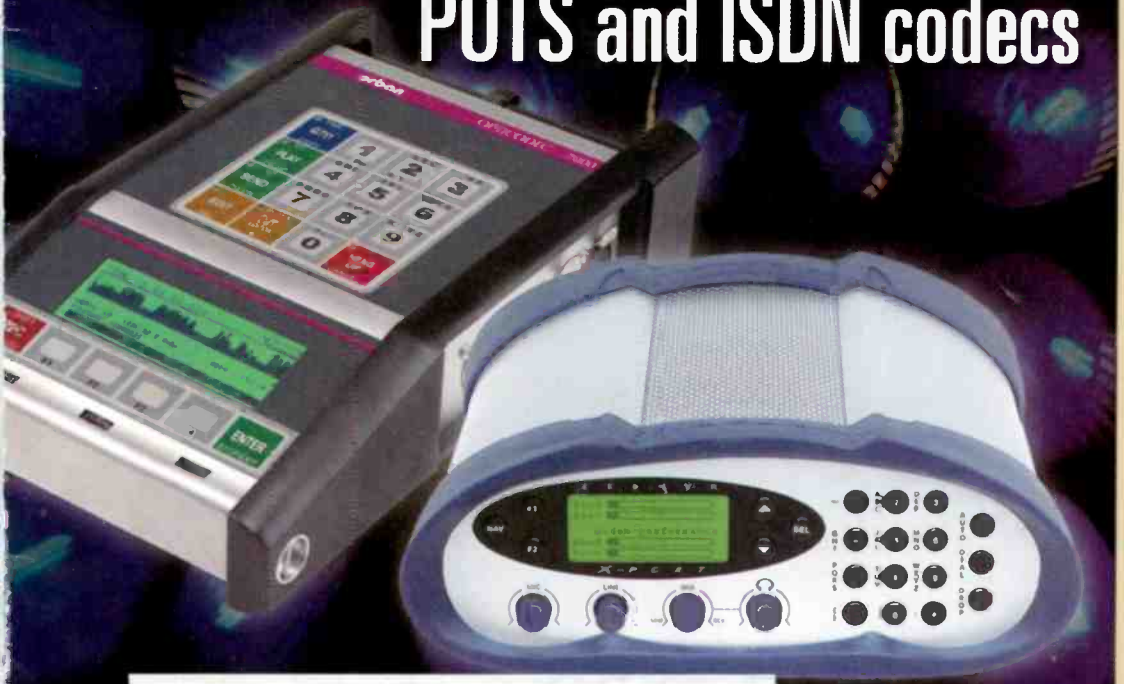
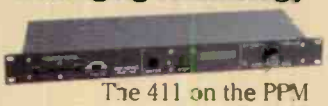
Radio™
THE RADIO TECHNOLOGY LEADER

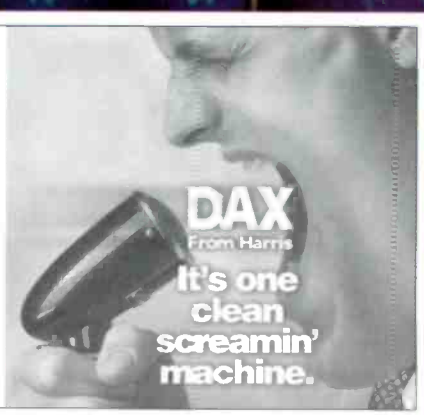
Get Connected

Point-to-point audio delivery with POTS and ISDN codecs





A PRIMEDIA Publication



THE AMAZING LITTLE MIXER

ALM

Routes any INPUT to any FADER...

OR ANY INPUT TO YOUR MONITORS! The new ALM-12d console from Auditronics combines the benefits of a router and a console—all into one cost effective package. It's got everything you need: twelve faders plus two caller faders, four mic pre-amps and of course control room and studio monitoring, built-in cue and headphone amplifiers, and a concealed headphone jack.

It's got the high end features too, like bright LED dot matrix source displays above faders and monitor pots, and 24 bit A>D and D>A ins and outs. Its AES digital inputs have sample rate convertors so it works with virtually any digital source gear you have. It can run your source machines too—up to eight of them—all opto-isolated. It even has DSP digital metering that simultaneously displays VU columns and peak hold full scale digital so you can be assured of pristine performance. It has powerful caller tools that generate MXMs automatically, and you can program any of its four MXMs to be pre or post fader.

Digital so easy you don't install it—you CONNECT it!

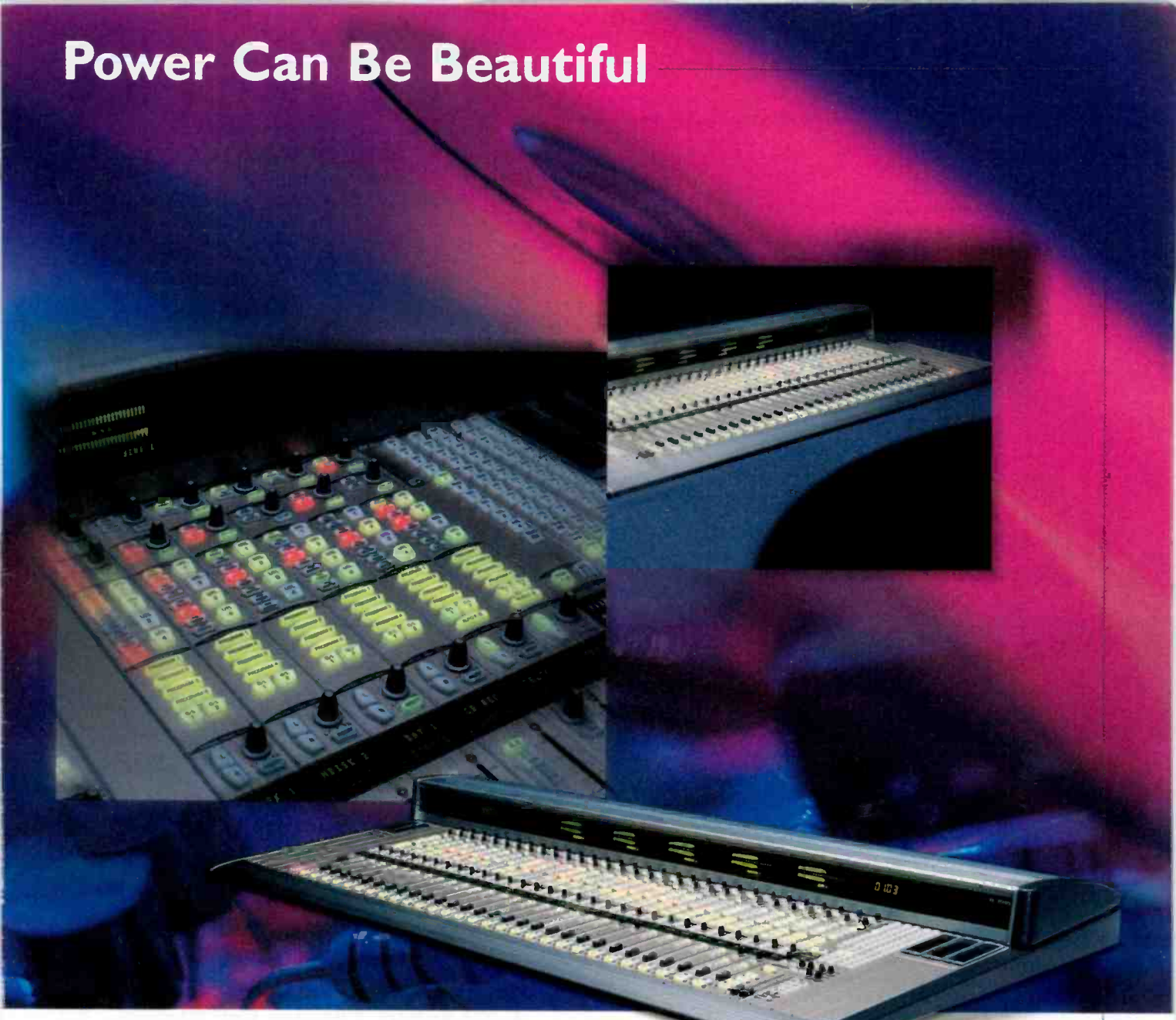
And because it's **AUDITRONICS**, it's built tough as steel, and will be easy to maintain.

DIGITAL CAN BE EASY—JUST CALL AUDITRONICS!

tel 252-638-7000/fax 252-635-4857/sales@wheatstone.com
600 Industrial Drive, New Bern, North Carolina, USA. 28562

AUDITRONICS
www.auditronics.com

Power Can Be Beautiful



Sure, it's the best looking broadcast console you've ever seen. But, beneath the sleek, elegant exterior beats the heart of a true warrior! Harris' BMX*digital* by Pacific has everything you need to win the digital revolution. Whether it's the number of output buses, mix-minuses, off-line mixes, stereo sends, direct IFB's, monitor inputs and outputs, inter-communication paths or logic interface, BMX*digital* offers more.

BMX*digital*

Incredible Flexibility including all input modules accommodate analog and digital signals without reconfiguring, swapping, or even removal from the mainframe.

Amazing Adaptability with easy storage, recall and reconfiguration of set-ups for various day parts, and built in connectivity to routing switchers, digital storage systems and other networked sources.

Low Cost of Ownership by design, Harris' BMX*digital*'s true cost of installation, operation and maintenance is markedly lower than other consoles.

Legendary BMX Reliability is what you expect in a Harris console by Pacific. The table pounding of your resident shock jock won't faze this beauty.

Harris' BMX*digital* by Pacific. Beauty that's a lot more than skin deep.

next level solutions

SERVICE

SYSTEMS

AUTOMATION

TRANSMISSION

HARRIS

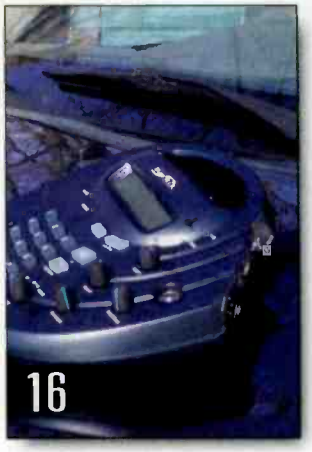
www.**broadcast.harris**.com • 1.800.622.0022

Contents

Radio™
THE RADIO TECHNOLOGY LEADER
Radio Magazine
www.beradio.com
April 2003 • Volume 9, Number 4

www.beradio.com

Features



Columns

Departments

42

40

ON THE COVER:
The gentle codec has grown to be a critical element of a radio station. The Orban Opticodec and Telos Xport are just two of the more recent codec innovations.
Cover design by Michael J. Knust.

The Flexible Coaxial Cable that Doesn't Bend on Quality.

Introducing FLEXLine™ from Dielectric — our new, flexible air dielectric coaxial cable now available in sizes for every broadcast application from low power FM through high power DTV.

And because it's from Dielectric, FLEXLine™ meets the same rigid standards of excellence that you've come to expect from the world's leading supplier of broadcast equipment. FLEXLine™ is manufactured from the finest material available. Simply stated, it's the perfect alternative for tough design challenges such as crowded tower installations, or any application in which flexible cable has advantages over rigid transmission line.

- **Sizes 7/8", 1-5/8", 2-1/4", 3-1/8", 4-1/8", 5", 6-1/8"**
- **Features precision fitted connectors**
- **5/10 year warranty**
- **Complements complete line of VHF/FM/UHF antennas and RF Systems**

Dielectric
COMMUNICATIONS

Engineering Excellence Since 1942

1.800.341.9678 • www.dielectric.com • Raymond, Maine

Currents Online

Highlights of news items from beradio.com from the past month

FCC Lifts STA Requirement for IBOC

While a Special Temporary Authorization is no longer required, stations must notify the FCC in writing within 10 days of commencing IBOC operations.

AETA Transfers to ATA Audio

In January, ATA Audio was granted an exclusive distributorship license to manufacture, market and distribute the AETA product line in the United States and Canada.

Latin American Broadcasters See First On-Air HD Radio Demo

Harris sponsored the first demonstration of the HD Radio system in Latin America at the Extreme Digital Roadshow on March 13.

Coast Guard Chooses Burk to Control Loran Sites

Burk Technology was awarded a contract to supply 200 GSC3000 transmitter remote control units to the United States Coast Guard.

The Voice of Ampex and STL Alignment Tapes Dies

Robert Keith Morrison passed away at the age of 77 on March 10.

Jeep Harned Dies

Grover C. "Jeep" Harned died on March 13 in Colorado. He was 72. Harned was best known as the founder and owner of MCI.

IEC Votes in Favor of DRM International Standard

The International Electrotechnical Committee (IEC) has given the Digital Radio Mondiale (DRM) on-air system the highest approval as an International Standard.

SAS and WBS Enter Joint Agreement

The first joint product launch will be a new audio console based on the Ward-Beck R2K series.

Site Features

EYE ON IBOC

Engineer's Notebook

More useful tools have been added to this online resource. A javascript SWR calculator has been added to the RF tab. Also, a complete set of conversion formulas including javascript calculator shortcuts has been added to the Electronics/General tab.

Eye on IBOC

We track the stations signing on with HD Radio. Have you commenced IBOC operations? Be sure to let us know at radio@primediabusiness.com.

Applications & Solutions

The redesigned and relaunched *Radio* magazine website includes feature sections to help you find articles and information fast.

Need to DUMP?
... get an ARSE!

ARSE! Delay (als dI'leI) *n.* ***Profanity Delay***
The most sophisticated Profanity Delay system on the market, with features so advanced it's like being able to 'edit' your live program.

between 2 and 30 seconds of stereo broadcast-quality delay ■ simple to use, even for presenter self-operation ■ builds delay inaudibly using algorithms optimised for speech or music ■ or can build delay by playing your filler audio for you automatically ■ countdowns to cue points on build/edit/drop delay

At only $970* no wonder it has our competition swearing like a truck driving sailor...

www.profanitydelay.com

MDOUK tel +44 121 256 0200, email: sales@profanitydelay.com
* Limited time introductory pricing only

Proven performance

Finding a completely analog facility today is rare. Except for natural analog sources, such as microphones and speakers, digital technology has been applied to every element in the audio chain. In most cases, the cost difference between analog and digital is negligible, sometimes favoring digital. The improvement of digital devices over analog is also obvious in most cases. But think about your facility: Is the digital improvement as good as it could be?

I think that many engineers and stations have become complacent with their digital audio paths. The assumption is that because it's digital, it must be good. Theoretically, this is true. In reality, small variations add up, resulting in less-than-perfect results. Just because it sounds good, don't assume that it's perfect.

One advantage to digital is that it allows us to hear some errors that are masked by analog. The inherently low noise floor and resistance to distortion allow the more obvious problems to show. However, our ears alone aren't sensitive enough to detect everything. This is why we have test equipment. The key is to have the right test equipment.

Everyone complains that there just isn't time. The adage that there is never enough time to do it right, but there is always time to do it over is truer than ever. Between installation and reactive maintenance, most stations aren't devoting enough time to preventative maintenance.

When is the last time you examined the air chain? It's likely that your chain has less-than-perfect audio. Let's define distortion as a measured difference between two elements from the same source. Some distortion is intentional. Audio processing introduces distortion that is meant to enhance the audio. Audio data compression from encoding algorithms introduces another kind of distortion that is designed to be inaudible.

Lots of elements in the chain may be digital. The audio source may be digital, the routing may be digital and the STL may be digital. The minute changes are cumulative.

If any kind of data reduction is used, it will be harder to track system problems. Traditional analog tests are meaningless because of the nature of the encoding process.

Audio storage systems are another culprit to hindering stellar sound. Re-evaluate the decision to data reduce the audio at its current setting. Hard-drive storage is cheaper than ever. Increasing the data rate and reducing the compression ratio may be an easy way to gain ground.

When was the last time you ran an audio proof? To get a real understanding of how your air chain performs, the tried-and-true method of running audio will reveal many details about the audio path. The excuse that you are short on time is not a new one. Everyone is short on time. Do what you have to do, but make the time at some point.

Run the usual analog tests, but also buy or borrow the tools you need to measure the digital devices. Jitter and bit-error rates are just two of the tests to conduct. Keep in mind that each conversion from analog to digital and back introduces small amounts of distortion. Sample-rate converted inputs will reclock a signal and prevent jitter from being passed to the next device, but the quality of each sample-rate converter varies. The same is true for analog-to-digital and digital-to-analog converters.

The digital tests may reveal inaudible problems, but in time these unheard nasties will get you. You may discover a converter that doesn't work as well as it should.

Finally, check the pre-emphasis curve in the final limiter. Don't just meet the minimum criteria, get the pre-emphasis curve as close to ideal as possible. This aspect alone is probably the most overlooked problem.

Radio relies on one sense: audio. We can't hide behind pretty pictures and graphics. If the audio is bad, there's no excuse.

Don't allow your auditory sense to get lazy. It's a good idea to check your personal audio system and get a hearing test to see how your own audio monitoring system is working.

Take the time to proof you audio chain. You may get the edge on your competition. Make the most of the audio path and put the sparkle back into your on-air audio sound.

Chriss Scherer, editor
cscherer@primediabusiness.com

Send comments to: **E-mail:** *beradio@primediabusiness.com*
Fax: *913-967-1905*

Meet Ed McMahon's Loyal Sidekick.

Ed McMahon is back on the air, broadcasting his new show "Livestyles Live" from the comfort of his own home. Thanks to his Comrex codec, the distinctive quality of Ed's famous voice comes through — even when he's on the road.

Expand your talent pool. Comrex ISDN or POTS codecs can bring in the best voices and the most compelling shows from around the world, without the expense of having to bring the people into your studios.

"Honey, we need to be in Paris tomorrow! Pack the Comrex and we'll do the show from there!"
—Ed McMahon

Rely on Comrex for your next broadcast. And we'll give you the shirt off our back.

Mail us the warranty card from the purchase of your next BlueBox, Matrix, Vector or Nexus. We'll send you a handsome Comrex shirt like the one Ed is wearing (retail value $65) FREE. Plus, we'll extend your warranty to two years. How's that for reliability?

