Do You Need D/CET?
Frank Foti thinks he has a better mousetrap. Harris disagrees. Two commentaries, inside.

Live Assist & Automation
In this issue: Nine User Reports, dozens of new products.
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Radio World®
The Newspaper for Radio Managers and Engineers
July 8, 1998

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Galaxy IV Leaves Questions

by Mark Croom

GREENWICH, Conn. Broadcasters affected by the recent failure of the Galaxy IV satellite are looking ahead, trying to figure out how to be better prepared for any future outages. Besides the immediate problems related to filling silent audio channels, station managers and engineers received a jolt when they found that they had to implement backup plans and do without technology they have come to depend on for information, program audio and communications services.

When the outage occurred, engineers secured phone lines and alternative distribution channels while they tried to replace lost capacity. As plans are laid, radio networks are weighing the high cost of additional satellite space against cheaper wired alternatives and the cost of lost airtime.

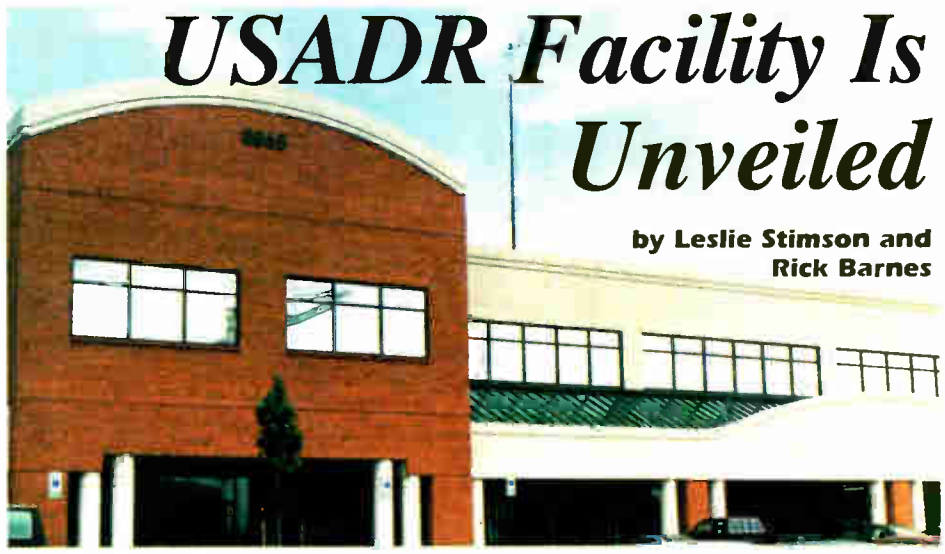
What happened

It was late afternoon on May 19 when Galaxy IV began turning away from the Earth, after onboard computers used to keep the satellite aimed at the planet stopped working. Dan Marcus, vice president of corporate communications for PanAmSat, the owner of Galaxy IV, said the real difficulty came when the automatic backup system failed as well. The satellite could no longer keep its antennas aligned with Earth, and 90 uplink users lost their service. Marcus said that engineers began work immediately to figure

See GALAXY, page 3 ▶

USADR Facility Is Unveiled

by Leslie Stimson and Rick Barnes



COLUMBIA, Md. The technical team developing in-band, on-channel digital audio broadcasting systems for USA Digital Radio is working in new facilities, designed specifically for its gargantuan — and potentially history-making — task.

The new facility is approximately 12,000 square feet, about four times the size of the previous location in Linthicum, Md. Both locations are between Washington and Baltimore.

USADR DAB Systems Manager Rick Martinson said the facility will enable researchers to do a better job of testing prototype AM and FM DAB systems. Also, the new facility is 300 feet higher than the old.

"The previous building was down in a valley, and that was not good for transmitting FM," he said. Martinson also said the former location was close to Baltimore-Washington International Airport — not an ideal neighbor for a facility that conducts RF testing and uses temporary antenna masts.

A single-bay transmit antenna is installed on the roof of the new facility,

See USADR, page 19 ▶

NEWSWATCH

Regulatory Fees Set

WASHINGTON The FCC has modified the regulatory fee schedule for FY 1998. The fees will now be based on station class and stations' city strength service contours instead of protected field strength signal contours. Last year, regulatory fees reflected a new calculation method. They were determined through a combination of station class and population served. Many fees for rural stations increased as, under last year's methodology, their contours intersected major metropolitan areas outside of their primary or secondary market areas. Stations serving higher populations pay higher fees. Stations may find out how much they owe by calling (888) 225-5322.

'Radio Free Berkeley' Silenced

SAN FRANCISCO After a legal battle that began in 1994, Stephen Dunifer's unlicensed "Free Radio Berkeley" is off the air — a blow for those who support the creation of a new class of low-power stations. The United States District Court for the Northern District of California granted the federal government a permanent injunction against Dunifer, preventing him from further broadcasts without first getting an FCC license. Dunifer said the FCC's licensing regulations were unconstitutional, and infringed on First Amendment rights of people too poor to buy a radio station.

Judge Claudia Wilken rejected Dunifer's arguments in her decision released last month. She said Dunifer lacked standing to challenge the FCC rules because he never applied for a license or a waiver from the rules so that he could transmit at low-power. In her decision, Wilken stated that the Supreme Court has found the FCC's licensing regulations to be constitutional. "The right of free speech does not include, however, the right to use the facilities of radio without a license."

NAB President and CEO Eddie Fritts called the decision "a great victory for those who play by the rules. The FCC deserves credit for putting Mr. Dunifer and other broadcast bandits out of business."

Dunifer released a statement through his attorney that said his legal team was studying the decision to determine whether to appeal and whether the court order would provide a vehicle to protect "the rights of the thousands of microbroadcasters currently on the air."

Index

Radio Looks to Another Galaxy

▶ GALAXY, continued from page 1

out what happened, but at the same time PanAmSat was working with its customers to get service restored on other satellites.

Ultimately, when engineers were unable to regain full control of Galaxy IV, they decided to replace it with their "in-orbit" spare, the C-band Galaxy VI. Customers on Galaxy VI were displaced while the satellite was moved from 74 degrees West to Galaxy IV's old home at 99 degrees. Marcus declined to say how many users of Galaxy VI were involved. He said most, but not all, of those customers were accommodated on other satellites in the PanAmSat fleet.

Marcus described the failure of Galaxy IV as unprecedented. "These spacecraft are built with lots of redundancy, and we consider the probability of having such a failure to be well under 1 percent in a five-year period," he said. Failures are rare because most satellites go immediately to a back-up system in the event of a problem, ensuring that most users experience little or no on-air glitches.

A number of broadcast networks were silenced by the Galaxy IV failure. It affected National Public Radio, which had been using C-band service, as well as a number of state news and sports networks, and some national networks including UPI.

Users other than radio stations also were affected. The Data Transmission Network of Omaha, Neb., which is used by stations for weather maps or business data services, was put out of commission. Subcarrier data feeds were interrupted, including feeds from Differential Corrections Inc. that many FM stations transmit on subcarriers.

Most noticeable to most Americans was the impact on the nation's pagers. That, too, took its toll in radio. Many engineers missed their pager signals, which meant they could not even get the message that their station groups were off the air.

Because Galaxy IV was a hybrid, containing C-band and Ku-band transponders, all the Ku customers had to be moved elsewhere. Most ended up on Galaxy III-R, a nearby satellite in the PanAmSat fleet. Dan Marcus said once the company made Galaxy III-R available to their users, networks began coming back on line within 12 hours. The larger paging and data networks had hundreds, and in some cases thousands, of station antennas to repoint before the networks were operating. For those users it was still several days before full operations could be restored.

Satellite users learned quickly about the details of satellite time guarantees.

Satellite users learned quickly about the details of satellite time guarantees. Customers can buy two types of satellite time, according to Dick Becvar, president of Skylight Corp., which buys satellite time for the skylight Radio Network. Non-preemptible time comes with a guarantee from the provider that there will be backup service available in the event of a "provider-caused" outage. Preemptible time is less expensive, and carries no back-up guarantees.

While waiting for service to be restored, some radio networks used phone lines to distribute programming. TRZ Communications Services of Akron, Ohio, a phone service provider, has a consumer sports product known as TEAMLINE. TRZ Chief Executive Officer Tom Zawistowski described the product as a "live play-by-play of professional and college sports on a pay-per-listen basis." Zawistowski said TRZ normally has at least 600 lines available for TEAMLINE feeds. When the outage occurred, some of those lines quickly were reconfigured for radio clients. About a dozen news and sports networks used phone line feeds acquired through TRZ.

Alan White, operations manager of Kentucky News Network, called TRZ. White said "we were wall-to-wall with political ads, so the impact of lost service would have been devastating." White said TRZ was able to set up the lines KNN needed "virtually within minutes," so the network missed only one evening newscast. "We faxed all 90 affiliates during the night, so they would all be able to call for the feed in the morning," said White.

Some networks, including UPI and NPR, were able to feed a number of clients through secondary distribution channels. United Broadcasting Networks, a talk network based in White Springs, Fla., and the SkyLight Radio Network, a Christian radio program service based in Roseville, Minn., used ISDN lines to link up with UPI to maintain hourly newscasts to their own affiliates.

Skylight Chief Engineer Mark Allard said, "We had a continuous ISDN call going with UPI for almost three days, and amazingly, it stayed up the whole time." NPR and UPI also arranged Internet feeds using RealAudio technology.

What will happen the next time a satellite falters? PanAmSat's Marcus said that while individual decisions must be made by the customer, the high cost of maintaining some type of alternative space segment must be weighed against the disadvantages of being down for a time. He stressed the overall reliability of satellite distribution. "Customer service is our number-one priority," Marcus said. "We didn't spend a lot of time analyzing what happened, but we began work almost immediately to take care of those customers whose service was lost."

Many smaller radio networks cannot afford backup service on another satellite, so terrestrial alternatives probably will be the answer to short-term failures. White of the Kentucky News Network had high praise for the service he received from TRZ.

"We might just use him on retainer for backup in the future," White said.

A few ISDN lines probably will continue to be used for emergencies, though cost quickly becomes prohibitive for more than a few lines.

Bird Failure Leaves Plenty of Questions

Public Radio System Must Replace Basic Capacity Much Sooner Than Planned

by Fred Krock

SAN FRANCISCO The loss of Galaxy IV will have a major impact on future National Public Radio satellite operations. NPR must face replacing basic capacity several years earlier than planned.

Galaxy IV was expected to last until some time between 2003 and 2005. Galaxy VI, which replaced Galaxy IV, is expected to last until some time between 1999 and 2000.

NPR operates the Public Radio Satellite System, which carries programming for about 420 downlink stations and another 200 repeater or associate stations that feed off those downlinks. Commercial radio customers also buy satellite time from PRSS.

NPR's agreement with satellite owner PanAmSat allows PRSS to remain on Galaxy VI until it dies or is replaced. Thus NPR now has no backup satellite.

NPR Vice President of Distribution Pete Loewenstein told attendees at the recent Public Radio Conference that NPR may have become complacent after almost 20 years of relatively failure-free satellite operation. He also admitted that communications were not as good as possible at the beginning of the failure, pointing to the need for "fire drills" in the future.

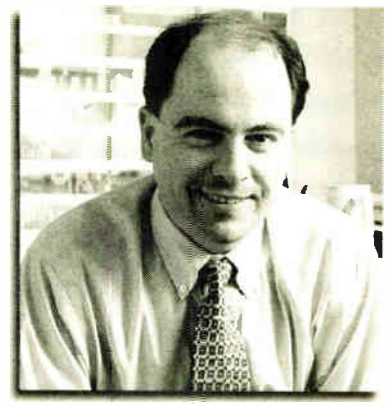
According to another NPR distribution official, NPR did have back-up plans in place for three scenarios: if one of the two satellite transponders failed, if both transponders failed, and in case the whole satellite failed. NPR officials said they could not implement the total failure plan until the satellite owner declared the satellite a loss, some 14 hours later.

This same official said that maintaining an alternative hot standby system would be very expensive and virtually impossible. Station capability

See PRC, page 17 ▶

Hmm, What's Different About You?

From the Editor



Paul J. McLane

When you pulled this issue of **RW** out of the mail box, you probably noticed something a bit different. This issue features a new look to the front page, designed to help you find the most interesting, newsworthy articles and columns at a glance.

Harris Power Station

Now, I'm not a big fan of making change simply for its own sake. **RW** is a familiar, even beloved part of our readers' lives. When we do make a change, even a cosmetic one, we think about it carefully first.

Readers have told us that each issue of **RW** contains numerous outstanding stories and other nuggets well worth reading. But those articles sometimes seemed buried. In fact, each issue of **RW** can contain between 25 and 50 stories, plus many smaller pieces of information, columns and reader letters.

Our earlier front-page design only allowed us to tell you about four or five stories. The new front page will help you find your way around the paper more quickly.

The staff of **Radio World** looked at the leading newspapers and trade publications in the United States, as well as our sister publications at IMAS, and selected the best ideas to help bring a fresh look to our front page. Our production department did a wonderful job.

★★★

Also in this issue, we rechristen the section of **RW** devoted to the business of running your radio station. The section now is called *GM Journal*. This is where you will find the best writers and features from our sister magazine *Tuned In*. In weeks to come, we will add even more useful business and financial content there. At the same time, we will continue to publish profiles of industry leaders, news stories about trends in programming and sales, and info about services available to your radio station.

Let me know what you think about these changes to your newspaper.

★★★

I keep in touch with many friends and colleagues from my days of selling broadcast equipment. From time to time, I ask around to find out what's new. If you want a quick read of the pulse of our business, or if you're looking to see what snazzy new gizmo is hot these days, the ladies and gents at the equipment suppliers can tell you.

For example, Dave Burns at Harris Corp. likes this neat little item: The Power Station, a personal power supply, which essentially is a rechargeable battery in a box. It provides a portable source of filtered 110 V, 60 Hz current. It has a standard three-pin AC duplex outlet on the front panel, and weighs 34 pounds.

"If you want to run a big sound system, forget it," Dave said. "But if you want to run talk show/dialup stuff, it will run 125 watts for two hours, or 10 watts for 25 hours. It has 250 watts continuous available." The Power Station contains a sealed lead-acid battery that can be charged overnight from a wall socket.

To quote the brochure: "Unlike a portable generator, it requires no fuel, makes no noise and emits no internal combustion fumes."

For info, call Steve Ellison at Harris, (765) 962-8596. Tell him you saw it here in **Radio World**.

Next time I'll pass along a tip from a different dealer. Suggestions are welcome.

In this issue you will notice a newly named management section and a fresh look to our front page.

A tip of the editorial hat to the Warner Electric Motors and Controls Division of Dana Corp. Its Bristol, Conn., facility just celebrated its 60th anniversary in June.

Known as Superior Electric until its purchase by Dana in 1989, the Bristol facility is a leading manufacturing site for the voltage regulators and variable voltage transformers that launched its business way back in 1938.

That year, according to the company, two friends, Alfred B. Nelson and Thor L. Hannon, launched The Superior Electric Co. in a crowded makeshift laboratory in Nelson's bedroom. Nelson had been a development engineer with General Radio Co.; Hannon was associated with Connecticut Light and Power. Their first product was the variable voltage transformer, later trademarked POWERSTAT. To this day, it remains a mainstay in the company's product mix.

Readers of **RW** know the company for its STABILINE Voltage Regulators. Units in its WHR Series are found widely in transmitter sites, studios and remote vehicles, where radio managers need smooth, reliable power. The facility also makes motion control components, stepper/servo motors and controls, AC synchronous and gear motors, and other specialized electronic controls.

Happy birthday, guys.

◆ READERS FORUM ◆

Letters received are the property of **RW**, and may be edited for space considerations.

Two promote, or not two promote ...

Dear **RW**,

Yet another *Promo Power* gem by Mark Lapidus in **Radio World**. Thanks for the helpful info.

I've got a dilemma here at WARM 106.9 in Seattle. Our midday personality is expecting twins this September and we were wondering what to do promotionally, if anything, for the upcoming event.

Anything come to mind, Mark?

Tom McCarthy
Announcer
KRWN(FM)
Seattle

Mark Lapidus responds:

Thank you, Tom! Man ... there's tons of stuff you can do with that. The most obvious that will get press is letting Mom do her airshift with the twins in the studio, maybe once a week for the first year. "Bring 'em to work Fridays," perhaps. I can see the TV cameras in there now.

Other items:

- *A Name the Twins contest*
- *Twin-Spin Tuesdays in their honor until the birth*
- *Two prizes instead of one during her show until the birth*

More than that, Tom, and you'll have to hire me as a consultant! But seriously, pick one or two ideas. This is one of things that can be overdone. Don't let listeners get sick of it.

Umbrella antenna error

Dear **RW**,

I would like to thank you for the opportunity to have the Umbrella antenna article published in the April 15 **Radio World** ("A New Radiator Design for AM"). I have received over two dozen phone calls of inquiry. It is nice to see such a high interest in AM.

However, Dr. Christman and I were taken aback by the errors introduced in the editing process. It is critical to us that what is published under our names be accurate and above reproach. The following is an outright misrepresentation that needs to be corrected.

Our paper states that designs have been completed for several areas of the country. The article states that stations in several areas of the country are using the design, which gives the incorrect impression that stations in addition to WPSP are actually broadcasting with the antenna.

We are concerned that the article, after going through editorial rewrite, does not accurately reflect the original content. A copy of the original text is available by contacting Communications Technologies Inc. at (609) 985-0077, fax (609) 985-8124 or e-mail *comti01@aol.com*

Clarence M. Beverage
President
Communications Technologies Inc.
Marlton, N.J.

RW regrets the error.

CAIG to the rescue

Dear **RW**,

I just read Steve Lampen's article in the May 13th, issue of **Radio World**, "More About Those X(LR) Files." Steve mentioned that patch panel manufacturers strongly suggest that no chemical cleaners be used, because some coated metals such as gold can literally be washed away.

Our product, ProGold, will not wash away the plated surface. ProGold was specifically formulated to condition, preserve and lubricate plated electrical connections. With regards to cleaning a jack with a gold-plated interior, we do not recommend reinserting the plug a few times. This will result in severely scratching the plating.

I welcome visitors to our Web site *www.caig.com* to review technical information on ProGold and other CAIG products.

Diane James
Sales representative
CAIG Laboratories Inc.
San Diego

This Is Just the Warm-Up

Radio stations and the FCC won a victory in June when a federal judge ruled against famous low-power radio guru Stephen Dunifer. But broadcasters and regulators should not allow themselves to slip into complacency.

The industry has been wondering for years how long Dunifer could get away with thumbing his nose at the federal system of licensing radio broadcasters. His "Free Radio Berkeley" in California has been a low-power rallying symbol, for pirates and for those who prefer to push for new services through proper channels. To radio owners, however, he is a troubling presence, operating on the fringe of the system, talking about corporate greed and limited access to the airwaves — access, he says, that only the *very rich* and *very few* enjoy. Simplistic as his arguments are, they hit a sensitive nerve, particularly in the wake of ownership deregulation.

He was able to stay on the air despite FCC efforts thanks to a four-year legal fight, during which time he also sold low-power equipment to others who were inspired by his example. Now a U.S. district court judge has rejected his arguments that federal laws fail to set standards for FCC action on licensing microbroadcasters. Judge Claudia Wilken said Dunifer was not entitled to challenge FCC rules because he had never applied for a license or a waiver in the first place. Wilken rejected Dunifer's claim that the FCC regulations are unconstitutional, finding the FCC rules meet constitutional standards.

But this victory fails to answer the broad First Amendment questions that pirates and microbroadcasters want to raise. Those people won't go away just because their patron saint suffered a legal setback — a technical one at that. And despite the government's clear interest in maintaining a system of effective spectrum management, free of interference, the long-term political winds have changed in recent years.

The FCC is taking comments right now on several proposed low-power radio services. In a few months, we should have a better sense of whether any is a serious contender.

Radio license holders are unwise if they do not plan now for the day when the FCC or the courts mandate a new class of low-power stations.

— RW

Mark hits the mark

Dear **RW**,

I read with great interest the April 29 article "Beyond The Basics: Get A Clue" and couldn't agree more with Mark Lapidus about the current condition of radio. Sadly, to a great degree, radio has become a sea of sameness and it doesn't have to be. Let's face it — as programmers, our plates are *always* full. Yet, the most important thing we can do with our time is to create compelling radio. It's up to us as programmers to lead, inspire and develop our airstaffs to become more than just liner card readers.

I'm always hearing about the perceived lack of air talent available. I ask, what has your station done lately to connect with your listeners? Creative liner cards of the '70s, '80s and today? I, for one, did not get into radio to be known as "that guy who reads liner cards for a living."

Liner cards do have a place, but they should not replace talent. Great radio stations understand the importance of the "human" element to capture the moment and bond with listeners. Sure, we're all busy as programmers and are more than used to putting in "radio hours," but remember — we program the computers, they shouldn't be programming us. It's what comes out of the speakers that counts (and puts quarter hours on the radio station!). You've got to sound "real."

I feel fortunate to have caught the tail end of the "Golden Age of AM Music Radio." What an array of stations and talent styles to DX, listen to and pattern yourself after. Mind you, I'm not for living solely in the past but there are valuable lessons to be learned from those days. Have fun, be creative, have the discipline to take the time and work with your airstaffs, encourage them to stretch and be more than just generic jocks.

I think Larry King probably sums it up best: "To have listeners interested in you, you must be interesting to them!" With all of the distractions available to our potential listenership, we can't afford to do anything less. Mark has hit the mark! I hope his words inspire others to be known for radio's truest sense: the art of communication.

Bill Shannon
Program Director
WRQN(FM)
Toledo, Ohio

Write to Us

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Correction

In the Marketplace section on page 70 of our June 10 issue, contact information for Panduit was incorrect. The phone number is (708) 532-1800.

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GUEST COMMENTARY

D/CET: What Is It, and Why?

A Well-Known Processing Guru Argues for 'Digital Composite Enabling Technology'

by Frank Foti

The author is president of radio equipment manufacturer Cutting Edge. For another viewpoint, see page 8.

There has been a tremendous amount of excitement made over the first generation of digital FM exciters. Theoretical performance of RF generation, and modulation without an AFC circuit is possible, along with stability that is second to none! Unfortunately a problem plagues the modulation capability of these exciters: overshoots that occur whenever the AES/EBU input is used.

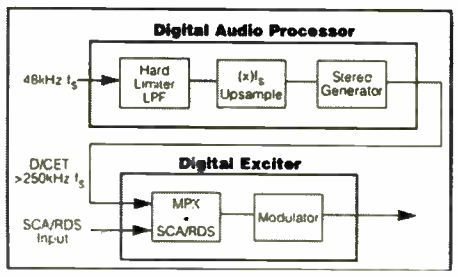
Some radio engineers say this problem reminds them of early attempts in the mid-1970s at more aggressive audio processing. Then, the problem dealt with the nonlinear characteristics of the 15 kHz low-pass filters that were employed in the stereo generator section of older exciters. For different reasons, the same problem can haunt digital exciters of today.

Following is a recap of an innovative, yet practical approach to a problem that was detailed in a recent NAB '98 technical presentation. Many engineers approached me after the presentation to acknowledge that the problem existed in their facilities, pleased that someone was able to confirm and explain why it occurs.

Major advance

The quest for the all-digital transmission path has taken a major step forward with the introduction of D/CET from Cutting Edge, a manufacturer of digital audio processing products. D/CET, Digital Composite Enabling Technology, is an advanced method of connectivity that allows the stereo multiplex generator of a digital audio processor to be coupled directly to the modulator in a digital exciter to yield improved modulation efficiency and sonic performance. This is equivalent to the tried-and-true analog BNC connection using the composite output of the audio processor and the wideband multiplexed input of an analog exciter.

This D/CET interconnection method is



an advance over the conventional practice of coupling the processor and exciter by way of an AES/EBU connection. The latter technique precludes the use of the processor's own multiplex generator, because the discrete Left/Right audio channels are placed in an AES/EBU data stream. The exciter must, therefore, perform the multiplex function. Unfortunately, numerous problems can develop if this topology is used, problems that adversely affect modulation efficiency (hence, loudness) and audio quality.

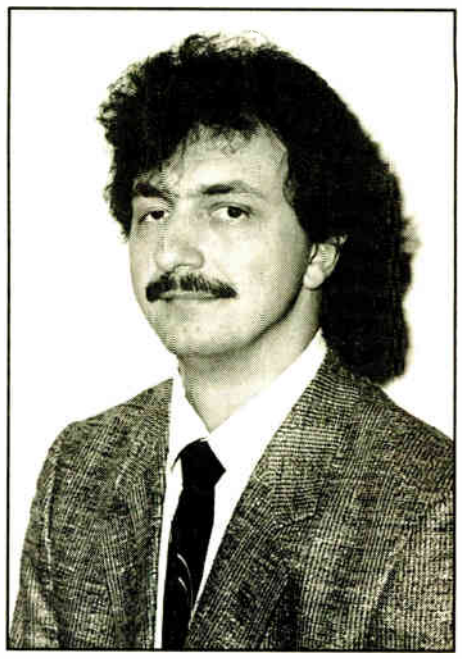
First, in the case where a digital audio processor and digital exciter operate with different sampling rates, the exciter must transform the sampling rate; this transformation can cause modulation overshoots, which can, in principle, be removed in some exciters that include a clipper stage. Unfortunately, additional limiting/clipping can degrade audio performance by adding distortion. If such a clipper is not available, then total modulation will suffer, as the drive must be reduced to accommodate the overshoots.

Second, the culprit that causes overshoots is something known as the Sample Rate Converter, or SRC. This is a digital hardware component that does the sample rate translation. Incorporated into the SRC is a digital low-pass filter. This low-pass filter must be included in the sample rate process, or aliasing products will result. In the case where a 48 kHz sampled system is transformed down to a 32 kHz rate, this low-pass filter must be set to 16 kHz, which is the Nyquist frequency of the new desired rate.

The incoming digital audio, operating at the 48 kHz rate, may contain some nonlinear energy that is beyond 16 kHz. As this nonlinear energy is passed through the 16 kHz low-pass filter in the SRC, it overshoots, thus the problem. There is further detailed description of this problem in the technical paper titled "Critical Issues and Considerations for an All-Digital Transmission Path." The paper can also be viewed at Web site *www.nogrunge.com*

More problems

Third, considering that most digital processors use some form of up-sampling to perform the hard-limiting function, there must be additional sample rate conversions in order to get the signal into the AES/EBU format. After being up/down-sampled, it will then be further up-sampled in the exciter when performing the multiplex function. The multiplex signal, with a bandwidth of at least 53 kHz, must have a Nyquist frequency that is at least 106 kHz. In practice, most exciters up-sample the multiplex to approximately 250 kHz or greater. Each of these up/down conversions requires further low-pass filtering to protect against aliasing. These filters cause two undesirable



Frank Foti

side-effects: overshoots and added propagation delay.

Fourth, another important issue relates to the ability of the audio processor to be "system-locked" onto the exciter. It appears that the first generation of digital exciters uses the SRC as a means to "buffer" the system sampling rate of the processor to the exciter. This is fine, as long as there is a PLL located in the exciter so that the incoming sampling rate from the processor can be locked onto the sampling rate of the exciter. If this does not occur, overshoots can also result, even if the incoming sampling rate is the same as the system rate of the exciter.

Fifth, it is a known and accepted practice in FM broadcasting to employ "composite clipping" (processing in the multiplex domain), which is unavailable in existing digital exciters.

Answers

D/CET eliminates these problems completely. The following benefits can be achieved by this innovative development:

• The exact peak levels developed by the multiplex generator are modulated at that exact level. There is no overshoot due to sample rate converters or from lost peak control due to multiple sample rate conversions.

• The audio processor is operated as a "slave" off the master clock system in the exciter. This assures that both systems are locked onto one another, which further produces "bit-for-bit" transparency.

• Once the audio is in the digital audio processor, it is processed at the sampling rate needed for the particular audio processing function being performed. For example, all AGC and dynamic limiting can occur at the normalized sampling rate of the processor. Then, as the rate needs to be progressively increased for hard-limiting and stereo multiplex generation (in that order), the signal is up-converted by an appropriate amount, but scaled, so that, at the output of the multiplex generator, the sampling rate is at that rate required by the modulator section of the digital exciter. Up-converting does not generate overshoots. Gone is the "Sampling Rate Roller Coaster," as all of the multiple up/down conversions are eliminated!

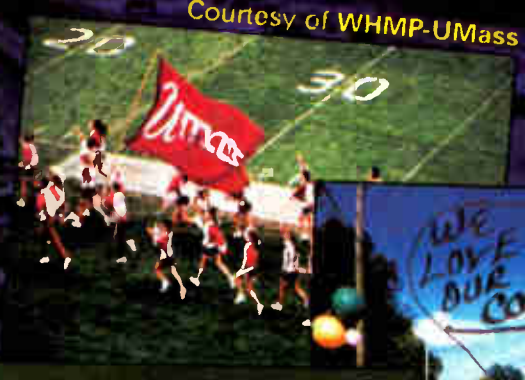
• Composite clipping can occur in the

See FOTI, page 12 ▶

Hit the Road

Remote broadcasts have never been easier!

Sometimes it's impractical to install a special circuit like ISDN for a one-time remote, and often your RPU just won't make it. However, a plain telephone line is usually available and the HotLine delivers up to 10 kHz, two-way audio, on just one dial-up line. Want to sound great from anywhere, anytime? Hit the road with a Comrex HotLine.



Courtesy of WHMP-UMass

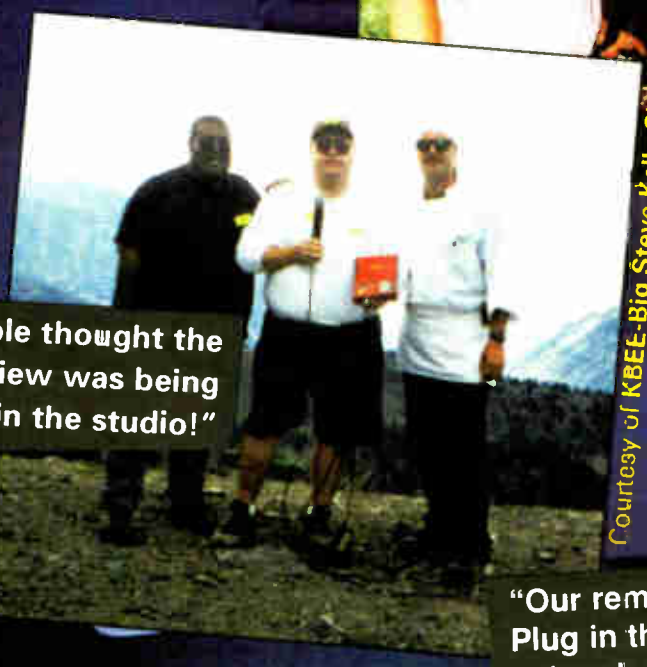
Courtesy of WEKS-The Bear

"I didn't have to do my usual routine of pulling a muscle contorting my radio antenna to avoid (RPU) interference."

Courtesy of KTNN

Courtesy of Middleburg Broadcasting Network

"The HotLine helped them sell 60 (cars). They could not believe the clear signal from 252 miles away!"



Courtesy of KBEE-Big Steve Kelly Show

"People thought the interview was being done in the studio!"

Courtesy of Jason Gant — Ask the Computer Doctor Show

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GUEST COMMENTARY

Harris Replies to D/CET Proposal

Company Does Not Support a Proposed Digital Multiplex Interface Standard

by Edwin Twitchell and Richard Fry

The authors are employed by Harris Corp. Edwin Twitchell is principal engineer for the DIGIT exciter; Richard Fry is FM sales application engineer.

A technical paper presented at the NAB'98 convention by Frank Foti of Cutting Edge Technologies proposed a new standard for connection of a digital FM audio processor directly to the digital modulator of a digital FM exciter (see page 6).

The stated goal of the standard is to provide improved system performance by correcting peak overshoots that were noted by Cutting Edge when connecting their Omnia.fm Processor to the AES/EBU (AES3) input of a standard Harris DIGIT CD Digital FM Exciter. Their paper was supported by a demonstration in the Cutting Edge NAB booth of an Omni.fm Processor feeding the digital modulator of a Harris DIGIT CD Digital FM Exciter that was modified by Cutting Edge.

Tighter and louder?

The convention listening comparison as engineered by Cutting Edge, without the involvement of Harris engineering, claimed to prove that this new interface standard provided tighter control of overshoots while being noticeably louder than the AES3 input path.

The Cutting Edge demonstration allowed the listener to switch between the AES3 input of the DIGIT CD and the digital composite interface modification to the DIGIT CD.

Harris believes that listeners may have heard a difference between the two modes because the Cutting Edge modification to the DIGIT CD allowed part of their digital composite baseband to mix with the DIGIT CD's internal stereo generator when listening in the AES3 mode. This is because the point where Cutting Edge injected the Omnia's digital composite signal is always active regardless of the operating mode selected, which would cause the listener to hear two stereo signals mixed together in the AES3 listening mode, thereby making this listening comparison invalid.

Cutting Edge, however, concluded that the main reasons for the difference in sound were due, first, to use of an inappropriate data sampling rate (32 kHz) in many current digital FM audio processors and digital STLs; and, second, to overshoots resulting from sample rate conversions within digital audio processors and within the Digital Input Module of the Harris DIGIT CD FM Exciter.

Cutting Edge believes that using a digital composite interface from the Omnia.fm processor to a location inside the Harris DIGIT CD is a remedy for basic design deficiencies in present-day equipment, and allows better overall performance.

Different viewpoint

There are three ways that overshoots can occur in a digital system, which may be outlined as follows.

1) Unquantized Intra-sample Peaks In any discrete system the signal can be represented only at specific intervals of time, called sample times. What happens between the sample times is undefined but can be determined only by resampling or interpolation.

It must be understood that these peaks are really present, but because a sampled system cannot represent every point of the signal, the peaks may be missed. For example, let's compare a 15 kHz sinewave sampled at 32 kHz and at 48 kHz. We assume that the quantization of the sinewave is done in such a way that the sinusoidal peaks are not sampled, but are located precisely half-way between two sample times.

Eq. 1 $F(nT) = A\cos(2\pi nT/T_0 + \theta)$

(A = Peak, T = sample period, T_0 = 1/15 kHz

Eq. 2 $F(0) = A\cos(\theta)$

(Sampling at time = 0)

Figure 1

Equation 1, shown in Figure 1, identifies the general equation for a sampled sinusoid. Equation 2 identifies a specific sample at time = 0. If θ is set to 0, then the sampling process generates the actual peak of the sinewave (peak = A). But if the phase offset is worst case relative to the sample time, namely $\pi T/T_0$, then the quantized peak is much less than the actual peak, A. For a 32kHz sample rate ($\theta = 15\pi/32$), the peak is almost entirely missed, and the sample generated is 0.098A (or less than 10 percent of actual peak value). It is clear that many more samples are needed for high accuracy. The faster sample rate of 48 kHz is better, but still produces a rather large error of just over one-half the actual peak value.

What this means is that the actual values of the 48kHz sampled waveform can be up to 5 dB less than the actual peaks. When the digital signal is eventually converted to FM, these original peak values will be present. Again, these peaks were inherent in the original sampled system (in this case, the audio processor). But because the peaks do not show up until after later digital processes, their cause can be attributed incorrectly.

2) Excess Audio Bandwidth and Filters In any discretely sampled digital system, careful attention must be given to ensure that alias artifacts generated in the sampling or re-sampling process do not distort the audio signal. This can be handled in two ways.

Either the sample frequency is chosen to be sufficiently high such that no frequency component in the audio signal exceeds the Nyquist frequency (one-half the sampling frequency), or the frequency content of the audio signal itself must be low-pass filtered at or below the Nyquist frequency. Typically, a digital low-pass filter is used when frequency content of the input signal is uncontrolled or unknown.

The audio bandwidth defined for stereo FM broadcast is restricted to 15 kHz in order to keep the upper end of the L+R channel and the lower end of the L-R channel from overlapping and causing interference to the pilot tone. Because there are many different types of audio sources that may provide AES3 audio data to the DIGIT, the safest approach to avoid aliasing is to apply a digital low-pass filter before further composite signal processing in the digital stereo generator.

Although this provides adequate alias protection, it can produce undesired peak modulation overshoots if the audio input frequency content (spectrum) exceeds the filter cutoff frequency. This is because spectral energy is conserved in a linear process. The energy outside of the filter cutoff frequency will increase the peak modulation and appear as overshoot. The amount of excess modulation is proportional to the amount of spectral energy extending beyond the low-pass filter cutoff frequency.

Energy transfer

As an example, if a simple hard limiter were used for peak limiting, it would generate odd-order harmonics of the signal. The hard-limited signal bandwidth would certainly exceed the bandwidth of the original signal. If the limited signal were then fed through a low-pass filter whose cutoff frequency was equal to the original signal bandwidth, the effect of the filter would be to undo or reverse all or most of the gains of the hard limiting function — the peaks would be restored. This is because all or most of the energy in the limiting function was transferred to frequencies outside of the filter's cutoff frequency.

Or put another way, the low-pass filter cutoff frequency must exceed the highest frequency component of the signal to ensure no peak overshoots. If this frequency exceeds the Nyquist frequency, then aliasing will occur. There is a trade-off between unwanted alias distortion and peak overshoots if the audio processor does not properly contain the spectral content within the expected 15 kHz audio bandwidth.

3) Filter Response If a filter does not have a flat frequency response, then signal peaks can increase. This is rather obvious, but is still important if tightly controlled peaks are critical. What it really means is that certain frequency components will be increased while others are reduced depending on their frequency. This is a matter of system performance for both the audio processor and stereo generator. Typically, this type of peak response variation within the filter passband is less than a tenth of a dB and is not as significant as the problems related to excess audio bandwidth beyond the low-pass filter cutoff frequency previously discussed.

What's better?

To analyze the claims made by Cutting Edge:

1) Is a 48 kHz sampling rate better than a 32 kHz sampling rate? As far as the DIGIT is concerned, neither is better and neither rate will cause overshoots as long as the bandwidth of the audio signal (AES3 input) is tightly controlled to no greater than 15 kHz.

The Cutting Edge Omnia.fm processor may produce unacceptable overshoots when connected to the AES3 input of a DIGIT because the Omnia processor uses a sampling rate of 48 kHz and filtering, which does not restrict the spectral energy to 15 kHz as required by the stereo generator. The philosophy used to design the DIGIT was to protect the pilot and SCAs from contamination and audible distortion caused by aliasing of high-frequency components in the digital audio inputs. This is accomplished with 15 kHz, phase linear, digital low-pass filters on the digital audio inputs.

2) Do sample rate conversions cause overshoots? The claim that repeated sample rate conversions damage the AES3 signal is technically incorrect because it addresses a symptom rather than the problem. The root of the problem is that spectral energy in the audio source is being allowed to exceed the required 15 kHz bandwidth limitation for stereo which in turn exceeds the cutoff frequency of the rate conversion filters that follow it.

The FM stereo broadcast system requires that the maximum stereo audio frequency is limited to 15 kHz to prevent aliasing between L+R, L-R, and the 19 kHz pilot tone. Any rate conversion at 32 kHz or above will not cause overshoots with a 15 kHz bandlimited signal, but audio inputs exceeding 15 kHz and not meeting this requirement will result in overshoots.

Objections

Practical considerations relative to the Cutting Edge interface solution are summarized as follows.

- Direct connection of the Omnia.fm Processor to the DIGIT FM Exciter requires physical modifications to the exciter Digital Input Module to provide a reference clock to the external Omnia processor, and to bypass the DSP stereo generator and Digital Composite Limiter (DCL) functions within the Digital Input Module. This modification involves removing circuitry and attaching wires to the circuit board where there are no accommodating connection points or connectors for mechanical stability. Modification of this SMT board is unreliable and voids the warranty.
- There are multiple timing and operational considerations that have not been fully tested relative to this interface. The electrical performance specifications and correct operation of the exciter cannot be guaranteed.
- The FCC type notification is no longer valid.
- The direct connection of the Omnia.fm processor requires the FM processor to be located only at the transmitter site,

See HARRIS, page 15 ▶

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ARMA Sets Forth Its Show Goals

ATLANTIC CITY, N.J. *The American Radio Manufacturers Association believes radio needs a better way to bring equipment exhibits to broadcasters. ARMA formed a board of directors and steering committee during the group's first show in Atlantic City, N.J. Members Elaine Jones and François Robitaille, Davicom Technologies; Vince Fiola, Studio Technology and John Davis, MediaTouch spoke with* ***RW*** *Editor Paul J. McLane.*

John George of Audio Broadcast Group works the ENCO booth.

RW: What is the steering committee doing now?

