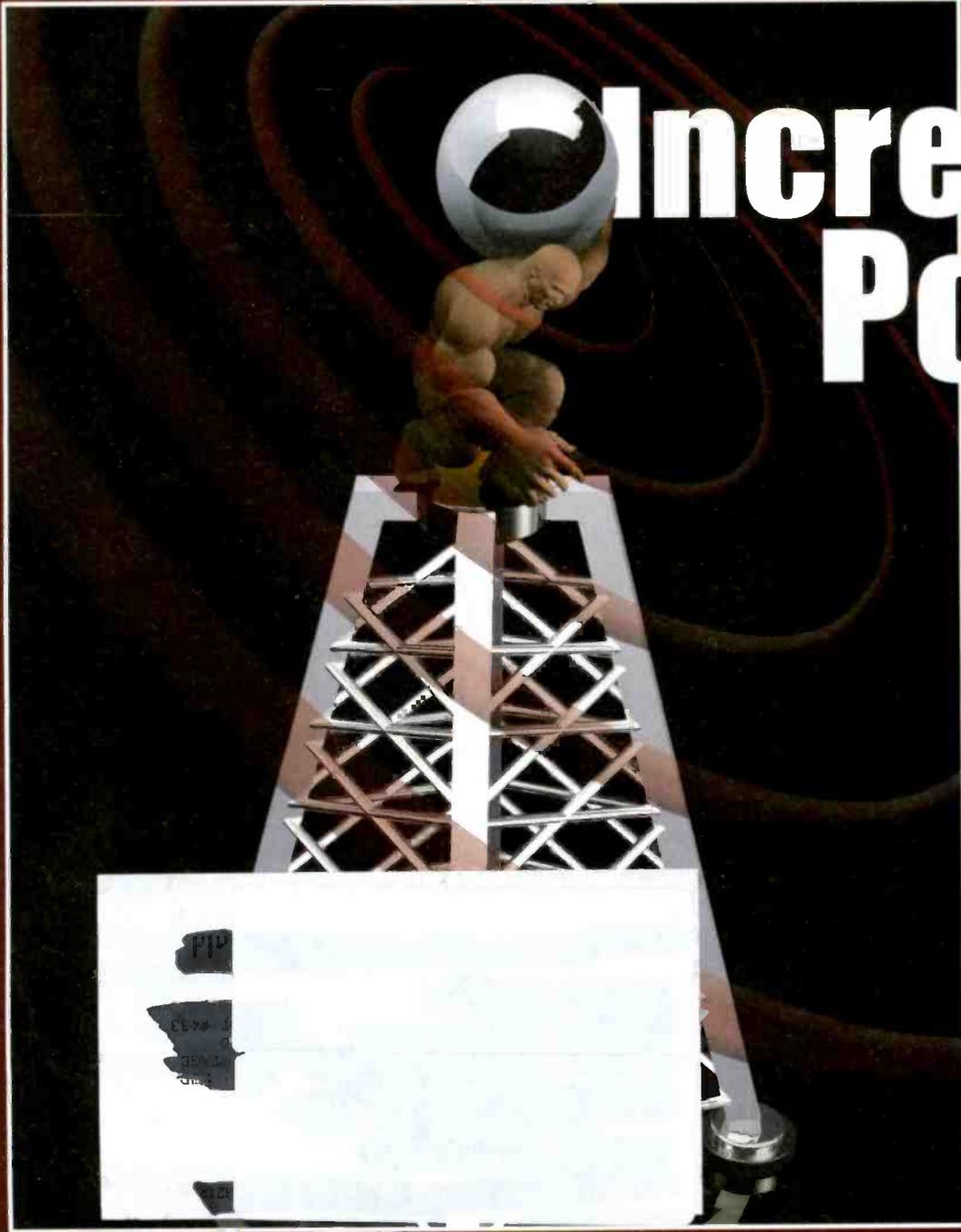


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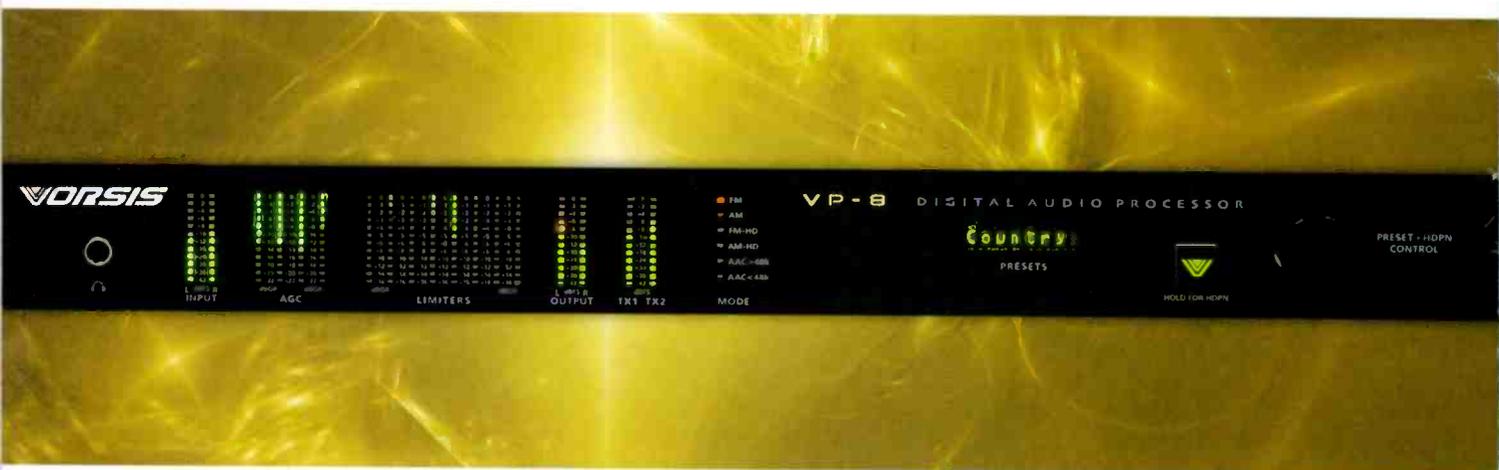


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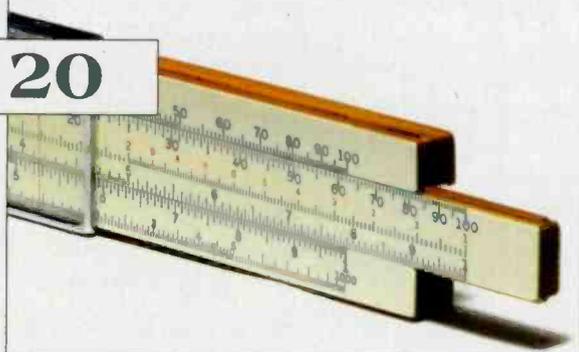
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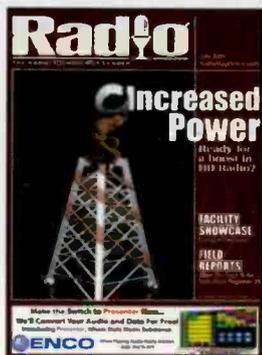


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ON THE COVER

The impression from the 2009 NAB Show is this: Some amount of increase in digital power is inevitable. Are you ready? Start reading on page 14. Cover design by Michael J. Knust.



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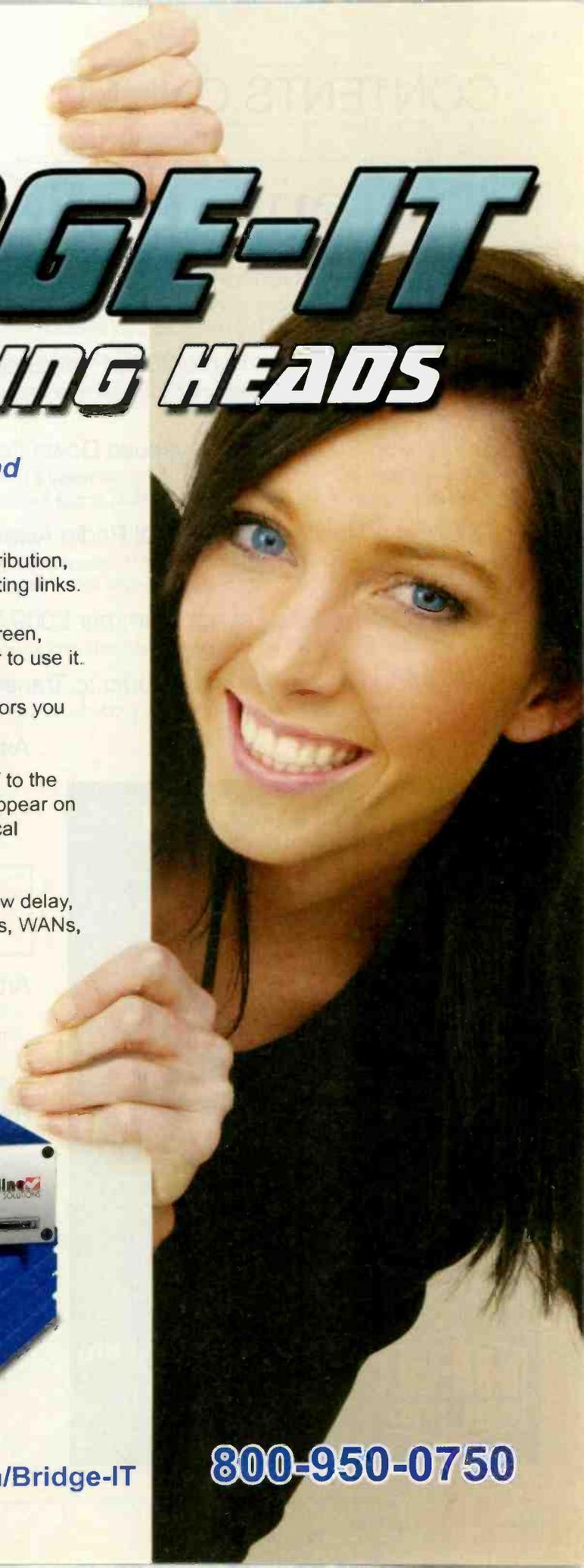


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Currents Online

Selected headlines from the past month.

Senate Confirms Genachowski and McDowell for FCC

Genachowski replaces Kevin Martin, who stepped down earlier this year. Genachowski has worked for the FCC in the past, but has not served as a commissioner.

National Radio Hall of Fame 2009 Posthumous Inductees

Jose Miguel Agrelot, Harry Kalas and Studs Terkel have been selected for posthumous induction into the National Radio Hall of Fame.