BLUEBOX

MATRIX

VECTOR

NEXUS

For a dealer call
800-237-1776

COMREX

19 Pine Road, Devens, MA 01432 USA
Tel: 978-784-1776 • Fax: 978-784-1717 • Email: info@comrex.com • www.comrex.com

Measuring the media

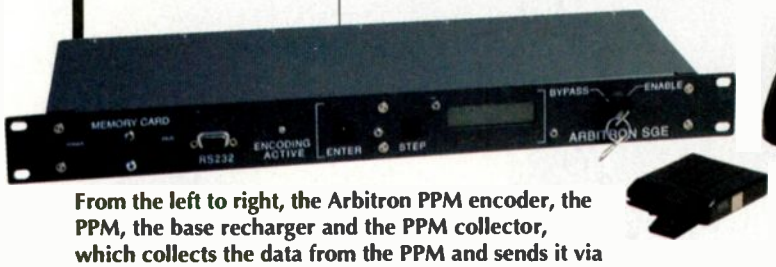
By Scott Hanley

Ponder a daring new technology, years in the making that could dramatically change radio for the future. This technology is owned and championed by a single company, and will require new equipment for stations and for listeners, but there is no guarantee of success.

Sounds like HD Radio, right? Well, no. This futuristic tale is about the Portable People Meter (PPM), a new technology and system that may or may not revolutionize the way radio and other media uses are measured. The PPM is in the last stages of several years of field-testing, first in England and now in Philadelphia. The technology has been used in Singapore since 2001.

The PPM is a device about the size of a pager. The survey subject carries the device all day to detect what radio, TV and cable broadcasts are seen or heard.

At the end of every day, the PPM holder puts his meter into a base station cradle at home that will recharge the batteries and send the data from the collected codes to Arbitron to be tallied. The results can offer a minute-by-minute report of the media that was heard or seen for the entire day.



From the left to right, the Arbitron PPM encoder, the PPM, the base recharger and the PPM collector, which collects the data from the PPM and sends it via modem to Arbitron.

Each measured media outlet injects inaudible markers with a unique code into its audio stream. The PPM detects and records that code and tallies it by time of day. As an engineering project, it seems to work, but bringing the technology to market has been more complicated.

Relevance to stations

The latest generation of PPM encoder is a 1RU device that feeds an inaudible signal into a station's audio path just before the audio processor. The level of the signal that carries the code has to be set properly, or there can be detection problems on the receiver end. This was evidenced during tests in Philadelphia.

The other side of the equation is the listener and his PPM. The survey subjects who receive the device would be selected for a broad demographic sample of a market. Unlike the once-a-week paper diary, participants would carry the PPM for as long as two years.

Once the survey participants have their PPM, it's up to them to carry it with them wherever they go. They put it to rest at night only to recharge the battery and download the collected data to the cradle.

Preliminary audience measurements from the Philadelphia PPM tests showed similar shares and ratings with diary-derived estimates, but there were some differences, too:

- Cume audiences and reach were higher
- Morning drive listening was lower
- Time spent listening was lower
- The average number of stations used was higher
- More listening by young adults and men
- More listening on weekends, evenings and overnight

Rewards for using the PPM

As the PPM technology unfolds, managers and sales teams may face the biggest challenge of all: new terminology. In a real-time PPM world, the term average quarter hour (AQH) has little meaning. Audience measurement can now be observed to the minute.

Share becomes share of media, not just other radio stations. This combined media comparison to cable and broadcast television and even encoded online streaming media could be a benefit for radio.

Right now, Arbitron gives diary holders about a dollar for a completed diary; not much of an incentive for the effort. PPM participants will be given higher incentives and rewards to wear or carry the device every day, all day except overnight when the PPM is set in its cradle.

Because of the daily feedback loop, Arbitron plans to get greater compliance by survey subjects. Technical glitches should be easier to spot, too. And, because the PPM doesn't require a diary entry, the potential to survey younger listeners becomes more possible. Our 12+ measurement for a cume audience would drop down to 6+.

Why Change to the PPM?

Companies that conduct research are having a harder time getting people to participate. Telephone call-out

surveys have higher rates of refusal. Recruiting for focus groups and auditorium testing is getting more difficult and more expensive.

For Arbitron, response rates to paper diaries continue to decline; about 35 percent for radio nationwide and far less in some of the country's largest radio markets. The few dollars handed out by Arbitron to diary keepers seems to be less and less an incentive to complete or return the paper diaries.

The charger base can be placed in a convenient location.

Improving the response rate and getting more precise and accurate data are of increasing importance in our more media-cluttered world. The drive to improve is strong enough that Arbitron and television's Nielsen Media Research are working together closely to develop the PPM.

One concern expressed by the advertising community is that while programming is encoded, commercials are not. Advertisers want to know that their spots were heard. There are other concerns, too. How do you measure bath, shower and other private listening? How will it measure traveling listeners, who are often high-income people who spend days and weeks away from home and their base station? What about other people spending nights away from home? Will minority audiences be appropriately represented?

In addition, measuring headset radio listening requires an adapter to be plugged into a portable radio. How many people will comply? Yet, compared to the current system of paper diaries from Arbitron with a declining response rate, the PPM still looks to be a great improvement.

Arbitron says it will continue comparison tests in Philadelphia through the Winter 2003 ratings period. After that, more test panels are planned for 2003 and 2004. The 2002 plans anticipated reaching the top 100 DMAs and 170 radio metro markets by 2008. This timetable does not seem fixed, and it is affected in part by the status of a proposed joint venture with Nielsen.

Estimates of additional costs for stations and advertisers have not been made available. Implementing PPM technology will be expensive. It is a technological change that could dramatically alter the way media is measured. And because you become what you measure, imagine what changes could happen to radio in the process.

Hanley is director and general manager of WDUQ-FM, Pittsburgh.

The Secret is Out.

Break every composite performance barrier with the new Starlink Digital Composite STL.

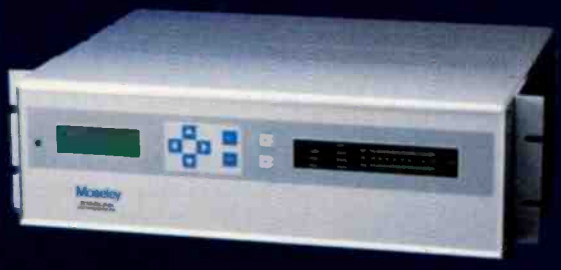
Moseley

It's an engagement years in the making. Digital audio quality finally meets the convenience of composite operation.

Introducing the newest Moseley milestone – the Starlink Digital Composite STL. It delivers all the audio quality that earned the component Starlink its industry applause, with full 16-bit sampling.

Stereo separation that fully exploits the advantages of digital signal processing, with minimal distortion. Plus an overall system gain improvement of 20 dB over analog STL performance SNR better than 85 dB.

Best of all, it's a direct replacement for your existing composite STL. So it's easy to implement the digital audio quality you've hardly dared whisper about until now. With all the quality assurance of the name you know for STLs. Moseley.



The Starlink Digital Composite STL.
Spread the word.
And contact us today for the complete story.

111 Castilian Drive • Santa Barbara, CA 93117-3093 • (805) 968-9621 • www.moseleysb.com

FCC refuses extension of three-year construction period

By Harry Martin

Anyone considering the purchase of a construction permit should take a close look at a recent FCC decision rejecting a CP buyer's efforts to get the permit extended. There are some important lessons to be learned.

The case involves the buyer of a permit to build a new AM station in the Palm Beach, FL. The original permit—good for 36 months—was issued on March 9, 1998. In December 2000, a scant three months before the permit was set to expire, the buyer filed its application to acquire the permit's expiration date, and simultaneously requested that the Commission's staff toll the permit and revise or waive its construction deadline because, according to the buyer, the site specified in the permit was no longer available. The buyer also claimed that the original permittee was inexperienced in the Florida construction business, which supposedly had impeded his efforts. And for good measure, the buyer observed that the original permittee had filed for the permit in 1986, when he was 49, but the permit had not been granted until 1998, when the applicant was 61 and "essentially retired." The buyer's suggestion was that, if the Commission had just moved a bit more quickly, it would have been easier to get the station built.

In February 2001 the staff denied the buyer's tolling request, stating that the three-year-old events he described did not satisfy the Commission's tolling criteria. It also denied the companion waiver request because the buyer failed to allege "rare and exceptional" circumstances necessary to justify waiver of the rule and because, in any event, no documentation or substantiation had been offered to verify the circumstances allegedly justifying waiver.

The buyer filed for reconsideration, this time submitting a declaration from the original permittee supporting the facts in the original tolling and waiver requests. On March 6, 2001, the staff denied reconsideration because the buyer failed to establish that the declaration could not have been filed in a timely manner. Also, the Commission said that the unsubstantiated facts in the declaration did not warrant a waiver of the rules.

Two days later, one day before the construction deadline, the buyer went ahead and consummated the assignment of the permit for the unbuilt station. Soon thereafter, he filed an Application for Review of the staff's decisions. But that ultimately went nowhere as well: Finding no error in the staff's decisions, the Commission denied the Application for Review. The buyer ended up with nothing.

In its decision, the Commission took the opportunity to clarify a few issues regarding tolling and waiver requests. Pursuant to the Commission's rules, a permittee is required to file its tolling request no later than 30 days from the event on which the request is based. This, the Commission noted, is to ensure ongoing permittee construction diligence and to "avoid post hoc permittee temporizing." Unfortunately for the buyer in the Florida case, in addition to the substantive reasons for denial of his tolling request, the Commission concluded that the tolling request was untimely.

As for the waiver, the Commission acknowledged that it has shown some leniency in the timing of waiver requests. In the Commission's view, however, the permittee should file any waiver request as soon as possible following the event on which it bases its request, "preferably within the same 30-day period afforded to tolling applicants." The Florida buyer's eleventh-hour request, filed less than three months before the expiration of the permit, clearly did not meet this standard.

Finally, in a footnote, the Commission added insult to injury by noting that while the buyer's tolling notification was made with the original permittee's full knowledge, the Commission's rules state that these requests may only be submitted by the permittee. The buyer's position as a proposed owner of the station did not qualify it to seek any extensions or waivers.

Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail martin@fhhlaw.com.

Dateline:

June 2 is the due date for license renewal applications for radio stations in Washington DC, Maryland, Virginia and West Virginia. June 2 is also the due date for biennial ownership reports for radio stations in Arizona, Washington DC, Idaho, Maryland, Michigan, Nevada, New Mexico, Ohio, Utah, Virginia, West Virginia and Wyoming. Stations in those states, and DC, also must place their EEO public file reports in their public files by June 2, even if their renewals are due on that date.

We've Got That

Magic Touch!

The Smartcaster Magic Touch from Smarts Broadcast Systems opens the first window to the reliable use of the Windows Operating System! Available in touch screen or mouse controlled configurations, the Magic Touch is an intuitive live user interface that gives your operators total control of the air sound.

Play from your program log, music log or hundreds of programmable buttons. The Magic Touch works with the innovative Linux Audio Device that actually records and plays the audio. That means you don't need expensive computer equipment to run the Magic Touch. It's very affordable!

SMARTS Broadcast Systems

800 747-6278

www.smartsbroadcast.com

ON AIR DIGITAL USA

By Chriss Scherer, editor

Sending audio was never this easy

With digital technology comes the necessity to encode and decode audio for the medium that will carry it. The process of manipulating bits is used in almost every form of digital delivery. The term codec is now widely used in circles well beyond radio and broadcasting. While downloading and installing a specific software codec is second nature for most computerized media users, the term codec still carries a singular meaning for radio broadcasters.

Telephone service has a long history with radio. It was frequently used for point-to-point audio distribution because of its simplicity. Even with the telephone's limited audio bandwidth, it was a popular method of transmission. To improve the response of the telephone line, heroic efforts were successfully made with frequency extenders. While these improved the quality, they still fell short of providing an easy-to-use method of establishing a high-quality link.

When the telephone companies began making high-speed services available to consumers, it didn't take long for broadcasters to combine the telephone flexibility with the newly developed methods of digital audio data compression. When Switched 56 and ISDN became available in most areas, telephone codecs became more and more popular.

The ISDN codec changed the way radio stations held remote broadcasts. No more fooling around with remote pickup transmitters, licenses and interference; just order an ISDN line and send a remote kit.

Prophet Systems Innovations

DIGITAL AUDIO SOLUTIONS

AS INDIVIDUAL AS YOUR STATION

There is no station like yours. And no digital audio solution like NexGen Digital Broadcast from Prophet Systems. It doesn't matter if you're after seamless music scheduling, effortless voice tracking or trouble-free WANcasting. You'll find the features you need from Prophet Systems. NexGen Digital is customizable and scaled to fit your format and budget – whether you're responsible for a dozen stations or one. And it's developed and supported by real world broadcasters. So call to find out all the ways Prophet Systems can help you deliver great radio, with a system that's as unique as you are.

Visit us at NAB
North Hall #N1924
South Hall #SU5369

PSi
PROPHET SYSTEMS
innovations

1-877-774-1010
www.prophetsys.com

Sending audio

As digital audio data reduction techniques improved, the methods were applied to the more universal telephone service—the POTS line. Now both versions see widespread use every day. Their use has even extended beyond wired uses to some wireless applications.

Deciding which to use

Many stations use ISDN and POTS codecs regularly. When using an MPEG algorithm, and ISDN codec will always provide the widest frequency range. If all other factors are equal, ISDN will usually win.

ISDN also provides consistent performance. Data and digital circuits from the telephone provider are designed for reliability. Once a connection is made, it will stay in place with fewer problems. ISDN also has some disadvantages. It is more complicated to set up. Some telephone companies require long lead times to install service, ranging from 30 to 60 days. In some instances, ISDN may not be available in a given location. There are also variations in the types of ISDN. Ordering the proper configuration can be frustrating, but all the ISDN codec manufacturers offer advice and hints to make the ordering easier.

Depending on the codec hardware, setting up the ISDN codec may be more complicated than setting up a POTS codec.

The cost to install and use an ISDN circuit is typically more than the same costs for a POTS line. ISDN is usually billed a monthly rate plus time usage, whereas POTS lines are usually just a monthly rate. For business customers, the monthly rates for an ISDN line and a POTS line are similar, but POTS is usually cheaper.

The biggest advantage for POTS codecs is the proliferation of POTS lines. Last-minute remotes can usually be accommodated easily. It's usually easy to borrow a fax line or modem line for the broadcast. In a pinch and with the proper connection, the POTS codec can be used through a PBX telephone system. The connection rate will usually suffer, but the broadcast will be on the air.

The main drawback to using a POTS codec is that the audio performance depends on the quality of the connection.

If you routinely have trouble with a POTS line, there are several steps you can take to improve the performance. You will need to work with your telephone company to do this. Don't simply open a trouble ticket stating that the data rate is too low. Most of the time, the ticket will be opened and closed almost immediately because your reported

What's in a name?

While most tech-savvy radio people are familiar with the terms POTS and ISDN, here's a quick refresher.

POTS - Plain old telephone service. The traditional telephone service capable of 300Hz to 3kHz of analog audio transmission. Not a fancy acronym, but it is accurate.

ISDN - Integrated services digital network. Simply put, a digital telephone line capable of transmitting at least 64kb/s. At one time it was imagined that ISDN service would replace all POTS lines. This never happened.

Have all your remotes covered with SCOOP E-Z

- **POTS**
  7 kHz speech
- **ISDN**
  7 kHz, (G722)
  20 kHz, (MPEG Layer II)
- **GSM - Wireless**
- **Inmarsat Capabilities**
- **Two Channel Audio Mixer**
- **Microphone Supplies**
  Ph48, Ph12 or T12
- **Small Weight and Size**
  <4 pounds
  9 x 6 x 3 inches

ISDN

WIRELESS

POTS

INMARSAT

ata AUDIO

ATA Audio Corporation
400 Valley Rd., Suite 100 • Mt. Arlington, New Jersey 07856
Phone: 973-659-0555 • Fax: 973-659-9555

www.ataaudio.com
sales@ataaudio.com

problem won't go through the scrutiny it deserves. The telephone company test will show an adequate noise level and loading. Instead, try contacting a customer service representative directly to discuss the problem. By making the telephone company aware of your problem through the circumstances, you should be able to improve the service.

The distance from the user's connection to the telephone central office (CO) is the first limiting factor. While you can't change the location of either of these places, it may be possible to obtain service from a different CO. The longer the distance, the less reliable the line will be.

Find out if the telephone line is carried through a subscriber line concentrator (SLIC). If it is, ask to be removed from the SLIC and put on direct copper lines. A subscriber line concentrator is commonly installed to serve pockets of high population density that are physically distant from the central office. New construction areas are commonly connected through a SLIC. The SLIC allows more calls to be carried in a smaller capacity. While this is advantageous to the telephone company, using a SLIC adds an additional conversion step to the path, which is not good for POTS codecs.

Once the physical path from the phone to the CO is a direct copper connection, have the telephone company check the line for loading coils. If any are found, have them removed. The loading coils are passive repeaters. Once the coils are removed, take the time to find the copper pair with the lowest noise. This may take some time, but the reward is worth it.

Finally, be sure that any bridge taps are removed from the line.

Comrex has introduced a GSM wireless module that simplifies accessing the wireless network with a codec.

DIGITAL BROADCAST CONSOLE

ESSENTIALS

Make your move into radio's future:

Otari's New DB-10 Digital On-Air Console.

High-resolution digital audio is now becoming a demanding fact-of-life for today's top-market radio operations. To meet this challenge, Otari introduces the new **96 kHz DB-10 Digital Broadcast Console**. The fully expandable DB-10 is the most advanced and reliable small-format digital On-Air console available, specifically designed to meet the needs of broadcast professionals. Its ergonomically refined control surface features ten (10) fully configurable input channel faders. Choose from Analog Inputs (Stereo and Mono) or Digital Inputs (AES/EBU and S/PDIF) for a maximum of 16 active channel paths in total, with 4 microphone inputs always available on faders 1 to 4. The DB-10 also features the EMG Emergency bypass function, which protects you in the event that one of your digital input sources should fail.

The DB-10 provides 99 password-protected snapshots, and 9 project settings for easy recall. Multiband selectable equalization, compressor/limiter dynamics, 2 AUX, 2 TEL, and 2 PGM busses as well as two digital mix minus (N-1) busses, are available on all channels. The DB-10 handles sample rates from 32kHz to 96kHz using the highest quality sample rate converters. Synchronization can be achieved via internal or external 48kHz word clock, providing a reliable digital lock every time.

Up to 4 DB-10 consoles can be cascaded together to provide additional channel inputs as needed. When cascading DB-10 consoles, both the talkback and Emergency Bypass signals are shared between all consoles, allowing for one man operation. All of this in a compact footprint perfect for small studios, while also being expandable for use in larger facilities. Furthermore, the DB-10's portability makes it the perfect choice for OB trucks.

Need computer backup? DB-10's console snapshots, project settings, and GPIO data can be quickly saved and recalled using a standard PC serial link. The outboard power supply unit supports 100-240VAC and optionally 24VDC. And by adding another optional power supply unit, the DB-10 can be redundantly duplexed for failsafe operation. If your station's been waiting to provide "all digital" content, here's the on-air console solution to take you securely into radio's future. The **Otari DB-10** delivers digital technology today - with the simplicity, reliability and familiarity of analog's past.

