RADIOWORLD

SEPTEMBER 1, 2016 | The News Source for Radio Managers and Engineers | $5.00 | RADIOWORLD.COM

NewBay Media

NFL Frequency Coordination Is All Grown Up

The Game Day Coordination program is now 21 years old — here's how it came about

BY JUDITH ZISSMAN

As the new NFL season opens, Radio World takes a special in-depth look at the program where football and RF engineering meet.

It was Jan. 29, 1995 at Joe Robbie Stadium in Miami, Fla., the site of Super Bowl XXIX. The game was a triumph for the San Francisco 49ers but a confusing mess behind the scenes as the teams, support services and worldwide media attempted to use their wireless communications devices.

The elaborate halftime show, an ambitious "Indiana Jones"-themed extravaganza featuring Patti LaBelle and Tony Bennett, required precise communication as well. Radio frequencies designed to support a few hundred devices at any given moment were crowded with thousands of official and unofficial devices, each vying for a tiny slice of the spectrum.

Ralph Beaver and Jay Gerber review coordination areas.

Afterwards, Jim Steeg, the National Football League's senior vice president of special events, had 364 days to address the situation before the next Super Bowl.

He called NFL Films Vice President, Executive in Charge of Production Jay Gerber and asked him to find a way to resolve the interference issues.

As a longtime extra class "ham" radio operator, N3AW, Gerber understood the complexity at stake for managing radio frequencies. And because he managed a multitude of simultaneous international Super Bowl broadcasts each year, he had the grace under pressure required to handle the needs of the key stakeholders for this most important day.

All photos courtesy Jay Gerber

A direction-finding crew, ready for action.

ROGUE SIGNALS

Still, it was an ambitious undertaking. No one had attempted to frequency coordinate an NFL national sporting event. Super Bowl XXX would be the first.

The game would be held at Sun Devil Stadium in Tempe, Ariz. Gerber enlisted Karl Voss, an engineer at local news TV station KPNX and Arizona's frequency coordinator, to help. Voss, Gerber and electronic design engineer Harvey Shuhart of Control Dynamics Corp. formed the first NFL frequency coordination team.

Their plan was simple: Respond to interference issues and resolve them

(continued on page 3)

10 INCREDIBLY AWESOME THINGS YOU CAN DO WITH A BLADE BEFORE YOU EVEN NETWORK IT

REPLACE YOUR SOUNDCARD

When you install the WheatNet-IP driver, you can get rid of your soundcard, its breakout box, switcher, serial interface, and your isolation. Stream up to 24 stereo channels of audio to a WheatNet-IP system (8 per BLADE).

INTERFACE & CONTROL ALL YOUR STUFF

12 logic universal GPI/O ports along with 128 software logic ports for you to control whatever you have plugged in. When you finally get to a network, control everything on it without breaking a sweat.

CREATE & MANAGE COMPLEX SIGNAL PATHS

Say you need a mix-minus for a live show or remote broadcast. With our ASSOCIATED CONNECTIONS, 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. When a base connection is made, up to ten additional connections can be made.

PROCESS STEREO AUDIO

Each BLADE-3 has a stereo multiband processor with: 4-band parametric equalizer, 3-way crossovers, 3 compressors, 3 limiters, and a final lookahead limiter - all can be used across a network.

PLAY NICELY WITH OTHERS

You've got some other gear you want to use. No problem. Your BLADE is fully AES67 compatible to allow exactly that. We've been to PLUGFEST with our BLADES and we know they work perfectly with anyone else's stuff that's up to snuff.

SPIN SOME REALLY COOL AUDIO CLIPS

There is an optional built-in audio clip player that you can use to put emergency audio on the air. Add files, organize the playlist, and fire playback with a logic port, triggered by silence, logic or manually.

DIAL IN A MIX OR TWO

There are TWO 8 x 2 mixers built into the BLADE. Why? So you can combine multiple inputs and deliver lovely mixed stereo audio. Of course, you can configure those mixers any way you like.