BIA Survey: 2009 Radio Revenues Down from 2008

New estimates project 2009 revenues of approximately \$14 billion, a 15 percent decrease over last year, based on revenue reports from stations across the country.

Ed Christian to Receive National Radio Award

At Saga Communications, Christian oversees 91 radio stations, five full-power and four network low-power TV stations, the Illinois, Michigan and Minnesota Radio Networks and the Michigan and Minnesota Farm Radio Networks.

Prism Sound, Sadie Launch Summer 2009 Seminars

The seminars will fall into two categories – broadcast and music recording – with a date at each venue devoted to each topic.

Nautel Adds Axia Livewire IP-audio to Transmitters

Nautel joins the list of Axia partners offering products that work with Axia IP-audio networks.



Arbitron Adds TV Measurement in PPM

Arbitron has released ARB-TV, a suite of audience measurement services to measure away-from-home television viewing. The services uses the Arbitron Portable People Meter (PPM) to gather data.

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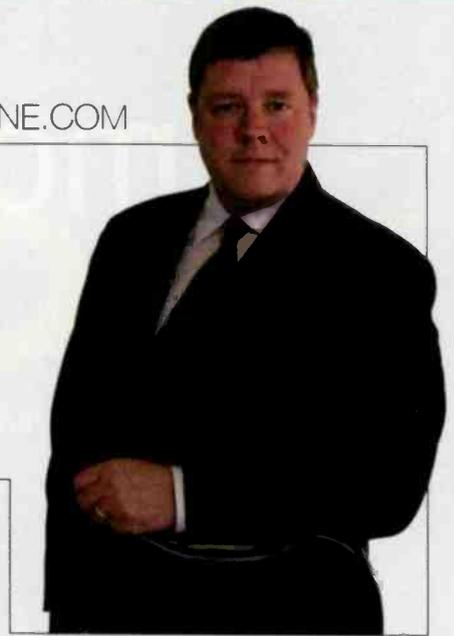


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The going is tough

We all know that the economy is in a rough state. It affects everyone in different ways, but there is one aspect no one can escape. It's not climbing prices or shrinking paychecks. It's not that serious, but it's certainly just as annoying. All the clichés come out in full force during difficult times.

You have no doubt heard all the statements that don't really do anything to help the situation. While reaching for the low-hanging fruit to get through the tough times, and prioritizing based on the return on investment are all good, we don't need to dwell on what we could do. Focus instead on what we are doing.

The economy in general has its problems, but the specifics for radio are easy to see: On-air ad sales are down so expenses are scrutinized if not eliminated altogether. Some companies are cutting back on salaries or working on reduced-hour work weeks with corresponding reductions in pay. Despite this reality, the pressure is on to keep the facilities at top form.

You're probably trying to do more with less (oops, another cliché). You're asked to make an ageing piece of equipment last just a little longer. You have to delay the studio project another few months. In short, you just have to get through the tough time until things get better.

There are some unfortunate consequences to the current belt tightening. One consequence often ignored is that once things are rosy again, the tight restrictions are kept in place. We made it work without spending money then, we can just keep going that way, right? You can only work in starvation mode for so long. From an engineering standpoint, it's important to recognize the overall situation and work within the available means, but it's also important to inform the manager or owner about the realistic details. You can make it work a little longer, but the day will come when it has to be replaced.

Of course it's easier and cheaper to replace something when you want to and not when you have to. If the project is put on hold, develop a new plan and timeline to restart it.

But difficult times have a more personal effect. With the added pressure, it's very easy to develop and project a bad attitude. While some

commiserating is therapeutic, too much of it does nothing to improve the situation. It often just makes it worse. Not only do you feel unmotivated, others may see you as no longer being a part of the team, or worse part of the problem by not trying to find a solution.

I mentioned reductions in work hours and pay earlier. The common answer is, "At least you still have a job." While that doesn't help the situation, it is true. (I know many people have lost their jobs, which is unfortunate, and I'm not making light of this point.) Another cliché that fits here is work smarter, not harder. Prioritize tasks, and get the maximum effect for the effort. Unfortunately, some of the pet projects – the fun part of the job – may have to wait.

This is a perfect time to develop new ideas. Sit in on a sales meeting. Have lunch with the sales manager or general manager. Bounce ideas off each other. There could be an engineering solution to a sales or revenue problem, and everyone will benefit from the effort. This could be a good time to launch a multicast channel or online stream. The equipment may already be in place.

As we look ahead for relief, we see the predictions: on-air ad sales look flat, but online has promise. The overall economic view predicts a better future. So pull out your favorite clichés just to have a chuckle, then roll up your sleeves and get back to making the radio magic.

Chris Scherer

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⟨ACCESS⟩

Thoughts about NEC 4-1

By John Battison,
P.E., technical editor, RF

As the use of AM directional antennas began to become more widespread, a growing need was perceived for a more precise and less laborious method of designing these complex antenna systems. Up until that time most directional antennas were designed with the aid of a slide rule and or a mechanical calculator (the forerunner of the computer). The computer was in its infancy and a number of consulting engineers had constructed their own programs that took the place of the slide rule and its accessories when designing an AM directional antenna. As might be expected sometimes there were slight differences in the mathematical designs and algorithms. As a result, directional antenna designs produced by different algorithms using the same basic input might have very slight differences.

This was brought to my attention rather abruptly one day when an FCC engineer telephoned and said there was a slight difference between his figures and mine on a particular radial on a pending application. My results had been produced (illicitly) on a very large super computer. The difference was small, less than a quarter of a millivolt, but my figures didn't match the Commission's in this one instance. Fortunately, we settled the matter to our mutual

wave and skywave radiation patterns for a given set of operating conditions that I know of was provided by Dataworld. And it was very useful, but the problem remained that any change in the shape of the ground wave pattern nearly always changed the skywave values and required further ground wave computation ad nauseam. Several engineers developed their own programs and offered them for sale to other engineers. Many of these programs were very successful.

An improved method

As time passed and DA design work received increasing attention, it became obvious that more information was needed about how the antenna worked in its environment once constructed. This led to antenna modeling and the use of method of moments calculations for directional antenna design. The mathematical wizards and the Lawrence Livermore laboratory began to develop programs using the NEC classification. NEC-2, developed by Jerry Burke, J. Poggio and J.L. Smith, offered a means of individually analyzing, in effect, the modeling of the antenna's actual operation and developed a starting set of values so that the array could be set-up and then manually brought into the desired operating conditions.

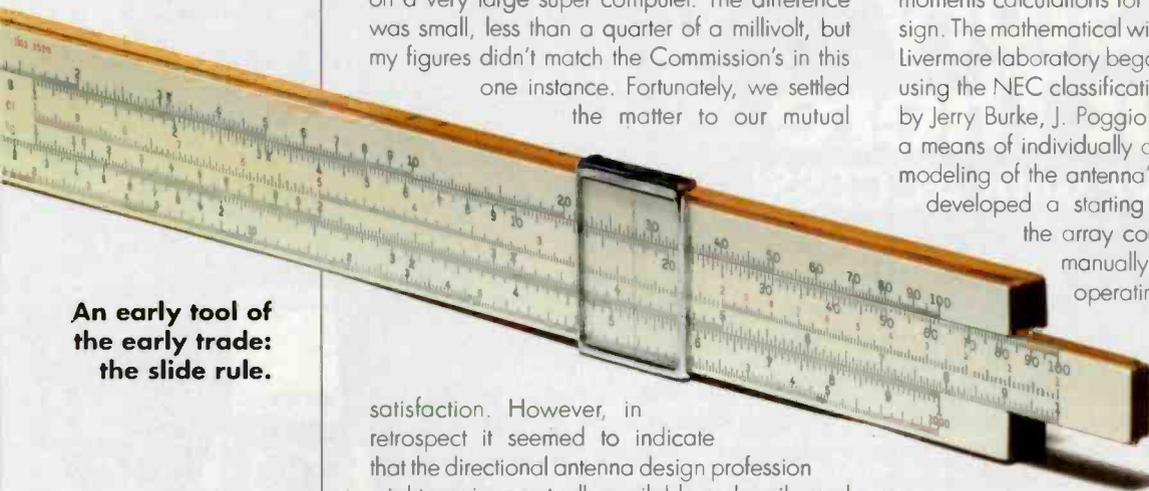
The root of the problem was perceived to be based on the fact that the original directional antenna parameters were developed on the basis

of mathematical calculations, which did not always precisely agree with the results obtained by modeling the proposed antenna system. Actual physical modeling was not always possible, nor results perfect, using scaled operating frequencies and model construction. It required a mathematically based modeling program, which took into account the physical differences and influences of the actual operating components in the system. Basic directional antenna design had been

An early tool of
the early trade:
the slide rule.

satisfaction. However, in retrospect it seemed to indicate that the directional antenna design profession might require a mutually available and easily used mathematical program.

At the time, computers were just becoming available to the common man, and if I remember correctly it was the old Radio Shack TRS-80 computer platforms that became the first computer exposure for many engineers. As computer production price and quality improved many engineers developed their own antenna programs in the old simple computer language. One of the earliest commercially available computer-generated ground



based on antennas with a single drive source. Broadcast DAs in effect use multiple sources to drive the various radiators of a multitower system because each antenna element either acts as a power source or in the case of a negative tower, a power subtraction.

In order to model complex structures it was necessary to combine two electric field integral equations (EFIE) for small wires and the magnetic field integral equation (MFIE) for plane surfaces. The EFIE works well for very thin wires with decreasing size. To ensure accuracy, segment wire lengths should be kept to less than 1/10 of a wavelength.

NEC was under development for more than 10 years and earlier versions were known as BRACT and AMP. It is basically a hybrid compilation that models objects in wire form using electric field integral equations, and a magnetic field integral equation when modeling closed surfaces that have time harmonic excitation. It is probably one of the most valuable tools available to antenna designers and a NEC-4 is written using Fortran 77. A user either purchases or licenses, the NEC-4 program and Lawrence Livermore includes a source code set up for the Intel visual Fortran compiler. In addition a slightly stripped down version is also included that should compile with most UNIX Fortran compilers.

(When using the UNIX version, it is necessary to type the file names rather than selecting them from a dialog box.)

Another Lawrence Livermore computer wizard named Kok Chen has developed an additional version that compiles with the free Fortran compiler on the Macintosh computer so that most users appear to be well covered. Chen can also supply a GUI named Cocool NEC that works with NEC-2. It's planned to develop a version for use with NEC 4-1.

