

# Radio

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MORNING SHOW

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## Free Beer & Hot Wings

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New Morning Show Studio

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THE INTELLIGENT NETWORK

The screenshot displays a complex control interface for the Wheatstone Blade-3. It features a grid of audio channels, each with a visual waveform and various status indicators. The interface includes several sections:

- Channel Labels:** PGM A, PGM B, PGM C, PGM D, CK, HDPS, STU 1, STU 2, and a bottom row with A12 1, A12 2, A12 3, A12 4, M3B1-1, M3B1-2, M3B1-3, M3B1-4, M3B1, and SWT.
- Channel Status:** Each channel has a vertical bar with colored segments (red, yellow, green) and a small 'OK' indicator.
- Waveforms:** Four large, stylized waveforms are visible on the right side of the interface.
- Navigation:** On the right side, there are buttons for 'NAVIGATE', 'ADJUST', and 'ENTER'.
- Product Name:** 'Wheatstone BLADE-3 DIGITAL ENGINE BLADE' is prominently displayed in the center.
- Network Info:** At the bottom right, it says 'WHEATNET IP - AUDIO OVER IP NETWORK'.

# BLADE-3

DELIVERING ON THE PROMISE OF IP AUDIO<sup>SM</sup>

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World Radio History



## everything you need to put music on the air... all the way from audio input to your transmitter, in a single box.

When we invented modern radio audio networking, we vowed to build the first truly intelligent IP audio system. One where every interface held the DNA of the entire system for recovery. A system with true Gigabit connectivity. One that required only a single CAT-6 cable to interface any network piece – to carry audio AND control information. A system that could actually be up 24/7/365 and handle everything you need yet so simple to interface as to be virtually foolproof. Well, here ya go...

### • Gigabit Connectivity

All BLADE-3s use Gigabit Ethernet. This makes all the difference in network capacity, near-zero latency, throughput, reliability – in short, everything.



### • Virtually All Audio Formats

BLADEs are built to handle and convert native analog, microphone, AES/EBU, SPDIF, AOIP, MADI, SDI and AES67.



### • Two 8x2 Utility Mixers

Each BLADE has two 8x2 utility mixers that can be configured in many different formats. Two 8x2 four 4x1, etc. These internal mixers are full featured and include panning, channel ON/OFF, fader levels, and access to any source signal in the system. They also include a full ACI (Automation Control Interface) allowing remote control, ducking, auto fade, channel on/off, levels, source assign, etc.

### • Audio & Control Routing Matrix

#### • Source & Destination Control

Each BLADE has the ability to route any system source to the destinations on that BLADE.

#### • Front Panel Logic Indicators\*

#### • 12 Universal GPI/O Ports

#### • 128 Software Logic Ports\*

Used to interface with software switches, indicators, and control functions throughout the system.

#### • Built-in Audio Clip Player\*

#### • Silence Detection

#### • Dual OLED Displays\*

#### • LIO/SLIO Logging\*

#### • Aliases\*

Allows the same source to be identified by different names. Multiple aliases can be used so different operators can share logic functions, source feeds, routing, etc.

#### • Auto Mono Summing

#### • Signal Splitting

#### • Gain Control on Every Input & Output

#### • Balance Control



### • Stereo Audio Processor\*

Each BLADE-3 has a stereo multiband processor with the following: 4-band parametric equalizer, 3-way crossovers, 3 compressors, 3 limiters, and a final lookahead limiter. This is a "routable processor," meaning it is not limited to the local I/O on the BLADE – it can be considered a network resource.

### • Onboard Intelligent OS

Each BLADE has its own intelligence/operating system that allows it to be a powerful standalone router, part of a larger system or control the entire routing system.



### • Associated Connections\*

This is a great feature in BLADEs for callers. codecs, networks, remote broadcast & live talk shows that require a mix-minus. You can create a predetermined back haul, IFB feed or mix-minus for each device based on its location in the system or on a fader. If you have a shared resource connected to your system, such as a codec, the software will "automagically" give the proper return feed to the codec based on its destination. When a base connection is made, up to ten additional connections can be made. This significantly helps streamline studio routing, phone and codec selection.

### • 44.1 or 48K Sampling Rates

### • Flexible Signal Configuration

Signal can be defined as up to 16 mono, 8 stereo or any combination of mono and stereo totaling 16 channels.

### • AES67\*

Ability to support AES67 compliant devices. Allows WheatNet-IP system to synchronize to IEEE1588 from a PTP grandmaster clock and ingest /stream AES67 compliant packets.

### • 44.1, 48K, External Sync or AES67 Operation\* • Clock/Sync and Alarm Indicators\*

### • Automation Control Interface

This is a "tool box" that every BLADE has that allows full control of the BLADE's functions such as routing, ducking, panning, full logic control, mixing and silence detection. Each BLADE supports up to 20 ACI connections which can be used with devices like Talent Stations, GP panels, SideBoards, etc. It also allows control of our partners'/third party equipment.

### • Front Panel Headphone Jack & Source Selection

### • Salvos/Macros

### • Studio Bypass



### • Front Panel Input and Output Metering

There is metering for every input and output on the system – 12-segment, multi-color LEDs that can be used for metering inputs and outputs as 8 pairs or 16 mono signals.

### • SNMP

SNMP gives you centralized monitoring over large distributed systems. You can configure alarms and set thresholds to get notified if and when a problem occurs. The instant alarms and notifications help you take quick corrective actions through e-mail, SMS, and executing custom scripts.

### • Connection Choices

Has both DB25 to make transitional wiring easy for existing BRIDGE TDM customers and RJ45 – Studio Hub compatible RJ connectors for input and output.

### • Full Info Screen

Each signal has a new info screen allowing the user to add text to signals such as wire numbers, termination locations, etc.

### • LIO Test

### • Automatic Backup

### • Alarm Notification

### • NTP

### • Front Panel Locking

### • Version Checker

### • Crosspoint Save

### • Debugging Tools

### • No Cooling Fans Needed



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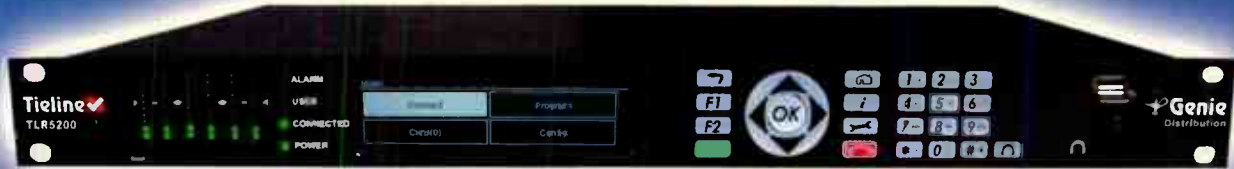
**On the cover:** The new "Free Beer & Hot Wings Morning Show" studio, complete with cameras, low-profile microphone booms, large LCD monitors, and lighting suitable for video

### 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 3-pack of Hosa HMIC-025 mic cables. Send your entry to [radio@RadioMagOnline.com](mailto:radio@RadioMagOnline.com) by October 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](http://RadioMagOnline.com)

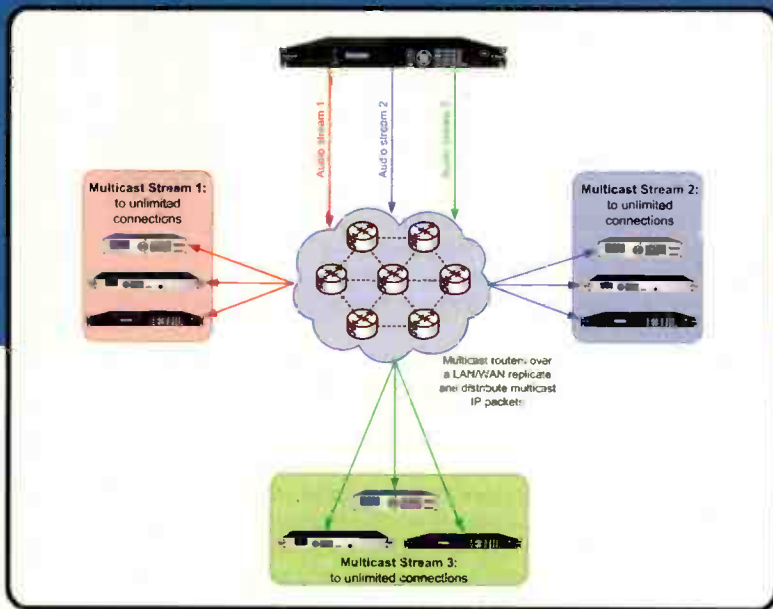


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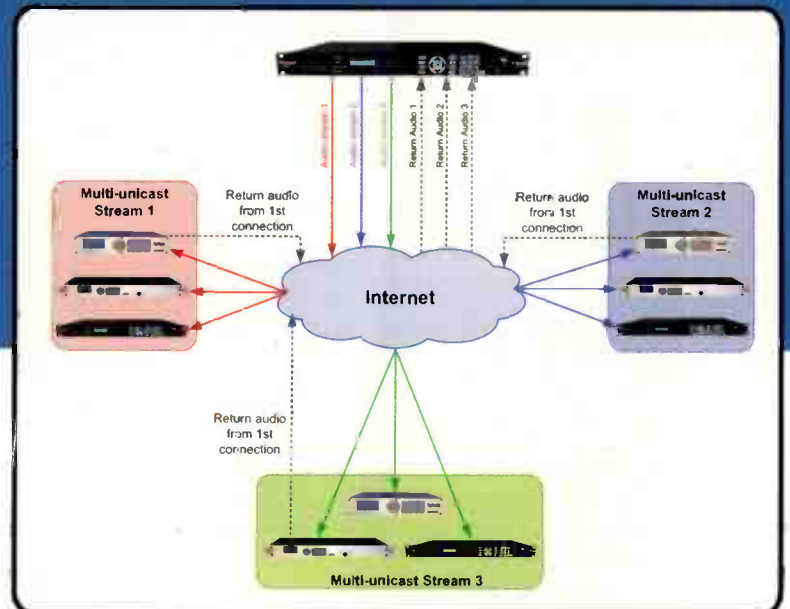


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## iStreamMedia Teams Up With Radionomy

NEW YORK—iStreamMedia, which launched its iStreamRadio Internet radio directory and event guide in June, has chosen Radionomy as its official streaming and music licensing partner.

Radionomy recently acquired Shoutcast and WinAmp.

The iStreamMusic brand offers digital music channels in a variety of genres via multiple web and mobile platforms. The partnership will expand and enable future launches of iStreamMedia's



recently acquired ErrorFM.com and soon to-be announced PoweredFM.com brands.

Radionomy stations will also gain a new online directory listing in iStreamRadio, where their stations will be listed on its web platform, as well as included on the iStreamRadio mobile app for iOS, Android, Windows Phone, and BlackBerry.

Radionomy says it has over 15 million unique

listeners streaming over 65 million hours a month from over 7,000 stations.

iStreamMedia, LLC. was co-founded in 2012 and initially launched iStreamRadio, an Internet



radio directory and event guide. Subsequently, the company launched its own digital music channels under the iStreamMusic brand.

## CBS Radio and Townsquare Media Partner on MNN

DETROIT—CBS Radio and Townsquare Media have partnered to launch the Michigan News Network to nearly 20 affiliates throughout the state.



The venture will provide affiliated stations in Detroit, Flint, Lansing, Kalamazoo and Ann Arbor with news, sports and other local content produced by CBS Radio stations WWJ(AM) and WXYT(FM).

MNN will offer top-of-the-hour broadcasts weekdays from 6 a.m. to 7 p.m. and 60-second sports

updates three times per day during the same time period. The CBS Radio content will be licensed by Townsquare Media, which will serve as the exclusive syndication partner and manage affiliate relationships.

WWJ(AM) provides live and local content 24 hours a day and was honored in 2014 as the Michigan Association of Broadcasters' Station of the Year and recognized with an NAB Crystal Award for community service.

Detroit's sports talk station WXYT(FM) is the home of Lions football, Tigers baseball and Red Wings hockey.

As a part of CBS Corporation, CBS Radio owns and operates 126 radio stations in 27 markets. The division distributes its programming via AM, FM and HD Radio stations, Radio.com and CBS Local Digital Media apps.

Townsquare Media owns and operates 311 radio stations and over 325 local station websites in 66 small to mid-sized markets.



## 137th AES Convention Calendar Is Now Online

NEW YORK— A calendar of technical program events is now online for the 137th Audio Engineering Society Convention, which will take place Oct. 9–12, 2014, at the Los Angeles Convention Center.

Attendees will learn about professional audio developments through a series of papers, engineering briefs, tutorials, workshops and special events.

AES137 will offer program tracks in the fields of broadcast and streaming media, game audio, live sound, networked audio, recording and production, product design, and sound for picture, as well as historical events sessions, standards committee meetings, tech tours and more.