Microphone courtesy of Audio-Technica

www.otari.com

OTARI

Another Otari Indispensible Tool-Of-The-Trade

Otari Corporation • 8236 Remmet Ave. • Canoga Park, CA 91304 • 800/877-0572 Fax: 818/594-7208 • email: sales@otari.com • www.otari.com Otari Southeast • 1234 17th Avenue South • Nashville, TN 37212 • 615/255-6080 Fax: 615/255-9070

Bridge taps are split connections that run to other destinations. In most cases, these are left behind from a previous installation and use of the wire pair. A bridge taps add capacitance to the line and can be a receiver for induced noise.

Earlier I mentioned that a POTS codec should not be used with a PBX. If an analog port is available, the codec will work, but the circuitry in the PBX will likely cause a performance reduction. Also, because electronic phone systems use standard RJ-11 jacks, don't assume that the connection you are given is a POTS line. There are commercial phone testers that will indicate the personality of a telephone line. If you don't have one, a cheap alternative is an inexpensive phone. Many electronic phone systems have voltages and currents that are different from those on a regular phone line. The voltage present can destroy the modem in the POTS codec. If you plug the analog phone in and can get a dial tone, you are probably OK to use the POTS codec.

ISDN codecs have evolved to serve in applications beyond the telephone connection. IP and streaming connectivity are becoming standard uses.

ISDN ordering

Ordering a POTS line is easy. There are only a few decisions to make, most of which have nothing to do with the actual service.

ISDN is available in two basic varieties. The Basic Rate Interface (BRI) has one or two bearer channels (at 64kb/s) and one data channel (at 16kb/s). The other variety is the Primary Rate Interface (PRI), which provides 23 bearer channels and one data channel. When ordering an ISDN line for use with a codec, specify BRI service.

Several options will be presented, but cut to the chase and specify that you want a U-interface reference point, 2B1Q line coding and either 2B+D service, which supports up to 128kb/s, or 1B+D service, which supports up to 64kb/s. Most rack-mount codecs are designed for 2B+D service.

Once the line is ordered, be sure to get the following information from the telephone company:

- The type of switch that the line will use
- The ISDN switch protocol version
- The ISDN telephone numbers, called local dialing numbers (LDN)
- The SPIDs with the prefixes and suffixes

INTRODUCING

NETSTAR™

A new codec with Advanced Audio Coding for use over the Internet, ISDN or DSL

The newest codec from CCS/ MUSICAM USA does it all! While maintaining compatibility with exlsting codecs, NetStar opens a new realm of connection capabilities. NetStar can send and receive full fidelity, real-time stereo audio not only via ISDN and dedicated data lines, but also via IP.

NetStar contains not only standard coding algorithms like G.711, G.722, MPEG 1 & 2 Layer 2 and MPEG 1 & 2 Layer 3. but also the latest MPEG 2 Advanced Audio Coding (AAC) and MPEG 4 AAC-Low Delay.

NetStar can even connect bi-directionally via IP *with uncompressed linear audio and near-zero delay!*

NetStar automatically recognizes the calling codec, and even comes with its own built-in web server for easy remote control from any web browser. And, because living within your budget is essential, NetStar is not only our most capable codec ever, it's also our most affordable.

Contact us, or your authorized CCS/ MUSICAM USA dealer for details

MUSICAM USA

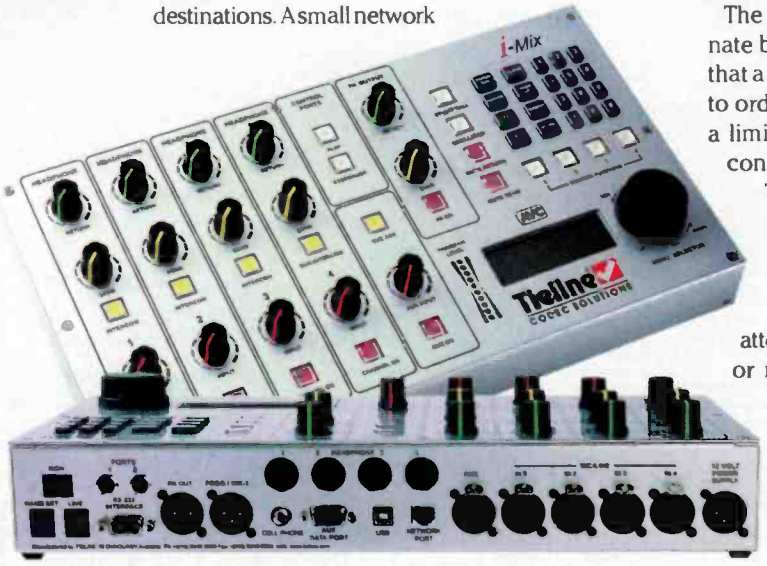
MUSICAM USA
670 North Beers Street, Bldg #4
Holmdel, NJ 07733 USA
732-739-5600
732-739-1818 fax
sales@musicamusa.com
www.musicamusa.com

MUSICAM USA is the d/b/a of Corporate Computer Systems, Inc

Sending audio

ISDN service may be offered as point-to-point or point-to-multipoint. In most cases, point-to-multipoint service is preferred. This allows the user to dial and receive calls from two separate codecs simultaneously. While this is not a requirement of ISDN service, it does provide extra flexibility. For instance, a single program can be sent to two destinations. A small network can be created on the fly as needed.

In addition to BRI ISDN, other data networks may be used with an audio codec. One example is Frame Relay. This does not have the flexibility of dialing an ISDN number, but excess capacity on an existing circuit can be used for audio information.



Simplicity and convenience are key features for portable codecs. Internal mixers and multiple connections add to a system's capability.

Wireless options

The wired codec options have created opportunities to originate broadcasts from unique locations, but their nature requires that a wired service be available. Ignoring the required lead time to order a telephone circuit, the physical tie to the CO has been a limitation for some. This is one area where RPU transmitters continue to reign.

The proliferation of wireless services has made mobile reporting easy, although the audio quality of most services is far from optimal. In most cases it's barely acceptable.

As wireless telephony has improved, adapting the service to codec use as a wireless data path has garnered attention. Until recently, cell service did not have the capacity or robustness to handle a high quality, encoded audio data stream. In 1993, the Personal Communications Service (PCS) was launched in the United States. This encompassed three types of technology.

Time Division Multiple Access (TDMA), which is being phased out, was developed to take advantage of the existing analog infrastructure. Code Division Multiple Access (CDMA) is primarily used by Sprint and some regional carriers. Both of these cannot reliably carry the

When the Rock and Roll Hall of Fame and Museum started planning its new state-of-the-art Alan Freed Radio Studio, help came from Logitek.

Alan Freed Radio Studio Console Configuration

Logitek Audio Engine with 6 IO24A I/O cards, providing up to 72 analog inputs and 72 analog outputs

- 24 mix-minus buses
- Supervisor software for complete control of fader assignments and router functions

Numix-12 Console

- 12 fully assignable faders, easy access to 8 stereo buses

vMix "Virtual" Console software

Logitek is proud to support the Alan Freed Radio Studio

Our digital audio routing and console designs were a perfect fit for a studio that would both showcase their beautiful facility and provide the flexibility that hundreds of visiting DJ's and station personnel would want. The Logitek Numix console can easily be configured for visiting talent, providing access to equipment and guest mics in an arrangement that makes sense for each operator. The Audio Engine provides routing and control functions throughout the studio, making it the heart of this 21st century operation.

Logitek

Logitek Electronic Systems, Inc.
5622 Edgemoor
Houston, TX 77081 USA 713.664.4470 **1.800.231.5870** **www.logitekaudio.com**

Resource Guide

For a complete feature comparison of these products, find this article online at www.beradio.com.

AEQ	**www.aeqbroadcast.com**
Swing	ISDN
Eagle	ISDN
Course	ISDN
AEV	**www.aev.net**
Millennium 2	ISDN
ATA Audio (formerly AETA)	**www.aetausa.com**
Scoop Reporter E-Z	ISDN, POTS, wireless
Scoop Studio	ISDN, POTS
HIFIScoop 3	ISDN
Audio TX	**www.audiotx.com**
Communicator	ISDN, IP
Audio Processing Tech.	**www.aptx.com**
WorldNet Milano	ISDN
WorldNet Rio	ISDN w/ TA
Worldnet Tokyo	ISDN
Comrex	**www.comrex.com**
Vector	POTS
Matrix	ISDN, POTS, Wireless
Matrix Rack	ISDN, POTS, Wireless
Envoy	ISDN
Nexus	ISDN
Nexus Rack	ISDN
BlueBox	POTS, Wireless
Harris	**www.broadcast.harris.com**
Intralink ISDN Muliplexers	ISDN, IP
Musicam USA	**www.musicamusa.com**
CDQ1000	ISDN
CDQPrima 110	ISDN
CDQPrima 120	ISDN
CDQPrima210	ISDN
CDQPrima220	ISDN
CDQPrima230	ISDN
Liberty	POTS
Netstar	ISDN, IP
Prima LT	ISDN
Prima LT Plus	ISDN
RoadRunner	ISDN
SuperLink	ISDN, IP
TEAM	ISDN, IP
Orban	**www.orban.com**
Opticodec 7000	ISDN
Opticodec 7400	ISDN, IP
Sonifex	**www.sonifex.co.uk**
Nica X-1	ISDN
Nica X-2	ISDN
Telos Systems	**www.telos-systems.com**
Zephyr Xstream	ISDN, IP
Zephyr Xstream MX, MXP	ISDN, IP
Zephyr Xport POTS	POTS
Zephyr Xport POTS & ISDN	ISDN, POTS, IP
Tieline	**www.tieline.com**
Imix	POTS, ISDN, wireless
Commander	POTS, ISDN, wireless
Patriot	POTS, wireless

Congratulations to Next Media Group & the newest iSelector stations

Jacksonville, NC

iSelector™

Myrtle Beach, SC

iSelector™
Personalized Online Player

Get your station back on the web.
Contact RCS at 914-428-4600

RCS Sound Software
www.iselector.com

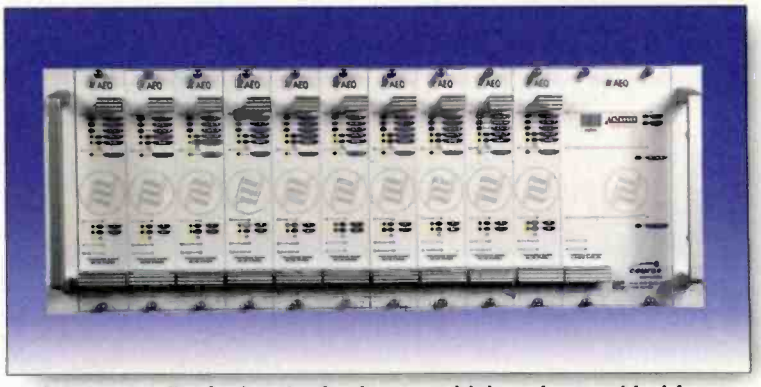
audio data needed for a broadcast.

The Global System for Mobile Communications (GSM) was developed in Europe and has become the predominant wireless telephone technology outside North America. GSM service availability is increasing, thanks to T-Mobile and Cingular.

GSM is a modified, more efficient version of TDMA and uses time slots and frequency channels to allocate the spectrum in use. GSM data rates start at 300b/s. Calls use as many time slots as necessary up to a maximum usage of 13kb/s. Calls will jump between channels and time slots (frequency hopping) to maximize the system's usage.

POTS codecs, designed for low data rates, are an ideal choice to tap into the portability of GSM phones. We are currently on the cusp of seeing this application take off.

Another wireless codec application that is useful in areas where GSM service does not exist is satellite phones. These phones, which are a necessity in some parts of the world, provide service from the United States mostly in coastal waters. While airtime is fairly expensive and the portable terminal must be licensed by the FCC for use on land, certain circumstances, particulary a mobile environment, may justify its use.



Rack-mount studio chasis units that house multiple codecs are ideal for stations that rely on high-volume codec connectivity.

Cheap insurance

Codecs have proven to be a highly flexible and convenient method of sending duplex audio. Stations regularly use them for remote broadcasts because of their ease of use and quality sound. Even in fixed locations that need a connection on a daily or weekly basis, a codec makes perfect sense.

If the codec you have chosen can operate on ac power or batteries, install a set of batteries even if ac power is used. If ac power is lost, the battery power can keep you on the air to cover the outage. Most codecs that operate on batteries will do so for at least an hour.

Most transmitter sites have a POTS line available for regular use or for a dial-up remote control. This line can also be used with a POTS codec as a backup STL if needed. If a higher quality backup

STRETCH & SQUEEZE

Spots and Songs for Perfect Timing with NO Pitch Shift

Hear Scott Studios' Stretch & Squeeze yourself at NAB Booth N2701 or on the Internet at www.scottstudios.com

24/7 Technical Support: 888-SCOTT-411
(972) 620-2211 FAX: (972) 620-8811

1 888 438 7268

1-888-GET-SCOTT

Scott Studios

13375 Stemmons Freeway, Suite 400
Dallas, Texas 75234 USA

Sending audio

is needed, install an ISDN line at the transmitter. Even if an ISDN codec is not permanently installed, the line will be available when it is needed.

Codecs have made their mark and continue to show their flexibility with new applications. The technology originally designed for use on data-restricted, dedicated circuits has made its way into other uses including wireless telephony and audio data multiplexing and streaming.

Telos has introduced the Xport, which can use a POTS line in the field to call an ISDN codec at the studio.

Thanks to Comrex and Telos for providing information.

What's in an interface?

By Rolf Taylor

ISDN codecs can specify several types of interface. Among these, S, T U, V.35 and X.21 are more commonly seen, although there are others. This should help demystify the various types and help you understand what each kind means.

The U interface is the connection between the raw ISDN network and the NT1 (Network Termination, type 1). It is almost always a two-wire interface. This is not standardized by international standards. In most of the world (but not the United States and Canada) it is completely the domain of the telephone company, and because the telephone company provides the NT1 the lack of a standard does not matter to the user. Among the de facto U interfaces in Europe are the U p-n, U po and _ kC, which comes in two forms.

In the USA and Canada, the U interface is standardized by the American National Standard Institute (ANSI) and uses 2B1Q line coding. It is good for 18,000 feet on most existing unloaded copper outside facility. Telephone companies sometimes use other transport technologies, either to provide service over T-1 or fiber or to extend the range beyond 18,000 feet. However, they must always convert this back to the 2B1Q coding for delivery to the customer because that is the agreed standard in the United States.

2B1Q stands for two-bits per quat, which is short for quaternary. A quat is a signal that can take one of four states. 2B1Q uses four quats. Each level conveys two bits of information: 00, 01, 11 or 10 depending on the quat.

The telephone company typically terminates the U interface with a six-position/four-pin miniature modular RJ-11 jack, or an eight-position/eight-pin miniature modular RJ-45 jack. For either jack, only the center two pins are used.

The raw bit-rate on the 2B1Q U interface is 160kb/s. This path

comprises two 64kb/s channels, referred to as B channels and a single 16kb/s channel, referred to as a D channel. In this case, B stands for bearer and D stands for data. The D channel carries the call setup and teardown and is a local version of the Common Channel Interoffice Signaling techniques, such as SS7 used by the telephone companies. The remaining 16kb/s of data are used for data framing and synchronization, and an embedded operations channel for to convey information on block errors to the far end.

There is a V interface, which is the two-wire interface at the telephone company's central office. Because this is clearly the telephone company's domain, you rarely encounter the term.

The S interface uses a modified form of alternate mark inversion (AMI) framing similar to a T-1. It is a four-wire interface. This is standardized Internationally. The raw bitrate is 192kb/s. In addition to the two B channels (at 64kb/s each) and the D channel (at 16kb/s), there are bits for framing, synchronization and an up to two embedded operations channels. In some parts of the world this is referred to as the S0 (S zero) interface.

The S interface is a bus architecture that supports as many as eight terminals and a single NT1. When multiple terminals are used, there are certain wiring and termination rules that must be followed. International standards outline the allowable configurations and termination requirements for the S interface. The standards call for an RJ-45 jack. The center four pins carry the signals. The remaining pins are sometimes used to provide power for the terminal or NT1. When power is provided, it is usually placed on pins seven and eight.

The T interface is a subset of the S interface. Unlike the S interface, only a single terminal can be used on the T interface.

X.21 and V.35 are standards for serial data ports, not unlike RS-232. RS-232 can be used for synchronous or asynchronous data, although it is typically used for asynchronous data. V.35 and X.21 are used solely for synchronous data. The usual application is to connect data terminal equipment (DTE), such as a computer terminal or codec, to data communications equipment (DCE), such as a CSU/DSU on a T-1 or dedicated digital line. In addition to the transmit and receive data pins and handshake pins, these interfaces include pins for clocking, as required by synchronous data applications.