USE YOUR FAVORITE AUDIO FORMATS

There are a bunch of audio formats out there and we've got them covered. HD/SDI, AES, MADI, AOIP, ANALOG, TDM.

MAKE FOUR VOICES SOUND AMAZING

With the M4-IP USB mic processing BLADE, you get all this cool BLADE stuff, AND you get FOUR built-in voice processors based on our famous M-1/2.

DETECT SILENCE AND DO SOMETHING ABOUT IT

The BLADE is constantly monitoring stuff. Silence, for instance. When it finds it, it can do just about anything you want, INCLUDING having it play clips that it optionally stores.

And as cool as all this is, it's just the start. Wait until you network it with our intelligent control surfaces, talent stations, panels and other BLADEs. It'll blow your mind. Learn a lot more at: blades.wheatstone.com

BLADE-3 AN ENTIRE BROADCAST PRODUCTION STUDIO IN A SINGLE RACK SPACE

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

phone +1.252.638-7000 | wheatstone.com | sales@wheatstone.com

RADIOWORLD
Vol. 40, No. 22 September 1, 2016

Next Issue of RADIO WORLD September 14, 2016
Next Issue of ENGINEERING EXTRA October 19, 2016

Website: www.radioworld.com
Email: radioworld@nbmedia.com | Telephone: (703) 852-4600
Business Fax: (703) 852-4582 | Editorial Fax: (703) 852-4585

For address changes and subscription renewal, please visit radioworld.com and click on the "Subscription" button. To submit letters or story proposals, to request writer's guidelines, or for other editorial matters, email the editor at radioworld@nbmedia.com.

EDITORIAL STAFF
EDITOR IN CHIEF, U.S. Paul J. McLane
GEAR & TECHNOLOGY EDITOR Brett Moss
TECHNICAL ADVISER Thomas R. McGinley
TECHNICAL EDITOR, RWEE Rich Rarey
PRODUCTION EDITOR, RWEE Karen Lee
CONTRIBUTING EDITOR Emily Reigart
CONTRIBUTING EDITOR John Bisset
WEB EDITOR Michael Balderston
EDITORIAL ASSISTANT Cameron Vigliano
INTERNATIONAL EDITOR IN CHIEF Marguerite Clark

EDITORIAL CONTRIBUTORS
W.C. Alexander, Susan Ashworth, James Careless, Harry Cole, Ken Deutsch, Mark Durenberger, Charles Fitch, Christopher Friesen, Harold Hallikainen, Craig Johnston, Alan Jurison, Paul Kaminski, John Kean, Peter King, Larry Langford, Mark Lapidus, Daniel Mansergh, John Merli, Jim Peck, Mark Persons, Stephen M. Poole, Carl Lindemann, James O'Neal, Tom Osenkowsky, Rich Rarey, John Schneider, Randy Stine, Richard Strickland, James G. Withers, Tom Vernon

ADMINISTRATION & PRODUCTION
PUBLISHER John Casey
EDITORIAL DIRECTOR Paul J. McLane
PRODUCTION MANAGER Karen Lee
ADVERTISING COORDINATOR Caroline Freeland

AUDIENCE DEVELOPMENT
CORPORATE DIRECTOR AUDIENCE DEVELOPMENT Meg Estevez
CIRCULATION MANAGER Kwentin Keenan
ASSOCIATE CIRCULATION MANAGER Michele Fonville

SUBSCRIPTIONS
Radio World, P.O. Box 282, Lowell, MA 01853
TELEPHONE: 888-266-5828 (USA only 8:30 a.m.–5 p.m. EST)
978-667-0352 (Outside the US) FAX: 978-671-0460
WEBSITE: www.myRWNews.com
EMAIL: newbay@computerfulfillment.com

CORPORATE
NewBay Media LLC
PRESIDENT AND CEO Steve Palm
CHIEF FINANCIAL OFFICER Paul Mastronardi
CONTROLLER Rick Ng
VICE PRESIDENT OF DIGITAL MEDIA Robert Ames