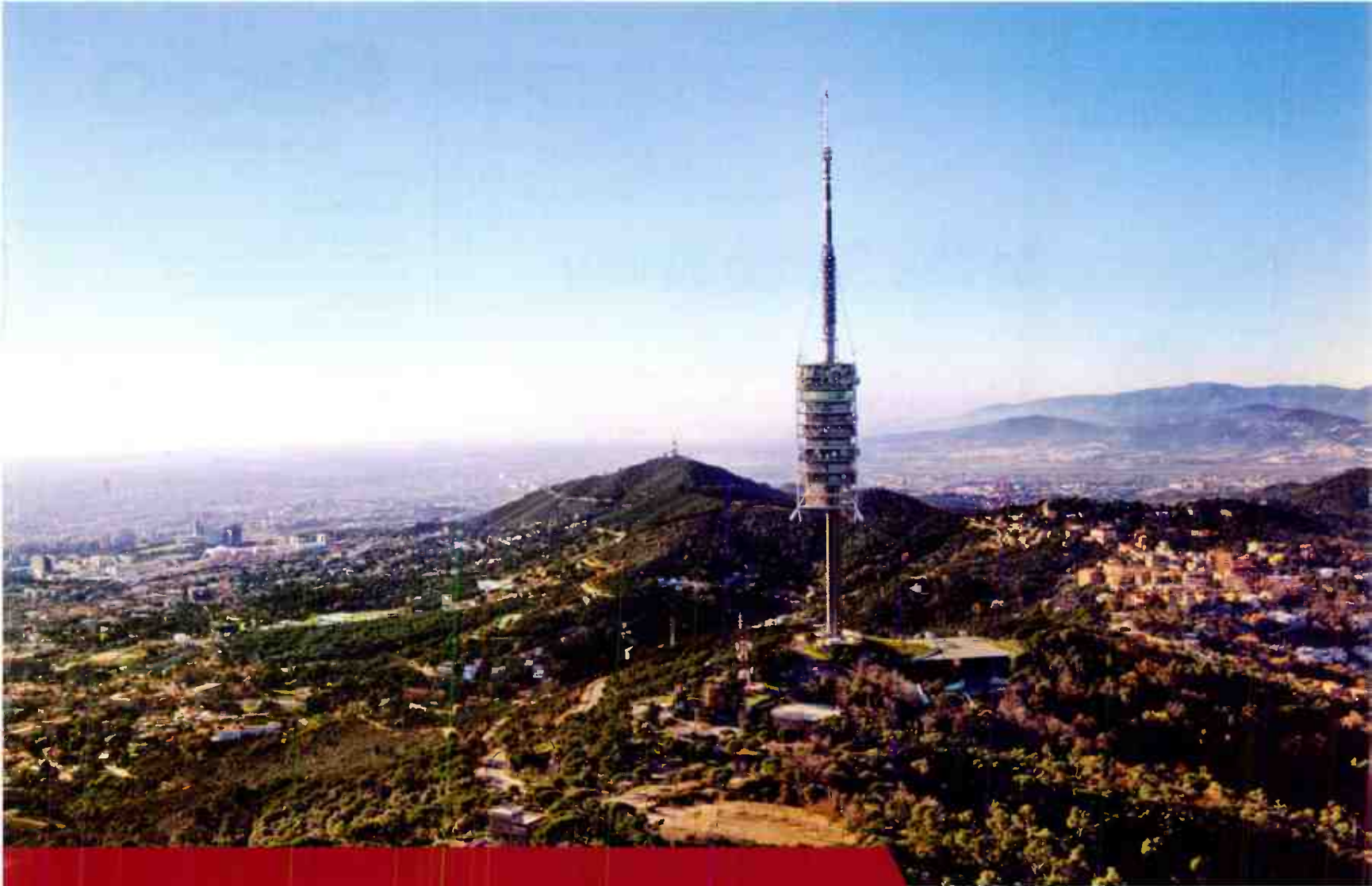
Those in attendance with either an Exhibits-Plus badge or an All Access badge will have entry to two of the AES convention's events: the Project Studio Expo and the debut of the Live Sound Expo and High Resolution Audio program.

The Project Studio Expo brings together the latest techniques, tools and experts for professional training on topics ranging from acoustics in small spaces to microphone placement, mixing, and mastering. The Live Sound Expo offers expert advice for the broad spectrum of live sound engineers with an emphasis on the practical, bringing professionals with decades of experience to the stage to inspire and educate attendees.

Additionally, a High Resolution Audio program will be held Oct. 10, 2014. The result of a collaborative effort between the AES and DEG: The Digital Entertainment Group, the HRA program will include sessions addressing the current and future direction of HRA from various perspectives, including content creation, digital distribution, licensing of hi-res music files, archiving, subscription models, marketing/promotion of hi-res music, compatibility of playback devices and more. These sessions will discuss some of the most current and controversial issues concerning the adoption of high-resolution audio.







## Accelerate Your ROI

Operating costs are a critical concern for every over-the-air broadcaster. These concerns are eclipsed only by the ambition to deliver a superior radio experience for audiences. Who will you trust to maximize your long-term capital investment?

GatesAir has a decades-long history of technological breakthroughs that enhance operating efficiencies and improve the radio listener experience.

These innovations were the fabric of our company as Harris Broadcast – a history that continues today with the formation of GatesAir.

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# Welcome to the Radio Show



**W**hen most broadcasters think about convention time, the annual NAB Show in Las Vegas immediately comes to mind. April in Vegas is certainly the “big show” for those that attend, but there are a number of other excellent industry shows and gatherings throughout the year, including the annual Radio Show.


Many remember this gathering formerly as “NAB Radio” but since 2010, the National Association of Broadcasters has partnered with the Radio Advertising Bureau to produce the annual fall Radio Show. This year brings the Radio Show to Indianapolis, headquarters of the Society of Broadcast Engineers. For the first time, NAB Labs and SBE have partnered at the Radio Show to produce what they are calling a “robust technology lineup.”

Wednesday opens with a session entitled “IT for Radio Engineers: Understanding IP Networking, Routing and Switching.” Wednesday afternoon will feature a review of all-digital testing on the AM band.

Thursday morning includes a Super Session entitled “Hybrid Radio-What’s in It for You?” Panelists will discuss new opportunities for radio in an increasingly interactive media environment, including integration with connected cars and mobile devices. Thursday afternoon, the SBE will offer certification exams for those who have applied to take them.

Friday offers two final technology sessions: “Designing, Maintaining and Monitoring Reliable IP Audio Broadcast Facilities” and “15 Tech Ideas That Help the Bottom Line.”

While the exhibit floor and the technology sessions are likely to be what those in engineering have come to the Radio Show for, don’t hesitate to check out some of the other sessions as well. Highlights are available in this issue of Radio magazine along with a map of the show.

Although it may not always be readily apparent, those on the engineering side of the station can often learn a lot from the sales and programming side of things and vice versa. Part of the fun of these events is networking with your peers and colleagues with whom you might not otherwise interact. 

Shane Toven | Editor

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# AM NRSC Measurements

by Jeremy Ruck, PE

**F**or a little over twenty years now, each AM station has been charged with the annual task of making equipment performance measurements. These measurements, to be made in accordance with the provisions of Section 73.44 of the commission's rules, result in yearly documentation at a specific point and time in space that a transmitter plant meets the occupied bandwidth and harmonic limits spelled out in the rules. Although these requirements have been in place for two decades, and indeed were bantered about for several years prior to their implementation, I still get the occasional call from a station unaware that

The NRSC-1 standard, developed in 1986 when I was still in high school, discussed pre-emphasis, and set the bandwidth limit of AM audio to 10 kHz. A year later, the National Radio Systems Committee (NRSC), a group composed of AM station representatives, manufacturers, and suppliers authorized the release and publication of the standard by both the Electronic Industries Association, and NAB. Compliance with the standard was at that time voluntary.

Further adjustment to the standard took place over the next year, and in 1988, the emission limitations we live with today were released by NRSC. In short order the commission adopted the standard, and on April 27, 1989 released the First Report and Order in MM Docket 88-376. While creating the annual measurement schedule, the commission in its wisdom also allowed for a grace period. If you were in compliance with NRSC-1 prior to June 30, 1990, or from the date of original commencement of operation, then you were considered to be in compliance with the emission mask requirements until June 30, 1994, and did not have to make emission measurements unless directed to do so by the commission.

The most desirable piece of gear for making the emission measurements is a spectrum analyzer. Appropriate analyzers must be able to provide a peak hold duration of 10 minutes, no video filtering, and a 300 Hz resolution bandwidth. Perhaps recognizing that a spectrum analyzer was, and still is, a high dollar item, the commission allowed for other specialized receivers or monitors to be utilized. However, if any disputes over accuracy arose, measurements via a spectrum analyzer would take precedence.

The second paragraph of 73.44 spells out the emission limitations. Specifically in the range of 10.2 to 20 kHz, emissions must be -25 dBc. Further out in the range of 20 to 30 kHz from carrier, the attenuation level is an additional 10

dB at 35 dB down. In the 30 to 60 kHz range, the attenuation level is a function of the frequency, and is defined as  $[5+1 \text{ dB/kHz}]$  below carrier. This range creates the negative sloping line portion of the emission mask. At 60 up to 75 kHz above and below the carrier frequency, the attenuation level returns to a constant level of 65 dB below carrier level. Finally, stuff beyond 75 kHz out must be attenuated to the lesser of  $43+10 \log(\text{Power in watts})$  and 80 dB. This last expression allows for a constant level at powers greater than 5000 Watts, and



Figure 2. Spur due to mixing in AM TX

lesser values at lower power. Should harmful interference be found to exist, a station may be directed to achieve greater levels of attenuation than the specified mask.

The emission measurements are, according to the rules, to be made at a distance of approximately one kilometer from the antenna. At the bottom end of the dial, a wavelength is roughly 555 meters, so at one click out, you find yourself at, or well into, the far field range. At this point the radiation has settled down, and the odd propagation effects observable closer in have since faded away. Since at least 80 dB of range must be observable in order to demonstrate compliance, it may be necessary to adjust the measurement location somewhat.

The measurement distance may need to be adjusted due to the power level of the station. Additionally, it may be found in some instances that a distance of one kilometer provides accessibility problems. Other factors necessitating adjustment of the measurement distance could include overhead power lines, or reradiating structures that may tend to distort the accuracy of the measurements.

Harmonics, especially the second and third,

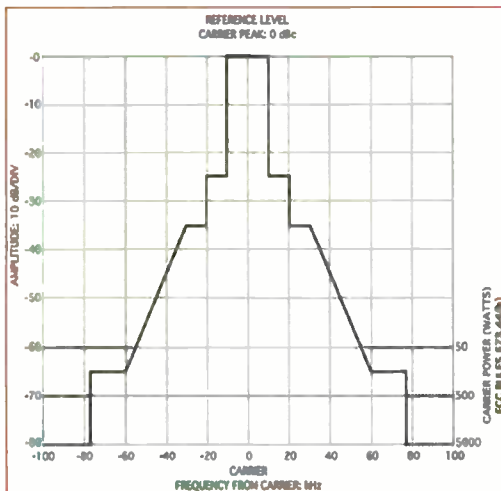


Figure 1. AM NRSC Mask

such measurements are a necessity each and every time the blue marble makes a full course around the sun.

The genesis of the measurement requirement can be tied to the commission's desire to enhance AM broadcasting during the 1980s. During this time, the quality of AM receivers was suffering. Additionally, there were many more AM stations available on the dial, and interference to first adjacent facilities, especially at night, was becoming a more serious issue.



are well known gremlins in many transmission systems. As multiples of the fundamental carrier frequency, they are necessarily located beyond 75 kHz from the carrier. Their limits therefore fall in the power dependent range discussed above. Although a spectrum analyzer can be used for these measurements, it tends to be simpler to make them using a calibrated field intensity meter, and applying the math to obtain the harmonic to carrier ratio.

An additional problem with the second harmonic occurs when two stations where the frequency of one is twice that of another are relatively close to each other. If, for instance, your station uses 630 kHz, while another facility in the region is on 1260 kHz, the second harmonic of your carrier plops right down on top of the frequency of your neighbor.

The potential for the generation of intermodulation products should also be considered when making NRSC measurements. The presence of another AM station in proximity, or combined into the same antenna system makes this issue a very real possibility. Traps in the antenna system are generally utilized to keep the transmitters from talking to each other; however, these occasionally wander, or may be insufficient to attenuate properly the generated spurs.

For instance, two stations close by on 1340 and 1450 have the potential for generating products on 1230 kHz and 1560 kHz. These spurious products are of course located well beyond 75 kHz of either carrier frequency. As a result, they fall in that 80 dB attenuation range. Additionally stations close by each other should evaluate spurs caused by the harmonics and fundamental frequencies of each other.


In general, most modern transmitters out by themselves in a cornfield should pass the emission and harmonic tests with flying colors. Substantial variances



Figure 3. Spurs due to AM TX power supply

between measurement sets, however, may be indicative of subtle problems with the rig that may not be overtly noticeable by power levels and the like. Splatter above the mask levels may result from issues in the final amplifier stage, while unexplainable spurs from a lone transmitter may indicate PDM problems. Not only do NRSC measurements keep neighbors happy, but they also provide an additional check on the performance of your facility.

A colleague and friend of mine has quipped that NRSC measurements are the

“annual albatross” due to the resources spent on their acquisition. Too often, the holders of the purse strings also view the measurements as a fatuous exercise. Like any coin, there are always two sides, and the NRSC measurements are in reality another beneficial tool in the box. Regardless of your view of them, they must be performed no less frequently than once every 14 months, and are one of the things the commission looks for when paying a visit. Since the requirements have been around for two decades, it is a challenge to have to explain to the inspector why they are absent from your files. Don't be that guy. 

*Ruck is the principal engineer of Jeremy Ruck and Associates, Canton, IL.*



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by Lee Petro

# Tower Rules Update

**T**he FCC took additional steps to clean up the underbrush surrounding its tower structure registration rules. None of the revisions are revolutionary, but most of the changes will make it easier to own and operate on communications towers by eliminating outdated and inconsistent rules, and providing additional guidance to tower owners.

**Antenna Structure Marking and Lighting Specifications** – The current version of the FCC’s rules require compliance with FAA Advisory Circulars that were released in 1995 and 1996. While the FCC’s rules indicate that the FAA’s requirements for tower marking and lighting are mandatory, the FCC also reserves the right to make additional or different requirements. The individual tower’s marking and lighting requirements are also specified on the “No Hazard” determination issued by the FAA when it gives authorization to construct a tower.

Since the reference to advisories printed nearly 20 years ago might be problematic, the FCC modified its rules to require compliance with the tower’s No Hazard letter instead. As a result, a tower owner will be able to review its own authorization, rather than tracking down an advisor circular to ensure compliance.