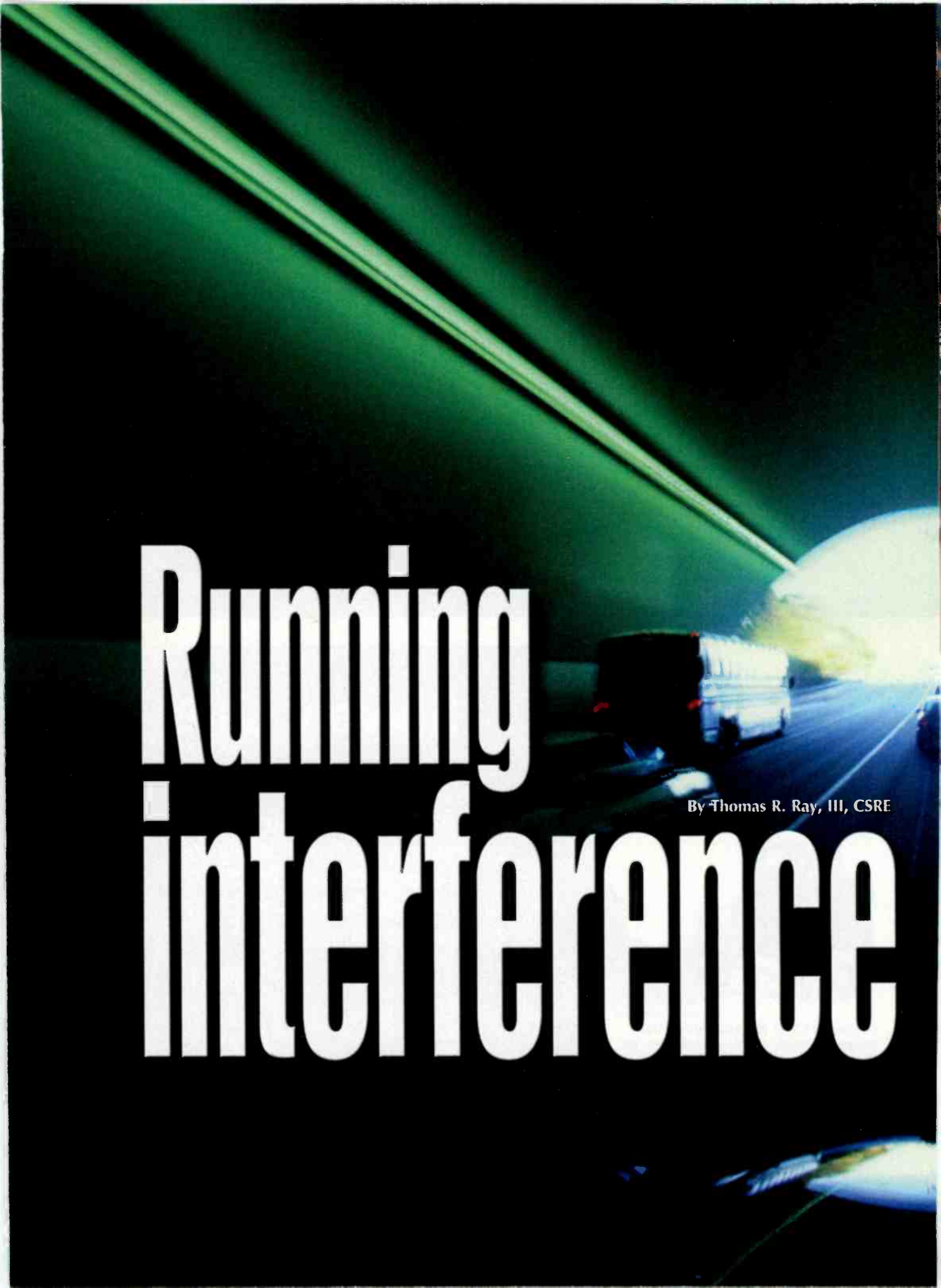
V.35 is most common in the USA and Canada, while X.21 is commonly used in other parts of the world.

One reason X.21 and V.35 are preferred for high-speed synchronous applications is that they use balanced transmission pairs instead of the unbalanced signals used in RS-232. Just like audio, the use of balanced pairs reduces problems with noise and ground loops. The handshake signals are unbalanced on V.35 whereas they are balanced on X.21.

X.21 typically uses a 15-pin D-sub connector, while V.35 uses a large AMP Winchester connector. In many cases vendors use some other connector on their equipment; if so an adapter cable may be required.

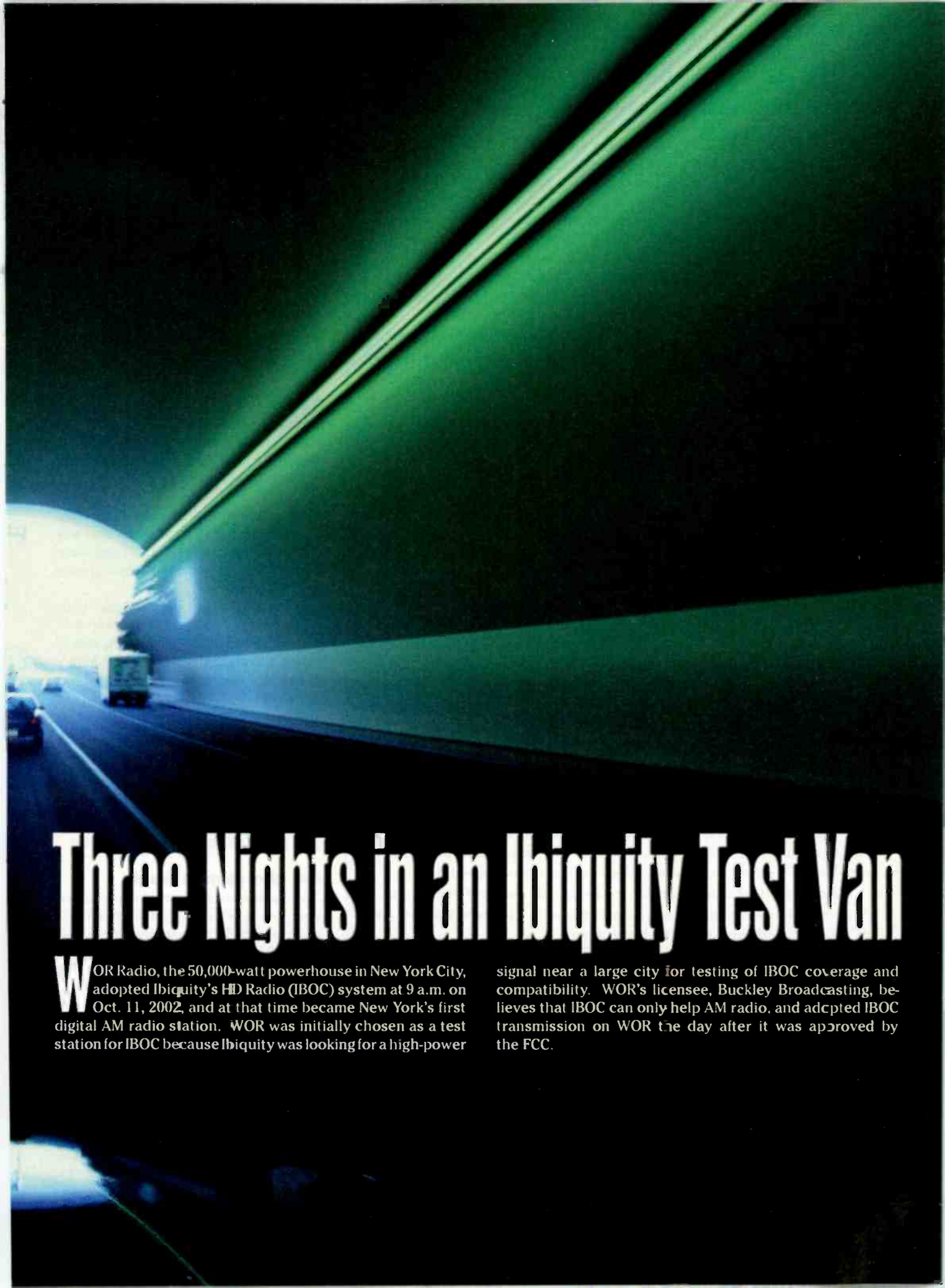
Finally, there is an undefined R interface. This is the interface between an ISDN terminal adapter and a piece of pre-ISDN equipment using any pre-ISDN standard such as RS-232 or plain old telephone service (POTS). If an X.21 or V.35 interface were present on an ISDN terminal adapter, they could be called the R interface, because they are standards that pre-date ISDN.

Taylor is applications engineer at Telos Systems, Cleveland.



Running interference

By Thomas R. Ray, III, CSRE



Three Nights in an Ibiquity Test Van

WOR Radio, the 50,000-watt powerhouse in New York City, adopted Ibiquity's HD Radio (IBOC) system at 9 a.m. on Oct. 11, 2002, and at that time became New York's first digital AM radio station. WOR was initially chosen as a test station for IBOC because Ibiquity was looking for a high-power signal near a large city for testing of IBOC coverage and compatibility. WOR's licensee, Buckley Broadcasting, believes that IBOC can only help AM radio, and adopted IBOC transmission on WOR the day after it was approved by the FCC.

Running interference

So far WOR has encountered many positive results during the transition to IBOC. Foremost is our daytime digital coverage. At the suggestion of Ibiquity, WOR runs its IBOC signal 6dB lower than the original IBOC specification. This is because the secondary lobe of WOR's directional pattern sends an 85kW signal towards Philadelphia. Philadelphia is 75 miles away from the transmitter site in Lyndhurst, NJ. The reduced digital power level reduces the power toward Philadelphia. Even while operating the digital carrier 6dB lower, the coverage to the Philadelphia city line, the 2mV/m boundary, is solid. With this in mind, the station was curious to investigate the IBOC nighttime coverage and examine any resulting sideband interference.

The racks at the WOR transmitter site. The IBOC exciter is mounted at the bottom of the rack on the right.

On the evenings of Dec. 2, 3 and 4, an Ibiquity test van made several trips around the New York metropolitan area. As station engineer, I rode in the van with Russ Mundschenk of Ibiquity. We ran three tests on each night. On the first night we tested our own analog compatibility. On the second night we tested the digital coverage with the presence of a first-adjacent channel digital interferer. On the final night we tested the nighttime digital coverage without the digital interferer. WOR operates on 710kHz. The station we used for the first-adjacent interferer was WLW on 700kHz in Cincinnati.

Let the games begin

To establish a baseline reference, we drove west from New York on I-78 to a point 51.7 miles from the WOR transmitter site. At this point WLW's skywave signal is 10dB (on average) below WOR's carrier. This was measured with a Hewlett-Packard spectrum analyzer with a roof-mounted 31" whip antenna in the Ibiquity van. We chose the parking lot of a state highway maintenance post in an area away from any streetlights. This location proved to be noise-free, and the skywave conditions could not have been better at 10 p.m. The spectrum analyzer, set to show stations from 660kHz to 770kHz, showed carriers neatly spaced every 10kHz. It was amazing to see the skywave phenomenon displayed on the spectrum analyzer. Hearing skywave effects on a single station

The best selection

FM Educational Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
MP-1	1	500 W	$250
MP-2	2	800 W	$650
MP-3	3	800 W	$950
MP-4	4	800 W	$1,250
MP-4R	4	2000 W	$1,750
MP-5	5	3000 W	$2,250
MP-6	6	3000 W	$2,700

FM Low Power Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
GP-1	1	1500 W	$350
GP-2	2	3000 W	$1,350
GP-3	3	4500 W	$1,800
GP-4	4	6000 W	$2,500
GP-5	5	6000 W	$2,900
GP-6	6	8000 W	$3,500

FM Medium Power Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
SGP-1	1	3000 W	$650
SGP-2	2	6000 W	$2,450
SGP-3	3	8000 W	$3,500
SGP-4	4	8000 W	$4,300
SGP-5	5	8000 W	$5,100
SGP-6	6	8000 W	$5,900
SGP-6R	6	15000 W	$6,500

Please Contact the OMB America Sales Department, for other antenna systems configurations

TV & Radio antenna systems

EUROPE

Commercial & T.V. Factory:
Avda. San Antonio, 41
Teléfs.: 976.50.46.96 (6 lines)
Fax 976.46.31.70
50410 CUARTE DE HUERVA
(Zaragoza)

Antenna & Radio Factory:
Camino de los Albares, 14, bajos
Teléfs.: 976.50.35.80 (6 lines)
Fax 976.50.38.55
50410 CUARTE DE HUERVA • (Zaragoza)
Internet. http://www.omb.es
e-mail: ombcom@infonegocio.com
VideoConference(RDSI) 976 46 32 00

INTERNATIONAL DIVISION
3100 NW 72 nd. Avenue Unit 112
MIAMI, Florida 33122
Ph.: 305 477-0973 – 305 477-0974 (6 lines)
Fax: 305 477-0611
Internet. http://www.omb.com
e-mail: ombusa@bellsouth.net
Videoconference: 1 305 5940991/92

Running interference

is one thing, but observing the atmospheric changes on one signal while another continues without effect is fascinating.

Using a Potomac FIM-41, the WOR signal was measured to be about 0.75mV/m, which is roughly WOR's 0.5mV contour. This is outside the station's secondary lobe, but not yet in the null at 342 degrees. The WOR signal was fairly constant, indicating that a groundwave signal was present, while the WLW signal would vary greatly, indicating that we were receiving skywave coverage.

The IBOC exciters at WLW and WOR were set to cycle on and off for one-minute periods over a 10-minute window. While WLW's IBOC carriers were on for one minute and then off for one minute we monitored WOR. We then swapped the process and monitored WLW during a similar cycling of WOR. We used six radios to monitor these signals. Five were standard consumer models that you would find at any consumer electronics store and included a Technics tuner and a GE SuperRadio III. The sixth was an Ibiquity test receiver.

When the WLW carrier was 10dB below the WOR carrier and WLW's IBOC carriers were on, I observed some minor noise in the analog WOR signal. By minor I mean that the receiver volume had to be turned up to hear it. If WLW's carrier met or exceeded WOR's carrier level (and WLW exceeded WOR by 10dB at times), the noise level in WOR's signal rose, but it was far from objectionable. Clearly, the WOR analog signal within our 0.5mV contour would be useful.

Conversely, when WOR's IBOC carriers were on, and WLW's carrier was 10dB down, the WLW analog signal was rather noisy. It was not bad enough to make me want to tune WLW out, but it was annoying. If WLW's signal decreased to a level of 15dB below that of WOR, the signal was unlistenable. If, however, WLW's signal level was equal

SBE Chapter 15 meets at WOR

The January 2003 meeting of the Society of Broadcast Engineers New York City Chapter 15 was dedicated to IBOC. The program began with tours of WOR's transmitter facility and an Ibiquity test van.

Later, Tom Ray of WOR, and Jeff Detweiler and Russ Mundschenk of Ibiquity gave a presentation on the transmitter installation, the upcoming consumer radio rollout and general discussion on implementing IBOC.

The tour of the WOR transmitter site.

to or exceeded WOR's signal level, the noise was only slightly audible and the analog signal was useable. When the WLW signal was unlistenable and WOR's IBOC carriers went off, the WLW signal was still unlistenable, either because of another station on 700kHz coming in, or the sideband from a station at 690kHz splattering. In general, I would say that it was not strictly the IBOC carriers that made the signal unlistenable.

Close up of the rack-mounted IBOC exciter.

Wanting more

After an hour of listening, we packed up and drove to a location about 72 miles from the WOR transmitter, near Bethlehem, PA. At this point, the WOR and WLW signals were nearly equal, and judging from the signal variations on the spectrum analyzer, were both predominantly skywave. When both signals were skywave, the noise level on the desired signal was somewhat annoying when the interfering carrier was 10dB lower. The noise level increased if the interferer increased to a level that was equal to or exceeding the desired carrier, but I considered the signals to be listenable. Annoying, but listenable.

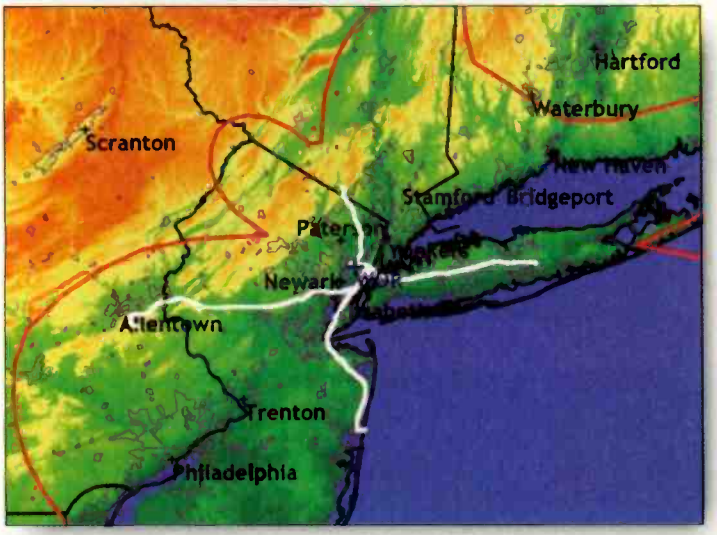
On the second night we took four routes. One took us out I-78, another took us south down the Garden State Parkway, a third took us through Manhattan, the Queens Midtown Tunnel and east out the Long Island Expressway, and a fourth took us up WOR's null north on New Jersey Route 17.

During all four routes, the digital signal held its own, finally falling apart 50 miles to the west, 52 miles to the south (which is in WOR's minor null), 53 miles to the east on Long Island (which is in the major lobe, but the ground conductivity on Long Island leaves much to be desired), and 20 miles north through our null. When driving through the null, we noticed that the farther we were from the transmitter, the less upper sideband we received from WOR. Yet the digital signal still decoded properly, and in most cases fell apart close to the 0.5mV/m contour.

In Manhattan, we drove down 40th Street. There are several areas on 40th Street before Broadway where the WOR analog signal is fairly noisy. Despite the interference, the digital signal remained strong. The only place where the digital signal was undecodeable was at the corner of 40th and Lexington. There are several large buildings there, and probably due to a combination of reflections and shielding, the entire AM band from 660kHz to 770kHz as shown on the spectrum analyzer all but disappeared. Naturally, when there is no signal, neither analog or digital will play. Once we moved out of this area the digital signal locked in again.

The Lincoln Tunnel and Queens

Running interference



The courses taken on the second and third nights of testing.

Midtown Tunnel have a leaky coax system that the MTA can insert traffic advisories on all New York AM stations. This system completely strips the IBOC sidebands. However, when sitting under the roof at the toll plazas at both tunnels the digital was going strong.

The hat trick

For the last night of testing, WLW ran only an analog signal while WOR ran analog and IBOC. The WOR coverage mostly duplicated the same results, as it did with WLW as an IBOC interferer. This leads me to believe that this interference does not affect an IBOC signal.

Listening to the digital signal while on the road was amazing. WOR's Joey Reynolds had a guest singing live Christmas carols with an acoustic guitar. It almost sounded like the guest was in the van with us. It was that good. It was also amazing to realize that this was an AM station. It wasn't getting fuzzy under bridges and overpasses.

My opinion is that if the IBOC carriers were reduced by 3dB to 6dB for all stations at night, the digital coverage would obviously be reduced, but there would be less effect on the analog signals. Certainly, digital coverage is adequate at night on the WOR signal.

Another way to look at this is to consider a Class B FM station. Depending on terrain, it is expected that signal will be lost about 50 miles from the transmitter. No one thinks anything less of the system because of this. Maybe we should start considering AM in this same vein. The audio quality of the digital signal, in my opinion, far surpasses the analog quality. Is IBOC the savior AM radio has been in search of? I don't know, but I know that I would rather listen to the digital audio rather than the bandwidth-restricted, scratchy analog.

Ray is corporate director of engineering for Buckley Broadcasting/ WOR Radio, New York.

Map image courtesy of Chip Morgan and Realcoverage.com.

Sennheiser HD 280 Pro Headphones

By Jon Taylor

Headphones are pretty simple. Personal monitors. Your private sound field. My favorite term is "cans." Unfortunately, I've heard some headphones that actually sound like cans—garbage cans.