Plotting programs are available (source and window executables) that will read the input or output files and plot the model, radiation, patterns and input impedance versus frequency with Windows executables that have been compiled for use with Windows. The code originally was designed for use with fixed sized arrays and executables have been compiled for a number of sizes up to and 11,000 x 10,000 matrix. Recently they have been including a version that allocates the matrix to a size controlled by an input command. One of the nice features of working with Lawrence Livermore seems to be the fact that Jerry Burke is available to provide invaluable information. 

E-mail Battison at batcom@ohio.net.

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FCC changing ownership reporting requirements

By Harry Martin

A new FCC ownership reporting system goes into effect Nov. 1, 2009. The current plan is for all commercial licensees – along with a variety of broadcast owners and investors previously exempt from any such filing – to file new reports on that date. The filing of biennial ownership reports for commercial stations on June 1, Aug. 1 and Oct. 1 has been suspended. Noncommercial educational licensees must still file the usual biennial reports on those dates.

The shift in reporting requirements, and a change to new reporting forms, arises from concern about the relatively low percentages of minority individuals and females among the ranks of broadcast owners.

The following changes have been made:

- All commercial licensees must file, even previously exempt stations owned by one person or a partnership of natural persons.

Dateline

For *noncommercial* stations, in the following locations only, the biennial ownership report deadline is Aug. 1: California, North Carolina and South Carolina.

Aug. 1 is the deadline for radio stations in California with more than 10 full-time employees to electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

Aug. 1 is the deadline for radio stations licensed in the following states to place their annual EEO Reports in their public files: California, Illinois, North Carolina, South Carolina and Wisconsin.

Nov. 1 is the deadline for submission of biennial ownership reports for *commercial* radio stations in all states and territories.

- Equity owners whose reporting exemption was based on the single majority owner rule must now report their interests.

- Equity owners whose interests would be attributable but for the higher EDP threshold for investors in minority-controlled companies (generally 50 percent vs. 33 percent) will not be exempt from reporting.

- Investors and affected lenders must not only report the names of the licensees and the stations owned by those licensees as at present, they must also provide the FCC-issued Federal Registration Number (FRN) for each and every licensee in which they have a reportable interest.

- The FCC will begin random audits to verify what is reported.

- Information will no longer be accepted in uploaded attachments to the ownership report form. Everything must be submitted on the ownership reporting form itself.

Implementation of this new regulatory scheme is dependent on speedy adoption of a new Form 323 and its approval by the Office of Management and Budget. It is likely that the Nov. 1 start date will have to be postponed if the form is not ready in time.

The Commission also has separately proposed revisions to the ownership report form (Form 323-E) for noncommercial educational (NCE) radio and TV stations to include information about the ethnic, racial and gender makeup of their governing bodies. In the meantime, as noted above, NCE licensees must continue to file their ownership reports biennially on the anniversaries of their renewal filing dates. The Commission is considering imposing ownership reporting obligations on LPFM licensees for the first time since that service was created.

Martin is a member of Fletcher, Heald & Hildreth, P.L.C., Arlington, Virginia. E-mail: martin@fhhlaw.com

- LPTV stations and Class A television stations are no longer exempt from reporting.

- All affected entities will file on the same date, every two years, beginning Nov. 1, 2009.

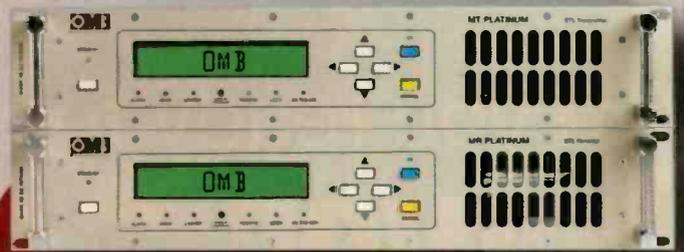
- The data reported must be accurate as of Oct. 1 of the same year in which the report is filed.



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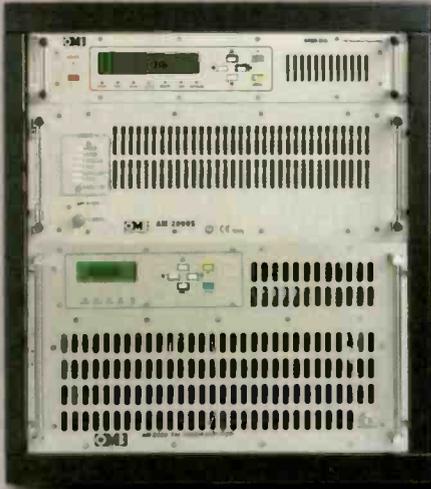
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Are you ready for a Power Increase?

By Doug Irwin, CPBE AMD

The digital sideband power for HD Radio may get a boost. Are you prepared for it?

In April of this year, the Corporation for Public Broadcasting engaged NPR Labs to undertake a further study of the potential interference effects of higher-power HD Radio transmissions on the analog FM radio service. The results of this study are expected by the end of this summer, prior to the NAB Radio Show that will be held in Philadelphia this year. Although I did not attend the 2009 NAB Show myself, several of my colleagues who did all formed the impression that some amount of increase in digital power is inevitable.

I'll look at the practical means by which a station can increase its digital power level. If your station is waiting until the dust settles prior to committing to the purchase and installation of an HD Radio transmission system, hopefully you can gain some insight in to what will be necessary when you do make the decision to go forward. Let's first review the common means used up until this point to get HD Radio transmissions on the air.

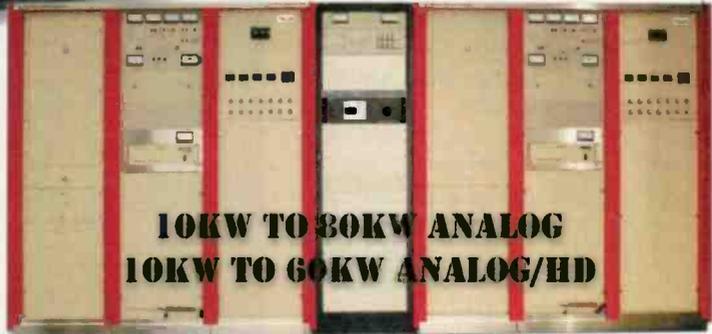
Probably the most common method of creating the hybrid HD Radio signal is by way of a high-power, -10dB, four-port injector installed between the output of the analog transmitter and the main antenna. The analog transmitter's power output needed to be increased by 10 percent to make up for losses through the injector; the HD Radio transmitter had an output that was 10 times the TPO needed to get the correct HD ERP, because the coupling of the high-power injector is -10dB (in other words, only 1/10 of the power inserted on that port of the injector, or -10dB, actually makes its way out of the injector and in to the main transmission line). The other 90 percent of the digital transmitter power was terminated in a waste load and dissipated as heat.



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Power Increase

This method proved relatively easy, as long as the analog transmitter was sized adequately, and the facility could provide the extra ac power and air conditioning capacity. Because the analog and digital made use of the same antenna, the -20dB ratio between the analog signal and the digital signal was consistent for coverage throughout the listening area.

Another way to use the same antenna for digital and analog was to procure a transmitter that was a common amplifier – one that had the analog and digital signals common in its output. This of course required buying a new transmitter, and was somewhat limited in the amount of power it could supply – at least early on. The transmitter technology for HD Radio has moved along well in the last four years.

If a facility had a licensed auxiliary antenna that had a HAAT of at least 70 percent (and no more than 100 percent) of the main antenna, while being within three arc-seconds in both longitude and latitude, a station could use it to transmit the HD Radio signal. This ended up being a convenient method for some stations. I have used this method, and early on we were concerned that the -20dB ratio of digital to analog would not be consistent in the field due to the use of different antennas. In practice it did not turn out to be an issue though.

Finally, if the station had a high-power analog transmitter that lacked 10 percent headroom in its output capability, but you were determined to use the same antenna to transmit both signals, then Split-level combining was sometimes a way to go. A combined amplifier analog and digital transmitter was combined with an analog transmitter to develop the correct amount of digital RF and analog RF for a common antenna feed.

Behind the power

Now that we've reviewed the common methodologies of HD Radio transmission used over the last five (or so) years, let's examine the implications of increasing the power. We'll assume the increase is 10dB, since this is the highest increase proposed. In fact it may be something lower (thus making the job of increasing the digital power somewhat easier).



ERI Lynx Series II



Dielectric HDR series

If the station uses high-power combining (with a -10dB injector) it is clear that you will not be able to increase the digital power by simply developing more power for the digital input port on the injector. Neglecting the injector specs momentarily, you would need a much larger transmitter (electrically and physically), a much larger waste load, more ac power capability and much more air conditioning.

On the other hand, if you could eliminate the need for the -10dB injector, then the current HD Radio transmitter is probably sized correctly for the amount of TPO needed, assuming you could get its RF into an antenna with the right amount of power gain. One potential solution then may be to replace the main antenna. The popular antenna manufacturers, including Shively, ERI, Dielectric and Jampro all make antennas with dual inputs (one for the analog carrier, and another for the IBOC carriers), providing the end-user with a convenient means by which the right amount of IBOC ERP can be achieved.

One performance parameter critical to the success of antennas such as these has been the isolation from the analog antenna input port to the digital antenna input port. If there is too little isolation, circulators are needed on the output of the digital transmitter to prevent too much of the analog power from getting back in to the digital transmitter, thus creating intermodulation artifacts that show up as spectral regrowth. It was pointed out to me that a 10dB increase in the digital transmitter power is now going to potentially cause problems with intermod generation in the analog transmitter output as well; and for this reason it will be very important to have good

isolation from the analog to digital inputs (as it has been) but also from the digital to analog inputs. This will be one critical specification to address with the manufacturer you consider.

Antenna applications

ERI offers the Lynx antenna, which provides separate inputs for analog carrier and the IBOC carriers. The elements of the Lynx are all excited by both the analog and IBOC carriers; the antenna presents the same power gain for both. According to Tom Silliman of ERI, the Lynx is already capable of handling a 10dB increase in

power on its digital input. Published specs for the Lynx show that the two inputs are isolated from one another in excess of 30dB – but it should also be noted that the circulators ERI can provide for use with this antenna are rated up to 2,500W. (Higher power ones are available, according to Silliman.)