VIDEO/BROADCAST GROUP
EXECUTIVE VICE PRESIDENT Carmel King
VICE PRESIDENT / SALES DIRECTOR Eric Trabb

ADVERTISING SALES REPRESENTATIVES
US REGIONAL & CANADA: John Casey, jcasey@nbmedia.com
T: 212-378-0400, ext. 512 | F: 330-247-1288
US REGIONAL: Michele Inderrieden, minderrieden@nbmedia.com
T: 212-378-0400, ext. 523 | F: 301-234-6303
EUROPE, AFRICA & MIDDLE EAST:
Raffaella Calabrese, rcalabrese@nbmedia.com
T: +39-320-891-1938 | F: +39-02-700-436-999
LATIN AMERICA: Susana Saibene, susana.saibene@gmail.com
T: +34-607-31-40-71
JAPAN: Eiji Yoshikawa, callems@world.odn.ne.jp
T: +81-3-3327-5759 | F: +81-3-3322-7933
ASIA-PACIFIC: Wengong Wang, wwg@imaschina.com
T: +86-755-83862930/40/50 | F: +86-755-83862920
CLASSIFIEDS: Michele Inderrieden, minderrieden@nbmedia.com
T: 212-378-0400, ext. 523 | F: 301-234-6303
LIST RENTAL: 914-925-2449, danny.grubert@lakegroupmedia.com

Radio World Founded by Stevan B. Dana

Radio World (ISSN: 0274-8541) is published bi-weekly with additional issues in February, April, June, August, October and December by NewBay Media, LLC, 28 East 28th Street, 12th Floor, New York, NY 10016. Phone: (703) 852-4600, Fax: (703) 852-4582. Periodicals postage rates are paid at New York, NY 10079 and additional mailing offices. POSTMASTER: Send address changes to Radio World, P.O. Box 282, Lowell, MA 01853.

For custom reprints & eprints please contact our reprints coordinator at Wright's Media: 877-652-5295 or NewBay@wrightsmedia.com

Globe graphic ©iStockphoto.com / Edward Grajeda

GDC

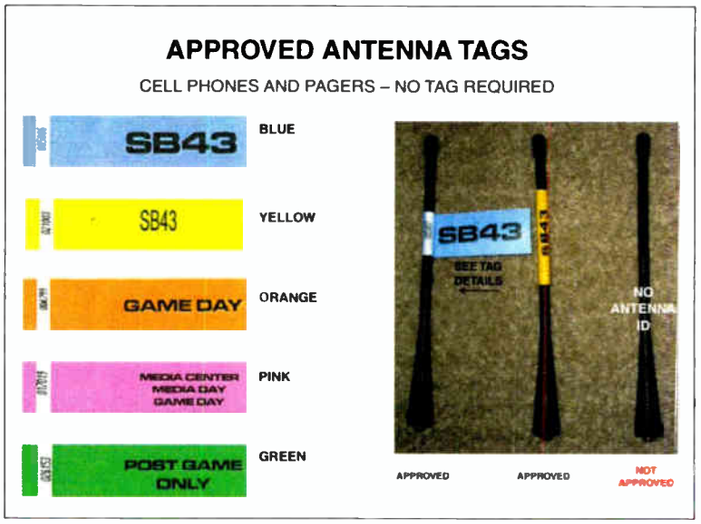
(continued from page 1)

immediately. They met that challenge; hundreds of users were organized and coordinated, despite initial reluctance to share spectrum use. But issues were rampant at first.

For example, game day communications between the coach and quarterback would have been disrupted by maintenance crew communications. The Game Day Coordination team eventually found the source of this rogue signal, a home-built repeater with a cellphone input and an output to handie-talkie radios, which allowed the crew chief to reach his staff in the stadium. The GDC team heard the chief give out his cellphone number, which allowed them to track him down and shut down the repeater.

After Super Bowl XXX, Gerber and his group had a monumental task: developing and implementing a process to coordinate hundreds of key stakeholders and make it work for future Super Bowls.

Frequency counters being used to read parabolic dishes.