Jones: Basically setting up the structure of ARMA, putting together our list of objectives. We (want to) have another ARMA-based exhibition, co-located with some venue. We are not sure what venue yet, but in seven to eight months, January or February 1999, will be our next targeted show.

We are looking for venues to co-locate with, people who are doing management or technical seminars and would like to have the strength of a good, solid exhibition behind them for the radio industry. ...We see it as a means of strengthening somebody else's show, rather than going in competition with someone. One of the charters (of) ARMA is to consolidate shows, as opposed to creating more shows.

Robitaille: We also don't want it interpreted as trying to do away with people's shows. It's not like we, as a group of manufacturers, are coming together because all we want to do is five shows a year and to hell with all those other shows.

RW: How do you define the mission of your organization? Is it show driven?

Fiola: For now, it is. For manufacturers, that is how we get our product out in front of our customers.

Davis: At this point we are not interested in being a lobbying group or a quasi-lobbying group.

Davis: We just want to do exhibitions.

Jones: One of the strongest ways we can further the cause of radio and promote radio technology is to get together and provide a strong exhibition for some of these smaller shows that don't necessarily have the draw to bring people in, and to create a reason to attend the show other than management sessions.

We want to provide a voice for radio for the manufacturers, and make sure that radio broadcasters are being kept up to speed with the current technology.

A sad fact of life is that a lot of the radio stations simply don't have the budget to go to the big shows.

No NAB bashing

RW: Manufacturers tend not to use smaller shows to introduce big technology. Do you see any resistance from people who might want to come to shows, but say, "Yeah, but to see the <u>new</u> stuff I still have to go to NAB"?

Davis: We are not saying, "Don't go to NAB." For my company, we are not saying that we are not going to NAB anymore. By all means, we are going to be there in the spring, and we are going to be there in the fall. ... I feel that there are so many people out there who would like to go to NAB, but can't afford it, and therefore, never get a chance to see my stuff.

Jones: With consolidation, the groups aren't sending as many people to the shows from all of their own stations, as used to attend when stations were owned by private individuals. It is a matter of economics for the large groups.

Somebody who used to go to the NAB and had it completely paid for, now if he wants to go to the NAB, he has to do it out of his own pocket, possibly even take vacation time. ... But they still want to see the technology, and we want to provide this on a regional basis.

RW: Before this show, the ARMA people said they would be willing to cooperate with NAB. Has ARMA approached NAB?

Jones: I don't see that we have the power to do that right now, and we may never have that power. The people that are on the board right now with ARMA have got very good relationships with the NAB exhibit staff. ...

Every single member of ARMA will tell you that NAB is the most crucial show of the year, and that will not change. We are absolutely not going to pull out of NAB for any reason. What we do want to do is further the cause of radio and I am sure that we will be talking as a group to the NAB about ways to make radio more visible in the hub of the Las Vegas venue.

RW: Is there a particular Canadian angle or view on this problem, something different that companies north of the border bring to the table?

Robitaille: Well, not really. As a Canadian manufacturer, I always attended the NAB and the NAB Radio Show, and smaller stations don't have a chance to see my product. They don't come to NAB or the larger shows.

We do have Canadian Broadcasting, we do have the NAB, the NAB Radio Show, the Canadian Wireless — almost multiplied by two, the number of shows. So consolidation of the shows and possibilities for these people to see the products that we have to offer is another opportunity.

Cooperation a goal

RW: Have you talked, as an organization, with any of the groups that already sponsor regional shows? Will some of them be leery of change in the landscape and how they interact with this group of manufacturers?

Jones: We don't want to say, "Here we are, a group of powerful radio manufacturers, you will bow to us." What we want to say is, "We are giving you an opportunity to bring in a solid group of exhibitors. We have got an association that would dearly love to come to these regional shows and show our wares and basically to strengthen what you have to offer."...

RW: There are more regional events than you can coordinate with ARMA. Aren't you going to be forced into a rotational schedule? Regional show sponsors may see this plan as taking away from their goal of having exhibitors every year. They may prefer to fight it out every year for your business and booths, rather than have ARMA only once every four or five years.

Jones: Yes and no. A lot of these regional shows we attend with our dealers anyway, and a show like ARMA, where we actually come in and have our own exhibit, is something that currently really doesn't exist. Some of the manufacturers may go to some of the little shows like the Texas show or the Wisconsin show or whatever, but they don't have as big of a presence. So we're not saying we are going to disappear from these venues, but when we do co-locate with them, we will have a larger presence.

Davis: I don't think they are going to be polling anybody and saying, "If you are part of this group, you can only exhibit

See ARMA, page 11 ▶

Walden Keynotes at ARMA

The featured speaker at the first ARMA convention was Glynn Walden, vice president of engineering for CBS Radio and USA Digital Radio. He updated USADR's research into in-band, on-channel digital audio broadcasting. Highlights of his remarks:

New IBOC competitors

New competitors are on the marketplace, but they're years behind USA Digital Radio. They're talking about doing demonstrations. We did demonstrations back in 1993 for the AM system, and in 1995 for the FM system. ... The signal traveled not just around the block, but 35 or 40 miles, and the new systems we have today are far advanced over those. ...

The entire knowledge base of IBOC rests in our library, and in the heads of the people who are working at the USADR facility in Columbia, Maryland. ... There are other people who know pieces of this, but we wrote the entire book on IBOC.

Satellite radio:

That's a concern to broadcasters. The broadcasters jokingly call it, behind the scenes, "The Death Star." ... (Satellite radio broadcasters) claim they're going to do it with subscription, but they're already talking 50 channels of advertiser-supported talk radio. ... That means there will be 50 new competitors (in every U.S. radio market). Broadcasters are going to be at a severe disadvantage if they don't have digital to compete.

Benefits of IBOC for radio:

To date, (based on) the proposals of the IBOC system proponents, the data channel is the most robust, the *only* mobile robust data channel of any capacity into a car, or into your laptop or wherever. Most of the other digital services, such as HDTV, are limited to fixed services with antennas pointed directly at the ... stations.

IBOC brings broadcasters the ability to control the process ...

A futurist would say, "It's apparent that you're going to want to turn off that analog at some point." As a broadcaster, it's difficult for me to totally buy into the concept. I can see it, but I can never imagine turning off that analog.

We're never going to see a five-dollar clock radio in digital. It isn't going to happen.

Broadcasters get to make the transition inexpensively, they get to gain new revenue streams and they get to maintain their investments in their radio facilities.

Low-power radio proposals

I have to take off my CBS hat here. ... As Glynn Walden, an engineer, I am absolutely committed to preserving the allocation standard the FCC has, because if we throw away the standards we have nothing. We can see this is very true in AM radio, where the FCC erred on the side of quantity vs. quality. We have an AM system that is really in trouble because there is too much interference. ...

I hope they don't make the same mistake again. If you're going to put on a million one-watt, low-power radio stations, I don't have as big a problem with that as I do a guy who wants to come on with a 2 kW radio station, because he's going to cause interference and a lot of interference to IBOC.

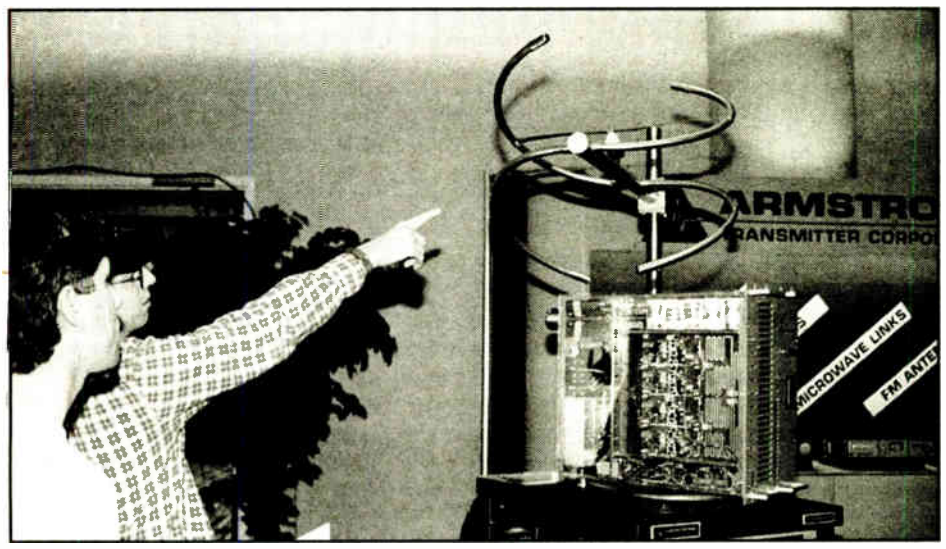
▶ ARMA, continued from page 10

with us." It's like, "Do your business the way you think you need to do your business best." We just want to provide an opportunity for the manufacturers to say, "Okay, I have a limited budget this year. I need to scale down. Here is a way to scale down."

RW: Is there a membership cost for somebody who wants to be in ARMA right now? And how many members are there?

Fiola: Dues were set at $500 a year. They (must) have a manufacturing facility in North America — Canada, U.S., Mexico. ... They need to manufacture products for the radio industry.

Jones: Our initial membership looks like it is going to be about 25 companies.



James Donchez, left, and John Palumbo visit Armstrong Transmitter.

However, we will be promoting this. We would like to see a solid membership of 50 to 60 companies next year.

Fiola: The regional issue of going here or there may not fit for every one of those 50 or 60 companies' schedules. So it may be a 30-exhibit show at a regional location.

Dealers and lobbying

RW: Part of the broadcast equipment and service marketplace is the dealer network. There doesn't seem to be a place for the dealers in this organization.

Jones: The dealers are invited to join us in the exhibitions, and we are establishing associate membership for companies like that to join ARMA. ... Although this is primarily a manufacturers' organization, we all recognize that dealers are a critical part of the selling process throughout North America, and definitely want to keep their involvement.

Davis: Our primary dealers are here today. I would be dead without them. My sales force.

RW: A group like this has potential in other ways, such as standards-setting among equipment manufacturers. For example, how does the industry handle DAB proponents when they suddenly tell us that they have a system but that it assumes certain parameters and licensing fees?

Jones: Lobbying, standards settings, things like that are not on our agenda right now. What we want to do is just get the association established. As the association grows, we will be in a better position to have committees for standard setting or pushing for the cause of radio and radio manufacturers.

Robitaille: Before we start doing any kind of lobbying we have to have some sort of credibility established. I don't think that with 25 manufacturers as a membership we have really the right or the power to pretend that we can negotiate standards.

RW: How many shows a year can you attend in the ideal scenario?

Jones: We would like to get somewhere between five and seven shows, because that would allow us to cover the different regions. You have to basically break the country into quadrants. We will be paying close attention to where the major shows are located and attempt to co-locate with other shows in some smaller regions that are not going to be served by the larger shows. ...

Another reason for ARMA, and one of the strengths that we can offer to the smaller shows, is that there is synergy even among the competitors for showing at the same venue. ... The more companies we can get to support us and come to some of these regional shows, the stronger radio's presence is going to be throughout the country.

Turnout

RW: Attendance at this first event has been modest.

Fiola: Actually, I think this show is a fabulous success because of the response from the manufacturers. Attendance *is* down, or modest. I would like to have seen 500, 600 people here, but the 25 manufacturers that are here attended the organization meeting. ... There is not a lot of dissension. There was not a lot of foot stomping. ... The success of this show can't be measured in the attendance. It is really that the 25 groups got together and decided that this is where it should go, and that was the success.

Jones: It also shows that this organization can pull off a show, a very nice show at that. We have modest attendance because we just didn't have time to get the word out properly, but we didn't want to go too far into the summer because it is impossible to get good attendance at trade shows in July and August.

RW: Organizationally it is going to take somebody a lot of time before every show, no matter how up-to-speed you are. Are you going to have a paid staff?

Jones: We are going to have a paid administrative person to coordinate putting these shows together. That is one of the reasons for the $500 membership fee. We need to pay this person and take care of legal fees. We are not in this to make a lot of money. The fees are intended to cover administrative and legal costs for this nonprofit organization.

These companies exhibited at the ARMA 1998 Spring Equipment & Technology Expo in Atlantic City, N.J.

Armstrong Transmitter
Belar Electronics Lab
Broadcast Electronics
Burk Technology
Davicom Technologies
Dielectric Communications
ENCO Systems/Audio Broadcast Group
Energy-Onix
Fidelipac
Gentner Communications
Gorman Redlich Mfg.
Logitek Electronics Systems
MediaTouch
Phasetek
Potomac Instruments
Prophet Systems
QEI
Radio Computing Services
Radio Systems
Scott Studios
Solid Electronics Laboratories
Studio Technology
Systems With Reliability SWR

*Is ARMA heading in the right direction? Send your comments to **RW** at* radioworld@imaspub.com *or write to the address on page 5.*

D/CET: Is It a Better Way?

▶ FOTI, continued from page 6

audio processor, along with linear low-pass filtering that will increase loudness by eliminating modulation of spurious harmonics in the upper composite spectrum above 53 kHz. The combination allows composite clipping to occur without exaggerated multipath distortion that can occur with conventional composite clipping. Additionally, there is protection of the environment for SCA and RDS services.

• System propagation delay is reduced as compared to an AES/EBU connection because all of the required filters for up/down conversion are eliminated.

The D/CET link consists of a bi-directional fiber optic link. All of the information needed to carry and recover the digital FM composite signal is carried in one direction. Sync and framing bits are added to the digital composite multiplex signal before being sent down the fiber-optic link. A master clock timebase is sent in the other direction, from the digital exciter to the digital processor. Having the digital FM composite multiplex signal generated using the timebase of the exciter avoids the need for an undesirable sample rate conversion of the digital FM composite signal.

This method is an advance over coupling the processor and exciter through an AES/EBU connection.

Don't be fooled by counter-claims that the existing AES/EBU method is sufficient. The following description of the NAB '98 prototype demonstration emphatically proved otherwise. The proof is in the listening, and the ears don't lie!

NAB '98 demo

The D/CET demonstration conducted at the Cutting Edge booth consisted of a prototype electrical, rather than optical, D/CET interconnection between a modified Omnia.fm all-digital audio processor and a Harris Digit digital exciter. Data, sample rate and clock signals were conveyed from the Omnia.fm to the Digit. The Omnia.fm was slaved to the Digit's clock. In addition, a conventional AES/EBU connection was also made, and a switch enabled listeners to choose between the AES/EBU signal path and the D/CET signal path. The output of the Digit was fed to a dummy load, from which an RF sample was fed to a consumer FM receiver.

It was readily apparent that the D/CET signal path afforded noticeably tighter control of overshoots (as observed on the Digit's front-panel modulation bargraph meter), while being noticeably louder than the AES/EBU signal path. In addition, the audio also was more "transparent," sounding more true to the original programming. For reference, a separate switch allowed the listener to hear the CD output or the analog output of the Omnia.

D/CET hardware

To complement the state-of-the-art all-digital signal processing, the proposed D/CET interface uses a digital fiber-optic link consisting of industry-standard, proven, off-the-shelf, fiber-optic components designed for industrial data applications. This has several advantages.

Fiber cable runs up to 500 meters allow the digital audio processor to reside in the same rack as the digital exciter, in the next room, or in an adjacent building.

Total immunity from RFI allows more freedom in locating equipment without concern for the effects of high RFI levels.

Total immunity from EMI means the D/CET link may be routed in the plant with AC power mains, system power cable or other cable runs traditionally "off limits" to data or signal cables. Total galvanic isolation means runs between buildings are straightforward without grounding or lightning protection concerns.

Summary

D/CET provides the tightest coupling of an audio processor and FM exciter ever, creating a synergy whose performance approaches theoretical perfection. Sonic transparency and loudness are improved significantly, and system noise drops to the limits of the DSP components employed.

These improvements indicate that both digital processing and transmission methods can advance the state of the art in broadcasting. But simply stringing digital components together in a broadcast chain without due consideration for the interaction among components cannot unlock the promise of digital audio technology. D/CET, innovated by Cutting Edge, provides a significantly improved interconnection method that truly does digital justice.

■ ■ ■

Frank Foti is president of Cutting Edge. Reach him at (216) 241-3343 or via e-mail to frank@zephyr.com

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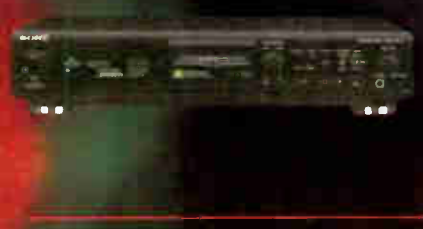

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Circle (191) On Reader Service Card

FM Seeks Class C0

by Leslie Stimson

WASHINGTON The FCC proposes to make several important changes to streamline its technical radio rules.

It would create a new subclass of FM Class C stations, allow some FM stations to interfere with others under limited circumstances, and overhaul the Class D licensing procedures. These are some of the changes in a Notice of Proposed Rule Making seeking to streamline Part 73 and Part 74 of the FCC technical rules.

Most of the proposals in MM Docket 98-93 affect commercial FM and noncommercial educational FM stations.

New Class C

The FCC proposed dividing the existing FM Class C into two subclasses, Class C and Class C0 (or C zero). It would give affected stations three years to meet a new Class C minimum antenna HAAT of 450 meters. Now, Class Cs operate with HAAT of between 300 and 600 meters. Of 863 Class C stations, the FCC found that 519 are authorized to operate with HAAT of less than 450 meters. But these stations still are protected to class maximums. Stations that do not meet the new Class C HAAT requirement would be subject to automatic reclassification as a Class C0 at the end of the transition period.

FCC officials feel the current rules may unnecessarily preclude proposals to introduce new or expanded service. Generally, every FM is protected from interference to its maximum height and power classification. FCC Audio Services Division Deputy Chief Peter Doyle said this policy permits certain broadcasters to "warehouse" spectrum, when they may have no interest in the maximum use of their facility's class.

Another proposal designed to give broadcasters more flexibility to make station improvements would allow so-called "negotiated interference agreements." Stations would be able to negotiate only when certain criteria are met:

- Service gains — Total service gains must be at least five times as great as the increase in total interference.
- City of license protection — No protected interference would be permitted to any station within its community of license.
- Minimum service requirements for areas and populations subject to newly created interference — Applicants must demonstrate that all areas of newly created interference would continue to receive at least five aural services.
- Minimum distance separation requirements — Spacing requirements would be retained for commercial stations and new requirements would be imposed on noncommercial education FM stations to safeguard against major station relocations.

Comments on the proposals were expected to be due by the end of August. For information, see the FCC Web site, *www.fcc.gov*

Harris Says 'No'

▶ HARRIS, continued from page 8

removing the option available with other FM processors used with the Harris CD LINK and DIGIT/DIGIT CD FM Exciter to install the processor either at the studio or the transmitter with essentially equal results.

- As a practical point, hundreds of successful broadcast systems have been put together using digital audio processors with 32 kHz AES3 sampling rates, sample rate converters, and the DIGIT stereo generator. These systems exhibit exceptionally good peak limiting control without overshoots. This demonstrates that modification of the DIGIT as proposed by Cutting Edge is not required to provide tight overshoot control.
- The DIGIT digital input module contains a Digital Composite Limiter (DCL) which can be used to prevent modulation overshoots due to excessive audio bandwidth in the AES3 audio data or due to lossy perceptual coding (lossy data compression) in the audio transport system. The DCL works very effectively to prevent overshoots without adding audio distortion or affecting the pilot or RDS/SCA subcarriers, even when the DIGIT is presented with poorly processed and/or excessively wideband audio.

In conclusion, the Harris DIGIT was designed for all types of audio sources by providing appropriate bandwidth restrictions to minimize aliasing and stereo degradation. It is based on the universal AES3 digital stereo input standard. Although Harris Corp. does not exclusively favor any particular audio processing equipment, it must be recognized that the audio processor to DIGIT interface can impact overall system performance.

For this reason, Harris does not endorse or support the proposed "Digital Multiplex Interface Standard" described in the Cutting Edge technical papers.

■ ■ ■

For further information from Harris, contact Richard J. Fry, FM Applications Engineer, Harris Broadcast Division via e-mail: dfry@harris.com

***RW** welcomes other points of view.*

Galaxy IV, We Hardly Knew Ye

by Alan R. Peterson

GREENWICH, Conn. The Galaxy IV satellite was actually a hybrid HS 601 satellite built by Hughes Space and Communications company, and was launched into orbit in June 1993 aboard a European Ariane 42P rocket. The craft was originally part of Hughes Communications' plan to have five HS 601 satellites — Galaxy IV, V, III-R, VIII-i and X — in orbit for cable and broadcast TV, private data, voice and newsgathering services.

When Hughes merged with PanAmSat Corp. of Greenwich, Conn. in May 1997, the Galaxy satellites became part of PanAmSat operations.

The HS 601 was introduced in 1987 in anticipation of direct television broadcast to small home dishes, small aperture terminals for private business networks and mobile communications. In 1995, Hughes debuted the HS 601HP, which could carry payloads twice as powerful as regular 601 models due to enhanced battery and solar cell technology. As of December 1997, Hughes had received orders for 65 HS 601 satellites by various companies.

In spite of the loss of Galaxy IV and other incidents, the HS 601 has proven itself to be a stable and dependable space platform.

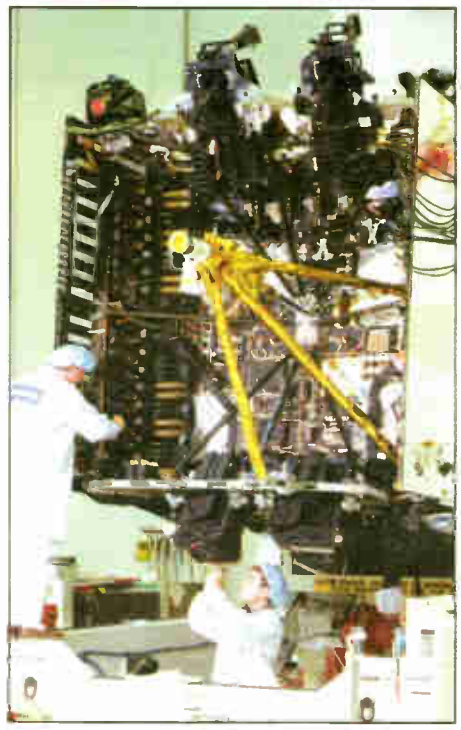
Two modules comprise the body: a payload structure with honeycombed shelves to support communications equipment, electronics and isothermal heat pipes; and the primary structure containing battery packs, bus electronics and the propulsion subsystem. All antennas, reflectors and solar power arrays mount to the payload module. The nine-foot cube-shaped structure offers 729 cubic feet of payload space.

Time line

The first HS 601 satellite was placed into orbit by Australia's national satellite communications company AUSSAT in August 1992 from a launch site in China. The second was destroyed in a launch explosion in China in December 1992, and was replaced in August 1994.

Each AUSSAT satellite is equipped with a 150 W L-band transponder permitting terrestrial mobile communications through small car-mounted antennas. Fifteen 50 W Ku-band linear transponders are also part of the Australian payload.

Later orders for Hughes HS 601 spacecraft included the United States Navy (10 satellites); Japan Satellite Systems (three satellites); NASA (three satellites); ICO Global Communications (12 satellites) and Asia Telecommunications Satellite Company, whose AsiaSat 3S craft will eventually have 9 kW of payload power in the C- and Ku-bands.



Close-up of Hughes HS 601 Satellite

Other payloads placed in HS 601 satellites have included traveling-wave tube amplifiers for Ku-band use. 28 MHz Ka-band beacons and experimental laser retroreflectors. Innovative antenna configurations have included graphite-constructed "Springback" 17-by-22 foot oval antennas and octagonal antennas for Ku- and C-band use. The ICO Global satellite network is expected to be able to handle 4.500 simultaneous telephone calls.

Galaxy IV carried 24 C-band and 24 Ku-band transponders. The C-band units delivered 16 W per channel for TV, radio transmission and data service, while the Ku-band equipment handled 50 W per channel for private data, voice and video networks.

Losses

Besides the loss of Galaxy IV and the AUSSAT craft, only very few HS 601 satellites have encountered difficulties on the way into orbit.

In March 1993, a U.S. Navy UHF Follow-On satellite was launched, but left in the wrong orbit. PanAmSat lost its original PAS-3 in December 1994 due to a booster rocket failure. It was replaced in January 1996 by another craft also designated PAS-3.

Two other craft never made it to space. In January 1995, APT Satellite of Hong Kong lost an HS 601 and a Chinese Long March 2E vehicle in a launch accident. And in December 1997, Asia Telecommunications had an unsuccessful launch of a Proton rocket, postponing the inauguration of service via AsiaSat 3S until 1999.

FIRST PERSON

Galaxy IV: When NPR Lost Its Big Bird

by Rich Rarey

RW contributor Rich Rarey, technical director for National Public Radio program "Talk of the Nation," provides a blow-by-blow account of how NPR employees reacted when the onboard computers used to keep the Galaxy IV satellite aimed at Earth stopped working.

WASHINGTON May 19 was a routine day in NPR's Satellite Technical Center. The room is packed with RF monitoring and satellite receiving equipment, automation controllers and rows and rows of LED bargraph meters. Slightly after 6 p.m., technician Dan Jones was relieved for his meal break by fellow tech Phil Hedgman. Phil was sitting at the STC console, a long articulated row of computer monitors that display the automation system tasks.

At around 6:11 p.m., the background audio chatter from a handful of satellite demodulators suddenly went silent.

Phil looked up and noticed that the RF waveform analyzer display, usually glowing with the sharp spikes of active satellite channels on Galaxy IV, was a flat line. The STC Technical Director for the day, Bill Bremmer, suggested switching to the backup High Power Amplifier, and did so, but still no audio returned from Galaxy IV.

Then the phones started ringing.

"We were buzzing around the walls," Phil said, "The first thought is that the satellite was OK, but there was a video carrier doing a double illumination of the transponder." Dan switched the analyzer to look at a different public radio transponder on Galaxy IV, and saw no carriers there either. "What could we do? We were just dead in the water." Phil said, "We called PanAmSat, and we were about the first — they didn't seem to be aware of the problem at first. (But) I was getting the feeling they were getting calls from other users."

In NPR Master Control just on the other side of the wall, NPR Engineering learned of the satellite failure.

"First thing we noticed was the silence sensors for the international service going off," said MC Supervisor Norb Gallery. "Then (we) noticed that none of the other demods were working. After we determined that there was a systemic problem, we handled the stations calling in a first-come, first-served basis." Terrestrial linked stations, such as WHYY-FM Philadelphia, WNYC-FM New York and Washington's WAMU(FM), were fed the audio stream that would have been on the NPR News Channel. This caused a wonderful chain-reaction because those stations fed other stations through a combination of ISDN codecs, state-run communication networks and off-air rebroadcasting (the signal of one station on your own, with permission).

WETA's Eric Hoehn was able to get an audio feed to the Washington, D.C., uplink of the Public Broadcasting Service through a handful of hops, using ISDN from NPR to audio tielines from WETA(FM) to WETA-TV, then video tielines (stereo audio per tieline) from WETA-TV to PBS.

Back in NPR Master Control, NPR Telecom Director John Keator said he activated a telephone conferencing bridge that handled 12 dial-up calls. "The problem was that the bridge was two-way, and any station that accidentally left backfeed audio through their phoner was heard by the other stations. This was only a temporary solution, and we called the AT&T Conference Center to order a 150-port dial-up conference, starting at 4:45 a.m. the next day."

Vermont Public Radio CE Rich Parker, left, and Contract Engineer Ira Wilner prepare to move the dish.

Stations could dial a toll-free number and receive programming down the phone line. Then an ISDN bridge was ordered from the AT&T ISDN Center. The ISDN protocol was set to G.722 to accommodate the largest number of codecs.

Other broadcasters offered help immediately. John said, "AP's Phil Avner called and offered to set up a 12-port ISDN bridge, which we gratefully accepted." Norb Gallery said, "The primary goal was getting NPR news programming distributed, because ('All Things Considered') was the show on the air at the time. Once we determined that the sat outage would last, the goal was to get stations as many paths as possible to 'Morning Edition.'"

The goal, according to Norb, was to "start setting up as many (audio) paths as you can, then start trimming back the 'tree,' strengthening the paths that appear to be beneficial to the most."

NPR Satellite Operations Director Ralph Woods was busy contacting ABC for space on one of its satellites. "It was a long shot because most public radio stations don't have the receivers, but some stations may have a good relationship with their local ABC/CBS affiliate. (ABC/CBS share a transponder.) It worked out well through 5 a.m. Thursday morning. After we got the OK, we threw in some patch cords and we were up."

Using the Internet

Land-based transmission paths were essential to coordination. NPR Webmaster Rob Holt was contacted by the "All Things Considered" executive producer, who asked that Rob post a message on the NPR Web site announcing the satellite loss. Rob said, "The Internet's not down, why don't we use it to stream RealAudio to our stations?"

Within minutes, Rob had configured two audio streams, suitable for modems operating at 14.4 and 56 kilobits per second, and posted them to a stations-only URL on the NPR site. RealAudio also helped by streaming the programming from its site, which was connected to NPR via an ISDN codec.

Meanwhile, broadcasters kept in touch with each other about the problem through two Internet listserves. PUBRADIO and PubTech listserves provided the only NPR-to-station and station-to-station electronic contact, as the system's normal data transmission, the "DACS," was lost with the satellite outage.

As the evening wore on

By 7:54 p.m., an hour and a half after satellite loss, NPR news programming was available on RealAudio, from the PBS satellite subcarriers, from ABC's Satcom C-5, from the Canadian Broadcasting Corp. Anik E2 satellite, from a telephone conference bridge and member stations linked by T1 line.

By noon the next day, additional ISDN bridges were in place, and programming was promised on satellite Galaxy III-R for 1500 that afternoon. The only catch to receiving Galaxy III-R was that station engineers had to physically repoint their dish toward this satellite. The repointing issue caused concern, not only for the logistics of locating a satellite 23,000 miles away, but because many stations installed their dishes in 1979, and engineers believed that the mounting bolts would be frozen in place.

As they repoint ...

Many stations reported that turning the dish was easier than anticipated; NPR Tech Support Coordinators Scott Bridgewater and Vince Destajo staffed the satellite tech support phones, and generated a checklist for engineers to follow when repointing their dish.

What source did stations use? Raw data gathered two days after the outage showed about 138 stations used the telco bridge, with that number declining as higher-quality paths became available. Although the data numbers are approximate, many stations chose to repoint their dish to Galaxy III-R, while fewer stations stayed with the PBS satellite feeds, ISDN bridges and Internet feeds.

The repointing issue caused concern, not only for the logistics of locating a satellite 23,000 miles away, but because many stations installed their dishes in 1979.

NPR's Fall-Back Plan

▶ PRC, continued from page 3

changes on an almost daily basis as affiliates add or improve ISDN equipment or other alternative program delivery facilities.

NPR was operating temporarily on Galaxy III-R in less than 24 hours after Galaxy IV failed. An estimated 65 to 70 percent of NPR affiliates repointed their satellite dishes to receive Galaxy III-R signals. Other stations continued to use alternative delivery methods.

Alternative delivery methods included regular telephone bridges, ISDN bridges, the PBS satellite, the BBC satellite and FedEx. Some stations without service rebroadcast signals of stations with service. BBC programs could be found on a subcarrier of C-Span satellite delivery.

NPR is surveying affiliates about the satellite failure. NPR officials said early indications are that most stations were able to receive programs thanks to the response by NPR and by station personnel.

Some NPR staff members scheduled to go to San Francisco had to remain in Washington to help restore satellite service. NPR had to check antenna polarization and adjust power output of 70 uplink stations. Galaxy VI requires about 4 dB more uplink power than did Galaxy IV to produce the same downlink power.

'We've lost contact ... '

At approximately 6:15 p.m. Eastern Time May 19, NPR lost all program distribution channels. Technicians at NPR started working with technicians at PanAmSat, who determined quickly that they had a satellite outage (see story, above.)

NPR had used Galaxy VI for about 18 months between 1990 and 1993, while PanAmSat was building Galaxy IV to replace Westar IV, Loewenstein said.

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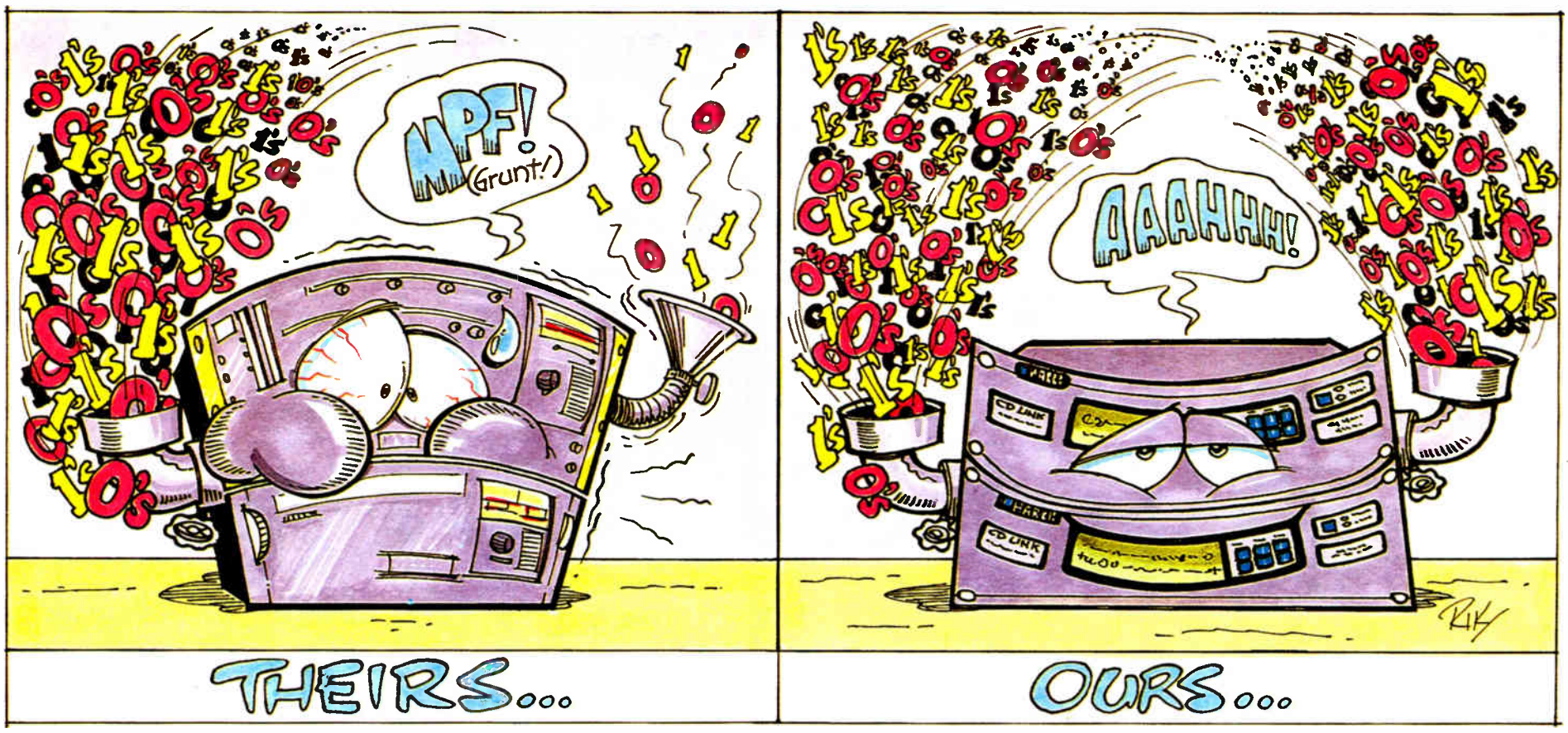

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Despite claims of other digital 950 MHz STLs in the market, only CD LINK™ truly does nothing to your 16 bit digital audio signal from the studio. If you are in doubt about whether a digital STL is using compression, just ask them "What coding algorithm are you using?" Any answer other than NO digital compression in any form is used..... means the STL is compressed and your original studio audio has lost some of its quality.

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▶ USADR, continued from page 1

where it is used for testing. Technicians can raise and lower the antenna with an ENG-style motorized Will-Burt mast. A TV camera on the roof allows the staff to monitor the antenna from inside the building.

USADR is using the rooftop omnidirectional antenna to transmit an FM IBOC signal, layered on each side of an analog signal, on 93.5 MHz at approximately 600 W. Employees can see the IBOC signal on a spectrum analyzer and hear the analog signal on receivers. The company holds an experimental FCC license to conduct the broadcasts and plans to transmit test signals intermittently through the end of the year, with call sign WD2XAB. A person driving in the area with an FM radio set to 93.5 would hear music.

USADR also has on order a directional antenna that will allow transmission of up to 2,000 W, allowing signals to reach Baltimore and Washington.

It has signed a multiyear lease for the new space, which Martinson said was custom-designed for DAB development. The company now has lab space with features like appropriate electrical power to support a transmitter, transmitter hookups, the roof-mounted tower, an acoustical listening room and an RF shield room.

Four project teams actually are working on IBOC DAB here; their areas of focus are AM, FM, integration and receivers. The integration team works with the AM and FM groups to help integrate lab work with field tests. The fourth team is developing prototype receivers capable of receiving IBOC DAB signals.

Nineteen members of SBE Chapter 46 in Baltimore visited the facility recently. Guides demonstrated the RF screen room, designed to test the IBOC system in a clean RF environment. External signals cannot leak into the reception evaluation tests.

Members also visited the audio or "listening" room, designed with leaded walls and sound foam installation for acoustically clean audio. "You can hear a pin drop in the audio room," said Martinson. This is where visitors actually listen to simulated DAB performance and compare it with that of analog AM and FM.

Computing power

The researchers use special computer tools to develop simulations of transmitters and receivers. Engineers can develop these devices and "listen" to them on computer without actually building a prototype — thus saving USADR time and money in research and development.

The USADR employees work with Bittware-designed DSP boards and Sharc processors, the software development engines going into the company's prototype IBOC exciters and receivers.

Vice President, Engineering, CBS Radio and USADR Glynn Walden said, "The system is being developed on Sun Ultra Sparc high-level simulation tools, or SPW, a package that allows you to build a receiver and a transmitter in software."

During a recent speech to the American Radio Manufacturers Association in Atlantic City, N.J., Walden described the USADR computing power this way: "You go into a toolkit. If you need a discriminator, you pull a discriminator out of the tool kit. If you need a mixer, you pull a mixer out of the tool kit. ... You can make copies and glue them together on the screen just like you would do (in) word processing."

Under controlled lab conditions, USADR engineers have used multipath generators to re-create data that the

USADR Codec Evaluation Tests

Electronic Industries Association recorded in earlier tests in Salt Lake City, copied those and run them through the USADR system. USADR will use the Salt Lake City data again, along with data collected from FM characterization tests in the Washington area in controlled lab tests later this year.

"We want to make sure the system we are designing and building will work under various field conditions, not just Salt Lake City," Martinson said.

The USADR vision

USA Digital Radio, a partnership of CBS and Gannett, was created in 1991. It is one of three organizations now publicly pursuing research into in-band, on-channel digital radio. It positions itself as the supplier that best understands the needs of the radio community, because it is funded by broadcasters and actively takes input from the industry.

USADR is working closely with Fraunhofer Labs, Xetron and Bittware.

USADR hopes to finish project development by the summer of 1999 and transfer its technology to receiver and transmitter manufacturers at that time. It has been working quietly with those manufacturers already to learn more about their needs.

USADR envisions a migration of the radio industry from analog to digital, first by broadcasters, then listeners, starting as early as the year 2000 and ending beyond 2010. That way, some broadcasters and listeners can "be the first ones on their block" with the new technology, while other stations and listeners who are not as concerned with evolving technology can wait until prices for the digital equipment drop.

To facilitate the transition to digital, USADR is developing two systems of digital broadcasting. One is a hybrid approach, to be used during the transition period; the second is all-digital.

The waveform is represented as two small blocks of digital signal on the extreme upper and lower portions of the channel with the analog signal represented as a sharp triangle in the center. Reception, therefore, can be either analog, digital or both on the same channel. Severe impairments to the digital signal can be filled by the analog signal using USADR's "time diversity blend backup to analog."

The hybrid systems for FM and AM are similar, in that the digital signals reside on either side of the analog signal in the same allocated channel. Likewise, the transition to all-digital would be similar, with digital signals existing in the space currently occupied by the analog.

Will existing transmitters be able to transmit the hybrid and all-digital signals? USADR says it is possible to pass the AM DAB waveform through some transmitters now on the market. For FM, modifications to transmitters are required to accommodate IBOC DAB. The cost to convert to DAB is difficult to estimate and will vary by station, USADR says, because it is dependent on age, power and quality of the equipment in use. For some stations, USADR says, a digital exciter will suffice. For others, new exciters, STLs and transmitters will be required.