Sennheiser is a famous name in professional headphones. The HD 280 Pro is a closed back circumaural design with neodymium drivers. The HD 280 Pro provides an 8Hz to 25kHz virtual linear frequency response and 102dB SPL. This means these are headphones designed for critical listening. Those engineers who still grab their 1966 X brand cans to test the latest microphone processor will not believe these cans. It always amazes me how many late 60s and early 70s headphones are still in use. The tape replaced record. CD replaced tape. The computer replaced everything. Do you really think those old cans can compete with today's headphones?

The HD 280 Pro headphones are surprisingly lightweight. They breakdown to transportable size with collapsable rotating ear-pieces. The rotating ear-pieces also make for easy single-ear monitoring.

They are probably the most comfortable headphones I've ever worn. However, out of the box they're a little tight. They hug your head so close it feels more like a helmet. They loosen up with a little time. I happen to like a tight fit. It reduces sound leakage from the headphones and outside sources.

How do they sound? Very good, actually. Are they the best I've ever heard? No, but they can compete with the professional's choice headphones for long-term performance. The key to a good pair of headphones is not just the sound, but also the comfort and the durability. These fit the bill.

Maybe the best feature is the easy-to-replace parts. Something I have never seen before in professional headphones is the attention to detail given in the HD 280s. The easily replaceable, single-side coiled cable plugs into a connector inside the ear-piece. If you have never tried to repair the tiny wires of an inner-ear-piece chord after 10 at night you truly haven't been frustrated. Sennheiser really put some thought into replacement parts, obviously with the idea that these headphones will be around a long time.

In addition to the audio cable, the most important piece of the headphones is also easily replaced: the ear padding. We've all worn headphones down to the plastic. It just hurts too much to keep trying to wear them.

Taylor is creative services director of KCFX-FM, Kansas City.

Performance at a glance:

- Circumaural design
- 8Hz to 25kHz response
- Neodymium drivers
- High SPL capability
- Tight fit with good isolation
- Easy part replacement

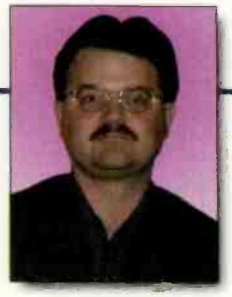
Sennheiser

P 860-434-9190
F 860-434-1759
W www.sennheiserusa.com
E lit@sennheiserusa.com

Editor's note: *Field Reports are an exclusive* Radio *magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio *magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* Radio *magazine.*



Aphex Model 2020 MkIII

By Kent Kramer, CBRE

With the ranks of Hispanic broadcasters getting longer everyday, having an edge on the competition can make a difference. One important element in achieving that edge is delivering the highest quality product possible to our listeners. We put tremendous effort into not only the programming and direct community involvement but also the audio quality. The days of Spanish language programming being a niche format on the AM dial have given way to being some of the top-rated FM stations in the nation's top markets.

Our stations' programming runs from Spanish CHR to tropical, with concert remotes, mixing music live from local night clubs and lots of listener call-ins. Within this eclectic mix we often get programming material produced in parts of the world that have lower production standards. Even material produced here is often done in home studios with variations in quality.

It is my responsibility to achieve consistently high audio quality on air using all the sources of varying quality, but without processing the distinctiveness out of the source material. It also has to be loud if you are going to be a successful commercial station in the Los Angeles, New York and Chicago markets.

I've been using Aphex products for years, and my stations have used the first and second generation Model 2020 processors with good results. I had not associated Aphex with maximum loudness boxes, so I was interested in listening to what the company had done with its latest iteration of the Model 2020, the MkIII.

The Model 2020 MkIII basic unit is a wide-band leveler, a four-band compressor and a split-band peak limiter with analog inputs and outputs. Options include digital I/O, a high frequency limiter and a stereo generator. This gives each installation the ability to configure the unit to its needs. We use the digital I/O and HF limiter options so that all the processing is done in the unit and the digital output is then fed to a Digit exciter.

The difference between this version and the two previous versions, the 2020 and the MkII, is that the leveler was changed to be more RMS detecting and the HF limiter has been changed to split-band design. Other changes included how the Automatic Limit Threshold, a patented element, was controlled. The improvements were quite noticeable with a more open high end.

The MkIII improved the performance of the HF limiter. According to Aphex, the slopes of the crossover filters in the MkII were not steep enough and clipping distortion could occur on sibilant peaks when the unit was driven hard. The MkIII has much steeper slopes and this problem has been solved.

Performance at a glance

- Dual-output stereo generator
- RBDS interface
- Dual-mono and stereo capability
- Analog and digital I/O
- Remote control accessible
- Crystal oven oscillator option available

How does it sound?

You have to have deep, solid, clean bass for any music format, but especially for any dance or hip-hop genre. All versions of the 2020 deliver more bass than you could ever dream of—so much so you that you should set it up listening on full range speakers or else you can get so much bass that the typical car speaker will rattle out of the car door. The split band peak limiter allows the unit to generate so much bass. It uses the principle that bass clipping is actually an enhancement while mid and high frequency clipping can be irritating. The circuit analyzes the amount of mid and high frequency content and adjusts the clip point of the bass clipper, thus giving the maximum amount of bass for any input. Also, there are two shelving equalizers that allow you to further shape and enhance the bass.

One of the unique features of the 2020 is the Wave Dependent Compressor in each of the bands. It has a convoluted filter detection circuit that keeps the attack time fairly slow until a faster attack is needed. Slower attack times

are typically better sounding than fast attack times, but slow attack times result in larger overshoots, causing the following limiter to work harder. This circuit sounds like a slow attack while also providing peak control. The bands can be linked, but only the slow time constants are connected. The result is the fidelity of a wide-band compressor but without the hole punching. When the bands are unlinked there is a dynamic EQ effect. To get the vocals out more consistently I unlink the bands. The vocals that had been buried become present and clear.

The high end of the MkIII is noticeably bigger and clearer than the MkII. The DJs have commented that their voices sound much more open and clean, and that is with running the processor heavily.

In tuning the MkIII I found that I could achieve different textures and sounds with small adjustments. That is in sharp contrast with other processors that have a character or sound that is their sound almost no matter how the unit is adjusted. All of the processing parameters on the 2020 can be adjusted on the front of the unit or via easy and intuitive software (for PC only). There are eight factory presets and 16 user presets. The only things that are not adjustable from the front panel or software are the digital input reference level and the digital output level. These must be adjusted by internal trimmers.

As part of our corporate commitment to quality we had been willing to lose a little bit of loudness for higher fidelity. With the 2020 MkIII we have been able to get consistently high audio quality with each song retaining its own character. Announcers' voices are clean, present, natural and big, and call-ins are clear and intelligible.

Kramer is vice president of engineering for Big City Radio, Los Angeles.

Aphex

P	818-767-2929
F	818-767-2641
W	www.aphex.com
E	sales@aphex.com

Editor's note: *Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

Marti STL-20C

By Paul Mueller, CSBE

The original intention was to install a radio communications link between WGUL-AM's studio and transmitter site. But year after year, STL transmitter and receiver products kept coming up short. We couldn't find a composite STL system that could overcome the distance and terrain between WGUL-AM's studio in Palm Harbor, FL, and its transmitter tower in Safety Harbor, FL. The STL systems the station owned lacked the signal strength to make the hop satisfactorily from an 80-foot tower behind our studio complex, across 10 miles and over a 60-foot hill to our 280-foot tower in the Florida lowlands.

Performance at a glance:

20W RF output
Direct FM synthesized
Less than 0.2 percent distortion
Flat frequency response up to 200kHz
58dB separation, 50Hz to 15kHz
62dB separation, 1kHz to 5kHz
Greater than 76dB S/N
Spurious emission better than 60dB below carrier
Peak-hold bar graph modulation meter
Two BNC inputs
15-pin connector on rear panel provides filtered outputs for remote control and remote power metering

What we needed was a super STL—an STL able to leap tall buildings in a single bound.

I gave up all hope of finding such an STL until I heard about the Marti STL-20C composite transmitter. With more than double the output power of other STL transmitters, I had every reason to believe this STL's 20W power amplifier would send our programming soaring across the path. Also, the system was more cost effective than the leased equalized phone lines we used to run programming over to the AM site. And, by all indications, WGUL-AM's Music of Your Life format, broadcast in AM stereo, would benefit from the synthesizer used in this STL. Modulation is direct FM, synthesized ±50kHz deviation for 100 percent modulation. The synthesizer has a flat frequency response up to 200kHz, with less than 0.2 percent distortion. Its average left and right separation is 58dB across the band, and the separation for the 1kHz to 5kHz range affecting stereo fidelity is even more (62dB separation).

Could this clean STL give our station the full sound we were seeking? I decided to find out.

First, however, I had to overcome other obstacles. STLs and other airborne systems had proliferated in the area over the years. Finding available band space wouldn't be easy. Nor would it be easy to convince our community that we needed to put up more communications equipment. We were already battling the local authorities to keep a pickup dish at the studio complex for the AP network. It was apparent that we needed an extra powerful STL transmitter for just about any contingency. A marginal STL wouldn't do. We needed every millivolt the STL-20C had to offer so the STL receiver would be able to pick up the transmitted signal in a RF congested area.

By the time we overcame the usual permit hurdles and acquired approval from our local frequency coordinator to transmit a vertically polarized 950MHz signal that wouldn't interfere with another station's horizontal 950MHz STL, my optimism started to wane. Nonetheless, I cleared two rack unit spaces at the studio for the 11-pound STL-20C, hoping against all odds that we would finally be able to make the hop between studio and transmitter using a quality link. When our Marti STL-20C transmitter arrived I was glad to discover that its front panel design had the same feel I'd come to expect in my years of installing Marti STLs for other stations.

That made setup almost a non-event. I simply brought in composite audio through a BNC connector in the back of the unit, adjusted the unit for maximum power, and monitored everything from a bar graph meter on the front panel. The meter is a peak hold type, providing precision readings on forward power, reverse power, PA current and subcarrier level. LEDs gave me an instant read on whether the unit was transmitting in composite or mono mode. The only control new to me was a switch for synthesizer resolution, selectable in 25kHz steps. Another new and welcomed addition is the STL-20C's automatic changeover feature; all we will need is an ATS-20E for a second transmitter.

As a testament to the ease of installation, I used the

manual as more of a reference than a step-by-step guide. The unit ran consistently as promised, with not so much as a glitch, even though this was the first STL-20C off the production line.

Test and Ye Shall Receive

After installing the new STL at the studio tower, I stood back to see if the STL-20C would deliver. To my amazement, its 20W output amplifier sent programming sailing over the hill—as well as over the new housing developments and trees jutting out from atop the hill. The Marti R-15C receiver for the 280-foot receiving tower received the content easily. Incredibly, program content made it from the top of the transmission tower, through a lengthy transmission line and across a ravine to the transmitter building, where it took another beating as it passed through two cavities installed to protect the AM from rogue cellphone signals coming from another site nearby. I added a pre-amplifier in the circuit to give the signal a little extra boost. Overall, the STL overcame a 12.5dB loss in the transmission path.

When we turned on the radio and listened to the sound, I was in for another pleasant surprise. Not only was the station's reception strong and clean, but there was also a new depth to the music. It was now fuller than ever. Our CEO noticed it right away.

In the final analysis, I'd have to say that Marti's new STL transmitter has made significant strides in range and quality. Without it, WGUL would still be sacrificing budget and program content to leased phone lines.

Mueller is chief engineer of WGUL-AM/FM, Palm Harbor, FL.

Marti

P	817-735-8134
F	817-735-9340
W	www.martielectronics.com
E	sales@martielectronics.com

Editor's note: Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

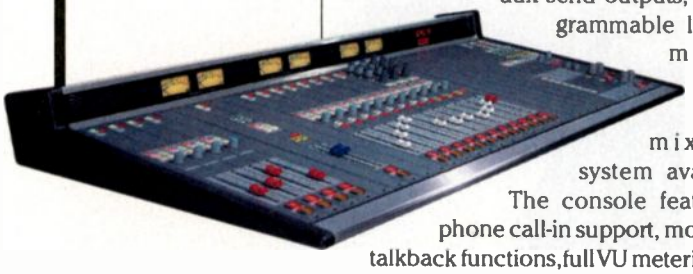
It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

New Products @NAB

By Kari Taylor, associate editor

The NAB convention is so big, we divided our new product preview into two issues. We have also provided the exhibitors' booth numbers to help you find them at the convention. For more NAB information, turn to the March issue, which includes the exclusive *Radio* magazine FASTtrack and a map of the Radio/Audio Hall.

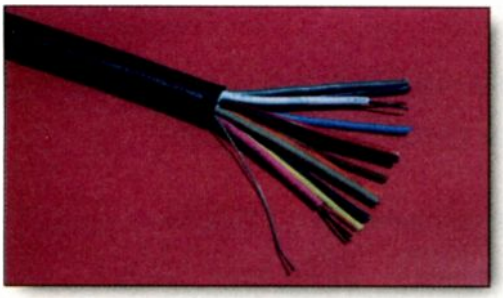
Analog radio on-air console
Wheatstone
Booth N2804



A-7000: Features of this analog radio on-air console include flexible configurations and combinations of dual source mic or line inputs, four stereo outputs, mono sum and aux send outputs, fully programmable logic and machine control and dual mix-minus system availability. The console features full phone call-in support, monitor and talkback functions, full VU metering, clock, timer, stereo cue/solo, EQ availability per module, aux send and individual channel IFB feed options. The counter drop-in mount system offers easy installation.

252-638-7000; fax 252-637-1285
www.wheatstone.com; sales@wheatstone.com

Digital audio snake cables
Nemal Electronics
Booth C3318



SND2424: These AES/EBU-compliant digital audio snake cables can be used in broadcast and other high-end audio applications. These 110Ω cables are available in constructions containing two to 24 pair, and are UL-CM approved. Part number SND2424 consists of 24 individually-shielded and jacketed pairs with an overall foil shield and jacket. The cables facilitate rapid and neat installation of systems requiring multiple digital audio pairs, and the discrete color-coded individual jackets provide for easy and positive identification. Outer jackets are available in black or other colors by special order. This product is available on 500-foot rolls, or fully terminated to customer specifications.

800-522-2253; fax 305-895-8178; www.nemal.com; info@nemal.com

Digital broadcast audio processor
Omnia Audio
Booth N2618

Omnia 6-hdfm: For FM broadcasters upgrading to HD Radio, this processor provides seamless, synchronized audio processing for IBOC and analog signals. The processor uses 96kHz, 24-bit sampling capable of reproducing the entire audio range of IBOC. A split processing structure routes audio from the

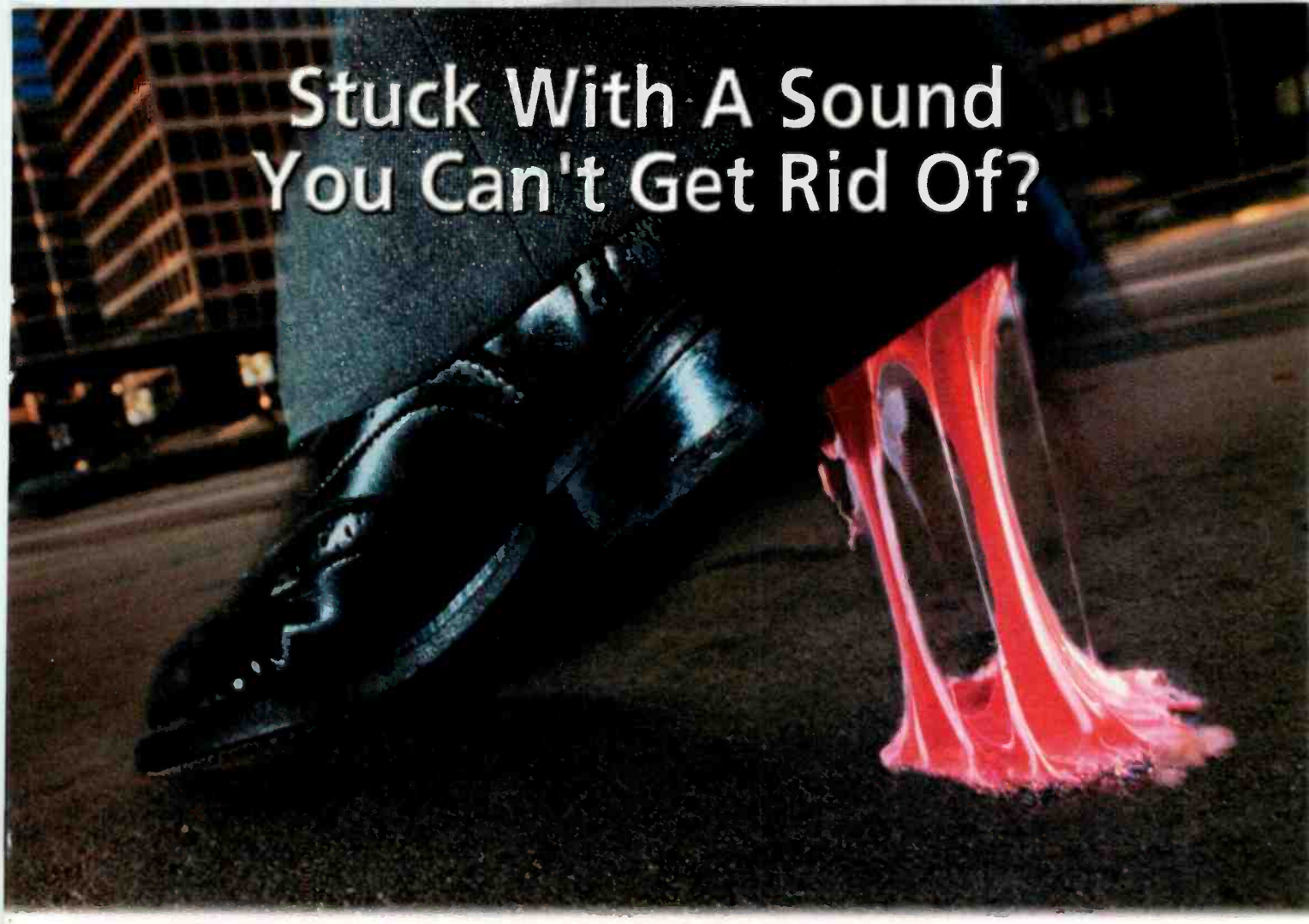
mixer section to separate, concurrent output stages for analog FM and DAB. A look-ahead final limiter conditions audio for the bit-reduced encoders used in IBOC systems, while the analog FM signal receives distortion-controlled final limiting with pre-emphasis and 15kHz filtering. Other features include a six-band limiter, five AGC bands with adjustable AGC crossovers and wideband AGC; twin full-color active-matrix displays with an integrated Dorrough Loudness Meter make it possible to immediately see the effect of processing adjustments. Remote control is accomplished via Ethernet, serial or modem connection.