The FCC retained the right impose additional or different requirements, and tower owners will still be required to obtain authorization from both the FAA and the FCC before it makes changes to its tower marking and lighting. Moreover, while the FCC will not apply the revised rules to existing antenna structures unless the FAA requires such changes to a specific tower, it reserved the right to make future changes mandated by the FAA for particular structures.

**Accuracy of Height and Location Data** – In the past, any alteration to an existing structure was required to receive prior FAA and FCC approval due to the lack of clear language in the

FCC’s rules. Therefore, the FCC took the opportunity to clarify that only changes or corrections that are one foot or greater in height, or one second or greater in location, will require prior authorization.

**Notification of Construction or Dismantlement** – Previously, the FCC required tower owners to notify the FCC of any modification or dismantlement of a tower within 24 hours, whereas the FAA required notice within five days. Under the new rules, the FCC accepted comments that the notification procedures among the two agency should be harmonized, and will require notification within the 5-day period currently in place at the FAA.

**Voluntary Antenna Structure Registration** – Under the FCC’s environmental rules, towers may need to registered with the FCC’s Antenna Structure Registration system even if it was otherwise exempt from registration due to its height or location in close proximity to an airport. Because it was unclear why these towers were registered, the FCC will now provide an option for tower owners to indicate that the tower was being registered on a voluntary basis.

**Posting of Antenna Structure Registration** – In the past, it was unclear whether the posting of an ASR number should be when the tower was within an enclosed perimeter fence. The FCC clarified that the posting of tower structure registration numbers should be posted at the closest access point to the tower, which may be on the perimeter fence or access gate. If more than one tower is enclosed within the same perimeter fence, then the ASR number must be posted at the access gate and at the base of the tower.

**Provision of Antenna Structure Registration to Tenants** – Dusting away a relic of the past, the FCC eliminated the requirement that a paper copy of the ASR be provided to tenants. Instead, the FCC will permit the provisioning of the ASR number via paper mail or email.

**Inspection of Structure Lights and Associated Control Equipment** – Perhaps one of the more significant changes for owners of towers in a number of different locations, the FCC will permit tower owners that have constructed self-notification systems, which incorporate self-diagnostic systems, 24-hour staffing, and back-up operations centers, to avoid the requirement of quarterly inspections. If a tower owner has these protections in place, but had not previously received a waiver of the quarterly inspection rule, it can notify the FCC and provide supporting information regarding its system. Otherwise, when a tower owner implements a new system, it can notify the FCC and seek an exemption from the inspection rule.

**Notification of Extinguishment or Improper Functioning of Lights** – The FCC also strengthened the obligation to keep the FAA informed of tower lighting malfunctions, requiring that timely notices are provided to the FAA, and delivered to the FAA in a manner specified by the FAA. The current rule permitted notices to be provided by telegraph, a pointed highlighted by Commission Pai

**Recordkeeping Requirements** – The FCC will require tower owners to maintain records of extinguishments or improper functioning of tower lights for two years, and provide the records to the FCC upon request.

While none of these rules break new ground, the FCC’s main goal was to take steps to eliminate outdated rules and harmonize the current rules with the FCC. While some of the new rules will become effective 30 days after the rules are published in the Federal Register, some rules require new or modified information collection requirements, so those will need to get the OMB stamp of approval first. **Q**

Petro is of counsel at Drinker Biddle & Reath, LLP.  
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# Electronic News Gathering for Radio

by Doug Irwin  
CPBE AMD

**W**hen you consider the viability of radio in the long-term you can frame it completely in terms of “content.” Clearly, if listeners want a certain content that is only available from a radio then they’ll have no choice but to listen to one. While listeners have an ever-increasing number of choices from which to get music, there are few choices when it comes to news and sports content. It’s for this reason that I (along with others) believe that talk, news, and sports content will become more important for radio as time moves along.

For many listeners a big attraction of local radio is local news; and therefore, a station’s ability to report on local news stories is important to its success. After all, you can get national and international news from any number of sources, right? But when it comes to local politics, or localized disasters like fires, or local traffic problems, local radio is likely one of a few choices. In this article we’re going to talk about the ways and means by which radio stations gather and report on local news.

KFI is one of two 50 kW AM stations that generates its own news content in Los Angeles and since it’s a member of the group of stations I work for naturally the topic is “close to home.” Our 3 field reporters use the (nearly) ubiquitous public internet for filing reports and doing live reports on-air, although the older tried-and-true techniques are still in use as well (more on that below).

Each of the station’s three field reporters has a vehicle assigned to them and along with each vehicle are the various devices necessary to record and edit their stories. (Figure 1.) Reports are recorded and edited on the reporter’s laptop computer, saved as .mp3 files, and e-mailed back to the newsroom for use in newscasts. “Live-shots” are more complicated because one of our 6 RPU receive sites needs to have good reception of the remote vehicle, which are using roof-mounted omni antennas, and transmitting with about 20 watts.

Since each of our reporters has a “smartphone” naturally we’ve experimented with “apps” that can be used for newsgathering purposes. In particular, since we use Comrex Access, “Luci-Live Lite” is an inexpensive app that all of our reporters have. Luci Live Lite enables a limited-feature-set



Figure 1. KFI Reporter Steve Gregory filing a report from his news vehicle

version of Luci Live (see below) removing the record, edit and ftp functions, and limits the codec choice to the slightly-lower-quality G.722. In all other ways, though, it provides the same interface of Luci Live, providing an easy-to-use application for broadcasters who need simplicity in both setup and operation.

The full “Luci Live” is a mobile broadcast application that enables “studio-quality” news segments to be streamed via laptop or mobile phone. Its on-screen controls emulate console faders, while additional features such as audio capture, editing and ftp upload enable broadcast-ready content to be produced quickly. When used with Comrex hardware codecs, Luci Live can deliver HE-AAC audio in both directions with moderate delay. Connections can be made via the N/ACIP protocol (which uses SIP), or the native Luci RTP mode.

Linphone is available for free for Android phones and it has been tested to work with Comrex codecs. It uses the Opus audio algorithm—a newer, high quality (according to Comrex) low delay choice which

has been included in Comrex codecs starting with firmware 3.0. LinPhone doesn’t require registration and can dial directly to the IP address of your codec.

Comrex also offers a free app called ARC2, which is a “wrapper” around C-SIP Simple, enabling AAC-ELD on an Android device. They say the set-up is complicated—but it’s a “one button push” after that and works well.

Another very well-known provider of IP codecs for use in news gathering applications is Tieline. Their smartphone app is called “Report-IT” and it’s available for either Android or iOS. It allows the remote reporter to talk back to another Tieline IP codec at the studio with 15 kHz audio bandwidth (real-time) or to record “off-line” with up to 20 kHz of audio bandwidth, using the smartphone’s built-in microphone. Using Report-IT you can record interviews, edit them and then file via FTP. You can also build a list of edited recordings, and play them back (“donuts”) while delivering a real-time report. From a practical standpoint though, you would need a mic adaptor, and external mic, to use while doing this so that you could talk and manipulate the controls on the phone at the same time; that’s where a mic adaptor comes in (see more on that below).

Back at your studio headquarters, a Tieline Merlin Plus would be a very





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handy codec for connecting to smart-phones in the field because it can handle up to 6 full-duplex, monaural connections simultaneously. Merlin PLUS is a single RU IP codec designed to connect over the full suite of wired and wireless



The data stream from the LAN is encrypted by the Multichannel VPN Router and distributed onto the Internet connections (here 2x DSL, 1x 3G / UMTS). The encrypted and fragmented data passes the networks of the utilized ISPs and reaches the Multichannel VPN Hub in the data center, which in turn decrypts the data stream and reassembles it correctly. Afterwards, the data stream is forwarded to its actual destination on the Internet. The same goes for the opposite direction. Here, the Hub encrypts the data stream, while the VPN Router decrypts it.

Figure 2. Block diagram of basic 'field-data-aggregation' system using multiple ISPs

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IP networks, including Public Wide Area Networks (WANs); Private Local Area Networks (LANs); 3G and 4G wireless Networks; and Wi-Fi and WiMAX Networks.

As I mentioned previously it might make a reporter's life easier to have a mic/headphone adaptor for an Android or iPhone. Tieline makes their own mic adaptor; but you can also check other sources, such as <http://www.kvconnection.com/>.

Even with the best smartphone and the most effective app, if the 3G/4G wireless network is under a barrage of users, the remote audio connection will likely fail. This fact has limited the usefulness of smartphones for "live" reports. Can anything be done to mitigate this problem? There are several companies making "bonding" devices that aggregate bandwidth from multiple wireless sources--the idea being that, via one network or another, the remote user will benefit from enough bandwidth to make a robust connection, and with multiple network choices, that the problems associated with network connectivity will be reduced. (I would never dare say "eliminated.") Let's take a look at several companies tackling this problem.

Mushroom Networks offers a product known as Portabella, which comes in two models: the standard Portabella 141 for indoor use; and, the ruggedized Portabella 141i for mobile or portable deployments (<https://www.mushroomnetworks.com/product/portabella>). Both support 3G/4G bonding. (Thanks to John Lorentz of WINS for the heads-up on this product.) The Portabella has 4 USB-based ports for cellular wireless data cards. The 10/100baseT Ethernet based LAN port connects to the local network or devices at the mobile location. Back at your studio location, you would install the Mushroom Networks Truffle, which is a single RU, packet-level load balancing router with WAN aggregation and Internet failover technology. With the Truffle, multiple DSL, cable modem or T1 services can be combined to provide higher speed and more reliable Internet access—namely for our application--making multiple



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Figure 3. Remote base station transceiver located in the Hollywood Hills above Los Angeles

The Multichannel VPN router goes in the field, connected to multiple wireless carrier networks. This particular device can accommodate up to five connections; four by radio, and one local Ethernet connection. At the studio/HQ end, the Multichannel VPN hub is installed, and its job is to aggregate all the packets originating in the field, coming in via multiple IP sources, in to a single packet stream. It's important to note that the stream can be used locally (same datacenter) or forwarded to another location via Ethernet. What's interesting about this is the potential for shared use amongst stations in an ownership group, with different locations.

The final company I'll make mention of for 3G/4G bonding is PepLink; their system is known as Speedfusion (<http://www.peplink.com/technology/speedfusion-bonding-technology/>). Like the other two mentioned, it requires a device in the field (in this case the Pepwave "Max") and an aggregator at your HQ, in this case known as the Peplink "Balance". Features are similar, although I will make mention in particular of the 256-bit AES encryption used in Speedfusion.

### WHAT IF DISASTER STRIKES?

In addition to the more "modern" ways of gathering news and filing reports, KFI has what many (including myself) consider an "old-fashioned" ENG system, based completely on VHF and UHF radio.

Why, in this day and age, would any station keep such a system in place, you might wonder? The answer is very simple: historically, when major disasters have hit an area, the cell-telephone system fails. The classic example is that of Hurricane Katrina, covered in an article I wrote in 2005 ("When Disaster Strikes" [http://radiomagonline.com/transmission/radio\\_disaster\\_strikes\\_during/](http://radiomagonline.com/transmission/radio_disaster_strikes_during/)). Regarding the immediate aftermath of Katrina, Marty Hadfield, then director of engineering for Entercom (owner of WWL radio) told me: "The worst part is when you have lots of people concentrated in one spot; the cellular system gets overloaded. All the downtown (New Orleans) sites were constantly overloaded. After about three days though, people's batteries began dying, and so the cell sites came back in

connections to reporters in the field. Truffle is also a stateful firewall, bandwidth manager, traffic monitoring and traffic shaping appliance with adaptive Quality of Service features.

Viprinet has a similar product line, the operation of which can be seen in Figure 2 (<http://www.viprinet.com/en/products/multichannel-vpn-router-modular>).

to a useable condition." The very last thing you want to happen during an important, once-in-a-career news event is for your means of reporting to be dead. Thus, stations such as KFI maintain their radio systems.

So what does it take to effectively cover a metro the size of Los Angeles? The most succinct response is probably just this: many receivers. The KFI system consists of three parts:

- A VHF remote base station, used for communication between the newsroom and all remote vehicles;
- Multiple UHF RPU receivers used to cover the metro;
- IFB transmitters that are used to feed real-time in-studio talent audio out to the remote location

The VHF "2-way" system that the news room uses to communicate with our three remote vehicles is actually a remote base station that is located at our Beverly Hills transmitter site (for KYSR-FM). For all intents and purposes, it's simply an extension of our intercom system: the push-to-talk button is located at the editor's position at our Burbank location. Audio gets sent up to the KYSR site on a non-equalized audio circuit provided by AT&T; return audio from the receiver heads back down to Burbank in a similar fashion. The base station is a "legacy" Motorola MTR-2000. (Figure 3.)

Beverly Hills is at the north end of the metro, though, so we need additional receiver locations. We have two: first is the KFI transmitter site at La Mirada, which is about 16 miles southeast of downtown Los Angeles. The second remote receiver location is at Pleasants Peak, which is a 3500+ foot peak that is about 40 miles southeast from downtown. This site gives us good coverage of the southern end of the metro (meaning Orange County). (Figure 4.)

Back at our Headquarters in Burbank we make use of a Motorola voting system in order to determine just which receive site audio gets used in the return path for the intercom (2-way) system. The voter decides between the Beverly Hills audio, the KFI transmitter site audio, and the Pleasants Peak site audio, which finds its way back to Burbank (more on that later).

Aside from the basic communication that the 2-way system provides, we have a higher-quality means of gathering audio from the remote news vehicles: our set of RPU receivers. The large metro, combined with the mountainous terrain of southern California, compels us to use multiple

locations. Working from north to south we have:

- The Beverly Hills site (same as the 2-way) which covers San Fernando Valley
  - Verdugo Hills (northeast of downtown LA) which covers SFV well, and much of metro
  - Our own studio HQ in Burbank
  - Mt Wilson (at the KOST transmitter site) which covers the metro well
  - East LA (at the KLAC transmitter site) which provides better coverage of downtown LA, including City Hall and Police headquarters
  - The Pleasants Peak site, which covers the southern end of the metro
- We use T1s to get the receiver audio back to our Burbank location.