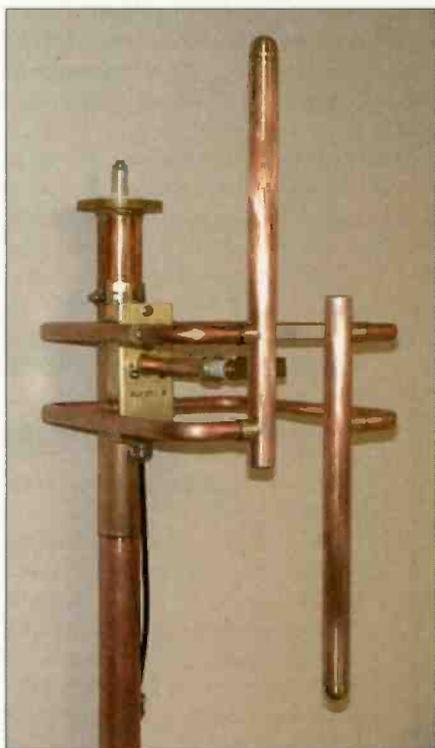
Dielectric offers its HDR series of interleaved antennas for IBOC and analog radio transmission. The two sets of antenna elements (with separate inputs of course) are configured for opposite circularity, which provides for a high amount of isolation from digital to analog and likewise from analog to digital. Matt Leland of Dielectric tells me that the digital input for the HDR is completely able to accommodate the proposed 10dB power increase for IBOC.

Shively Labs offers interleaved antennas as well, for example, its model 6813. The

IBOC input of this particular antenna will be able to accommodate the higher power IBOC levels.

Jampro offers its JSHD dual-input antenna for HD Radio. Like the other antennas previously mentioned, it has a separate input feed for IBOC, and thus has nice built-in redundancy. Greg Montano of Jampro told me that this antenna is also scalable for -10dBc IBOC carrier levels.

There are multiple instances around the country of the HD Radio signals being back-fed through an existing wideband combiner (such as the Shively 2540 used on top of Tiger



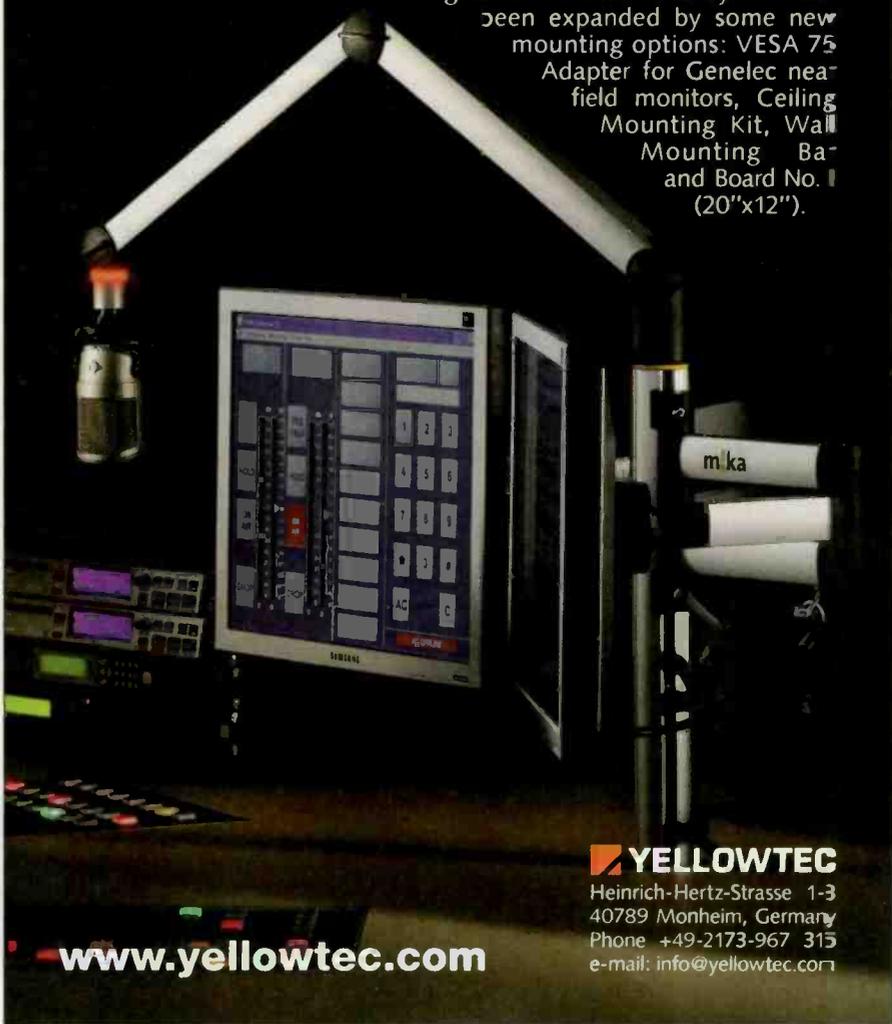
Shively Labs model 6813



Jampro JSHD

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Power Increase

Mountain in Seattle). Here in New York, we make use of a Shively combiner at our back-up transmitter site on top of 4 Times Square (although we don't transmit HD Radio from there). That system has been configured by John Lyons, the site's manager, as a back-fed system for the purposes of adding multiple HD Radio signals together for subsequent transmission by the Shively panel that is located there. I have learned from Bob Surette of Shively that this particular configuration can accommodate a 10dB increase in digital TPO; we would only need to size up the transmission line on the digital output side of the combiner. I point this out as a possible solution for some stations looking to achieve the 10dB proposed increase in digital power.

I also asked both Tom Silliman and Bob Surette if the hybrids used in their large panel antennas are able to accommodate the 10dB increase in digital power. In the case of the Shively antenna at 4 Times Square (at the very least), the answer was yes. Silliman also indicated that the answer was also yes in general for ERI panels but recommended a review and peak voltage calculation in each case.

Perhaps a new transmitter

Of course another possibility (especially if you have not invested in HD Radio at all) is to go with a new combined amplifier transmitter. Several of the manufacturers of combined amplifiers have already published specs on their various transmitters' analog power limits with respect to the 10dB power increase. For example, the Harris Z12HD+ has an analog power limit of 2,876W in this mode. Its HT/HD+ (which is the vacuum-tube combined amplifier) tops out at just under 8,200W of analog power in this mode. Harris recently introduced the HPX40, which was designed with increased IBOC levels in mind. This transmitter will produce 16kW of

analog power in the -10dBc mode, making use of the standard PAPR algorithm.

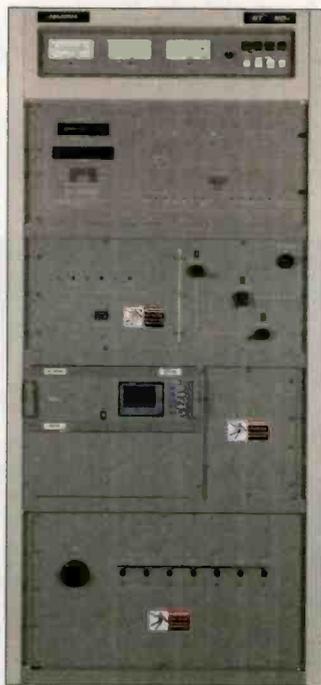
Nautel has developed a different version of the PAPR (peak to average power ratio) reduction algorithm for use in its IBOC transmitters and thus has different set of published specs for the amount of analog power its transmitters can generate in the -10dBc digital mode. For example, the NV20 will deliver up to 8.8kW of analog power in this mode; the NV40 will go up to 17.5kW.

I have learned from Broadcast Electronics that its current set of solid-state combined amplifiers can be operated in the -10dBc mode, with the obvious reduction in analog output power capability. Like BE, Continental Electronics is taking more of a conservative, wait-and-see approach as to where higher digital levels really end up before publishing elevated level performance specs on their vacuum-tube combined amplifiers.

If you currently use a separate antenna for HD Radio (often referred to as space combining) then your ability to move up in power by 10dB is probably going to depend mainly upon how much TPO you currently generate. If it was difficult to find the right amount of floor space, electricity or air conditioning for the current HD Radio transmitter, how easy is it going to be to increase it by 10dB? Is there the necessary amount of isolation between the main and auxiliary antennas? These are obviously very site-specific questions. One

possible solution may be to change your auxiliary antenna to one with higher gain. This will not only lower your TPO requirement, but could also increase the isolation from your main antenna as well.

The split-level combining method will likely be problematic when trying to increase digital power because there generally isn't that much headroom available in either the IBOC amplifier or the analog transmitter. Assuming there is some amount of headroom available in the current IBOC amplifier, one possible solution would be to add a second (identical) IBOC amplifier with a 3dB hybrid combiner to increase the overall IBOC power. This would obviously necessitate extra space, ac power and air conditioning at the site.



Harris HT/HD+



Broadcast Electronics FMI Series



Nautel NV Series

Resource Guide

HD Radio transmitter and antenna manufacturers

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www.armstrongtx.com

Bext

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Broadcast Technology

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www.ERInc.com

Harris

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Jampro Antennas

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www.jampro.com

Larcan

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Nautel

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www.psibroadcast.com

PTEK

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www.ptekpower.com

QEI

800-334-9154
www.qei-broadcast.com

Shively Labs

888-SHIVELY
www.shively.com

SWR

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I've used the -10dBc levels because it provides the most stringent requirements. It's certainly possible that the amount stations are allowed to increase is going to be less than that, making the solutions to the problems associated with increasing HD Radio power considerably easier. I'm a believer in HD Radio – not only in the efficacy of the technology, but in its future importance to our industry. If we continue to make it available to the radio audience, I believe it will experience a continually increasing level of acceptance. It took FM radio 20 years to catch on after all.

Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York. Contact him at doug@douglirwin.net.



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Radio Station

2.0

In the summer of 2008 I was asked by Cumulus Media Cincinnati, which owns and operates WRRM (Warm 98), WGRR (Cincinnati's Greatest Hits), WFTK (96 Rock), WNNF (Frequency 94.1) and WOFX (92.5 the Fox) to help plan, design and manage a

complete studio and office facility move. With the purchase of WNNF and WOFX, the cluster had outgrown its downtown facilities and expanding in the existing building was not an option. The area had also been on a steady decline: It was time to make a move.

Karrie Sudbrack, local market manager, Gary Kline, Cumulus V.P. of engineering and IT, and I visited numerous buildings and locations. Would the building be easily accessed from all locations in the city? Would there be adequate parking? Did the facility have the proper security and safety for the employees? Were there clear STL paths to all the transmitter sites from the rooftop or could a small tower be erected on the premises that would accommodate these needs? Would there be enough space to expand or add studios in the future? Within a few short months and after many discussions, a perfect location was chosen.

The studios would be housed in a new and very modern building called Linden Pointe in the Norwood, OH, area. Norwood is a centrally located, up-and-coming neighborhood in the greater Cincinnati metro. It is surrounded by trendy retail shops, restaurants, businesses and night life. The floor chosen for the radio stations had never been occupied: It was a perfect blank canvas.