216-241-3343; fax 216-241-4103
www.omniaaudio.com; info@omniaaudio.com

Remote off-air monitoring
Audemat-Aztec
Booth N2049

Golden Eagle updates: There are several new updates to this monitor. For example, a menu event log that provides a shortcut legend in the status column at the end of the journal. Users can access it by clicking on the status field description. Another feature is the measurements menu screen that is now in a new ergonomic environment. The real time measurement menu is a new feature. Enter a frequency or select different signals and see the measurements change in real time. The Webcam menu pulls up the last picture that appeared. To refresh it, simply click on the snapshot option.

305-692-7555; fax 305-682-2233
www.audemat-aztec.com; contact@audemat-aztec.com



YOU NEED THE NEW APHEX 2020MkIII AUDIO PROCESSOR

Settling for flabby, undefined bass? Buried, clouded, mids? Shrill, annoying high end that you just can't tune out of your current processor? Is your only comfort that some of your neighbors on the dial sound as bad or worse than you do? Then it's time to step up to the new Aphex 2020MkIII.

Radically new processing algorithms and circuitry bring even greater loudness while maintaining clarity and musicality. The bass is tight, deep and resonant, the mids are detailed and forward, and the highs are open and natural. The 2020MkIII is so powerful, yet so clean, it is the only "broadcast" processor used in world class post production and mastering facilities.

With an extensive range of useful controls you can readily achieve your own unique sonic signature ....a sound that you'll never want to get rid of.

Call us today to audition the new 2020MkIII at your station.

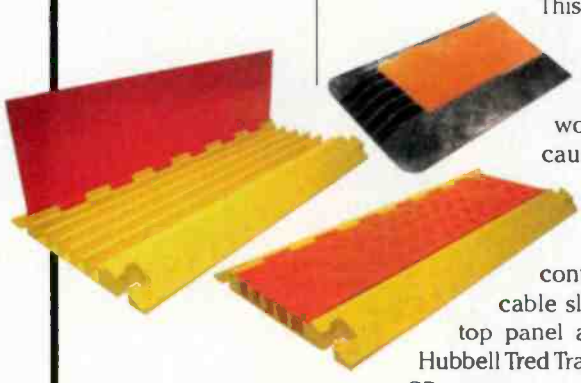
APHEX SYSTEMS

*Improving the way the world sounds*SM

11068 Randall Street, Sun Valley, CA 91352 U.S.A
818-767-2929 Fax: 818-767-2641 www.aphex.com

Traffic-area cable trough
Whirlwind
Booth C3434

Cable Run and Protector: This cable trough comes in bright yellow and orange or orange and black for high visability. With ramped sides, the sections can support as much as 5.25 tons. Tabs on each end allow the user to lock multiple units together. Endcaps are available to cover the tabs. This product offers a convenient carry handle located on the underside and won't slide around because it weighs 19lbs. Each section measures 36"L × 17.5"W × 1.95"H. It contains five 1.3" × 1.3" cable slots under a hinged top panel and will mate with Hubbell Tred Trak and the Lineback-er GP systems.

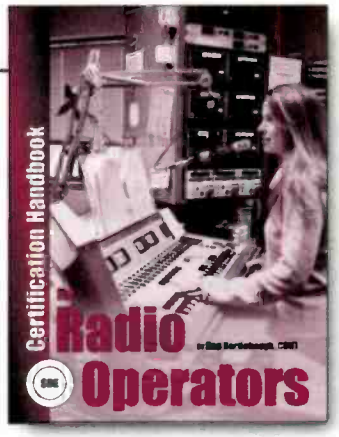


888-733-4396; fax 716-865-8930
www.whirlwindusa.com; sales@whirlwindusa.com

Digital radio console
Soundcraft USA/BSS Audio
Booth N3216

RM1d and RM1ds enhancements: This on-air radio console features front-panel and control-menu labeling that can be customized for radio installations. The console features an all-digital processing path with assignable input selection from analog mic/line, S/PDIF, TDIF and AES/EBU sources. It offers integrated dynamics processing and Lexicon effects, cue speaker, dual timers and digital processing enables it to store and recall as many as 128 console presets of desk settings. Version 3.0 operating software adds password lockout functions so that unauthorized changes to the console setup are not possible. The update also enhances the dynamics section and steamlines the menus for setup, dynamics and effects. A variable high-pass filter function is also included.

615-399-2199; fax 615-367-9046
www.soundcraft.com; info@soundcraft.com



Certification handbook
Society of Broadcast Engineers
Central Lobby Booth 12

Certification Handbook for Radio Operators: This handbook helps board operators increase their knowledge of station operations by explaining standard practices and common procedures. This handbook will help operators learn more about the broadcasting business from the technical and business side. While it is designed for individuals just getting started in radio, the information is useful to anyone who works behind the console. The book covers FCC rules, technical layout of a typical station and the general responsibilities of a radio operator. In addition, an overview of station management structure and professional etiquette is presented. Other chapters cover station logs, the Emergency Alert System (EAS), safety requirements and operational procedures for trouble situations. Studying the information in the Certification Handbook for Radio Operators will prepare an operator to take the optional SBE certification test and earn the Certified Radio Operator (CRO) designation. It was written by *Radio* magazine contributor, Ron Bartlebaugh, CBNT.

317-846-9000; fax 317-846-9120
www.sbe.org
e-mail lbaun@sbe.org

Six-channel mixer
Mackie Designs
Booth SL2531

Tapco 6306: This mixer was designed and manufactured to make high-quality, durable professional audio equipment accessible to any station's budget. The mixer is backed by the engineering and manufacturing team of Mackie Designs and includes features such as low-noise mic preamps. The mixer features two low-noise mic preamps, two instrument inputs, a stereo aux return to monitor, two aux sends, eight-segment LED metering as well as separate headphone and control room level controls.

800-898-3211; fax 425-487-4337
www.mackie.com
productinfo@mackie.com

Rack-mount cable tester
RCI Custom Products
Booth SL1624

CT8RM: This rack-mount cable tester provides a convenient and practical way to test most commonly used audiovisual connectors. It is useful for large system installations such as hotels and sports arenas, or in portable audiovisual systems

where misplaced and lost cable testers are problematic. Features include 2RU high, tests for continuity as well as shorts, test any connector to any other connector, includes XLR, BNC, phone, minim banana, S-video, RCA and Neutrik NL4 connectors.

800-546-4724; fax (240) 912-0131
www.rcicustom.com; plates@rcicustom.com

Software package
Dalet Digital Media
Booth SL321

Daletplus Active Log: The newest addition to the Daletplus suite of solutions, this software package is feature rich for large scale media ingesting, monitoring, cataloging and archiving. Developed for standard IT hardware, the system is a cost effective solution that eliminates the need for tapes and time consuming tape management. Its user-friendly interface emulates standard recording and transcribing functionality, while providing powerful search and retrieval capabilities, enabling instant access to information, even while recording. The package is useful for managing massive amounts of video, audio and metadata.

212-825-3322; fax 212-825-018
www.dalet.com; sales@us.dalet.com

Patch bay
Signex
Booth N3201

PST96D25P: The Bantam Pro patch bay is available with direct solder rear termination or fitted with 25-pin D-sub connectors wired to the Tascam DA88 standard. It can be used for most types of audio signal including mono, stereo, balanced and unbalanced lines. Unike conventional panels, the Isopatch design offers half or full normalling on every channel by simply soldering across the special program pads on the top PCB.

207-773-2424; fax 207-773-2422
www.independentaudio.com; info@independentaudio.com

Rack-mount telephone interface

JK Audio
Booth N2237

Innkeeper 4: This product contains four independent digital hybrids in a 1RU space. The front panel keypad, display and handset jacks provide easy speed dialing and call setup. Digital hybrids allow the user to send signals into the phone line while maintaining separation between the user's voice and the caller. The balanced XLR output jacks contain only the caller's voice. Digital hybrids connect audio signals to standard analog telephone lines without the transmit and receive crosstalk common to analog hybrids. A digital signal processor (DSP) continuously monitors the phone line and audio signals to deliver separation, typically exceeding 50dB, without any setup and without sending a noise burst down the line. An auxiliary telephone jack is provided. The auxiliary telephone is disconnected when you press the call button, and reconnected when you press the drop button.

800-552-8346; fax 815-786-8502
www.jkaudio.com; info@jkaudio.com

Omnidirectional microphone

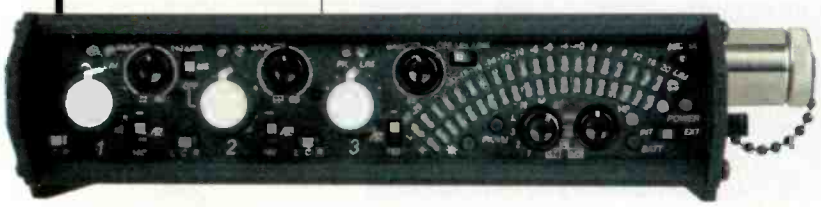
Pearl Microphone Labs
Booth N3201

CO22: Manufacturing microphones in Sweden for more than 50 years, the company's large membrane microphone, the CO22, is a phantom-powered preamplifier offering low noise levels, which make it useful in studio applications. The frequency response of the mic is flat on the on and off axis up to 12kHz, which makes it useful in distance recording applications. It is also useful for recording acoustical instruments, whether recording a small ensemble or a full symphony orchestra. The microphone is finished in black chromium, and a red LED indicates that phantom power is applied to the microphone. The mic is supplied in an AC01 aluminium case.

207-773-2424; fax 207-773-2422
www.independentaudio.com; info@independentaudio.com

Compact production mixer
Sound Devices
Booth N2045

302: Developed specifically for field production audio applications, this is a compact and cost-effective battery-powered audio mixer. Key features include: large, 40-segment sunlight-viewable output level meters, channel-selectable microphone powering (48/12V phantom and T-power), three microphone inputs with Lundahl



input transformers, input limiters and software-selectable output limiters and headphone monitoring, including PFLs and MS stereo matrix.

608-524-0625; fax 608-524-0655
www.sounddevices.com; info@sounddevices.com

Composite data/power cables
Belden
Booth C674

Brilliance Multi-Media Touch Panel Control cable: These composite data/power cables are appropriate for analog or digital system controllers and are recommended for all aspects of building management, including: PC, A/V and Internet integration; remote monitoring and control of building systems and security surveillance; equipment monitoring; A/V system preprogramming; and energy, environmental and climate control programming. The 1502R and 1502P two-pair composite cables are designed to be flexible. The data pairs offer noise immunity and are engineered and tested for 100Ω impedance. The signal and control pairs are rated at 300V and have a temperature rating of 750 degrees C. Each cable consists of a shielded data pair and an unshielded signal/control pair. The data pair in the riser-rated 1502R construction is comprised of two 22 AWG 7-strand tinned copper conductors insulated with foamed polyethylene (FPE).

800-BELDEN1; fax 765-983-5294
www.belden.com; info@belden.com

NTP time servers
ESE
Booth SU5623

E-104, E-289,E-299, E911: This line of network time protocol time servers (NTP) provides a method of putting time information onto a network. Each of the four NTP time servers provide accurate and synchronized time throughout a network. The concept is as simple as plugging the time server into the network, configuring the time server and allowing any client on the network to request time from the time server. This time server is equipped with an internal GPS receiver as its time reference, providing the user with a source of Stratum 1 accuracy. ES-289, ES-299 and ES-911/NTP receive their time reference from external sources of time code. They are time code translators, each receiving time code and outputting NTP. The ES-289 accepts SMPTE/EBU time code while the ES-299 references IRIG (A, B or E), NASA 36, XR3 or 2137 time code (AM or TTL). ES-911/NTP accepts ASCII time code in any of the following formats: NENA (Format 0, 1 or 2), ESE (Format A) or NMEA 0183.

310-322-2136; fax 310-322-8127
www.ese-web.com; ESE@ese-web.com

Composite STL receiver
Marti Electronics
Booth N2604

SR-20C: This composite STL receiver is the companion to the STL-20C transmitter, which has a 20W output in the 935MHz to 965MHz band. The added power will help on those difficult paths. This receiver will yield an average left and right separation better than 60dB across the band.

817-735-8134; fax 817-735-9340
www.martielectronics.com
sales@martielectronics.com

Editing workstation
SADiE
Booth N2746

Series 5: Completely redesigned, this line of editing workstations increases a station's processing muscle. The new platform includes full support for real-time DirectX plug-ins and standard Windows networking. The DSD8 is a full eight-channel PCM editor supporting all high-resolution formats. The two-channel DSD2 can be upgraded to a DSD8. The PCM4 replaces the existing Radia workstation as the company's entry-level product in the Series 5 range. The PCM8 replaces the existing 24-96 system and offers eight-channel in/out capability.

615-327-1140; fax 615-327-1699
www.sadie.com; sales@sadie.com

Digital audio codec
Musicam USA
Booth N3022

Netstar: This codec allows users to send and receive real-time audio, contact closures and ancillary data. The codec is self-contained in a 2RU chassis. Stereo analog and AES/EBU inputs and outputs are standard. Netstar can send and receive bi-directional audio via IP, ISDN and all types of dedicated data circuits. This product contains all of the popular coding algorithms, including G.711, G.722, MPEG 1 and 2 Layer II, and MPEG 1 and 2 Layer III for compatibility with older

codecs. In addition, it provides MPEG 2 AAC and MPEG 4 AAC low-delay encoding for high audio performance at lower bit-rates. Featuring four large, bright LED VU meters and a large menu display, this codec is a flexible headphone monitoring system that allows users monitor send audio, receive audio or a blend of the two. The blend function is well suited to voice talents, who often need to monitor both ends of a session.

732-739-5600
fax 732-739-1818
www.musicamusa.com
sales@musicamusa.com

Digital audio codec
AEV
Booth N2460

Millennium 2: This codec offers networking capabilities such as Internet, Intranet, LAN and WAN. It features 24-bit/96kHz digital audio, combined with coding algorithms from G.711, G.722, Layer 2, Layer 3 and networking via ISDN, X.21/V.35. For conventional broadcasting, the codec offers a high range of standards and J.52 compatibility. Other features include communications and Webcasting, networking, broadcast and Internet. Multichannel ADAT and eight channel I/O for multichannel audio in HDTV, HQ-productions, as well as automatic codec detection are also available.

+39 051 950 350; fax +39 051 950 201; www.aev.net; info@aev.net

Recording device
LakeSoft
Booth N2250

Eskimmer 4.2 Appliance System: Version 4.3 of the Eskimmer Appliance System allows high-quality recordings of on-air signals, performances or communications, and allows playback over its unique Webskimmer interface via a LAN, WAN or the Internet. Easy-to-use controls allow a user to listen to audio from down the hall or across continents. Encoding-on-the-fly allows audio that is still being recorded to be immediately accessible for playback and verification.

866-599-5253; fax 541-967-8721
www.lakesoft.com; info@lakesoft.com

Test unit data link
Neutrik
Booth C2560
Minilink USB: This link, which can be retrofit in the field, enables PC-based communications between NTI's Minilyzer (ML1) and Digilyzer (DL1), and allows easier documentation and data acquisition of all device functions. The Minilyzer and Digilyzer are part of the Minstruments family of test equipment, manufactured by NTI AG and sold by Neutrik USA. These products can be used to maintain audio equipment, de-bug audio installations and tune live sound systems, as well as analyze acoustical and industrial vibration.
732-901-9488; fax 732-901-9608
www.neutrikusa.com; info@neutrikusa.com

Upgrades and Updates

AEQ Eagle and Swing add new features

The dual-channel, ISDN audio codec now offers MPEG Layer III transmission for compatibility with most other codec brands. In addition, an ISDN backup feature has been added. When the Eagle is used with the V.35 or X.21 interface, the unit can be set to automatically dial a preset emergency number through the terminal adapter when it detects a loss of the clock on the data link. When a stable clock condition returns, the codec reverts back to the data-link mode and original settings.

The Swing has added an internal digital dynamic level processor (DLP), which provides constant audio levels without overloads. The dynamics processor settings are fully adjustable through a software interface.

Orban Ships Optimod PC

The first shipments of the long-awaited Optimod PC (a.k.a. the Optimod 1100) began in February. The product was an idea driven completely by customer demand and developed by Bob Orban, Greg Ogonowski and the engineering team at Orban.

Eimac Power Tube Reference Manual Online

The Eimac division of CPI has posted the *Care and Feeding of Power Grid Tubes* reference book on its website at www.eimac.com. Covering device fundamentals and theory, equipment design considerations and applications information, this is considered by many to be the essential reference in the tube industry. ■

New Products @NAB

www.beradio.com

Studio headphones
AKG
Booth N2241

K171 Studio and K271 Studio: These studio headphones feature Varimotion XXL transducers. Varimotion XXL technology delivers sonic definition, wide frequency response and lifelike dynamics. The K171 Studio offers a closed-back design with the comfort of supra-aural headphones. The closed-back design, combined with the new transducer, gives the headphone a different low-frequency character than the K141 Studio, yet maintains its comfort. The K171 Studio has a frequency range of 18Hz to 26kHz and weighs 7.1oz without cable. This headphone has a detachable 10ft/3m input cable with a screw-on, gold-plated mini-to-1/4" jack. The K271 Studio combines the benefits of a circumaural around-the-ear design for comfort with a closed-back design for isolation from ambient noise. Another feature of this headphone is a switch in the headband that mutes the audio as soon as the headphones are taken off. This headphone has a frequency range of 16Hz to 28kHz and weighs 8.5oz without cable.

615-620-3800; fax 615-620-3875
www.akgusa.com; info@akgusa.com

Phone editing system
Audion Laboratories
Booth N2604

Vox Pro PC: Providing quick digital editing of voice and phone recordings, commands may be executed on a PC keyboard or an optional control panel measuring 8" x 10".

Features include importation of file types such as MP3 and multiple file export in most formats. Voiceslip automatically separates host/caller talk-over. This product also offers one-button insert record, a jog wheel and button audio scrub. It undos and redos for the life of the recording. Vox Pro Network, an optional plug-in, allows users to access accounts and files from any networked Vox Pro workstation on their station's existing NT, Novell or peer-to-peer network.

206-842-5202; fax 206-842-6029; www.audionlabs.com

Multistream audio adapter
AudioScience
Booth N3003

ASI6244: This adapter is aimed at high-performance broadcast and streaming applications requiring multi-stream MP3 and MPEG Layer 2 record and playback with analog and AES/EBU digital interfaces. The sound card uses dual 150MHz Texas Instruments TMS320C6711 DSPs and provides four stereo outputs, two stereo inputs, four record streams, four play streams and a powerful multi-rate digital mixer.