DIGITAL RADIO

AMRC and CD Radio Push Forward

WASHINGTON Both of the license holders to provide satellite-delivered digital audio broadcasting to U.S. listeners are moving ahead with their business plans.

American Mobile Radio Corp. has formed its core management team, including Hugh Panero as president and chief executive officer, and Lee Abrams as senior vice president of content and programming. Panero most recently served as president and chief executive officer of the national pay-per-view network Request TV.

AMRC said it would also offer 100 channels of music and information programming, as its competitor, CD Radio, recently announced (**RW** June 24.)

AMRC is counting on dual revenue streams from subscriptions and ads to make a profit. Unlike CD, AMRC plans to carry advertising on its music channels "done elegantly enough so that it doesn't approach the clutter and intrusiveness of traditional radio," said Panero.

CD intends to carry ads on information channels only and recently announced plans to carry programming from Hispanic Radio Network on two channels.

Panero sees satellite-delivered DAB programming as another entertainment distribution system. "People who have limited channel capacity go to where it's increased...We've seen this in the introduction of direct broadcast satellite television where people want more choices."

Abrams, meanwhile, recently consulted Capstar, Nationwide and the ABC Radio Networks and is credited with transforming FM by pioneering the album rock format in the 1970s and smooth jazz in the 1980s.

Panero said Abrams' hire will enable the service to develop a personality "that is not Muzak."

• MARKETPLACE •

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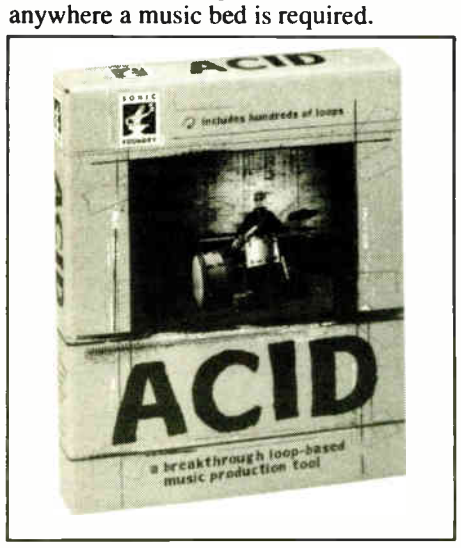
Mail info and photos to: RW Marketplace, P.O. Box 1214, Falls Church, VA 22041

Sonic Foundry

The ACID software from **Sonic Foundry** puts a powerful multiple track editor with unique continuous loop audio processing behind an approachable user interface.

Users are able to take audio files from a variety of sources and easily create seamless "loops" with precisely matched tempo and pitch to produce music for use anywhere a music bed is required.



ACID provides direct output to WAV and AIFF files and automatically matches tempo and pitch between loops for instant synchronization. Loops can be previewed in real time before being opened, and unlimited tracks are supported for multiple track mixing, subject only to system RAM. Other features include 16- and 24-bit audio support, a DirectX audio plug-in support for real-time effects and unlimited levels of undo and redo.

Hundreds of prerecorded loops of different formats ship with the ACID software. Some of the formats include rock, country, hip-hop, alternative, techno, funk, rave and industrial. Adapting these or building new programs can be rapidly achieved whenever new music is needed.

*For more information, contact Sonic Foundry in California at (608)256-3133; fax (608) 256-7300; or circle **Reader Service 139.***

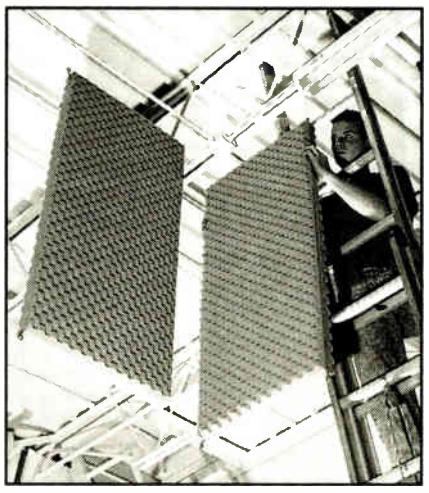
Noise Absorber

The Acoustical Foam Baffle from **NetWell Noise Control** is designed to reduce noise from various sources around the desired area.

These 2-by-4-foot baffles are convoluted on both sides for maximum surface exposure to airborne reverberant sound energy. With built-in wire eyelets at the corners, these 3-inch-thick baffles are easy to install and can absorb up to 90 percent of unwanted sound in a variety of applications.

The Acoustical Foam Baffles are ideal for station applications, blocking out un-encloseable commercial noise sources. Free catalogs, samples and consultation are available from the company.

*For more information, contact NetWell Noise Control in Minnesota at (612) 939-9845; fax (612) 939-9836; or circle **Reader Service 165.***



Fixed Vacuum Capacitors

New from **COMET North America** is the MC MiniCap family of fixed vacuum capacitors. This line of Q-factor, high-current capacitors are designed for use in RF applications, including broadcast equipment.

The MC Mini-Cap is a reliable and cost-effective alternative to mica, ceramic "doorknob" or banks of ceramic chip capacitors, which can have limited current carrying capability and tend to show considerable thermal instability.

The MC Mini-Cap family of capacitors feature a compact, rugged design with a conservatively rated holdoff voltage of 15 kV peak test. The design results in minimal internal inductance and features high-quality RF electrical connections. This allows the capacitors to perform reliably at frequencies up to 100 MHz and higher.

COMET offers five standard versions with capacitance values of 25, 50, 100, 150 and 200 pF. All capacitors boast a high Q factor, excellent thermal stability, high current values of 70 A at 13.56 MHz and a simple, sturdy mounting configuration.

*For more information, contact COMET North America in Connecticut at (203) 852-1232; fax (203) 838-3927; or circle **Reader Service 87.***

Slanted Rack System

Anthro Corp., the Oregon-based manufacturer of Technology Furniture, introduces the Anthro SlantRack for broadcast and multimedia environments.

Designed for easy visibility of rack-mountable equipment, SlantRacks come in three sizes. The 9 Unit model comes with glides for desktop applications, while the 13 and 21 Unit models come with four 2-3/8-inch castors for use alongside desks or rolled underneath to maximize space.

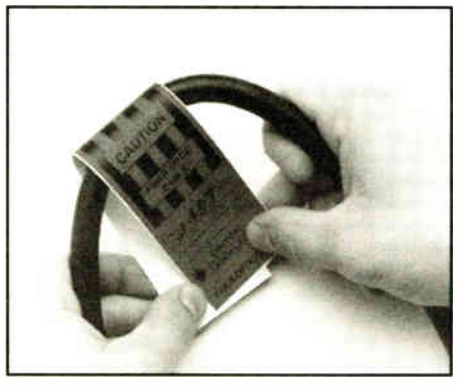
SlantRacks carry a lifetime warranty and have tapped mounting rails for mounting equipment. The unit can be customized by adding the SlantRack Base Shelf to store power supplies, computer boxes and other non-rackable equipment.

*For more information, contact Anthro in Oregon at (503) 691-2556; fax(503) 691-2409; or circle **Reader Service 113.***

Write-on Cable Markers

VIP Products announces the availability of write-on Flagging Markers for fiber-optic cables.

Flagging Markers are available in two sizes: 2 x 4-1/2 inches and 2 x 9 inches. They are printed with the legend "CAUTION — LASER LIGHT — FIBER OPTIC CABLE" in black ink on orange self-adhesive vinyl. The technician simply writes an identifying code on the marker before wrapping it around the cable.



There are two ways to apply a marker to a cable, depending upon whether permanent or temporary identification is in order. Also available are markers made with bright orange fluorescent material, which are especially valuable in dimly-lit vaults or tunnels.

Flagging Markers are furnished with 25 labels per package.

*For more information, contact VIP Products in Texas at (713) 240-0900, or circle **Reader Service 13.***

Fast Shipping Furniture

A wide variety of accessories from **Equipto Electronics** are available for fast shipping.

Within five days of ordering, the "Express Line" service from Equipto will ship an array of items including vertical racks, 15 degree sloped front consoles, workstations and instrument cabinets.

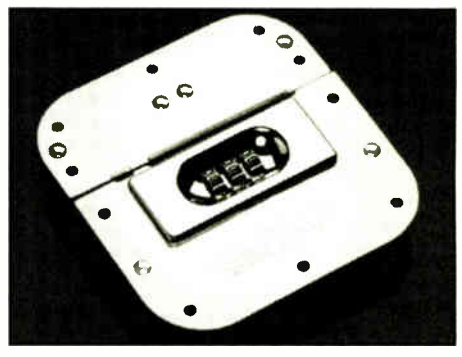
In addition to these products, multiple accessories can be specified. Typical accessories include shelves, drawers, plug molds, panels, laminated shelves, panel mounting angles and hardware. Several Express Line products can be ordered in any of 12 standard colors. A company catalog is available in print or on computer disk.

*For more information, contact Equipto Electronics in Illinois at (630) 897-4691; fax (630) 897-5314; or circle **Reader Service 194.***

Keyless Lock

Neilsen/Sessions, a **ZERO Corporation** company, introduces the 604 Series multi-purpose lock.

This flush-mounted, steel combination lock offers keyless, streamlined security. The lock, a new standard in case and container hardware both in form and function, can be set and reset to any three-digit number.



The lock is recessed into a standard-sized dish for improved safety and appearance. The unit is mounted by means of 10 rivets located around the combined lock and strike components.

The 604 Series lock will eliminate the hassles of lost keys and protruding locks.

*For more information, contact Neilsen/Sessions in Connecticut at (860) 522-8145; fax (860) 525-0180); or circle **Reader Service 168.***

PRODUCT EVALUATION

Gentner SPH10: Solid Analog Hybrid

W.C. Alexander

For many years, the Gentner SPH-3A was the industry mainstay for analog hybrids. There are one or two of these rugged, dependable units in radio stations throughout the country. These units were simple to install, simple to adjust and simple to operate. That combination, along with attractive pricing, made them popular.

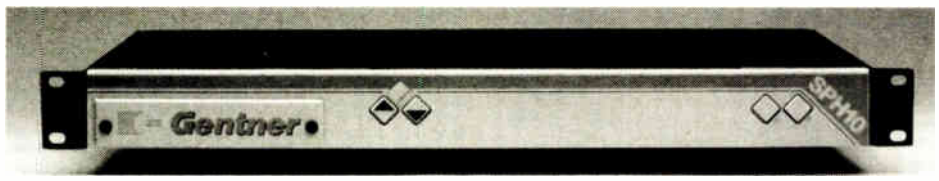
Gentner, a familiar name in specialized broadcast equipment, has introduced a new single-line analog hybrid, the SPH10, to replace the SPH-3A. With many other Gentner products throughout this company, I expected the new unit to be built to the same high quality. I was not disappointed.

Designed to fit

The SPH10 is packaged into a single-space rack-mountable chassis that is 8 inches deep. This is the same size as the older unit and should fit into any rack with one available space. The face is painted in Gentner's standard beige color and features four push-button controls: on, off and volume up/down. Red and green LED indicators are positioned adjacent to the off and on buttons to indicate the state of the unit.

Auxiliary controls are located behind a removable cover on the left side of the unit. These controls include send/aux send level controls, aux and caller output adjustments and a bank of DIP switches that are used to select mic/line input level and latching/momentary external control. Once set, these controls will be seldom used. As the saying goes, "Out of sight, out of mind." Having these controls positioned behind a screwed-down panel will remove the temptation for operators to make unauthorized adjustments.

Connections to the unit could not be easier. The rear panel features a standard three-prong power jack, a DB25 female remote jack, a 1/4-inch phone jack for monitor speaker, an XLR-female "send in." an XLR-male "caller out," an XLR-male "aux out" and a dual RJ11C connector for telephone line and set. One Switchcraft XLR-male and one XLR-female connector are supplied with the unit. It took me just a couple of minutes to connect the unit and get it running.



The SPH10

In a typical installation, a mic or a mix-minus feed is connected to the "send in" jack. The front-panel DIP switch selects mic or line level for this feed. For field use, it is handy indeed to be able to plug a mic directly into the unit with no external preamp. If a line-level send is used, it should be a 0 dB nominal level.

Either a clean caller-only output ("caller out") or a mixed caller/send output ("aux out") can be used to feed the console or recorder. Typically, the "caller out" would be used to feed the console while the "aux out" would be used to feed a recorder.

A standard phone line is connected to the "line" side of the RJ11C connector while a standard analog telephone set is plugged into the "set" side. The phone line is routed to the set until the front-panel "on" control is pressed.

Provision is made on the 25-pin D-connector for remote control of the unit. Either a momentary or a latching closure to ground (DIP switch selectable) can be used to turn the unit on and off remotely. This feature permits the unit to be activated by a console remote start switch, an external call selector unit (KSU) or other remote device. Monitor muting is also provided through this connector, as are unbalanced "send," "caller" and "aux" audio connections. Open-collector status indicators are provided for "on," "off," "caller presence" and "send presence" tallies.

After connecting the send, output, speaker, phone line and set to the unit, I made a few calls. Some adjustment of the "send," "caller" and "aux" levels were required to get everything just right, but these adjustments were a snap with the front-panel controls. The "on" control provides make-before-break operation, so an outgoing call can be made on the external telephone set and the hybrid switched on without dropping the call.

Those on the other end of the line during my test calls reported clear, crisp send audio. On my end, caller audio was likewise clean and clear. With the built-in 1 W monitor output connected to a speaker I was able to listen to the caller off-line, without using the console. Operators will love the simple on/off operation. There are no complex keystrokes or operator adjustments to cause confusion.

Noticeably absent from the SPH10 is a "null" control. The SPH10 features an integrated optical telephone interface that provides a high degree of isolation from the phone line (and should provide a good degree of surge and RFI immunity as well).

This interface features a fixed hybrid that Gentner claims provides 20 dB or more of send/receive isolation in most cases. In my testing, I found that with one line I used, the unit produced less than 10 dB of isolation while with another, about 20 dB was achieved. It was odd to me not to have some control of the hybrid null.

My overall impression is that the SPH10 is a good, rugged analog hybrid, one of few still on the market. It can be used in the simplest single-line newsroom operation, downstream of a KSU as the heart of a more sophisticated on-air telephone system, with another SPH10 for conferencing, or in the field as a remote telephone interface.

With a list price of $499 and a street price of around $475, dealers report brisk sales.

■■■

Cris Alexander writes the column Feed Line for RW. His current series on building an expanded-band AM station continues below left.

Those on the other end of the line during my test calls reported clear, crisp send audio.

Product Capsule:
Gentner SPH10 Hybrid

Thumbs Up
- ✓ Optical telephone interface
- ✓ Simple, push-button controls
- ✓ Hidden setup adjustments
- ✓ Balanced I/O
- ✓ Built-in monitor amp
- ✓ Flexibility

Thumbs Down
- ✓ No null adjustment

For more information contact Gentner at (800) 945-7730, visit Web site www.gentner.com or circle **Reader Service 90**

FEED LINE

CP Measurements: Once Is Not Enough

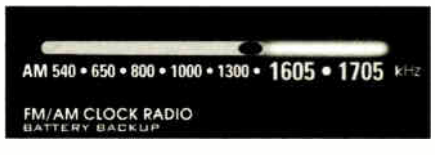
W.C. Alexander

This continues a multipart series of articles about constructing an AM expanded band station. The previous part appeared in RW June 24.

If there are special conditions on your construction permit, you must comply with each of them in addition to all of the regular CP/rule compliance issues.

Before and after proof

The FCC may place a special condition on the new station's CP that requires you to make partial proof-of-performance measurements both before and after tower construction or array modification for diplexed operation. These measurements prove that the new construction/modification does not disturb the existing station's directional pattern.



If the directional array is someone else's, all you must show is the before-construction and after-construction measurements and the average before/after ratios on each radial. The

See AM, page 22 ▶

Timely Measurements Can Be Crucial

▶ AM, continued from page 21

measurements must be made in accordance with the procedure for partial proof-of-performance measurements outlined in §73.154 of the FCC rules.

The measurement must be made at 10 points between three and 16 km from the center of the array on each radial. The measurement points must be the same as those established in the last full proof of performance. If the other station's directional array is out of proper adjustment prior to construction, so be it. You only need show that no substantial change in the pattern resulted from the new construction. Whether or not the array is in proper adjustment is not your problem.

If the directional array is yours, be certain the array is properly adjusted before making and submitting proof measurements. Submitting data showing the array is out of adjustment is tantamount to an admission of guilt for operating it that way. You will save yourself a world of trouble if you make sure the array is "in" before you start your measurements.

Timeliness

Because the environment plays such a prominent role in the field strength at any given point for an AM station, before-construction measurements should be made as close to the start of tower construction as possible, and the after-construction ones made immediately following tower completion. If the time between measurements can be kept to a couple of weeks, that is good. Wait any longer, particularly when seasons and ground conditions are changing, and you may invalidate the measurements.

The cooperation of the other station's licensee is essential in making these partial proof measurements. You must be able to ascertain that the antenna monitor parameters and common point current are the same before starting each day's measurement, lest a change in the operating parameters skew the results of the proof. That licensee should also assist you by providing a copy of his last full proof so that you can locate the points.

If the licensee refuses to cooperate or drags his heels, the FCC can order the licensee to cooperate. Most station licensees would rather cooperate than have the FCC knocking at their door. Enlist FCC assistance only as a last resort.

The other station licensee also can waive the before/after requirement by letter, essentially assuming responsibility for any adverse effects your construction may have on his directional pattern. This generally is a foolish thing for the DA owner to do, however, as it can leave him holding the bag for something over which he has no control.

This can be expensive in the long run, but it does happen from time to time — especially when the DA owner knows his array is not in compliance but does not want proof filed with the FCC.

If offered a waiver, be sure to have your communications attorney review the document before you proceed with construction. Your attorney may want to suggest specific language be placed in the agreement. Heed his or her advice, or you may wind up holding the bag for readjustment of the other guy's DA!

Lost copy

Despite FCC rules requiring a copy of the last full proof be kept at the transmitter site, these things get lost or accidentally thrown out. If this is the case, the other licensee may not be able to provide you with the proof documents you need. In that case, you can obtain a copy from the FCC's copy contractor for a nominal fee.

In the event that the after-construction measurements do show a substantial change in the other station's measured pattern, you will have to detune your tower on the other station's frequency and repeat the measurements. The same apparatus and procedures will be used to detune your tower as discussed in the part of this series dealing with detuning unused towers in diplexed operations.

Submitting data showing the array is out of adjustment is tantamount to an admission of guilt.

In a nutshell, a tuned circuit is inserted at the tower base that will place a detuning component or network in the circuit at the other station's frequency and make the same invisible at your operating frequency. The tuned circuit is really half a diplexer and is adjusted for series resonance at the other station's frequency and parallel resonance at yours.

Minimum current

The detuning component or network is then adjusted for minimum current in your tower at the other station's frequency, usually measured with a temporary sample loop placed a quarter-wavelength (at his frequency) below the top of your tower.

If your tower is less than a quarter-wavelength long at the other station's frequency, you can tune for minimum current to ground on that frequency by placing the antenna of a field strength meter against the ground strap connecting the ground side of the detuning network, or by placing a temporary sample loop just above the base of your tower and using its output as a tuning indicator.

Detuning your tower at the other station's frequency will make it invisible to that directional array and prevent it from reradiating and distorting the pattern. If your tower is quite near the other array and in the main lobe, you might want to save yourself some trouble and go ahead and detune the tower before making the second set of measurements. A consulting engineer can analyze the situation, determine whether detuning will likely be needed and design the proper network.

Detailed report

Once you have analyzed both sets of measurements, a report must be prepared and filed with the license application/request for program test authority. This report should include:

✓ A narrative describing the purpose of the measurements;
✓ The equipment, procedures and personnel used to make the measurements;
✓ The environmental conditions under which these measurements were made;
✓ A description of any detuning apparatus installed; and
✓ The credentials of the person supervising the measurements.

A tabulation of the measurements should be included by radial, listing the bearing of the radial, the point number of each measurement (this must correspond with the point number for the same point on the last full proof of performance), the distance from the station (this, too, must agree with the point distance from the last full proof), the DA field strength noted before construction, the DA field strength noted after construction and the ratio of after-construction to before-construction field strength at each point. The arithmetic or logarithmic average of the ratios for each radial should be shown.

The next part of this series will deal with antenna impedance measurements, spurious/harmonic measurements and FCC paperwork.

■ ■ ■

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. Contact him at (972) 445-1713 or via e-mail at cbceng@compuserve.com

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Workbench

Radio World, July 8, 1998

Get A Better Grip With Ice Hockey Tape

John Bisset

Jim Arcaro, a Certified Professional Broadcast Engineer, has a great suggestion to keep your hands from slipping off or being cut by metal tools. Jim used to play ice hockey and used black hockey tape regularly — it keeps the hands from slipping off the stick.

He picked up a roll of hockey tape at a sporting goods store and keeps it in his shop. When he needs a good grip, he wraps the handle with this cloth tape.

It works on more than wrenches. I recently used some of this tape around the end of a hacksaw blade. Somebody borrowed the hacksaw frame and all I had were the blades. Wrapping the last 5 inches of the blade with the tape both gave a good grip and prevented the blade from chewing my fingers to pieces. The emergency job was completed.

Jim also has a tip for worn indicator lines on rotary fader knobs. An operator complained of not being able to see where the knob was pointing. Rather than buy a replacement knob, Jim sought to economize and grabbed a little bottle of fluid used by the receptionist to correct typing mistakes.

Either masking tape or "invisible" office tape can be used to mask the knob. Simply repaint the line groove and the knob is good as new.

The indentation in the fader knob will prevent the whitener from flaking off, and if it does, just reapply.

What is nice about the whitener is that mistakes can be quickly repaired; just scratch off the dried compound and start over.

Jim also has used this compound on oscilloscope faces where the line is molded into the graticule rather than printed on in colored ink. This makes viewing from a distance easier.

Reach Jim Arcaro online at *jgarcaro@juno.com*

★★★

Time for another entry in your *Workbench* card file. This suggestion comes from Michael McCarthy, who runs a full-service contract engineering and special projects company based in Chicago. The company is Mize and Co., and they sell wire products and accessories.

Some of the products Michael recommends are standard wire lugs and jacket, as well as the larger automotive ATC MaxiBlade fuses used in new cars today. Those 50- or 60-amp fuses are great in ENG and remote vans. Mize & Co. even sells the fuse holders.

The company is geared toward the automotive/retail service center, but they will sell to the little guy not in that line of work. Best of all, most of the materials they sell are made in the United States. To reach Mike McCarthy, call (847) 640-8965.

★★★

Finally, remember what a *stylus* is? Figure 1 offers a suggestion for the empty box.

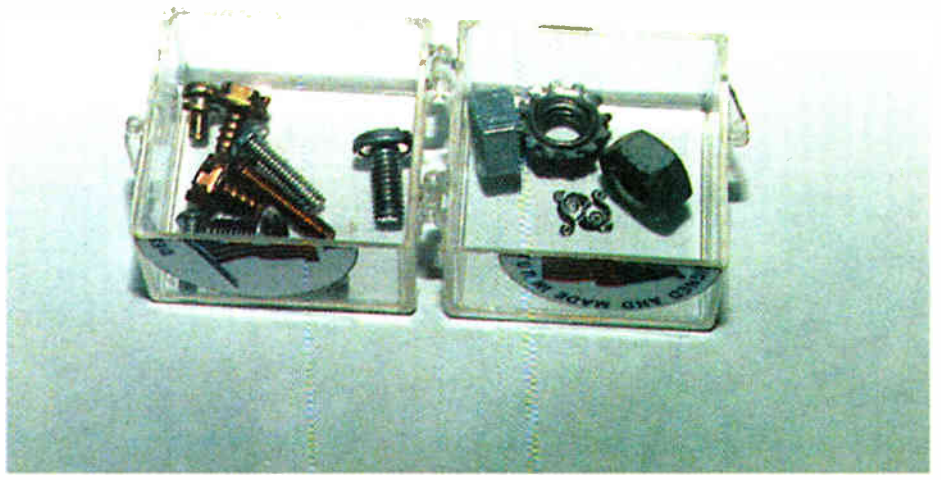

Figure 1

heat-shrink tubing. The company sells a complete line of lugs for all wire gages, with various platings and insulators.

For example, Mike averages about $6.50 for 100 22-gage nylon crimp lugs. In addition to the standard lugs, they stock sizes you never knew existed — how about 6-gage to No. 10 screw loop terminal? Maybe a No. 4 wire butt-splice, or even heat-shrink butt splices with heat-activated sealing compound!

The company also supplies heavy wire for 12V applications such as remote vans, along with an assortment of automotive electrical accessories.

Mike found welding wire with a red

Keeping miniature hardware in one place can be a challenge. Small styli boxes can solve the problem, especially when a deck has been disassembled and is awaiting replacement parts. If the hardware is small, clear flexible one-piece cassette storage cases will work too.

■■■

John Bisset has worked as a chief engineer and contract engineer for nearly 30 years. He is a district sales manager for Harris Corp.

Submissions for this column are encouraged and qualify for SBE recertification credit. Fax your submission to (703) 323-8044, or e-mail to jbisset@harris.com

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Neither Rain, Nor Sleet, Nor Snow ...

Troy Conner

After more than 45 days of fog, wind, calluses, sweat, bug bites, hay fever and other pleasantries in Wake Forest, N.C., the biggest part of the job finally is done. The 74-foot, four-and-a-half ton antenna is up and aligned atop the 1,200-foot WCPE(FM) tower and is being tested.

Figure 1: Timmy rides the pan.

Last month I recounted tales of my tower crew's nearly continuous weather woes. The crew sat around a lot and held cookouts on the hotel sidewalk, waiting for the rain to quit so we could continue the project for this public radio station on 89.7 MHz.

We were able to rig the tower and then assemble the five-ton, 140-foot gin pole on the side of the tower. We then inched the pole and its track up to the tower top to await a favorable weather window.

The process somewhat resembled a NASA launch: the conditions had to be just right before lifting a large and basically unwieldy object, in this case a "spiny" Dielectric antenna.

Sunny day

When a sunny day arrived at last, things just seemed to take longer than planned. As with most tasks, the devil is in the details. The big tasks went relatively quickly, while some of the "small" items took considerably longer than anticipated.

The antenna, for instance, was lifted, aligned and then bolted into place in about four hours. On the other hand, "plumbing," or running the four-inch rigid copper transmission line, took several days longer than originally planned.

The one-and-a-half-inch conduit, serving the antenna electrically, also took days more than any of us expected. In fact, because of several shorts, the crew is back on site as I write this, hastily repulling runs in the electrical system, so the top strobes can be lit and the customer can crank the new antenna up to 100-pecent power. In Figure 1, Timmy, our "top pusher" (on-tower foreman), is shown riding the pan with a load of inch-and-a-half conduit.

In addition to man-handling more than 100 10-foot "sticks" of heavy conduit, threading it together and U-bolting it inside the tower, we had a wad of wires to stuff. In all, there were 18 wires to deal with: seven #4 wires, four #10 wires and seven #14 wires. As you might imagine, the J-Boxes (junctions) were a tad tight.

Another example of an unexpectedly time-consuming task was the installation of the antenna elements. Because of its diameter, the Dielectric TDM antenna cannot be trucked with all of its radiating elements in place.

Once the antenna was unloaded and set on its custom trestles (oversized saw-horses), some of these elements could be bolted in place before lifting.

In addition, the elements on the side of the antenna where the two "picking" or lifting lugs are located are left off the mast intentionally, thus reducing the risk of hang-ups as the antenna is lifted and rotated around the gin pole.

Figure 2: It's 'element-ary.' Installation of some antenna elements must wait until after the antenna is safely rotated around the yellow gin pole.

If you look closely at Figure 2 you can see some of these elements at about the level of my feet. Were these installed prior to lifting, it would become nearly impossible to rotate the antenna around the yellow gin pole safely. Taped to each loose element is the little cotton bag containing the required bolts for each assembly.

Chris, our resident New Yorker, is visible about 30 feet below me, making sure nothing got hung up on the pole or tower. Large antenna "sets" (or lifts) can be some of the most dangerous work in this business. If your insides aren't constricted, you probably shouldn't be up there.

The lingering fear of a foreign environment and the constant flow of adrenaline keep us safe. Fortunately, this particular lift went off in picture-perfect fashion.

Bolt proudly

Once the base of the antenna had been lifted above the tower top (slightly above my feet in Figure 2), we rotated it clockwise (toward me) around the gin pole until it was positioned above the inkwell or socket. Then the antenna was gently lowered down into the inkwell and bolted into final position.

When we arrived at 7 a.m., the antenna lay horizontal on its trestles; at noon, when we broke for lunch, it stood, proudly bolted, at 1,200 feet. The remainder of the afternoon was spent installing the antenna elements on the gin pole side (see Figure 3).

I spent a delightful afternoon trying not to drop tiny stainless nuts and bolts, all while contorting into odd positions to bolt the remaining elements into place. Working with Greg from California, we would lower the gin pole from element to element so we would have a place to work from.

Typical of my tower pictures, Figure 3 shows my boot. I am standing atop the pole so I can hold the element; Greg is rooting in his bolt bag for a wrench.

Let's just say it was loads of fun, and leave it at that.

■ ■ ■

Troy Conner is the owner of Tower Maintenance Specialists. Reach him by phone at (704) 837-3526 or via fax at (704) 837-1015.

Figure 3: At 1,200 feet, the remaining antenna elements are installed.

HE **DARED** TO GO THERE.

Protect Against Solar Transits

Understand Sun Outages Now in Order to Avoid Satellite Program Problems This Fall

Bill Sepmeier

Twice each year, broadcasters who use satellite-delivered programming experience a week or so of daily interruptions in program delivery due to "sun outages," or more accurately, "solar transits." Even though these events can be predicted to the second, they still tend to catch us by surprise. Programs abruptly disappear for a few minutes each day. Engineers are called in to "fix" the problem.

The satellites and transponders used in the radio broadcast industry are geostationary, located 22,300 miles above the equator in an orbit ring around the Earth commonly called the Clark Belt.

When an artificial satellite is placed into this ring, the speed at which the satellite revolves around the earth coincides with the rotational speed of the Earth below. Thus, the satellite effectively becomes "stationary" in regard to its position over the planet. This is handy, because radio and television signals can be "bounced" off the satellite to and from ground-based terminals that do not have to track the "fixed" spacecraft.

There are only a couple of problems with this elegant system. First, the Earth does not rotate exactly in the same plane formed by itself and the sun. If it did, we would experience no seasonal changes here, and life as we know it would be much different.

So inclined

The Earth spins on an axis that is somewhat inclined from the solar plane, and because the spin inclination is constant as the Earth itself revolves around the sun, the north half of the planet receives a more direct shot of sunlight for half the year, providing us with spring and summer in this hemisphere. On the other side of the revolution around the sun, the other half of the planet gets the more direct shot, delivering spring and summer down there while we northern-hemisphere folks go skiing and scrape ice from our windshields.

Because the artificial satellites must, by design, remain exactly over the equator, their orbit is inclined from the solar plane to match the planet "below." Placing them in the right spot is done soon after launch, and stationkeeping needed to keep them there continues until the spacecraft runs out of propulsion fuel some 10 to 15 years after deployment.

Satellites that can no longer remain in the proper fixed location can still operate, but their orbits incline back toward the "natural" plane formed by the Earth and sun. In order to continue to use them, ground-based antennas must be able to move and track the apparent movements of the spacecraft caused by the gravitational pull of the sun.

Not the brightest bulb

Second problem: Communications satellites do not actually "bounce" signals. They receive signals beamed up to them in the microwave bands and immediately transpose these signals to new frequencies, which are then transmitted back down at the new frequency to microwave receive antennas on the ground.

Most modern C-band satellites transmit these signals back to us with TWTAs, traveling wave tube amplifiers, operating at about 15 to 20 W. Ku-band satellites in general (non-DBS) service typically operate at power levels from 15 W on older platforms, to 60 W on the newer hybrid spacecraft.

Fifteen watts. Think about it. That is approximately the same power as the bulb in your refrigerator. Sixty watts. Almost too dim even for a reading lamp. And we receive a lot of our day-part programming material from these little fridge lamps located 22,300 miles away above us. Don't you love rocket science?

Last problem: In addition to generating and radiating enough light and heat to support life on Earth, the sun transmits a pretty healthy amount of radio frequency energy across the entire RF portion of the spectrum, including a lot of energy on the exact same frequency as the one in use by the satellite network your station uses for mid-day programming and news.

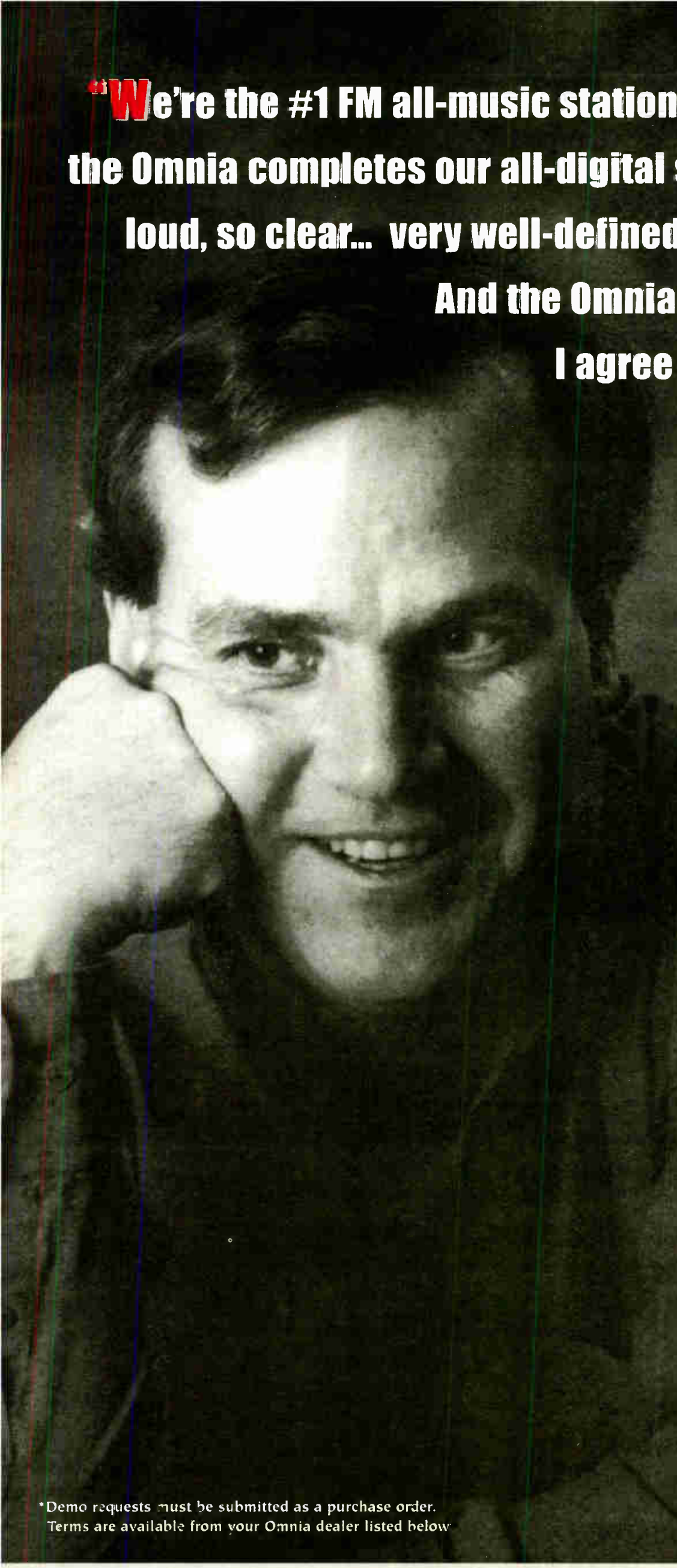
Twice a year, the Earth, spinning away on its little inclined axis, surrounded by hundreds of little fridge lamps in orbit over that inclined axis, all of this happily revolving around the sun, passes through a point in space where the Earth, your satellite receiving antenna, the fridge lamp you are looking at and the sun all line up.

During this period of time each spring and fall, these so-called solar transits bring the alignment of your antenna and the celestial bodies of satellite and sun within a degree of arc for a period of about five minutes each day. This lasts approximately one week.

With the sun and your satellite transmitting on the same frequency, and the sun using a very efficient thermonuclear fusion power source, the fridge lamp carrying Rush Limbaugh loses. Sure as taxes.

You know the location of your antenna as well as the location of the satellite you are looking at. The location of the sun is

See SEPMEIER, page 31 ▶



"We're the #1 FM all-music station in Philly, probably because the Omnia completes our all-digital studio. Now, our sound is so loud, so clear... very well-defined with absolutely no grunge. And the Omnia is one thing that my PD and I agree on. It's definitely a keeper."

Russ Mundschenk, Chief Engineer,
WBEB 101.1 FM, Philadelphia, PA

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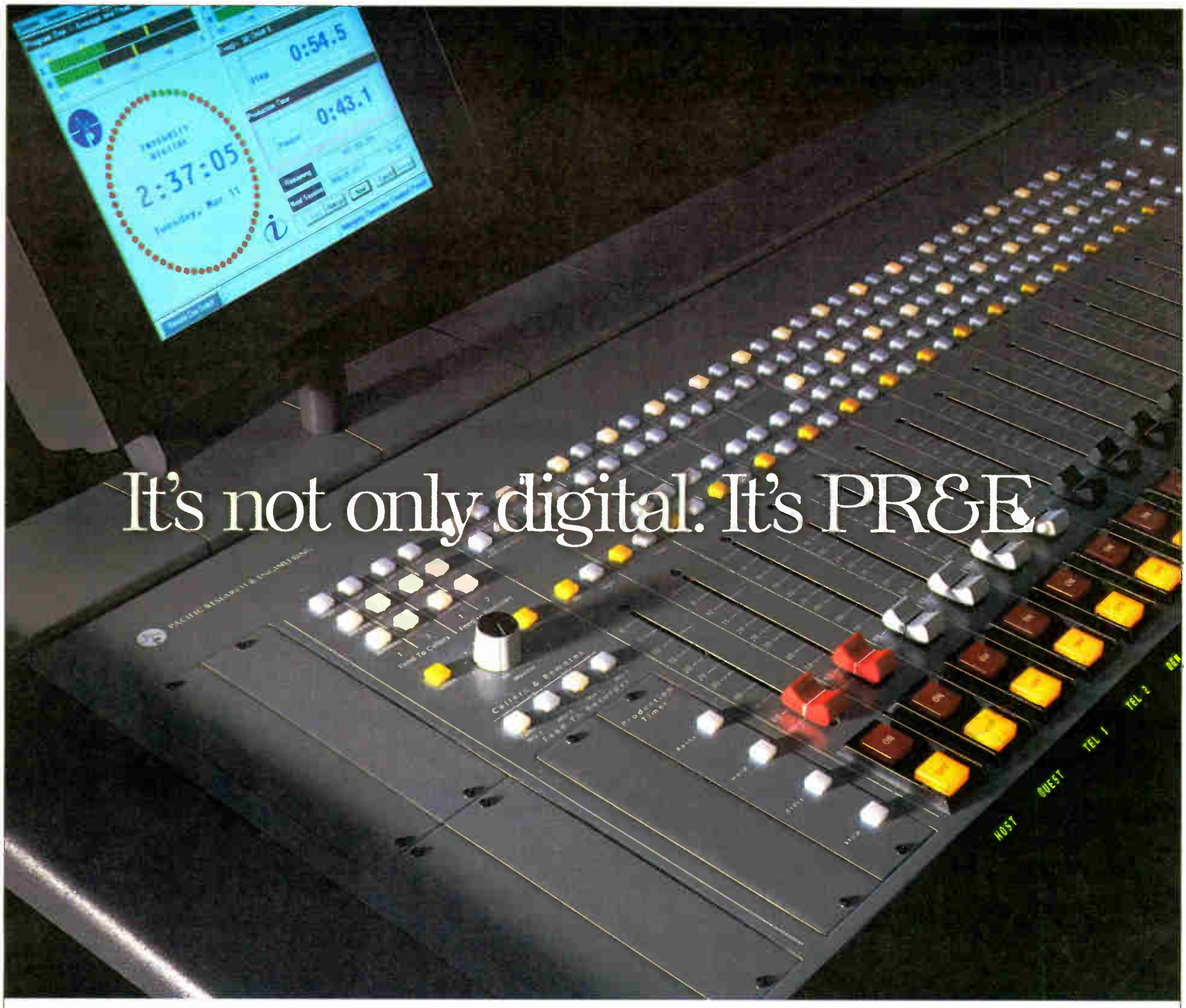
*Demo requests must be submitted as a purchase order.
Terms are available from your Omnia dealer listed below

Audio Broadcast Group 3685 Roger B. Chaffee Blvd. Grand Rapids, MI 49507 Tel: 616.452.1596 Fax: 616.452.1652 www: support@abg.com
Bradley Broadcast Sales 12401 Twinbrook Parkway Rockville, MD 20852 Tel: 800.732.7665 Fax: 301.230.6526 www: info@bradleybroadcast.com
BSW Broadcast Supply 7012 27th Street West Tacoma, WA 98466 Tel: 800.426.8434 Fax: 800.231.7055 www: info@bswusa.com
Crouse-Kimzey Company P.O. Box 155999 Fort Worth, TX 76155 Tel: 800.433.2805 Fax: 972.623.2800 www: sales@proaudio.com
Radio Communications Unlimited 5509 Barrington Ooltewah, TN 37363 Tel/Fax: 423.396.3743

Circle (29) On Reader Service Card



It's not only digital. It's PR&E.