This shows an earlier version of the tagging system used at the Super Bowl. The design has since changed.

Work would start weeks before each game. The league sent notices to all possible RF users to let them know they would need to participate. The GDC team, which soon included Ralph Beaver managing RF use at the media center, began to map the frequency ranges used by NFL licensees and news organizations to allocate the appropriate number of microphone channels.

These organizations were required to provide the GDC with a full equipment list as well as contact information for the crew and any additional issues of concern.

A radio tagging system was devised and modified over the years to help identify cleared transmitting devices. One of the images accompanying this article shows an earlier version that worked well but has since been modified to include frequency and other pertinent information.

DF

On Game Day, to enforce compliance, the GDC team sets up direction-finding stations inside the stadium in the end zone and along the sidelines, as well as outside in the frequency coordination headquarters office trailer.

The DF equipment includes an Icom Communications receiver, a Communications Specialties PL/DPL/DTMF decoder, a two-way radio for the GDC DF team to manage internal communications and a set of headphones, as well as a Doppler Systems DF unit and DF antenna designed and produced for this purpose by Bill Ruck, the northern California frequency coordination chairman. Ruck was instrumental at the outset of the GDC program in assisting teams along the West Coast.

The program uses Hewlett-Packard spectrum analyzers to examine each piece of RF equipment that enters a stadium perimeter. In addition, any device brought into a stadium for game day must be registered with the GDC and assigned frequencies and schedule constraints.

With limited spectrum availability — especially at the Super Bowl, where there might be more than 10,000 RF devices sharing a pool of approximately 4,000 frequencies — the goal is to coordinate a frequency sharing plan. For example, a frequency used during game play might not be needed during halftime, and would be reassigned to those who need a communication or broadcast channel at that moment. This requires a tremendous amount of planning and real-time coordination, even when everything runs smoothly.

Because of the amount of screening needed before and dur-

(continued on page 4)

Karl Voss works in the Coordination Office trailer with vendor Mike Mason.

GDC

(continued from page 3)

ing the game, Gerber enlisted a team of assistant GDCs by recruiting local amateur radio operators as volunteer coordinators. He knew that hams would have the skills necessary with little training to operate DF equipment, attenuators, frequency counters and other related RF equipment.

ALL SEASON LONG

Based on the success of early Super Bowl coordination, Gerber proposed that a similar process become part of every NFL event, including pre-season and regular season games, the draft, the NFL Combine, even games played abroad. NFL management eventually accepted the proposal.

Gerber began working to provide frequency coordination for regular-season games. He turned to the Society of Broadcast Engineers and worked with then-President Ed Miller, Executive Director John Poray and Rick Edwards, SBE's vice president and chairman of its frequency coordination committee, to assemble a list of volunteer coordinators for every NFL team. The candidates were interviewed and trained on what the league needed to keep the communications channels clear and functional throughout its events.

The scene at media RF check-in.

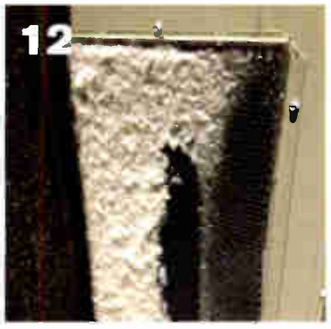
With the help of the SBE and Edwards in particular, primary and backup coordinators were identified for every league venue. Eventually, some stadiums required more than two coordinators. Now there are as many as four supporting certain teams, like the Colts and Broncos.

