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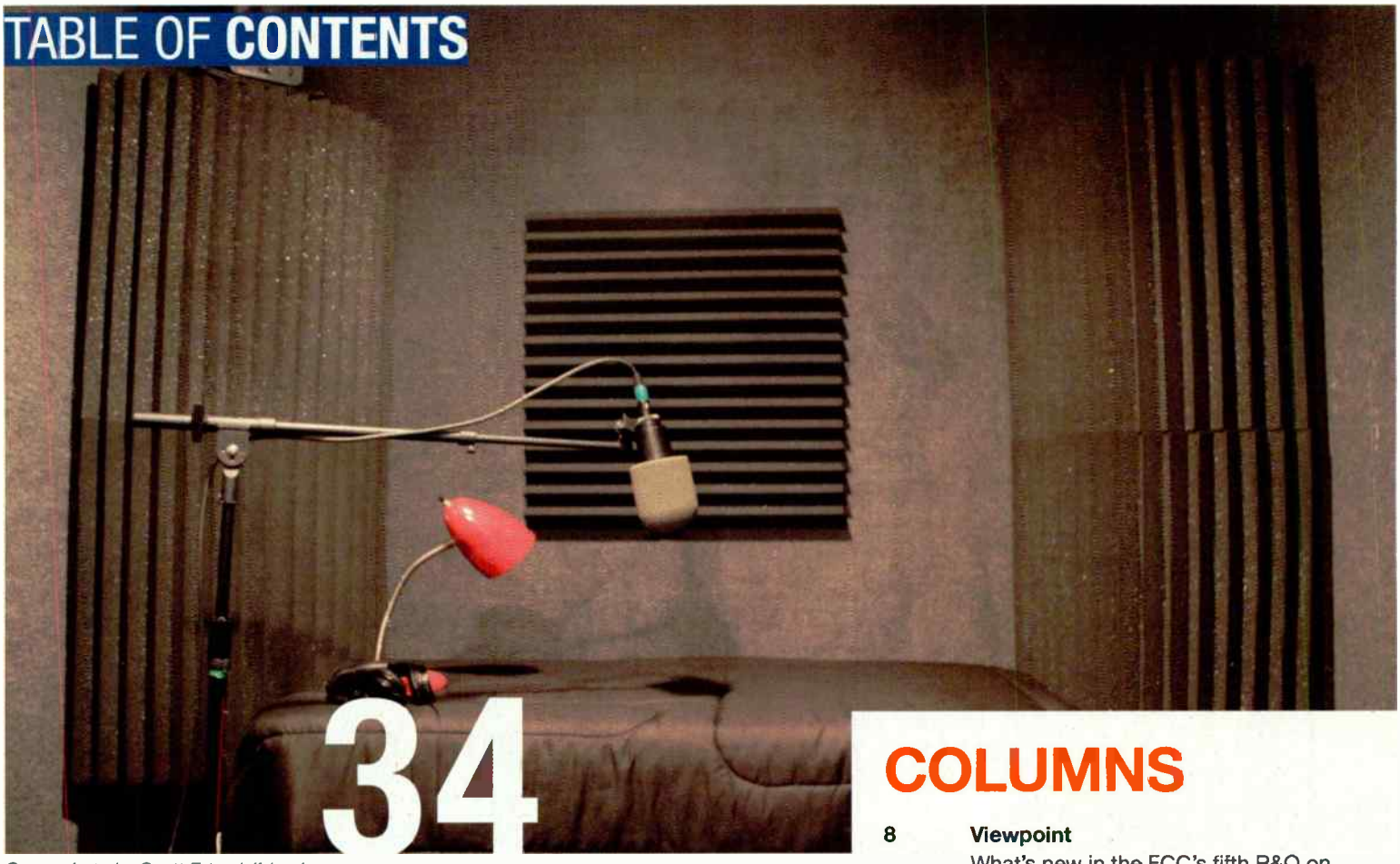

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HD Radio Who?

Mark Kassof and Company have published online the results of an interesting survey about consumer awareness of HD Radio. The survey finds no improvement in consumer knowledge. Here's a summary:

> In 2008 (when the same topic was last surveyed) 67 percent had at least "heard of" HD Radio; now, 54 percent have.

> In 2008, 21 percent of respondents said HD Radio delivers better sound quality; now 20 percent do.

> In 2008, 8 percent said HD Radio delivers more channels and choices, the same as now.

> In 2008, 7 percent said HD Radio was satellite radio; now 6 percent do.

The authors conclude, "it's great that HD Radio is finding its way into new cars. Over time, that is undoubtedly the single best way to get into the minds of consumers. But for now, HD Radio's "Knowledge Gap" continues."

READ THE FULL REPORT

kassof.com/2012/hd-radio-zero-progress-in-consumers-knowledge-2/

APRE Seeks Noms for 2012 Engineering Achievement Award

The Association of Public Radio Engineers (APRE) is accepting nominations for the Sixth Annual APRE Engineering Achievement Award, which will be presented at the annual NPR Labs/APRE Engineering Dinner in April 2012.

The honor recognizes an individual for outstanding contributions to the art and/or science of radio engineering that have made a significant impact on, or improvement in the state of the public radio industry. The deadline for nominations is March 5, 2012

Clear Channel Radio has rebranded as Clear Channel Media and Entertainment. The company says the name change better reflects the evolution of its business.

CES News

Research In Motion (RIM) unveiled the new BlackBerry 7.1 OS at the 2012 CES. Users with a BlackBerry Curve 9360 or 9380 smartphone will find a nice surprise with the update: FM radio.

Also at the 2012 CES, iBiquity Digital highlighted expanded support for HD Radio from automakers. Bentley, BMW, Mini, Rolls Royce, Scion and Volvo all offer HD Radio as standard equipment across their entire vehicle line-ups. Other OEMs have committed to offering the technology as standard on specific models. For a full list of automakers, visit RadioMagOnline.com.

FCC Releases Fifth EAS R&O

The Federal Communications Commission has released the Fifth Report and Order on the Emergency Alert System (EB Docket No. 04-296). The main thrust of the rulemaking is to further implement the Common Alerting Protocol into the EAS rules and to streamline the existing Part 11 Rules.

With the order, the FCC codifies in detail the general obligation the Commission adopted in the Second Report and Order in this docket to require EAS participants to be able to receive CAP-formatted messages. This will enable EAS participants not only to receive CAP-formatted alert messages, but also to redistribute those messages in the legacy EAS format over the current broadcast-based EAS. Specifically, CAP-formatted EAS alerts will be converted into and processed in the same way as messages formatted in the EAS protocol and will be used to generate enhanced visual displays for the viewers of the EAS station processing the CAP message.

For more on this R&O check out the Viewpoint column in this issue or visit RadioMagOnline.com

Audiovox Intros Table-top/Portable HD Radio Receivers

Audiovox Electronics announced the introduction of the company's first line-up of HD Radio-enabled home and portable products that will be marketed under both the Audiovox and Acoustic Research brands.

Acoustic Research will introduce two table top units: the iHD-TR01 and the iHD-TR02. The iHD-TR01 features an iPhone/iPod Dock, iTunes tagging, and a tray loading CD player. The iHD-TR02 is a derivative model.

The Audiovox brand will have the iHD-A01, with an iPad/iPhone/iPad docking speaker system, with HD Radio/FM sStereo, and iTunes tagging. Additionally from Audiovox is the iHD-BB01, an HD Radio/FM stereo boom box, including a top-load CD player and iTunes tagging.

Also from Audiovox are two new HD Radio Portable Players: the iHD-P01, with an MSRP of $59.99. The iHD-P02 is the step-up model and includes the Artist Experience feature.

FIND THE MIC AND WIN!

Tell us where you think the mic icon is placed on this issue's cover and you could win a Hosa USX-100 mic-to-USB interface. Send your entry to radio@RadioMagOnline.com by March 10. Be sure to include your guess, name, job title, company name, mailing address and phone number. No purchase necessary. For complete rules, go to RadioMagOnline.com

Easy to use, Easy on the Budget

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LOGITEK

DIGITAL CONSOLE

In a world of ultra-complex operating systems (just look at your smartphone), sometimes simpler is better. Logitek's Pilot brings you the operational features you need with an almost non-existent learning curve.

Available in configurations with 6, 12 or 18 faders, the Pilot surface offers intuitive controls for bus and source selection, a Cue switch over every fader, built-in cue speaker, and 16 character source names on bright, wide angle displays. It includes 12 user-configurable soft keys along with a Quick Route button for fast selection of program, aux and user defined monitor sources. Its tabletop design allows you to use it anywhere or move it out of the way when not needed, and its economical price works well even with tight equipment budgets.

Even the most simple to operate console doesn't have to sacrifice on features. The Pilot offers easy, intuitive operation backed by the power of the Logitek JetStream Mini, a powerful 128-channel user-configurable audio node that handles all console functions as well as IP audio networking. Mixing, routing and processing along with buckets of mix-minus are all contained in a single fanless, convection-cooled 2RU enclosure.

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EAS Gets an Update

Jan. 10 will be a day the EAS crowd remembers. That's when the FCC released its fifth report and order on EAS and the Common Alerting Protocol (CAP). The 130-page R&O addresses many of the ongoing concerns with EAS, but there are still a few details that are not yet settled. So what's new? Here's an overview.

Some of the more recent EAS questions involve CAP and its details. Stations have been required to be capable of receiving CAP-encoded alerts for a few months, even though few emergency management agencies can actually send them, but questions still remain. One hotly debated element of CAP was the requirement for stations to be able to receive CAP-formatted messages from state governors. The fifth R&O eliminates this requirement.

Another burning question related to EAS participants was the use of CAP converters, rather than purchasing a new EAS unit with CAP capability. The converters essentially translate the CAP data for a legacy EAS unit to understand. Until the R&O, it was unclear if EAS participants could use these converters, referred to as intermediary devices, to fulfill their CAP obligation. Now they can.

The EAS CAP Industry Group (ECIG), a consortium of EAS manufacturers and service providers, prepared the CAP Implementation Guide (IG) to help broadcasters and alert originators apply CAP capabilities into the existing EAS. This R&O recognizes that group's Implementation Guide as the accepted method to convert CAP-formatted messages into the legacy EAS format. The ECIG IG is also rolled into the FCC's established certification scheme.

With the introduction of CAP, FEMA created an Integrated Public Alert and Warning System feed for federal CAP-formatted alert messages. This information is distributed via the Internet. The new rules require EAS participants to monitor this feed. Some stations have argued that Internet service is not always readily available or reliable to all EAS units. In those cases, the FCC will waive the monitoring requirement.

But the new rules are not solely about CAP.

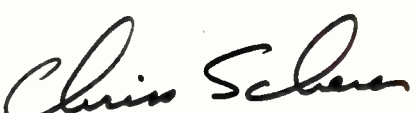
The EAS Operating Handbook, which is supposed to be a thorough guide for stations to implement EAS, has known shortcomings and errors. An update for the Handbook is still in the works, but the FCC is waiting until the results of the Nov. 9, 2011, national EAS test are reviewed before making changes.

That test used the Emergency Action Notification (EAN) code, which is intended for a Presidential alert. The rules included an Emergency Action Termination (EAT) code, which never really fit the EAS plan, since an EAN would include its own end-of-message tone. The R&O eliminates the EAT.