Now you can get digital technology and PR&E reliability in the same console. Integrity.™

It's the first digital on-air board that also speaks fluent analog. All 16 inputs can handle analog signals. Ten can also accept digital inputs at any sample rate. So you can deal with the hodge-podge of equipment in real-world studios. A unique architecture also guarantees a level of reliability other digital consoles can't match. So you can rest assured your signal will stay on the air.

What's more, you get on-board DSP voice processing, remote or local configuration controls, and channel-specific remote control connections. And you can set, save and recall each board configuration at the touch of a button for seamless transitions from show to show.

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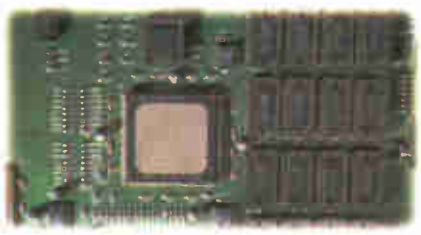
The LCD displays audio levels, time-of-day clocks, session status and event timers with a Windows® interface to powerful configuration management and session-based features.

Integrity's difference is more than just digital. It also offers four special-purpose buses to provide automated mix-minus for telephone and remote feeds, each with IFB.



Integrity uses an array of state-of-the-art floating-point digital signal processors to perform its mixing, routing and other functions.

Each fader has a 10-character alphanumeric display. The display changes when another audio source is assigned, which can happen either manually or at a preassigned time.

PACIFIC RESEARCH & ENGINEERING

Circle (55) On Reader Service Card

Harris Names Bisset to Sales Team

Harris Corp. named **John Bisset** as the radio field sales manager for the Middle Atlantic states.

Bisset, a member of the SBE and a columnist for **RW**, replaces Carl Davis, who transferred to the company's television field sales staff.

The Harris Broadcast Division supplies analog and digital broadcast products, including AM and FM radio transmitters and related equipment, and distributes studio products from more than 10,000 manufacturers.

Premier Appoints Thomas, Connolly, Wiener

Premiere Radio Networks has appointed **Vanessa Thomas** to the new position of vice president of affiliate marketing/country division. Thomas' new responsibilities include the management of the network's country product and services division with a focus on new marketing strategies.

Vanessa Thomas

Premier also has two other new faces on staff. **Michael Connolly** has been named senior vice president/eastern sales manager, and **Roby Wiener** is vice president of marketing services. Connolly comes to Premier from CBS Radio Networks where he served as vice president/sales manager of the network's southern region. Wiener, formerly with Warner-Lambert, has served as chair of the Radio Committee for the Association of National Advertisers.

Cariffe Joins Chancellor

Chancellor Media Corp. named **Joe Cariffe** to the new position of director of sales for the company's radio station holdings in San Francisco.

Joe Cariffe

Chancellor owns five FM and two AM stations in San Francisco — KIOI(FM), KMEL(FM), KKSF(FM), KYLD(FM), KISQ(FM), KNEW(AM) AND KABL(AM).

Predict Sun Outages

▶ SEPMEIER, continued from page 28

a known fact. So it is easy to predict when these alignments will occur, especially with a desktop PC.

The Internet, especially *www.broadcast.net*, is the home of a couple of nice programs that can save you a lot of headaches.

Finally, if you do forget to predict a transit and are called into the studio while all of your satellite receivers are "in fade," one contributor to an Internet forum discussing solar transits suggested you stand in front of the receivers, utter a mumbled and cryptic "magic incantation" while slowly waving your hands over the equipment, and then announce, "This will clear up in about two minutes, but will happen again tomorrow and for the next few days. Or until I get a raise."

■■■

Bill Sepmeier is vice president, engineering, of NSN Network Services Ltd, a Jacor Communications Corp. company in Avon, Colo. He is a free-lance writer and public speaker on satellite and Internet topics. Reach him at (970) 949-7774 or via e-mail at bill@nsn.net

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Circle (133) On Reader Service Card

GM Journal

When Hackers Attack

Page 35

Radio World | Resource for Business, Programming & Sales | July 8, 1998

MARKET WATCH

Richmond Radio Ready to 'Explode'

Lack of Format Competition Makes Market No. 56 An Attractive Buy for Radio Advertisers

Lynn Meadows

Richmond, Va., is steeped in history yet on the verge of tremendous growth. The city is sometimes called "the perfect blending of past and present."

Virginia legislators serve here in the neo-Classical Virginia State Capitol building, designed by Thomas Jefferson. Jefferson Davis served as president of the Confederacy here in Richmond. He is buried here, as are more than 18,000 Confederate soldiers. Granite stones honoring Robert E. Lee, Jefferson Davis and Stonewall Jackson share space on Monument Avenue with a newly added monument to Richmond native and tennis great Arthur Ashe, Jr.

Beyond the city limits are the counties of Chesterfield, Hanover and Henrico that make up the rest of the Richmond market and add the suburban sprawl of malls and single-family homes. The city was recently named the No. 1 mid-size city in the south by Money Magazine. Total 12+ population in the market is expected to approach 1 million by the year 2000.

The blend of past and present is evident in Richmond radio, where the same faces have remained in management positions despite the flurry of consolidation activity in which three groups have scooped up half of the stations in the market.

Of those three groups, Sinclair Telecable has the longest history in Richmond. The family-run company also owns radio stations in Norfolk, Va., and Austin, Texas.

Richmond native Ben Miles is vice president of Sinclair Telecable and general manager of its four Richmond stations: urban station WCDX(FM), urban AC WPLZ-FM (licensed to nearby Petersburg), smooth jazz WSMJ(FM) and gospel WGCV(AM).

Miles joined WCDX in 1987, two years after Sinclair Telecable built the station. The company had been trying a variety of formats without great success. When it

See RICHMOND, page 35 ▶

Radio in Richmond airs against a background of history.

A 'Bossjock' and His Ol' Yellow Legal Pad

Doug Tracht

For a bossjock charged with the job of making people laugh every morning, nothing is more frightening than staring at a blank yellow legal pad. That's why I scribble on just about anything that's not nailed down — including that pad — in an effort to help me remember what the heck I want to talk about on the air! Hey, I'm organized ... an organized mess!

I have to write stuff down or I'll forget about it. That's my life — I'm always in pursuit of a joke, and paper is where my jokes reside (after I've thought 'em up, that is). What am I going to talk about on any given morning? What new topical or zesty joke can I unleash on my unsuspecting public? What's on TV or in the papers that I have to pontificate about? It all goes down on my yellow legal pad. I'll tell

See GREASE, page 37 ▶

Photo by Alan R. Peterson

Doug 'The Greaseman' Tracht

Technology and Price Breakthrough

NEW - Your Complete Digital Solution !!!

Perfect Cart machine replacement: play, stop, pause, loop, link . . .

Perfect for Live Assist: Jingle Box, Phoner Editor, & much more . . .

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From the #1 manufacturer of Digital Workstations in Radio !!!

Live On Air
$495

Live Assist $1,995

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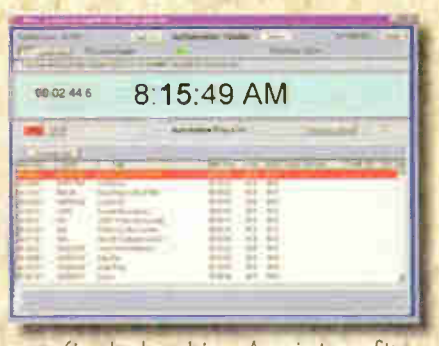
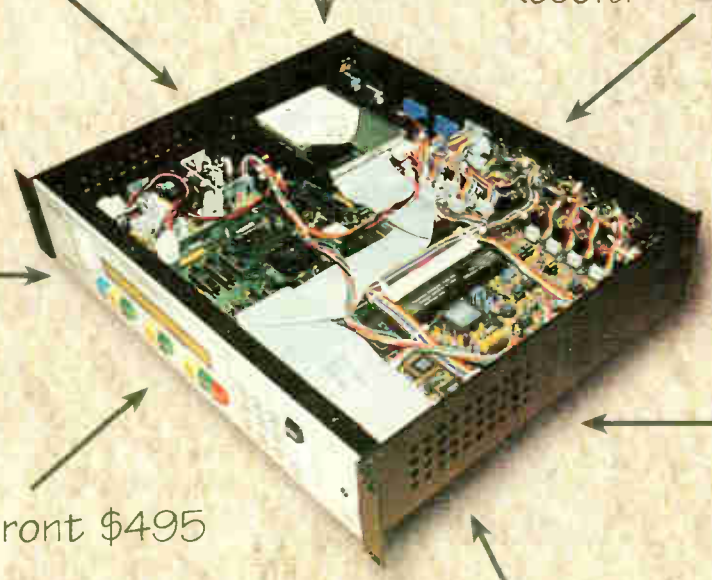
$2,995



(includes Live Assist software)

Triple Play & Record

Cart Machine Control
$750



Jingle Box Control
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DL4 Digital Audio Engine

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The DL4 is a technology & price breakthrough !!! More reliable and 1/4 the price of comparable products, the DL4 is NOT a PC computer with sound card in it. The DL4 is in fact a digital audio appliance that is controlled by Arrakis LCD control panels, jingle boxes, and Windows 95 PC computers. If the PC fails, your audio library is still available !!! Expandable from 3 Plays & 1 Record to up to 96 Plays & 32 Records, the DL4 fits any size station s needs. You can even use your favorite PC based digital editor for production with the DL4 On Air !!! Call TODAY to find out how little it will cost for you to SAVE money and move into the 21st century !!!

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ONLINE RADIO

'We Got Hacked!' Here's What to Do

Kim Komando

A flabbergasted program director phoned me recently seeking advice. He explained that his station's Internet Web site was "hacked," apparently by some unfriendly listeners who wanted to tell the station and its Web site visitors what they really thought of one of their most popular talk hosts. This went unnoticed for hours until the general manager called with the news. Talk about bad timing.

The best way to manage a security breach is to keep it from happening in the first place.

What can you do?

Safe and secure

The first step is to make sure that your system is as secure as it can be. When I say "your system," I mean whatever system you do business on, whether it is your computer system or that of your Internet Service Provider.

Your first line of defense is a reliable firewall, a combination of hardware and software that controls access to a computer system. Suppose that the only means of remote access to your computer is by using a modem attached to the computer. Simply turning off the modem is a firewall in its simplest form.

If you are involved with broadcasting online and promoting your show or station, you want the entire world to have access to your system around the clock. Although this access is great for listeners, it is easy to see the security problem this creates.

Your system is vulnerable to attack 24 hours a day, seven days a week. You have no reason to cut corners. Unless you are a phenomenally talented hacker, don't even consider building your own firewall. Just like brain surgery, this is one area you should trust the experts.

Unfortunately, a good firewall can cost as much as brain surgery, so don't be surprised when you get the bill.

After securing the server that contains your Web page and the information, look to your internal operations. Change passwords often, and use a mixture of letters, numbers, and other characters such as the ampersand ("&"). This is important for radio stations that usually have a fair share of visitors, employees and staffing changes.

You also must limit access to sensitive information within the station. Ask yourself these questions.

- Who will update and change the Web site?
- Who else knows the passwords?
- Which computers in your office have access to the passwords?
- Most important, how well do you know the person (or persons) in charge of doing the job, and can he or she be trusted?

When hackers attack

How can you tell whether you have been attacked? And more important, what should you do?

First, make sure that you review daily the activities on your Web site so you know what it normally looks like, and also to track what is and is not working. The best way to tell whether you have been attacked is to monitor your site constantly for any — I repeat, any — suspicious or unusual activity.

Consider these points:

- Have you noticed an unexplained increase or decrease in traffic through your site?
- Are you suddenly using up considerably more disk space?
- When you look at the daily activity reports and hits from your Web site, do you notice any unusual activity or patterns?

If you answered yes to any of these questions, there probably is a good explanation. You should still check everything out, however. If you don't know how to proceed, contact CERT, the Computer Emergency Response Team. The sole purpose of this nonprofit, around-the-clock organization, sponsored by various members of the Internet community, is to address security issues and concerns.

You can reach CERT by phone at (412) 268-7090 or by e-mail at *cert@cert.org*

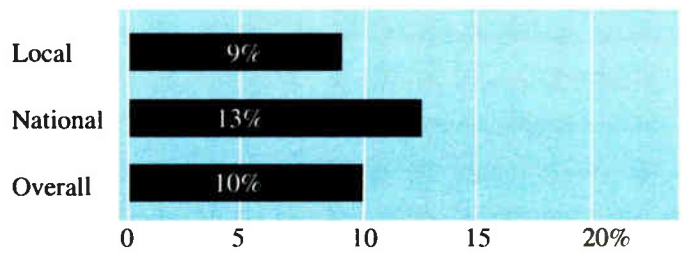
I also suggest visiting the CERT Web site at *www.cert.org* for some valuable information.

If you do get hacked, the very worst thing you can do is talk about it on the air. That tells other malicious folks just how vulnerable your site is and gives the culprits attention that they seek. After your station gets hacked, silence is golden.

■■■

If you do get hacked, the worst thing you can do is talk about it on the air.

RADIO REVENUE : YEAR TO DATE



Strong sales gains at the national level in April helped drive up year-to-date national radio revenue performance. A 17 percent jump in April did the trick, helping to drive combined national and local radio revenue to a pace 10 percent ahead of last year's.

"The recent trend of national dollars filtering into small and medium markets continued in April," said Radio Advertising Bureau President and CEO Gary Fries.

April marked the 68th consecutive month of ad revenue gains, RAB said.

New Retail Openings Bode Well for Richmond

▶ RICHMOND, continued from page 32

changed the format to urban contemporary that year, WCDX was in the top five within eight months and has remained in the top five ever since, Miles said. The group acquired competitor WPLZ in 1992 and WSMJ in 1996. It LMAs WGCV with Hoffman Communications, which has two other religious stations in the market.

Clear Channel came to Richmond in 1992 and now owns six stations: big band WTVR(AM), light AC WTVR(FM), news/talk WRVA(AM), sports/news WRNL(AM), classic rock WRXL(FM) and CHR station WRVQ(FM).

In 1996, Clear Channel purchased AC station WTVR(FM) and its AM counterpart for $18 million, the highest sales price in the market so far. WTVR "Light 98" General Sales Manager Jean Massey believes that figure would definitely be higher today.

"We've gotten great ratings. The format seems to be really hot right now across the country. Country used to be number one in this market for years, and this is our third book in a row in adults 25-54 that we have been number one over the country station," she said.

Formats

Atlantic Star, a division of Capstar, is the most recent player in the market thanks to the purchase of SFX Broadcasting. The group owns country station WKHK(FM), classic hits WKLR(FM), hot AC WMXB(FM) and WBZU(FM), which is the only alternative station in the market.

"One thing that is really good for us in the market is there are no duplications of formats," Massey said. There is only one FM country station, for instance, one alternative station and one classic rock station. The three urban stations on the FM band, two of which are urban AC, are the exception.

"I think Richmond is somewhat unique in that, for a city its size, it is probably 'under-radio-ed,' especially in terms of FM stations," Miles said. "I don't think it has the level of competition you would find in most markets this size or in markets within close proximity, like Norfolk, Va., or Washington, D.C.

"The agencies all the time say 'I love buying Richmond' because you can really reach the 25-54 audience with about three stations," Massey said.

Sherry Jenkins, senior broadcast buyer with The Martin Agency, agreed. "With Richmond, you've got one of each format. You can go in and be very specific targeted. If you've got a specific product, you know exactly who you are going to need to talk to."

Hot growth

The hottest trend in Richmond is growth. Motorola and White Oaks Semiconductor will soon open plants. New retail businesses like Home Depot are moving in, and Kohl's Department Store opened its first three Richmond area stores in April.

Since the passage of the Telecommunications Act, market revenue growth has been in the single digits. About 12 local stations report revenue information to Miller, Kaplan, Arase & Co.

According to Massey, the Miller, Kaplan figures in 1996 show a 6.5 percent market growth for local and national dollars combined. In 1997, that figure fell to 5 percent. Year-to-date through April, the number was 6.2 percent.

"I would like to see the market grow a little bit better than that, to be very honest with you," Massey said. "But I am hoping that it will grow with the growth in the market, with

See RICHMOND, page 43 ▶

Internet-Only Time Machine Bows

Will Recreating the Feel of 1960s Radio Be the Answer to Profitable Webcasting in the '90s?

Alan Haber

What it means in the grand scheme of things is anyone's guess, but Ricky the K's three-hour, five-night-a-week "Solid Gold Time Machine," available only on the Internet and only to subscribers, may wind up pointing the way toward what many consider to be either simply elusive or patently non-existent: profit in cyberspace.

Buck stops here

Stations and other program providers trying to make a buck on the Internet might be well advised to at least keep an eye on the DJ otherwise known as Richard Kaufman.

"We're giving people radio that they haven't had in 35 years," said Kaufman. That's what a little plate reverb and vacuum tube compression and limiting will do for the average '60s radio denizen.

As radio continues to stab at Webcasting in the hopes of either increasing brand awareness or adding to the bottom line, focus groups and other research-oriented activities beget hints that may or may not suggest ways to make the Internet work for the medium.

Kaufman certainly is working, putting in long hours in his Dallas studio, pumping out '60s groove after '60s groove. He doesn't call the songs he plays "oldies"; he finds the word "very demeaning." Ricky the K projects with abandon into his RCA 77-DX ribbon microphone, spewing bit after bit, intro after intro, recreating the feel of '60s radio as only a child of the '60s can.

"We are the HBO of radio," said Kaufman of "The Solid Gold Time Machine."

"You can go watch free movies in a thousand different places, yet people are willing to pay extra money to watch HBO, to watch Showtime, to watch Cinemax. There are a thousand places to listen to oldies, but there are people (who) are willing to pay extra money to get the things that we can give them that oldies stations can't or won't."

More songs

Like musical variety. Kaufman boasts he bests the number of songs on the average oldies station playlist with his 3,000-strong tune arsenal and won't repeat any song for about nine weeks.

"We have to distance ourselves as far away from the oldies stations as possible," said Kaufman. "We have looked at all the people who really, really love oldies — what their major complaint is with all oldies stations — and we've addressed those complaints."

"The Solid Gold Time Machine," Kaufman said, "is designed ... for long-term listening, for people who will listen to all three hours every night." Music lovers pining for Barry McGuire's No. 1 1965 waxing, "Eve of Destruction," or Allan Sherman's No. 2 smash from 1963, "Hello Mudduh, Hello Fadduh! (A Letter From Camp)," or The Critters' top-20 1966 tune, "Mr. Dieingly Sad" (or, possibly, Rolf Harris' 1963 No. 3 platter, "Tie Me Kangaroo Down, Sport") will find peace everlasting in the arms of Kaufman's Machine.

Announced in 1995 but not premiered until May of this year, "The Solid Gold Time Machine," which reports to ASCAP and BMI, has taken its time to metamorphose from a proposed satellite-delivered entity into an available-only-on-the-Internet music and screaming DJ compote. The reality of cost overhead, lower

Richard Kaufman

press time, more than 100 happy listeners in the United States and abroad — in mono, because Kaufman thinks it sounds best on the Net that way. Everything on the show is on cart except for Kaufman's live bits, and played on 12 cart machines.

Kaufman and his partner, Dennis Ardizzoni, a Texas state bank examiner, are making a profit. Thanks to low overhead and getting "enough subscribers a week before the show even went on," Kaufman is optimistic. The sky's the limit, in fact, for gaining more sympathetic ears for The Machine.

The chief cook and "Solid Gold Time Machine" bottle washer does it all — he records the show in half-hour segments as WAV files onto a hard-drive system from approximately midnight to 3 a.m. and uploads them as RealAudio files to his Web site by 8:30 a.m. Subscribers must listen to the current show before the next one is uploaded; shows are not archived.

We're giving people radio that they haven't had in 35 years.

— Richard Kaufman

No prep

"We're in this for the long haul," said Kaufman. "I intend to do this for the rest of my broadcast life." And without prep for his on-air antics, either. "I don't believe (in traditional prep)," he said. "Show prep is for losers. If you're doing personality radio and you can't ad-lib, and you can't be spontaneous, then you had better go back and evaluate your validity as an air talent."

The secret of Kaufman's planned long-term success on the Net? "You either have to be different than, or better than, and hopefully we're both."

■■■

Ricky the K's "Solid Gold Time Machine" Web site resides at www.60sradio.com

Reach him at pamsjngl@flash.net

So, What's Funny? Ask Grease!

▶ GREASE, continued from page 33

ya, if the dog eats my homework, I'm in deep poop!

What's ripe for ribbing? The Greaseman team and I pretty much see most things in life as fair game for comedy. Sure, I try to keep common sense in mind, but jokes are all about finding a scapegoat — someone, something, someplace is going to catch the brunt of our laughter.

To me, telling a joke is like releasing a pressure valve. For a skinny kid from the Bronx who was the victim of a lot of derision and jokes growing up, it's kind of a payback. And it kinda makes you feel good. In fact, I think a lot of my listeners find laughter not only therapeutic, but a daily requirement — like getting enough roughage.

Just about anything can spark a laugh. Whenever some sort of major news event or hideous, Hollywood happenstance is on the front pages, for example, jokes come out of the woodwork from every conceivable place on earth ... and beyond! My crew and I create and write a bunch, but they spread like wildfire on the Internet. Ya can't stop 'em!

And ya can't stop what they're about. Funny's funny and, hopefully, it's timeless, too. I have a ton of timeless favorites. Timeless can mean just about anything, even a raunchy Redd Foxx-like routine or a sinewy "Seinfeld" plot twist that has me in tears of laughter. Just about anything is fair game.

The challenge for me and for all of us radio people who hang our hats on humor is to make fresh material timeless! And, when material is timeless, you just know it.

The golden rule on The Greaseman Show is: if it makes us laugh, then we'll do it ... keeping in mind, of course, the station's license. My producer, Bill Scanlan, always knows I have a real sick or zesty one ready when I ask him, "How can we get away with this one?" Sometimes I can't, so it goes into my stand-up act. That said, I've always operated under the adage, "Better to beg forgiveness than seek permission." Hey, I not only test the envelope, I lick it!

If your job is to be funny on the radio, be funny. Don't limit your comedy. Laugh at lots of stuff. I laugh at "The Far Side" comic strip, "I Love Lucy," comedian/actor Dennis Leary in the movie, "The Ref"— hilarious!

Broaden your horizons. Pick up a drop-dead serious book like one of those holier-than-thou self-help tomes. That'll make it easier to find laughter in more places in the world and perhaps spark a joke that you can jot down on your yellow legal pad or cocktail napkin or crumpled sliver of paper. But be legible!

Fortunately, unlike some general managers I've worked for (relax, it's a joke!), I don't doodle.

Fans, Co-Workers Remember Morgan

Bob Rusk

The death of Robert W. Morgan has silenced one of the most beloved voices in radio. Morgan, a morning drive fixture on the Los Angeles airwaves for 30 years, passed away on May 22 after a lengthy battle with lung cancer. He was 60.

Morgan, who most recently worked at CBS-owned KRTH(FM), took a leave of absence from the oldies station last year. In an emotional statement to his listeners at the time, Morgan acknowledged that he had cancer.

"My doctors aren't quite sure what caused it, but suspect those two packs a day for 35 years might be a factor," he stated.

Huge ratings

Morgan arrived in Los Angeles in 1965 and was the original morning man on "Boss Radio" station, KHJ(AM), now KKHJ. With his signature phrase, "Good Morgan," he awakened the audience with his rapid-fire baritone delivery and top-40 rock. It was a winning combination. Morgan amassed rating shares in the high 20s, an accomplishment that since has not been equaled in the market.

Morgan was born in Mansfield, Ohio,

See MORGAN, page 41 ▶

Robert W. Morgan

Products & Services Showcase

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

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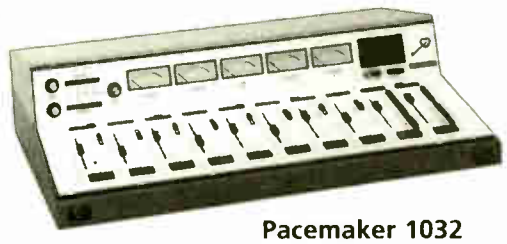

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Tracking the 'Pulse of the Planet'

Linda Sultan

Jim Metzner, award-winning producer and host of "Pulse of the Planet," lets nature speak for itself.

"Pulse of the Planet" is a series of 2-minute radio programs that track the rhythms of nature and culture. The award-winning series is heard on more than 200 stations in 20 countries around the world.

Capturing sounds for radio as diverse as dolphins talking, tree sap flowing and tops spinning requires some innovative recording techniques.

Attitude

"The most important recording technique is the attitude of the person behind the microphone," Metzner said.

While recording, Metzner said, he tries to be as unobtrusive as possible, letting the sounds do the "talking." It is a balance of how to be a guide without getting in the way of the sounds that is one of the program's biggest challenges.

"You have to say enough so that listeners can relax and know where they are and what is going on and then the sounds speak for themselves," Metzner said.

Jim Metzner

"Pulse of the Planet" travels the world to record the sounds of natural phenomena and cultural events. In a recent program about sugaring time in New England, listeners heard the sounds of sap becoming syrup: the dripping of the sap into the buckets and the wood fire part of the process.

Sound to signals

Another program explored gamma ray bursts. Because gamma rays are inaudible, very high-energy bursts detectable only by satellite, Metzner called on scientists at the Massachusetts Institute of Technology (MIT) to translate the signals into sound using a synthesizer. Listeners could hear the gamma-ray bursts as tones in the synthesizer.

"It was the first time anybody had done that," he said.

Hand-held stereo and binaural microphones are often used to give a real sense of the essence in a specific location. A parabolic reflector is frequently used in field recording. The large parabolic dish is useful in gathering bird sounds and far distant sounds and bringing them closer.

An unusual technique employed for the show is the use of "translations." The technique involves receiving signals that are well below or well above the range of human hearing, and then adjusting the speed of the signal so that listeners can detect the sounds.

The technique has been used with the infrasonic sounds of blue whales and elephants and the ultrasonic sounds of bats.

Metzner has encountered some unusual situations in his role as a radio producer. While on Cape Cod, he became part of a whale rescue team. He learned that pilot whales had beached themselves nearby.

With microphones in hand, he rushed to the scene, but soon put down his equipment and became a participant in the rescue.

Even when on holiday, Metzner continues to record. Once on a trip to Morocco, he took his microphones to the rooftops of the city of Fez to recorded the call to prayer.

To assemble more than 250 programs a year from all over the globe, "Pulse of the Planet" often relies on field producers and scientists who use their own equipment.

Recently a colleague in Southeast Asia recorded the sounds of top spinning in Malaysia, where spinning tops is a local September tradition.

The tops, about the size of bowling balls, are wrapped with rope. One team member dramatically throws the top at full force, another of the top-spinning team catches it in mid-air and then a third person balances it on a small pedestal. The tops are squirted with oil and often spin for hours.

It is a competition of sorts, judged by how well the top is tossed and how long it spins. Music is often played at these top-spinning events.

Although many of the sounds featured on "Pulse of the Planet" come from exotic locals, Metzner also records sounds in his own community. In the springtime, he records the extraordinary sound of toads found in his neighborhood.

"The sounds are hauntingly beautiful and melodious," said Metzner. "Each toad has a register that it sings from and its own separate pitch. The different sounds come from different parts of the pond or the wetlands. When the toads sing together it is like listening to a symphony."

■ ■ ■

For information from "Pulse of the Planet," contact Andrew Rosenblum at Murray Street Enterprise in New York City at (212) 619-1475; via fax at (212)-349-0744; via e-mail at pulse@murraystreet.com *or circle* ***Reader Service 116.***

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Morgan Dead at 60

▶ MORGAN, continued from page 37

and liked to joke that he was destined to work in radio. After all, his parents' initials were AM and FM. "It gave me a great excuse for not finishing my final year in law school," he once quipped. His first job was in 1955, on the campus station at Wooster College in Wooster, Ohio.

He then moved west and was hired at KACY, now KTRO(AM), in Port Hueneme, Calif. He hosted the overnight show, "Kegler's Spare Time with Bob Morgan," live from The Wagon Wheel Bowl.

Morgan switched to the morning shift at KMBY, now KNRY(AM), in Monterey, Calif., but soon left for KOMY(AM) in nearby Watsonville. He worked at KOMY for just one day; KMBY lured him back at five times his salary after the station was flooded with calls from Morgan's loyal fans.

Turning point

The turning point in his career came in 1963, when he moved to KMAK, now KCBL(AM), in Fresno, Calif. He was hired by Ron Jacobs, who was vice president of programming at Colgreene Broadcasting, which then owned the station. Jacobs did mornings at KMAK, and Morgan was brought in to do afternoons. "But," Jacobs told RW, "when I heard how much potential Morgan had, I left, and he took over morning drive."

Jacobs, who would go on to be co-architect of the "Boss Radio" format and program director at KHJ, had two ideas that proved crucial to Morgan's future success: while at KMAK he changed Morgan's air name to Robert W. Morgan "because 'Bob Morgan' sounded less glitzy than what we wanted;" and he suggested that Morgan not refer to his shift as the "Morning Show."

Good Morgan

"Why should a guy named 'Morgan' call that time of the day 'morning.' It was such an obvious thing," Jacobs said. KMAK then began promoting the daypart as "the Morgan."

But Morgan quickly moved on to stations in Sacramento, Calif. and Oakland, Calif., en route to his "Boss Jock" gig at KHJ, where he made radio history with his phenomenal ratings.

He brought a caustic wit to the Los Angeles airwaves and made no apologies for comments that sometimes raised eyebrows. An incident in 1969 provided the kind of material that listeners had come to expect. As he walked to his car one morning, Morgan was stopped by a police officer. He was carrying a handheld hair dryer, which the officer apparently mistook for a gun. Later on his show, Morgan called the officer a "punk cop."

Morgan then told the audience, "He pulled his big gun on me ... gonna shoot the disc jockey for carrying a hair dryer down the street. I may be a little funny, but it wasn't even plugged in!"

When a listener called Morgan's show to complain about what he was saying, he put her on the air. "You better watch out, lady," the master of the one-liner shot back. "I'll bring my hair dryer down there and terrorize your neighborhood!"

Morgan left KHJ in 1970 and went to WIND(AM) in Chicago. Two years later, the California sunshine lured him back to KHJ, where he remained until 1974. He spent the remainder of his career in Los Angeles, working at stations including adult standards-formatted KMPC(AM), now KDIS(AM). Morgan returned to his top-40 roots in 1992, when he joined KRTH.

During his career, Morgan hosted several nationally syndicated radio programs, including "The Robert W. Morgan Special of the Week" in the 1970s. Among his television credits, Morgan was the announcer on the syndicated music show "Solid Gold" throughout the 1980s.

Morgan was recognized with a star on the Hollywood Walk of Fame in 1993. The following year, he was among the charter inductees into the National Broadcasters Hall of Fame, along with former President Ronald Reagan, Larry King, and Ted Turner.

Morgan is survived by his wife Shelley and daughter Susanna. Donations in his name may be sent to: The Robert W. Morgan Cancer Awareness Fund, 19528 Ventura Boulevard, Suite 603, Tarzana, CA 91356.

Tributes

"I followed Robert in the 9 a.m. to noon slot at KHJ and learned a lot from him. We are all composites of people we admire, and he was someone I always admired. As long as I'm doing a show, there will always be a 'Good Morgan.' There's a lot of him in me."

— Charlie Tuna

"Robert and I worked together at KMPC. He was a wonderful friend and one of the greatest radio people of our time. A couple of years ago, when he was at KRTH, we put on the Beautiful Downtown Burbank Film Festival and showed only one film: 'Attack of the Killer Tomatoes.' It was a magic moment!"

— Gary Owens

"Robert W. Morgan was to Los Angeles morning drive what Johnny Carson was to national television. It is impossible to imagine radio in Los Angeles without the best 'Boss Jock' in the business. His unique combination of timing, wit, and charm made him a man without peer."

— Kevin Gershan, former producer, "The Robert W. Morgan Show"

Station Billboard Bares All ... For a While

A vandal did some celebrating on the latest WFBQ(FM) billboard. The Indianapolis station flaunted its 20th anniversary with the original billboard, which proved irresistible to a certain spray-paint "artist."

The vandal anatomically altered the billboard, which was further defaced several days later.

WFBQ fielded listener complaints about the graphic enhancements, as well as suggestions on how to make the billboard more presentable, and settled on the current picket-fence design, complete with a new pun.

Before

After

Bayliss to Roast Randy Michaels in October

Stephanie Muller

The John Bayliss Broadcast Foundation will host its 13th Annual Bayliss Media Roast on Oct. 27 at The Pierre Hotel in New York City.

The Bayliss Foundation, which was established in 1984, gives scholarships to students who plan to pursue careers in radio.

This year, the foundation hopes to award 20 scholarships in the amount of $5,000 each. All proceeds generated by the Media Roast go toward this scholarship fund.

This year, Jacor Communications CEO Randy Michaels joins a long list of distinguished past roastees, including Scott Ginsburg, former FCC Commissioner James Quello, RAB President Gary Fries, and talk show hosts Larry King and Dr. Ruth Westheimer.

Randy Michaels began his career in radio working for Taft Broadcasting at WGR(AM)/WGRQ in Buffalo, N.Y., as a programmer. He climbed the broadcasting ladder of success, taking positions at AM radio stations in Cincinnati and Kansas City, eventually being named vice president of programming for Taft.

Jacor CEO Randy Michaels

Seven Hills

Michaels went out on his own in 1983, forming Seven Hills Communications, which later became Republic Broadcasting.

Michaels joins a long list of distinguished past roastees.

Michaels was named executive vice president when Republic merged with Jacor Communications in 1986. Michaels has held his current position, CEO of Jacor Communications, since 1993.

Invitations will go out later in the summer for the black-tie event. This is the only fund raiser that the Bayliss Foundation will hold; but it will accept donations throughout the year.

Anyone interested in supporting this cause can send a check to Bayliss Foundation, P.O. Box 221070, Carmel, CA 93922.

For more information on the foundation, or details regarding this year's Media Roast, contact Kit Hunter Franke at (408) 624-1536, ext. 240; or via e-mail *baylissroast@kagan.com*

Richmond Poised for Big Growth

▶ RICHMOND, continued from page 35

the Home Depots and the Kohl's and some of those coming in. I don't see why it won't."

The big stores may be helping already. National revenue year-to-date in the market is up 16.9 percent, compared to a 4.8 percent increase during the same time span last year.

Ken Wayland, general sales manager of news/talk WRVA, uses four benchmarks to assess the Richmond economy: retail, financial, automotive and building.

"If you look at those four cornerstones, all are experiencing growth right now," Wayland said. He said much of Richmond radio is a derivative of what is happening in those industries.

"It truly is in a position to explode," Steve McCall, general manager of the Atlantic Star stations, said of market growth.

According to Miles, Richmond is the most successful of all the Sinclair Telecable markets.

"Our stations had a record month (in May), the biggest month in the history of the triopoly. So I would have to say business is good," said Miles.

New growth already is bringing more revenue to radio, as advertisers try to introduce themselves.

"Richmond is kind of ... dominated by conservatives. For that reason, change is something that they need to market very cautiously," Wayland said.

For instance, two buyouts of long-standing Virginia banks have taken place recently and the newcomers are spending a lot of radio dollars to introduce themselves.

"People don't like to see a lot of change. It takes a long time for anything new to be accepted in Richmond," Massey said.

Making programming changes also can be challenging. When WRVA started airing Dr. Laura, Wayland said the time needed by the audience to adjust "was probably three times that of the national norm."

"I cannot tell you the number of phone calls we had in the beginning: 'Who is that woman? She's mean.'

"People expect consistency, stability and credibility out of us," Wayland said. "A lot of that is heritage. When you have been on the air for 73 years, you have (listeners who are) parents, grandparents, people that just grew up with the radio station and know no other dial position. Of course, they are the ones that get mad at Dr. Laura."

WRVA has received the award for best news operation in the state by the Virginia Association of Broadcasters for 17 consecutive years.

George Nadel Rivin, partner in charge of broadcast services for Miller Kaplan Arase & Co., said he thinks consolidation has allowed large groups to attract top-quality managers to the smaller markets, where groups now can offer managers more stations, more responsibility and more money.

McCall is an example. Prior to coming to the Richmond market 10 months ago, he worked for SFX Broadcasting in Raleigh, N.C. Everyone else interviewed for this story, however, had worked in Richmond for at least seven years.

Jenkins of The Martin Agency is one example of a constant in the market. She has been buying in the market since 1986 and says she still works with some of the same people.

"A lot of the people that started out at the radio stations at an assistant level are now sales managers, general managers of the radio stations," she said.

"Richmond is a great city," McCall said. "They have an appreciation for their past and a prospect for a fabulous future."

■■■

Lynn Meadows is a free-lance writer based in Chesapeake, Va.

Richmond Radio Snapshot

Market Rank: 56
Revenue Rank: 45
Number of FMs: 14
Number of AMs: 14

Est. Revenue 1994: $36,800,000
Est. Revenue 1995: $37,700,000
Est. Revenue 1996: $40,200,000
Est. Revenue 1997: $43,000,000
Est. Revenue 1998: $45,800,000

Revenue Growth:
'91 - '96: 5.7%
'97 - '01: 6.5%

Local Revenue: 80%
National Revenue: 20%

1997 Population: 937,400
Per Capita Income: $16,264
Median Income: $35,133
Avg. Household Income: $41,999

Source: BIA Research

Richmond
Radio Market Overview

Stations	Owner	1997 Est. Rev. in $mil.	Format	Winter 1998 Rating
WKHK(FM)	Atlantic Star	6.8	Country	10.6
WCDX(FM)	Sinclair Telecable	5.0	Urban	10.1
WTVR-FM	Clear Channel	5.5	AC	10.0
WRVA(AM)	Clear Channel	4.1	News/Talk	8.9
WRVQ(FM)	Clear Channel	3.6	CHR	7.0
WPLZ-FM	Sinclair Telecable	1.8	Urban AC	5.6
WSMJ(FM)	Old Dominion Broadcasting LLC	1.25	AC	5.5
WMXB(FM)	Atlantic Star	3.8	Hot AC	4.9
WRXL(FM)	Clear Channel	3.4	Classic Rock	4.0
WKLR(FM)	Atlantic Star	1.35	Classic Hits	3.6
WBZU(FM)	Atlantic Star	1.8	Alternative	3.2
WKJS(FM)	FM-100 Inc.	3.1	Oldies	3.1
WTVR(AM)	Clear Channel	5.5	Big Band	1.8
WSOJ(FM)	FM-100 Inc.	0.75	Urban AC	1.6
WREJ(AM)	Belle, Walton & Cummings, Charles	0.5	ChrsContemp	1.5
WXGI(AM)	Gee Comm. Inc.	0.15	Country	1.4
WFTH(AM)	Johnson, James Jr.	0.35	Gospel	1.1
WDYL(FM)	Hoffman Comm. Inc.	NA	ChrsContemp	1.0
WCLM(AM)	World Media Broadcasting Co.	0.55	Urban/Olds	0.9
WRNL(AM)	Clear Channel	0.75	Sports/News	0.9
WGCV(AM)	Sinclair Telecable	0.2	Gospel	0.8
WVNZ(AM)	4M Communications	NA	News	0.4
WLEE(AM)	Pearson, Max H.	0.1	News/Talk	0.3
WDZY(AM)	Hibernia Comm.	0.1	Oldies	Not rated
WGGM(AM)	Hoffman Comm.	Not Listed	Inspiration	Not rated
WPES(AM)	Calvary Comm.	Not listed	Business News	Not rated
WYFJ(FM)	Bible Broadcasting Network	Not listed	Christian	Not rated

BIA RESEARCH

Stations are ranked in order of Arbitron Winter '98 12+ ratings. Copyright 1998 The Arbitron Company. May not be quoted or reproduced without the prior written permission of Arbitron. Other information provided by BIA Research through its MasterAccess Radio Analyzer Database software.