The league allocated budgets to pay coordinators a small fee for expenses and purchase of required equipment. This included a frequency counter, communications radio, laptop with proprietary database, spectrum analyzer and direction finding equipment. (The DF gear was a mix of homebrew and professionally made; see photos of them and more pix for this story at *radioworld.com/gdc*.) In addition, uniform shirts, hats, jackets and coats were provided to

THIS ISSUE

SEPTEMBER 1, 2016

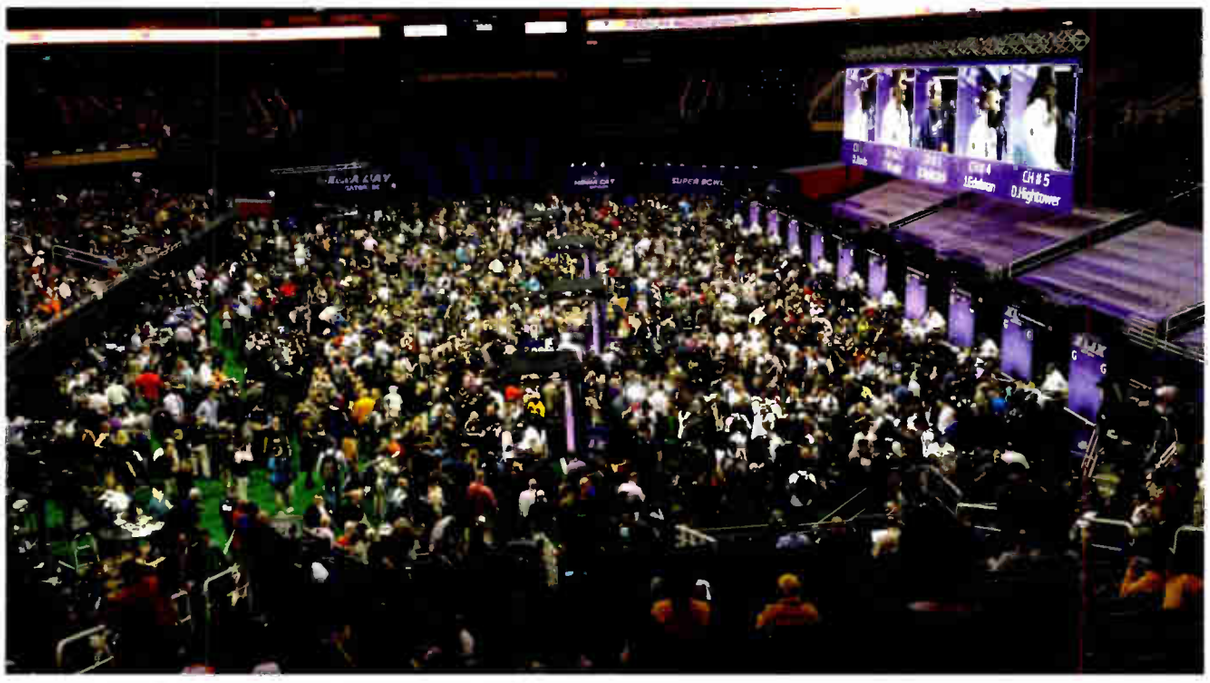
NEWS



FEATURES

BUYER'S GUIDE

OPINION



Super Bowl Media Day in Phoenix in 2015 — a potential RF nightmare.

make the GDC recognizable and part of an official NFL operating team.

WIRELESS PROLIFERATION

In the early days, RF users from local, as well as national and international, networks were slow to respond to coordination efforts. Meanwhile, the use of wireless devices increased exponentially, on and off the field. These include wireless microphones, in-ear monitors, camera controllers, telemetry, intercoms, digital cameras and walkie-talkies — not just for the teams but for stadium and team operations, food vendors, media and other stakeholders. One team explored adding wireless devices for fans to rent on game day and use to follow the game, watch replays and even order food.

As frequency coordination became an important part of game day operations, the various stakeholders began to push for more involvement in the process.

A head coach called Gerber one day to ask that the GDC arrive at the stadium six hours before kickoff so that his equipment could be checked for interference to make sure his game plan wouldn't "go to pot" if someone showed up at the last minute on their frequency. Because GDCs were mandated and agreed to be there two hours before the game — and because last-minute issues can show up at any point, even with advance coordination — Jay suggested that the coach contact the Game Day Coordinator directly to work things out. The GDC worked with the coach to formulate a plan that made him comfortable that his communications system would be operational for the whole game.