A lingering question about the legacy EBS alert tone was addressed. This tone is required to run at least 8 seconds, but had no set maximum length. Stations adopted 8 seconds as their de facto standard. The R&O now stipulates the attention tone to be no more than 8 seconds, which essentially defines the length.

And there are two lesser changes to the EAS rules. First, the Non-Participating National (NN) EAS station designation has been eliminated. Only a handful of stations applied for that status, so the FCC deemed it unnecessary. The other minor change is semantic: EAS locations to date have been referred to as FIPS (for Federal Information Processing Standard) codes. These codes remain in place, but the FCC now uses the American National Standards Institute (ANSI) system to define the same locations with the same codes. FIPS codes are now called ANSI codes.

The fifth R&O is not complete in addressing all the known issues with EAS and CAP, and some issues have been tabled until a later date. But the R&O finally addresses many of the long-standing concerns about EAS.



Chriss Scherer | Editor

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THIS CODEC HAS BEEN THROUGH TWO WARS, MULTIPLE ELECTIONS, FLOODS, FAMINE, EARTHQUAKES, HURRICANES, MARATHONS, CHAMPIONSHIP GAMES, REGATTAS, LOTS OF CONCERTS AND WAY TOO MANY CLUB EVENTS TO ADMIT.

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Method of Moment Modeling

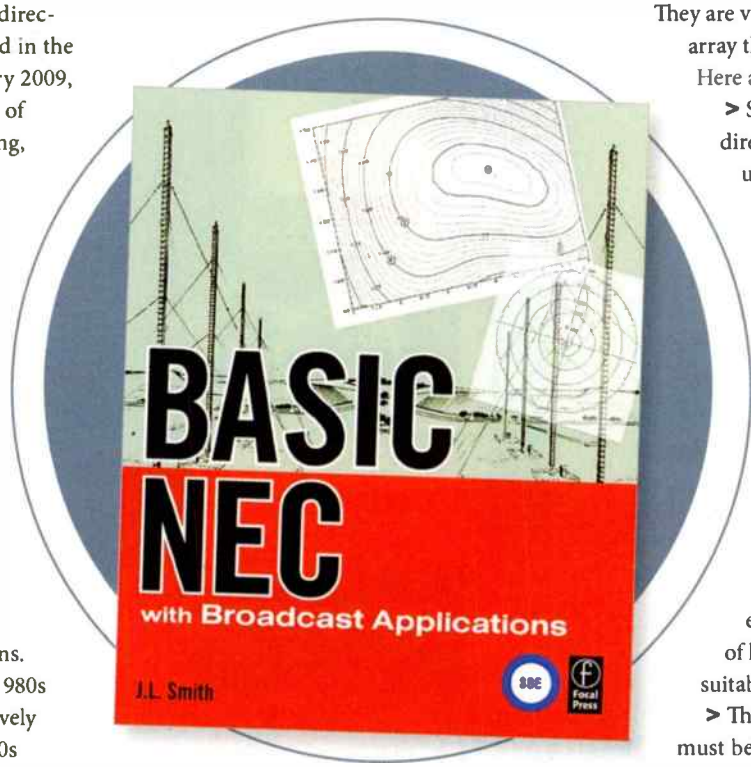
by Kevin McNamara

It seems like yesterday, long before there were handheld GPS units, smart phones and even Google Maps that my staff and I were prepping for another set of proof of performance measurements. Drawing radials, plotting points and digging through the mostly unreadable original proof of performance that provided concise directions to points that were now located in the middle of a new freeway. In February 2009, the FCC formally permitted the use of Method of Moment (MoM) modeling, which allows the use of specialized software to predict the patterns of AM arrays, assuming they meet certain criteria.

COMPUTATIONAL ELECTRO-MAGNETIC MODELING (CEM)

The theory behind determining the behavior of electromagnetic energy utilizing computer modeling techniques has been around since the 1950s, although having the computational horsepower to process the calculations was limited to very few government and academic institutions. CEM became more practical in the 1980s with the introduction of small, relatively inexpensive desktop PCs. In the 1960s scientists and engineers devised computational electromagnetic codes that were used in the development of military and commercial satellite antennas. The computer program was named Antenna Modeling Program in the early 1970s. As the program was enhanced to support a broad range of military applications, the name was changed in 1977 to Numerical Electromagnetics Code (NEC). You may recognize, or even have used the modern version of this program of which many variations of the original program is offered as free open source software package called MiniNEC.

There are websites that offer free and low-cost versions of the full NEC package as well. While the basic algorithms of the NEC code is used in the various versions, the major difference in these packages are typically the design of the user interfaces, which are tailored to a specific type of design objective (i.e. Yagi antennas). If you haven't had a chance to use one of the versions of NEC, I would suggest you search the net and download a copy, particularly if you are interested in antenna design or and amateur radio operator looking to "home-brew" something. There is also a great deal of free documentation and tutorial for these programs online.



The Numerical Electromagnetics Code is the basis of the Methods of Moments proof. This SBE publication provides more details.

DOES YOUR ANTENNA SYSTEM QUALIFY?

The specific requirements for performing a proof of performance using MoM are spelled-out in 47CFR73.151(c) of the FCC regulations. They are very specific as to the type of antenna array that qualifies for MoM modeling. Here are the key points to consider:

> Series fed or top-loaded series fed directional antenna systems only. Folded unipole and sectionalized antennas are excluded.

> Standard (buried) ground system per 47CFR73.189(b)(4), which states:

"The ground system should consist of buried radial wires at least one-fourth wave length long. There should be as many of these radials evenly spaced as practicable and in no event less than 90. (120 radials of 0.35 to 0.4 of a wavelength in length and spaced 3 [deg] is considered an excellent ground system and in case of high base voltage, a base screen of suitable dimensions should be employed."

> The tower spacing and orientation must be within 1.5 electrical degrees (at the operating frequency of the station) of the original approved locations. This must be surveyed and certified by a licensed surveyor. Any variation from this could be corrected with a subsequent application for construction permit to change the physical and/or operating parameters, providing no interference is created. Formerly licensed facilities are exempt from the survey requirement providing there has been no change in the authorized or theoretical pattern.

If using base sampling, you are required to perform base impedance measurements on each tower with the other tower(s) open or short-circuited. The modeled tower impedance must agree with the measured impedance ±2Ω and ±4 percent of resistance and reactance.

Impedance measurements must also be performed on sample lines with the sample device connected. 47CFR73.155 (a) describes the requirements for both base current and sampling loop methods.

Typically MoM modeling of an antenna is represented by one or more vertical wires, which represent the actual radiator. The FCC permits a variation of the modeled tower to be 75 percent to 125 percent of the physical tower height.

Adjust the antenna monitor to agree with the data derived from the measurements performed for the MoM matrix. 47CFR73.151(c)(2) states "The computer model, once verified by comparison with the measured base impedance matrix data, shall be used to determine the appropriate antenna monitor parameters."

The antenna monitor must be calibrated per the manufacturers test procedure and a certificate or statement of calibration must be submitted with the application.

The appropriate fees must be submitted with the application for approval to use the MoM proof of performance going forward.

YOU WILL STILL NEED TO MAKE SOME MEASUREMENTS

Even after you have been approved to use the MoM proof of performance, there is still a requirement to establish and document a minimal amount of monitor points along radials that define the minimum and maximum areas of the pattern. 47CFR73.151 (3) states "Reference field strength measurement locations shall be established in directions of pattern minima and maxima. On each radial corresponding to a pattern minimum or maximum, there shall be at least three measurement locations. The field strength shall be measured at each reference location at the time of the proof of performance. The license application shall include the measured field strength values at each reference point, along with a description of each measurement location, including GPS coordinates and datum reference."

You will also need to recertify the antenna monitoring system every two years in order to be in compliance with the current rules.

The question of whether the expense of converting to the MoM proof is worth it depends on many factors, including the age of your system. Typically this would make the most economic sense for newly constructed systems or older systems that are updating RF infrastructure; however existing operations with limited technical resources may also find the savings in time alone worth the initial effort.

McNamara is president of McNamara Associates, Cape Coral, FL.

Potentially Sticky Political Pitfalls

by Lee Petro

Last month, this column provided a brief refresh of the political advertising rules, and mentioned that we would be covering some of the pitfalls confronting broadcasters this month. With the basics now under our belt, the following is a discussion of several potentially sticky situations broadcasters should try to avoid.

Package/Bonus Spots: Most stations offer long-term advertising packages to their frequent customers. These package deals may be priced to include extra spots, or reflect a "bulk rate" discount. In either case, a station must consider these long-term packages when calculating its lowest unit rates during the political window. Even if a candidate only wants to order a small number of spots, the candidate is entitled to the discounted rate for the same class and time.

Under these circumstances, the station must allocate the rate charged for the spots running within the package's term among the various classes and determine each spot's portion of the package price. That is the rate used for that particular class of time to determine the lowest unit charge for candidates during the political window. The allocation can take into account the relative value of the spot over the term, i.e., higher value for those spots aired during the time of year when the demand is greater. But since the allocations must take place when the packages are purchased, if stations are taking long-term orders that will run through the primary or general elections, make sure that the necessary steps are taken now.

Web-based Advertising: A frequent component of the packages discussed above include advertising on a station's website. While it is obvious that a station's website is largely outside the routine regulation of the FCC, certain actions taken by a radio station must be considered in connection with political advertising placed on the station's website.

In particular, if a station includes Web-based advertising in a package with on-air advertising, the Commission has advised that an advertising package that includes a station's website must also be available to a candidate's competitor. While this may seem odd, the Commission's policy has always been that competitors must be treated alike, and extra benefits made available to one candidate must be made available as part of the equal opportunities made to that candidate's competitor.

Furthermore, while a station is prohibited from censoring on-air political ads by legally qualified candidates, and thus enjoys immunity from charges of slander/libel or copyright violations, if those advertisements are placed on a station's website, such immunities do not apply. As with on-air advertisements on non-candidates, a station must pay close attention to the content of website advertisements to ensure that the content does not create liability for the station. If a station receives a complaint, it should contact the party placing the advertisement for support to back its claims. If, after a reasonable review, the station believes the complaint to be valid, it should pull the advertisement.

Public Files: Timely disclosure of the spots purchased by candidates is very important, especially during the run-up to voting day. As such, stations should take steps to ensure that information relating to the purchase of time, including the rate, date, time and class of time, and the name of the purchasing agent (candidate, committee), is placed immediately in the station's political file within the public inspection file. These disclosure policies also apply to third-party, non-candidate orders, along with the disclosure of the group, and the names of its executive officers or directors. While an opposing candidate is not entitled to updates from the station's staff, if the station advised one candidate over the phone of recent purchases of time, than the station must also provide such updates to the other candidates in the same race.

Hopefully, this discussion has raised some factors that will help you navigate the upcoming political season. You should contact your communications counsel if you have any questions.

Petro is of counsel at Drinker Biddle & Reath, LLP. Email: lee.petro@dbr.com.

DATELINE

Feb. 16: Stations in Indiana, Kentucky and Tennessee continue running License Renewal Pre-Filing Announcements, continuing on March 1 and 16.

April 2: Stations in Indiana, Kentucky and Tennessee file License Renewal Application and EE O Program Report.