Figure 4. 2-way, RPU receiver, and ICR transmitters located at Pleasants Peak



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World Radio History

The two receivers mentioned for Pleasants Peak are backhauled via a dual-channel inner-city relay to the KFI transmitter site, and then sent to Burbank via T1 circuits.

As anyone who still uses RPU for remotes knows, cuing the talent remotely, or taking a “live shot” and speaking directly with talent that are on-air requires a pre-delay audio feed. We use an IFB transmitter located at 5500 feet on Mt. Wilson for this purpose. The audio comes from the studio-to-studio intercom system, with P-T-T buttons in the talk studio, the news-booth, and the control room. Each remote vehicle has an IFB receiver for remote cuing purposes.

KFI has a long history in the Los Angeles market and is one of the stations that “everyone will



Figure 5. KFI's IFB transmitter rack located at the KOST transmitter site Mt. Wilson

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tune to” in the event of a big natural disaster. For this reason, we take loving care of the radio communications systems.

As time marches on and more and more listeners get their news and entertainment via the internet, it's important to continue to emphasize our “legacy” strengths even while our own methods evolve. The one-to-many aspect of over-the-air radio has some terrific advantages over the one-to-one nature of internet connectivity—and it's never more evident than during an emergency situation. Use of wireless network communications and the public internet has radically changed ENG methods, as we have seen. Yet, our “old-fashioned” methods and techniques remain as valuable as ever. 0



Figure 6. One of KFI's remote news vehicles with 2-way, RPU, IFB receive antennas





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## FACILITYSHOWCASE



"The Free Beer & Hot Wings Morning Show" team preps before broadcast in the new studio. (l-r) Gregg "Free Beer" Daniels, Steve McKiernan, Eric Zane and Chris "Hot Wings" Michaels

# "Free Beer" and "Hot Wings" in the Morning

by Mike Maciejewski  
Chief Engineer, WGRD-FM, Grand Rapids, MI

Action films don't begin to compare to the stunts that the morning team pulls off every day putting together "The Free Beer & Hot Wings Morning Show" for radio syndication, a television segment, a smattering of podcasts and video, and whatever else the team comes up with. The new studio includes an LX-24 control surface with TS-4 Talent Stations networked through a WheatNet-IP audio system.

**T**here's a reason why we call one of our audio producers the stunt boy—and it's not just because he does wild stunts like drive cross-country to the Lindsay Lohan trial so he can be the crazy guy in the pink shirt jumping up and down on the evening news, or flying to Pamplona, Spain to "run with the bulls."

Producer Joe Gassman and the morning show team jump through hoops to produce the Compass Media syndicated "The Free Beer & Hot Wings Morning Show" out of Townsquare Media's WGRD-FM studios in Grand Rapids, Michigan.

On any given morning, there are any variety of entertainment clips to source from the Internet, podcasts to upload on the fly for the website, live video streams over the Internet headed for the studio, the website, or both, and iPhones with cameras recording every move.

There's also the small matter of a 6 a.m. segment with the local ABC TV affiliate, which is broadcast live at the same time the morning team syndicates its radio show to some 43 markets spanning the continent, from Portland, Maine, to Palm Springs, California.

All of this comes with the kind of stunts you'd expect of a live action film, but with none of the CGI.

The show's cast and crew—Gregg "Free Beer" Daniels, Chris "Hot Wings"



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World Radio History

## FACILITY SHOWCASE

Michaels, Eric Zane, along with producers Joe Gassman and Steve McKiernan, had been complaining for some time that we needed a studio that was more modern. For 10 years we made changes here and there in the old analog studio to keep up with the show, its expanding syndication, and an increasingly competitive media environment. Eventually, however, it was obvious that we needed a radical change to keep up with it all.

The real eye-opener occurred when the morning cast and crew sat down as guests at an affiliate's broadcast studio, and noticed how easy it was to integrate all of their laptops, tablets, and iPhones into the studio. The affiliate station was using IP audio networking.

We wanted a similar set up, and were surprised to learn that it was all very doable. Ten years ago when the show became syndicated, audio over IP was a pipe dream for us; something that only major-market stations could afford. Now, not only could we afford it, but it was becoming increasingly obvious that we could no longer afford NOT to upgrade. We could no longer expect the old analog studio to handle it all. The show began doing monthly live remotes from affiliate markets which required additional mix-minus capability beyond the two that the existing analog



Small and relatively inexpensive professional cameras with HD-SDI

console could handle. But by the time we added the television segment, things got interesting. The morning team was syndicating the radio program live to all of our markets, doing a local break for flagship WGRD, while at the same time doing the segment on the ABC TV affiliate in Grand Rapids. Timing wise, it is quite a juggling act, and interesting to see

## FACILITY FOCUS

### Omnirax



*Omnirax – Collaborative Ergonomics in action at Townsquare Media's FBHW Morning Show Studio in Grand Rapids, MI*

Omnirax is proud to have been a partner on Townsquare's recent build of a new studio for their syndicated "Free Beer & Hot Wings Morning Show." We worked closely with Mike Maciejewski, market engineering manager, to maximize Omnirax's unique collaborative design process.

The build was Innova Custom Line furniture, the solution for a project with some unique challenges: five mics, a very dynamic and interactive cast of characters and a very narrow space to work with. We worked through a variety of iterations and #7 was the one which was built. The decision was made to keep all the monitors off the table so sightlines could be clear and the show could flow.

We were most gratified to hear that the on-air talent loved the furniture, the new technology and their new home. High pride of ownership is just one of the many reasons that Omnirax Furniture Company remains "The Engineer's Choice" for expert Custom and Production furniture solutions.

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Finally, in July of 2014, it happened. We modernized the "Free Beer & Hot Wings" studio entirely, moving up to our fifth Wheatstone console, the LX-24, with two TS-4 Talent Stations for the producer booths. The studio is networked using WheatNet-IP with eight audio I/O and processing blades. The team can handle just about any workflow situation that arises, and there are plenty of new situations that happen daily!

Immediately, the LX-24 solved the pressing problem of coordinating the TV segment with the affiliate stations and the local breaks in the show. The entire setup for this segment of the show is stored as events in the LX-24 control surface and activated with the push of a button, along with the source and destination groupings. In the old studio, the team had to switch the mic settings from the night before and setup any sources they might need. With the LX-24, these transitions are easily executed with a simple button press.

Next on our list was to integrate the two producers more into the workflow. Two TS-4 Talent Stations took the place of a basic panel with mic and talkback buttons and an amplifier that was hard-wired to the studio monitor output from the control room. That was a problem because the producers couldn't monitor other sources. They were operating blind in many cases, with no ability to spot check the network feed. Now, if there



vMix software handles video switching, graphics and encoding

are issues with the satellite during the show, for example, they'll be able to dial around on the TS-4 to make sure that it's there.

The look of the studio is critical these days, since the show produces a lot of live video for our website as well as still shots for social media including Instagram and Facebook. The show's website presence alone is impressive. There are several thousand paying subscribers to the website,



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- Laurie Prax, KVAK AM & FM/Valdez, AK

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- Mark Jensen, MWB Broadcasting/York, NE



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so it's important to keep these fans engaged not only with sound, but with video as well.

For this new multimedia world where looks are as important as sound, the first thing we eliminated in the new studio was the clutter of computer monitors and keyboards that crowd the countertops. There are a large pair of LCD screens on the wall for automation, another one for the web, and yet another for the call screener. Because Hot Wings and Eric sit across from Free Beer, we mirror the automation and web screens to displays on the opposite wall so they can see them as well. We had collected way too many computer monitors over the past 10 years, and ended up with a very cluttered and crowded workspace.

The clutter has been eliminated. In the new studio, we still have seven monitors, but they have been replaced by the 40-inch LCD screens on the walls. Putting the monitors on the wall cleared the sight lines between the talent and gives the studio a much more natural setting for the guys to fight with each other. The new low profile "TV" mic arms from Yellowtec nicely eliminated the cluttered look of traditional overhead mic booms.

With seven large LCD monitors, we needed a way to manage the



Kramer video matrix switcher (left) for managing studio LCD monitors and Wheatstone Blades (right) for audio and logic routing

video displayed on them. A Kramer 8x8 video matrix router gives us the capability to choose which computer is displayed on each LCD. We can also dynamically change this on the fly using automation triggers thru the Wheatnet blade logic ports. An example would be switching the mirrored screen from showing Nexgen during a spot break back to the call screener display during a show segment.

The show had been streaming live video to their website for about 4



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Preparing the vMix system for a broadcast

years using a couple of simple consumer webcams. In the new studio we've upgraded to a professional HD multi-camera setup and will be producing the show like a conventional TV talk show. We're using vMix, a software based video switcher running on a custom PC that has the horsepower to handle the task. It performs switching, graphics, stream encoding, and can also record the program. The camera switching is automated to have the video follow audio using a custom Arduino micro controller. The Arduino runs a script that I wrote for making intelligent switching decisions based on which mics are active. If, for example, two of

### EQUIPMENT LIST

#### Audio:

- Wheatstone LX-24 console
- M4 mic processors
- Aura8ip
- ip88ad and ip88cbe blades
- Yellowtec M-ka TV mic arms
- Heil PR-40 mics
- Custom furniture from Omnirax

#### Video:

- Custom-built PC for video switching
- "vMix HD" software video mixer
- Black Magic Design Decklink Quad HD-SDI capture card
- Marshall Electronics CV340CSB HD-SDI cameras
- Custom Arduino controller for video follow audio switching
- Kramer VP-8x8 matrix video switcher
- Leprecon DMX controller
- Elation TVL1000II LED studio lights
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## FACILITY SHOWCASE

the guys are arguing, it can bring up a side by side shot of those two cameras. Or if the entire crew is laughing together it can bring up a group shot. The Arduino controller is connected to the Wheatstone M4 blade audio and logic outputs.

We did a lot of research before choosing video cameras. We needed something that wasn't beyond the reach of our budget. Webcams were quickly ruled out for the close-up shots, though we're still using a few for the wide shots of the studio and in the producer booths. We needed cameras that have a zoom lens so the close-up shots could be properly framed. This way the audience will

### "FREE BEER" DANIELS REPORTS ON DAY THREE IN THE NEW STUDIO

In a voice that only radio can fully appreciate, Gregg "Free Beer" Daniels walked us through the new "Free Beer & Hot Wings" studio at Townsquare Media's WGRD-FM, Grand Rapids, MI, where the syndicated show's morning team spent an uneventful morning.

"Normally, moving into a new studio, it's awkward for a while. Your muscle memory is gone and you're thinking about the next button. But even today, on Day Three, when that muscle memory is still being developed, it's really comfortable and feels familiar in a good way," says the lead host for the syndicated radio show with cohorts Chris "Hot Wings" Michaels, Eric Zane, and audio producers Joe and Steve.

Still, he's quick to point out that they have had to make some adjustments...like, what to do with all that spare time in between sets now that the studio has gone from analog to digital.

He doesn't miss having to set up the old analog console every morning for the show's five lively personalities with all the right mics at all the right levels going to all the right faders, and with a few audio clips thrown in to make it interesting. "It used to be such a pain to get all the buttons right on the board that on the days I had to be gone, our producer would take photographs with his iPhone, each button one at a time so I could check it. It took something like 18 photos to get every step right," says Daniels.

Now, it's a matter of pushing the preset button on the side of the LX-24 console. Daniels can push the button again to call up other important presets for voicetracking to the local broadcast when the affiliate stations are on break or for the morning show's live segment on the local ABC TV station. "Before, to interrupt the regular show while managing all that with the affiliate network, and then jump into the local TV station, it was a logistical nightmare," he explains.

The team is also enjoying the easy access to audio that comes with an IP audio network. "Stuff comes up on a live show that's not scripted. So we need to be able to get audio files on the fly, and it used to be that we'd post these to a network, and then the person that wanted to play one had to find it and download it and then put it in Cool Edit Pro. Now, all of sudden, I can play audio from Steve in our producer's booth two doors away. Amazing," he says.

As for the aesthetics of the new studio, Daniels says he has no complaints, noting the slick wall-mounted PC monitors that replaced the growing bank of ad hoc monitors they had been tripping over – or having to look around – for some time. "By moving those out of the way, it's created more of a roundtable discussion. We can finally make eye contact, which is important for a show like ours that's based on personalities and interactions with each other," he comments.



## FACILITYSHOWCASE



Custom PC for video switching



The vMix user interface

really be able to see facial expression and reactions, adding an entirely new dimension to the viewing experience. We looked at consumer grade camcorders as one possible solution, but the HDMI cabling is troublesome to extend. We ended up choosing the Marshall Electronics 1080p HD-SDI cameras which use basic 75 ohm coax cabling and work well with the 60 foot run to the vMix PC. Total cost for the entire video system including cameras, software, and computer was less than \$8,000. This is a fraction of what gear of equivalent quality would have cost just a few years ago.

### SOUND IS IMPORTANT TOO

It's not just about looks with the new studio. The guys use quite a few YouTube clips, They'll play news clips of odd stories and comment on them; rewinding, mixing, and adding a few zingers as they go. Quite often this spins into discussion with listeners calling into the show.

These clips can vary considerably in audio quality. To clean up the sound,

we are now able to use the processing in the LX-24's mix engine. This built-in audio processing help us manage some of the wild levels and EQ to improve quality.