At every NFL venue, there are signs notifying RF users that they must coordinate. The GDC name and contact information are on the sign, which has been weatherproofed and hung in strategic locations. The league informed all networks and media RF operations that coordination would be mandatory, with severe penalties for non-coordination violations.

For example, it was established and supported by NFL security that any non-coordinated entity, which the GDCs referred to as a "CoordNot," would have

(continued on page 6)

GDC

(continued from page 5)

their wireless equipment removed and held in stadium security, though they would be allowed to use a "wired" microphone if it was a "first offense." Repeat offenders were not given such accommodations.

GDCs were required to keep a list of who did not meet the coordination requirements throughout the season. This was published and repeat offenders had their credentials removed, their wireless equipment held in security and themselves escorted from the stadium. Equipment could be retrieved only two hours after the final game whistle was blown. This provided assurance that they would not be able to participate in post-game interviews.

Word spread quickly throughout the industry, which helped reduce the number of "CoordNots" at all NFL events.

LEAD TIME

Of course, the Super Bowl involves its own set of coordination requirements.

For example, all wireless operating entities are requested to coordinate weeks before the game rather than the standard 24 hours. Every RF user is asked to attend an "RF War Games" on the Thursday before the game, during which every wireless entity turns on its equipment simultaneously to see if anyone would experience interference, or be "shot down." These rehearsals always reveal issues that must be resolved.

Even after War Games were implemented, sometimes things didn't go smoothly. At a Super Bowl in Tampa, a news organization learned that the frequency they'd requested was not available. The crew contacted their equipment vendor for a new frequency to be installed, but instead of reprogramming the radio to a clear frequency, the vendor somehow shifted the frequency slightly without clearing it with the GDC group.

The result was a programming disaster. The frequency they were now transmitting on blocked the live video stream from a B2 stealth bomber flying over the stadium during ceremonies after the national anthem, a video stream that was supposed to be transmitted worldwide in real time. The stream was blocked and viewers never saw it.

Officials from the FBI, FAA, FCC and network immediately converged on the GDC office trailer demanding to know what had happened. After DF-ing the frequency, the team found the rogue transmitter and shut it down.

At another Super Bowl, during the NFL tailgate party for ticket holders and dignitaries, a well-known band showed up with newly installed radios utilizing frequencies that interfered with game operations, including coach's communications. Because they were uncooperative, the league authorized the GDC to shut them down if they didn't change frequencies. Karl Voss saved the day by personally re-tuning their equipment to an acceptable frequency. The band later apologized profusely; as it turned out they didn't know how to change frequencies themselves.

At the Super Bowl, facilities are set up to aid in on-site coordination. Every RF user must enter the stadium through the RF check-in operation to certify that its equipment is clean and coordinated; they are checked for transient signals and spurs from dirty frequency modules.

This step is especially important, to identify the many crews and on-camera personalities who arrive on Game Day and did not participate in the War Games, have not been coordinated and must be accommodated as best as possible on site. To help, coordination and new frequency assignments are allocated in the Media Center as well as at RF check-in at the stadium.

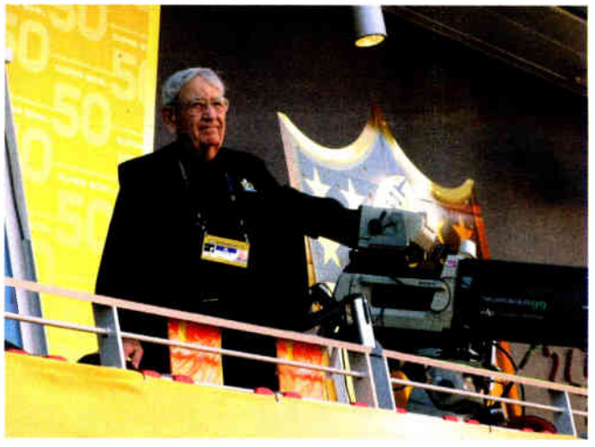
This can be challenging. The media entrance and RF check-in at the Super Bowl are crucial but can be time-consuming. Crews trying to get around these delays have been caught trying to enter the stadium through gates meant for fans. Fortunately, the GDC crew has coordinators at every stadium entrance; they stop any crew with RF equipment and redirect them to the media entrance. The GDC team has discovered on-camera talent trying to hide wireless equipment in briefcases and other disguises to avoid the RF check-in process. These crews are always caught and penalized, and in instances of blatant disregard may be shut down completely with the help of NFL security.