April 2: Noncommercial radio stations in Delaware, Indiana, Kentucky, Pennsylvania, and Tennessee file their Biennial Ownership Report (FCC 323-E).

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IBOC Update

Data and Asymmetrical Sidebands

By Doug Irwin, CPBE DRB AMD

Ibiquity's brand of IBOC (HD Radio) has new capabilities worth studying. Let's look at two specifically: Artist Experience and asymmetrical IBOC sideband capability.

Likely you've heard or read about the capacity of HD Radio to transmit images; not moving ones, but rather artwork related to music or commercials. Officially called Artist Experience, it is really in its early stages as this is written. Here's iBiquity's official definition:

"*Artist Experience is the synchronous transmission, delivery and display of images on the receiver related to a specific audio segment. Cover art images (for example) may also include artist photos, slide shows or other images related to the song or audio being played. Commercial images related to an advertisement segment may also be displayed using this feature.*"

So how is Artist Experience implemented? For starters, an additional software application manages the image-associated data. As of this date, Broadcast Electronics TRE, Emmis Interactive/Tag Station and Jump2Go have products that format and manage this data. One common component of these solutions is an interface client known as the MSAC (multiport synchronous asynchronous client) that typically runs on a computer that can communicate with the importer via IP. (MSAC could also run on the importer itself.) The MSAC sequencer function supplies synchronization information to the studio automation system, typically including:

> Song PSD content
> Large object transfer ID
> Song play timing

In addition, it issues pre-fetch commands to get images from an image server, and it will run a schedule request/response API, which includes:

> Whether the image is a station logo or cover art or other
> Lot ID of the image (optional, generated if not supplied)
> Data file name
> Service name, HD1-AE, HD3-logo
> When the sync event will occur
> Did sync event occur

Artist Experience is a data service configured with a specific bandwidth to deliver the images. Typically the service requires 5-7kb/s to deliver images for HD1, HD2 and HD3.

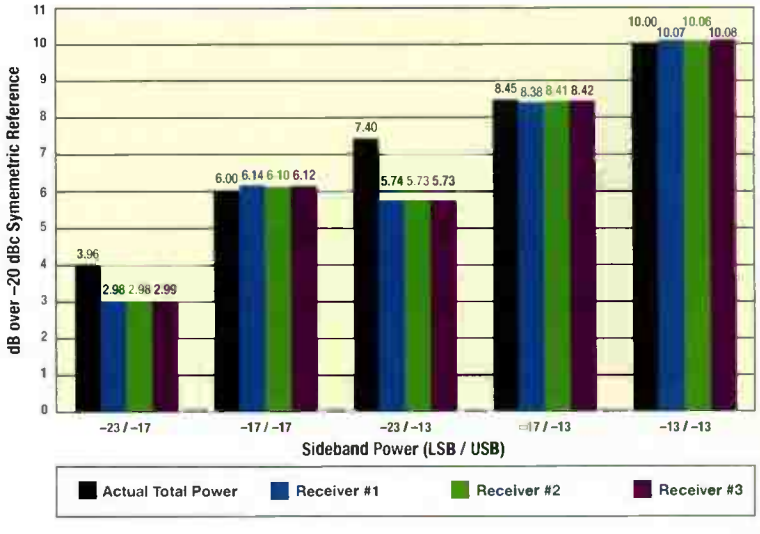
The MSAC and LOT clients were developed by iBiquity, but they are integrated into a software solutions offered by the three manufacturers mentioned above. In other words, they are sub-components used by the manufacturers to build the Artist Experience software solution. By this method, each manufacturer can build the user interface to give it their own look and feel – but the core elements are the same.

The MSAC client can be configured to manage bandwidth for all data services. This is a configuration that iBiquity refers to as a multiport configuration.

The images themselves are limited in size to 24KB in a JPG or PNG file format. The resolution on the end-user device of 200px × 200px.

Importers must use v4.3.1P1 or later. Automation systems must incorporate HD Radio HDP PSD SDK v4.7 or later; and, according to iBiquity "All of the major automation manufacturers (examples: BE AudioVault/TRE, Arctic Palm, David, Dalet, ENCO, Jump2Go, MediaTouch, RCS, WideOrbit) have Program Service Data (PSD) generator options for their current product offerings. Some automation system software may require upgrades to incorporate the new feature."

Figure 1: P1 Partition Equivalent Asymmetric IBOC Sideband Power (No 1st Adjacent Interference)



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So how does this extra information gets transmitted outbound via IBOC? Artist Experience images fall under the category of Advanced Data Services, which the NRSC defines as:

Advanced data services provide broadcasters with the ability to transmit information that may be unrelated to MPS, SIS or SPS. These services can carry any form and content that can be expressed as a data file or a data stream, including audio services. Examples of such services include (i) visual effects associated with MPS, SIS, or SPS services; (ii) multimedia presentations of stock, news, weather, and entertainment programming including audio, text and images; (iii) broadcast updates to in-vehicle systems; (iv) local storage of content for time shifting and later replay; (v) targeted advertising; (vi) traffic updates and information for use with navigation systems; and (vii) subscription or free-but-limited-access services using conditional access.

Your exporter and exciter need to be at the correct software version as well, specifically v4.3.2 (or later) Image Support Client/Automation software based on LOT SDK v4.3.3.

And yes, there are receivers in the field that will show "artist experience" images. One example is the JVC KW-NT3HDT; two other JVC models were introduced at CES 2012. (The day this was written, over a dozen online stores offered this radio for sale.) Volkswagen claims to be the first to offer artist experience, and it will be available in selected 2012 models. And finally, there is the Insignia NS-HD02 portable, though as I write this, that unit appears to have limited availability.

TO THE SIDEBANDS

Let's shift gears now and talk some about asymmetrical IBOC sidebands. Why is this necessary to begin with? To answer that, just a small snippet of the Commission's own reasoning in their public notice (regarding MM 99-325) from Nov. 1, 2011:

A significant number of FM stations currently are precluded from taking advantage of the full 10dB digital power increase [from -20dBc to -10dBc] *permitted by the Order* [of Jan. 29, 2010] *due to the presence of a nearby station on one but not both of the two first-adjacent channels. If asymmetric digital sideband operation is permitted, such stations presumably could increase their digital power on the sideband away from the limiting station.*

So now with a reason to go ahead with this new facet of IBOC, two questions are rather obvious. What if anything will this do to plain old FM (analog) reception? And how effective is

the transmission of asymmetrical sidebands with respect to the IBOC reception? Studies were undertaken to answer both of these questions.

Nautel engaged NPR Labs to perform laboratory testing on its peak-to-average-power reduction algorithm (PAPR) HD Powerboost. The purpose of the testing was to see how this PAPR affected FM reception of the host station. During the same tests, the effects of asymmetrical sideband transmission were also tested. I should mention also that the tests were performed operating in MP3 (extended hybrid) mode which adds an additional set of partitions for OFDM carriers closer in to the host frequency. This was done because it represents a tougher set of test conditions than that of MP1 mode. Also, the tests utilized automotive, home stereo and shelf system receivers for analog FM compatibility tests and an analog automotive receiver for RBDS performance tests.

The entire report is available online. Here's a summary of the results:

In comparison with conventional IBOC operation, Nautel's PAPR had little or no measureable effect on the performance of analog test receivers, even with the highest-tested asymmetrical digital sideband ratios of -10/-20dBc.

Asymmetrical operation reduced the audio noise level of the home receivers by up to 3dB as either sideband was reduced

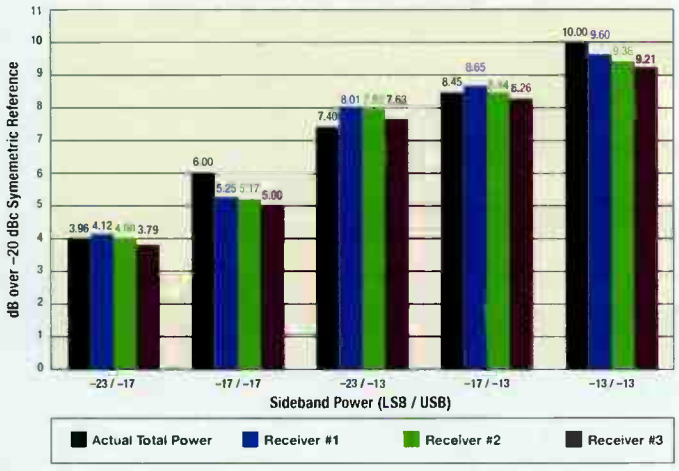
RBDS reception sensitivity with mobile fading was slightly affected by -10dBc symmetrical sidebands, but showed improvements similar to analog FM reception with asymmetrical operation

The report was directed by and submitted by John Kean of NPR labs, and after a detailed analysis of the measurement data (seen near the bottom of page 10) the report states: "In sum, broadcasters are best off maintaining symmetrical sideband levels, but coverage improvements are possible with an increase of only one sideband."

To answer the question regarding the performance of the digital receivers, we look to iBiquity's report published in December 2011, which is also available online.

This report was undertaken to see how the transmission of asymmetrical sideband power would benefit digital receivers in terms of the digital signal-to-noise ratio. It was done in the laboratory using three particular chipsets that iBiquity characterizes as being typical in both the OEM and aftermarket: the ST Micro STA-680, the Texas Instruments Jacinto, and the NXP SAF3560. The tests were done with IRSS 4.4.x

Figure 2: P1 Partition Equivalent Asymmetric IBOC Sideband Power
(6 dB DU 1st Adjacent Interference)



PAR v.2 (A late news update: IRSS 4.4.x PAR v.2 was delivered to manufacturers on Jan. 17, 2012).

Four sets of measurements were taken; P1 partition with no interference, and P1 partition with 6dB D/U interference on the lower adjacent channel; and P3 partition, with no interference, and with 6dB D/U interference on the lower adjacent channel. Those measurements are shown in Figures 1, 2, 3 and 4 respectively. Interpreting these is easy; along the left-hand column you see the scale is decibels over the -20dBc (legacy) reference. The black bar is the difference in power with respect to the legacy power, calculated for each LSB to USB ratio. The colored bars represent the actual measured receiver performance, in decibels, as an improvement in digital SNR.

The conclusion to be drawn from these charts is that the increase in overall digital power (even asymmetrically) does produce an improvement in the digital signal-to-noise ratio.

As this is being written, we're still in the Commission's public comment period regarding proposed changes, but its public notice said this:

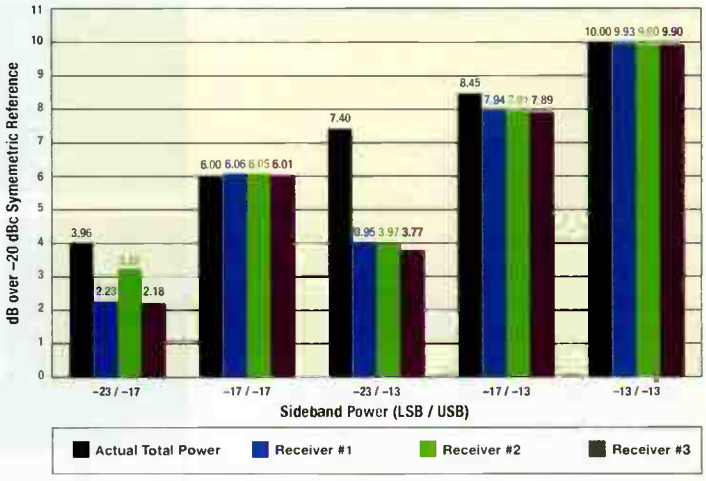
"*We tentatively conclude that it would be expedient to modify Form FCC 335-FM, currently used for Digital Notifications, to accommodate requests for increased digital power and/or operation with asymmetric digital sideband power.*" So it seems rather clear that barring some huge change in their collective mindset that allowance for asymmetrical sidebands, from the legal perspective, is coming soon.