Stamp Celebrates Radio

Take a stroll back in time with the new commemorative "Celebrate the Century" stamps, representing significant events for each decade of this century.

The Citizens' Stamp Advisory Committee already has approved stamps spanning 1900 to 1949, including the "Radio Entertains America" stamp for the 1920s (pictured).

The stamps representing the years 1950 to 1999 will be voted on by the public. Anyone may vote at post offices, where ballots for each decade are available; or online at the "Celebrate the Century" Web site (*www.stampvote.msn.com*).

The 1970s is the next decade to be voted on. Voting begins on September 1, 1998 and concludes at the end of that month. Among the 30 eligible categories are three radio-themed entries: Citizen's Band radio (CBs); disco music; and PBS and National Public Radio.

Voters will decide which 15 of the 30 eligible categories will be commemorated with a stamp.

— Stephanie Muller

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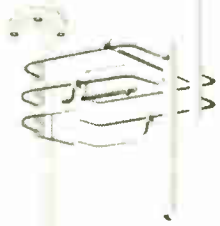

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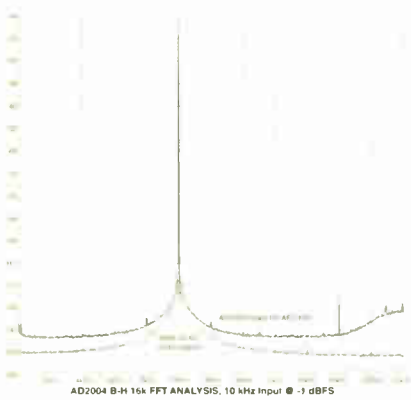
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Talk Productions has syndicated its program "Bargain Buylines," hosted by Sue Goldstein.

For 26 years, Goldstein has made a career of informing the general public about how to get the most for their money. She has written more than 60 books on shopping and has made appearances on many popular television programs, such as "Oprah" and "Good Morning America."

The Underground shopper

The show is available to all formats and is set up to run as a series of daily vignettes, Monday through Friday. Goldstein will lend her bargain hunting skills while providing valuable tips to listeners.

Talk Productions' president Jerry Schraeder said, "Whether in New York City or Raton, N.M., the public in general is always looking for the best deals available ... and Sue Goldstein knows just where they are."

For more information contact Mike Sala or Angelo Celidonio in Texas at (888) 668-4595; or circle ***Reader Service 59.***

Jaffe Offers New Audio Service

Jaffe Associates has taken steps to make legal research easier for journalists by incorporating a new audio component into the Jaffe Legal News Service.

The items in the service contain soundbites of well-known attorneys commenting on newsworthy issues. It links to a Web site and is particularly beneficial to radio journalists because the 15- to 30-second quotes can be downloaded as WAV files for use in audio stories.

Also available via the Internet is the Jaffe Legal News Service Archive, which includes a collection of back issues listing legal sources. It be searched by keyword at *www.get-serious.com/publicity.html*

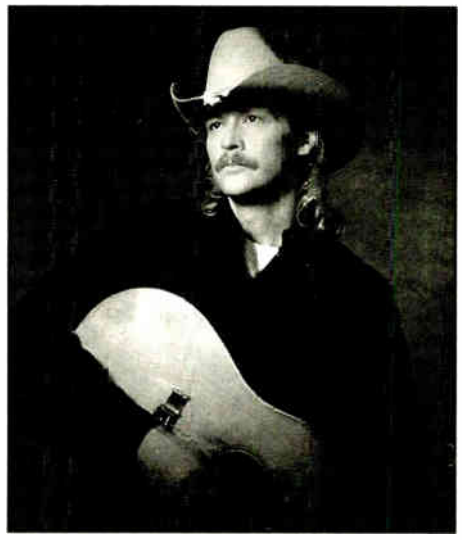
For more information, contact Roni Singleton at (301) 972-3008; or circle ***Reader Service 85.***

Country Music and NASCAR Heat Up Airwaves

Somehow, a day at the auto race just wouldn't be complete without your favorite country artists to help celebrate the festivities. This is the concept behind the United Stations weekend radio program, "Thunder Road."

After acquiring "The Road" from Stillman last fall, United Stations has joined forces with Stillman President Winslow Stillman and Executive Vice President Charles Crutfield to combine two popular pastimes: country music and NASCAR Winston Cup Racing.

The show is hosted by on-air personality Bobby Mitchell at WWKA(FM) in Orlando, Fla., who is joined by veteran motor sports correspondents Eli Gold, Jim Phillips and Steve Waid.



Alan Jackson

"Thunder Road" provides listeners with pit and on-track racing news surrounding the NASCAR events. In addition, listeners can enjoy interviews with country music artists, and get news on what's happening in Nashville from Sue O'Neill.

Country music listeners will enjoy another of United Stations' new programs, "Country Giants."

The three-hour monthly radio program features biographical salutes to some of country music's leading performers, including Vince Gill, Reba McEntire, Garth Brooks and Alan Jackson.

For more information from United Stations, contact Julie Harris in New York at (212) 869-1111; or circle Reader Service 163.

BIA Makes Broadcast Research Easier

Up-to-date radio and television commercial data can be accessed easily in a timely manner using MEDIA Web Search.

BIA Research has produced an online research service, available to the broadcast industry via the Internet. Users have a multitude of information at their fingertips, around the clock.

MEDIA WEB SEARCH

Debbie Metcalf, BIA vice president, said, "We are excited to answer the loudest and most often-voiced request of our clients, 'I need the most current and accurate information *now*.'"

Users can access Arbitron and Nielsen ratings information, FCC filings, data from the Census Bureau and links to other BIA databases. All obtained data in the program can be exported easily into many spreadsheet applications.

BIA industry surveys also will be accessible through MEDIA Web Search, providing figures such as estimated station revenues and projected market growth.

For information from BIA, contact Geoff Alexander in Virginia at (703) 818-2425; or circle ***Reader Service 111.***

Travel Radio Journeys to Great Britain

For people who just want to get away from it all, On Travel Radio presents its new one-hour program "The Jewels of Britain."

Listeners are invited to participate in a fascinating journey that will take them to places such as London and Wales. The show also will visit some of Britain's historical landmarks, including Bath, Greenwich, St. Andrews in Scotland, and Shakespeare's Stratford-on-Avon.

ON TRAVEL

This radio adventure aims to leave listeners yearning for the real thing. Those adventurous types are given the opportunity to call 1-(800) BRITAIN, to obtain a free copy of "The Jewels of Britain" directory.

The program will be hosted by noted broadcast journalists Paul Lasley and Elizabeth Harryman, and will be broadcast by National Public Radio and several stations around the country. "The Jewels of Britain" is free to interested stations.

For more information contact C. Michael Leone in California at (714) 493-7988; or circle ***Reader Service 137.***

NBG 'Mic Check,' A History of Hip-Hop

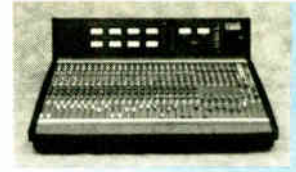
NBG Radio Network's newly syndicated "Mic Check" gives hip-hop fans a chance to explore the history behind the music.

NBG Radio Network

Hosted by the "Urban Commentator" Josiah, the show traces the history and progress of popular hip-hop artists through their music. Veteran New York hip-hopper DJ Excel, the man behind the mix, brings his musical knowledge to the show.

The 90-minute program is available on compact disc, and is offered on a market-exclusive basis.

For more information contact Ollie J. Holmes at (800) 505-5640; or circle ***Reader Service 189.***



Product Guide: The Good Stuff

Page 50

Studio Sessions

Off to Africa With Music in Mind

Anders Åhlin

Two years ago, RW brought you to the waterfalls in Monserrat to read about recording the sounds of nature. This time, author Anders Åhlin takes us to Northwestern Africa to record and preserve the musical traditions of the Gambian people.

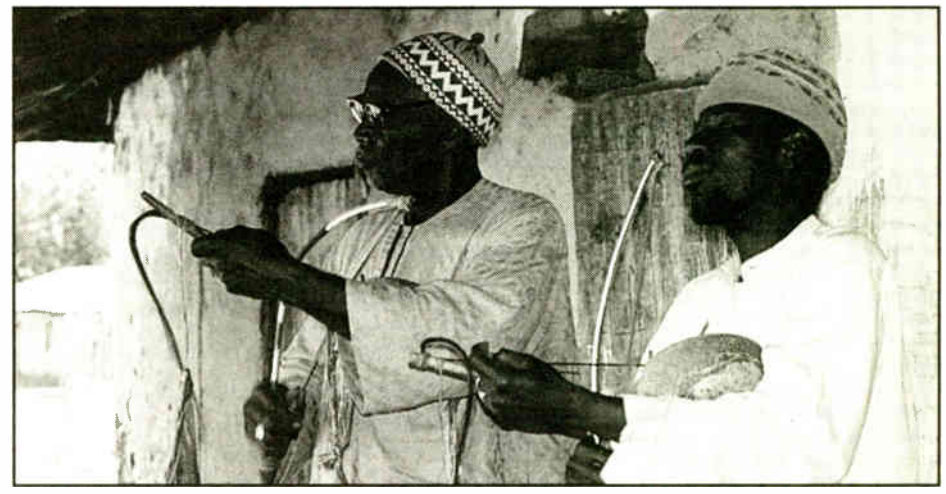
Facing the shiny new terminal of the modern Banjul International Airport, I realized how quickly social and technical standards were developing here in Gambia — a tiny, narrow country tucked into Senegal in Northwestern Africa.

Unfortunately, with this progress comes the realization that many traditions would be lost along the way. This is what brought me from Sweden to the capital city of Banjul.

Since 1993, The Malmö Academy of Music, part of Lund University, has featured a multicultural program that allows its students to visit Gambia for a three-week period. Students meet musicians and learn about the different musical traditions of the region, preparing them for the multicultural reality of modern Sweden. As part of the program, Gambian musicians are invited to visit the Malmö Academy as guest students or as teachers in their respective fields.

Recently, the very first Gambian music school for children, the Maali Music School, opened in the Nemakunku village near Banjul. The school, headed by Alagi Mbye, a kora musician and jali (*griot*, or old master) of the Mandinka tradition, allows children of the village to study their traditions and a regular curriculum simultaneously.

This is a notable development in both Nemakunku and Gambia, because the old music masters do not write down their history. The griots keep everything in their minds, passing the heritage along as they tell stories to the children.



Recording a ditty on a pair of *riti*, Gambian one-string fiddles.

Now, with this recent modernization, the country risks losing its musical traditions. When the old masters pass away, the history and musical knowledge they retain in their minds and hearts will disappear.

To help maintain the musical tradition of Gambia, the Malmö Academy of Music set out to preserve the griots' teaching in letters, digital sound and video.

I journeyed to Gambia with my colleague, music historian and musician Eva Saether, for two weeks in February to record "Gambia CD 2," a collection of traditional music complete with rare interviews with traditional music masters.

This effort would provide Lund University with valuable research and educational tools, but would also help Gambian teachers educate children at the Maali Music School.

Anyone who has done audio recording knows how important it is to plan ahead — to prepare for a production and anticipate all needs. But when it came to producing a CD in Gambia, unexpected situations meant our plans and preparations were critical.

Six months prior to our departure date, we asked Mbye to scout out the locations on our itinerary, notifying griots and the people of each village of our arrival and explaining why we would be there.

In addition to all the standard technical equipment we would need, we had to consider environmental concerns. How would we protect our equipment from red sand dust? What about the heat and humidity? How would we recharge our battery packs when electric power would be scarce?

Once in Gambia our first stop was Sofaniama, located in the Maccarthy Island Division. There we met Momodu Camara and unpacked our equipment to record his performance on a bolonbata, a kora instrument that was used in the past to instill courage in warriors during battle.

Our equipment consisted of a Tascam PDR 1000 DAT recorder and Brüel & Kjær 4006 omnidirectional microphones for most of the recordings. An Électro-Acoustique Appliquée microphone preamp kit was used to boost the performance of the DAT recorder.

The preamp provided us with signal adjustment options and gave us 10 hours on a six-pack of conventional batteries.

Our second appointment was the Mandinka village of Katamina in Njamina, where we stayed overnight with Ousman Sonko, the village's Mandinka drum master.

In Katamina, we recorded two masked dances — The Mamo and Kankurang — along with a couple of sets of Mandinka drumming and two riti musicians. A riti is a single-stringed violin with a very special sound.

After Katamina, we moved to Basse Santa Su, the main city of Basse, the

See GAMBIA, page 48 ▶

PRODUCT EVALUATION

Sony Multitrack MiniDisc Deck Gets a Second Look

Alan R. Peterson

Back again in *Studio Sessions* is the Sony MDM-X4 MiniDisc multitrack recorder. We gave this unit a workout about a year ago and proclaimed it an innovative use of MD technology as well as the logical successor to cassette-based personal multitrack recorders.

What made this revisitation necessary was the introduction of the MDM-X4 Mk2, an updated version of the original unit.

In last year's review, I suggested the addition of a second MIDI jack. The first version had only one MIDI jack, which limited the unit's versatility in synchronizing with other digital devices. The unit now has MIDI

The Sony MDM-X4 Mk2, Synchronized to Cakewalk Music Software

See MINIDISC, page 54 ▶

PRODUCT EVALUATION

Earthworks Mic Is Flat to 30 kHz

Rich Rarey

Interesting transducers have been coming our way lately. The most recent was an intriguing microphone from Earthworks Inc., of Wilton, N.H. The company sent us one of their Z30X Enhanced Cardioid microphones that they say is flat from 30 Hz to 30 kHz.

For anyone who has already seen or used an Earthworks microphone before, it still looks like a Star Trek medical diagnostic tool: A rounded nine-inch-long metal body not much larger in diameter than an XLR connector, narrowing to a slender cylinder at the pickup end. A series of slit ports in the tapered cylinder give the Z30X its cardioid directional abilities.

At $750 list, this is a microphone that will attract the attention of music recordists, voice-over talent, and others looking for a close-in mic that delivers a surprisingly even sound over a wide frequency range.

From the top

We began our subjective evaluation of the Z30X by placing it next to a microphone very familiar to us: the Neumann U87.

The U87's rolloff switch was engaged and its output fed into the right channel of a DAT through a Benchmark preamp. The Z30X was placed on a separate Benchmark preamp feeding the left channel of the DAT recorder. A familiar program host was placed in front of both mics.

In listening to spoken-word recordings, we were struck by the fidelity of the Z30X and how, at three inches, the mic exhibited only slim proximity effects, notably the chest-cavity resonance of the human voice.

Interestingly, by comparison, the U87 sounded as if it had a distinct mid-frequency rise in the sibilance range at about 1.2 kHz. The Z30X captured and properly translated human sibilance without sounding edgy or phasey. Earthworks literature recommends using the Z30X for close miking.

The Z30X comes with a foam cap. I might have suggested a Popper-Stopper or similar filter be used to prevent breath noise, until I found out Earthworks has a new pop filter intended to replace the provided foam cap. The latter seemed to be ineffective against direct plosives.

Even without a filter, the compact size of the microphone makes it possible to position it in a variety of ways and still allow voice talent to easily see their scripts.

Off to a gig

To exercise the Earthworks Z30X, we passed the microphone to NPR recording engineer Mark Greenhouse. It was fortunate that we had already done our voice evaluation, because we never saw the Z30X again. Greenhouse used it once on a music gig, and refused to give it back.

Greenhouse wrote us later — fearing we would demand the Z30X factory loaner back — and was enthused. "I tight-miked a lead vocal in a 12-voice acapella group and the Z30X had a smooth presence I liked. The rest of the group was on Neumann U87s and TLM170s. The Z30X had not only a good blend with the Neumanns, but a distinct presentation perfect for the lead."

Greenhouse also took a gamble and used it to record musician Lew Tabakin's performance with Billy Taylor for a taping of NPR's "Billy Taylor Jazz at the Kennedy Center."

"Lew plays flute and sax," Greenhouse told us, "and the Z30X was his flute mic. I was delighted with the natural, open, un-shrillness of the mic, both at close range and as a player in an ambient array. I was able to use it flat, with just reverb added."

Greenhouse recorded Tabakin's baritone sax with a Sennheiser MKH40 mic, and found himself using substantial EQ to remove a peaky, sibilant edge that the high sound pressure levels caused. "I used the Z30X to give some atmosphere to the sax and it added size to an otherwise unnatural sound," he said.

'Swap ya'

Greenhouse traded DAT recordings made with the Z30X with us. We got his music DAT and he received our spoken word tape. We had a chance to hear for ourselves the pleasing, breathy presence of the recorded flute sound. It was smooth without being grating or scratchy. Even on Tabakin's fortissimo (very

Earthworks Z30X Cardioid Microphone in Wood Carrying Case

See MIC, page 53 ▶

Audio Field Assignment: Africa

▶ GAMBIA, continued from page 46

innermost region of Gambia. We arrived about an hour before sundown, and I needed to charge the batteries.

There was no power to be had, as one of two main generators supplying the town broke down. This meant half the city was without power, including, as luck would have it, our hotel. Fortunately, we were able to draw energy from the shop next door.

Back in my room, I noticed that the wall power receptacle was an old British-standard style outlet. And where was my power adapter for this type of socket? Safe in a locker back home in Sweden, naturally.

I convinced a young boy to find a suitable adapter as quickly as possible. After a stressful half-hour, he arrived back with the proper one. Finally, I could recharge the batteries.

The next day we visited the Kanuteh Mandinka family compound just outside Basse Santa Su. This family represents the deepest roots of the Mandinka jali tradition. Little did we know that this would become the most unexpected day of our entire trip.

Author Anders Åhlin looks on as a Gambian *griot* listens to a recording.

We started to record a few traditional jali songs performed by village women, accompanied by the kora and drums. As soon as the first song began, the atmosphere became quite heavy.

Emotional moment

Ahmadu Kanuteh, the old Mandinka master, let his tears flow openly, certain that our intentions were honest — to preserve tradition and carry on the customs.

Later in the afternoon, I interviewed the old master. Ahmadu Kanuteh spoke in the Mandinka language, so I did not understand a single word. Still, the atmosphere was extraordinary.

The lecture lasted for more than 90 minutes without a pause. I had just loaded a new tape into the DAT recorder, allowing me to record the entire interview without a break.

We stayed one night in Bansang before heading back to Banjul. After some rest, we conducted some more recording sessions with Demba Danjo on the guitar-like konting. The last days of our journey saw us translating the recorded interviews.

All the recording sessions took place outdoors, and the light breeze and other background noises were a concern to us. Fortunately, it never became anything more than a concern. In Gambia, February is the austral summer, and the weather is usually hot and serene.

While wind was not a problem, other environmental noises did come through on the tape. I just had to accept this, as music events in Gambia are always spontaneous and the environmental noise becomes part of the event.

We used two different microphone setups for recording (see the sidebar). An X-Y coincident pair was used on instruments and voices of different volume output, as in the Kanuteh sessions.

This was done rather simply by placing the microphones a suitable distance from the performers, depending upon the sound response. By placing the microphones at the right spot, I was able to create a good, natural mix among the kora, the drums and the voices.

We also used the X-Y setup quite close to the sources when recording the bolonbata and the konting, because they had a very weak output.

We went over to using an A-B setup on only two occasions: during the masked dances in Katamina and for the ritis.

The DAT recordings were dubbed over to a hard disk editor. We used a TC Electronic Finalizer for some gentle processing. To my ear, analog tape with Dolby S/R noise reduction has a certain quality that, unfortunately, is not yet available in the 16-bit digital domain.

Heading home to Malmö

We flew back to Sweden, exhausted but very satisfied. In our hands was approximately 25 hours of extremely rare and valuable material. The more than 1,000 kilometers we had just traveled on the rough roads of Gambia proved to be only a vague memory in the overall picture.

We also decided that this project is only the beginning: There is so much more to explore. And the few discomforts we experienced on the trip were a small price to pay for the joy of knowing that our work will help preserve the musical traditions of this wonderful place.

■ ■ ■

Anders Åhlin is the senior master of music for aural training, music production and engineering at the Malmö Academy of Music in Malmö, Sweden. Contact him via e-mail at anders.ahlin@mhm.lu.se

Stereo Mic Techniques Used by Åhlin

The mic techniques employed by Åhlin and his assistant are common configurations that offer decent stereo imaging and separation. Both are described in great detail in the book, "Stereo Microphone Techniques" by Bruce Bartlett, who also contributes to **RW** (1991, Focal Press/Butterworth-Heinemann).

X-Y mic placement, also known as "Coincident Pair" (Figure 1), normally is done with a pair of directional mics mounted one above the other with their grilles nearly touching. The mics are angled apart, pointing toward the left and right sides of the performance.

According to Bartlett, the greater the angle, the wider the stereo spread. But coincident *cardioid* mics tend to create a narrow spread.

A variation on this technique is called "Near-Coincident Pair" or "ORTF" (Office de Radiodiffusion Television Francaise, the organization that created the method). ORTF miking also places two mics at an angle, but the bodies criss-cross in the middle and not at the grille surface.

The A-B method (Figure 2) is also called "Spaced Pair," and is simply a pair of identical microphones spaced several feet apart and aimed straight on at the performance being recorded. Omnidirectional microphones are the most popular type for this application. And again, the greater the spacing of the mics, the wider the stereo image.

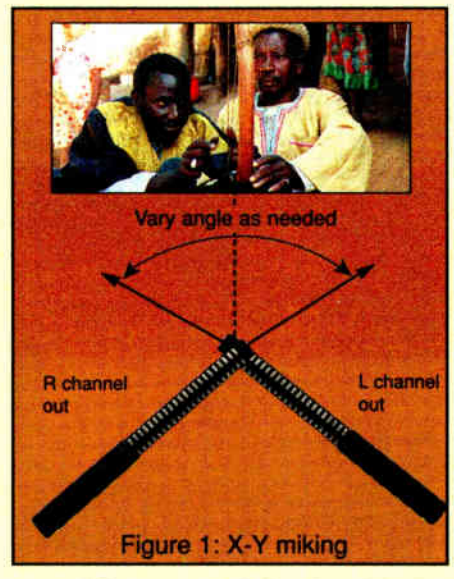


Figure 1: X-Y miking

The caution here is in spacing the mics too wide. The time delay between channels can cause unusual phasing effects and the positioning can cause exaggerated spreads that do not sound realistic.

If your field recording has been in mono until now, practice recording to stereo cassette, DAT or MD with these microphone techniques. It is possible to capture broadcast-quality stereo recordings even with two of the battered 635 mics you keep in the news remote bag.

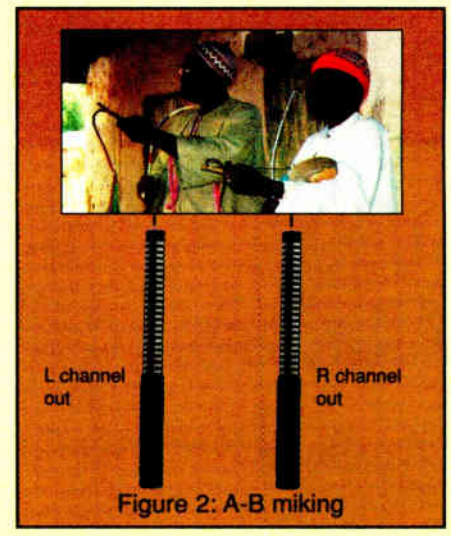


Figure 2: A-B miking

Experiment with different angles to hear the stereo image changing and the effect it has on a mono mix.

— Alan R. Peterson

PCs Are Right for Voice-Over Artists

Travis

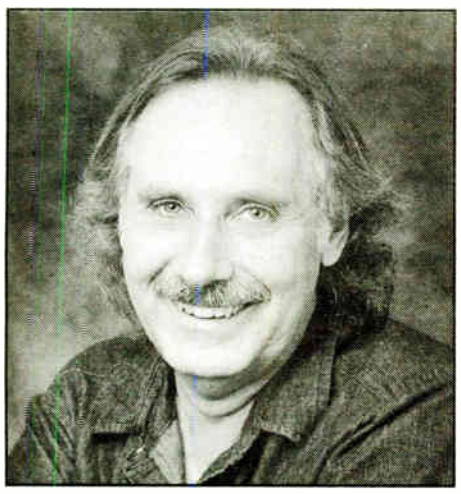
It has been said that, of all the things that have changed our lives in the past decade, the personal computer has had the most impact.

About one-third of the people I know in the voice-over business are heavily into their computers. Another third have a computer but do not use it for much. The final third have no idea why they would ever want such a thing.

Being a closet geek, I myself have had computers of one sort or another since 1981. Rather a long time by today's "computing" standards.

Does it have a windup key?

Sometime back, sandwiched between my radio career and current voice-over profession, I once operated an audio production recording studio. My first "computer" was essentially a geek toy that cost only about $180.



Travis

I was eventually able to purchase what was then a truly wondrous machine — one equipped with a cavernous 1,048 bytes of memory, operating at a blistering speed of 1 million instructions per second. In contrast, my current machine is a very average IBM compatible: 800 times as fast as my earlier box with 64 MB of memory. This is roughly 61,000 times more memory.

For those of you who have yet to actually own a computer (what's taking you?), the overall "quality" of a computer is rated by memory and speed. Asking how much memory and speed one might need in a computer is roughly like asking how much horsepower you might have in a car.

Ground breaker

Back then in the Bronze Age, nobody had PCs. So you can well believe my little machine created a lot of interest at the studio.

As soon as I upgraded my machine to what was then a hefty 16 kB memory, I began my first studio computer "project:" a list of the studio sound effects library, sorted alphabetically. At the time, my sound effects library consisted of about 80 LPs — you do remember vinyl records, don't you? — from a wide variety of sources. A sorted list of effects would save a considerable amount of time searching for appropriate effects.

I also began doing studio billing on the machine, and soon after that, some simple word processing. It became very clear to me that computers were rapidly going to become valuable tools for the small business operator and anyone working free-lance.

I also experimented with recording audio on my little machine. At the time, professional digital audio equipment was just appearing on the market at prices well beyond my studio's meager budget. So I bought a small A/D converter, hooked it up to the computer, wrote a little program to record the audio as digital data and then play it back.

It was then that I discovered how truly horrible 8-bit digital audio could sound.

Hurray for the '90s

Today, a decade later, that has all changed. For an investment of a few hundred dollars, I have far more studio power in my personal computer than I have ever had in my entire recording studio.

I now have 16 audio tracks, lots of processing and much faster editing capability than I ever had on tape. Certainly I miss the feel of tape, but I do not miss the occasional cut finger from razor blades.

Though I am now happily out of the studio business with no desire to return, having so much recording capability available to me for such a small investment comes in very handy to me as a V/O performer.

First, it provides me with a very convenient way to produce audition materials. Sometimes a client will ask to hear what I might sound like on a particular spot and simply wants a tape rather than have me go through the normal audition process. With a "studio" inside my computer, I can provide a semi-polished version, complete with music and sound effects.

The system is also used to keep my V/O demo current. Whenever I get a good copy of one of my more noteworthy projects, they are loaded into the computer to be dropped in when it is time to produce my next demo.

And maybe best of all, I have the ability to just mess around with audio. Now that it is no longer a job I need to worry about, I can fire up the PC and produce something just for the heck of it. Turn the power on, let the program boot, load in

See TRAVIS, page 53 ▶

• PRODUCT GUIDE •

Products for Radio Production

Mail info and photos to: RW Product Guide, P.O. Box 1214, Falls Church, VA 22041

Otari CD Duplicator

The Otari CDP-50 CD-R Duplicator is appropriate for small to medium radio program syndicators and production houses needing to do small runs of CDs. The tabletop unit can continuously duplicate up to 50 discs from one master disc.

Master disc data is read and downloaded into the CDP-50 internal hard disk. Data is then copied onto blank CD-R media at 4X copy rate in any write method: Track-at-Once, Disc-At-Once and Multisession.

The device has a built-in Pentium 166 processor and 16 MB RAM capacity. The optical head and disc transport mechanisms all fit into the case shown below the CRT monitor. The CDP-50 has a maximum disc duplicating capacity of 50 discs.

*For information, contact Otari in California at (415) 341-5900 or circle **Reader Service 34**.*

WHo DId THaT MUSiC? Releases

New releases from WHo DId THaT MUSiC? include the Gravity and Revolución production music libraries.

The "Gravity" library is a hard-edged collection, influenced by the music of contemporary musical artists such as Prodigy, U2, Nine Inch Nails and Pulp Fiction. Tracks are described in company literature as "manic," and "a raw provocative approach." The initial release of Gravity includes cuts called, "Reactor," "Fracture," "Elemental" and "Bang, Warp and Pulse."

"Revolución" is 300 tracks of Latin-influenced production cuts, blending traditional musical roots with an aggressive new sound that is now emerging in club scenes. Titles include, "Latin Hard House," "Rock'n Español" and "Latin Garage/New York Club."

The WHo DId THaT MUSiC? library is licensed on an annual blanket fee structure or by "laserdrop," and is based on market size and intended use.

*For information, contact WHo DId THaT MUSiC? in Los Angeles at (310) 442-1440 or circle **Reader Service 60**.*

WaveFrame Enhancements

The WaveFrame 408 Plus is a new digital workstation with roots in the earlier 401, 408 and StudioFrame DAW-80 systems.

The 408 Plus provides playback of

eight audio tracks from a single SCSI bus, identical to the format used in the Tascam MMR-8 multichannel digital recorder. It is based around a Pentium processor, includes 64-bit ATI graphics and integrated Ultra SCSI controller for multimedia applications.

The eight-track-per-SCSI-bus function is possible due to the new WaveFrame R8-Plus board, which doubles the capacity of previous versions of the workstation. The R8-Plus board can be retrofit into any existing 408, 401 or StudioFrame system. The R8-Plus option is $995. The price of a complete WaveFrame Plus system begins at $10,995 for an eight-track, eight analog I/O configuration.

*For information, contact WaveFrame Corp., in California at (818) 843-7004 or circle **Reader Service 86**.*

Denon Multi-Zone Mixing Amp

Originally designed for sound systems contracting, the Denon DN-A850 multi-zone mixing amplifier has applications in combined station facilities.

The DN-A850 is normally used in restaurants, clubs, bars and theaters to route four different music sources to four different zones. For station use, the DN-

A850 can be used to play each station's respective programming into specific zones around the facility; such as in the lobbies or management corridors of each station. One side of the building can have a popular music format piped in, while another portion can receive the talk-formatted AM.

Two mics can be plugged into the DN-A850 to provide paging facilities to one or all four zones. The selected channel dips by 30 dB and the mic signal is mixed in. Each zone has individual bass and treble controls and individual channel LEDs indicate when a signal is present.

The DN-A850 is rated at 50 W per channel. The unit is priced at $1,300.

*For information, contact Denon Electronics in New Jersey at (973) 575-7810 or circle **Reader Service 112**.*

New Lightweight Fender PA

Following the success of last year's Passport public address system, Fender has rolled out the Passport 150; a new lighter-weight self-contained portable PA system.

Both weight and wattage has been scaled back on the Passport 150. Down from more than 50 pounds and 250 W, the new Passport weighs in at less than 30 pounds and pumps 150 W through two speaker enclosures. The entire package is as small as a suitcase.

A switching power supply allows the Passport 150 to work anywhere in the world without adapters. "Field" 12 VDC operation is also possible with an optional DC/DC converter. Four 6.5-inch transducers — two in each cabinet — provide clear, full-range coverage of voice and air signal at remotes.

Internal digital reverb and dedicated inputs for cassette or CD are all included in the Passport 150.

*For information, contact Fender Musical Instruments in Arizona at (602) 596-7242 or circle **Reader Service 138**.*

Soundcraft B400 Console

The British-made Soundcraft B400 Broadcast console (**RW**, April 15) is available in the U.S., distributed by Harman Pro North America.

Designed for production and on-air use, the B400 is based around the design of the Soundcraft B800 mixer. Frame sizes from 24 to 56 modules can be created, with any mix of mono, stereo or stereo telco modules installed. Board connections include one stereo and three mono auxiliary busses.

There are LED indicators on all switches and each channel strip has its own LED bargraph VU meter. Master metering and talkback/slate are also available.

*For information, contact Soundcraft in Tennessee at (615) 360-0471 or circle **Reader Service 164**.*

Harris to Distribute CD Factory

Harris Corporation has been named the exclusive broadcast distributor of the Sonic Foundry Professional CD Factory, a software-based system that lets broadcasters create audio CDs with a Pentium PC.

The CD Factory has been developed by Microboards Technology and consists of a Panasonic 4080 external CD Recorder, Sonic Foundry CD Architect software, an Advansys SCSI interface card and all necessary cables. Two pieces of recordable media are included.

The CD Architect software burns Red Book compact discs that will play on any CD machine. The software allows recording and indexing 99 tracks per disc with 99 sub-index points per track, non-destructive real-time balancing of volume levels between tracks and full editing with a printable list.

For basic wave editing and audio acquisition, Professional CD Factory also includes a copy of Sound Forge XP, a "lite" version of the company's popular audio editor. Tools include graphic EQ and dynamics, reverb and time compression.

*For information, contact Harris Corporation in Illinois at (800) 622-0022 or circle **Reader Service 190**.*

PRODUCT EVALUATION

Steinberg Eliminates 'De Noise'

Read G. Burgan

It seems like only yesterday that I labored over the transfer of a particularly noisy 16-inch broadcast transcription. I used all of the hardware in my audio arsenal, including a one-third octave equalizer and a graphic equalizer. No matter what combination of filtering I used, I could not eliminate the noise without drastically affecting the sound itself.

Certainly that was then and this is now. If there is one area where digital audio has had a dramatic impact, it is in noise reduction. Many software companies have developed digital noise reduction products that eliminate all kinds of noise while leaving the sound itself intact.

One of the latest of these is the Steinberg DeNoiser. This works with most any PC-based digital audio software that employs Direct-X plug-ins. There is also a Mac version available.

Departure from the norm

Most similar software products work by taking a noise sample from a sound file and then removing anything matching the noise sample.

DeNoiser applies an algorithm that it uses to reduce unwanted noise. Steinberg describes the process this way: "DeNoiser is based on spectral subtraction. Each section of the frequency spectrum that has an amplitude below the estimated noise floor is reduced in intensity by use of a spectral Expander. The result is a noise reduction that does not affect the phase of the signal."

Most conventional noise reduction software has a multitude of variables that affect the final result, and mastering them all can require a lot of experimentation.

DeNoiser has only three on-screen slider controls. In less than five minutes, one can easily figure out how the controls affect the final product.

Because DeNoiser does not require a noise print, you do not have to wander through your sound file looking for a "silent" portion typical of the offending noise you want to remove. When you press the preview button, DeNoiser begins to dynamically analyze the program material. It then applies its own algorithm as it plays the file.

Take the controls

Each of the three controls can be adjusted during the preview process and the resulting change is heard in real time.

Steinberg DeNoiser: Three faders fix noisy recordings.

The Level control is a threshold control that determines the level at which the noise reduction is applied. The noise level is graphically represented on the screen by a yellow line. All that needs to be done is to set the Level control's green line slightly higher than the noise line.

The Reduction slider determines how much noise reduction is applied. It can be set anywhere from 0 to 20 dB.

Finally an Ambiance slider allows you to fine-tune the noise reduction to minimize the affect on ambiance in the sound file.

Without a doubt, this is one of the easiest and fastest noise reduction modules I have come across. Does it work? Well, yes and no. Let me explain.

To test DeNoiser, I used Sound Forge 4.0 as the digital audio host for the plug-in. On tape hiss, it does relatively well. On vinyl recordings, I found it much less effective than other comparable noise reduction software.

I used the Sound Forge Spectrum Analyzer module to look at the noise in several sound files before and after processing by DeNoiser. Here is what I discovered.

Most of the DeNoiser effect takes place at 4,000 Hz or higher. At those frequencies, there is an average apparent noise reduction of about 11 dB when the reduction slider is set for 20 dB of noise reduction. But below that point, the noise reduction tapers off to virtually nothing.

For one test I used a reel-to-reel recording of a newscast I did when I was in public radio back in the early '70s. Like many studios put together on a shoestring, it left a lot to be desired.

There was a prominent hum at 65 Hz, and after one application of DeNoiser, the 65 Hz hum was still as prominent. A second application of DeNoiser reduced the higher frequency noise even more, but made no dent on the 65 Hz hum or other low-frequency noise.

I found the same thing true when I tried DeNoiser on those 16-inch broadcast transcriptions. It reduced the higher frequency noise substantially, but made little or no dent in the low-frequency surface noise that often accompanies phonograph records.

When I ran the same material through the noise reduction software I normally use, with a setting of 20 dB of reduction, I found that both DeNoiser and my other software removed about the same amount of noise in the higher frequency areas, but the other software also removed an equal amount of noise all the way down the lowest frequency in the spectrum, resulting in a noticeably quieter sound file.

However, DeNoiser does seem to have less effect on the ambiance and creates less artifacts. This was particularly noticeable where a person takes a breath.

Most noise reduction software provides the ability to remove up to 100 dB of noise in one pass, versus the DeNoiser maximum of 20 dB of noise reduction. However, in my experience, attempting to remove more than 20 dB in a single pass will almost invariably create artifacts..

DeNoiser is easier to learn and use than most other noise reduction software currently available, but is limited in its effectiveness to those frequencies that are at or above 4,000 Hz. It will definitely reduce certain kinds of noise in your sound recordings, and if time and speed are important considerations in your work, you should consider DeNoiser for your audio arsenal.

DeNoiser has a retail price of $399. Steinberg North America is at 9312 Deering Avenue, Chatsworth, CA., 91311. You can also check out the company Website at *www.us.steinberg.net*

■■■

For information, contact Steinberg North America in California at (818) 993-4161; e-mail info@steinbergna.com *or circle* ***Reader Service 190.***

Read Burgan is a free-lance writer and a former public radio station manager.

Earthworks Mic Goes To 30 kHz

▶ MIC, continued from page 47

loud) passages, the microphone remained faithful.

Greenhouse in turn, remarked about our spoken word recording. "I was immediately struck by a size difference from the U87," he said. "The Z30X sounded bigger. It must be a midrange phenomenon that activates the speakers differently. The end result is that the voice sounds, well, *bigger*. The volumes were the same, the proximity the same, yet the Earthworks sounded more like what I want to hear."

Eric Blackmer, director of sales and marketing at Earthworks, told us, "The key to the sonic performance of the Z30X is fast and accurate impulse response," he told us. "All microphone diaphragms ring like drum heads. This adds coloration (excess phase) to the signal. With small diaphragms, this ringing is less pronounced than with larger diaphragms.

"We also optimize the impulse response of the microphone," he said, "partially by creating a reflection-free zone around the element and partially by acoustic and electronic compensation. We also pay very close attention to the acoustic path to the rear of the diaphragm."

On or off

Blackmer stated, unlike typical directional microphones, the off-axis frequency response of the Z30X is nearly as flat as the on-axis pickup, but with some attenuation. This means less off-axis phase distortion and discourages feedback in live-sound situations.

Blackmer also recommends against using the Z30X for ambient miking such as location classical recording. Outside of the bass proximity range (15 cm), its response curve has a "down elbow" starting at 400 Hz. Earthworks intended the Z30X to be used for close miking.

Our only complaint about the Z30X is that it was slightly noisier than a U87, heard by turning up the monitors to high levels. In actual use with nominal levels, using spoken word and music, the noise was not audible.

Overall, we were pleased with the performance of the Z30X, noting that it does indeed work well in close mic situations and sounds good to our ears.

■ ■ ■

For information, contact Earthworks in New Hampshire at (603) 654-6427 or circle ***Reader Service 8.***

Rich Rarey is technical director of National Public Radio's "Talk of the Nation." Reach him at rrarey@npr.org

Sound V/O Advice: Get a Computer

▶ TRAVIS, continued from page 49

the appropriate music and sound effects, then record my voice and put an entire audio production together.

'Demo'-gogue

One of the more recent advances that I find extremely useful in voice-over work, is the ability to record audio CDs.

Ever since cassettes replaced open-reel demo tapes, I have been disillusioned by the audio quality of my demo tapes. Modern cassettes are better than ever in terms of noise and frequency response, but so many cassette machines run slightly off-speed. Demo tapes quite often are played on inexpensive boom-box machines that run a little fast. And although I can pitch-up my voice to approximate the sound of my sped-up demo tape, it would still be much better if potential clients would hear my work at its natural speed.

For about $400, I have been able to install a CD recorder in my computer. Blank recordable CDs are now under $2 each — even less in volume purchases — which means I am now distributing my demo on CDs that I burn myself.

My demo now has the quality which used to be available only on open reel tapes. Even cheap CDs run on-speed, and the appearance a CD has is much more impressive than a cassette.