Listening to the show, it seems like they're winging it, but in truth they do a lot of prep in advance. Our new studio now lets them focus on what they do best! 🎧

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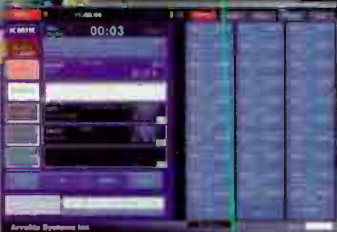


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# RADIO SHOW SESSION HIGHLIGHTS

Wednesday, September 10, 2014

**IT for Radio Engineers: Understanding IP Networking Routing and Switching Tutorial**  
9:00 a.m. - 2:15 p.m.  
Indianapolis Convention Center Room 110  
Instructor: Wayne Pecena, Director of Engineering, Texas A&M University

**Radio Rules! Everything You Need to Know About Federal Regulation and More!**

10:15 a.m. - 11:15 a.m.  
Indianapolis Convention Center Room 109  
Moderator: Jane Mago, Executive Vice President and General Counsel, NAB

**Panelists:**

- Peter Doyle, Chief, Audio Division, Media Bureau, Federal Communications Commission
- Al Kenyon, IPAWS National Test Technical Lead, Department of Homeland Security - FEMA
- Nancy Ory, Member, Lerman Senter PLLC
- Davina Sashkin, Attorney, Fletcher Heald & Hildreth, PLC

**All-digital on the AM Band - Testing for the Future**  
2:30 p.m. - 3:30 p.m.

Indianapolis Convention Center Room 110  
Moderator: Ben Downs, Vice President and General Manager, Bryan Broadcasting Corporation

**Panelists:**

- Greg Borgen, Owner/Operator, WDGY
- David Layer, Sr. Director, Advanced Engineering, NAB
- Andrew Skotdai, President, KRKO and KKXA
- Glynn Walden, Sr. VP, Engineering, CBS Radio

**The Magic - Radio's Storytellers**

2:30 p.m. - 3:30 p.m.  
Indianapolis Convention Center Wabash 1  
Moderator: Gary Berkowitz, Radio Consultant, Berkowitz Broadcasting Consulting  
**Panelists:**

- Bob Kevoian & Tom Griswold, Air Personalities, The Bob & Tom Show, Westwood One
- Clark Howard, Host, nationally-syndicated radio show, The Clark Howard Show
- Scott Shannon, Morning Host, WCBS-FM

## Opening Remarks and Keynote

3:45 p.m. - 5:00 p.m., Wednesday

Indianapolis Convention Center Sagamore 3-5

**Keynote:** Bob Hoffman, Partner, Type A Group

### Presenters:

- Erica Farber, President and CEO, Radio Advertising Bureau
- Gordon Smith, CEO, National Association of Broadcasters

Thursday, September 11, 2014

**Leadership Breakfast**  
"Capitalizing on Radio's Potential"

7:15 a.m. - 9:00 a.m.  
Indianapolis Convention Center Sagamore 3-5  
Moderator: Lew Paper, Partner, Pillsbury Winthrop Shaw Pittman LLP

**Panelists:**

- Lew Dickey, Chief Executive Officer, Cumulus Media
- Dean Goodman, Chief Executive Officer, Digits LLC
- Jeff Smulyan, Chairman & CEO, Emmis Communications Corporation
- Jose Valle, President, Univision Communications, Inc.

**Presenter:** Marci Ryvicker, CFA, CPA, Managing Director, Senior Equity Analyst, Wells Fargo Securities, LLC

**From the Control Room to the Board Room**

9:15 a.m. - 10:30 a.m.  
Indianapolis Convention Center Hall D  
Moderator: John David, Executive Vice President, Radio, NAB

**Speakers:**

- Dan Mason, President & CEO, CBS Radio
- Bob Pittman, Chairman, Media and Entertainment Platforms, Clear Channel

**Hybrid Radio - What's in It for You?**

11:00 a.m. - 12:15 p.m.  
Indianapolis Convention Center Hall D  
Moderator: Jeff Simpson, Board Member, DMC-Bonneville

**Panelists:**

- Paul Brenner, Senior Vice President & CTO, Emmis Communications Corporation
- Dave Kelly, Director of Strategic Research, Big Machine Label Group
- Ginny Morris, Chair and CEO, Hubbard Radio
- Eric Williams, Product Manager, Sprint Corporation

**Ask the Experts:**

**Political Programming and Advertising**  
2:00 p.m. - 3:00 p.m.  
Indianapolis Convention Center Hall D  
Moderator: Ann Bobeck, Senior Vice President and Deputy General Counsel, NAB  
**Speaker:** Robert Baker, Assistant Chief, Policy Division, Media Bureau, Federal Communications Commission

**SBE Certification Exams**

2:00 p.m. - 5:00 p.m.  
Indianapolis Convention Center Room 110

**Executive Future**

3:00 p.m. - 4:00 p.m.  
Indianapolis Convention Center Hall D  
Moderator: Dan Harris, Co-Anchor, ABC News  
**Panelist:** Alan Mulally, Board Member, Google

**The NAB Marconi Radio Awards**  
25th Anniversary Dinner & Show

6:00 p.m. - 9:00 p.m.

Friday, September 12, 2014

**Attracting the Next Gen. and Winning**  
9:00 a.m. - 10:15 a.m.  
Indianapolis Convention Center Wabash 3  
Moderator: Trila Bumstead, Owner, Ohana Media Group

**Panelists:**

- Jared Boomer, Music Director, WICR-FM
- Colin Bowles, On-Air Talent/Traffic Director, WICR-FM

**Designing, Maintaining and Monitoring Reliable IP Audio Broadcast Facilities**

9:00 a.m. - 10:15 a.m.  
Indianapolis Convention Center Room 110  
**Speaker:** Jacob Robinson, Director of Engineering & IT, Emmis Communications

**From Pixels to People: Building Your Professional Network for Career Advancement**

9:00 a.m. - 10:15 a.m.  
Indianapolis Convention Center Room 109  
Moderator: Ruth Presslaff, President, Presslaff Interactive Revenue

**Panelists:**

- Kim Guthrie, Executive Vice President, Radio, Cox Media Group
- Theresa Merrill, LinkedIn Marketing Trainer, Social Media Coach & Speaker, Sell Social Media
- Diane Sutter, President/CEO, Shooting Star Broadcasting

**Music Licensing Tune-Up**

10:30 a.m. - 11:45 a.m.  
Indianapolis Convention Center Room 109  
Moderator: Suzanne Head, Associate General Counsel, National Association of Broadcasters  
**Panelists:**

- Bruce Joseph, Partner, Wiley Rein LLP
- Curtis LeGeyt, Senior Vice President, Government Relations, NAB
- David Oxenford, Partner, Wilkinson Barker Knauer, LLP

**Retaining the Next Gen. and Winning**

10:30 a.m. - 11:45 a.m.  
Indianapolis Convention Center Wabash 3  
Moderator: Stacy Aldredge, Training and Consultant Coach

**Panelists:**

- Nancy Ahlrichs, SPHR, Strategic Account Manager, FlashPoint
- April Deuschle, Manager of Instructional Design, Defender Direct
- Sam Thompson, Training Coach, Consultant

**15 Tech Ideas that Help the Bottom Line - A Radio Technology Panel of Experts**

10:30 a.m. - 11:45 a.m.  
Indianapolis Convention Center Room 110  
Moderator: Chriss Scherer, Owner/President, Scherer Media Services, Kansas City

**Panelists:**

- Jacob Robinson, Director of Engineering & IT, Emmis Communications
- Jeremy Ruck, Principal Engineer, Ruck & Associates
- Paul Shulins, Director of Technical Operations, Greater Media

**Radio Luncheon**

12:00 p.m. - 1:30 p.m.  
Honoree: Bud Walters, President, The Cromwell Group  
Keynote: The Honorable Ajit Pai, Commissioner, Federal Communications Commission  
Moderator: Gordon Smith, CEO, National Association of Broadcasters





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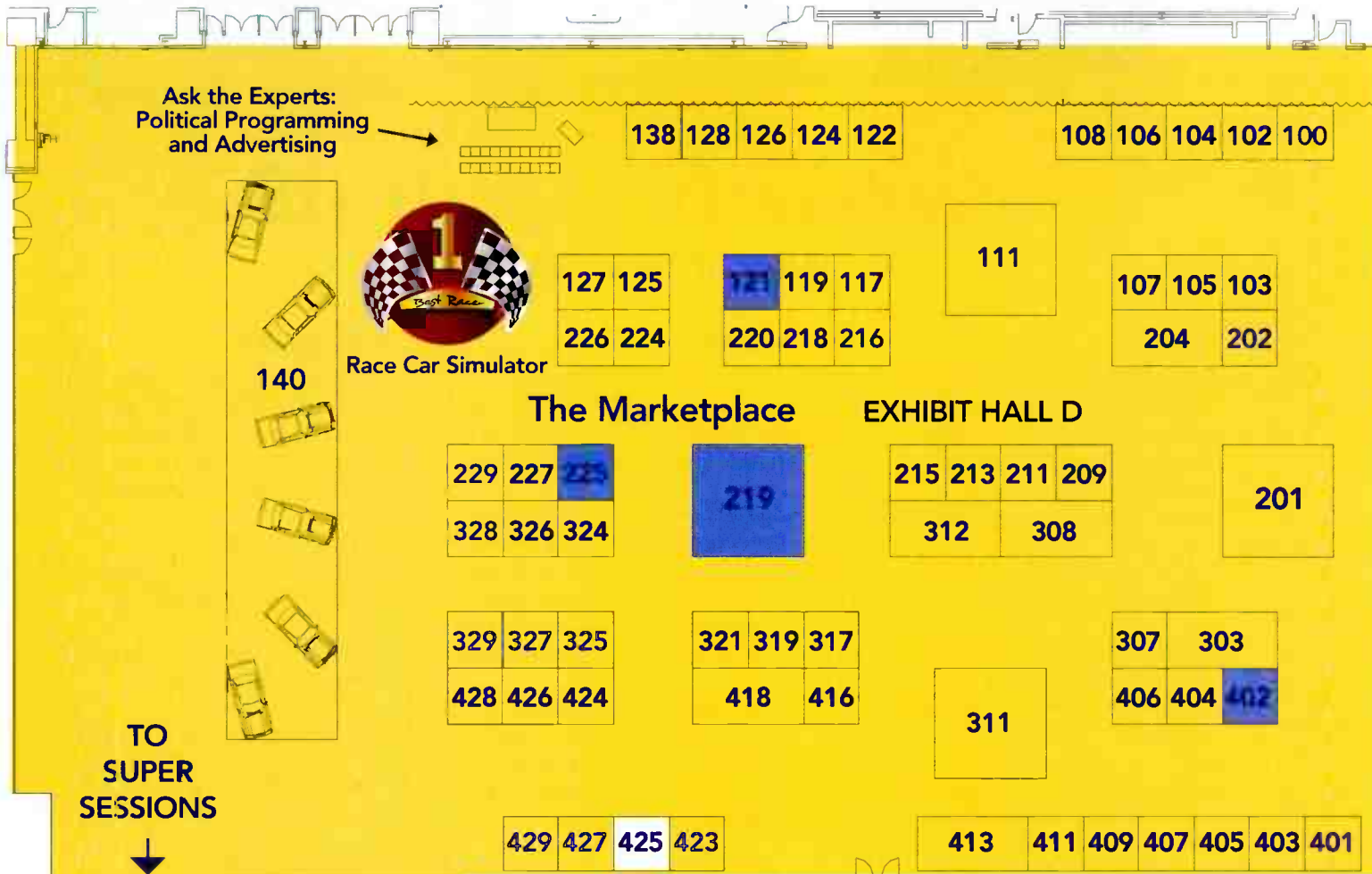
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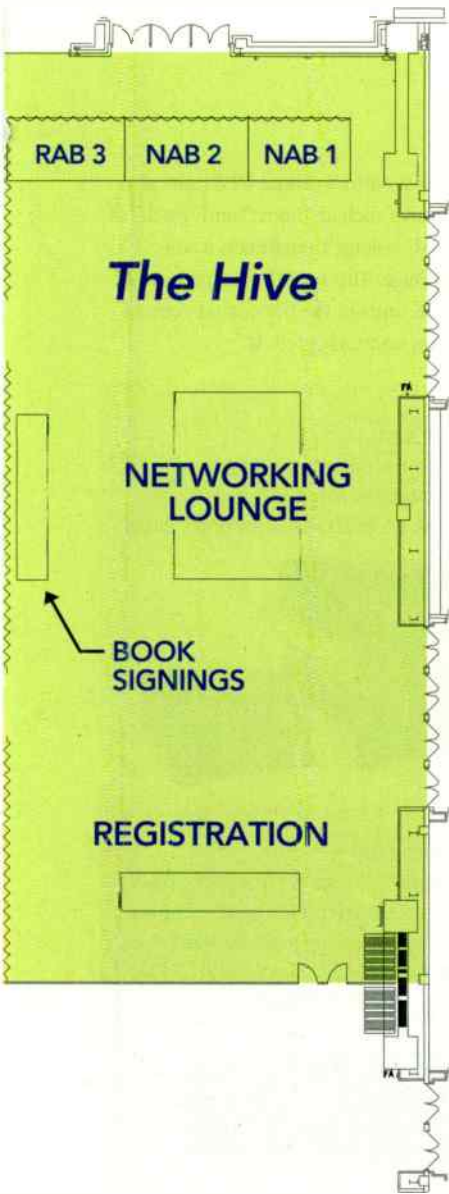
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# UPS Systems

by Shane Toven, Editor

**A** critical but often taken for granted part of any broadcast facility is the humble Uninterruptible Power Supply or UPS. This is most certainly one of those components that an engineer hopes is never noticed and works as intended when

needed. UPS systems come in a variety of form factors and capacities. The technology used is typically either true online double-conversion; constantly regenerating AC output from battery, or line-interactive which switches to battery only when incoming AC power is outside of acceptable

parameters or lost entirely. Some UPS units also have other features such as “boost” and “buck” of the incoming AC voltage to maintain a constant output voltage. This month, we compare a selection of UPS units in the hopes that your AC power flow stays uninterrupted. **Q**

## APC Back-UPS Pro | [www.apc.com](http://www.apc.com)

From APC (Schneider Electric), the Back-UPS Pro UPS series is an economical way to protect loads such as individual desktop PCs in offices. These line-interactive UPS units are available in sizes from 500 to 1500 VA. Selected models feature a front panel LCD for monitoring, and automatic voltage regulation.