TECHNICAL PERSPECTIVE

What about the technical perspective? iBiquity is currently finishing IRSS 4.4.x with peak-to-average reduction power reduction (PAR) v.2, which will give IBOC exciters asymmetrical capability.

Nautel's HD Powerboost gives its exciters asymmetrical IBOC sideband capability already, and the company has been shipping them since April 2011. HD PowerBoost is optional, and Nautel has also made asymmetrical

Figure 3: P3 Partition Equivalent Asymmetric IBOC Sideband Power
(No 1st Adjacent Interference)



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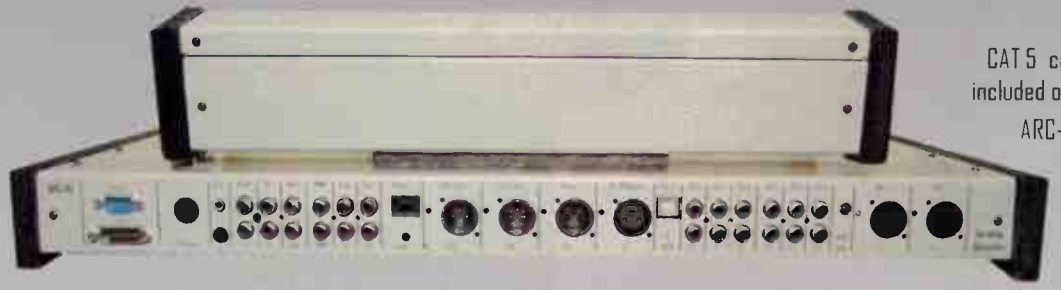

CAT 5 cables included on the ARC-10BP

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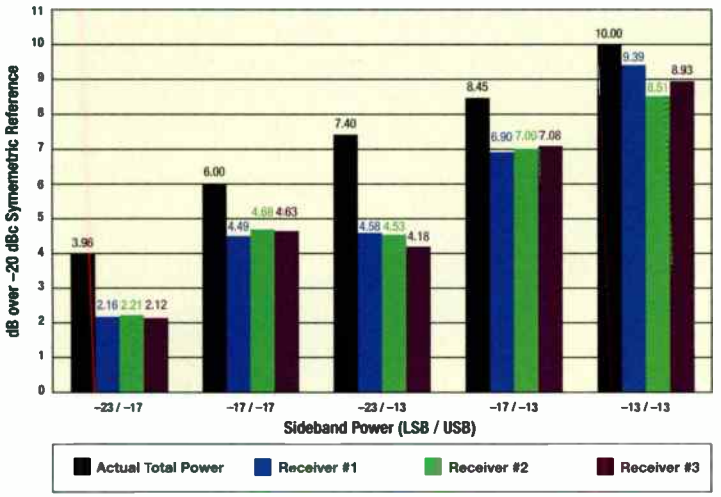
Figure 4: P3 Partition Equivalent Asymmetric IBOC Sideband Power (6 dB DU 1st Adjacent Interference)



sideband capability available for its transmitters that don't have it. The HD PowerBoost algorithm is used, but it's configured to provide a better MER, as opposed to power gain.

Harris' Flexstar exciter also has asymmetrical IBOC sideband capability, and has been shipping with this capability since the summer of 2010.

Engineers at Continental Electronics have already been working with the beta version of IRSS 4.4.x and anticipate having its own software release (subsequent to the release of IRSS 4.4.x) in time to meet the needs of their customers looking to use asymmetrical sideband power.

According to Broadcast Electronics, its VPe technology already meets the soon-to-be released IBOC asymmetrical sideband transmission standard.

Artist Experience and asymmetrical IBOC sideband capability are two of the latest features for HD Radio. I'm of the belief that every new feature should be put in service, and enhancements should be used when they provide a definite advantage. You may not be a trailblazer and perhaps you want to see this technology mature, but please don't let it pass your station by. We need to do everything we can to keep our listener attentions, no matter what it is.

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Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York.

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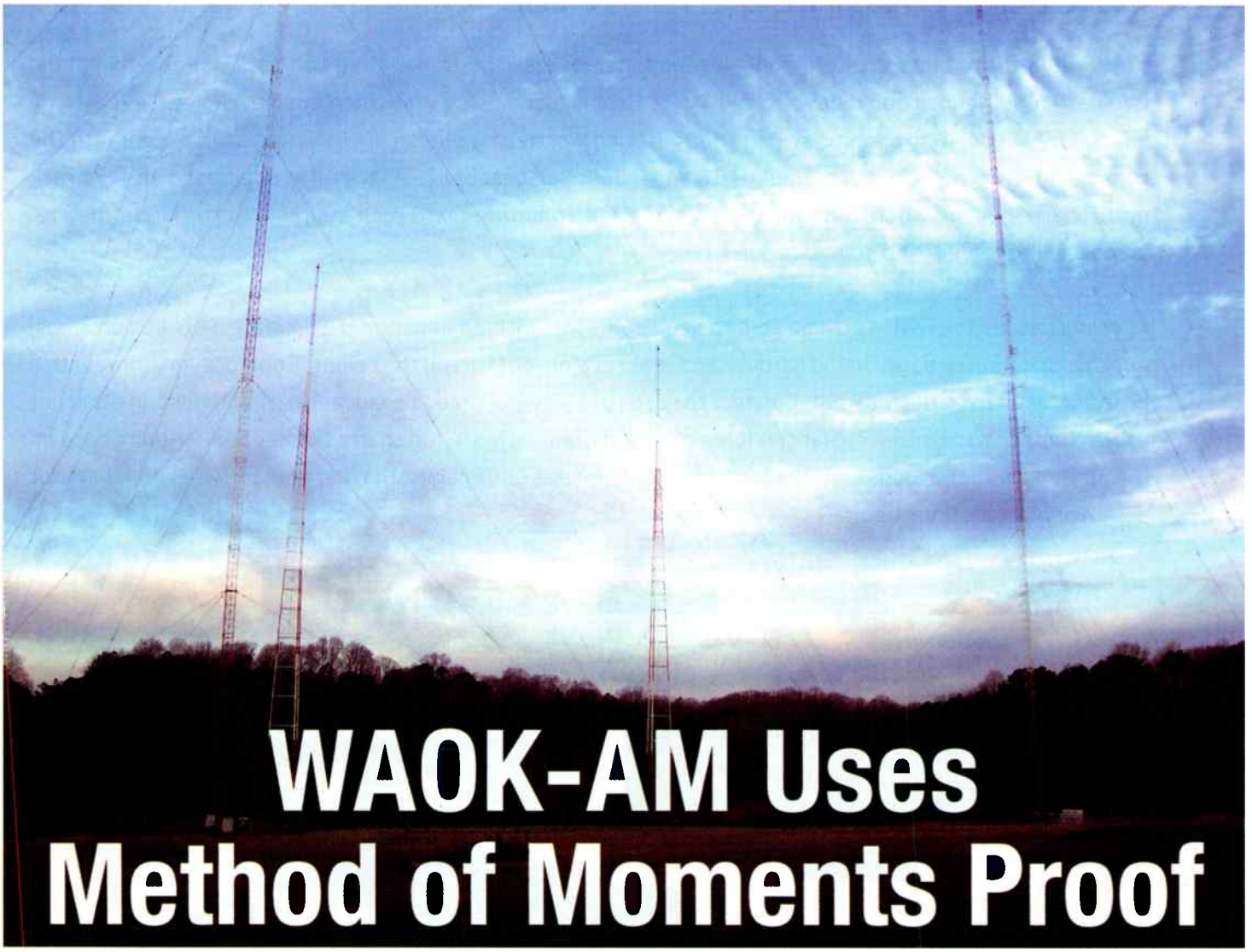

WAOK-AM Uses Method of Moments Proof

The antenna system employs Kintronic Labs VSU-1 voltage sampling units.

By Donald Crain and Thomas F. King

The FCC has allowed stations to use Method of Moments proofs, and WAOK-AM in Atlanta, is one of the first stations to implement the technology by using Kintronic Laboratories Model VSU-1 voltage sampling units. The VSU-1 was initially introduced at the 2010 NAB Show, where it received a *Radio* magazine Pick Hit. Following further development and testing, the first production units were supplied to WAOK in January 2011 for installation in its four-tower nighttime array that utilizes two self-supported and two guyed half-wave towers. A Method of Moments proof of performance of the WAOK nighttime array was conducted in March 2011, submitted to the FCC on April 5, 2011, and was subsequently granted by the FCC on June 9, 2011.

You may ask, Why use voltage sampling when current sampling has been around for so long? The window of opportunity to utilize voltage sampling to conduct a Method of Moments (MOM) proof of AM directional antenna (DA) arrays was opened as a result of the efforts of a determined committee comprised of professional consulting engineers and broadcast equipment manufacturers that persevered over a period of at least 10 years in formulating with the FCC what became FCC 08-228 MM Docket No. 93-177 dated Sept. 26, 2008, entitled "An Inquiry Into the Commission Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification." Referring to Section 73.151(2)(i) of this landmark revised rulemaking the following statement regarding voltage sampling of AM DAs can be found: "Samples may be obtained from base voltage sampling devices at the output of the antenna coupling and matching equipment for base-fed towers whose actual electrical height is greater than 105 degrees." The CBS WAOK nighttime array was an ideal candidate for voltage sampling because it utilizes half-wave towers with differing cross sections. Voltage sampling was the only avenue whereby a MOM proof of this array could be accomplished resulting

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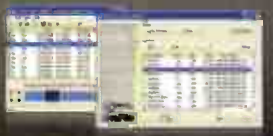

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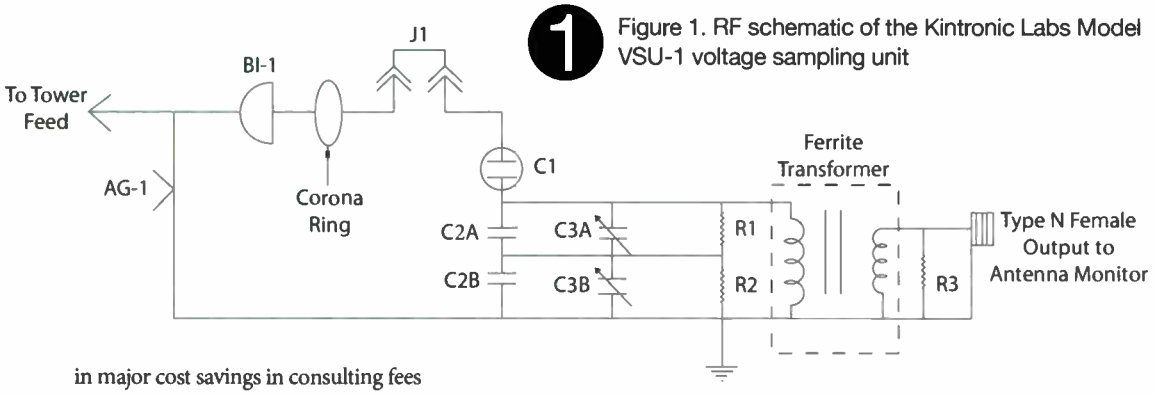


1 Figure 1. RF schematic of the Kintronic Labs Model VSU-1 voltage sampling unit

in major cost savings in consulting fees compared to the cost of full multi-radial proof of performance. As the towers are greater than 120 degrees in height, but shorter than 190 degrees, the array does not qualify to use base current sampling. Because the towers are not identical in cross-section, sampling loops cannot be used. In addition, the requirement to have monitor points was eliminated and the sampling system could be maintained on the ground as opposed to having to send up tower riggers to maintain sample loops and the associated sample lines.