It seems to me if you are in the voice-over business or plan to be, buying a computer and taking the time to learn it would certainly be a good investment. Especially now that computers capable of broadcast- and audition-quality audio can be bought for under a grand.

If you have one now, think about upgrading its audio performance and start pricing CD writers. It just may give you the edge.

■ ■ ■

Travis is a California-based voice-over talent. He can be reached at Ttravis@compuserve.com *or drop a note to him c/o* ***RW.***

Sony MD Deck Has Improved Sync

▶ MINIDISC, continued from page 46

In/Thru/Out jacks, making it possible to sync with another MDM-X4 for eight-and-beyond tracks of recording.

Many other desirable enhancements include scrolling song names of up to 20 characters, punch-in pre-roll times of up to 20 seconds and new functions buried a level or two beneath the Edit key.

Quick reminder

For those who may have missed the original review, the MDM-X4 is Sony's four-track MD machine. The MD multitrack requires Data MiniDiscs rather than conventional MDs. This allows more than two channels to be recorded onto a disc. In fact, Yamaha has managed to place *eight* tracks on its competing Data MD-driven multitrack device.

Conventional MDs can be recorded and played back on the MDM-X4, but only in two-channel format.

For anyone used to multitrack mixers and/or personal mulitrack recorders, the mixer portion of the MDM-X4 Mk2 will be familiar.

Input strips 1 through 4 have a Trim control with a 40 dB range; Mic/Line input selector switches that double as Track Return switches; fixed 3-band EQ with shelved highs and lows and a peaking midrange; a two-way Aux control feeding the auxiliary busses, and a pair of Assign keys directing the input signal to the desired Group Bus (track). The Pan knob adjusts balance and directs audio towards the proper Group Bus.

The final two Input strips are a ganged Channel 5/6 and a Master channel. Channel 5/6 has two bands of EQ and the Master Aux send controls. The Master fader on the far right of the mixer portion of the MDM-X4 Mk2 includes four Cue balance controls and four buttons to monitor the unaffected signal on all four tracks.

The Transport and Record controls occupy the right side of the top panel. This is where the Record ready keys are found, as well as the extremely easy-to-understand Play/Record/Skip controls and a large Jog/Shuttle dial.

The fluorescent display includes level meters, a time display, Record Ready, and status indicators that show if MIDI clock or MIDI Time Code (MTC) is engaged.

Finally, a strip of jacks along the top surface connect the MDM-X4 to all of your audio gear (XLRs on Channels 1 and 2). The MD itself slides into a slot on the right side of the unit; the Eject button is with the transport controls.

Get in sync

The picture shows the MDM-X4 Mk2 synched up to the Cakewalk 5.0 music sequencing program. The Mk2 Sync setting was switched to EXT (external MIDI clock), to be driven by the MIDI time references output from Cakewalk.

When I fired up Cakewalk, nothing happened. I needed to set up MIDI Machine Control (MMC) so the Sony MD unit would understand the transport commands being sent by Cakewalk. Once I did that, the two devices locked up fairly quickly and ran perfectly in step.

I suggest leaving a few seconds of "roll-in" on your projects so external recorders, processors or other outboard devices can chase the time code before any critical material comes along.

The new sync feature is very neat. When used in conjunction with a MIDI sequencer, the MDM-X4 Mk2 can be tied together with an effects processor, which can switch in an effect at a specific point in the mix. The processor can be dropped into the Aux lines and placed under automated control by the sequencer.

The MDM-X4 Mk2 does not have automated *mixdown*, as would a DAW. The unit is a blessing to anyone who likes feeling real faders under their fingers, but may seem awkward to folks that draw volume curves on a screen.

Why consider an MD multitrack? There is still a camp of audio folks who want to be able to hold media in their hands rather than trust a performance to the intangible workings of a hard disk.

The unit is portable, so it goes where nothing else might. Rather than record that cassette "winner" cut in flat mono at station appearances, a multitrack MD can record stereo crowd ambiance and jock mic all in one pass. Mix it down to stereo back at the station by plugging directly into the production board.

The mixer portion of the MDM-X4 Mk2 is of good enough quality to mix and feed audio back to the station via codec. Those Cue faders are quite handy to have around, as they avoid having to bring splitters for separate mixes.

Those remaining stations that run early-morning public affairs programming can use an MDM-X4 and a trio or quartet of mics at a guest's office, capturing audio of a quality not possible with noisy cassettes.

Getting creative

Finally, creative jocks and production people cut bits and comedy songs at home, generally in very cramped quarters. A self-contained MD multitrack makes sense. The finished product must be mixed to compatible media that can be brought to the station.

The "I-hear-the-compression" debate rages on. I suppose if you use an MD to capture a soft string quartet, *maybe* you will hear something. All I know is I cannot hear compression artifacts when an MD track clears the processors and hits the air. MD is a capable radio performer.

The changes made to the Mk2 version of the Sony MDM-X4 make it a better studio performer. You may want to keep an eye out for the competing Yamaha eight-track MD version, but remember that total track density reduces the time that will fit on a single MD disc. You get a lot of tracks but not a lot of time to fill them. In the portable studio world, four tracks still sell better than eight.

Sony continues to make the MiniDisc a popular format. A device such as the MDM-X4 Mk2 is fast, easy to use and sounds better than anything ever rolled out for analog cassette.

The World Standard in Digital Audio

Major broadcasters worldwide
choose Dalet
more than any other system.

Steve Densmore
Manager of Operations for ABC Radio Networks
Washington DC

"It's mature technology. It's stable. We like the software functionality."

Steve Densmore
Manager of Operations for
ABC Radio Networks, Washington DC.

OPEN SOLUTIONS PARTNER 6 YEARS
Microsoft SOLUTION PROVIDER
COMPAQ
Digigram POWERED

Mike Silverstein, Assignement Editor,
ABC News Radio, Washington D.C.

Cost Efficiency

Whether you are a large or small market station, Dalet offers a completely integrated suite of software which allows the entire staff to work together. All departments – traffic, production, programming, news and on-air – have simultaneous access to all audio, copy and logs.
With modular software options, the Dalet system can meet your specific budget requirements – growing with your business needs.
Standard hardware also means cost savings. The system is not proprietary, and will grow with the industry.
Finally, with Dalet's easy-to-use interface your staff will be operational in no time.

Reliability

Dalet has the proven expertise to assure that your station stays on the air. Choose from a wide range of security options (RAID array, mirrored servers, local backup) to meet your specific requirements.
Dalet's digital audio system has been running on Windows and networks for eight years, at hundreds of sites – from stand-alones to hundred-plus workstation networks. It works for them, it can work for you.

Group Connectivity

Consolidation can generate huge productivity gains, provided groups have the right tools. Dalet is continuously developing new solutions to meet the evolving needs of our clients. With TeamRadio – Dalet's traffic and billing software – the business of over 1000 radio stations can be linked together. Intranet applications allow stations within a group to access each other's orders and audio remotely.
The production work done by one station can be used by another, only minutes later.

Unprecedented Support

Dalet is a service-driven company. With more than 70 engineers, we assure that your station stays on the air.
Dalet's support experts are on call, 24 hours a day.
Clients have on-line support over the Internet.
We can also provide on-site visits to upgrade an existing system.

"It's almost like the Maytag repairman, we don't really call them that much. But when we do have problems, they respond right away." Steve Densmore

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'Tom Joyner in a Box' Page 64

Buying an Automation System?

by Carl Lindemann

Building a good relationship with your automation or live-assist system is like making a good marriage.

Sure, love at first sight can happen. But a courtship period — and maybe even some prenuptial counseling — is a better bet for a happy, healthy union.

Much worse is the shotgun marriage method. "I see a lot of people taking the 'ready, fire, aim' approach," said Dave Scott, president and CEO of Scott Systems. "They wait until the cart machines aren't going to make it another 20 minutes. Then they make a slap-dash decision."

That can be disastrous. Usually, the right choice is the result of careful planning. An extensive review of the marketplace is one element of success. As you narrow the choices, make field trips to other stations to see systems in place. Conduct hands-on testing at your own facility. Throughout, management, engineers and air staff can bring important perspectives to the process.

WQHT (FM) Chief Engineer Jim McGivern with his Dalet5 System

The final decision affects virtually every aspect of station operations. "This isn't a little PC toy that will be used for few recreational hours in the evening," said Scott Slocum, western division sales manager for Computer Concepts Corp. "This system handles the on-air signal for the station, all revenue-generating announcements, and the final product that determines whether the station will be able to attract and keep an audience."

Best of what's around

With the myriad systems on the market, selecting what's right for your station seems daunting.

The first task is to determine your needs. How many stations and formats will be covered? What about satellite feeds? Will these be changing?

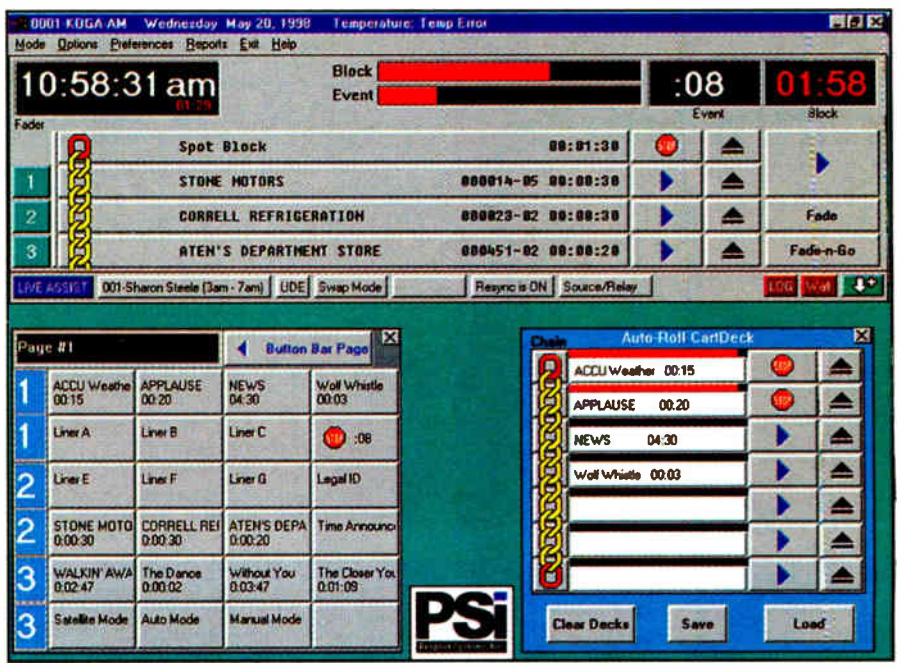
"Systems that work well in large facilities can also work well in small ones — but this is not always true the other way around," said Toussaint Celestin, on-air audio delivery product manager for Orban. "Buyers need to closely examine issues of scalability — how quickly can they expand their system and how easy is it to add additional workstations."

Having defined these basic parameters, next determine the reliability of a system.

"We hear from disappointed stations that have bought inexpensive systems, thinking that all systems are reliable, but they found that is not the case," said Beau Sanders, who handles eastern regional distribution for Pristine Systems.

A crucial difference between packages — even coming from the same vendor — is the operating system that's "under the hood." Systems based on DOS, Windows 95, Windows NT and UNIX are right for some situations, but wrong for others. Be explicit when considering your needs. The wrong OS can bring a plague of lockups, crashes and audio drop-outs.

Another important infrastructure matter is how sound files are distributed among workstations and servers. "Centralized audio provides instantaneous and simultaneous audio play from any studio. You can play a cut without waiting for a file transfer," said John Davis, U.S. vice president of radio operations for MediaTouch. With improper system architecture, spots can be missed while the system struggles to transfer sound files to where they are needed.



The Audio Wizard CFS32 From Prophet Systems

Hammers and nails

Reliability also is a hardware issue. Many vendors offer turnkey systems, but allow stations to source the computers separately. You may be tempted to cut costs by building them yourself, or even obtaining hardware through trades with local vendors. That can be problematic in the long run.

"Much of the time, trade-out computers are those that had a problem, or

See AUTOMATION, page 62 ▶

USER REPORT

Scott Studios Spot Box Replaces the Carts

by Daniel J. Ferreira, Jr.
SBE/CBT
Chief Operator/Engineer
WMUA(FM)

AMHERST, Mass. A year ago, WMUA(FM) General Manager Brad Davidson decided to replace our analog cartridge tapes.

Our goals consisted of cart replacement with console remote start/stop; three stacked decks in the air studio for automatic sequencing or manual playback; the ability to record in the air studio when desired; multitrack recording in the production studio (with capability to go on-air if necessary); many hours of backed-up on-air storage; automatic transfer between studios; balanced +4 line levels, and a touchscreen pick list. Inexpensive and expandable storage was also desirable.

Daniel Ferreira, Jr. in the WMUA Control Room

We did not want automation, because WMUA is always live. Block formats of modern alternative

See SPOT BOX, page 59 ▶

USER REPORT

UDS II — 'Reliability Plus'

by Greg Pyron
Operations Manager
KOMC-AM-FM, KRZK(FM)

BRANSON, Mo. At Hometown Radio, KOMC(AM)-FM and KRZK(FM) in Branson, Mo., the Ultimate Digital Studio II and DCS combo make the job of operations manager a breeze. Just don't tell the general manager — he thinks this computer stuff takes a lot of work.

We program two 50 kW FMs: one for country listeners and one for a large population of adult standard fans. We have a UDS II system with a Sony 3600 CD changer in each control room.

Training is a breeze. Operators learn one system, then go from station to station, maximizing our air talent resources. They all love the UDS II system. Old vinyl-and-tape guys like me pick it up in a flash. Even people who have never done radio can operate the UDS II with a minimum of instruction.

I have been a happy Ultimate Digital Studio customer since our original purchase in 1991. When I heard a new feature-rich UDS II system was in development in 1994, I was on the phone to Dallas to get on the list to be one of the first kids on the block to have one. It turned out to be a sound choice.

Reincarnation

The previous incarnation of the UDS II was a product of TM Century. TM sold that portion of the company to **On Air Digital, USA** about a year ago. As a long term UDS customer, I was a bit uneasy about the deal at first. But the best of the TM team moved with the product, and service from On Air is stronger than ever.

The reliability of the UDS/DCS combination is impressive. Neither the UDS II software nor its associated computer have caused me to be off the air for one minute in the past seven years. The only time it has been off is when we turned it off to rearrange the studio or when a power failure ran longer than the UPS backup could hold on.

We have since installed a 4 kW generator to power all components attached to the UPS. All I have to remember now is to keep the gas tank full and give it a squirt of Stabil once in awhile.

The four networked DCS computers have been similarly trouble-free. We have had to replace a monitor or two and have managed to beat a keyboard to death, but the system ran on while we borrowed what we needed from odd office computers down the hall. And because the UDS II is PC-based, acquiring replacement peripherals is a snap with a visit to the local computer store.

I often hear tales of woe from my contract engineer friends about someone's system locking up, a glitch with some software or a unit mysteriously fried by some errant static charge. I just smile and say, "Maybe I should knock on wood. That just doesn't seem to happen at Hometown Radio."

I credit the people who have built these systems with a commitment to quality. There are some top-drawer developers at On Air Digital who are continually refining and adding useful features to the UDS II. Meanwhile, the folks in Lenexa, Kan., at Computer Concepts (home of the DCS) have established a track record for reliability as well.

Put the two systems together and you get a package that allows walkaway operation without constantly looking over your shoulder.

Adding to the mix

The original Ultimate Digital Studio system was a reliable box, but lacked time-based features that even older proprietary units could boast. The UDS II came along to address those issues and added a host of other features. Although the on-screen display did not change much between the two versions, the entire UDS II software scheme was rewritten from the ground up.

The new software was thoroughly tested in-house in Dallas and in real-world beta tests in the United States and abroad. The result is a product that controls a wide range of audio sources, interfaces with all major music scheduling software packages and allows the operator to time out every hour with precision.

Control room clutter is kept to a minimum. We have done away with paper logs, PSAs and liners can appear on screen with a keystroke and even the weather has an on-screen home. A pop-up countdown timer is handy for contests, there is a perpetual calendar and a calculator that does basic math and time calculations. The UDS II makes provisions for RBDS as well.

Ultimate Digital Studio II

See UDS II, page 64 ▶

USER REPORT

ENCO DAD Family Excels at EXCL

by John Burger
Chief Engineer
KLOK(AM)/KBRG(FM)

SAN JOSE, Calif. EXCL Communications owns and operates 17 radio stations, broadcasting three all-Spanish formats.

Programming and production originates at our San Jose headquarters. Fourteen properties rely on unmanned workstations to maintain the final on-air product. Local station staffs concentrate on sales and promotions and leave the driving to us.

In early 1994, EXCL owned just two stations. By the end of the year, we had acquired three more. The most cost-effective way to operate them was to network our San Jose programming to them, eliminating separate programming and production staffs for those stations and future acquisitions.

Satellite delivery was chosen for reliability, cost effectiveness and long-term growth of the networks. We selected a well-known, computer-based store-forward system seen in operation at another small chain of stations.

This system was not as robust as we were led to believe. By 1995, its unreliability and spotty technical support — along with our need to accommodate future growth — forced us to abandon it and revisit our decision.

We budgeted for another year to select, install, and get a new system on line to support our projected growth. Store-forward was the most important criteria, followed by a reliable studio interface for both production and on-air operations. After our initial bad experience, the choice was not going to be easy.

PC automation was popping up like mushrooms. But when it came to actually seeing store-forward capabilities in action, we kept hearing, "We have a system running 22 stations in Sweden," or, "We have our system installed in a 38-station chain in Australia."

ENCO was the only manufacturer able to show us a system in operation on U.S. soil.

What we needed

The company showed us satellite-delivered programming and production, store-forward that worked and a robust studio/production interface. From an engineering point of view, the power and flexibility of the DCL (DAD Command Language macros) closed the deal, while management's attitude was simply, "This one better work!"

The key elements are DADPRO workstations for uplink on-air and production, DADSAT for store-forward control, and DADJR Limited Functionality Workstations for the unmanned local stations.

DADPRO is a closet full of tools for the broadcaster. It equips studios with many familiar machines: Cart Record and Play, Multi-Cart Decks, Digital Editor, Automation and more. Use as many or few of these as necessary.

Choices

Our main dilemma when we installed DAD was feeling overwhelmed by the choices we had available, but we soon determined what worked best for our application and ran with it.

ENCO DADPRO32 System

MasterLog, the live-assist/automation machine, quickly became our preferred vehicle. It melded well with our jocks' need to produce localization elements while still running their shows.

In production, the DAD Editor sees nearly as much action as our DSE-7000, and the Array panels provide rapid access to production elements.

We run dual file servers, and all nine studio workstations have full and equal access to both. We have had zero crashes or delays using this system. Dolby AC-2 compression is used and the digital audio is fed around the facility on a 100VG network.

This network is immune to the RF generated by our transmitter on the other side of the wall from our server room. We cannot get RF out of the telephones, but DAD plays on and on.

DADSAT is the "Forward" in store-forward. The terminal works in conjunction with a DADPRO Workstation and our uplink. We can immediately dispatch commercials, liners, etc., or build a

See DAD, page 66 ▶

Spot Box Is King at WMUA(FM)

▶ SPOT BOX, continued from page 56

rock CDs, 1950s vinyl and even the occasional 78 rpm platter are a way of life here.

Two factors kept us out of digital and still using analog cartridge tapes. One was not knowing whether the industry would stay with removable media such as floppies or MD, or move to hard drives. Another was the high cost of digital mass storage with expensive "bells and whistles" that are not necessary for us.

This is a University of Massachusetts station. Purchasing rules mandate sealed bids. Most vendors pushed what they wanted to sell instead of what we wanted to buy. All kinds of bids for digital automation, scheduling, voice tracking and/or networking system came back with hefty price tags. Some even wrote that our requirements "cannot be done."

And the winner is...

One cart replacement bid met our specifications and budget: The Spot Box by **Scott Studios Corp.** of Dallas. We have used Spot Box on-air and in production for more than a year. Windows 95 Ethernet networking links the two units together. They give us awesome CD-quality audio.

The Spot Box touchscreen is simple to use. The left side of the screen is a triple-deck virtual cart machine that comes up on three console faders. The right side shows a stack of carts categorized numerically or alphabetically, with a button to change from one to the other.

The user scrolls through the Pick List, touches the desired event, then touches the deck to load it. Touching the on-screen Start button plays the event. Operators are not lost in a quagmire of tabs or pages, nor confused by the machinery. The simplicity of the Spot Box is an added bonus for our student operation at WMUA.

The on-air and production Spot Boxes share the same capabilities, although the pop-up production cart recorder covers the Pick List of the air studio machine. Spot Box is ideal for hands-on training of new people. They learn how to use Spot Box in production before they go into the air studio.

All audio is stored where it was recorded and sent by LAN to the other Spot Box for backup. We have had no problems in our first year with the Spot Box. Should a catastrophe happen, we can go on-air from production or move the production Spot Box into the air studio. Both machines are ready to go with the same audio in the same places, and on the same screen that operators are familiar with.

In case of failure, recordings can still be made in production and patched to the on-air Spot Box for recording.

Where it's at

The least expensive multitrack production unit Scott has uses the SEK'D Samplitude program. The Scott Trim and Label software enters the name, cue, date and runtimes for start and end. Spot Box gives you the cut-by-cut option of compressing or not. WMUA usually uses 4:1 compression, which sounds fine.

Installation of the Spot Box was simple. When operators pick and play an event from the touchscreen, the associated mixer module is activated. By touching the Off button, the associated mixer module turns off.

Spot Box formerly used the same remote for start/stop and provided no remote run tally light. I called Dave Scott, president of Scott Studios, and sheepishly asked if Spot Box could have tally added. He said, "Sure. Why not? You're the boss!" Within a week, we got a free software upgrade from Scott to control my tally lights.

Spot Box is working well for us. WMUA finally is airing stereo announcements with CD quality. Our recordings are clean, clear and crisp like never before. And Spot Box also avoids using "out of date" material.

Show time

Our operators appreciate the Spot Box. All recordings are at the operator's fingertips instead of across the room in a cart rack. The studio remains tidy with no carts all over the counters and, most important, all material will be there and will be cued up.

Carts at WMUA once were hoarded like gold. Carts already in use by others were often taken from the control room for new projects. Those headaches are now gone, along with blades, reels, splicing tape and the like.

We air a reggae show with many drop-ins — far too many for separate carts. At one time, the operator had to search a long cart for the right cut, then wait for it to recue. But with the Spot Box, everything is always cued and ready. After play (or audition), the "cart" is locked out to prevent unintentional replay. However, we can override that by touching the Off button for a second go-round.

With the Spot Box, there is no wasted time. This producer finds Spot Box better sounding and more convenient than carts, and it enhances the on-air creativity of WMUA programs.

For more information, contact Scott Studios in Texas at (800) SCOTT-77; fax (972) 620-2211; or circle ***Reader Service 216.***

USER REPORT

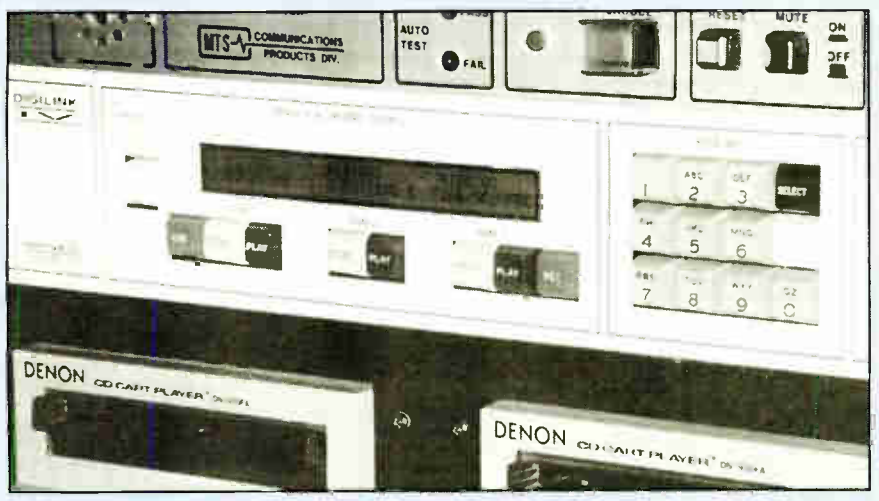
Arrakis DL4 Resolves Audio Storage Issues

Gary Alan Kline
Chief Engineer
WAZY-AM-FM, WGBD(FM)

Lafayette, Ind. Just a few years ago, stations contemplating a move into the digital audio storage era could expect a rack full of expensive equipment and many hours spent getting everything configured and ready to go on the air.

The Arrakis DL4 resolves these issues and makes digital audio storage reliable and cost-effective for large- and small-market stations alike.

A single DL4 unit, as shipped, includes three playback outputs and one source input. This would replace, for example, two cart decks and a CD player or any combination of traditional audio sources.



The Arrakis DL4 System

After a straightforward installation procedure, users get a front-end control panel, which is intuitive and logical. For us at Artistic Media Partners in Lafayette, Ind., operating WAZY-AM-FM and WGBD(FM), the DL4 has helped us to switch to digital audio storage with few, if any, glitches.

For us, the three most important reasons we chose the DL4 were audio quality, ease of use and reliability.

The MPEG-II compression scheme used on the DL4 creates a sound which we find indistinguishable from the original material. An additional advantage of MPEG II is compatibility — audio can be sent from one station to another using the Internet, a satellite network, or any other data delivery method.

As for ease of use, the DL4 replaced Denon 951FA CD players in our stations. Because the front panel controls mimic those found on cart decks, CD players, reel decks and other conventional sources, air personalities have no problem adapting.

To play any cut stored on the DL4, the user enters an alphanumeric code indicating the selection. When our station is in live-assist mode, the jock uses the same number listed on their music scheduling log. He or she then designates which output to send it to, then pushes Play.

Commonly used functions such as headphone volume, record threshold and remaining hard-drive time are available on the front panel of the DL4. Maintenance and utilities are handled with an MS-DOS or Windows program provided by Arrakis. A PC used to perform these operations can be connected to the DL4 via an RS-232 port.

The reliability issue: the basic DL4 includes its own internal drive, operating software and motherboard, rather than rely on an external PC. The internal components were selected for professional use. A data port is available for advanced applications such as station automation, live assist, and production.

See ARRAKIS, page 64 ▶

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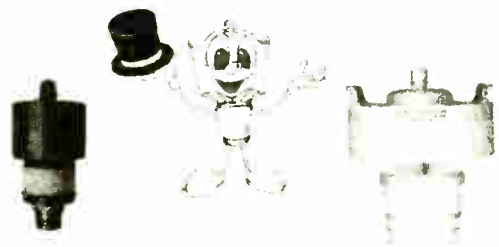

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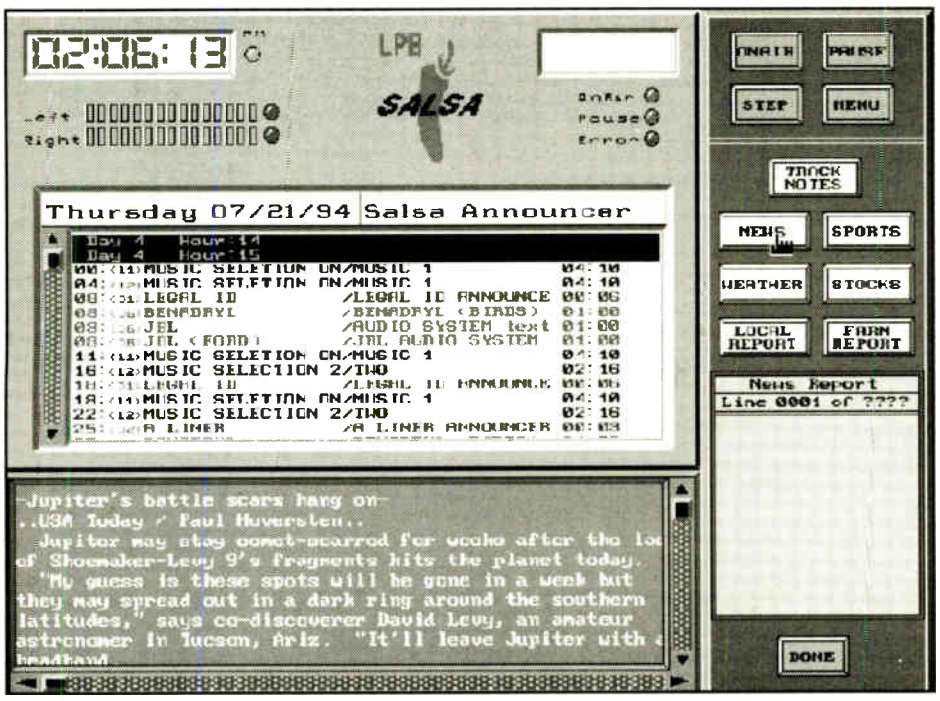
USER REPORT

A Serving of SALSA in Bar Harbor

by R. Scott Hogg, President
Bridge Broadcast Group
WMDI(FM)-WAKN(FM)

BAR HARBOR, Maine Small-market broadcasting presents financial challenges unique in today's ever-changing broadcast industry. These challenges force many broadcasters to succumb to automated satellite broadcasting, thereby removing much of the "local feel" inherent in small-market stations of the past.

Although these feeds are well-produced and revenue-directed, many times the local communities of license are the ultimate losers in this battle of property



The SALSA Automation System From LPB/Systemation

and cost consolidation. It has been the mission of Bridge Broadcast Corp. to effectively create a successful marriage between technology and personnel, thus maintaining adequate cost containment without sacrificing 24-hour, locally produced programming.

The backbone of our system integration is the SALSA Automation System by **LPB/Systemation**. The software, running on a standard 486/DX66 PC with a 4 GB hard drive, is a reliable and cost-effective alternative to many higher-priced automation suites.

Decisions, decisions

SALSA offers four modes of automation: satellite, CD, hard-drive, and live-assist automation. The Bridge stations use SALSA exclusively in the live-assist mode, although much of our daily programming is fully automated. Our music plays from six Pioneer PDF-100 CD changers. Tracks, times, intros, overlaps and song data are entered and edited into the system easily.

The system operates in the DOS environment, but is graphically friendly and controlled by drag-and-drop mouse operation and keyboard control. Most important, SALSA is user-friendly, presenting a quick and painless learning curve normally mastered in a matter of hours.

Music and traffic scheduling integrates easily with SALSA, either via LAN networking or floppy disk uploads. Color coding of the studio operation screen separates music, traffic and nonmusical elements. Instantaneous drag-and-drop functions allow the operator complete control of log manipulation.

Probably the most exciting SALSA application our station has utilized was the implementation of "jock drop" inserts throughout the broadcast day. SALSA's ability to record and play simultaneously allows our one-studio facility to be used primarily as a production studio, while competently managing all on-air operation.

Six-hour jock shifts are compressed into 30-minute "jock recording sessions," recorded daily and uploaded for next day's airing. Four to eight jock drops per hour are loaded easily in minutes, then fired in their respective time slots. This creates the sound and impression of live, real-time operation. Two hours of our morning show are even recorded, with over 15 inserts per hour, seamlessly fired by SALSA.

In fact, the SALSA element structuring and manipulation features have allowed our stations effectively to eliminate jock burnout and productivity loss. Instead of having a jock stuck inside a studio for six hours a day, he or she is now in there for less than an hour. All drops are perfect, as mistakes during the recording sessions are deleted and re-recorded. Our jocks can now manage other station functions like traffic, news, weather and quality show prep, outside the live studio environment.

SALSA also is capable of handling large volumes of data, including our current use of over 3,400 songs, 475 commercials, and 1,200 liners, sweepers, promos and nonmusical elements.

Conversion from live-assist mode to satellite or hard-disk mode is done with a simple button-push. Operators can punch up the system most applicable to their specific use. Mini-backups are made daily, and the four most recent backups are stored automatically to the hard drive and/or floppy.

The SALSA live-assist mode operates on a sequential system, but can be manipulated by clock time as well. SALSA comes complete with a music and jock scheduling system, offering 24 different music and jock clocks.

Probably the most impressive feature of SALSA is its 24/7 technical support line. Bob Wille, the software guru for LPB/Systemation, is available every step of the way, offering easy-to-understand step-by-step directions over the phone or via e-mail.

With SALSA being our first automation product, everyone in the organization had to learn the system from square one. SALSA takes the prize in both initial set-up training and product support for a surprisingly inexpensive annual support fee. It is this product support that gives all station employees the confidence needed in a successful transition to automated system integration.

Jumping the hurdles

Some of the drawbacks of the SALSA automation system include its current limitations on the Pentium platform and higher memory processing speed. SALSA uses gobs of higher memory which, at times, slows down other software functions.

For instance, when the system is on the air firing a commercial set, the search functions available to the jock and the ability to edit advance music schedules are slowed considerably. LPB is working on some memory reconfiguration to combat these problems.

In the live-assist mode, changes made to elements currently loaded into the on-air screen (two hours of elements) cannot effectively be made unless the clocks are reset. To change a recorded weather report scheduled to fire in ten minutes, one would have to reset the clock after the recording was made to load the new report into its slot.

Although this drawback is relatively minor, it does detract from the otherwise smooth and friendly operation of the rest of the system.

The Bridge Broadcast Corp. has recently begun construction of a new station in Maine. I have had the opportunity to compare the LPB/Systemation product to many of its competitors. Although more expensive systems come with more bells and whistles, SALSA seems to be a perfect alternative for cost-conscious stations looking to break into partly or fully automated systems.

Additionally, if the learning curve is important to you and your staff, SALSA is capable of making the transition process to automation easy to understand and operate.

For more information, contact LPB in Pennsylvania at (610) 644-1123; fax (610) 644-8651; or circle ***Reader Service 61.***

Planning Your Automation Setup

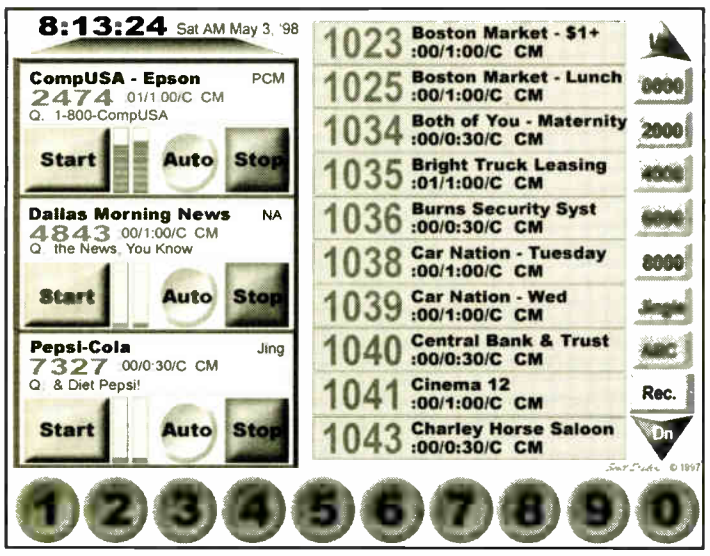
▶ AUTOMATION, continued from page 56

couldn't be sold otherwise," said George Thomas, president of Cartworks/dbm Systems. "Purchasing a complete unit ensures that the components of the system are compatible with each other and all your support comes from a single source. One vendor can't place the blame on the other when components from various sources are used."

Even with a turnkey package, be clear as to whether you are dealing with "open" or proprietary components. "Open systems don't trap you into a scheme which will become obsolete will require expensive upgrades down the road," said Eileen Tuuri of CBSI/Custom Business Systems Inc.

Even the best components can fail. Complete reliability comes from redundancy. How much redundancy is enough? In setting up the ENCO DADPRO system for World Radio, a new network that provides programming for public radio stations, Chief Engineer Ned Keller wanted to be sure they would stay up and running no matter what the circumstance.

"We went with dual redundant everything: mirrored drives, dual power supply — and I even have a spare monitor, keyboard and mouse lying around," he said. "It is way worth a little bit more money in the long run."



Scott Studios' Spot Box

What computer?

Investing in quality computers is important, but don't lose sight of the big picture. John Schad, president and owner of Smarts Broadcast Systems, suggests that it's best not to think of these as computers at all!

"Prospective buyers should consider that they are purchasing broadcast equipment and look for features as they would for any other equipment," Schad said. "What it sounds like is much more important than what the screens look like. Look at features needed in a reliable broadcast automation system. A good computer doesn't necessarily mean a good automation system," he said.

What about sound quality? Will you use compressed or uncompressed sound files? At what sampling rate? KRMN (FM) owner Jim Turvaville in Shamrock, Texas, set sound quality as a top criterion in choosing a SALSA system from LPB/Systemation. At first, he was skeptical of any hard drive-based audio, and wanted a CD interface. Setting sampling rates, however, made a major difference.

"Most MOHD (music on hard drive) systems use a 32 kHz sample rate, because 'you can't hear the difference,' but I could almost always tell," said Turvaville. "The SALSA at 44 kHz sample rates makes the artifacts I hear in the compression much less noticeable." Nevertheless, higher sampling rates or uncompressed audio means larger sound files, as well as the need for more capacious hard drives to match.

So you narrow the search to systems that can handle your operation reliably. How will your staff handle operating the system?

Typically, there's some compromise between simplicity of use and the system's ability to handle complexity. Finding the right balance often comes from talking with other users and visiting their operations. Referrals from other stations was essential to the search according to Ken Bryant, operations manager and owner of Seneca Broadcasting.

"We went looking at other station operations and (asked for) referral information from other station management and engineers," said Bryant. "The reason we hit upon LPB/Systemation was the relatively simple operation and referrals from two other stations that already had this equipment in use."

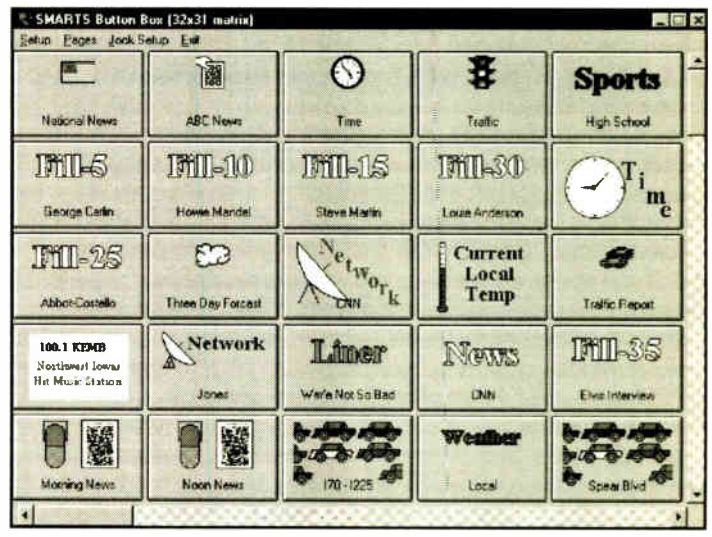
The next step: Try before you buy. David Julian Gray, digital audio systems administrator for National Public Radio, determined the delicate balance between ease of use and functionality after a hands-on evaluation of some six systems.

"The easiest system did not have the required functionality. The system with the greatest functionality was not the easiest to learn and use. The ultimate decision (Dalet) was deemed workable from an ease-of-use standpoint while delivering, in their shipping product, the greatest number of required features with the fewest compromises in functionality, quality and ease of deployment," Gray said.

Larry Wilkins, CPBE, chief engineer of Cumulus Broadcasting in Montgomery, Ala., saw how this translates into practical realities before selecting an Arrakis system.

"Our company had four different vendors set up their system (at different times) in one the production rooms. Engineers and the program director checked it out first. Then we had board operators check it out," Wilkins said. Differences invisible elsewhere became obvious.

"As we got into the testing, we found that the ease of operation during a fast-pace morning show began to be very important. Some systems had a lot of features, but moving around the screen and switching between screens made it difficult for on air operation," he said.



A Handy Automation Tool From SMARTS

Every system requires some training, and this needs to be figured in as part of the overall cost. "An easy-to-use digital system that doesn't meet your needs is just as useless as a system that can meet the need but can't be figured out," said Eric Briggs, senior account manager for Broadcast Electronics. "Training is critical with any system. The money spent to have your staff properly trained will prevent hours of frustration and lost productivity."

For some, this is best carried out in a formalized fashion — i.e., school. "We dedicated a great deal of money and personnel resources to create the PSI Training Academy," John Marquis, Director of Training at Prophet Systems, said.

Despite extensive research, Walter Hooper found that the system he first purchased for the five-station group he owns in Tennessee wouldn't do. "We spent most of our time trying to figure out how to work around system limitations. I believe very strongly that the automation system should work for you. You should not work for the system, nor should you have to compromise your programming to accommodate the automation system," said Hooper.

After this ordeal, Hooper switched to the ENCO DADPRO32.