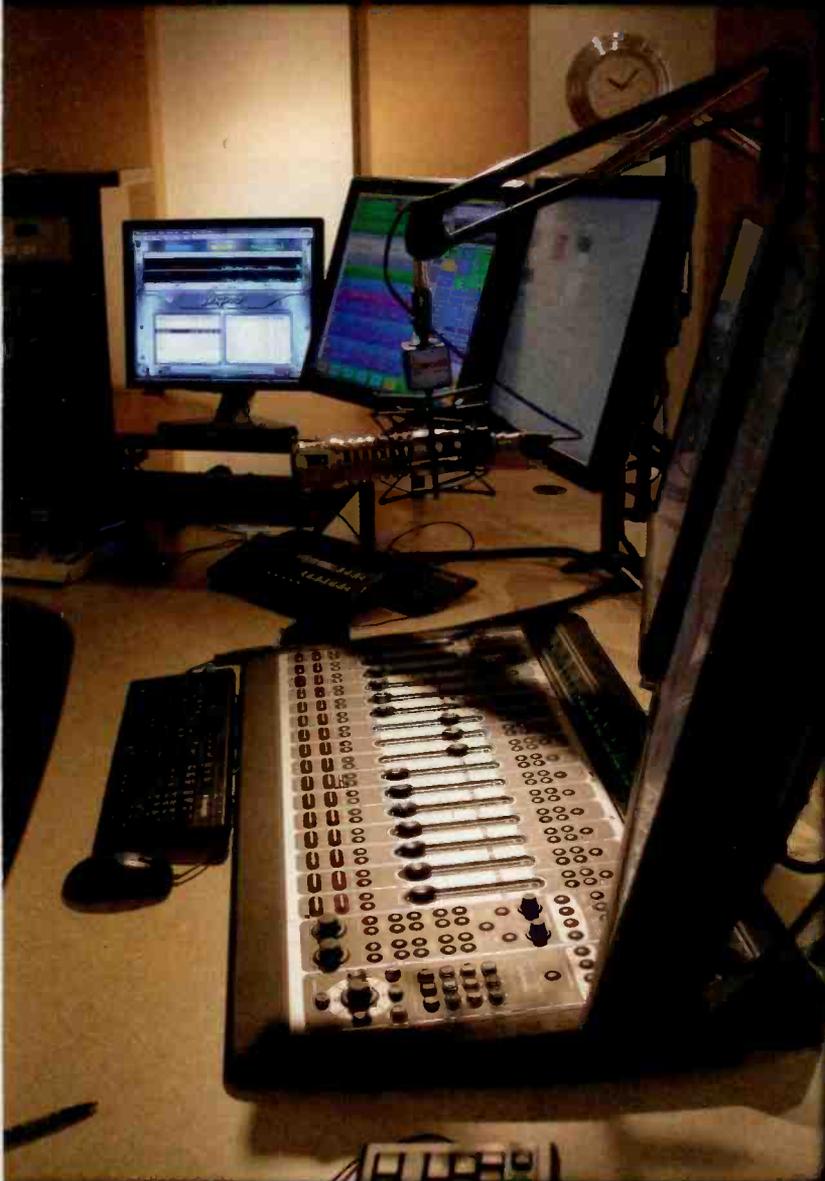
Getting started

The architectural firm selected for the project was SHP Leading Design. The SHP team worked with us to create an open office. Many radio station operators put their studios in a corner of the building to hide them from the public; our design would put the studios at the forefront of the facility. Two air studios would be placed on either side of the reception area with windows looking in. The rest of the studios and the technical operations center were laid out in the main hallway so clients and visitors would walk through and see them. Floor-to-ceiling windows bordered the entire space allowing a great deal of natural light. Walkways around the entire perimeter ensured the open feel. A giant common area and comfortable lounge areas were put in place to encourage collaboration. Only a few closed-door offices were proposed, but each would have glass doors and be visible from the outside.

Reduce, reuse, recycle

Building a facility of this size can be an expensive venture. Broadcasters in general have certainly felt the pain

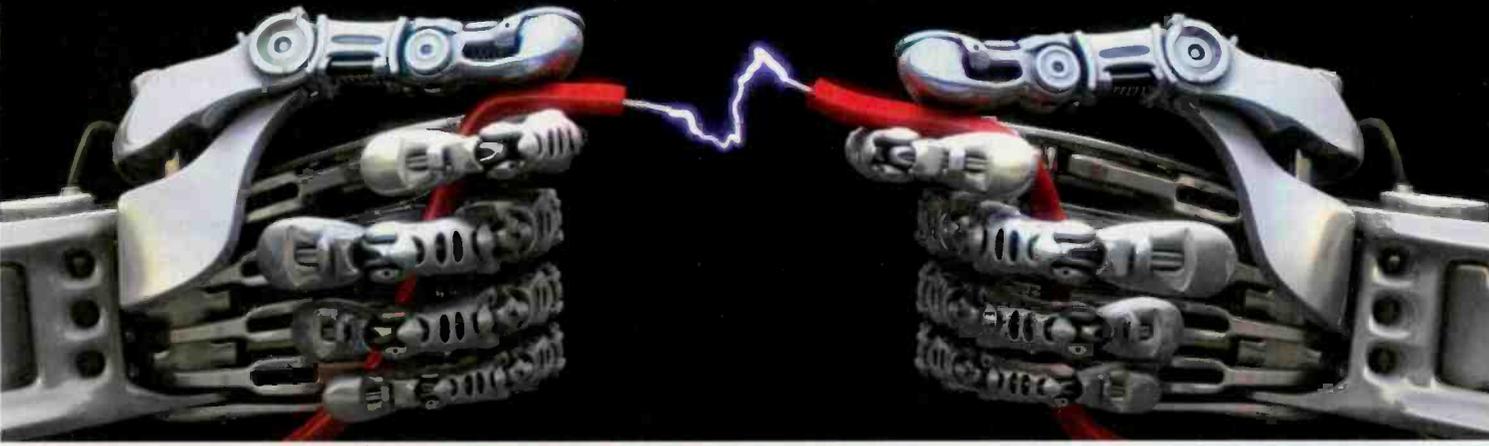
The Warm 98 air studio has one of two Axia Powerstation systems.



In a down economy, stations must be resourceful to reduce, reuse and recycle, even when building new facilities.

Automation

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~ Jim Franklin, Program Director
WBO, Appleton/Oshkosh - Wisconsin



"Finally, an automation system that keeps in mind that not every jock is also a computer whiz. This system is easy to operate from the word go..... yet offers all the bells and whistles that help make your station sound great. The clock builder option makes interfacing with satellite shows very easy. Plus, it has the best voice-tracking capabilities available."

~ Matt Scurry, Operations Manager
WWFN/WHLZ, Florence - SC



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~ Leslie Whittle, Program Director
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Jack Ruth (owner)

KIQS, Four Corners Broadcasting, Durango, CO

"I love the flexibility (of Xtreme). The switching capability of the bridge is great. I've used (other automation) & Xtreme is much more user-friendly. I have recommended it for cost, capability & support. I always get an answer from your support guys!"

Ward Holmes, Regional Manager

WHFT, Avon Park, FL

"The tech support is a huge help. Nothing but good things to say, they've always been great & resolved any issues quickly."

Tony Scott, Program Director

WJQS, Jackson Mississippi

"Everything's GREAT with the Xtreme! I'm running 3 Xtremes. I love it because I can run it remotely from home. I would definitely recommend it because it's easy to work with & once you get started you can't break it!"

Monte Lyons, Operations Manager

WMER, Meridian, MS

"I love (Xtreme)! I'm a one man show . . . & it does the work of four people! Support is wonderful & very patient! Even when they're busy they always call back right away! I have made several referrals to my friends."

Mike Glass, owner

Woodland Hills, CA Internet Radio

"You bet I'd recommend it for the ease of use & it's robust. I learned the software in about 15 mins."

John Tobin

KIKO-FM/KIKO-AM, Claypool, AZ

"I rate (Xtreme) at a 10 for ease of use. It's very simple, with limited engineering experience needed. You open the software & it's all self-explanatory."

"The manual is great! When I have a basic question I can open it & find the answer."

"It's inexpensive & does EVERYTHING! I'm still finding new features!"

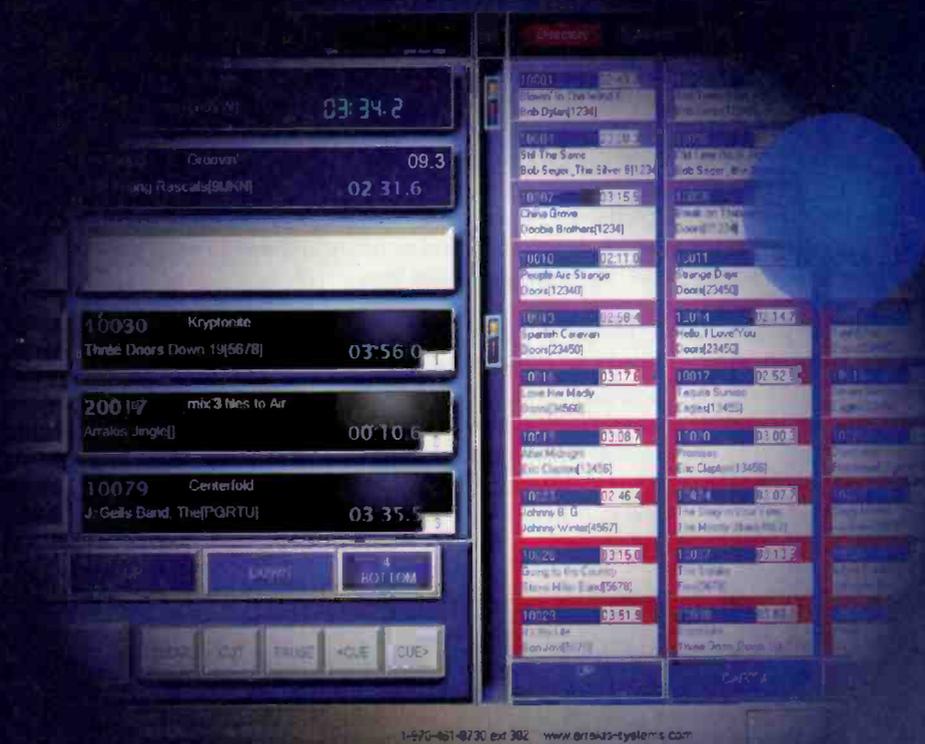
Shelly Harrison, General Manager

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Radio Station 2.0

of the current economy and we simply could not look at the project with great big budget eyes. We would have to reuse much of the equipment we already had in place and purchase only necessary infrastructure items such as furniture, racks, wire, cable and connectors.