The VSU basic design is attributable to Ronald D. Rackley, PE, who provided to Kintronic Labs and other manufacturers a technical treatise on a prototype design that he developed to spur interest in further development of a marketable voltage sampling unit. The design includes a capacitive voltage divider coupled into a ferrite transformer the output of which is designed to drive a 50Ω load (See Figure 1.)

A Model VSU-1 unit installed at the base of one of the four towers in the WAOK array

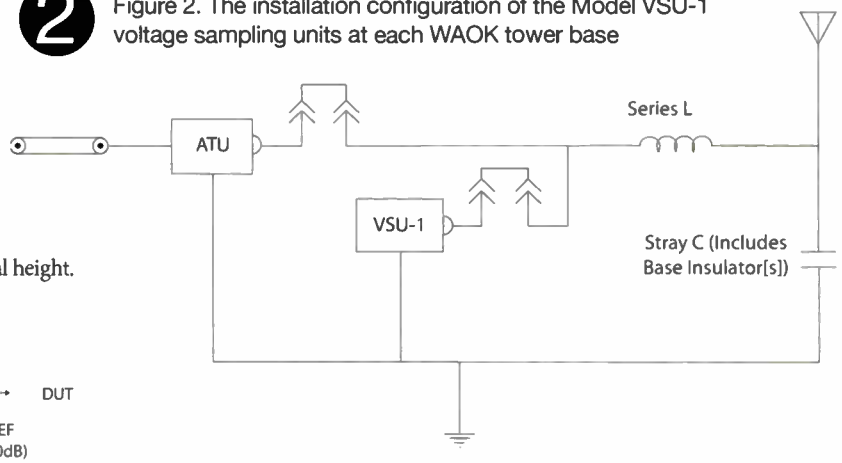
WAOK MOM PROOF METHODOLOGY

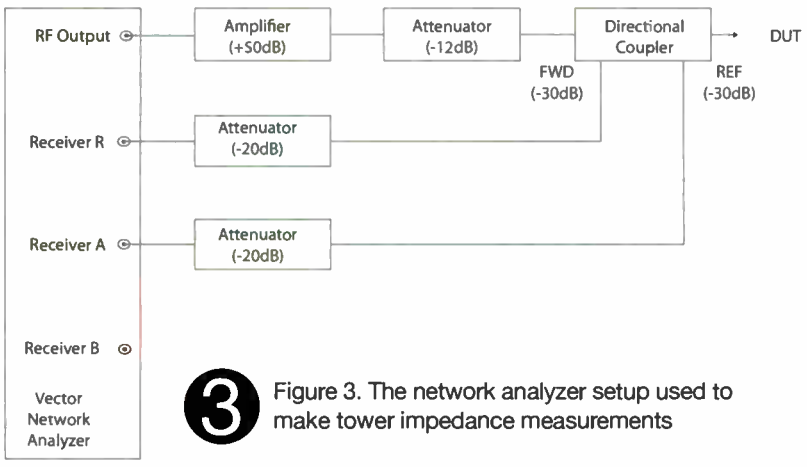
Following the installation of the voltage sampling system in the WAOK array Don Crain visited the site to conduct phase 1 of the MOM proof process. All the WAOK towers are 179.3° electrical height. Towers 1 and 2 are fixed cross-section guyed towers each having a facewidth of 30.25". Towers 3 and 4 are tapered cross-section triangular self-supported towers having a base cross section of 24.75' tapering to a cross section of 30.25" at the 290' level and having a fixed cross section of 30.25" for the top 65'. Robert LaFore, the CBS Atlanta market chief engineer, had to arrange for a tower rigger to climb one of the self-supported towers and measure the facewidth as a function of height due to the lack of any tower drawings at the station. This information was critical for the tower modeling effort required for the MOM proof.

Upon arrival at the station Crain measured the impedance of each tower with the other towers either open or shorted. Figure 2 shows the tower base installation configuration for the voltage sampling units.

A four-port network analyzer with an RF power amplifier and a Tunwall Radio directional coupler based on the technique developed by Ron Rackley was used to make the measurements as shown in Figure 3.

2 Figure 2. The installation configuration of the Model VSU-1 voltage sampling units at each WAOK tower base





3 Figure 3. The network analyzer setup used to make tower impedance measurements

The impedance measurements were made at the tower side of the open J-plug in each VSU unit as shown in Figure 2 with the ATU output J-plug open as well. The impedances measured for the shorted case are shown at right.

Tower 1	147.73 - j300.07
Tower 2	110.91 - j278.32
Tower 3	46.104 - j111.34
Tower 4	44.293 - j104.32

Tower	+45 Degree Offset Frequency (kHz)	+45 Degree Measured Impedance (ohms)	-45 Degree Offset Frequency (kHz)	-45 Degree Measured Impedance (ohms)	Calculated Characteristic Impedance (ohms)
1	1118.889	7.54 - j48.15	1367.531	9.18 + j48.11	48.86
2	1120.2696	7.51 - j47.81	1369.2184	9.01 + j47.65	48.44
3	1120.0725	7.45 - j47.53	1368.9775	9.00 + j47.47	48.21
4	1119.5559	7.49 - j47.91	1368.3641	9.10 + j47.92	48.66

Tower	Sampling Line Open-Circuited 90 Degree Resonance (kHz)	Sampling Line Open-Circuited 450 Degree Resonance (kHz)	Sampling Line Calculated Electrical Length 1380kHz (degrees)	Measured Impedance with VSU Connected 1380kHz (ohms)
1	246.105	1243.21	499.513	5.48 - j33.08
2	246.400	1244.744	498.898	5.42 - j33.13
3	246.725	1244.525	498.986	5.41 - j33.14
4	246.312	1243.951	499.216	5.44 - j31.91

The characteristic impedance of the sample lines was also measured using the following mathematical expression:
$Zo = \sqrt{(\sqrt{(R1^2 + X1^2)} \bullet \sqrt{(R2^2 + X2^2)})}$

With R1 + X1 equal to the measured impedance at the +45 degree offset frequency and R2 + X2 equal to the measured impedance at the -45 degree offset frequency.

The results of the sample line characteristic impedance measurements are shown on the next page in green.

In addition Crain conducted measurements of the sample line electrical lengths that were derived by measuring the open circuited 90 degree and 450 degree resonance frequencies. The results are shown below in blue.

The measured characteristic impedance and electrical length variations relative to the average are less than ±1 percent and ±0.5 degrees. Based on these measured data, Crain returned to his office to develop a computer model for this complex array using MININEC Broadcast Professional V14.5 software. Each of the four towers were modeled using 19 segments with the tower 1 and 2 segments having a uniform length and radius and towers 3 and 4 being modeled in a graduated diameter stacked cylinder approach where the bottom segments had longer segments and larger radii with uniform segment and radius at the top fixed cross section portion of

the tower. The tower spacings and orientations from the FCC database were identical in the self-impedance and DA models. The segment lengths and radii were varied while maintaining the tower height as constant to converge on modeled tower impedances with the other towers shorted that matched the corresponding measured impedances. A table of the final modeled segments for towers 3 and 4 are shown in the red table at right.

Following the completion of the tower models the final segment data was input into the MININEC Broadcast Professional DA model. The drive

Tower	Model Current Pulse	Model Voltage Magnitude (amperes)	Model Voltage Phase (degrees)	Model Drive Impedance (ohms)	Model Drive Power (watts)
1	1	1218.04	2.8	129.67 - j335.46	1487.32
2	20	1160.18	82.7	81.076 - j411.30	620.97
3	39	573.908	22.2	74.466 - j217.49	464.129
4	58	593.784	-85.1	72.681 - j102.29	1627.58

Tower Segment	Physical Height (degrees)	Model Height (degrees)	Model Percent of Height	Model Radius (meters)	Percent Equivalent Radius
3-1	22.72	24.5376	108.0	3.3479	100
3-2	22.719	24.5365	107.999	2.8398	100
3-3	17.671	19.0847	108.0	2.3881	100
3-4	15.146	16.3577	108.0	2.0212	100
3-5	12.622	13.6317	108.0	1.7106	100
3-6	10.098	10.9058	107.999	1.4566	100
3-7	10.097	10.905	108.002	1.2308	100
3-8	7.573	8.179	108.002	1.0332	100
3-9	7.574	8.18	108.001	0.8638	100
3-10	7.573	8.178	107.989	0.6944	100
3-11	7.573	8.179	108.002	0.525	100
3-12	5.049	5.453	108.002	0.3839	100
3-13 to 3-19	4.6979	5.0737	107.999	0.3274	100
3 Overall	179.3	193.644	108.0		100

Tower	Drive Impedance at VSU (ohms)	Voltage Magnitude at VSU (volts)	Voltage Phase at VSU (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase
1	106.92 - j267.83	1075.607	5.4851	103.1	-78.7
2	53.19 - j286.19	994.7057	84.1663	100.0	0.0
3	44.78 - j159.26	532.5842	23.3579	53.5	-60.8
4	56.60 - j71.77	490.1382	-77.5847	49.3	-161.8

impedances, power division and operating parameters for the required pattern were derived using FCC database theoretical information for operational constants. The table in green shows the final computed results.

Now taking into consideration the measurement derived series and shunt tower base reactances the corrected self impedance at each of the VSU measurement locations was computed using the WCAP network analysis program developed by Jerry Westberg. With equal length sample lines the operating parameters are equal to the base sampled voltages and phases. The final derived operating parameters are shown in the blue table above.

At this point it was time to return to the station and adjust the array to the predicted parameters. The previous measured proof monitoring points were used as reference points for the MOM proof. Following adjustment of the array to the predicted parameters all of the measured proof monitoring points were found to yield a reduced field intensity with the MOM proof parameters. This process was accomplished in record time compared to the weeks that typically would be involved in collecting multiple radial field intensity measurements followed by an exhaustive report. As stated earlier, the MOM proof was filed on April 5, 2011, and the license was granted on June 9, 2011.

We want to affirm with anyone considering the use of these voltage sampling units that they are resilient in lightning environments as attested to by an unsolicited report from Robert LaFore, the WAOK chief engineer.

"The VSUs are indeed coping with lightning very well. I just had a tower crew on tower 3 of the WAOK array. The insides of the beacon assembly are pretty much vaporized, and the wiring to that beacon is melted and charred badly. Paint is gone on the top of the tower. At the same time we lost several microswitches at tower 3. The VSU is showing nice steady numbers night after night."