Making a system "user friendly" — by design, training or both — will make or break a system. Dalet user Cris Alexander, director of engineering for Crawford Broadcasting and a columnist for RW, put it: "If the operators hate it, the system is doomed to failure."

Vendor relations

Actual implementation takes time. Cris Lawton, senior systems engineer for Susquehanna Radio, is in charge of installing and maintaining digital audio storage systems within its multistation operation.

"Changing from analog to digital is not a one-week process. Once you start, it takes about 30 to 60 days to get the system up and fully operational. Then over the next six months, you get all the kinks worked out. I don't like to say 'bugs' because that is referenced to software," Lawton said. "The kinks I am referring to are getting the traffic and music logs in and out of the system, working on electronic reconciliation, and setting up each jock with their own screen image."

Throughout this period, vendor support is crucial. How much does additional on-site service cost? How fast do they return support calls?

Even as the system becomes an ongoing part of the day-to-day operation, the relationship with your vendor isn't over. Upgrades and modifications are vital parts of maintaining the system through its life cycle. Rod Thannum, chief engineer for Northwest College Radio based in the Minneapolis-St. Paul area, said the 13-station network decided on its vendor because it offered the best opportunity to forge a solid working relationship.

"Our research told us that any of the three vendors (they considered) could probably meet our needs," said Thannum. "In the end we selected the Arrakis DL4 because it not only meets our technical and operational criteria, but the relationships developed with the personnel at the company gave us an indication as to how well expansion and upgrades would potentially go. In my view we were not just buying a box of hardware and a couple of floppies to run our stations. We were buying the services of a vendor to meet our current needs and grow with us," he said.

With the on air/live-assist system at the core of your operation, this ongoing relationship is indeed like a marriage. Irreconcilable differences may happen, but it's unlikely you will ever be divorced from this technology all together.

■ ■ ■

Carl Lindemann hosts "Cyberscene," a daily feature carried on public radio.

USER REPORT

CBC Taps MediaTouch for Galaxie

by Fred Benedikt
Senior Engineer
Canadian Broadcasting Corp.

Galaxie shown in use at the CBC.

TORONTO Galaxie is a new subscription audio service developed by the Canadian Broadcasting Corp., delivering 30 channels of continuous, commercial-free CD-quality music, overseen by music programmers from across Canada.

It is delivered to ExpressVu, a Canadian DTH (direct-to-home) service and select cable companies via fiber optics and satellite. Distribution to other service providers is planned as they become available. Galaxie was operational as of Sept. 10, 1997.

Galaxie has some unique automation and control features — specified by Galaxie/CBC and implemented by **Oakwood MediaTouch Technologies** (OMT/MediaTouch) as a turnkey vendor. The system utilizes the strength of the CBC infrastructure for operational, technical and computer support combined with the fault-tolerant MediaTouch system design. CBC looked for an experienced radio broadcast automation turnkey vendor, preferably Canadian, as CBC has a history of preferring to work with Canadian companies.

Background

A key criterion of Galaxie is the unattended operation and automatic failure detection. The Galaxie system minimizes the amount of user intervention required during normal operations and component failure conditions.

Each of the 30 formats has a preprogrammed backup audio source should any major system component falter. Failure of audio or missing programming is reported to a Web page on the CBC national intranet, where management and programming staff could monitor system status in real time from almost anywhere.

Low operational costs and WAN system access were the most challenging design aspects of Galaxie. Technical facilities are in Toronto, while Galaxie management is 300 miles away in Ottawa. Twenty-one music programmers are located in five Canadian cities from Montreal in eastern Canada to Edmonton in western Canada.

CBC's intranet WAN, running from coast to coast, proved to be the critical component in offering the high level of system access with low operational and communication costs. The music programmers create their music playlists with the assistance of RCS Selector software and deliver them electronically to the Galaxie technical facility in Toronto. The programmers make this connection with a local phone call.

A little help from our friends

Galaxie has 30 Pioneer CAC-V5000 500-bin jukeboxes, the first in Canada. These CD jukeboxes are controlled by MediaTouch OpLOG software. MediaTouch OpLOG automation software has been customized to play individual cuts and/or complete CD albums.

The core server is two DEC Prioris P166 HX Network File Servers with 20 GB of SCSI Fast Wide disk storage. A high-speed fiber optic link keeps the two file servers mirrored with identical data. During a primary server failure, the system switches over to the secondary.

A Microsoft NT 4.0 server provides system status information and log reporting for each music format. Additionally, the server provides delivery and processing of daily playlists. The log report is required for Canadian content regulations as well as for diagnostic feedback.

An audio workstation, with MediaTouch MediaDisk software, is available for the delivery of other audio source material onto the servers for integration into the automation system.

MediaTouch provided Galaxie with a mixture of standard, customized and developmental software for the automation, control and reporting features of the Galaxie facility.

See CBC, page 67 ▶

USER REPORT

360 Systems: Instant Gratification

by Ross Alan
Executive Producer
'Tom Joyner Morning Show'
ABC Radio Networks

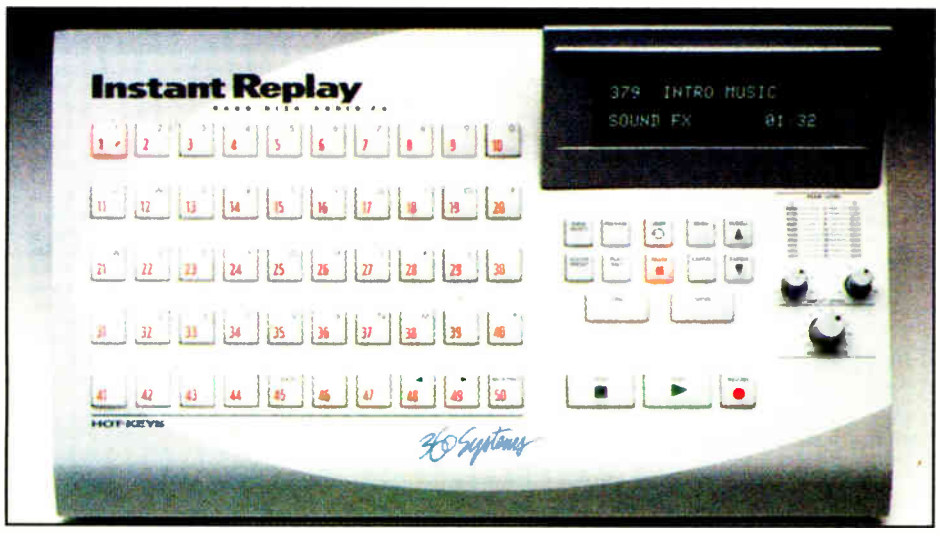
DALLAS When talking about live-assist products, there are systems that merely work, and others that work hard. The Instant Replay from **360 Systems** is one of the latter.

My initial experiences with the Instant Replay were in Atlanta, where I was producing "The Tom Joyner Morning Show" on a local basis for WALR-FM, "KISS 104.7." In fact, I was the only show producer utilizing the Instant Replay, compared to the other 96 affiliates using outdated cart systems. Joyner visited the station in Atlanta on several occasions and saw what I could do with the two units I had purchased.

The show is a satellite-fed "generic" product that requires localizing, done with Joyner's prerecorded voice setting up traffic liners, time checks, simulated conversations, intros and IDs. This gave our listening audience the impression that the show was happening right there in Atlanta. Tom knew all about the current traffic problems and local news.

'Tom in a Box'

With four hours of in-box memory, I could get creative by mixing liners to construct full simulated conversations between Tom and the local on-air staff. The unit has a Playlist function that allows the user to preprogram a series of liners to be played back-to-back at the touch of a button. This let me do contest giveaways with sound effects playing along with music beds in the background. At the time, I named the unit "Tom in a Box."



Instant Replay is integral to the 'Tom Joyner Morning Show.'

The two fully loaded machines allowed me to stretch creativity. All audio elements were categorized and loaded so I could access any type of comment or effect when desired. I even had liners that allowed for mistakes when I pressed the wrong button.

For instance, if I hit a time check for 6:07 and it was actually 7:07, I had a button for, "Wait, wait, wait a minute, I blew it (laugh). I don't want you to tear up that fast lane rushing to work. I gave you the wrong time. Let me see ... " Then of course I would hit the correct time and not only did I correct my mistake, but it gave the impression that Tom really goofed and corrected himself live.

With the machine's capacity of 500 pre-assigned liners and hundreds more stored in memory, I was able to come up with many creative moments. Seeing what I was accomplishing with the two Instant Replay units, Joyner recommended all 96 affiliates carrying the show also check them out.

Three months later, Tom hired me as executive producer of his national show from the ABC Radio Networks in Dallas.

On location

The first thing I did when I arrived was order two new four-hour Instant Replays for our remote broadcasts and load them up with jingles, contest beds, sound effects and music.

You might wonder why we needed to bring the units on location instead of simply originating the music and beds from the main ABC studios in Dallas. Because we do the show with a live audience on location, the crowds tend to sing along with the intros and outros to the songs and jingles. This causes a delay problem — the feed comes from Dallas, up to the satellite, down to the remote, back to Dallas and out to the rest of the country.

See INSTANT, page 66 ▶

On Air Digital, USA Scores With UDS II

▶ UDS II, continued from page 57

When recording liners for walkaway operation, we can key in the run times of your announcements. As these are entered in the playlist, the Time Update key can display how the remaining hours of the day will time out. Judicious use of this feature and the voice-tracking capability of the UDS II has led seasoned radio pros to inform me they can't tell when I am live or tracked.

Going awry

Every once in a while, we all make a bonehead mistake that will put some information on the screen never seen before. But help is only a phone call away and the answer is right there.

I once got confused and loaded the KOMC (adult) schedule for the ensuing day into the KRZK (country) machine. When I saw that most of my music had not loaded, I immediately thought there was a problem with the machine — as they say, popes and operations managers are infallible.

Technical support helped me check out a few things on the scheduler list. Suddenly I realized I was looking at the Andrews Sisters instead of the Forrester Sisters on my country playlist. Reloading the proper schedule put everything right and the current day's events continued to run like nothing ever happened. And the tech guy was gracious in trying to make me feel less stupid for performing the radio equivalent of the square peg in the round hole.

Reliability, ease of operation, dependable tech support and a vision to the future make the UDS II a suitable choice. From time to time, I have suggested features to enhance the UDS II system, and each time the On-Air folks have responded with software that does the job. I scan their "wish list" of enhancements for other customers using different source devices and find they are meticulous about meeting the needs of each client.

If you are looking for a system that will reliably take your station into the 21st century, I would recommend you look at the UDS II.

For information, contact On Air Digital, USA in Texas at (972) 481-8700; fax (972) 481-9499; or circle ***Reader Service 9.***

DL4: A Versatile Tool for Radio Stations

▶ ARRAKIS, continued from page 59

In our station, the versatility of the DL4 has been an advantage. WAZY(FM) already owned a Digilink III which was used only for spots, jingles and other non-music cuts. When station management wanted the ability to automate certain air shifts, we needed the ability to store our music library (currently 731 songs) on hard disk.

WAZY(FM) DJ Rick Mummey

We wanted the extensive features of the DL4, but needed compatibility with our earlier Digilink III systems. The cost of adding an expansion unit and hard drive space to the existing Digilink III systems was similar to the cost of a complete DL4.

The layout

With the software provided by Arrakis, the Digilink III interfaced directly with the DL4. Our Digilink III still contains all spots and jingles and instructs the DL4 when to play the music. Music is input to the DL4 from a Yamaha 02R digital console in our production room. The DL4 is controlled remotely from the production room with Windows 95 control program.

On the air, the segues between programming elements and music are flawless. The cooperation between these two systems does not affect the ability of each to operate on its own.

The DL4 can be connected to analog or digital consoles. Users have a choice of analog balanced I/O, 32 kHz AES/EBU digital or MPEG if desired. With the inexpensive Arrakis (DL-XFER) option, an existing PC-based production editor like Cool Edit or Digigram XTrack can be used.

Each of the unit's three playback sources has its own analog or digital stereo output. However, the DL4 also has a software-selectable mode which will mix the analog outputs into one, allowing them to be controlled by one fader on the console.

Three is the magic number

At WAZY, we use three separate outputs to feed our console, because this allows air talent to mix sources as they did before the transition to digital.

The DL4 has tally and remote logic for the start and stop functions of each deck. We use the tally and remote logic functions to interface with our Arrakis 12000 console, although the DL4 can be fairly easily interfaced with any console.

When we operate unattended, the console faders are left up. The tally logic of the DL4 turns the channels on and off. This prevents the unused pots from being left open, possibly picking up unwanted RF signals, such as from the 1 kW AM transmitter 50 feet away. In our station, the audio output from the Digilink III is fed to its own fader.

For about the price of a well-equipped PC, the Arrakis DL4 provides a complete digital audio system. Add a PC with appropriate software and it becomes a full-featured system capable of unattended operation, live assist and production.

For more information, contact Arrakis in Colorado at (970) 224-2249; or circle ***Reader Service 142.***

USER REPORT

PSC Eases Pains at CNNRadio HQ

by Darrin Tebbe
CBTE
CNNRadio Networks

ATLANTA A rapidly growing radio network means a rapidly growing number of projects to complete.

The networks of CNNRadio present this challenge to the engineering staff. Projects require off-the-shelf solutions to ensure quick completion, reliable service and most important, quick replacement. **Broadcast Tools** provides a complete line of such solutions. The company specializes in the little things you always have needed but usually had to make.

'Live' on-hold

CNNRadio has become the ancillary audio services branch of CNN. Oddly enough, perhaps the most important is the service that provides the latest news "on hold" for every Turner phone system in Atlanta. The on-hold audio loop consists of two minutes of CNNRadio Network news, updated every half-hour. The feed was previously provided by an outside source, sometimes delayed for hours. The problem: Callers on hold at the world's news leader would hear three-hour-old news. It was decided to bring the service in-house.

The solution had to be automated, low in cost and maintenance-free. A Henry Engineering Digicord recorder/player was chosen for audio storage. A Broadcast Tools 2X1 audio switcher would cut between live and recorded audio. The missing link was a low-cost controller that could reliably operate the system based on the time of day.

The Broadcast Tools PSC (Programmable Schedule Controller) fit the bill perfectly. With 20 output relays, 136 program steps and the ability to sync to our master clock, the under-$500 PSC is a bargain. The 20 SPST relays can be activated in a momentary or latching mode. The unit is very small (7.75 x 1 x 4 inches) and can be rack-mounted with an optional kit. The programming steps are stored in EEPROM and a 1 Farad capacitor holds the clock setting for nearly 72 hours in the event of a power failure.

Breaking the format

In addition to contact closures, the PSC can issue ASCII commands via RS-232 serial port. This simplifies controlling high-end routing switchers, consoles and automation systems.

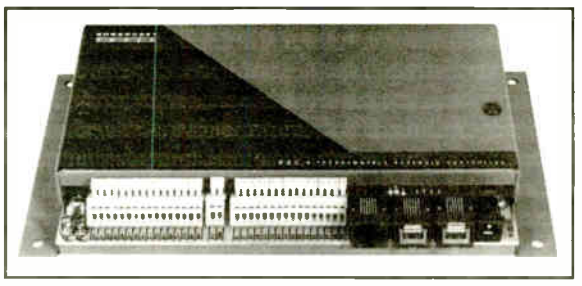
The unit accepts a simple closure to sync to a master time source. Its internal clock is very accurate; we have lost less than two seconds per month compared to our GPS master clock.

Programming via a non-dedicated computer or dumb terminal setup is easy. Our system was up in a couple of hours. The system provides a live on-hold newscast while it is happening and then repeats it until the next live one is detected.

The CNNRadio Headline News radio network is basically CNN Headline News television audio with a fixed half-hour format, providing network and local breaks at scheduled times during each half-hour. However, problems arise with breaking news, altering the Headline News format.

Affiliates rely on the scheduled breaks for income, so we needed a backup system that would operate the breaks based solely on time for these periods when the Headline News format was broken. The extra relays of the PSC provided that system, and it has worked flawlessly since installation nearly a year ago.

A simple main/backup switch facilitates the change in systems. The PSC also provides all network automation control for CNNRadio Europe, our overseas news service.



The Programmable Schedule Controller

Things that go bump

Our PSC was an early production model, and we uncovered a couple of bugs when we loaded it down with the second service. A quick call and a faxed copy of our schedule revealed two problems: operator error and a programming problem. The problems were found promptly and the unit was upgraded at no charge and delivered back via FedEx. This type of service separates broadcast vendors from consumer vendors.

In addition to the above-mentioned products, CNNRadio also uses Broadcast Tools audio switchers and button boxes in our day-to-day operation. All provide cost-effective and timesaving solutions to many engineering problems.

Documentation is good and tech support is just an e-mail or phone call away should you need it.

*For more information, contact Broadcast Tools in Washington State at (360) 428-6099; fax (360) 428-6719; or circle **Reader Service 36.***

USER REPORT

Auto-Mate System Hits the Mark

by Clif Wilson
Chief Engineer, KENE(AM)

TOPPENISH, Wash. Satellite-fed KENE(AM) in Toppenish, Wash., was using a fairly large SMC automation system that had just turned 10 years old. It was getting tired, so I had a chat with owner/manager Rick Knapp about looking into a computer system. I had researched several in the last couple of years — some were good, some very bad. The ones I rated negatively I knew by experience, but I won't name names here.

I had spent $20 just to receive the manual for the Auto-Mate system. I was impressed. The more I read it, the more I liked the program; but the price kept nagging at me, telling me this system couldn't be much. After reading through the entire manual, though, there was little I could pinpoint missing from this program.

One day in June 1997, the old system we were using finally gave up. Replacement parts were obsolete and we were forced to take over manually. We called John Zolkoske from Auto-Mate in Oregon, who shipped the Auto-Mate program to us overnight. I grabbed an old 486/DX66 computer we had laying around and I went to work.

The Auto-Mate System filled the void during the recent satellite failure.

This system came together extraordinarily easily. The biggest difficulties were in obtaining a large hard drive that would function in an old computer, and getting the Soundblaster audio card to come up in DOS. Another complication was in running wire from the satellite receiver to the computer. The entire project took about half the day. By evening, we were running off the computer.

It is true not everything was running perfectly, but at least we could go home and sleep that night. In a short time, we devised a usable routine.

I believe in redundancy, so our system does not end with one computer. We have two PCs in the control room, both equipped with the same features. The second computer has all my morning toys: special liners, jingles and one-liners I created.

We use ZIP drives in each computer to move files around because we find them satisfactory and quite speedy. We also use ZIP disks to back up the system. A disk management program called X-Tree is used to move all elements and assure that everything is updated.

Although Auto-Mate does allow us to record spots, music and liners directly into the program, we use a third, considerably faster computer in the production room. This has a simple cut/paste/mix editing program from Voyetra, the MIDI sequencing software company, which lets us standardize levels and trim spots to perfect length. Editing is a breeze and we find our attitudes leaning toward perfectionism.

A full plate

Our Auto-Mate currently is running with 350 to 450 entries a day in the satellite templates. We have 200 liners in the system and can assign liners to a specific announcer by way of an announcer code. Our network does a strong job using the personalized liners, and most people are not aware that our announcers are in Branson, Mo., and not right here in Toppenish.

Auto-Mate allows us to have 10-second legal Ids and five- and three-second

See AUTO-MATE, page 67 ▶

The Instant Replay on Location

▶ INSTANT, continued from page 64

In effect, the audience sounds like they are singing out of sync.

Having the Instant Replays on location allows us to play all the show elements from the remote broadcast, keeping the audience in-sync with the songs. They have become a necessity to our broadcasts, and since they're digital, there is no degradation or loss of quality.

To keep the unit working properly and avoid disk crashes, I perform periodic de-fragmenting with the program built into the Instant Replay. I also back up the entire memory to DAT tape via digital transfer. The 360 Systems product support is efficient and quick to respond to my questions.

Sense and sensitivity

The only problem is the extreme sensitivity of the buttons. My finger will sometimes double-tap the button, repeating whatever is on that preset. However, after a bit of practice, you get the hang of it and this is no longer an issue.

Initially, shipping the units from city to city and country to country worried us, but the Instant Replays have proven their ruggedness. We all know the nightmares of baggage handlers at the airports — even with "Fragile" stickers plastered all over the cases. With the proper shipping cases, the units are very durable.

I frequently need to load and reload music into the units. On average, each will hold about 50 full-version songs along with all other show elements. Weighing this factor, I recently put an order in for two of the new 16-hour Instant Replays. These units will allow me to store a ton of music and not have to update as often.

Given the price, convenience and consistent quality I demand, I recommend you look into the creative possibilities offered by the Instant Replay and consider retiring that collection of cart machines.

For more information, contact 360 Systems in California at (818) 991-0360, or circle ***Reader Service 10.***

The Wondrous World Of ENCO DAD

▶ DAD, continued from page 58

schedule of elements to be downloaded at designated times. This works well, but the satellite feed is a one-way street and there is no verification of a successful or failed download.

Occasionally, we would download a commercial only to find out later that it was never received. Satellite signal fade and local power failure were the most common reasons for a failed download, although operator error was also a factor.

To close this loop, we are converting from satellite-based to WAN-based downloads over our existing T1 link. ENCO provided a gateway application that functions independently of a DAD Workstation and will run largely unattended. This frees a workstation for other uses and will verify that a download was successful.

The DADJR workstations at the remote locations receive downloads of commercials and localization elements, then play them back on demand under DADSAT control with no local human intervention.

Due to our unusual technical demands, our DADJRS have been beefed up considerably. We have upgraded and added more DSP boards, increased memory and hard-drive capacity, as well as extra serial ports and a LAN card.

I like the system because it works. I also like the company, run by resourceful people who believe in and stand behind what they create. Unlike our previous system, when ENCO fixes one problem they don't create two more. When we have encountered problems, there was always someone to help me work through them at any hour.

For more information, contact ENCO Systems in Michigan at (800) 362-6797; fax (248) 476-5712 or circle ***Reader Service 35.***

▶ AUTO-MATE, continued from page 66

liners. Because I use the second computer to run top-of-the-hour IDs, I use the 10-second ID break in the first computer to play stagers. The Auto-Mate system updates the template every hour so we know where the spots are going to run.

Of course, if we enter something wrong, the computer cannot correct it. But even our errors are less noticeable compared to our old mechanical system. If we run a little over during a spot break, Auto-Mate will hold a liner for up to five seconds and nobody can tell the difference.

With the old system, the liner simply ran right over the top of the spot. This system is much more civilized; if a spot break runs long, Auto-Mate simply discards the liner after five seconds and sends you right back into music.

There are numerous little things that Auto-Mate does to make life easier, but there are also a couple of significant items as well. One is called Random Play, which assisted us through the Galaxy IV satellite failure. KENE(AM) airs the Branson Music Network for programming and the USA Radio Network for news. Both services were lost when Galaxy IV spun out, potentially leaving us with nothing to put on the air.

Auto-Mate gave us two options. We could install two relay cards and run a complete music-on-hard-drive system, or use Random Play. We did not think the satellite would be down for more than a day or two, so we simply started adding music to our hard drives and used the Random Play feature in the overnight slot. It ran a liner every two songs and a four-unit spot break every five songs. The Auto-Mate program placed station IDs close to the top of each hour. This was a lifesaver for our station.

It was eight days before a different satellite was moved into place and our format returned. We did the daytime by live-assist and let Auto-Mate do its thing at night. I remember working at stations, wondering what would happen during sun outages or other network losses. With Auto-Mate, we can return to the Random Play mode within 30 or 40 seconds of when someone arrives in the control room.

You know ...

Knapp made a comment the other day that Auto-Mate has, in the first year, already run longer and more error-free than the old $20,000 system we used before. I do not believe we spent more than $3,500 total, including all three computers.

He told me that in the 10 years he used that system, he had some sort of crisis almost every day: carts getting stuck or not stopping; liners running over music or spots and carts without cues resulting in silence. These things do not happen with Auto-Mate.

Some systems can play two or more items while recording a third. With Auto-Mate, I have all three systems to record and play on for less than half the price of only one of the others.

Admittedly, without the use of X-tree and Voyetra, life would be a bit more difficult. There would be some minor changes were I to do things all over again, but Auto-Mate would stay. I am aware of other programs within a few hundred dollars of Auto-Mate, but both require more expensive computers with Windows 95 or NT, thus driving up the cost considerably.

You will likely need someone with computer skills to help you set the system up, but once you get it up and running, I cannot think of a more user-friendly program. If dollars count, Auto-Mate is the way to go.

For more information, contact Auto-Mate in Oregon at (503) 769-2886, or circle Reader Service 62.

MediaTouch Essential To CBC Galaxie System

▶ CBC, continued from page 63

The many known and unknown complex issues, plus CBC's desire for high standards, caused an initial concern for MediaTouch. On the other side, CBC questioned their ability to provide the deliverables of the contract on schedule. Would MediaTouch have access to suitable resources to complete the contract should there be a significant problem?

By a collaborative approach between CBC and MediaTouch, the project had no insurmountable problems, including the necessity to redesign the Galaxie technical facility due to a location change. All critical broadcasting target dates were met but less defined, and more developmental issues took about double to triple the scheduled time to complete. If the relationship were confrontational, then this complex project would have surely failed.

The general advice provided by MediaTouch, and by Scott Farr in particular, proved to be invaluable and relevant. As counseled, the "human element" needed more consideration than originally anticipated for this highly computerized facility to operate smoothly and develop a comfort factor by the users.

With MediaTouch and CBC acting as parents, "B.A.B.Y." (for "Best Automated Broadcaster Yet," a.k.a. Galaxie) went through the natural stages of development: infancy, childhood and now adolescence. As an adolescent, B.A.B.Y. requires only minimal and occasional intervention.

MediaTouch and CBC both view this as a successful project in that it met the design criteria for Galaxie within budget.

For more information, contact MediaTouch in Winnepeg, Canada at (204) 786-3994, or circle Reader Service 217.

TECHNOLOGY UPDATES

Prophet Systems

On the way from **Prophet Systems** is the Audio Wizard CFS32, an upgraded version of the existing Audio Wizard CFS automation system.

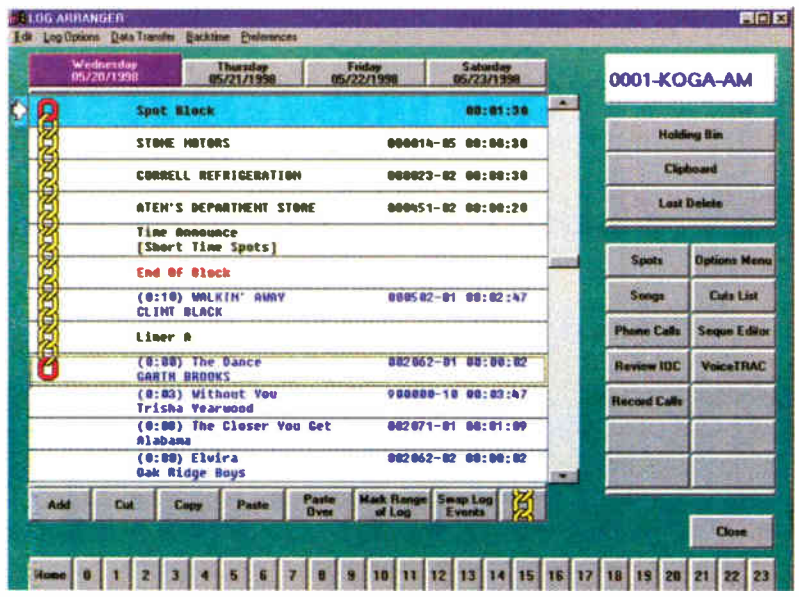
Combining the latest-generation 32-bit graphical user interface with the existing Prophet Systems database engine and WAN capabilities, the CFS32 is a robust but easy-to-use digital audio system. Its redesigned control room interface was designed with the large-market control room in mind.

Audio Wizard CFS32 can simultaneously run up to four monitors off one computer. This feature allows the DJ to arrange screens in whatever design is easiest to use. The left monitor displays the new control room interface, while the GUI log editor is on the right monitor.

A GUI-based option screen allows the tailoring of hundreds of parameters. Logs and clocks can be edited from a single program that allows the user to cut and paste information from one log or clock to others.

Spots, songs, archives, time and temperature announcements are accessed from a single GUI-based editor; time and temperature ann-ouncements can be recorded and reviewed quickly with the CFS32.

*For more information, contact Prophet Systems in Nebraska at (308) 284-3007; fax (308) 284-5007; or circle **Reader Service 88.***



SMARTS Broadcast Systems

The SMARTCASTER Generation 2000 from **SMARTS** combines virtually every station operation into a centralized computer system.

Order entry and production to broadcast and billing can be controlled by the Generation 2000 system. It features the Generation 2000 on-air playback unit with triple-overlap and dual-record; three Generation 2000 production units with complete playback/record; and a traffic system.

The system integrates multiple stations into one computer network. Computer stations feature a Pentium processor, VGA color monitor and hard drives to suit specific needs. A system hard drive provides redundancy.

The Generation 2000 allows playback of audio from the on-air and production rooms and virtually anywhere in the facility including the newsroom and the sales office. The need for paperwork such as logs is eliminated, and the reduction of labor resources to operate the station is noticeable.

SMARTS Broadcast Systems

Stereo audio and APT noise reduction enhance the sound quality of Generation 2000. There is automatic fill of underfilled and mandatory breaks, as well as audio overlap for smooth transitions. Seven-day walkaway programming allows the user to plan a daily broadcast schedule well in advance.

*For more information, contact SMARTS Broadcast Systems in Iowa at (800) 498-0487; fax (800) 398-8149; or circle **Reader Service 114.***

Dalet Digital Media Systems

The Dalet5 from **Dalet Digital Media Systems** features a new look, a robust database, added functions and remote-site accessibility.

Dalet5 incorporates the recent innovations of digital technology to bring the user a station-wide solution. Its backbone is a newly implemented client-server database that offers high processing power.

Managers of large installations with 30 or more workstations will appreciate the processing reliability this database structure provides. Stations of all sizes will benefit from the flexibility in creating, organizing and consulting database categories.

New applications designed for user interconnectivity and mobility create an efficient environment for radio group teamwork. Distant members of a radio group can exchange work in a matter of seconds. User-friendly intranet and Internet applications facilitate all interchange of logs, audio and messages for multiple-site management.

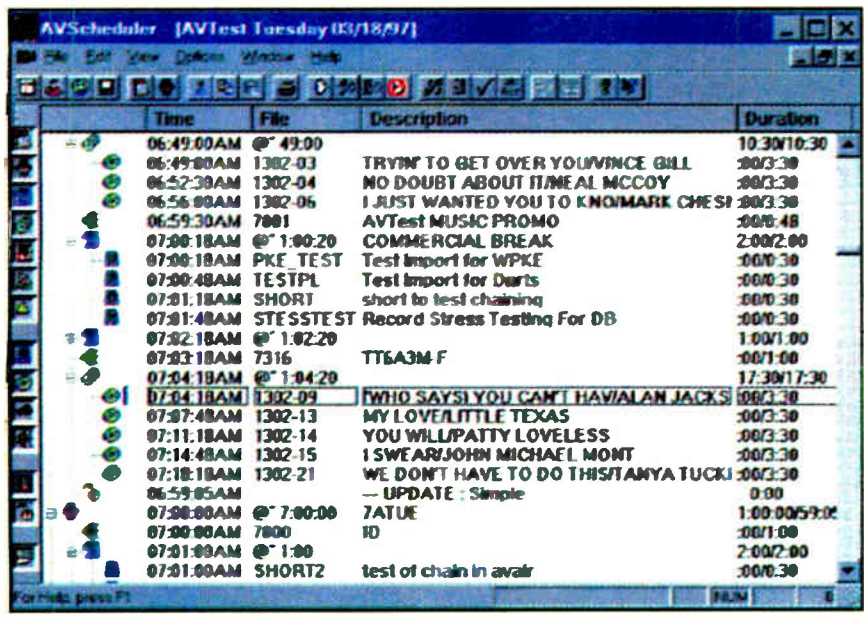
Other features of the Dalet5 include a graphic design that brings the staff clarity and speed in operating the system; on-air versatility, featuring a single on-air screen to centralize the tools for music, newscasts, talk and live-assist programs; automated operations; and Standard Technology, an open-system architecture that simplifies the integration of third-party breaks, logs and sound files imported from other sources.

*For more information, contact Dalet Digital Media Systems in New York at (212) 825-3322; fax (212) 825-0182; or circle **Reader Service 140.***

Broadcast Electronics

AV-Schedule is the most recent addition to the AudioVAULT live-assist and automation system from **Broadcast Electronics**.

This new feature is a 32-bit Windows application that imports schedules from virtually any traffic and music scheduling program and combines them into a playlist for the AudioVAULT AV-Air screen to execute. The resulting playlist can be manipulated visually by dragging and dropping elements between breaks, and playlist adjustments can be automatically built-in to support various AV-Air commands. AV-Schedule can operate a schedule from one station or different schedules from multiple stations.



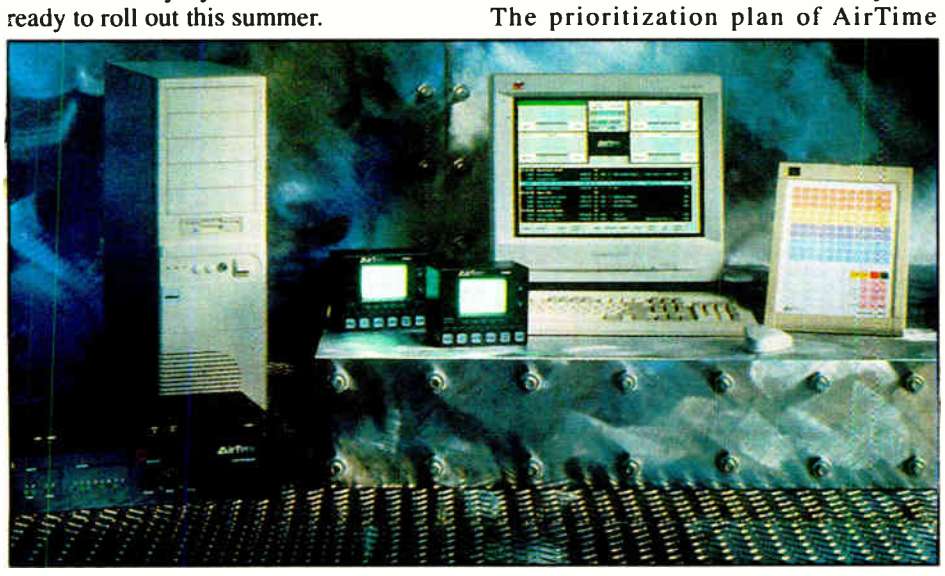
With AV-Schedule, the user can manually format or auto-set its built-in clocks to follow the structure of the music or traffic schedule. Tools such as Global Search and Replace and Schedule Change "bags" make post-import schedule adjustments simple. A number of reports including "Missing Cut," "Short Break," and "Cut Out Of Date" are provided to ensure scheduling accuracy.

AV-Schedule is now a standard part of the AudioVAULT software package.

*For more information, contact Broadcast Electronics in Illinois at (217) 224-9600; fax (217) 224-9607; or circle **Reader Service 166.***

Orban

After some tweaks and enhancements, the new version of the AirTime on-air audio delivery system from **Orban** is ready to roll out this summer.



AirTime is a real-time, multitasking network system designed for mission-critical radio environments. As part of the upgrade, AirTime now comes with automation functions providing dynamic interface controls with external devices and satellites with store and forward capabilities.

Other enhancements include the support of 100baseT networking and Digigram audio cards, larger graphics for the Sound Cube graphical user interface and a new main menu interface for easier use.

The QNX operating system within the AirTime moves digital information at high speed and efficiency, allowing AirTime to handle high volumes of audio and system data. All tasks are prioritized internally so there is never a delay in audio playback.

The power of QNX provides the benefit of integrating station functions without the drawback of traffic jams. The prioritization plan of AirTime keeps audio on the air while non-critical applications also are in use. Production, background mirroring, programming and other administrative functions can occur simultaneously without a glitch.

The AirTime Peripheral Interface allows audio playback from other outputs on site or from a remote location. On-air playback can be controlled from console faders or other external devices. The entire system runs on a Pentium/PCI platform and supports numerous hard-drive capacities and configurations to meet a variety of audio management needs.

*For more information, contact Orban in California at (510) 351-3500; fax (510) 351-0500; or circle **Reader Service 192.***

dbm Systems

dbm Systems has improved its live-assist and automation line with the release of CartWorks MHD, a Music-on-Hard-Drive system.

CartWorks MHD allows for in-context voice tracks — the ability to record voice tracks coinciding with time-of-day events. This feature provides a strong live sound. Announcers prerecord all voice tracks in advance. The company says the difference between live and automated operation will go unnoticed by listeners.

Users can switch easily between Live Assist and Automated modes. Should the need arise, switching to live operation is possible at any time to handle unusual situations. Cartworks MHD also can import logs from most music and traffic scheduling software so the need to learn a new software package is not essential. A Quick Scheduler system is included for fast and simple music scheduling.

The screens of this new system are designed to look like familiar broadcast tools. Operators can be trained within minutes (even those that lack computer skills).

*For more information, contact CartWorks/dbm Systems in Mississippi at (601) 856-9080; fax (601) 853-9976; or circle **Reader Service 218.***

Radio Computing Services

The **RCS** Sounder, Sounder Plus and Master Control NT systems are offered as a growth path to assist stations in choosing the proper live-assist system for its operations.

The basic Sounder improves live-assist on-air playback of jingles, promos, liners, sweepers, beds and sound effects with a touchscreen containing colorful icons and access to a station's audio library. The company says that, instead of an overloaded "cartwall" limited by hard-disk capacity, Sounder can stack and play up to eight carts on command, or put the stack on continuous play for unattended sequencing.

Sounder Plus takes the recall and play-back abilities of Sounder and adds the capability of importing entire program logs. Hours' or days' worth of songs, promos and spots can be loaded.

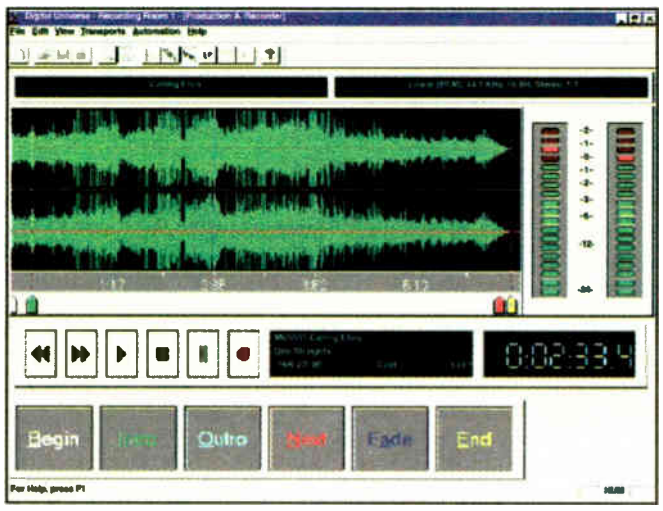
Master Control NT allows a station to move into the realm of full-blown automation, satellite and live-assist capability. RCS says this system has added versatility with the RCS Selector music scheduling program, combining the top traffic systems and adding Linker, a promo scheduler. With Linker, the operator can examine an entire log of songs, promos and spots to adjust as necessary before air time.

*For more information, contact Radio Computing Services in New York at (914) 723-8567; fax (914) 723-2258; or circle **Reader Service 11.***

CBSI

The Digital Universe live-assist digital audio system from **CBSI** is intended for radio facilities of any size. It delivers audio to each PC in real time from a single audio administration server.

Rather than allowing individual workstations to access network drives randomly, the client/server architecture allows the server to balance the load from all workstations and guarantee maximum use of hard drives. This overcomes the limitations and the potential for on-air failure of systems that are simply "networked."



Requiring only one PC and monitor per studio, the user can reduce hardware costs while tailoring each Digital Universe workstation to its intended application. The centralized server balances the audio load, delivering what is needed to each studio precisely when needed, and responds quickly to the changing requests of each studio.