## APC Smart-UPS On-Line | [www.apc.com](http://www.apc.com)

The APC Smart-UPS On-Line units are (as the name suggests) a true on-line double-conversion UPS and are available in a number of voltage and capacity configurations (from 1500 VA up to 20 kVA). Options include Ethernet management via SNMP, bypass switches, and external battery packs.



## TrippLite OmniSmart LCD | [www.tripplite.com](http://www.tripplite.com)

The OmniSmart LCD is from TrippLite's line-interactive series of UPS units. They feature an LCD front panel with adjustable backlight to monitor status, and provide voltage regulation and surge suppression, with communication via USB. The units will compensate for input voltages as low as 85 volts AC. Capacities are available from 650 VA to 1500 VA.



## TrippLite SmartOnline | [www.tripplite.com](http://www.tripplite.com)

TrippLite's SmartOnline is a double-conversion series of UPS units. The front panel provides a series of LEDs or an LCD to display battery capacity, load, and operational status. An internal bypass ensures the load continues to receive utility power in the event of a UPS failure. USB, RS-232, dry contact, and optional Ethernet connectivity is available.



## Eaton 5S | [www.eaton.com/5s](http://www.eaton.com/5s)

Eaton's 5S series of Line Interactive UPS units range in capacity from 550 VA to 1500 VA in a small form factor. The units feature a front panel LCD on selected models to display critical information about power quality at a glance. A USB interface is provided for communication with a connected PC. Other features include surge protection for Ethernet and coaxial cable, and an “Eco-Control” mode that will automatically power down other attached equipment when equipment connected to the “master” outlet is powered down.



## Eaton 9130RM | [www.eaton.com/9130rm](http://www.eaton.com/9130rm)

The Eaton 9130RM is an online double-conversion UPS in a 2RU form factor. Capacities range from 700 VA to 3000 VA. These units are suited for applications where power quality is more critical, such as equipment racks containing servers, network switches, and other sensitive equipment in broadcast environments. Available options include Ethernet connectivity for monitoring and control, environmental monitoring, bypass switches, and external battery packs for additional runtime.





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# Programmable Logic Controllers For Broadcast Engineers

by Dennis L. Sloatman

**A**s engineers, we often need to design a customized control system or interface to address a need which can't be met with an off-the-shelf interface device. In the "used-to-be" days, we'd get a Bud box, some Greenlee punches, a box o' wire, parts to construct a 24-volt DC power supply, a handful of 24-volt 4PDT relays, grab a cup of coffee, and head for the shop. I, like many of you, derived a great deal of satisfaction "back in the day" making these wonderful devices which performed their task tirelessly for decades.

Times have changed. Today, manufacturers have developed a line of really cool interface devices which can be combined to satisfy most of your control system needs. In some circumstances, however, you may still need to construct a discreet device control system (using a variety of timing devices, relays, diodes, counters, comparators, and analog circuitry), which requires a bit more "horsepower" and flexibility than off-the-shelf components can provide. In this case, you can choose the tried and true methods of using relays, sockets, capacitors, diodes, point-point wiring, and bread-board circuits, coupled with hours of assembly. This approach isn't wrong by any means and will get you the results you want. In this article, however, I suggest an alternative: the PLC, or "Programmable Logic Controller."

## DEFINITION OF A PLC

What is a PLC? Essentially, a PLC is a dedicated control block with multiple inputs

and outputs (called "points" in PLC language) which are either digital or analog. These points are controlled by an internal CPU with flash-type memory for program retention. Most PLCs are din-rail mounted, which is in itself, a wonderful thing (see "Getting Started.")

Depending on your need, you can select a PLC with a number of points ranging from as few as 10 to as many as thousands – with combinations of point types as required for your application. The PLC can be then be programmed to perform actions such as counters, latching relays, time-delay blocks of various types, comparators, RTC (Real Time Clock) functions, logic functions (and, or, inverter), math functions, and for/next loops. Other features are also available, and the capabilities will vary by the device selected. I'll discuss some of



Figure 1: Sample PLCs

these features in this article.

The good news is, you can have all of this capability for as little as \$69. For a typical application, however, you can expect to spend approximately \$150, not including the required power supply, din rail, and mounting panel.

## APPLICATIONS OF THE PLC

PLC devices are typically used for something other than the very limited market of broadcast tinkerers. Factories use PLCs for process control of machinery such as lathes, assembly line control, and for bottling and

packaging operations. Utility companies use them to control and monitor water tank levels, fluid rate, as well as the temperature, flow and pressure of gases. PLCs are used to control vending machines, games, and any other industrial process which requires responses to input stimuli. These stimuli include limit switches, temperature, voltage/current levels, angular velocity... or a command to change to night pattern! Not only can a PLC provide a more robust, reliable and adaptable solution to your application than a PC-based system, but these devices are tough – they're designed to work in an electrically noisy and harsh environment, such as a factory floor or a remote utility



Figure 2: PLC-Based Antenna Controller

pumping station. It's safe to say that PLCs are one of the most versatile devices available to any engineer.

Now let's focus on applications for our industry. As I mentioned, I constructed a PLC-based antenna controller for one of our Los Angeles AM directional stations using a Teco model SG2-20HR-D (Figure 2).

The key components of this assembly are (from left to right): PLC base unit, expansion unit, 2PDT 24-volt relays, and dual (redundant) 24-volt din-rail mounted power supplies. After constructing the controller, I realized that I could have reduced the labor of interconnection wiring, lowered the cost, and enhanced reliability simply by adding an additional expansion unit to eliminate the discrete relays.

When you consider the requirements for an AM directional antenna controller, you think

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of muting the RF of the transmitters with a small delay to allow the RF energy to dissipate prior to commanding the RF contactors to move. This will reduce or eliminate arcing and possible damage to the RF contactors, as well as avoiding a VSWR Trip (or equivalent fault) on your transmitter. The amount of time required can vary depending upon the type of transmitter. My informal survey of manufacturers has determined that the maximum delay required from initiation of the RF Mute command to the point at which no RF energy is present at the antenna terminals is approximately 200ms or less. So, there should be a delay of 200ms from the point at which a mode change is requested to the point at which the RF contactors are commanded to move to their alternate positions. Further, you would like a lockout on your antenna controller in the event that a command is issued which would not result in a mode change (that is, if you're already in Day Mode and you press the "Day" button, no action

would be taken – no undesired RF mute).

After the RF Mute has timed for 200ms, the next step is to issue the command to switch to the desired mode and to allow sufficient time for the contactors to move to the new position. So, when programming our PLC, we consider the time interval often referred to in data sheets as the "actuation time" or "operate time," and is typically 100ms or less for RF contactors. Thus far, we have 200ms RF mute and 100ms RF contactor actuation time to consider as we work through our design. Another consideration is a "J factor," which is the settling time of the RF contactors. Our antenna system must allow for all contactors in the system to switch to the new position. The controller must be programmed to issue a command of sufficient length to ensure that the slowest contactors have moved to their new positions. Of course, the switch positions can be monitored by the contactor auxiliary micro switches to be certain that all have contactors have switched

(although not all systems have that luxury).

After we're sure all contactors have switched, we can un-mute the RF signal from the transmitter.

Listing all the details of this operation may seem trivial until you consider the work that is required to build a system to control it. The standard design utilizes conventional relays and either timing relays or relays with capacitors, resistors and diodes. The real issue is the time and labor involved to build the controller: laying out the components, cutting to length and stripping all of the interconnecting wires, tinning them, drilling all the mounting holes, and arranging wire management. The good news is, this same antenna operation can be controlled by a system design using a single PLC and, perhaps, some expansion units. The PLC not only cuts expense and construction time, but it provides a system whose operational functions can be modified easily by re-programming the PLC.

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# FLIR ONE Thermal Camera Add-In for iPhone 5/5S



FLIR ONE

by Aaron Read

**E**arly in 2014, FLIR – maker of many thermal imaging products – announced they were taking pre-orders for the FLIR ONE add-on camera for the iPhone. Many engineers, your author included, “geeked out” over the ability to have a thermal camera for just a few hundred bucks, a first in this arena. The actual units went on sale in August, and they’re definitely more for consumers than professionals. Even so, they are useful within certain limitations.

## THE BASICS

The camera is about the same size/thickness as an iPhone itself. There’s a gap in the case to let the iPhone’s own flash shine. The extra weight is relatively negligible (3.9 oz) and the camera has its own built-in rechargeable battery (via an included micro-USB cable, not a lightning connector, oddly enough) that’s rated for two hours, although I found judicious use could extend that noticeably.

It comes with a nice, slim hardshell case that snaps onto your iPhone. It’s meant to stay on all the time while the camera easily snaps on/off. I like the concept and the execution is well-done, but if you don’t like the case it’s pretty tough to pry it off.

The “back” of the camera has two lenses: one for visual (MSX/Multi-Spectral Dynamics) and one for thermal. Plus a sliding switch that

## PERFORMANCE AT A GLANCE POINTS

- Cheap in comparison to other thermal cameras, but expensive for an iPhone add-on.
- Clearly a consumer, not professional, device.
- Limited to iPhone 5/5S; no upgrade path.
- Poor resolution/range. Variable-only color scale/reference temp.
- Lightweight, small form factor.
- Good independent battery life; won’t drain your iPhone’s battery.
- Excellent integration with iOS operations.

doubles as a lens cover and “tuning” control.

Once you charge up the camera and lock it in place, download the free FLIR ONE app from the Apple Store and open it. After several seconds of loading, it prompts you to press and hold the “tuning” lever for a few seconds.

That’s it! You’re now seeing heat just like the Predator from the classic Schwarzenegger flick, except the MSX seamlessly blends a subtle “outline” image that helps greatly to make sense of what you’re seeing. There’s also an available crosshairs with a pinpoint numeric temp reading. Pretty cool, eh? And it even seamlessly integrates with your iPhone’s photo albums for easy editing or sharing.

## THE LIMITATIONS

Unfortunately, it only takes a few minutes before the limitations become glaring.

The camera prompts you to “tune” it every few minutes, even every few seconds, depending on how much the temperature it “sees” is changing. Fortunately it’s a simple and intuitive process.

The bigger problem is the scale. The camera provides several different “viewing modes” with different ways of using color to represent thermal gradients. But neither the gradient nor the centerpoint can be fixed;

it’s always shifting depending on the hot/cold extremes the camera is currently “seeing”. What looks like a major difference might only be four or five degrees. And what’s red might be 120F or 50F, and changes every second. For something that seems like a simple software fix, this was very disappointing.

The resolution is understandably very low, about 80x60 for the thermal camera. Range is also limited; it can technically see for miles (it could tell the difference between clouds and clear sky, even at night) but effectively it’s more like 10 to 15

feet. The camera won’t “see” below 32F, either.

I don’t begrudge a \$350 thermal camera these issues, but if you need better specs you’ll need to spend more.

The camera puts a FLIR watermark on all videos and pictures. While minor, it’s really tacky that you can’t turn that off.

Worst of all, the FLIR ONE ONLY works with an iPhone 5 or 5S. \$350 for a device on Apple’s 18-month “planned obsolescence” timeline? Ouch.

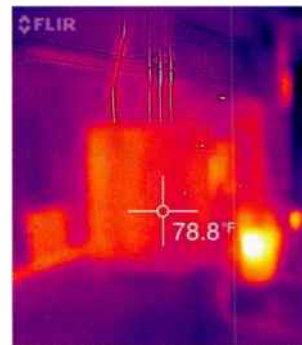
## BUT IT’S NOT ALL BAD!

After using it at my 10 kW AM transmitter building, I found things that were warm showed up as warm, cool things cool. No surprises there...which I guess is good for my facility! I can see how it could quickly identify problems that might otherwise be hard to detect, like waste heat from electrical problems.

And despite the problems, it helps to remember that thermal cameras usually start at \$1000 and easily breach \$10,000. The FLIR ONE is an actual, working thermal camera for just \$350.

However, if you had to buy the iPhone 5 separately, you’d quickly get into price ranges where the FLIR

ONE is not worth it. On the other hand, if you already have an iPhone 5 or 5S, and you have a “casual” or even “prosumer” need for a thermal camera? The FLIR One can work for you. And hey, it does look cool! ☺



Hot spots are readily apparent

*Aaron Read is the director of IT and engineering for Rhode Island Public Radio*

## ADDITIONAL INFO

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by Doug Irwin  
CPBE AMD

# Small Remote Controls

In last month's Tech Tips I discussed a few relatively inexpensive devices that can provide remote control for your studio location. This month we're going to look at a few other devices that have greater capabilities.

The first device we'll look at is the Davicom Micro. This is a ½ RU remote control with eight status inputs; eight analog metering inputs (0-5VDC) and eight relay outputs. The Micro can be expanded by way of Modbus, potentially up to 128 metering inputs, 256 status inputs, and 72 relay outputs. The native I/O for Micro is done by way of a small external panel, connected to the unit itself by D connectors. Communication is done through the telephone interface, or through the single Ethernet connection via desktop or mobile web browser, or through the USB port.

Davlink is the windows-based software program used for communications, remote control, and configuration of the Micro. By way of the Davlink software, the user can access 128 virtual logic gates, "qualifier" and inverter gates corresponding to each of its inputs, and the logic functions AND, OR, NAND and NOR, allowing the creation of automated functionality. Individual users can create their own password protected "workspaces" with diagrams and pictures that focus on particular functions.