We moved a used 100kW natural gas generator from a former Houston studio facility. We reused our Best Power/Eaton UPS system from the old studio location. We even removed and reused the IAC soundproof doors from the old studios to save thousands of dollars.

For the studios we chose Omnirax's new Innova series line of furniture. David Holland of Omnirax took the time to help us configure and design a perfect fit customized for each room, console and operators' needs. We needed furniture that would be budget-friendly, but also very functional. It had to be sturdy and long lasting and we had custom size and usage requirements. Due to existing tenants on the floors below and above we could not run conduit to our studios and furniture. Instead, all the wire, cabling and electrical would have to enter the room and furniture through wall junction boxes. Omnirax's custom CAD design matched exactly to the plans and layout. Wire and cable were easily distributed throughout the furniture and the punch blocks were easy to access and terminate. We were absolutely amazed with the quality, craftsmanship and

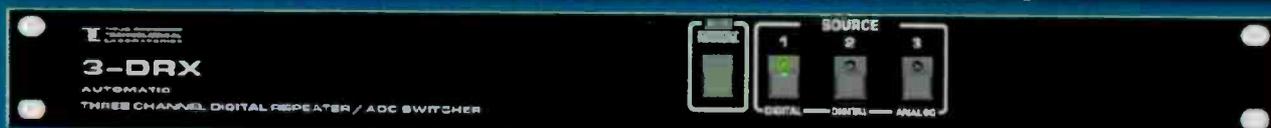


The studio for 96 Rock is almost identical to the Warm 98 studio. WGRR's studio is a mirror image.

extremely easy setup of this furniture line. On the day of delivery, we had a small crew of six engineers. Less than eight hours from the time the truck pulled up we had unpacked, moved and assembled all eight studios. It was definitely an experience to remember.

We decided to purchase two new consoles for the WRRM and WGRR air studios. These studios would be built first and would provide us a way to transition the stations one-by-one into the new facility. Our plan was to move the gently used Wheatstone G6 consoles and Bridge router system for WKTF, WNNF and WOFX. We needed to replace

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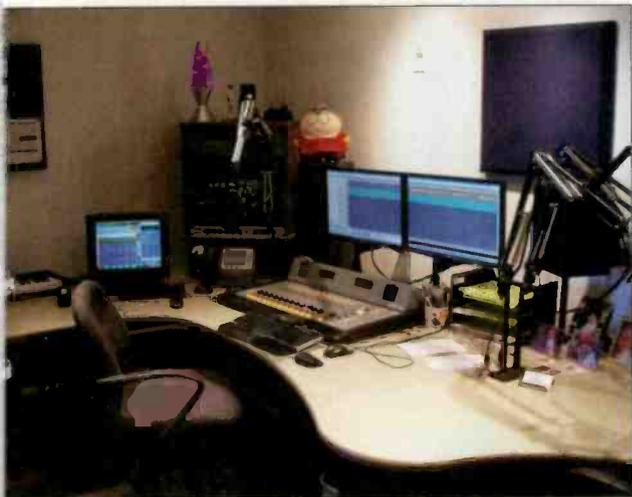


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The main production room is the largest production studio.

the aging analog and digital consoles in the production rooms and chose to install used Harris Impulse Digital and Airwave Digital mixers from our surplus equipment. We would also need to replace the aging automation system.

For the two new air studio consoles we chose Axia Element surfaces along with Powerstation. This would be the first Powerstation installation in North America, and we were extremely excited to get our hands on the equipment. 16-fader Element console frames were picked to accommodate all the sources needed in the studios. Axia was chosen for its versatility and Livewire IP audio technology. Additional

AES/EBU and Analog Nodes were placed in the TOC for interfacing with any other source or destination requiring traditional audio wiring. We needed a system that would require the least amount of trunk wiring and be extremely quick to set up and deploy. Axia also provided us an excellent path to grow and build future studios without traditional TDM-based digital routers or analog wiring systems.

For our automation system replacement, we chose Broadcast Software International's OpX. The scalable and redundant multi-tiered architecture of OpX with the integration of Axia's Livewire IP audio drivers were a perfect match. Using high-availability network switches we easily connected all the OpX and Axia systems without wiring a single audio card. Our OpX installation included a master file server, multiple and redundant audio record/playback servers, studio clients and numerous other utilities to quickly import and export audio, create rotator carts and playlists, and easily automate satellite programming. The back-end functions of OpX also let us export artist/title metadata and information to our RBDS systems, streaming encoders, now-playing website banners and future technologies.

For our wiring design we wanted the highest performance and lowest cost wire and cable that could be used for analog audio, AES/EBU digital audio, data, control and even video. We decided to stay away from traditional and expensive multi-pair trunk wiring and instead chose to use inexpensive 650MHz spec CAT-6 cable for all our



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Radio Station 2.0

connections to and from the TOC and studios. For termination we chose to use Krone K-110 punch blocks, Neutrik audio connectors and L-Com RJ-45, RJ-11 and D-sub connectors. To save money we did not use a wiring integrator and instead designed our own wire distribution and grounding system, ran all the wire, mounted all the blocks and terminated every connection ourselves. We chose overhead data center wire management ladders and kept them below any plenum ceiling spaces for additional cost savings.

To house our TOC equipment we purchased Middle Atlantic WMRK series 48" deep server racks with split rear doors. An ever-increasing amount of broadcast equipment systems are server and computer-based. The racks housed square-hole rails with removable 10-32 cage nuts for mounting traditional equipment. With the square holes we were able to mount all the servers and computers with their proper sliding rail systems. In the past, I have run into so many situations where you unpack the latest, greatest server, go to mount it in a traditional broadcast equipment rack and find that the rails don't work or stick out the back. With the 48" deep racks and adjustable rails we were able to mount each piece of equipment exactly as it was intended.

To make network connections easy, the rear of each rack was outfitted with a 12-port CAT-6 patch panel that terminated



The second and third production studios are slightly smaller. Carl Cruse, morning show producer for the Fox, is at work.

to a master patch panel in the network switch rack. Each piece of equipment requiring a network connection could be patched without ever having to home run the wire.

Both the Axia and Wheatstone systems use standard RJ-45 connectors for their analog and AES/EBU audio connections. Crimping hundreds of RJ-45 connectors can take a very long time so instead we purchased inexpensive 100' CAT-6 pre-made cables. With the pre-terminated cables we could cut each one in half, plug the connector end into the equipment and terminate the other end directly onto the punch blocks. The left over cable was

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A wire tray exits the TOC feeding individual studios through square cable chase conduits.

used for cross-connecting the blocks to their destinations. This wiring method saved us a considerable amount of time and money.

Beyond the studio

For our STLs we needed a way to operate out of each facility simultaneously for a seamless transition from the old location to the new studios. We chose to leave the RF STL systems in place at the old facility and to install a combination of reused Harris Intraplex T1 equipment and new Pulsecomm PCAU audio circuits. The PCAU cards had not been used in Cincinnati before and it took quite a bit of convincing with the local telephone company for

it to understand and agree to the installation.

We installed a Valmont/Pirod 30' guyed tower on the rooftop of the new building to mount the 950MHz and 5.8GHz RF STL antennas. Once the stations began broadcasting at the new facility the systems were taken down and moved from the old facility. We also installed a new 3.8 meter Prodein satellite dish on a non-penetrating rooftop mount for our satellite program delivery. Closely monitoring each one of these separate projects and shopping around for contractors helped achieve our budget goals while getting the highest performance out of each system.

Because of our current economy big budget moves are a thing of the past. We must find new and clever ways to build and improve our facilities. With the right attitude and ability to be creative we're able to make anything possible. The future of our radio broadcasting facilities and our capital projects depends on us as engineers to step up to the task, embrace new cost saving technologies and think outside the box.

Radio station 2.0: It's here.

Robinson is regional manager of engineering and IT, Midwest-Central Markets, Cumulus Media. He is based in Indianapolis.

Editor's note: BSI is owned by Cumulus Broadcasting.



More photos and equipment list online at www.RadioMagOnline.com

FACILITY FOCUS

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Axia PowerStation and Element

PowerStation, Axia's new integrated console engine, combines audio I/O, console power supply, DSP mixing engine and network switch into one easy-to-deploy package. Setup couldn't be easier: connect your studio gear and an Element 2.0 console (as large as 40 faders, with standard CAT-5 cables, name sources with a browser, and you're ready for air. Put PowerStation at the heart of standalone studios or make it part of a larger Axia network; Simple Networking lets you daisy-chain up to four PowerStations for easy multi-studio installation without a separate core switch. And it's built to deliver rock-solid 24/7 reliability, hardened with industrial-grade components and redundant power capabilities. With over 1,500 studios on-air, Axia is the fastest-growing console brand in broadcasting. If you're thinking IP-Audio, think Axia. Because experience counts.



www.axiaaudio.com
216-241-7225

Tips, tricks, hints and more

By Chriss Scherer, editor

Multitaskers are better

The adage using the right tool for the job is a good policy. We all know that a wrench does not make a good hammer, although I'm sure you've tried it. Many of the tools in our tool boxes are unitaskers, but when you're solving a problem, a multitasker solution can provide even more value.

I recently encountered a situation where some creative thinking solved a problem by applying a multitasker. This one involved hanging a vinyl banner.

A couple of bungee cords are usually all you need to attractively hang a vinyl banner, but they are not always the answer. Sometimes it helps to have a rod to attach the banner to. Carrying a 6' (or longer) rod is not very convenient. I looked into alternatives.

I wanted something that could be collapsed. Carrying three or four smaller sections is easier than a single long piece. I also needed it to be rigid, but not excessively heavy. I headed to the home improvement center to look.

I considered a shower rod, but it was too long.



I looked at various curtain rods. Also too long, and too flimsy. Both rods also could be too easily bent. I asked a sales associate for ideas. He suggested pieces of threaded rod with couplers. I also thought of this, but rejected it because the rod could also be easily bent and the threads marred. All these were unitaskers as well.

Then the sales associate offered one more idea: vacuum extension wands. These are the extension tubes for a vacuum cleaner. They are rigid, lightweight, and use a friction fit. Plus, they can still be used to reach the tight spots in the transmitter. Problem solved.

What unique application have you solved with a multitasker?

Adapt and thrive

The last time you bought a microphone you may have found a threaded adapter inside the mic clip. Did you wonder what it was for? I was once told it was for European mic stands, although I never saw a mic stand in Europe with that smaller thread. What do you do with those threaded adapters? You probably tossed them in a box like I did, thinking they might come in handy sometime.

What is that adapter for anyway? Let's review some thread sizes. Standard mic mounts use a $5/8$ "-27 thread. The little adapters you have are $3/8$ "-16 inside. I thought this was an odd size until I recently learned something about camera mounts.