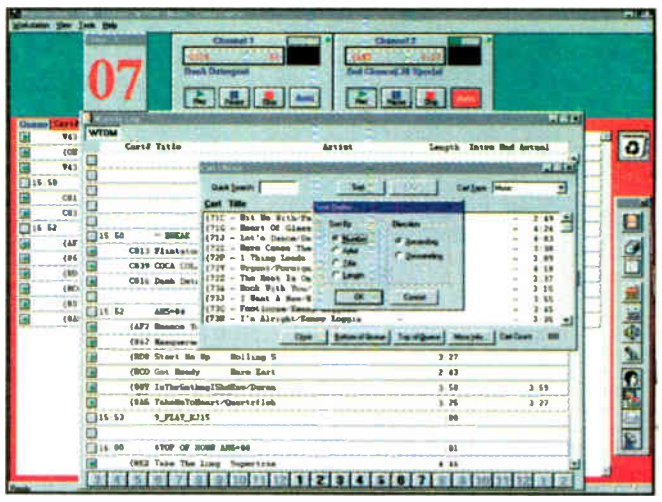
Digital Universe allows the choice of compressed or uncompressed linear audio. The system is specified to deliver 25 simultaneous linear stereo channels, and in stress tests has delivered many more. In 4:1 compressed modes, the factor increases fourfold, with the system delivering more than 100 simultaneous compressed audio channels. With the Digital Universe capacity, there is no reason to compress.

Touchscreen support and an on-screen log linked with the station's traffic system offer ease of operation. The user can access 55 hot buttons, user-configured as carts ready for instant play in a clean, uncluttered layout.

*For more information, contact CBSI in Oregon at (541) 271-3681; fax (541) 271-5721; or circle **Reader Service 37.***

Computer Concepts

Maestro from **Computer Concepts** offers broadcasters the ability to control all on-air operations.



All digital operations including commercials, music, announcer text and scheduling information are rolled into one command center with the Maestro. CD-quality digital audio is played back directly from hard disk. Maestro integration technology allows direct communication to the user to provide the title, artist, length and other information on any specific music cut.

This system permits the user to conduct searches, make substitutions, read news and weather forecasts and execute smooth song-over-jingle crossfades.

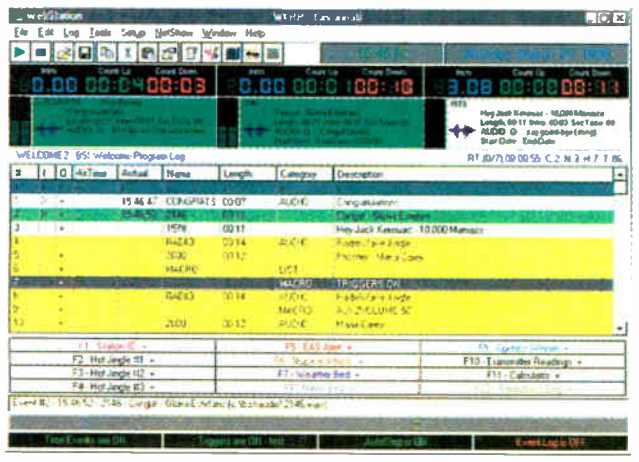
On-screen counters assist the air personality in timing spoken text over the intro and outro of any cut. Auditioning a song before it hits the air is accomplished easily.

*For more information, contact Computer Concepts in Kansas at (913) 541-0900; fax (913) 541-0169; or circle **Reader Service 63.***

Broadcast Software International

The WaveStation automation software from **BSI** has been upgraded.

WaveStation 3.00 is a full-featured digital audio automation system using non-proprietary hardware. Users can purchase off-the-shelf equipment at low cost, install the WaveStation software and have a proficient automation system. It is capable of satellite, live-assist and live operation. WaveStation can interface with satellite receivers, TTL and serial equipment.



The upgrade includes over 100 improvements to the previous version, with more than 80 stemming from user input. Major improvements include: drag-and-drop VoiceTrack interface; triple on-screen decks with manual control capability; serial command interface for control of external switchers and other devices; dual on-screen record decks with compressed streaming record; a full 32-bit design to take advantage of Windows 95, Windows 98 and Windows NT; and a BSI special edition of Cool Edit Pro from Syntrillium Software.

Options include inexpensive interfaces for input and output contact closures. The Version 3.00 upgrade is free for anyone who purchased WaveStation within the last year.

*For more information, contact Broadcast Software International at (541) 338-8588; fax (541) 338-8656; or circle **Reader Service 89.***

Halland Broadcast Services

The HitDrive music loading service from **Halland Broadcast** can load an extensive song music library of 1,000 tracks onto a hard disk in about four hours.

The system begins with the HitPick software, a large database of nearly 5,000 songs supplied free of charge. The songs, covering everything from oldies to classic rock to country, then are loaded onto the hard drive of the station. The HitPick program allows the user to look through the list and check off the desired tracks.

After returning the HitPick software to Halland, a database of the songs chosen by the user is compiled. A drive unit is connected to the HitDrive system and the desired music tracks are transferred. The HitDrive computer loads the station's drive at four songs per minute. The system can load 250 songs in one hour, or about 1,000 songs in four hours. Often, the station's drive can be returned via FedEx that same day.

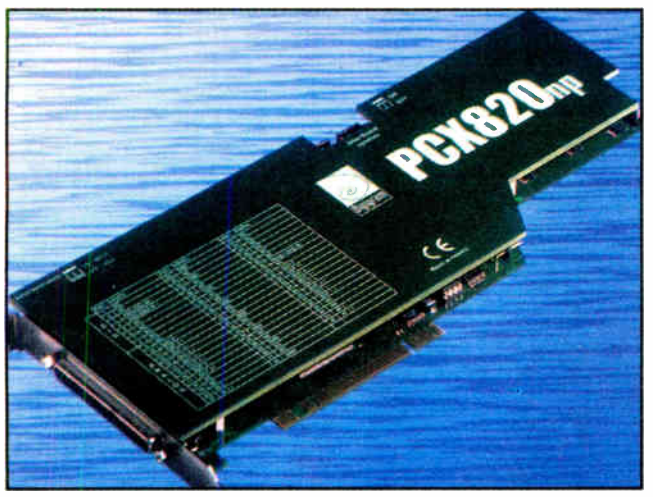
Halland offers three versions of the HitDrive service: 32 kHz MPEG, 48 kHz MPEG, and 48 kHz Dolby AC-2 compression. Music files can also be loaded to a 1 GB Iomega JAZ cartridge, should a station choose not to ship its actual drive to Halland.

*For more information, contact Halland Broadcast Services at (626) 963-6300; fax (626) 963-2070; or circle **Reader Service 115.***

Digigram

The PCX820np and PCX821np are the latest stereo record/playback cards to the **Digigram** multichannel PCXnp series of solutions for radio broadcast and automation.

The PCX820np is an analog record/playback PCI bus soundcard



that features four balanced analog stereo or eight mono outputs, plus one stereo input configurable as balanced analog or AES/EBU digital. The PCX821np is an all-digital record/playback PCI bus sound card featuring four balanced stereo AES/EBU outputs and one digital stereo AES/EBU input.

Specifically part of the Digigram PCX800np range, both cards use a 32-bit driver, operate on the PCI bus and take advantage of the latest generation of the Motorola 56301 DSPs. The PCXnp driver features improved multitasking and multiple-application management.

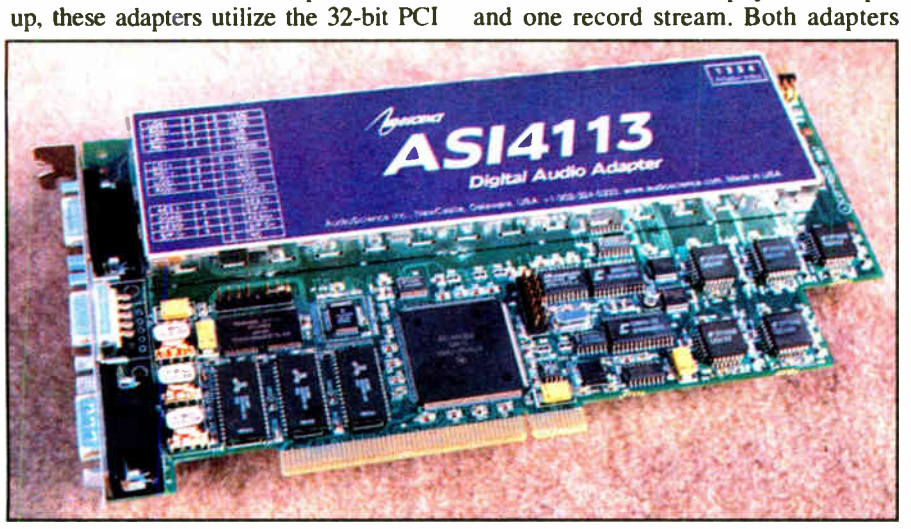
Multiple audio streams in both linear PCM or MPEG formats may be mixed into each hardware output. Using multiple PCX cards, up to 32 physical channels of audio can be accommodated easily on a single workstation. Processing power on both models manages simultaneous, independent record and playback in addition to several other functions.

*For more information, contact Digigram in Virginia at (703) 875-9100; fax (703) 875-9161; or circle **Reader Service 141.***

AudioScience

The **AudioScience** ASI4100 family of digital audio adapters for the PC platform has expanded with the addition of models ASI4113 and ASI4111.

The new adapters are distinguished from other adapters by the ability to simultaneously record and play up to five streams of digital audio, all with different compression formats and sample rates. Like other cards in its product lineup, these adapters utilize the 32-bit PCI



bus and the latest generation of 24-bit DSPs from Motorola.

The ASI4111/4113 are among the first broadcast-quality adapters to be based on the high-speed PCI bus. Compared to the older ISA bus, the PCI bus offers improvement in data transfer efficiency, freeing up more time for the CPU to run the OEM's application.

The ASI4113 offers four playback streams and one record stream. Each playback stream can be independently mixed to one of three physical outputs. All streams have independent sample rates and formats, and any sample rate is supported in the range of 8 to 50 kHz, with 100 Hz resolution.

The ASI4111 offers two play streams mixed to one physical output and one record stream. Both adapters offer AES/EBU and S/PDIF inputs and outputs, allowing a direct link to other digital audio equipment.

*For more information, contact AudioScience in Delaware at (302) 324-5333; fax (302) 738-9434; or circle **Reader Service 167.***

AEQ

The MAR4WIN radio automation system from **AEQ** is designed for the demands of the modern radio station.

MAR4WIN can handle up to four audio processing boards simultaneously and allow concurrent access to different databases, locals, remotes and the Internet.

Audio, text and video objects are displayed on a single screen which is configurable by the user. The information unit manager included allows for a flexible creation and modification of the actions associated to the objects.

MAR4WIN is easy to learn as all actions are carried out similarly using a drag-and-drop operation. Critical actions are accessible with touchscreen operation.

*For more information, contact AEQ in Florida at (954) 424-0203; or circle **Reader Service 12.***

mediatron

The NewsControl+ multipurpose system from **mediatron** can be used as a live-assist and automation system.

NewsControl+ can be employed as a flow control system for radio programs, playback of commercial stopsets or in live-assist mode for instant recall of jingles, station IDs, news and music.

The system provides simple broadcast automation with elements stored to hard disk. Jingles, newscasts, commercials and music may be played back to back without time-synchronous control.

For broadcast automation, two methods of operation are possible: looped playback according to a compiled playlist or random playback. One playlist can contain up to 1,700 elements with no time limit.

The system works under Windows and boasts an open flexible ACSII interface, allowing NewsControl+ to exchange information with music scheduling and traffic systems. Unlimited wall-of-carts and hot-key lists are featured as well as a virtual fader for both of these elements.

*For more information, contact mediatron in Germany at +49-8131-8305-0; fax: +49-8131-8305-25; or circle **Reader Service 219.***

Products & Services Showcase

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

TECHNOLOGY UPDATE

Register Data Systems

The Phantom Control Room from **Register Data Systems** can be used in multiple station applications: from simple live-assist and full walkaway satellite program automation to network delay, network origination and hard-disk music automation.

The Phantom simplifies daily operations by separating activity information and moving them into individual schedules rather than scheduling them between breaks on the log. Activities such as input changes, voice changes and clock changes are placed into these individual schedules. This keeps the log clean and uncluttered. Even liners and other voice elements stay out of the log because the Phantom automatically airs them on demand.

The Phantom allows the user to create schedules years in advance, as well as to adjust the current operation. The system retimes spots to fit into a satellite break window without running late or rejoining the network too soon. Other abilities include filling incomplete satellite breaks with spots without ruining product separation, as well as the capability to overlap spots in live dayparts to maintain a live sound.

Flexible recording capabilities allow the user to change the sampling rate, compression method and stereo/mono settings. The Phantom handles the rotation of voice elements automatically.

For more information, contact Register Data Systems in Georgia at (912) 745-5500; fax (912) 745-0500; or circle ***Reader Service 38.***

Antex

The **Antex** Broadcaster is a PCI-based, multichannel digital audio adapter for PC-compatible computers.

The Broadcaster has applications in broadcast automation, providing simultaneous, high-fidelity recording and playback of digital audio files. Its features provide OEMs and developers with the ability to simplify integration, increase functionality and lower the cost of digital broadcast systems.

With the functionality of four boards on a single card, the Broadcaster is divided into independent record and playback subsystems, each with its own sample clock. The playback subsystem has eight balanced analog outputs and one stereo AES digital output.

Additionally, this block has a pair of analog-based inputs and an AES stereo digital input that can be digitally mixed — but not recorded — into the output stream. Voice or satellite audio can be mixed into the main digital output of the block so that one unified digital signal can be processed and sent to the transmitter.

The record subsystem of the Broadcaster offers digital or balanced analog inputs, plus two balanced analog outputs for quality studio monitoring. The production subsystem features selectable sample rates up to 50 kHz.

For more information, contact Antex in California at (310) 532-3092; fax (310) 532-8509; or circle ***Reader Service 193.***

Pristine Systems

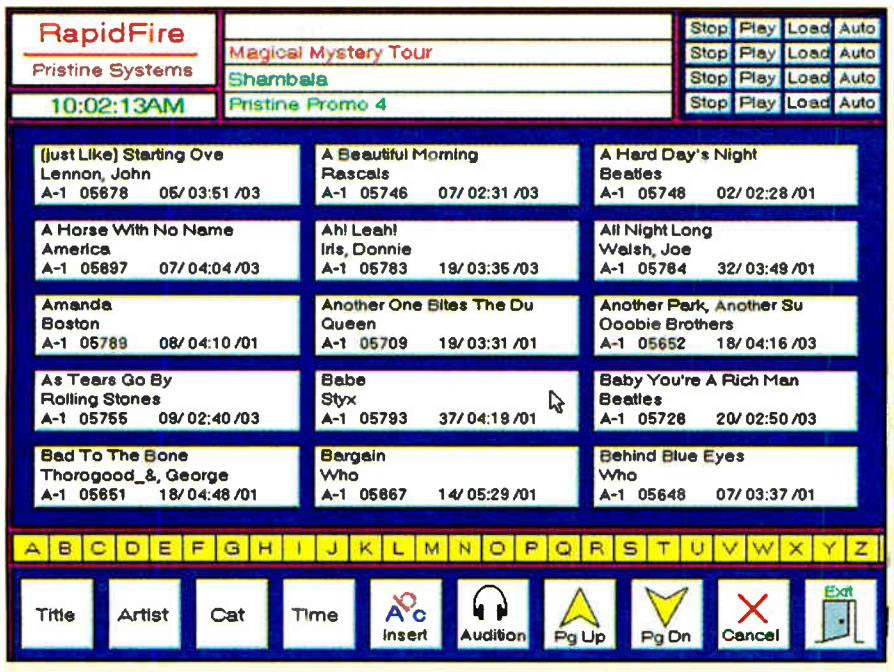
The **Pristine** RapidFire digital studio system serves live-assist, walkaway and satellite operations.

RapidFire allows the broadcaster to put everything needed directly on the computer screen. The user can "point and shoot" to load any of the four players, choose from the scheduled playlist or select from the RapidFire instant Quick Picks. The Quick Picks feature is available at all times for music, spots, liners, jingles, effects and PSAs.

Any song in the audio library can be auditioned at any time — even if the song is airing at the time. The TimeWarp feature allows the user to record and timeshift network feeds easily.

RapidFire accommodates 12 individual operator profiles, allowing up to 90 Drop Box items for each jock. The system is EAS-compatible and can operate on generic computer equipment. Also included is the Music Plus integrated multipass music and scheduling package, as well as a variety of production tools from the Pristine VoiceTrax system.

For more information, contact Pristine Systems at (310) 670-7500; fax (310) 670-0133; or circle ***Reader Service 64.***



Radio World

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

ACOUSTICS

Want to Sell

Circle (234) On Reader Service Card

AMPLIFIERS

Want to Sell

TOA TA-956-6 (2) input mixer/amp, $50 ea; (2) Altec 1592B mixer/amp, $75 ea; Altec 1594B 100 W pwr amp, $100; (3) Altec 1599A mixer extender, $50 ea. C Ware, 713-284-1098.

Belar RFA-1A fixed freq, 93.5 FM, RF amp, $450; (2) McCurdy DA-507 dist amp system for parts only, $100 ea; Ramko DA-6RS/e dist amp, $100. D Leutz, 209-586-1988.

Langevin AM-17 (2) 10 W modular power amps, $40 ea. A Ross, 425-775-8853.

Peavey CS800X power amp 400 W, 1 yr old, bench tested & cleaned by Peavey tech, $500/BO +shpg. S Davis, 814-942-4504.

Want to Buy

WE 129 preamp, 25B console, paying $1500, other mdls also wanted. S McDanel, 1-800-251-5454.

ANTENNAS/ TOWERS/CABLES

Want to Sell

Dielectric Cablewave 3" coaxial elbows (3), never used, $75/ea, $200/all; Dielectric A-50000-313 (3) port solenoid RF switch, 50 kW, never used, $3000/BO. P Wolf, 941-458-3777.

Andrew 1-5/8" 193' foam, new; Andrew 1-1/4" 203' foam, w/connectors, 3" hard line connectors & elbows. J Phillips, 419-782-8591.

ERI 1100 12 bay FM, high pwr, in warehouse, used at 99.5, BO; Custom made AM phaser unit, also (2) ATUs for directional AM used on 1410 kHz, $3500/all. J Wilsbach, 717-948-9136.

ERI 3 bay antenna tuned to 92.1; used coax cable, 250'. Deb Hoeflicker, 785-527-2266.

Harris/ERI FML-2E 2 bay antenna, 1 yr old, stored in warehouse, tuned to 93.5, $2500. I Davis, 314-862-7800.

Shively 2 bay w/radomes tuned to 96.1, 3 mos old, $4000; Phelps-Dodge 2 bay tuned to 94.5, $1500. D Magnum, 608-372-9600.

Want to Buy

FM antenna on or near 105.5, 10-12 bay. R Kelly, 915-520-1549.

Free standing tower, 150-300', will dismantle. B Hansen or D Frey, 1-888-622-7570.

200', 18 or 24" face, solid rod self support towers to hold 150 mph wind. J Bahr, 787-728-0364.

Rohn 65G, 5-8 20' sections. H Hoeflicker, 785-545-3220.

AUDIO PRODUCTION

Want to Sell

Radio Systems mono dist amp, never used, $100; Shure M-267, like new, $250. P Wolf, 941-458-3777.

Advantage One 8 chnl bi-amp mixer, $375; audio rack mount patch bay, $150. J Baltar, 207-623-1941.

AKG studio reverb, $125. C Ware, 713-284-1098.

ATI M-1000-2 precision dual mike pre, as new, $200. M Shea, 212-989-2684.

Carver CT27V A/V preamp tuner w/SurroundSound decoder, as new in box w/manual, $300; Tapco 4400 reverb w/EQ, gd cond, $100; Altec Lansing AHT 2300 amplified subwoofer w/100 W amp, black, gd cond, $300; Auratone 5C sound cube, nearfield speaker, great cond, $50. D Bailey, 214-343-0879.

Harris Stereo 80 board; Collins 7 chnl mono; Orban 622B, 674A EQs; Audio Digital TC04 bdct digital processor; CRL NR; Marti CLA-40 limiter. J Phillips, 419-782-8591.

Dynaflex NR units (2), gd cond, $175; dbx 155 4 chnl tape NR system, modified, $100. D Leutz, 209-586-1988.

Sescom ADA-1 Mk II 1x4 audio dist amp, new, $100. A Ross, 425-775-8853.

Want to Buy

WE 753 or 757 speakers, single or pair, will pay $1500-$2000 ea. 1-800-251-5454.

AUTOMATION EQUIPMENT

Want to Sell

TM Century/Sony Jukebox complete automation system, TMC 386SX16, (2) TMC controllers, (4) Sony CD Jukeboxes, $4500. D Magnum, 608-372-9600.

CART MACHINES

Want to Sell

ITC Omega mono, (6) play, (1) R/P, gd cond, $150/play, $225/R/P, $950/all; BE R/P 3000 series cart deck, gd cond, $200. P Wolf, 941-458-3777.

PR&E Tomcats (3) in rack mount w/spare set of cards & one rcdr w/o rack cage, checked & calibrated, $1500 +shpg. M Shea, 212-989-2684.

ITC 99B PB, $400; 3D stereo 3 tone, $300; Premium single play stereo, $150; PDII mono R/P, $250. M Hijmans, 970-949-0140.

ITC Delta, 3 machine rack mount shelf, $50. S Fuss, 310-722-1813.

Tapecaster X700RPS stereo R/P; (6) X700PS stereo play only, all in gd to excel cond; also has many extra parts, motors, heads, rollers, $1500/all. M Gollub, 410-535-2201.

CD PLAYERS

Want to Sell

Marantz CD-74 w/RC430 remote rcvr, $100. D Leutz, 209-586-1988.

CONSOLES

Want to Sell

Audioarts R-10 in great cond w/manual, $1500. D Bohanan, 912-638-9502.

Harris Stereo 80; Gates tube type Micro Trak 5 chnl stereo board. J Phillips, 419-782-8591.

Soundcraft 200-Delta, (12) deluxe input modules, master module, in rack mt, case w/pwr supply, 4 band EQ, 6 sends, 100mm faders, gd cond, $850. W Dudley, 352-588-4251.

ADM Tech 12x2 pro mix board, gd cond, $600/BO. S Fuss, 310-722-1813.

AudioArts R-10, great cond, used by one person, w/manual, $1500. 912-638-9502.

BE 5BEM100 mono; Gates Yard 80 mono; Ampro 8 stereo; BE 85150 dual mono; Arrakis 2100SCT-125 12 chnl stereo dual; Sparta 5 pot mono, $75; Harris Stereo 80 (2); Gates Producer; Collins 212M-1 8 chnl mono; Gates stereo Statesman 5 chnl. J Phillips, 419-782-8591.

Harris Stereo 80 solid state control board. Deb Hoeflicker, 785-527-2266.

Harrison Air 790 12 chnl stereo, slide pots, 4 inputs/pot, excel cond, just removed from service, $1600; Bogen MX6A-T transistor, works great, $60. F Willis, 850-653-3648.

Ramko DC-5RA, mono, gd cond, $250. Serge, 1-888-463-7964.

Soundcraft 1624, 18x16, 34 chnls, P&G faders, patch bay, stand, PS unit, clean, $5K/BO/trades. R Fuelle, 619-258-1080.

Tascam M-320B 20 inputs, EQ, line or mic, 4 trk outputs, 2 trk outputs, 2 effects buss, gd cond, $700. Mark, 515-684-0014.

MCI/Sony 618, 24x24, $6.5K; Quantum 24x24, $4.5K; Soundcraft 600, 32x16, $5.5K, like new; Model 30, $295; 512, $950; 520, $1450. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

TEAC 3 Tascam series 8 chnl 4 trk mixer, fair cond, $250. D Leutz, 209-586-1988.

FINANCIAL/LEASING SERVICES

Want to Buy

Altec 1567A pair in gd cond. M Schackow, 605-374-3424.

LPB 10-12 slide fader, stereo board. J Bahr, 787-728-0364.

LIMITERS

Want to Sell

Optimod 8100, just factory refurbished, 2 Audio Prisms, 2 yrs old, RFC-1 interface card, option in Optimod, $5000/firm. R Coleman, 309-932-2288.

LIMITERS continued...

Gates FM Top Level stereo limiter, excel cond, $150; Shure Level Lock, like new, $85. F Willis, 850-653-3648.

Want to Buy

Altec 438C or 436C; Gates SA39B. M Schackow, 605-374-3424.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

MICROPHONES

Want to Sell

AKG CH52EB (pair) w/CK-1 omni, C-3 hypercardioid, CK-8 short shotgun, C-9 long shotgun, all in vg to excel cond, $1700/all. E Toline, 954-255-7628.

EV 635A; EV 642; Senn MD 421; EV 664. J Phillips, 419-782-8591.

RCA 77DX, blk w/chrome or trade for UREI 1176, $1300. M Schackow, 605-374-3424.

Shure SM59, $125; Sennheiser ECM 10, $120; EV 635A, $140, +shpg. J Baltar, 207-623-1941.

Sony WRT810A, $395; WRT830A, $450; WRR840A, $895. T Schulze, 816-587-0000 x235 or tom@vmi-kc.com.

Neumann U47, $3900; U67, $3300; U87, $1800; KM83 or 84 pairs, $1400; KM88s, $950 ea; RCA 77DX, $1200; BK5, $700; BK1A, $300. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

RCA 77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

MISCELLANEOUS

Want to Sell

Audio Digital TC-4 digital delay stereo pair w/intermittent problem, as is, $200. G Manfroi, 217-629-7077.

Custom 200 amp single phase power dist system, 50' cable w/cam locks, vgc, $650. B Petruzzi, 702-646-0060.

Cutting Edge Unity 2000i audio processor/stereo gen, $4000. G Manfroi, 217-629-7077.

Large 24 VDC filtered, unregulated pwr supply. C Ware, 713-284-1098.

Molded weather resistant carrying cases, interior space 26-1/2x17-1/2x4-3/4 deep w/3" in lid, $60. T Schulze, 816-587-0000 x235 or tom@vmi-kc.com.

Record collection from AM station, approx 1700 LPs, 4000 45s, misc styles/artists, $950/all. J Wilsbach, 717-948-9136.

1964 Rock-Ola stereo juke box, gd cond w/manuals, $1500. D Leutz, 209-586-1988.

ARP AXXE vintage analog synthesizer in perfect working cond, adjusted to factory speca w/service manual & schematic, $500; Speaker grill cloth, 2 rolls, 5'x 50' ea, 1 blk & silver, 1 coarse brown tweed, $150/both. C Collins, 414-327-4141.

Marti SCC-8H SCA gen; Orban ST studio chassis; Otari MX5050 r-r; Shure M67 portable mixer; Tascam 564 Mini Disk DAW, new; Moseley 505 mono STL; Moseley 303 composite; Belar stereo monitor FMM1, FMS1, RFA1; TFT 723, 724, 730 monitor; Belar AM mod monitor; EV 635A (3); ITC RP Premium cart record (2); LPB 25 W AM xmtr (2); Ampex ATR 700 r-r; Sony MDS-302 Mini Disk rcdr. J Phillips, 419-782-8591.

Various older processors & test equip. C Hood, 5 Harrison St, Crafton PA 15205.

ADC TT (Bantam) Patchbays, $149; TT or 1/4" cords, $10; new short MRL test tapes, $229 for 2", 1/4", $79; Gates dual stereo tube limiter, $1200; Gates top level, $595; Allen & Heath GL2 rack mixer, mint, 14x4, $795; CBS Labs Audimax, $400 ea; tube preamps, $300-400; MX10 mixers, $795. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Complete control room including furniture & prod room, 6 mos old, call for complete list of equip, BO. J MacDonald, 360-457-1450.

Devry electronics training course, $600. R Chrysafis, 304-235-2292.

Want to Buy

Atlas 5B-36W mic stand, need bases, wheeled bases, swivels, crown pieces, will buy or trade for other Atlas stand parts; 7 meter panel for Sony 3036 console. W Sear, 212-582-5380.

Seeking Thordarson xfmr data on T46557-H & 188401, probably OEM type. E Davison, 217-793-0400.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NYNY 10003. 212-674-3060.

MONITORS

Want to Sell

Used Mod Monitors, McMartin & Belar. Many to choose from, tuned & calibrated on your frequency, full guaranteed. Goodrich Ent. 402-493-1886.

RECEIVERS & TRANSCEIVERS

Want to Sell

Sat dish, 11' mesh type w/feedhorn, LNB, rcvr, IR remote, 2' Ku dish, oval, $300/BO; Amateur band 10 meter rig w/stock D-104 pwr mic, MFJ-SBF-2, 13.8V 3A PS, AS M-344 magnum, features: NB, RIT, smooth tuning, AF gain/pwr off, dig disp, freq lock, band SWQ, key, ext sp jacks, (4) pin mic jack, analog s/RF meter, 5-pin acc, jack, 200' hardline + RG-8 coax, $400/BO; Motorola Mostar UHF FM 2-way 35W 16 ch w/base tray, base mic, mobile mic, 5 dB gain ant, pwr cord, $375/BO. R Chrysafis, 304-235-2292.

Comrex 2-line freq extender, xmtr & rcvr, $1995 for both ends. Steve Kirsch, 90 S Long Beach Rd, Rockville Centre NY 11570. 516-763-1776.

RECORDERS

Want to Sell

Ampex 602-2 stereo suitcase rcdr, $300. M Schackow, 605-374-3424.

Marantz PMD-430 3 head stereo, Dolby & dbx, illuminated VU meters, bias fine adjust, mic & line inputs, limiter carrying case, handle, AC adaptor, very low hrs, $350. M Shea, 212-989-2684.

CONSULTANTS

RECORDERS continued...

MCI 110 R/R heads in sets, 1/4" 2 trk, $200/pr, 1/4" 4 trk, $200/pr, 1" 8 trk, $500/pr, all new. M Shea, 212-989-2684.

Nakimichi cassette rcdr, $160; Otari 5050, $1400; ITC 7 trk decks, BO. J Baltar, 207-623-1941.

Otari MX 5050 4 trk w/rack stand in gd cond, $700. J Wilsbach, 717-948-9136.

Otari MX 5050; Revox B77, A77. J Phillips, 419-782-8591.

Sony TC-105 7" R-R, $25. C Ware, 713-284-1098.

Tascam DA-88, vgc, low hrs, no Sys 88 card, $2000. A Brooks, 704-684-1461.

Wollensak 2770 duplicator w/slave, mono, makes 5 copies per pass, heads & rollers recently replaced, $800/set or BO. B Petruzzi, 702-646-0060.

Akai GX-4000D r-r, gd cond, $200. Serge, 1-888-463-7964.

Dokorder 1140 4 trk r-r, 10", 7.5 & 15 ips, mint cond, $250. J Mindy, 716-377-1880.

Otari MX 5050 BQII 4 trk r-r, $1500. Mark, 515-684-0014.

Otari MX5050 4 trk r-r w/remote, excel cond, $1500; ITC 750 series r-r PB deck, fair cond, $100; Ampex PR-10 r-r w/MX-10 Ampex mixer, fair cond, $150; Sony 250 r-r needs heads aligned, gd cond, $100; Sony TC-8 8 trk cartridge rcdr, needs work, $100; TEAC 2300-SC r-r for parts, $100. D Leutz, 209-586-1988.

Revox A-77 R/P, gd cond, $300. F Willis, 850-653-3648.

Tascam DA-88, very low hrs, no Sys-88 card, vgc, $2000. A Brooks, 704-684-1461.

Ampex 4 trk tube deck, $2500; stereo 351 (recond), $1800; Akai Adam, new, digital 12 trk, $3500; MM1000-16 w/new heads, $4500; Otari MTR10-4, $3500; Ampex ATR102s, search to cue, $495; Ampex locator for ATR or 1200, $895; MCI 110C-8, $3.5K; Tascam 85-16 recond w/dbx, rc & loc, $3K. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Tascam 32, gd cond, rack mount, BO; Fostex E-2, gd cond, rack mount, BO; Fostex Autolocator 4050, gd cond, BO. S Fuss, 310-722-1813.

New & used Ampex 350 style tape transports, motors & parts, various prices. M Crosby, 408-363-1646.

Want to Buy

Dyaxis II 230 MEG M-O drive, need 1 to 5, $1000. A Brooks, 704-684-1461.

Ampex ATR100 tapere-corders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Ampex PR10 tape recorders. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

REMOTE & MICROWAVE

Want to Sell

Comrex LTX-R (2), $700 ea; US Audio Whirlwind Mix-5S stereo mixer, $225; SKB rackmount case-4 unit, $120, excel cond. K Starks, 313-480-9981.

Moseley 505 STL mono. J Phillips, 419-782-8591.

Burk TC-8 set up for wire line control w/interface unit, $600/BO. S Fuss, 310-722-1813.

Comrex 3XR-3XT 3 line freq extender transmit & receive units, like new, $3500. J Leslie, 602-754-5806.

Moseley MRC 1600 (2) complete systems, $1000 ea. M Hijmans, 970-949-0140.

Moseley MRC-1600 set up for STL-TRL(TSL) link, excel, $1400; Gentner VRC-1000 w/VRC-2000 software upgrade, like new, $1500; Gentner VRC-1000 command relay panel, $350. D Leutz, 209-586-1988.

Musicam Prima 110 codec, like new, used max 10 hrs, $2500/BO. E Primeau, 248-559-9697.

SATELLITE EQUIPMENT

Want to Sell

Universal SCPC 300C w/18 V LNB power supply & installation/operation manual, excel cond, BO. R Miller, 808-572-5534.

Wegener 96Q rcvr for Jones formats, like new, $1000. M Hijmans, 970-949-0140.

SOFTWARE/ DATABASES

Want to Sell

STATIONS

Want to Sell

AM Day 5 kW, night 42W/ND on I-10, _ hour from N.W. Florida Beaches, $150,000. 805-837-5414.

DCS: complete 2 studio + production, system computers & software upgraded late 1997, like new, must sell, $10,500. J Holden, 916-858-1038.

1 kW FT AM in Eastern North Carolina, great cond. R Benfield, 704-878-9667.

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- ☐ F. Recording Studio
- ☐ K. Syndicators/Station Providers
- ☐ G. Audio for Video/TV Station
- ☐ H. Consultant/ind engineer
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Want to Sell

Approx 5000-6000 45's (some LPs) from 50's thru 80's, gd cond, cataloged, sold as collection only, $5950. D Leutz, 209-586-1988.

Microtran table top tape degausser, handles 1"-2" tapes, $150/BO; mechanical tape timers, Lyrec & Seike/Spotmaster, new & used. M Crosby, 408-363-1646.

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Fluke 87 true RMS 4-1/2 digit multimeter, as new, $250. M Shea, 212-989-2684.

HP 8444A tracking gen, $1000; Tektronix DC502, FG501, 508 counter, $600/all; Wavetek spectrum analyzer 512 FFTS, $650. J Baltar, 207-623-1941.

Tek 585A o-scope w/202-1 scope cart, type 53/54g (2) 82, 1a4, B, 81a, plug-ins, TU-5 pulser, AC terminator for P6019, 902a tunnel diode pulser, 5 screw on tips, 3 probes, scope is 100 MHz 4 trace, $3000/BO. R Chrysafis, 304-235-2292.

TUBES

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AMPEREX, EIMAC, RCA, SVETLANA 4CX250B, 4CX250R/7580W, 4-400C, 3-500ZG, 3CX3000A7, 807, 811, 833C. Westgate 800-213-4563.

TURNTABLES

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Stanton 310 TT R/P preamp w/input load matching, mint cond, $100. M Shea, 212-989-2684.

TRANSMITTERS

Want to Sell

Cunningham CM 30-50 pre sunrise/post sunset AM xmtr, adjusts 0-50 W, rack mount, new tube type construction, $750. J Cunningham, 580-265-4496.

Harris 1984 MW5B FM, night pwr adjustable, working when disconnected, mostly solid state, $13,500. J Wilsbach, 717-948-9136.

Transportable AM 400 W freq-agile system w/ATU & antenna, $35,000. T Schulze, 816-587-0000 x235 or tom@vmi-kc.com.

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LPB AM xmtr 2-30 w/ATU, gd cond, $550; low pwr xmtr 30-50 w/ATU, excel cond, $700. Serge, 1-888-463-7964.

QEI Quantum 2.4 kW solid state w/300 W exciter, used 25 mos, perfect cond, $16,000. D Magnum, 608-372-9600.

Collins 830D FM 1 kW xmtr, 900C3 FM mod mon, 54N-1 FM freq mon, Harris MS-15 Exct-All cards, BE 5 chnl console, all manuals, used & slightly abused, details by fax on request, $7500. N Rupard, 316-331-3000.

Rockwell-Collins 831-D2, 2.5 kW w/manual, currently on air, avail 6/15/98, $7500. K Schafermeyer, 573-449-3883 eves 5-9PM.

Used PTEK 500W FM amplifier, $2950, full manufacturers 2 year warrentee. Other power amps and exciters also available. 408-448-3342.

Want to Buy

Harris HT20, 20 kW FM xmtr. J Bahr, 787-728-0364.

Harris MX15 exciter, needs minor work in power supply. J Bahr, 787-728-0364.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

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Hard-working team player, out-going, mature w/excel copy/prod skills & excel on-air voice seeks station needing same, will relocate. Shirley, 405-733-5161.

Listener preferred, seasoned personality avail for oldies, adult standards, country, adult contemporary, also news anchoring & prod. Alex McKuen, 513-777-8423.

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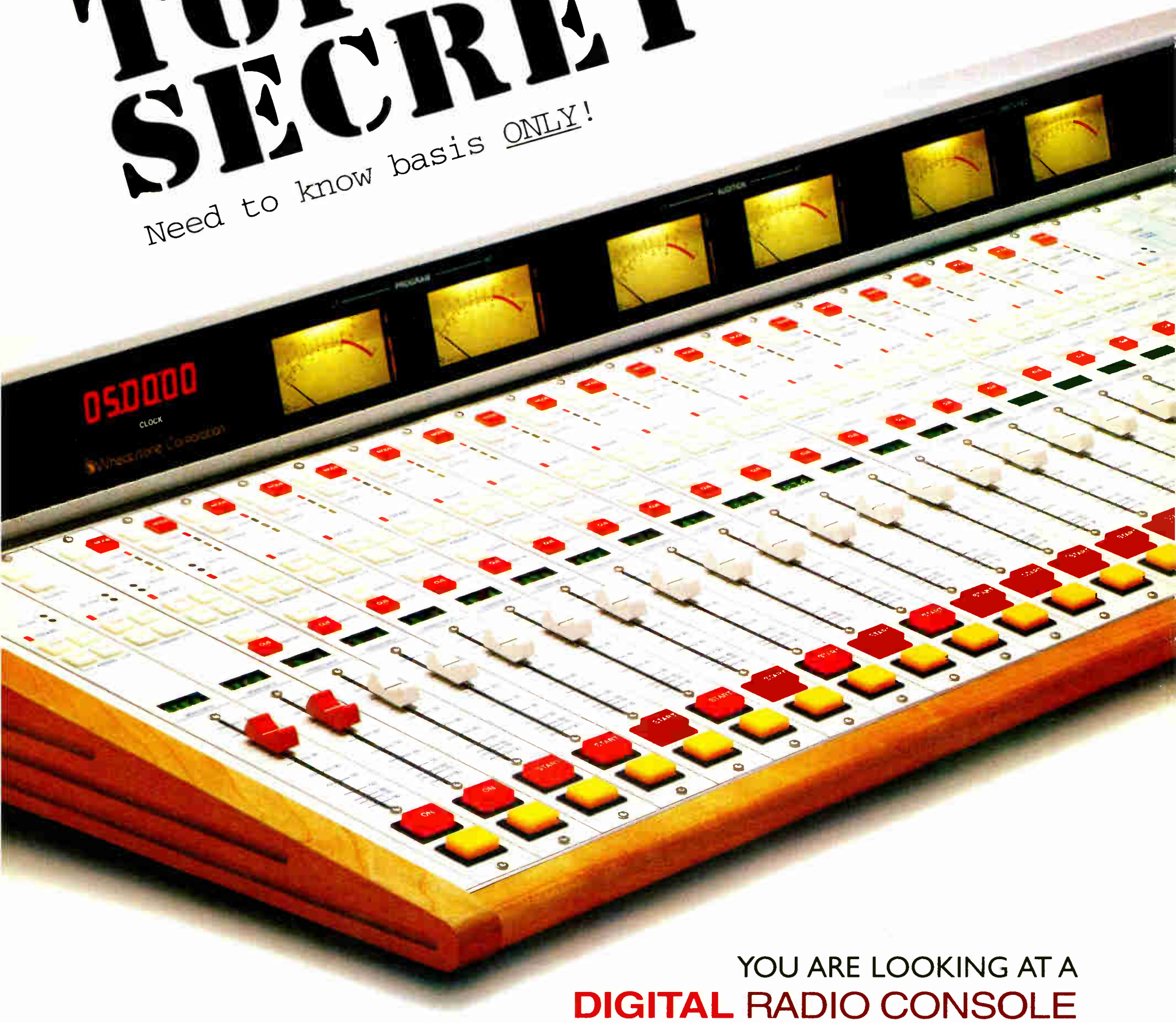

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