Another small but capable remote control is the Mini Control Silver from Audemat. MCS also has eight status inputs, eight analog inputs, and eight relay outputs. Designed for DIN rail mounting, all i/o connections are made directly to the unit. Communication is done via the

single Ethernet connector or the single USB port. Automated functionality is configured by way of Scripteasy, which allows the user to create routines and alert sequences based on the status and analog inputs. The logic operators AND, OR, XOR, and inverters are available, as are timers and a real-time clock. The MCS has SNMP capability allowing it to function as either an agent or a manager for up to two agents. The relay outputs can be controlled via functions configured in scripteasy. Alarm outputs are available via e-mail or the optional Voice/DTMF interface. New this year, Masterview 2.0 capability allows a remote user to look at custom user interfaces set up through scripteasy with any desktop or mobile browser.

When you have this kind of capability at the studio location it's amazing how useful it can become, especially as you become more adept at the configuration of the devices. Here are just a few ideas:

**Monitoring air conditioning**—If you have an unattended site running many computers, air conditioning is critical. Obviously you would measure the ambient temperature, you may also want to consider measuring the cold air output. Configure an automated function that alerts you when the ambient temp is creeping upwards, with no cold air output from the A/C units. This could give you a "heads up" to get your A/C tech on-site before the room gets unbearable.

**Generator monitoring**—You need to know about a power failure at the studio location. Gather status from the generator itself, and monitor the local line voltage. Configure an automated function that alerts you when the generator is running due to a power failure rather than weekly exercising. This may seem obvious, but how would you know about these conditions if the studio site is completely unattended?

**Building intrusion**—With logging capability



Davicom Micro




Audemat Mini Control Silver

native to the remote control, generate a record of doors being opened and closed. Match this information with camera "snapshots" later on. This could prove valuable if something "out-of-the-ordinary" happens at the studio after hours.

**Keep track of PPM**—Those of us in PPM markets know that if you have a loss of PPM, it's the same as being off-air. Use the status outputs from the PPM decode monitor and alarm monitoring to let you know about loss of PPM.

**Off-air monitoring**—As I wrote in the last month's column, sometimes you need to be in two or more places at once. You may find yourself out-of-range of your radio stations, or outside of your normal market. Let the studio remote control alert you to dead air, or loss-of-carrier. It's always a good idea to do that from a location other than the transmitter site.

Those are just a few ideas for any radio station. Individual stations will have many others specific to their own circumstances. You could probably name a few right now—perhaps something you'd like to share? We're always looking for your clever tech tips. Send them to [radio@radiomagonline.com](mailto:radio@radiomagonline.com). 

Irwin is RF engineer/project manager for Clear Channel Los Angeles. Contact him at [doug@dougirwin.net](mailto:doug@dougirwin.net).

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## NEWPRODUCTS

### Logitek JetStream Plus | Audio networking

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JetStream Plus offers high density I/O configurable by the user to precisely tailor audio and networking requirements with a minimum of components and with minimal rack space. Fifteen card slots are provided for analog inputs, digital inputs, analog outputs, digital outputs, SDI inputs and microphone preamps. A drop-down front panel makes access to cards easy, and redundant power supplies ensure robust performance. Any size Logitek console (Pilot, ROC, Mosaic, Artisan or vMix+) can be accommodated, and up to 4 consoles (36 faders total) may be operated via the JetStream Plus.

[www.logitekaudio.com](http://www.logitekaudio.com)



### Sennheiser Electronic HMD 26-II | Headset

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are equipped with the ActiveGard limiter, which protects hearing from sudden volume peaks above 105dB. It

can be activated or deactivated. The headset is provided with a dynamic hyper-cardioid patterned microphone. The short flexible part of the boom guarantees right positioning of microphone.

[www.sennheiserusa.com](http://www.sennheiserusa.com)



### Deva Broadcast DB9009-RX, DB9009-TX | Advanced audio IP decoder

This DSP processor supports the mandatory for any high class equipment HE-AAC versions 1 and 2, MPEG-1 Layer 3 compressed audio streams and lossless uncompressed PCM stream. DB9000-RX is also available in a version



with fully digital, DSP-based Stereo & RDS Encoder Module. The Encoder Module utilizes outputs for the MPX and the RDS or Pilot. Through the RS-232 port, this device could be transformed from Ethernet to a serial Redirector, enabling quick integration of the existing audio systems to the Internet. DB9009-TX is a second generation multi protocol Audio over IP Encoder. Its compressed output signal is directly transmitted over the IP-based networks to one or more compatible IP Audio players or decoders. The encoding of the audio sources into high quality configurable format is made in real time by HE-AAC Versions 1 and 2 or MPEG-1 Layer 3. This, in combination with the lossless uncompressed PCM stream, unaffected by the variable network conditions, guarantees long distance audio transmission without quality loss.

[www.devabroadcast.com](http://www.devabroadcast.com)



**Wheatstone BLADE 3 | AoIP routing**

Wheatstone's new line of BLADE I/O access units add: a built-in multi-band stereo processor for "spot" processing satellite feeds, headphone audio, Web streams or any audio feed routed through-out the network. AES67 compatibility offers interoperability with other AES67-compliant devices and signals into the WheatNet-IP Intelligent Network. The new BLADEs will interoperate with AES67 devices, which can be configured with the new version of

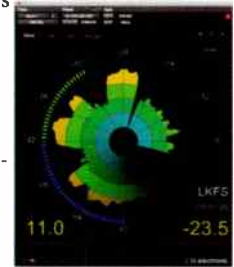


Navigator software containing master clock configuration settings and sync indicators. BLADEs also feature more logic, with 128 virtual logic ports per BLADE for triggering, managing and controlling the many feeds that have become standard in radio stations today. Dual OLED displays help the user easily view and change BLADE parameters. Smart associated connections take the hassle out of changing connections between locations, studios or announcers. Operators simply define the link they need (ISDN, studio feed, remote, etc.) and the BLADE can automatically set up a back link for it.

[wheatstone.com](http://wheatstone.com)

**TC Electronic LM1n, LM2n, LM6n | Loudness meter plugins**

The LM2n and LM6n meters offer a wealth of new features plus the easy to use Radar View. The LM1n plugin is a brand new addition to a growing range and provides the all-important basics in loudness metering, while only creating a small footprint on the screen. All of these new loudness meters support the major plugin formats, including AAX (Pro Tools 10 and 11), VST (Nuendo, Cubase, Audition, Premiere, etc.) and Audio Units (Final Cut Pro, Logic Pro, etc.) and even offers faster than real time off-line measuring in Pro Tools. LM1n, LM2n and LM6n comply with all major broadcast standards, including BS.1770, A/85, R128, TR-B32 and OP-59, and will remain compliant via updates whenever new revisions of these standards are released.



[www.tcelectronic.com](http://www.tcelectronic.com)

**2wcom FMC01 | FM/MPX codec**

The FMC01 is a compact codec for high-quality FM MPX contribution and distribution via IP or E1 (G.703). It combines encoder and decoder functions in the same unit. With 100 percent lossless audio encoding/decoding and optimized bandwidth technology that delivers maximum FM quality, the FMC01 is a point-to-multipoint distribution solution.

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## NEWPRODUCTS



### PreSonus Audio Electronics Monitor Station V2 | Desktop speaker management

Monitor Station V2 enables easy desktop management of multiple audio sources and up to three sets of monitor speakers. The new monitor controller provides a S/PDIF digital input and has a more ergonomic, intuitive layout than the original Monitor Station. Features include four stereo inputs—two pairs of balanced 1/4" TRS and one pair of unbalanced RCA Aux inputs with gain control—managed with a source-select switch. A 1/8" TRS unbalanced input is summed with the RCA Aux inputs. The S/PDIF stereo input supports 44.1, 48, 88.2, and 96kHz

digital audio; a button switches between the Aux and S/PDIF inputs.

[www.presonus.com](http://www.presonus.com)

### Broadcast Electronics STXe 500 | Exciter/transmitter

This exciter/transmitter, along with its 60W version, the STXe 60, is now the standard exciter in all current production BE FM transmitters. It features full IP connectivity, fully rated output into 1.5:1 VSWR, an extensive remote GUI interface, and full compatibility with single frequency networks, including external 10MHz and 1PPS inputs. In addition, the STXe500 is fully compatible with Broadcast Electronics' adaptive pre-correction and crest factor reduction technology, VPe. Along with these features, STXe also provides compatibility with the new 192kHz digital composite input. Internal control communications is done using CAN bus technology, providing maximum resistance to interference, especially in high RF environments like crowded transmitter sites. The STXe series is also fully type-approved for LPFM use.

[www.bdcast.com](http://www.bdcast.com)



### Neumann KH 120 D | Nearfield studio monitor

Based on the KH 120 A small format studio monitor launched in 2010, the KH 120 D is designed for tracking, mixing and mastering applications. Utilizing the latest in acoustic and electronic simulation technologies, the KH 120 D ensures the most accurate sound reproduction possible. Equipped with an additional BNC input for AES/EBU or S/P-DIF formats (24-bit/192kHz), the KH 120 D enables seamless digital workflow right up through playback on the studio monitor. The KH 120 D also features digital delay for both analog and digital inputs, enabling the monitor to be used for demanding tasks requiring time alignment.

[www.neumannusa.com](http://www.neumannusa.com)



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## NEW PRODUCTS

### Digital Alert Systems DASLC+, DASLC+R | Emergency messaging platform

These new models double the input capacity of the DASDEC-II LC low-cost CAP/EAS systems. The new DASLC+ and DASLC+R accept more

monitoring source inputs while providing core EAS/CAP decoding functionality, audio switching, and radios in an all-in-one package. A new expansion slot on each model gives users room for future upgrades. Like their two-input predecessors, both the DASLC+ and DASLC+R offer broadcasters critical functionality in a low-cost design, while the DASLC+R features three integrated high-performance AM/FM/NOAA radio receivers. Both models meet all FCC Part 11 rules and conform to FEMA CAP v1.2 and IPAWS 1.0 standards, giving most low-power stations everything they should need for FCC EAS compliance  
[www.digitalalertsystems.com](http://www.digitalalertsystems.com)

### Rode Blimp | Suspension windshield

The Rode Blimp is a complete windshield and shock mounting accessory for the NTG1, NTG2 and NTG3 microphones, as well as any third party shotgun microphone up to 325mm (12-1/4") in length. It now features the Rycote Lyre suspension system. Constructed from a single piece of hard-wearing thermoplastic, the Lyre provides acoustic suspension to traditional elastic solutions, and will never wear out, sag or snap. The Blimp's handle has also been completely redesigned, reducing the product weight significantly, while increasing the ergonomics for handheld use. Housed inside the grip is a heavy duty Mogami cable, which splits via a junction box to a flexible, thin cable inside the Blimp, to minimize the transference of vibration to the microphone.  
[www.rodemic.com](http://www.rodemic.com)



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#### Allen & Heath Qu-32 | Portable mixer

Qu-32 shares the Qu series key features, such as total recall of settings (including faders and digitally controlled preamps), Qu-Drive integrated multi-track recorder, dSNAKE for remote I/O and personal monitoring, multi-channel USB streaming, Qu-Pad control app, and the iLive FX Library. It comes with a larger, 7" touchscreen and 33 motorized faders. Key to the design was providing a dedicated fader per mic input channel while retaining a compact footprint, the Qu series distinctive styling, and extensive I/O, comprising 32 mic/line inputs, three stereo inputs, 24 mix outputs including two Stereo Matrix Mix Outputs and four Stereo Groups with full processing, patchable AES digital output with a further 2-channel ALT output, dedicated Talkback mic pre input, and 2-Track output.

[www.allen-heath.com/US](http://www.allen-heath.com/US)



#### Broadcast Software International VMix for Axia | iPad app

VMix for Axia allows the user to control the VMix functionality of an Axia LiveWire Mix Engine or Power Station from an iPad. VMix also features integrated control of the BSI SkimmerPlus audio logging application to start and stop recording and allows the user to keep notes about what is being recorded, which can then be emailed from within the app.

[www.bsiusa.com](http://www.bsiusa.com)

#### Dielectric DCR-T-R | FM antenna with Radome

Equipped with a rugged radome for protection against ice and harsh weather, the economical DCR-T-R antenna brings the benefits of Dielectric's FM ring-style series to low-power applications. Along with all radiating elements, the kit comes complete with jumpers and power dividers for fast installation. The antenna is ideal for Class A and B stations, circularly polarized, branch fed, field-adjustable to any FM channel from 88-108MHz, IBOC compatible, and low VSWR. It has a power rating up to 1kW with 7-16 DIN input per bay, and features high-impact ABS radome enclosing each bay, and lightweight, all-aluminum construction.

[www.dielectric.com](http://www.dielectric.com)

#### DaySequerra DDA212N | Digital audio distribution amp

The DDA212N features a built-in Web server for remote control from anywhere on a studio's network. It is a dual 1 by 6 DA for AES3 audio. All inputs and outputs are transformer-isolated and are available in BNC and XLR



versions. Special attention was paid to power, grounding and shielding: Galvaneal chassis provides outstanding EMI-RFI protection and ultra-quiet SMPS for low-noise and distortion applications world-wide.

[www.daysequerra.com](http://www.daysequerra.com)



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**Mackie CR3 and CR4 | Powered Monitors**

The Mackie Creative Reference Multimedia Monitor series includes two models, the CR3 and CR4, with 3-inch or 4-inch woofers and 3/4-inch silk-dome tweeters. The monitors also feature a curved high-frequency wave-guide for wide, even dispersion of sound. Additional features include all-wood cabinets and tuned rear ports. A left/right speaker placement switch allows users to locate the volume control on the left or right of their workstation. The front panel includes a on/off/volume knob with a lit power indication ring that will also control the volume of headphones, which can be plugged directly into the front of the monitors. The monitors also feature a front-panel aux input for simple connection of a media device. Creative Reference monitors come with all the required connecting cables, as well as a pair of acoustic isolation pads.