302-324-5333; fax 302-738-9434
www.audioscience.com; sales@audioscience.com

Discs
HHB
Booth N2146

CD-R Discs: After a comprehensive overhaul, five of the company's seven discs are replaced by new higher-performing products. The Silver Type discs, the CDR74 and CDR80, the inkjet printable CDR80IP and CDR80BulkIP, and the thermal printable CDR80 Bulk Thermal use a Phthalocyanine dye formulation in conjunction with a high-precision stamper to deliver significant benefits in three key areas. First, the discs are specifically developed for use in the 1× to 24× writers used in audio CD recorders and duplicators. Using the correctly speed-rated media is essential to ensure consistently low block error rates and low jitter, optimising the integrity of the recorded data and extending its secure archival life. High reflectivity offered by the new discs ensures that the recorded material can be replayed on the widest possible range of CD players. Second, the discs deliver excellent burn yields in short run and bulk recording applications, resulting in significantly improved economy. And third, when recording to discs developed specifically for 1× to 24× applications, economy is improved by reducing the operating stress on the lower-power lasers used in audio CD recorders and duplicators.

310-319-1111; fax 310-319-1311
www.hhb.co.uk; sales@hhbusa.com

Analog audio cables
Gepco International
Booth C244

X-Band: This analog audio cable is available in single- and multi-pair versions. The cable is flexible and sonically transparent. It offers low noise and is a durable balanced cable useful in studios or live-sound venues. This cable will not retain kinks and bends when flexed. Notable features include reduced high-frequency absorption and a foam dielectric that allows for easy cutting and stripping with minimal wick-back when soldering. Its shield will not open through repeated flexing and is easy to trim. Quick ground termination with drain wire and the cables offer RF and EMI rejection.

800-966-0069; fax 847-795-8770
www.gepco.com; gepco@gepco.com

Booth information current as of March 21, 2003

Studio Projects condenser mics

By Doug Irwin

I used to think condenser mics did not sound good on the radio. I had only heard one station that used them and in my opinion they sounded too bright and strident.

But then I started a new job at a station that had the same condenser mics, but at this station, the mics sounded reasonable. Soon after I took over this station, I was directed to move it—I was forced to research the field of condenser mics. I have been a fan of them ever since.

Performance at a glance

- Condenser-type microphones
- Wide-diameter mylar element
- Active-balanced output (C1 and C3)
- Transformer-balanced output (T3)
- >125dB SPL capability
- S/N ratio of at least 76 dB
- Include shock mount and heavy-duty road case

Mic processing and EQ are commonplace at radio stations, but have you ever noticed that many of the agency spots sound better? Ever notice these mics are brighter, with more presence? They are, in short, more realistic. Ever wonder why that is?

Condenser mics. That's what it is.

Have you ever seen any of the old jazz albums from the 50s and 60s, with pictures of the musicians standing around the studio? If so, did you notice the condenser mics? If not, how about this: music videos shot inside recording studios. Did you notice all the vocal mics are of the condenser type?

If you want presence and realism, start with the right type of mic. The addition of EQ and AGC to cheap mics will never make them sound real. Judicious use of EQ and AGC with good condensers can produce a wonderful sound.

The one thing your listeners are familiar with is the sound of the human voice. They hear that more than anything else. If you want your station to stand out; if you want your station to sound as though the jocks are talking directly into your ear; indeed, if you want them to sound as though they are right there in the car, then start off with good mics.

While you can spend thousands of dollars on a single mic, in the last several years, at least a half dozen manufacturers have produced less expensive models of condensers mics, many of which sound close to their ultra-expensive cousins.

Studio Projects has a new line of condensers that I have tried on air and tested against several dynamic mics that are commonplace around radio stations. I tested the same Studio Projects mics vs. two other common condenser types as well. The results were pleasing.

The power of three

Here are the specs as published in the instruction booklets that come with each mic. This particular line includes three models: the C1 condenser, the C3 condenser and the T3 "dual triode."

The C1 is specified as single diaphragm, with a FET amplifier/impedance converter. The output is balanced and requires phantom power (48vdc). The C3 and the T3 are specified as dual diaphragm, one inch in diameter. The C3, like the C1, has a FET amplifier/impedance converter, requires phantom power and has a balanced output. The T3 is not specified as having a transformerless output, as do the C1 and the C3, so I infer that it has a transformer in the output stage. That is necessary anyway because of the vacuum tube amplifier. The T3 has its own outboard power supply, and with the supplied cable, you feed the T3 +200vdc and 6.3vdc for the filaments. (Keep in mind that to install one of the tube condensers, you will need to run this multipair cable along your mic boom. You won't be able to use garden-variety mic cable in this particular application.)

The T3 and the C3 have adjustable patterns. The C3 will

make a cardiod, a figure eight or an omni-directional pattern. In addition to those patterns, there are an additional six (essentially variations on the others) that are available via a rotary switch on the power supply unit of the T3.

Otherwise, all three have similar specs. Frequency response is listed as 20Hz to 20kHz. The C1 has S/N ratio of 77dB; the C3 and T3 are rated at 76dB. The maximum SPL (for 1 percent THD at 1kHz) for the C1 is 131dB SPL; for the C3, it's 132dB SPL; and for the T3 it's 125dB SPL.

Published specs only tell part of the story. I tested the sound of the three Studio Projects mics vs. several other common microphones (one dynamic and two other condensers). The test was set up with as many as five mics connected to a Mackie 1604 mixer, using the on-board pre-amps. I listened through headphones from the monitor output.

Like other large-diaphragm condensers, each of the Studio Projects mics has fine detail in their sound. The dynamic mic sounded lifeless compared to any of the Studio Projects mics. I cannot conceive ever using this particular type of dynamic mic for voice ever again. The Studio projects T3 tube condenser did well against other similar studio condenser mics. I also feel that it had a richer low end than some of the other mics in my comparison.

Upgrading your station's microphones to condensers will most likely give the sound of your station (whether FM or AM) a boost that is beyond your expectations. The Studio Projects C1, C3 and T3 are worthy of your consideration.

Irwin is director of engineering services, Clear Channel Radio, San Francisco. William Blum, manager of studio engineering, helped in the collection of data for this article.

Studio Projects

P 310-373-9129
F 310-373-4714
W www.studioprojectsusa.com
E contactus@studioprojectsusa.com

Editor's note: *Field Reports are an exclusive* Radio *magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio *magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* Radio *magazine.*

Condron Call Screener for Windows

By Dave Casey, MCSE

A year or so ago I was asked to investigate a cal -screening system for our four FM radio stations. At that time we spent many hundreds of dollars on what then was the top-of-the-line call-screening software. After many frustrations with installation, reliability and complex user interfaces, the idea of electronic call screening appeared to be more trouble than it was worth for our staff. What we really needed was a simple, user-friendly piece of software. It was at this time that we discovered Condron Broadcast Engineering's Call Screener for Windows.

The Call Screener software consists of two self-installing executables. One executable runs on the computer in the air studio for the show host, the other executable runs on the computer for the call screener. The two computers communicate with one another over TCP/IP. The air studio computer connects to a telephone hybrid via a serial port. With an existing infrastructure, setup can take as little as 10 minutes.

Performance at a glance

- TCP/IP-based call screening
- Simple-to-use interface
- Compatible with Telos and Gentner phones
- Windows 95 through Windows XP compatibility
- Suitable for remote broadcasts

As phone calls are received the software tracks the status of each phone line. After calls are screened, short descriptions can be typed into corresponding fields next to each phone line. These descriptions, as well as a timer will stay attached with the caller until the call is dropped. The person screening the calls and the host can communicate immediately with an instant messaging text box at the bottom of each screen. This screen flashes brightly in the middle of the screen to get the other person's attention. Other features include customizable fonts and text sizes to make caller information easy to read, next and busy buttons that mimic the controls on the hybrid's control surface, as well as a total calls received counter.

Breaking the ties

One of the most innovative features that the Call Screener software offers is the ability to use it from anywhere in the world via the Internet. When we send one of our shows into the field for a remote broadcast, we send the Call Screening software on a laptop with them. To connect back to the studio, the person in the field dials an ISP and opens the Call Screener software. The IP address of the air studio computer is set up in advance. Once connected, the users in the field will see all the current caller information, and they can actually answer calls and place them on the air. This is a huge advantage for our morning and afternoon drive shows that depend on airing a high volume of calls.

In a world of sitting on hold for hours for technical support, it was a nice surprise to find out that the author of Call Screener for Windows, Chuck Condron, handles all technical support himself. The times I've had questions, Condron has been more than gracious with his time and help. He is eager to hear suggestions. Some suggestions

have appeared as new features in software updates. One feature I currently hope to see emerge is the ability for more than one remote computer to connect to the host at a time.

I recommend this software to anyone looking for a simple and reliable call-screening utility that isn't over-burdened with extra clutter such as large historical databases of caller information. The software will run on anything from Win95 to WinXP with little tax on the computer's resources, making the old Pentiums sitting in the closet valuable once again. Call Screener for Windows has versions that will work with all the current versions of Telos and Comrex Hybrids.

Casey is assistant chief engineer, Infinity Broadcasting-Seattle.

Condron Broadcast Engineering

P 602-381-5733
W www.cbesoftware.cc

Editor's note: *Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

Do you have an experience to share for a Field Report?

Tell us about it at radio@primediabusiness.com

Radiation, rates, royalties and rectifiers

We have entered the era of digital radio broadcasting, and engineers will face many daunting but interesting challenges as HD Radio is rolled out, especially on the medium-wave side. There are several obvious issues, which include antenna bandwidth, nighttime operation and the somewhat less obvious issue of protecting the digital signals that are not systematically protected on the adjacent channels.

The timing is right to consider if there are other methods that would give broadcasters additional tools for their conversion to digital.

AM or medium-wave broadcasting has always been an extremely important and powerful broadcast medium. It is a universal technology available worldwide. Surely that point was a big factor for USA Digital Radio when, on Jan. 24, 2000, the company agreed to work with the Digital Radio Mondiale (DRM) consortium to develop a universal, world standard for digital radio. Because no production-line receivers for digital radio exist at this time, it is difficult to determine the true compatibility of these two systems. Both are part of the ITU digital broadcast specification BS 1514-1. HD Radio is referred to as "double sideband IBOC." Technically, the two systems utilize OFDM modulation techniques with some form of QUAM modulation. Until recently, both used AAC audio coding; Ibiquity now uses the PAC algorithm. Other than the requirement to license two audio coding algorithms, building a universal receiver for use anywhere in the world should not be an issue.

The point is that there is no good reason why American broadcasters should not have the ability to use either of the two digital methods described in the single ITU 1514-1 specification. This would not be a "marketplace decision" as it was with AM stereo, primarily because there has already been effort put into making the two systems part of one standard. DRM is has already been authorized by the FCC for use (at least experimental) on the short-wave bands.

DRM is the International standard for digital radio below 30MHz according IEC specification 62272-1. It is non-proprietary and license-free. DRM offers scalable bandwidth, varying degrees of ruggedness vs. quality and is optimized to deal with sky-wave transmission. DRM also permits multiple programs (up to four) as opposed to HD Radio, which offers a single channel. DRM can support synchronous transmission so that a network of low-power boosters could replace large transmitter sites. There are DRM synchronous systems now in operation.

Ignoring the additional features of DRM, why muddy the waters now? Some good reasons are that a DRM approach could easily solve the night operation issue and be more compatible to narrow-band antennas. DRM can operate in a bandwidth as small as 4.5kHz or be expanded to carry more data and programs to a full 20kHz wide channel. This possibility plus the ability to choose one of two different levels of QUAM and from one of three audio compression schemes make it possible to optimize the signal from a very FM-like stereo signal to one optimized for speech and possibly very poor propagation or for multiple programs. This is not a one-time choice, but something that could be changed according to day part. Similar to the HD Radio approach, DRM can fall back to analog, but unlike HD Radio it sends a flag that can use any AM or FM frequency as analog backup. An alternate frequency flag can send receivers to another digital channel as well.

Because of the scalability of the DRM technology it can fit into our crowded broadcast spectrum and remain relatively protected as well. The best way for a station to accomplish this would be to convert the analog operation from dual sideband (DSB) operation to vestigial sideband (VSB) operation. One sideband would carry a full-bandwidth 10kHz analog signal while the other sideband would carry a 2kHz analog signal, leaving 8kHz for the digital signal. This would fit entirely within the existing NRSC channel. More bandwidth would be possible if overlap into the second-adjacent channel was allowed, as is the case with HD Radio operation. In many cases, a wide-band day mode and narrow-band night mode could be used. Not only would this solve night operation issues but also it would be accomplished in almost one-quarter of the bandwidth that we are now contemplating.

If the FCC were to slightly broaden its initial ruling and permit digital broadcasting in accordance with ITU BS 1514-1, broadcasters would have another valuable tool for the transition to digital, at least on the medium-wave band. Those who feel they can best benefit from HD Radio can also continue to perfect that component of the specification. It is very important that as we move forward that the medium-wave band remains a universal medium worldwide.

Robert Meuser
New York, NY

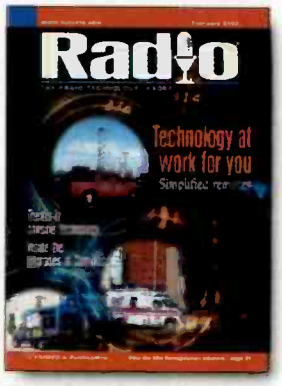
Send comments to:
beradio@primediabusiness.com

Forgotten knowledge

Dear John Battison:

I enjoyed your [*RF Engineering*, January 2003] article. It brought back memories of my early ham radio days. Back in 1947, I bought a two-meter transceiver kit from Allied Radio. This transceiver used a 6N4 tube as a super reg. receiver and used the same tube as a modulated oscillator/power amp on two meters. The audio section relied on a 7C5.

Because I lived on a farm in Northeastern Montana, and I was afraid of causing interference to another station—even though our closest neighbor was 2.5 miles away—I built a lecher wire system to measure my transmitter frequency. I later replaced the lecher with a Murdo Silver absorbtion frequency meter.



The lecher system is almost a forgotten art. Your article reminded me that there are many practices that at one time were common knowledge, but have faded from current memory. For example, I recently had an experience where I needed to install an inverse feedback ladder in our vintage 10kW AM broadcast transmitter. I had to dig through several resources until I found a reference that I could apply.

John, I would love to see an article written by you about setting up feedback ladders. I went through my library at home and found only two books that gave information on feedback ladders for inverse feedback systems. One was my college text book called *Principles Of Radio* by Henry and Richardson from 1947. The other book, also from 1947, is called *The Eleventh Radio Handbook*.

It seems to me that information on the feedback ladder's design is about as far gone as the use of KC for kilocycle and MC for megacycles. John, are we really that old?

Dale Heidner, W7NAV
chief engineer
KGVW and KCMM
Belgrade, MT

Royalty woes

I was reading an article about the waiver signed by Artemus Records and the RIAA. We launched an Internet radio station playing independent country music artists and only play those that we have waivers from. Radionashville.us is new and offering airplay for the artists who can't receive radio play anymore and unknown artist's who need a chance to be heard. It has been a lot of work and no profit.

We are getting waivers from every artist or label that we play on this site. It is the only way we can stay in business. As of now, we have a few waivers from larger labels and many from small independent labels. I hope that some day the major labels will be calling us instead of us calling them.

The only industry publication that's written by radio professionals – for radio professionals.

Radio™

THE RADIO TECHNOLOGY LEADER

Award-Winning ASBPE May 2002 Cover

The ASBPE award-winning editorial staff*, led by Chriss Scherer and featuring Harry Martin, John Battison and Kevin McNamara, reports monthly on critical updates that keep you current in an ever-evolving industry.

If you miss an issue of *Radio* magazine, you'll pass up valuable peer-to-peer advice regarding:

- New product previews;
- User reports;
- Facility showcases;
- Installation projects;
- FCC updates, and
- Application examples, so you get the most from industry tools.

Don't miss out! Subscribe to *Radio* magazine today.

To start your FREE subscription with the radio industry's community resource for radio technology, go to www.beradio.com and click on "Subscriptions."

Radio magazine – The Radio Technology Leader

* *Radio* magazine has received four ASBPE awards for outstanding editorial content from 1999-2001.

Reader Feedback

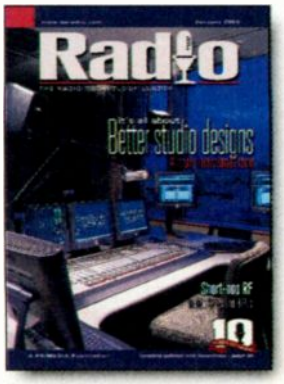
www.beradio.com

It only makes sense that record labels would want their artist's music to be played and have as much exposure as possible. Even though we are a new Internet radio station, we expect thousands of listeners a week. We also offer an online store to sell the product of the artists who can't get shelfspace anymore. I feel that this is the future of the music business. Also, we are going to make CDs available for download for a minimal fee.

If more labels would look at every site as being a potential store, then album sales would increase and the industry would not be having so many problems. Also, the major distribution companies will need to drop-ship individual CDs and set up a policy for doing this with Internet stores.

Anita Walls
Radio Nashville
radionashville.us

Sack SESAC?



Harry Martin's coverage of the latest SESAC rip-off [*FCC Update*, February 2003] was well written as usual, and it brings out yet another case of legalized plunder to the detriment of broadcasters.

SESAC, in my opinion, suffers from a major inferiority complex, derived from its unwanted repertoire of music that most stations would gladly never play if they could, but strangely, SESAC would never supply a list of its material to stations, so that stations could avoid the expense of the SESAC license.

Now, under "super-gouge" court rulings, SESAC becomes the latest case of bandits without pistols wherein broadcasters are left with no options other than taking the SESAC license. What's wrong with this picture?

To me it's wholly un-American and extremely questionable as to the merits of our illustrious legal system; the same system that brought you the O.J. Simpson debacle.

William S. Cook

Beware of digital media

It is unfortunate that television and radio stations have not yet banded together to demand their share of the proceeds of the billions of promotional value that broadcasters have given to Hollywood over the many years. I am glad to see and read someone speak out against the greed and avarice of the performers and producers.

When are broadcasters going to unite and take a stand? Or do we think that problems are just going to go away, or perhaps someone else is going to take care of them for us?

For instance, consider the horrible Internet royalties and burdensome reporting requirements that the composers, authors, publishers, performers and record companies have skillfully thrust upon every radio station desiring to better serve their listeners on the Internet.

In our case at WCPE, the Internet royalty rates are 255 times higher *per-capita* than those for our public radio

audience. I have been fighting for our Internet listeners for two years now, trying to seek fair and reasonable royalty terms. I've gotten to know a number of the players face-to-face, and I assure you, there are big problems hiding ahead.