A typical still or consumer video camera has a threaded inset. These are commonly $1/4$ "-20 threads, but there is another common camera thread size: $3/8$ "-16.

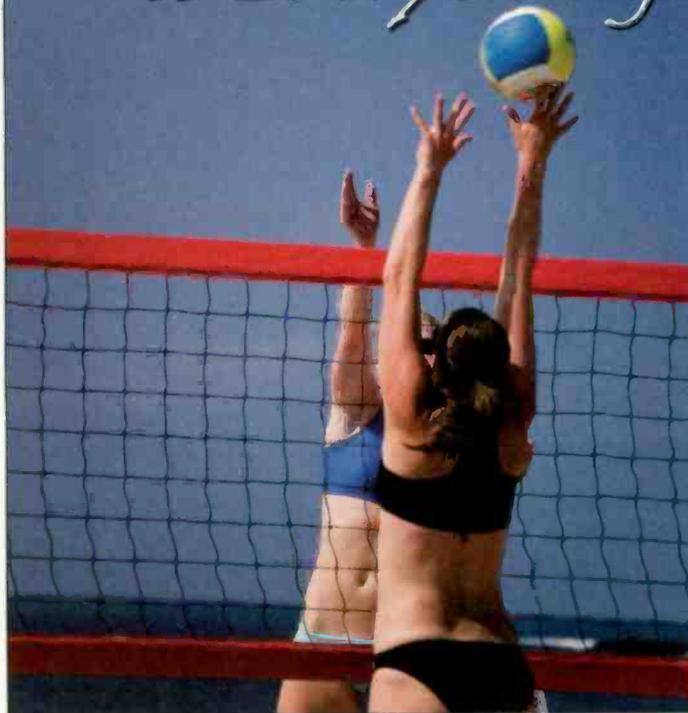
This all came together for me when I was looking to devise a clamp to attach a portable recorder to a tall mic stand (the bottom section of this stand is about 2" across). I located a clamp for a lighting truss that would work well. I also noted that $3/8$ "-16 is also commonly used with lighting equipment.

The bolt on the lighting clamp was perfect for the mic thread insert. With another adapter, I can mount the recorder on the bracket, too.

Perhaps now you can find some uses for those $5/8$ "-27 male to $3/8$ "-16 female inserts.

Do you have a tech tip?
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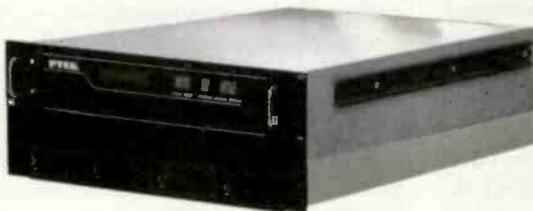
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Airtools Voice Processor 2X

By Marshall Rice

When I first heard Symetrix was shipping the new Airtools Voice Processor 2X microphone processor I couldn't wait to get a look at it. I'm a big fan of the 528E and I wanted to see how this new digital box would compare. The Voice Processor 2X features two independent channels of very low latency (less than 7ms) digital signal processing plus the ability to store up to 50 nameable presets. The processor can be tailored to each announcer's particular needs and it is easy to switch to their own personalized preset from the front panel. It contains two complete and independent channels of mic processing in 1RU. The 2X has two XLR analog inputs, either mic or line level, two XLR AES inputs, an RJ-45 Ethernet connection, a BNC connector for word clock and an RJ-45 jack for a remote control. The output section of the 2X consists of two XLR analog outputs at line level, or internally switchable to mic level, and two XLR AES outputs.

The 2X is set up by software on a host computer connected with standard CAT-5 cable directly, via an Ethernet switch or through an existing network. If you are not connecting through a network, the IP configuration on both the 2X and the host computer must be set manually, or you could use the default private IP address.

The 2X acquired its IP address from the DHCP server on the network. I started the software, ran

edit, whether to bypass the DSP or mute the channel. The presets are managed, recalled and stored from this menu as well. As you navigate through the screens you quickly realize how versatile and powerful this processor can be.

The processor consists of seven modules including compression, downward expansion, equalization, de-essing, highpass and lowpass filters, and voice symmetry. Choosig edit on the input tab opens the input control. On this screen are the mic or line level settings for each of the two analog inputs, or the digital trim adjustment if the AES inputs are used. Phantom power for condenser mics is chosen here, as well as phase inversion and muting. The two most impressive modules are the high- and low-pass filters, and the EQ. Use the HPF/LPF tab to edit the parameters of the high- and low-pass filters. Each filter features a 12, 24, or 48dB slope if needed, as well as variable frequency and resonance adjustment. The adjustments are represented on a graphical display that shows the frequency response curve for each channel. The high-pass filter works very well for eliminating rumble, wind or HVAC noise in difficult environments. The low-pass filter has the same features as the high-pass filter.

The EQ module is a four-band parametric equalizer that can be switched to either pre or post compressor. The frequency response curve of the EQ is also graphically presented, which makes setting up the EQ much simpler and quicker. The Comp tab opens the compressor screen. On this screen are the standard compressor settings threshold, ratio, attack, release, plus the added control of output gain or makeup gain for the compressor module. Compression and output metering is provided on this screen as well. The DS/EXP tab opens the de-esser and expander screen. The de-esser has a different approach on the 2X. Instead of the usual frequency and threshold adjustments the choices are now disabled, gentle, normal, or aggressive with no variables in between. The expander offers

Performance at a glance

Two programmable mic channels

Extensive I/O

Compression, EQ, de-essing, downward expander, high- and low-pass filtering

Saves up to 50 presets

Ethernet accessible

Windows setup software

the Connection Wizard and waited for the Wizard to discover the 2X (Figure 1). This took about 30 seconds. A very handy feature of the Connection Wizard is a button that will flash the LED meters on the connected 2X for easy identification in a multiple processor installation. Once you have determined which unit you want to connect to, just click the offline/online button and you are ready to set up the processor.

Navigation

I found the setup menus to be very intuitive and easy to navigate. From the main screen you can chose which processing module to enable, disable,

more control with the choices of threshold, ratio, attack, and release. Included on the screen is the metering for the de-esser and the expander.

On the output screen the output levels for both analog and digital are set. The analog range of +4 or -10 is set and voice symmetry can be set to active or inactive. Under the system tab are settings for the AES inputs and outputs. On this screen are settings for sync source, sample rate and word-clock termination. The AES output source for each of the two AES outputs can be chosen from a set of routing matrixes adding to the versatility of this processor. Each channel has an independent test tone generator which, when enabled, applies white noise, pink noise or sine wave to the input, which can be a handy tool for setting levels through the processor and console.

Airtools

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I connected three different mics to the processor: an Electro-Voice RE20, a Shure SM-7 and a Neumann U-87. The AES output was connected to a Klotz digital console and was monitored with Sony 7506 Headphones. Different voices were used, female and male on each of the three mics. I adjusted the processor until both the talent and I were pleased with the sound. The biggest difference I found between the 2X and the 528E is the precise tweaking that can be accomplished with the four-band parametric EQ, and the high- and the low-pass filters. The level of control afforded the engineer on the expander and compressor modules really makes the voice characteristics of the different announcers stand out.

Real-world analysis

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The talent did not notice any latency issues and the transparency of the compressor was noticed at once. The de-esser never quite sounded right to me especially on the U-87. The choices always seemed a little too much or not enough. So it was disabled. After getting everything set just right the parameters were saved to a preset and the preset was named according to day part. Being able to choose a specific setup for each voice on the air was a big hit and the announcers easily learned to operate the front panel. A remote for this function would be nice. The remote control was not available at the time of this writing.

Security on the 2X can be set on two levels. The front-panel controls can be disabled, and the 2X can be password protected to prevent unauthorized access from the network side. There are no knobs and none of the parameters can be accessed from the front panel of the 2X, all changes must be made through the 2X software. This can be a hassle when changes need to be made quickly, but you don't need those little cages over the controls anymore.



Figure 1

Rlice is the engineering director at Bonneville International St. Louis Radio Group.

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.

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Alesis Pro Track

By Pierre Lonewolf

In my never-ending quest for the better gadget for our staff, I came across the Alesis Pro Track handheld recorder. "So what?" you say. Well, the "what" is that it uses an Apple Ipod as the storage medium.

Since we made the transition from cassette and reel-to-reel here at KOTZ we have used various 600-series Marantz Compact Flash recorders. To add another layer to our ability to gather news, music and elder's stories, we needed a device that could be distributed cheaply with a short learning curve. After reviewing the plethora of available compact digital handheld recorders, I settled on the Alesis unit.

One of our problems here at KOTZ is equipment training. This applies to everything: consoles, announcer headsets for basketball games, you name it. Because a large part of our crew is volunteers, they don't spend the hours an employee has to familiarize themselves with our equipment. But everyone has an Ipod - especially the younger crowd.

Performance at a glance

- Combo XLR-1/4" inputs
- Phantom power
- Records 16-bit, 44.1kHz or 22kHz stereo
- Onboard stereo condenser mics
- Operates on ac, dc or 4 AAA
- Threaded mounting adapter

Kicking the tires

On the lower front of the unit are two recessed audio level knobs (left and right), a menu button and an enter button with a VU meter between them. Right above that is the Ipod docking area under the clear cover. The unit comes with two covers, one for a fifth generation and Classic Ipod, and one for the third generation Nano. The cover of your choice slips over the Ipod to hold it in place, protect it to some degree, but still offer access to its interface.

The left side reveals a row of buttons: open, phantom power on/off, Ipod charge on/off, power on/off and the power input. The open slide-type

switch basically disengages the protective cover. The Ipod can be charged in the unit when the power supply is attached. The Pro Track uses four AAA batteries as a power source.

Returning to the front, the menu button activates a menu on the Ipod. To record, press the enter button to initiate menu commands. The left and right input level control knobs are slightly recessed for protection, which makes them a little hard to turn in a hurry but not too bad.

Right below that are two mic inputs that accept XLR and TRS plugs. Between them is the mini headphone jack. On the right side of the unit is the volume control for the headphones, a limiter off/on switch, a record stereo/mono switch and a lock down connector.

User interface

Because of the simple operation of an Ipod, anyone can use the Pro Track. To use the recorder, first turn on the Ipod and then power the Pro Track. It shows a voice memo on the Ipod with a record or cancel choice. Select the record choice and recording begins. Using the built-in mics with the built-in limiter gave acceptable audio for voice, but watch the handling noise if you're moving around. Music was acceptable but using the external mic inputs gave better quality.

Can the user interface be better? I think so, but for the Ipod crowd familiar with the menu system it's no problem. Looking for where the recordings ended up was tedious, but not impossible.