The GDC team was so diligent in tracking down violators that they were able to assist NFL security in identifying trespassers. Once, a woman tried to enter the stadium illegally dressed in what looked like a police outfit, with black pants and a black shirt with the word "police" decaled on the back. She carried an HT on her belt, making her look official, but the GDC noted that the radio did not have the mandatory tag on the antenna indicating a cleared radio. The trespasser proceeded to work her way around the bicycle rack barriers at the end of the tent into the stadium,

(continued on page 8)

Weatherproofed signs like this appear at multiple locations in every NFL venue.

ABOUT JAY GERBER



Jay Gerber is accustomed to unique and challenging projects. His list of accomplishments include capturing the "Immaculate Reception" and Lynn Swann's "Kangaroo Catch" on film, and managing construction of a $15 million state-of-the-art video facility for NFL Films.

He designed the video system to emulate how teams used coaching film, and he led the conversion of film operations to video by all the NFL teams. He designed the league's first instant replay system, which consisted of several monitors and two VHS dynamic tracking player/recorders installed at every team venue.

He helped develop the helmet communications system in conjunction with electronic design engineer Harvey Shuhart of Control Dynamics Corp. Gerber and Shuhart also hold a patent for an innovative whistle detector system, developed at the request of Art McNally, then-NFL head of officials, to enable a replay decision based on when the whistle was blown. The detector identified which of the seven officials had blown a whistle and graphically indicated it in all network and replay booth recordings. In a playoff game test, a controversial play determining the outcome of the game would have been reversed if the system had been in official use.

He was also involved in a noise abatement system to allow a quarterback to transmit the snap count via a microphone built into his face mask and radio receiving modules in wide receivers' helmets. This eventually led to the idea for the coach-to-quarterback communications system.

While managing the GDC program, Gerber continued as VP of production of NFL Films until retiring in 1999. He continued to work for the league as manager of the coordination program until 2013.

WHERE COULD YOU GO...

...IF YOU HAD ACCESS?

NEED ACCESS?
CONTACT US:

1 800 237 1776
info@comrex.com

NOW YOU CAN GO TO EVEN MORE PLACES

What is CrossLock?

CrossLock is a suite of reliability tools for moving media over the internet with the lowest possible delay. Now you can use multiple wireless networks simultaneously by combining the bandwidth of the connections for a stronger signal or sending an additional media stream on a separate internet path for redundancy. By dynamically adapting techniques to suit network conditions, CrossLock turns challenging internet circuits into the most reliable link possible.

ACCESS 2USB
WIRELESS CODEC FOR AUDIO OVER IP

CrossLock™ VPN
Learn more at www.comrex.com

COMREX
BROADCAST RELIABLE

Early Bumps in the Road for ETRS

Form 1 submissions can be edited until Sept. 26, two days prior to next national test

BY SUSAN ASHWORTH

The new EAS Test Reporting System has been touted by the Federal Communications Commission as a vital means of easing the data-entry burden on EAS participants, encouraging timely filings and minimizing input errors.

ETRS went live June 27, designed to offer broadcasters and others a better way to provide feedback on the effectiveness of nationwide emergency alert system tests. The next such will take place Sept. 28. Form 1 filings were to be completed in the system by Aug. 26 but can be edited until two days prior to the national test.

The path to registration was a bumpy one for broadcast participants, at least in the early going. Users expressed concerns over coordinates and database organization, the complicated nature of the data required and the length of time it could take to complete the process, among other things. Radio World has reported some of these at *radioworld.com*; we summarize and expand on them here.