When this report was prepared we had no reports of any problems with the Kintronics voltage sampling system.

The authors thank Ron Rackley for his exceptional involvement in the development of the voltage sampling units and in his oversight of the MOM proof.

Crain is principal of M. Donald Crain, Inc, Boiling Springs, SC. King is president of Kintronic Labs, Inc., Bristol, TN.

Data in CAP, More on Ferrites, and Unique USB Chargers

by Doug Irwin
CPBE DRB AMD

HOW MUCH DATA IN CAP?

Now that the IPAWS OPEN server is on-line, it makes sense to get your CAP-enabled EAS equipment going. It's quite likely that your EAS system location already has Internet access; if not, it must by the end of June. But what if your only choices for Internet access are slow or limited in cumulative data over the course of a month? For an efficient system, make sure the polling you do is simply for the short update message. That message will include:

KEEP IT SIMPLE

1. A unique ID
2. A link to the entire message
3. A time stamp
4. A list of states affected
5. The EAS event code

Your EAS device should use its configuration to determine whether or not it wants to download/use entire messages. Assuming the short update length is 250 bytes, and you poll for updates twice per minute, you would have: 250 × 2 × 60 × 24 × 30 = 21.6MB total data (for a 30-day month). If you wanted to download the audio from the RWT, add in another 4MB (since the audio for the RWT will be around 1MB, four times per month) for a grand total of 25.6MB per month. Thanks to Harold Price of Sage for this information.

A BIT MORE ON FERRITES

The discussion on ferrites and how to use them (November and December 2011 Tech Tips) seems to have hit home with many of fellow broadcasters out there. In fact, my friend Clay Freinwald from Seattle wrote me:

"I trust I am like most and have a collection of these gizmos (ferrites) left over from previous projects or things I have scrapped. For me, they end up in a drawer. The real issue here is what is the core material and how will it perform at AM or FM frequencies? Then again even if the material has a label (not likely) how do you know what that means? Sure it's easy to go out and buy something that's pre-packaged (and labeled), but what about the collection in the drawer in your shop?" Clay forwarded this link regarding a method of identifying the ferrite mix: www.home.earthlink.net/~w6rmk/ferrite.htm

You'll have to have an impedance bridge (and signal generator) for that method.

Another good one I found with a little search is this: www.alan.melia.btinternet.co.uk/toroids.htm.

This one explains how to tell using either a grid dip oscillator or a plain LCR meter.

Another useful resource regarding ferrites: www.cwsbytemark.com/CatalogSheets/Ferrite_datasheet_oct06/FR_MATL.pdf

And finally, by way of the pub tech message list: a source of the large ferrite "donuts" that go around transmission lines: www.mag-inc.com/home/Advanced-Search-Results?pn=j4974.

FOR WANT OF A USB CHARGER

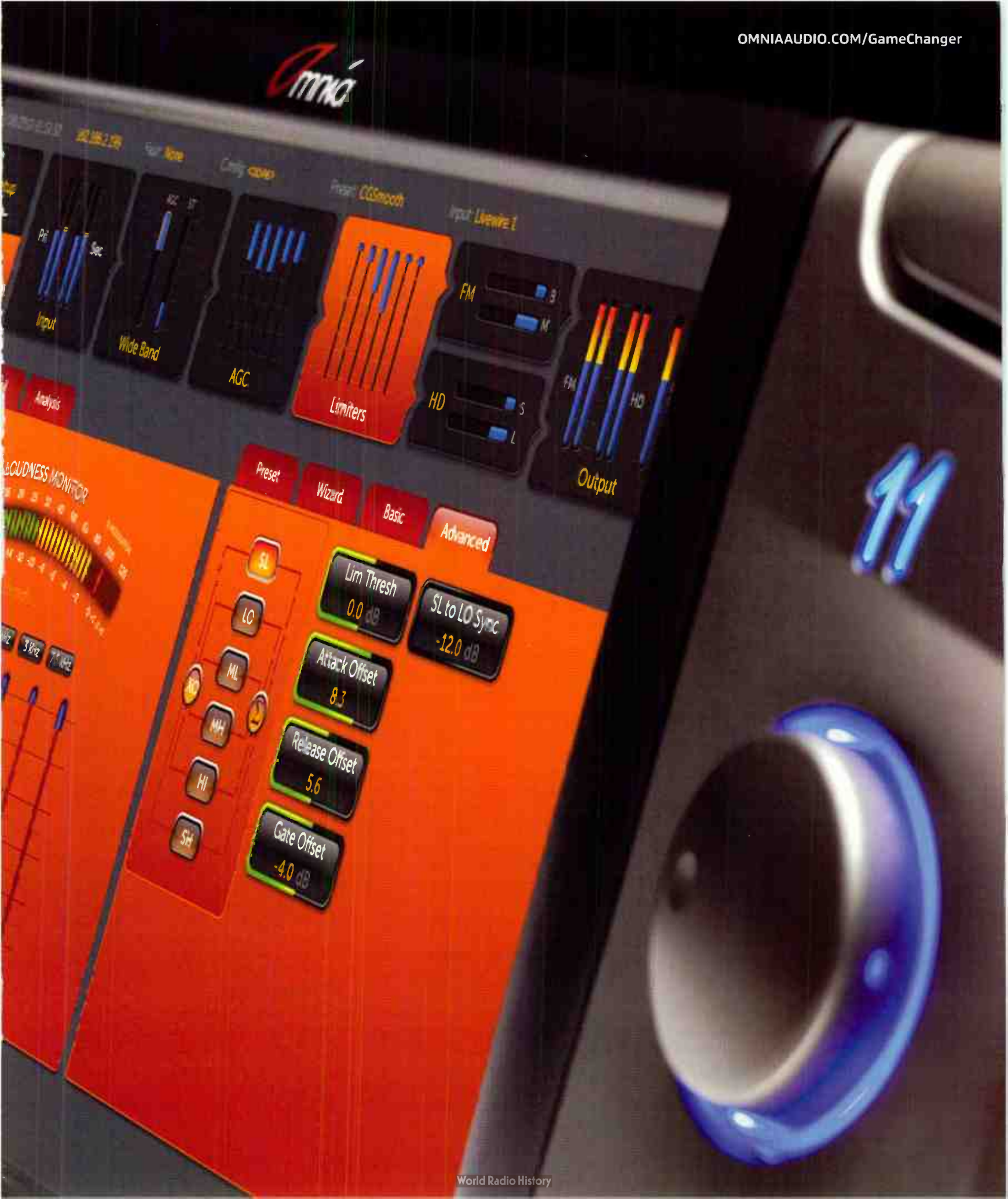
How many times has this happened to you: You've been at the transmitter site all day, and your cellphone battery has run down because cell coverage at transmitter sites is often horrible. You left the charger somewhere else because you didn't plan on being at the transmitter all day. There is an elegant solution to lugging around an extra charger: USB charger built-in in to an ac outlet plate. (store.fastmac.com/product_info.php?products_id=458)

Don't want to spend the money on what seems like a simple idea? Fine. In the broadcast tradition roll your own. (www.instructables.com/id/Outlets-of-the-Future-aka-in-wall-USB-Charger/).

WE NEED YOUR TIPS

Tech tips may be suitable to earn SBE recertification credits. Send your tips to radio@RadioMagOnline.com.

Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York. Contact him at doug@dougirwin.net.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Attack Offset
8.3
Release Offset
5.6
Gate Offset
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World Radio History

Tieline Bridge-IT

by Chris Wygal, CBRE

When better-than-phone quality is needed, or a new STL is to be installed, IP is discussed more and more. In the case of the Flames Sports Network we chose the IP route for college football and basketball broadcasts, and we're relying on the Tieline Bridge-IT to get us there and back.

Bridge-IT fits into one half of one rack space. It has an LCD display and a complement of buttons and keys, making it fully configurable from the front panel. The LCD screen displays the navigation menu tree and PPM metering of input and output levels. The back panel houses XLR jacks for dual-channel analog and stereo AES3 in/out. A 1/4" jack allows for local headphone monitoring. A Phoenix plug facilitates closure contacts. Programming data is connected through USB and RS-232 jacks. A standard LAN connection is available with connection and traffic indicator LEDs. The 1A rated power supply is a typical wall-wart providing 12Vdc.

OOOEY GUI

Local control and programming is done using the front LCD display, which features an easy-to-navigate menu tree. The front panel is useful in that sometimes Web browser GUI control isn't readily available. In our experience, the GUI is used mostly for remote troubleshooting and monitoring. Most, if not all our connection procedures are achieved using the front LCD screen. Bridge-IT is also controlled via an Internet GUI. Most of the configuration features are accessible using the GUI, including primary connection and monitoring settings. The codec is controlled via USB connection as well.

While the front LCD panel on the Bridge-IT is a straightforward control feature, the Web-based GUI is a friendly navigational and control interface. Assuming the user's computer has network access to the codec, and Java is enabled, simply entering the Bridge-IT IP address will launch the GUI. The codec can be set for DHCP or static IP address configuration. Once inside, several on-screen panels display input and output audio levels, connection speed dial and contact lists, connection status and many other features.

AUDIO HOOK UP AND CONTROL

Audio input levels (analog or AES3) are adjusted via the front panel or GUI with the key feature being the 18dBu of available headroom. Simply put, input levels peak at +22dBu, making clipping difficult. The analog inputs can be adjusted to line level or microphone level to accommodate different inputs. Bridge-IT can also be set to accept unbalanced connections. 15V phantom power is also available. The AES3 inputs can accept 32kHz, 44.1kHz and 48kHz sampling rates. Additionally, the codec features Intelligent Gain Control (IGC), which controls audio peaks and transient levels. The linear response of the IGC can work automatically or be fixed. The IGC works transparently, ensuring proper level control throughout a dynamic broadcast.

The unit ships with 29 broadcast-quality algorithms, the selection of which is based upon available bandwidth and IP connection quality, and the material being broadcast. MP2, G.711 and G.722, and PCM can be configured for stereo or mono broadcasts with bitrates ranging from 16kb/s to 1.54Mb/s. AAC and Enhanced Apt-x algorithms are additional licenses available. Bridge-IT features "Music" and "Music Plus" which are proprietary Tieline algorithms that allow for minimal bandwidth usage while providing high quality audio. Depending on program material, very low bandwidth connections can facilitate surprisingly pristine audio with little or no artifacting.

TRAFFIC ISSUES

When public data routes carry critical broadcast audio, care and planning must be exercised in knowing how IP gear will behave. By way of preparing for heavy network traffic, auto jitter adapter, fixed buffer level and forward error correction (FEC) can be configured when lost data packets compromise broadcast quality. Auto jitter

adapter is adjusted by buffer priority, meaning Bridge-IT will introduce latency to make up for lost or late packet delivery. Each auto jitter setting is a compromise between delay and audio quality. The codec will make necessary adjustments based on how the priority is set.

The user can set a fixed level buffer, which prescribes the amount of latency on the audio stream. The delay is constant at all times. Forward error correction uses more bandwidth, but it allows Bridge-IT to duplicate a certain percentage of the audio stream to account for lost data packets. In situations where bandwidth is limited, FEC can make the situation worse, so use caution. FEC is recommended for connections that have plenty of data headroom, but lose packets occasionally. Packet and stream data and connection statistics can be monitored via the web GUI or front panel.