[www.mackie.com](http://www.mackie.com)

**Glensound Electronics Cub | Digital mixer**

The Cub is a two-input, two-output digital mixer, with a USB audio interface for the Apple iPhone or other smart devices. It incorporates multiple level, high quality inputs, and return monitoring



in a small unit that will allow a broadcaster or engineer to successfully use smart phone apps. The smart device connects to the Cub via a top panel mounted A type USB plug. A lightning and 30-pin Apple interface lead is included. There is also a mini USB connection for connection to laptops and PCs.

[www.glensound.co.uk](http://www.glensound.co.uk)

**Orban Optimod 1552 | Multi-stream audio processor and codec**

The 1552 provides integrated audio processing and network streaming in a 2RU chassis. This product is intended for anyone who wishes to stream multiple audio programs. It introduces a new generation of Optimod processing that incorporates improvements to almost every processing subsystem. It is the first Orban processor for non-preemphasized audio channels that incorporates Orban's MX peak limiter technology, first introduced in with Optimod-FM 8600. Benefits compared to previous Optimod technology are significantly increased clarity and transient punch (particularly at higher loudness levels), thanks to a built-in psychoacoustic model.

[www.orban.com](http://www.orban.com)



**Lawo Jade 2.0 | Virtual audio router**

JADE 2.0 is Lawo's virtual audio router, managing all audio into and out of the PC. This radio software tool provides a unified interface to all audio applications, even with multiple audio hardware pathways. It can remember the routings for various tasks and recall them in an instant. It also provides advanced mixing and level control with an intuitive GUI and contains a suite of Lawo processing tools that you can insert into your signal chain.

[www.lawo.de](http://www.lawo.de)



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## NEW PRODUCTS

### Harbinger MüV Series | Portable PA systems

The Harbinger M60 and M120 offer four microphone/instrument inputs with individual volume controls, as well as an Aux input for connecting MP3 players for integrating music or backing tracks. The M60 system features a 60-watt powered mixer with two 10-inch two-way loudspeaker cabinets. The M120 offers 120 watts of power, with a pair of 12-inch two-way speakers with high frequency compression drivers. Both systems deliver full-range musical performance, with integrated two-band EQ and digital delay. The M120 also includes a three-band master EQ and Clip LED. All MüV systems are equipped with FX send and Record Out. Each Harbinger MüV PA comes complete with all speaker cables, and each speaker cabinet is designed with integrated 1-3/8 inch speaker stand mounts. [www.harbingeproaudio.com](http://www.harbingeproaudio.com)



### RTW TM3-Primus | Touchmonitor

This latest model from the Touch-Monitor series provides a full set of easy-to-read instruments for level and loudness metering. The TM3-Primus can be used as a desktop unit offering analog and digital audio ports. In addition, it features an advanced USB hybrid mode where a metering point in a digital audio workstation (DAW) (implemented using a specific RTW plug-in) is visualized right on the new TouchMonitor's screen. Also, a USB port allows for implementing an innovative USB/plug-in hybrid mode that enables metering to be performed right on the DAW so that a user can process and visualize the information instantly. [www.rtw.de](http://www.rtw.de)



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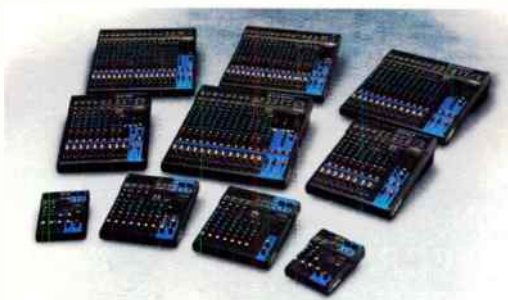
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**Soundstreak | Collaborative remote recording**

SoundStreak is a platform for collaborative remote recording using a standard broadband Internet connection. During a SoundStreak session, the two users employ an integrated real-time voice patch for nearly lag-free communication while SoundStreak's patented store-and-forward system records full-quality uncompressed audio files on the Talent computer in resolutions up to 96kHz/24-bit. These takes are then automatically transferred in the background via SoundStreak's secure server, leaving the files on the Production computer at the end of the session. SoundStreak's software and system access are free. All fees are paid by the Production end of the session, and are based on usage. SoundStreak includes a number of features and workflow enhancements such as secure, cloud-based asset management, automated file naming and handling, live script sharing and editing, and read-to-picture capabilities. All connections are with SoundStreak's servers rather than peer-to-peer.

[soundstreak.com](http://soundstreak.com)



**Yamaha MG Series | Audio mixer**

The redesigned MG series offers 10 different models ranging from six to twenty input channels with new SPX effects processors. In addition, four of the five XU models feature an integrated 24 bit, 192 kHz USB audio interface which is directly compatible with iPad and iPhone devices

through Apple's USB Camera Connection Kit. Other enhancements in the redesigned MG series include a more rugged chassis, and improved microphone preamplifiers.

[www.yamahaproaudio.com](http://www.yamahaproaudio.com)

**Omnia.9 | AM Support**

The Omnia.9 Multi-Band Audio Processor now supports both FM and AM. AM capability will be included in all Omnia.9 models shipping in September. The FM/AM upgrade is also available for download at no charge. Also available is the new Omnia.9 Dual Path (formerly Dual FM), which can process two entirely distinct program paths in combinations of FM+AM or FM+FM, and in AM simulcast environments the unit can process for FM+FM+AM. All versions of Omnia.9 are available with optional HD-1, HD-2, and HD-3 processing, encoding and processing for streaming, and RDS encoding.

[www.omniaaudio.com](http://www.omniaaudio.com)





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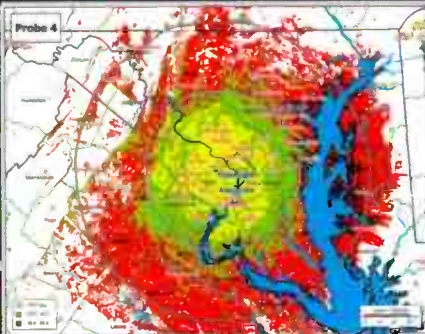
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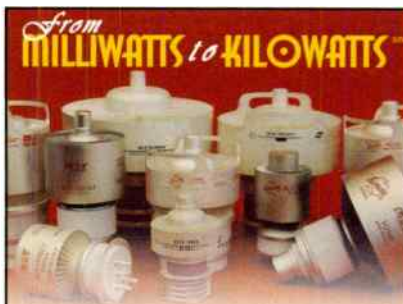
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**Reader feedback**

Steve Tuzeneau writes:

"I was reading the August issue of Radio and came across an acronym I was not familiar with.

The engineer who wrote the article for the KBEM Facility Showcase used the phrase "Radio Station HUDs." What does that acronym stand for?"

In this context, HUD stands for "Heads Up Display". The "Radio Station HUD" referred to in the article is a custom product developed on the Raspberry Pi embedded linux system. The display can consolidate a variety of information from sources such as RSS feeds, social media accounts, E-Mail, EAS, transmitter remote controls, websites (including weather radar) and any other dynamic information that the operator might need to have access to at a glance without navigating between multiple windows on a studio PC. For more information, visit [www.radiostationhuds.com](http://www.radiostationhuds.com).

Shane Toven, Editor

Have a comment? Send it to [radio@radiomagonline.com](mailto:radio@radiomagonline.com).

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**JULY ISSUE**

**Rod Hogg**

Owner, REVCOM Electronics  
Scott City, Kansas



He won a CBT-500  
cable tester from  
Hosa Technology.

**hosatech.com**

The microphone  
was hidden in  
the trim of  
the roof,  
immediately  
above the  
microphone  
shaped light  
fixture on the  
right.



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



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**SIGNOFF**



# This Month in SBE History

2014 Marks the 50th Year of the Society

## Regional Conventions

by Chriss Scherer

**T**he Society of Broadcast Engineers is rooted in serving the interests of its members. Through the activities and efforts of members and their chapters, the organization fulfills its goals:

- Promoting and advancing the science of broadcast engineering
- Establishing standards of professional education, training and competence for members
- Encouraging the exchange of ideas and promoting professional standards
- Representing the needs of members before regulators and the industry

One way several chapters have met these goals is by holding their own conferences. The oldest SBE conference is now hosted by SBE Chapter 22 Central New York, which holds the 42nd Broadcast and Technology Expo in October.

The origins of this expo go back to 1972 at a joint meeting of SBE Chapter 1 (Binghamton), chapter 2 (Scranton/Wilkes-Barre) and Chapter 22 (Central New York). The chapter held annual joint meetings in Owego, where Chapter 1 usually met. I talked to Gary Hartman, CPBE, who was an officer of Chapter 22 at the time. Hartman told me that Larry Taylor, then chief engineer of WENY-TV Elmira, NY, and chairman of Chapter 1 suggested the idea of the three chapters jointly sponsoring a "mini-vention," where vendors would have a local venue to display some of the latest technologies. The rationale was that since rank-and-file engineers rarely have an opportunity to attend the NAB convention, this would be an opportunity for them to see the newest equipment.

Hartman liked the idea, as did others from Chapter 2. A year later in the fall of 1973, the first SBE conference was born. It was held

Owego Treadway Inn, west of Binghamton, N.Y. Hartman says many were involved in the effort, but Taylor did most of the work.

Shown on this page are the flyer for the second Mini-Vention and an invitation to the third event. Hartman notes that there were no computer graphics or word processing programs, and it's easy to see how the flyer for the first Mini-Vention had the updates for the second event pasted onto the previous year's flyer.



Hartman says vendors loved the idea, but felt it should be in a better location. With that, the third meeting was moved to Syracuse, at the intersection of I-81 and the NYS Thruway (I-90). The distance from chapter hindered that group's participation, and the chapter eventually ceased being a sponsor. Chapter 1 continued as a co-sponsor for awhile, but also later dropped out.

The event was held for two years at the Northway Inn, then moved next door to the larger Hilton Country House for three or four years, then to the Sheraton Hotel for a number of years. The expo moved to Turning Stone

when the convention center was built.

Hartman notes that the idea caught on and other SBE chapters started their own conventions. Also, the term Mini-Vention was too close to regional meetings held by SMPTE (Rochester, Ottawa, Toronto and Montreal, jointly, for example), and at the behest of the national SBE the name was changed to Regional Convention. The Regional Convention name was applied to the Syracuse Expo in 1975.

The name of the convention was later changed to the SBE22 Broadcast & Technology Expo, which was the brainchild of Tom McNicholl, CBTE, of WKTV Utica, who was the committee chairman at the time.

Other SBE regional conventions:

- The SBE will hold its National Meeting at the SBE22 Expo this year.
- The Wisconsin Broadcasters Association and the Wisconsin SBE chapters jointly produce the annual Broadcasters Clinic, which will be held Oct. 21-23 in Madison, WI.
- The Oklahoma Association of Broadcasters and SBE chapters host an engineering conference in the spring.
- The Ohio Association of Broadcasters and the Ohio SBE chapters will jointly produce the Ohio Broadcast Engineering Conference Oct. 30 in Columbus.

SBE chapters and members are also involved in regional annual engineering conference programming conducted by state broadcaster associations in New Mexico, Michigan, Tennessee, Nebraska, South Carolina, Alabama, Louisiana, Texas, Indiana, Nevada and others. **Q**

*Scherer is a contract engineer and recording engineer in Kansas City, and former editor of Radio magazine.*



Please now to be in Syracuse on Friday, October 17th for the 3rd annual regional convention and equipment exposition of the Society of Broadcast Engineers, Chapters One, Two and 22.

Manufacturers and distributors will be displaying and demonstrating the latest in communications technology. Equipment for radio, audio, video, recording and testing will be there.

Highlights include the newest generation of quad video recorders... new audio cartridge tape units... handheld, battery-operated color cameras... re-designed audio oscilloscopes... BNC systems... mixers... microcassette... studio design... test gear... signal generators and waveform monitors... magnetic tape... portable video recorders... modulation monitors... much more!

Everyone involved in any phase of communications is welcome. Attendance is not limited to engineers, and there is no admission charge.

Exhibits are open from 11:00 a.m. to 9:00 p.m. Chapter 22 hosts a hospitality suite 5:00 to 7:00 p.m.

See you at the Northway on Friday, October 17th. The Northway Inn, Seventh North Street, Syracuse, is located at the intersection of the New York State Thruway (Interstate 90) and Interstate 81. Exit from 81 at Seventh North Street, turn right; the Northway will be right in front of you.

For additional information, contact convention chairman, Paul Barron, station WOTV-TV, Syracuse, New York.

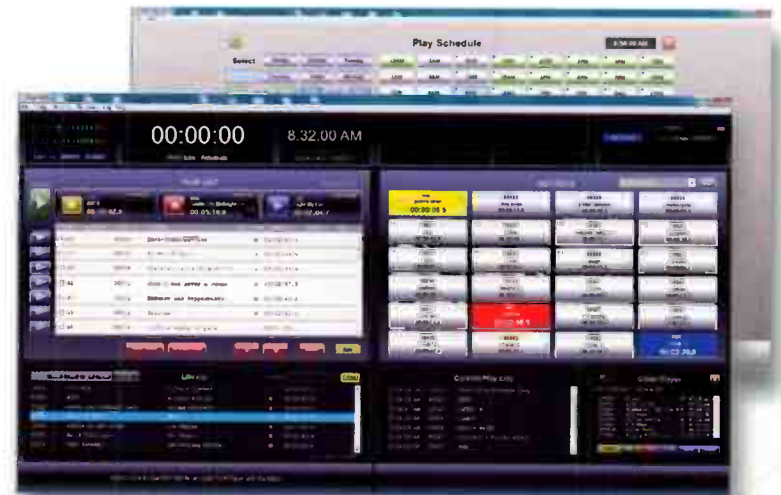


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