Once a recording was made, I checked the transfer between the Ipod and Adobe Audition. Usually I dread anything when it comes to Apple,

Combo XLR-TRS connectors make secure connections.



material is. For voice work, certainly. Music, some but not all, certainly not for studio-level stuff, but that's not what it was intended for. You need to know your source sound and its destination in order to use it well. The physical package could be thinner and a little more sturdy but that is just my taste. In the end I'll say the unit is workable in any station but I would suggest it be used in high school programs and college radio station settings since the end users most likely have an Ipod and you both have an investment it keeping it working and not disappearing. 🎤

Alesis

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W www.alesis.com

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not because it's a bad product, but because it seems I have to go through convoluted procedures to get what I want. Well not this time. I put the Ipod in my dock and called up the files I test recorded. Wondering how to get files from the player into Audition, I tried drag and drop from iTunes to Audition, and it worked just fine.

Does it work? Yes it does. Would I use it for professional use? It depends on what the source

Lonewolf is the chief engineer of KOTZ-AM/FM, Kotzebue, AK.

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NEW PRODUCTS

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by Erin Shipps, associate editor



Modular broadcast console Axia Audio

Element 2.0: Element 2.0 has features such as voice and headphone processing by Omnia, peak and average metering, one-touch phone recording, automatic mix-minus for every fader, an eight-channel virtual mixer that lets users combine multiple audio streams and control them with a single fader, motorized faders that can assume pre-set levels automatically, and show profiles that instantly recall talent's favorite settings. Element uses avionics-grade switches rated for millions of operations, bullet-proof optical encoders, conductive-plastic faders and a frame made from thick aluminum extrusions. It is available in sizes from two to 40 faders.

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FM transmitter PTEK

Gamma 3000: The Gamma 3000 features 1,250W power amplifier modules coupled with the hot pluggable power supplies. The power amplifiers and power supplies are independently operated and removable from the front of the unit while it is installed. They are load sharing. The minimal 10W of drive required can be provided with the optional PTEK FM25ES exciter. The Gamma 3000 is simple and quick to install. The system is 4RU weighing 88 pounds.

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703-875-9100; www.digigram.com
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UPGRADES and UPDATES

JK Audio is shipping the Innkeeper LTD hybrid, which was introduced at the 2009 NAB Show. (www.jkaudio.com)... Dave Scott, former CEO of **Scott Studios**, and **Enco Systems** are teaming to service and support SS32 stations. The venture is **Scott-Enco**. (ScottEnco.com)... Tascam has updated its 202 dual cassette deck to the 202mkV. The new model adds a return to zero function and A-B repeat. (www.tascam.com)... **Racktools 3.5**, the free layout and specification software package that includes all products from **Middle Atlantic**, has been updated with new shapes for user-defined components and greater drawing export flexibility. (www.middleatlantic.com)

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20 KW	2005	BE FM20S, solid state
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27.5 KW	1984	Continental 816R-4B
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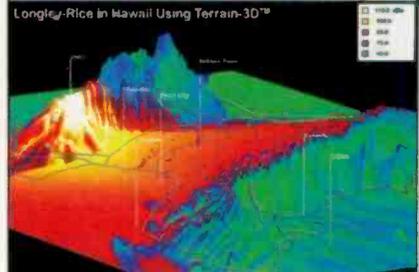
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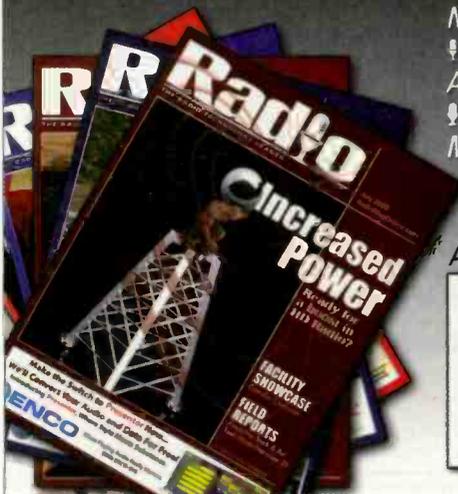
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Contributor Pro-file

Meet the professionals who write
for *Radio* magazine.
This month:
Field Report, page 30



Marshall Rice
Engineering
Director
Bonneville
International St.
Louis Radio Group

Rice began his career in 1979 at the student radio station KMNR-FM at the

University of Missouri-Rolla. He was an announcer and chief engineer at small market stations in the 80s before he realized what side of the mic he belonged on. He moved to St. Louis in 1988 where he met his wife at a live broadcast. He joined Bonneville International in 2000. He is also a Christmas enthusiast and spends his spare time designing and building decorations for his family's home.



Written by radio professionals
Written for radio professionals

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by Erin Shipp, associate editor

Do you remember?

If there is one thing that hasn't changed over the years, it's our need, as consumers, for more power. New portable devices are sucking battery power like never before and we're always looking for more. Even in this Jan. 23, 1926 advertisement from *The Literary Digest* for Balkite Radio Power Units, the theme was more power. "Unfailing radio power from the light socket," the ad touts. All Balkite Radio Power Units were "permanent pieces of equipment, entirely noiseless, had no bulbs, nothing to break, replace or get out of order." Looking to the future, it sure would be nice to have unfailing power that truly lasted. With the demand for more and more portable gadgets, we shall soon see what capabilities lie in battery power.



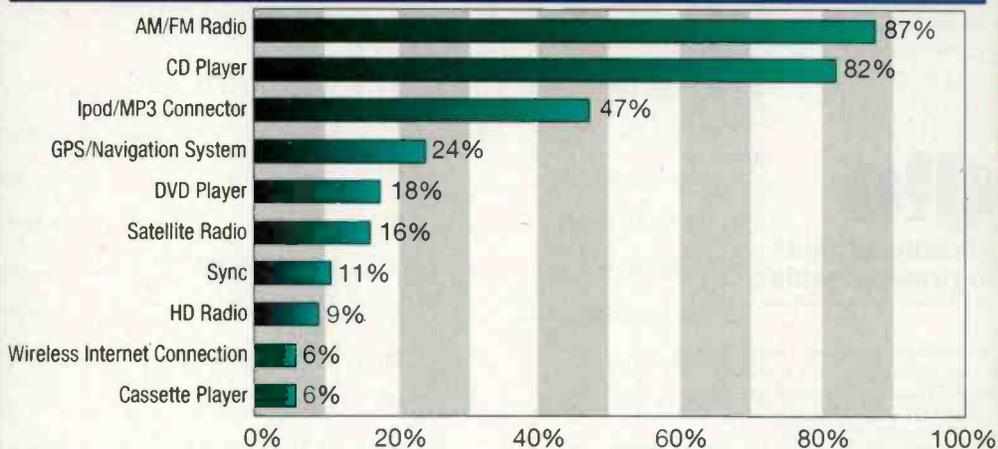
Sample and Hold Domestic cars need to market best features

With both General Motors and Chrysler in bankruptcy court, a Jacob's Media survey of more than 21,000 rock radio listeners from around the U.S. says many potential buyers will strongly consider an American car or truck this year. Of the 12 percent indicating they will purchase (or lease) a new vehicle in 2009, nearly half (46 percent) say they always buy a domestic product, and one-fifth (18 percent)

say they are strongly considering an American car or truck, even though they typically opt for a foreign brand. GM, Ford and Chrysler can ensure these buyers will purchase one of their vehicles by marketing the most desirable features and options, i.e. iPod connections, which stands high above options like satellite radio, GPS and HD Radio. Here's how the marketable options stack up.

Desirable Features - Next Car

Based on "Very Important" Responses*



*Of those planning to buy/lease a new car in 2009 - 12% of the sample

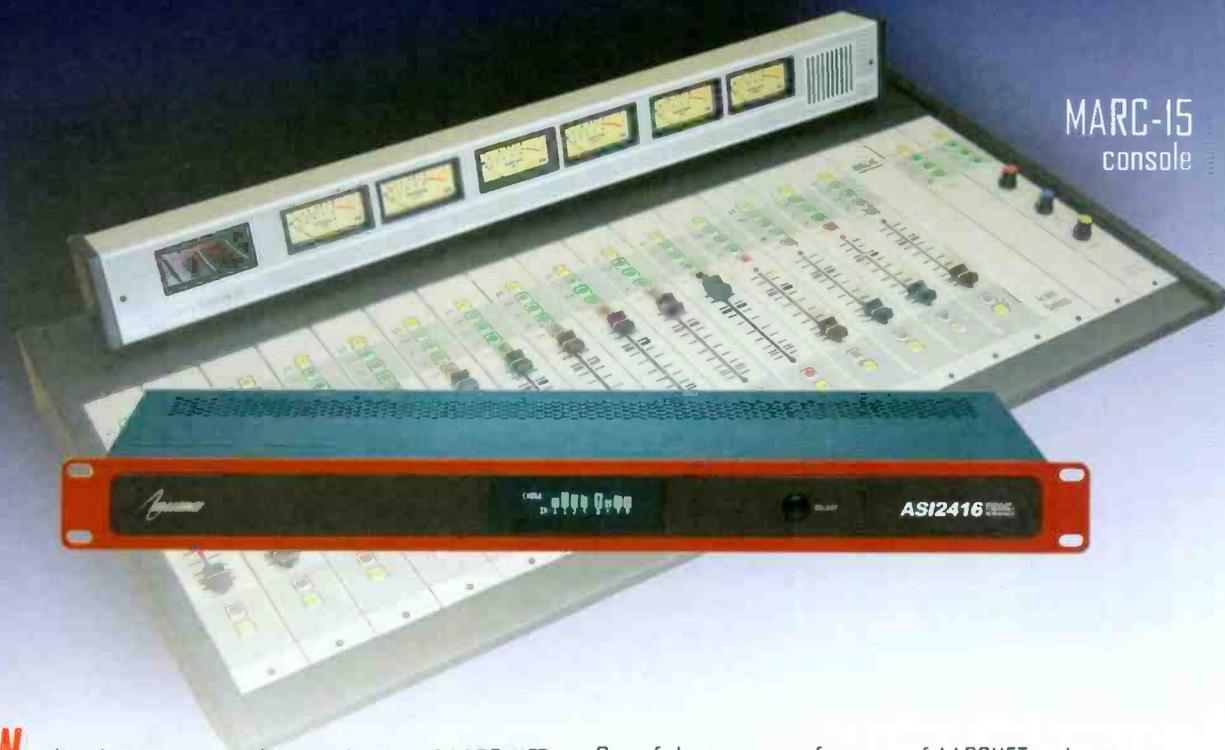
Source: Jacobs Media Tech Survey V.

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MARC-15
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