Bridge-IT also features QoS settings, where data packets can be instructed for different prioritization through several different networks. This is achieved by changing the DSCP field in the data packet header. IT administrators should be contacted when using the QoS settings. The codec uses "line quality" readings to monitor connection stability. "L" shows the quality of the local connection. "R" indicates network behavior on the remote end. A reading of 99 on both ends is optimal.

CONTACTS LIST

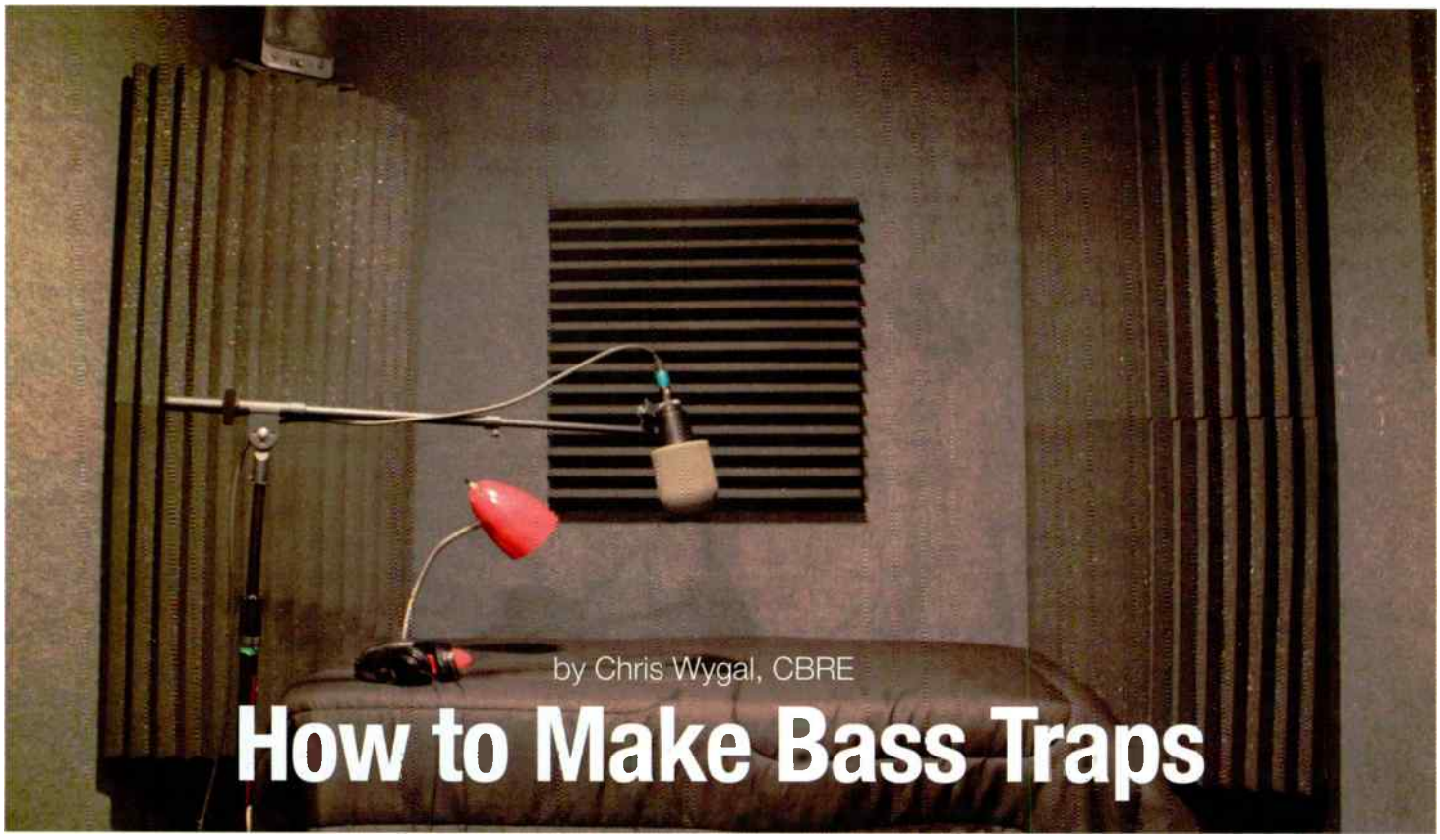
Sometimes a single Bridge-IT connects to several remote Bridge-IT units or other codecs for differing purposes. When this is the case, the GUI is useful for storing lists, programs and contacts previously set up by the user. Creation of programs allows for one-button dialing to other units. For example, a remote talk show studio may connect to a network master control each day. Instead of having to enter the IP address, algorithm, connection type, bit rate, jitter buffer and several other settings each time, a program can be configured with a contact. This allows for quickly calling another codec.

Bridge-IT will transport audio and RS-232 data via IP and SIP protocols, achieving audio connection and contact closure control over one connection route. Point-to-point, multi-unicast and multicast programs can be configured. Point-to-point is simply one Bridge-IT connected to another. Multi-unicast connections allow one Bridge-IT to broadcast to six other Bridge-IT units simultaneously. This requires software versions that support multi-unicasting. Multicast Programming allows a Bridge-IT to appear on multicast traffic where "subscribers" can connect to the unit as necessary. Multicasting usually requires special consideration from ISPs, and can incur extra service charges.

In the event that the codec is being used as an STL, and the connection is lost for an extended period, an SDHC card loaded with music or special messages can be inserted in the receiving Bridge-IT. The codec will begin playing the MP3 files until the audio stream is restored. This prevents dead air situations if IP connectivity is lost.

In an era of exploration that puts our valuable audio chains on the public IP infrastructure, having robust gear to navigate is vital. Bridge-IT is smart and concise in its operation. It negotiates difficult networks well, and makes up for costly data packet errors. It takes up very little space in equipment racks, and it travels unbelievably well. The front screen LCD display and buttons provide quick, on-the-fly operation, meaning everyone from seasoned engineers to new sports casters can use Bridge-IT to accomplish fantastic remote or STL audio connections.

Wygal is the programmer and engineer for Victory FM at Liberty University, Lynchburg, VA.



by Chris Wygal, CBRE

How to Make Bass Traps

When pesky resonant modes make an otherwise good recording facility sound hollow and tank-ish, hanging foam or carpet on the walls will usually fail to fix the problem. Without belaboring physics, resonant modes and standing waves are simply sound frequencies that, due to the physical dimensions of a space, seemingly get stuck in parts of the room. Standing waves can vary, but are usually midrange in nature, and can ruin the sound of a recording. A room that has four 90-degree corners and is nearly or perfectly square is destined to suffer from standing waves and resonant modes. The best way to destroy them is to put something in the room corners to break up their shenanigans.

I recently built a studio for personal use with a recording space measuring 11'×7'. The room is by no means square, but for some reason I found an obvious resonance at approximately 300Hz. So I decided to build my own bass traps. Also known as corner traps, these objects come in all sorts of sizes and styles, and are designed to fit nicely in 90-degree corners.

The sizing of my bass traps was anything but scientific. It was solely based on the 2'×2' foam absorbing panels I had left over from another studio. They basically decided for me that the bass traps would be 48" high and have a front surface 24" in length. With that decision, I took a leap of faith and purchased enough pine 1×4s, $^1/_2$" plywood, R-13 insulation and tempered hardboard to start experimenting. For creativity's sake, I wanted a curved front surface. I did some math (∏d = C (d=diameter, C=circumference), knowing a full circle would be 4×24=96) to make sure the curved front yielded a 24" surface area across. The structure of the bass traps would consist of three (top, middle and bottom) $^1/_2$" plywood layers equally spaced 24" apart, held together by 1×4" pine beams. The $^1/_2$" plywood parts had 15" sides, which allowed for the face to be the necessary 24". The 1×4" pine beams were cut 48", and the plywood parts were notched appropriately in three places so the plywood levels could be nailed to them. Once the skeleton was in place, I cut a 24"×48" piece of tempered hardboard (similar to pegboard material, but without the holes).

The completed trap showing before installation

Tempered hardboard is light and flexible, but also stubborn. It was barely cooperative

One of the traps installed in the corner.

enough to roll around the curved front of the bass trap without busting apart on the edges. This step required drywall screws. The hardboard would have pulled nails or staples out.

Once the wood structure was assembled, I used double-sided tape to hold the two 24"×24" foam pieces on the curved front. In hindsight, one piece of foam would have looked better, but the foam I had cost $0.00. With the foam in place, I stuffed the inside of the trap with R-13 fiberglass insulation. Why R-13? Because I happened to have that lying around too. Nonetheless, the insulation prevents standing waves inside the trap from resonating. Without it, the trap would serve no purpose, other than maybe as a diffuser, which I didn't need.

After the prototype trap was completed, I built three more just like it. Aesthetically speaking, the traps may be a little too big for the room, but from an acoustics perspective they work extraordinarily well. The room has no standing waves and you can't "hear" the recording space on tape. The walls are carpeted with grey marine carpet, which keeps reflections to a minimum. With the homemade bass traps, I've achieved a spectacular acoustic environment for a fraction of what I could have spent.

Wygal is the programmer and engineer for Victory FM at Liberty University, Lynchburg, VA.

Microphone Processors

The human voice is capable of a wide dynamic range, which is why it makes sense to run a station's mics through a mic processor. Used properly, a processor smooths the dynamic extremes and can add some presence to the on-air voices.

Some modern mixing engines provide dynamics processing, so an external processor may not be needed. But processing is as much art as it is science, and the right processor may have just the sound you seek.

Like most equipment categories, there are mic processors that seem to be a ubiquitous choice for many stations. The Symetrix 528E is a popular model. The DBX 286A and 286S are also commonly used. In this Side by Side we look at some other options.

All these units are 1RU. We noted the rack depth as well. The features of these units range from rather basic (but effective) dynamics and EQ to multiple-preset, software-accessable workhorses.

Model	Airtools Voice Processor 2x	Aphex Channel	Presonus Eureka	Vorsis M1
Channels	2	1	1	1
Inputs	mic or line (XLR)	mic (XLR), instrument	mic (XLR), line (1/4" TRS), instrument (1/4")	Mic (XLR)
Input Impedance	6.67kΩ	>2kΩ	50Ω-2.5kΩ selectable (mic), 10kΩ (line)	>2kΩ
Outputs	line (XLR), AES3	line (XLR, 1/4" TRS), AES3, S/PDIF, optical	line (XLR and 1/4" TRS), optional AES3 & S/PDIF	mc/line (XLR), AES3
Output Impedance	200Ω	66Ω (XLR), 600Ω (TRS)	51Ω	<10Ω
Output Sample Rates (kHz)	adjustable	44.1, 48, 88.2, 96	44.1, 48, 88.2, 96, 176.4, 192	44.1, 48, 96
Metering	input, output	output, gain reduction	input, output or gain reduction	input/out, de-esser, compressor, expander
Front-panel Control	LCD menu	yes	yes	yes
Software Control	Windows app	-	-	Windows app
Remote Control	remote port, Ethernet	cough switch	-	Ethernet
Phantom Power	48V	48V	48V	36V
Max Gain	70dB	65dB	52dB	70dB
Presets	50 via front panel & remote	1	1	via software
Phase Rotator	voice symmetry circuit	yes	no	yes
De-esser	yes	split-band universal	-	recursive-style
Filters	adjustable high-pass, low-pass	low-cut	high-pass	high-pass, low-pass
EQ	4-band (low shelf, high shelf, parametric mids)	single-band parametric, Aphex Aural Exciter, Big Bottom	3-band parametric	4-band (low shelf, high shelf, parametric mids)
Compressor	single-band	single-band	single-band	single-band
Expander/Gate	downward expander	logic-assisted gate	-	downward expander
Unit Depth	9.1"	8.25"	7"	10"
Other Models	-	-	Studio Channel, TubePre	M2 (dual channel)
MSRP	$1,979	$1,299	$700	$899

NEXT MONTH Check back next time when we explore the versatile world of toolbox testers.