Both commercial and non-commercial broadcasters are still dozing off at the wheel when it comes to the consequences of the Digital Millennium Copyright Act (DMCA) and the fees and provisions that the recording industry and their friends skillfully and quietly lobbied to create this law.

Broadcasters may think that they are clear for the most part, but I venture to say that if broadcasters don't fight this monster now at the "Internet" level, there will be real trouble.

After digital AM and FM broadcasting takes hold and the audience *expects* a digital signal from their favorite local station, one small modification to the DMCA (likely to be hidden and attached to some benign bill) will open Pandora's box. The record industry—angry for all these years about not being able to collect the performance royalties that they feel "cheated out of" from broadcasters—will have their day and their way.

Take a good look at the DMCA and the statutory license requirements and notice that only a few words prevent these harsh terms from being thrust upon terrestrial digital broadcasting.

The special interest groups that lobbied for the DMCA will have their efforts rewarded when radio stations have to pay an "ephemeral royalty fee" for the RAM copy of performances in the buffer of our digital STL receivers—not to mention our digital transmitters and *every single digital receiver tuned to them*.

After all, it is called the *Digital* Millennium Copyright Act, and we are talking about the future of *digital* broadcasting.

Back in the sixties, many broadcasters donated their little 3,000W FM stations to their local college; they didn't see a future in FM broadcasting. Let's not repeat that same mistake by ignoring the DMCA and the future of Internet broadcasting.

Deborah S. Proctor
general manager
WCPE-FM
Wake Forest, NC

Radio Gallery

Radio Classified

www.beradio.com

Certification

Professional Services

Publications

For Sale

Radio™
THE RADIO TECHNOLOGY LEADER
A PRIMEDIA Publication
www.beradio.com
radio@primediabusiness.com

Editor – Chriss Scherer, CSRE, *cscherer@primediabusiness.com*
Technical Editor, RF – John Battison, P.E., *batcom@bright.net*
Associate Editor – Kari Taylor, *ktaylor@primediabusiness.com*
Sr. Art Director – Michael J. Knust, *mknust@primediabusiness.com*
Assoc. Art Director – Robin Morsbach, *rmorsbach@primediabusiness.com*

Technical Consultants – Harry C. Martin, *Legal*; Kevin McNamara, CNE, *Computers and Networks*; Mark Krieger, CBT, *Contract Engineering*; Russ Berger, *Broadcast Acoustics*; Donald L. Markley, P.E., *Transmission Facilities*

Vice President – Peter May, *pmay@primediabusiness.com*
Publisher – Dennis Triola, *dtriola@primediabusiness.com*
Marketing Director – Christina Heil, *cheil@primediabusiness.com*
Vice President, Production – Thomas Fogarty, *tfogarty@primediabusiness.com*
Sr. Director of Production – Curt Pordes, *cpordes@primediabusiness.com*
Group Production Mgr. – Charlie Rosenthal, *crosenthal@primediabusiness.com*
Ad Production Coordinator – Natasha Franz, *nfranz@primediabusiness.com*
Classified Ad Coordinator – Mary Mitchell, *mmitchell@primediabusiness.com*
Audience Marketing Dir. – Leann Sandifar, *lsandifar@primediabusiness.com*
Audience Marketing Mgr. – Sonja Rader, *srader@primediabusiness.com*

MEMBER ORGANIZATIONS
Sustaining Member of:
· Acoustical Society of America
· Audio Engineering Society
· Society of Broadcast Engineers
Member, American Business Media — Member, BPA International

PRIMEDIA
Business Magazines & Media
COO – Jack Condon, *jcondon@primediabusiness.com*
Sr. VP, Business Development – Eric Jacobson, *ejacobson@primediabusiness.com*
Sr. VP, Sales Operations – John French, *jfrench@primediabusiness.com*
VP, Content Licensing & Development – Andrew Elston, *aelston@primediabusiness.com*

PRIMEDIA Business-to-Business Group – 745 Fifth Ave., NY, NY 10151
President–Charles McCurdy, *cmccurdy@primedia.com*
Chief Creative Officer – Craig Reiss, *creiss@primedia.com*
Design Director – Alan Alpanian, *aalpanian@primediabusiness.com*

PRIMEDIA Inc.
Chairman & Chief Executive Officer – Tom Rogers, *trogers@primedia.com*
Vice Chairman & General Counsel – Beverly Chell, *bchell@primedia.com*
President – Charles McCurdy, *cmcurdy@primedia.com*

Radio, Volume 9, Number 4, ISSN 1542-0620 is published monthly and mailed free to qualified recipients by PRIMEDIA Business Magazines & Media Inc, 9800 Metcalf, Overland Park, KS 66212-2216 (primediabusiness.com). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Additional resources, including subscription request forms and an editorial calendar are available online at beradio.com. To order single copies call 866-505-7173 or 402-505-7173.

SUBSCRIPTIONS: Free and controlled circulation to qualified subscribers. Non-qualified persons may subscribe at the following rates: USA and Canada, 1 year, $50.00, 2 years, $95.00, 3 year, $140.00. Outside the USA and Canada, 1 year, $65.00, 2 years, $125.00, 3 years, $185.00 surface mail (1 year, $105.00, 2 years, $205.00, 3 years, $305.00 airmail delivery). For subscriber services or to order single copies, write to *Radio*, 2104 Harvell Circle, Bellevue, NE 68005 USA; call 866-505-7173 or 402-505-7173; or visit beradio.com.

ARCHIVES & MICROFORM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis, and Proquest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at proquest.com.

REPRINTS: Contact Erlene Ramsey at Wright's Reprints to purchase quality custom reprints or e-prints of articles appearing in this publication at 877-652-5295 or 218-419-5725. Instant reprints and permissions may be purchased directly from our website; look for the iCopyright tag appended to eand of each article.

PHOTOCOPIES: Authorization to photocopy articles for internal corporate, personal, or instructional use may be obtained from the Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at copyright.com.

PRIVACY POLICY: Your privacy is a priority to us. For a detailed policy statement about privacy and information dissemination practices related to Primedia Business magazines and Media products, please visit our website at primediabusiness.com.

CORPORATE OFFICE: Primedia Business Magazines & Media, 9800 Metcalf, Overland Park, Kansas 66212; 913-341-1300; primediabusiness.com.

POSTMASTER: Send address changes to *Radio*, P.O. Box 2100, Skokie, IL 60076-7800 USA.

EDITORIAL, BUSINESS and CORPORATE OFFICE: 9800 Metcalf, Overland Park, KS, 66212; 913-341-1300; beradio.com, primediabusiness.com.

Advertiser Index

Advertiser	Page Number	Advertiser Hotline	Advertiser Website
Acoustics First	62	888-765-2900	www.acousticsfirst.com
AEQ	12	954-581-7999	www.aeqbroadcast.com
AM Ground Systems	71	877-766-2999	www.amgroundsystems.com
Antenna Systems	57, 66	847-584-1000	www.antennasystems.com
Aphex Systems	45	818-767-2929	www.aphex.com
Armstrong Transmitters	59	315-673-1269	www.armstrongtx.com
Arrakis Systems	18, 30, 50	970-224-2248	www.arrakis-systems.com
ATA Audio Corporation	19, 66	973-659-0555	www.ataaudio.com
ATI Audio Technologies	69	800-959-0307	www.atiguys.com
Audio Precision	20, 66	800-231-7350	www.audioprecision.com
Audio TX	7	+44-121-256-0200	www.profanitydelay.com
Autogram	65	800-327-6901	www.autogramcorp.com
Balsys Technology Group	57	407-656-3719	www.balsys.com
Bay Country	67	410-335-3136	www.baycountry.com
Broadcast Electronics	53	817-735-8134	www.bdcast.com
Broadcast Software International	34	888-BSIUSA1	www.bsiusa.com
Broadcast Tools	22	360-854-9559	www.broadcasttools.com
Burk Technology	52	800-255-8090	www.burk.com
Circuitwerkes	61	352-335-6555	www.circuitwerkes.com
Coaxial Dynamics	54	216-267-2233	www.coaxial.com
Comrex	9	978-784-1717	www.comrex.com
Conex Electro-Systems	38	800-645-1061	www.conex-electro.com
Continental Electronics	47	800-733-5011	www.contelec.com
Cortana	70	888-325-5336	www.cortanacorporation.com
Creative Studio Solutions	54	303-426-5004	www.creativestudiosolutions.com
Danagger Audio Works	66	888-892-8346	www.danagger.com
Dataworld	64, 67	301-652-8822	www.dataworld.com
Dielectric	5	866-DIELECTRIC	www.dielectric.com
Electronics Manufacturing	52	800-649-6370	www.rectifiers.com
Enco Systems	36	800-ENCO-SYS	www.enco.com
ERI-Electronics Research	68	812-925-6000	www.ERIinc.com
ESE	59	310-322-2136	www.ese-web.com
Gorman-Redlich Mfg. Co.	69	740-593-3150	www.gorman-redlich.com
Harris Corp. Broadcast Div.	1, 3	800-622-0022	www.broadcast.harris.com
Henry Engineering	64	626-355-3656	www.henryeng.com
Joseph Electronics	38, 67	800-323-5925	www.josephelectronics.com
Lightner Electronics	71	866-239-3888	www.LightnerElectronics.com
Logitek	25	800-231-5870	www.logitekaudio.com
Mager Systems	26, 48	623-780-0045	www.magersystems.com
Mediatouch	41	888-665-0501	www.omt.net
Mooretronix	70	800-300-0733	www.mooretronix.com
Moseley Associates	13	805-968-9621	www.moseleysb.com
Mouser Electronics	68	800-346-6873	www.mouser.com
Musicam USA	23	732-739-5600	www.musicamusa.com
Neumann Microphones	37	860-434-5220	www.neumannusa.com/103BER
Nexus Broadcast	71	800-219-7461	www.nexusbroadcast.com
Nott Ltd.	69	505-327-5646	www.nottltd.com
NPR Satellite Services	11	202-513-2626	www.nprss.org/be
OMB America	35	305-477-0973	www.omb.com
Orban	55	510-351-3500	www.orban.com
Otari Corporation	21	800-877-0577	www.otari.com
Patriot Antenna Systems	46, 66	800-470-3510	www.sepatriot.com
Propagation Systems	68	814-472-5540	www.psibroadcast.com
Prophet Systems	17	877-774-1010	www.prophetsys.com
Radio Computing Systems	27	914-428-4600	www.rcsworks.com
Radio Soft	51	888-RADIO95	www.radiosoft.com
Radio Systems	43	856-467-8000	www.radiosystems.com
RAM Broadcast Systems	24	847-487-7575	www.ramsyscom.com
RF Parts	69	800-737-2787	www.rfparts.com
rf Software, Inc.	61	352-336-7223	www.rfsoftware.com
Samco Antennas, Inc.	71	817-336-4351	www.samcoantennas.com
SCMS, Inc	49, 55	800-438-6040	www.scmsinc.com
Scott Studios	29	888-GET-SCOTT	www.scottstudios.com
Shively Labs	31, 67	888-SHIVELY	www.shively.com
Sine Systems	62	615-228-3500	www.sinesystems.com
Smarts Broadcast	15	800-747-6278	www.smartsbroadcast.com
TieLine Technology	28	888-211-6989	www.tieline.com
TM Century	66	972-406-6800	www.TMCentury.com
Transcom Corp.	70	800-441-8454	www.fmamtv.com
V-Soft Communications	67	800-743-3684	www.v-soft.com
Wheatstone	2, 75, 76	252-638-7000	www.wheatstone.com
Wireworks	65	800-642-9473	www.wireworks.com

www.beradio.com

Sales Offices

NATIONAL SALES DIRECTOR
Steven Bell
9800 Metcalf Avenue
Overland Park, KS 66212-2215
Telephone: (913) 967-1848
Fax: (913) 967-7249
E-mail: sbell@primediabusiness.com

EUROPE/UK
Richard Woolley
P.O. Box 250
Banbury, Oxon OX16 5YJ
Telephone: +44 1295 278 407
Fax: +44 1295 278 408
E-mail: richardwoolley@compuserve.com

CLASSIFIED ADVERTISING
Jennifer Shafer
Telephone: (800) 896-9939
(913) 967-1732
Fax: (913) 967-1735
E-mail: jshafer@primediabusiness.com

LIST RENTAL SERVICES
Marie Briganti, Statlistics
Telephone: (203) 778-8700 x146
Fax: (203) 778-4839
E-mail: primedia@statlistics.com

EDITORIAL REPRINTS
Wright's Reprints
Telephone: (877) 652-5295, ext. 106
E-mail: eramsey@wrightsreprints.com

Contributor Pro-file

Meet the professionals who write for *Radio*.
This month: Field Report, page 40.

Kent Kramer
VP of Engineering
Big City Radio
Los Angeles, CA

Kramer oversees the engineering and information systems departments for the entire company's stations in New York, Los Angeles and Chicago. He is also responsible for planning, approving and implementing upgrades to technical facilities, preparing and maintaining technical operating budgets (including capital expenditures) on a local and corporate level, managing facilities and overall FCC compliance. Kramer has managed several antenna and transmitter site upgrades, studio projects from small wiring changes up to major facility rebuilds and has been in broadcasting for more than 12 years.

Shaping radio today and tomorrow

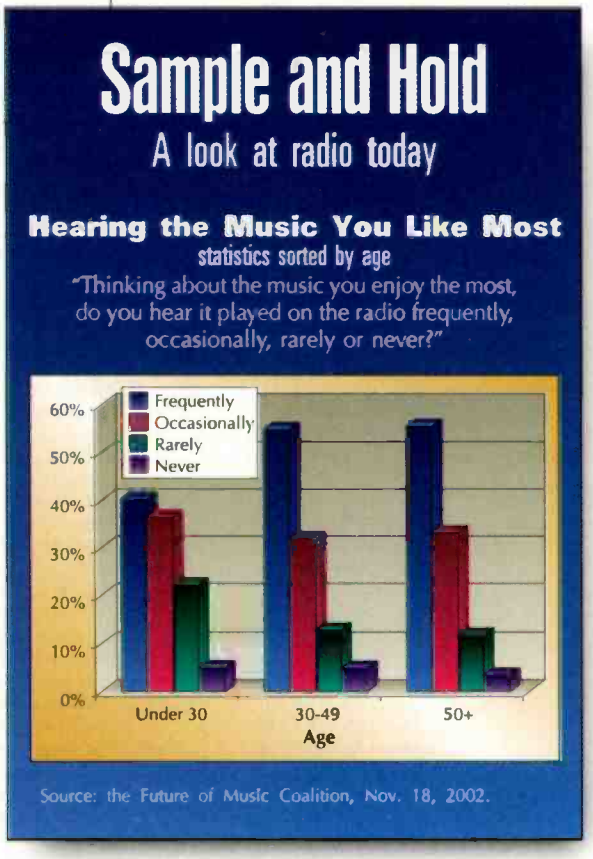
By Kari Taylor, associate editor

Do you remember?

At NAB1994 consolidation, digital broadcasting, RBDS and competing technologies were the hot topics on the show floor. With more than 800 exhibitors occupying about a half-million square feet of space plus SBE and IEEE sessions, there was plenty to see and do.

Highlights of the SBE technical sessions included an overview of commercial delivery over ISDN and ISO/MPEG Layer II coding. On Tuesday, the afternoon technical sessions focused on testing new technologies for emergency alerting systems. Sessions called "This is no Longer a Test," "Cable TV and the New EBS" and "User-friendly EBS" kept attendees informed on this subject. On Wednesday, the popular topic for sessions was DAB. Sessions included an update on the NASA/VOA DAB tests, "DAB on Trial: Eureka 147-The System with a Future," an AT&T DAB update and a USA Digital Radio FM DAB system update.

Another notable event of NAB1994 was the Engineering Achievement awards luncheon where Charles T. Morgan, senior VP of engineering, Susquehanna Radio, York, PA, received the radio engineering award and Thomas Vaughan, president, PESA Micro Communications, Manchester, NH, received the television engineering award.



That was then

In 1994, Pacific Recorders and Engineering offered the ADX, a digital production system, which was a fully integrated system that combined the flexibility of digital recording and editing with the speed of a fully automated production mixer. Instead of storing audio elements, the ADX would recall and recreate the mixing and processing talent of the producer. It had the ability to precisely replay complex multitrack production work from as long ago as a month. According to ADX advertisements, compared to other first-generation workstations, the ADX was unencumbered by architectural limitations. It was designed to grow and expand with the station's needs. Even the basic system had more standard features than any previous workstations.

Wheatstone Corporation

D-8000

Digital Radio Console

ADVANCED TECHNOLOGY! WHEATSTONE'S fourth generation digital console has what you need: dual-domain input modules that accept both analog and digital sources; built-in router integration with 8-character displays; a choice of features like auxiliary sends, equalization, dynamics control and event memory/recall—all without the aid of an external computer. *The D-8000 is an all-modular design with no active components mounted inside.* And best of all, it uses Wheatstone's exclusive VDIP® setup software, letting you easily configure individual console modules, logic modes and automatic functions. ***Contact Wheatstone—the digital audio people!***

sales@wheatstone.com
tel 252-638-7000

www.wheatstone.com

THINK *INSIDE* THE BOX

ONE INTERCONNECT DOES IT ALL!

THAT'S RIGHT— ONE DUPLEX FIBEROPTIC LINK OR A SINGLE CAT-5 WIRE = 64 channels of simultaneous bi-directional digital audio, intercage communication, logic signals, X-Y controller commands, plus auxiliary RS-232 data streams. *This single interconnect between your studio and central rackroom can save you thousands—if not TENS of thousands—of feet of wire in a typical installation!*

THE WHEATSTONE BRIDGE DIGITAL AUDIO NETWORK ROUTER can start small with a single cage and only a few cards, or fully populated units can be stacked to form larger systems. Wheatstone's STAR TOPOLOGY ARCHITECTURE lets you connect multiple locations to your central rack room, providing shared resources for all yet still permitting independently functioning studios, each with its own combination of plug-in modules specifically suited for a select set of gear.

SIGNALS ARE ROUTED entirely in the digital domain. All AES cards have sample rate converters on each input, freeing you from worry about varying sample rates throughout your facility. A family of plug-in connector modules makes installation easy, letting you mix varied signal technologies and standards all within the same cage. WHEATSTONE'S intuitive graphic based setup software handles system configuration, matrix selection and salvo pre-sets. All systems interface directly with Wheatstone consoles for seamless source selection and display.

THE BRIDGE
DIGITAL AUDIO
NETWORK ROUTER

Wheatstone

tel 252-638-7000/sales@wheatstone.com/www.wheatstone.com