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Stereo Program output
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Mix minus in-out for an external Telephone hybrid
BOTH balanced and unbalanced inputs and output for flexibility

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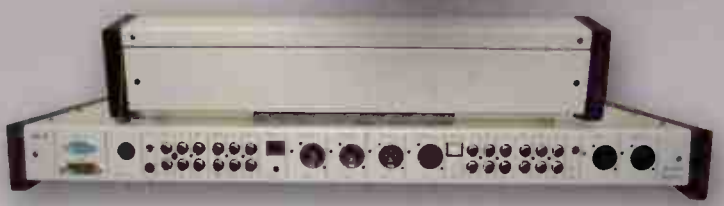
Mix minus in-out for an external Telephone hybrid
Multimillion operation switches with long life LED lamps

The ARC-10UP with unbalanced inputs and PC sound card is displayed. The ARC-10U has unbalanced inputs without a sound card. The ARC-10BP has balanced inputs with the PC USB sound card



ARC-10U... $1,599
ARC-10UP... $1,999
ARC-10BP... $2,495

CAT 5 cables included on the ARC-10BP

www.arrakis-systems.com

all prices are many

NEWPRODUCTS

Tascam | Portable recorder

DR-40: The DR-40 captures up to four tracks from built-in, high-quality condenser microphones, XLR mic or line inputs. The internal mics are adjustable from XY to AB position. A pair of Tascam microphone preamps welcome condenser microphones with phantom power, recording at up to 96kHz/24-bit resolution. It accommodates balanced XLR or 1/4" line inputs using locking Neutrik Combo jacks. The DR-40 accepts SD or SDHC cards up to 32GB, and a 2GB card is included. Once recorded, play back takes with EQ and the optional level align feature to avoid volume jumps. A stereo reverb effect is also built-in, as well as a speaker and chromatic tuner. Transfer recordings to a computer using the USB 2.0 jack. Other features include overdub mode, variable speed playback, and limiting and low cut filter.

tascam.com

Alesis | Pro audio dock for iPad/iPad 2

iO-Dock: This universal docking station has the connectivity to let users create, produce, and perform music on an iPad with virtually any piece of pro audio equipmnet or instruments. Connect microphones and instruments including guitar, studio monitors, PA speakers, headphones and MIDI controllers. The device works with virtually every audio and MIDI app and is Core MIDI compliant. Video output is included for connection to TVs and projectors. Inputs include two combo XLR-TRS for use with audio equipment, instruments, and computer audio, and input channel gain controls and switchable phantom power. Outputs include a pair of 1/4" and 1/4" headphone with separate volume controls. Controls include MIDI in, MIDI out, USB MIDI, and assignable 1/4" footswitch input.

alesis.com

Sennheiser Electronic | Wireless headphones

RS 220: These digital wireless headphones have a full, detailed sound while offering total freedom of movement. Dynamic transducers with powerful neodymium magnets ensure clear, lifelike audio reproduction with a frequency response of 19Hz to 21kHz. The maximum sound pressure level of the open, circumaural headphones is 106dB. In the RS 220, the transmitter sends the audio signals to the headphones without compression via a stable 2.4GHz connection using the Direct Sequence Spread Spectrum (DSSS) technique. The headphones have a range of up to 100m without the need for the transmitter and receiver to be in the same room. A further advantage of the transmission process is the low latency and thus minimum delay of the audio signal.

sennheiserusa.com

LBA Technology | Personal RF safety monitor

FieldSense ProHD: The occupational FieldSense personal RF monitor includes a heavy-duty protective nylon carry holster, which fits most rigging harnesses and other work belts. The monitor is designed for simple operation and to provide just enough information for safety. A single button toggles between user modes and power-on/off. The display and processing of RF exposure data is limited to that required for RF awareness: To make informed on-site decisions and take necessary precautions. The monitor is calibrated to international MPE levels, suitable for OSHA and FCC compliance. It operates in all frequency bands commonly used by wireless carriers.

lbagroup.com

Titus Technological Laboratories | Program data inserter

PDI-626: This program, data or EAS audio/data insertion device uses sealed relays to passively pass audio or data on six channels through the device. Upon remote command, an alternate source is transferred to the outputs bypassing the audio or data from the primary source. By placing the PDI-626 in the program chain program, data or EAS audio is easily and immediately transferred to the program channels when triggered by an external source. The PDI-626 features XLR connectors for the inputs and outputs. Either analog or AES-3 audio can be transferred this way. The PDI-626 is controlled by an external closure monitored for short to ground, open, or legitimate trigger from the triggering device. In the even of a failure of the triggering line the PDI-626 will not put the secondary source onto the program line. Local testing and triggering of the PDI-626 as well as full loop and system monitoring are via the front panel. Daisy chain of other units is possible with the remote trigger output. Remote status is also provided.

tituslabs.com

FIND THE MIC WINNER
DECEMBER ISSUE

Congratulations to

Werner Ullrich II

Slippery Rock University,
Slippery Rock, PA

He won a three-pack of Hosa HMIC-025 from Hosa Technology.

www.hosatech.com

The mic was hiding on the guitar player's strap

The winner is drawn from the correct entries for the issue two months prior. No purchase necessary. For complete rules, go to RadioMagOnline.com.

NEWPRODUCTS

Wicked Audio | Headphones

3D Headphones: These headphones sport raised, colorful artwork with a 3D appeal. They also feature maximum noise isolation, and built-in volume control. The adjustable headband and padded earcups offer a comfortable fit. Available in three different models: Hero, X-Ray and Airline.
wickedheadphones.com

End to End Technologies | IP audio remote link

Audio Compass Combo: Combining Audio Compass Navigator and Audio Compass P2P, Audio Compass Combo creates a single, audio product for radio networks, stations, and remote broadcasters. Answering the need for connectivity flexibility, End to End Technologies is now offering a server-based GUI audio-over-IP solution, combined with a peer-to-peer command line option.
audiocompass.com

Music 2 Hues | Music library

Soul 2 Soul: Soul 2 Soul is available on audio CD, or can be downloaded in MP3 and WAV file formats. The collection features contemporary sounding, easy listening tracks, focusing on smooth R&B, Urban, and Popcentered grooves. In addition to audio CDs, the company's updated Music Download Center offers the ability to purchase individual tracks from all of its current Flagship Series titles, or entire CD categories. New production music is added monthly.
music2hues.com

Ledtronics | Tube lighting systems

ETL-listed LED Tube Light Fixtures: The American-made series of T8 fixture replacements consists of overhead lighting systems that are durable, cool-running and provide efficient light dispersion, producing better illumination at lower cost than those they replace: LEDWSE200-2-4LR is a 4'/two-tube ceiling or flush wall-mounted T8 LED light fixture with wraparound lens for parking structures and garages; the similar LEDWSE200-3-4LR holds three tubes; LEDGHL310-2-4LR is a 4'/two-tube recessed-ceiling or T-Bar T8 LED light fixture, while the similar LEDGHL320-4-4LR accommodates four lamps. All four come with 20-25 percent DR, high-impact, clear acrylic, prismatic lens secured by stainless-steel screws, and a heavy-duty, easily accessible safety switch that allows individual fixture power to be disconnected during re-lamping or maintenance.
ledtronics.com

UPGRADES AND UPDATES

Roland is shipping the VR-3, a fully integrated audio mixer, video switcher for live production and Web streaming. (rolandsystemsgroup.com) ... **Navteq** now delivers traffic info to the Garmin Nuvi 3490LMT via HD Radio. (navteq.com, garmin.com) ■

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Wheatstone	2, 48	252-638-7000	www.wheatstone.com

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1950s Radio in Color

by Erin Shipps

From The Rock and Roll Hall of Fame and Museum in Cleveland: "The Rock and Roll Hall of Fame and Museum has opened its newest photography exhibit, 1950s Radio in Color: The Lost Photographs of Cleveland Deejay Tommy Edwards. The exhibit features more than 30 images of 1950s music, film and television stars, including Elvis Presley, Chuck Berry, Eddie Cochran and some surprises like Michael Landon and Henry Fonda – all in glorious Ektachrome color.

"Songwriter, musician and music historian Christopher Kennedy discovered Edwards' photography collection during his research into the long-lost rock and roll film The Pied Piper of Cleveland, which is rumored to contain some of the earliest footage of Elvis Presley. Kennedy's discovery resulted in his 2011 book "1950s Radio in Color", which features more than 200 images from Edwards' collection.

"As a prominent deejay at WERE in Cleveland, Edwards enjoyed unprecedented access to rock, pop and country music's biggest stars. Capturing artists as they visited WERE's studios to plug their latest record, or at the many high-school sock hops that he presented between 1955 and 1960, Edwards shot more than 1,700 slides.

"Tommy Edwards may never have imagined his photographs would someday be seen in a gallery. Fortunately, history has finally caught up with him, allowing us to feel the wonder and excitement he must have felt every day while witnessing a cultural revolution. Through his camera's eye, the stars became mere mortals and at the same time somehow even grander than before. The exhibit, in the Baker Gallery of the Museum's Main Exhibit Hall, will run through the summer." 0

All images by Tommy Edwards, courtesy of the Rock and Roll Hall of Fame and Museum

Clockwise from left: The Storey Sisters (April 1958); Eddie Cochran (January 1958); Chuck Berry (August 1955); and Johnny Cash (January 1958).

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studio furniture

all ARC consoles
(except ARC-10U) feature built in
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'Xtreme -Studios' live on air software

'Pre-End of the World Sale'
the Mayan calendar predicts the end of
the world in 2012... so Accent Furniture
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ACCENT is a contemporary blend of brushed metals, pleasing colors, and interesting textures. The metal structure is artfully integrated into the visible design decor of the cabinetry. Cabinetry and electronic equipment complement each other to create a bold visual environment for talent, guests, and clients alike.

www.arrakis-systems.com

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The new drive time

It's time to drive listeners to YOUR station. Here's the first step...

People say it's never been tougher to be in radio. We look at it a little differently. We think, while the challenges are great, there have never been more opportunities for radio than there are today. First, though, you need solutions that can handle ideas you haven't even thought of yet. Solutions that can enable your creativity without limitations. That's WheatNet-IP's Intelligent Network. With it, you're ready to drive your listeners to places they've always wanted to go but never knew how to find.

Wheatstone

THE WHEATNET-IP ENVIRONMENT

INTELLIGENT AUDIO CONTROL SURFACE CONSOLES. INTERFACES. ENGINES & PROCESSORS

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