TIME COMMITMENT

An early complaint shared by registrants involved the complicated and sometimes exacting nature of the information required. For example, ETRS Form 1 asks the registrant to identify the version of the facility's EAS software. This may prove tricky, especially for devices purchased from manufacturers like TFT, which went out of business in 2015.

"How could a TFT purchased in 2006, for example, and never updated, comply with regulations such as CAP that did not exist then?" asked John O. Broomall with Christian Community Broadcasters, which has been working with several low-power stations on their ETRS registration forms. "How can small stations, often with used TFT units or relatively new GMs, know which software version they have and if it is compliant with the latest requirements?"

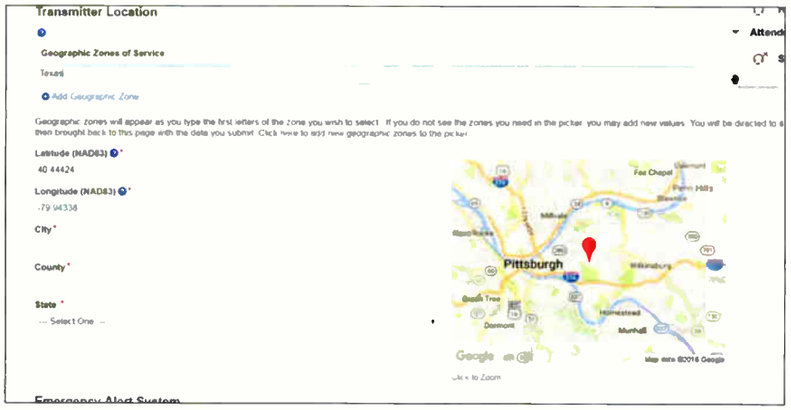
Broadcaster Tom Taggart with Seven Ranges Radio in St. Marys, W.Va., said the level of information required to weed through the system requires in-depth engineering savvy that may exceed the capabilities of many small stations.

"The information required by Form 1 takes both some engineering knowledge and knowledge of the FCC's databases," he said. "It will be beyond the ability of [some] station personnel to complete."

There were also questions about the time involved. Several users expressed confusion about published FCC data that put "estimated time per response" at 43 hours but also described 43 hours as the "total annual reporting burden."

"Is it really going to take up to 43 hours to do this, and for two stations will that be up to 86 hours?" asked Cal Zethmayr, general sales manager of WAAZ(FM) and WJSB(AM) in Crestview, Fla. "We are a small-market station with three full-time and two part-timers. I've been in radio 62 years, and done thousands of FCC pieces of paper over those years," he said. "This is the absolute most ridiculous thing yet. We can-

(continued on page 10)



Registrants have criticized the coordinates section of Form 1 of the new ETRS.

GDC

(continued from page 6)

where she was stopped by the GDC, who asked her to wait to clear her radio, as it was not one of the law enforcement-tagged units. It was obviously a rogue radio that had not been cleared. The GDC contacted NFL security and the woman was detained — all because an alert volunteer had noticed the absence of a little tag on an antenna.

KEEP IT CLEAN

Even today, almost 21 years after the start of the program, issues arise that demonstrate the value of coordination efforts.

At Super Bowl 50, AT&T contacted the onsite coordination office with a complaint that their cellular operation was being interfered with to the extent of it being nonfunctional — certainly an enormous issue given the thousands of wireless phone users on site.

After some research by the GDC group, the offending operation turned out to be a very large television display creating "unintentional radiation." The AT&T antennas had been placed adjacent to this display. Initial efforts to get the TV company to modify its display were unsuccessful until they were advised that the GDCs were authorized to have power for the entire display shut down if they did not rectify the problem. The company modified the display and reduced radiation to an acceptable level for the AT&T operation.

As the GDC program evolved, managing a clean environment continued to be a challenge. Some issues were as simple as interference from network parabolic dishes with transmitters left on piled on top of one another on the sideline. This was easy to track down and correct.

Working a 2006 playoff game were Joe Sweeney, Patriots GDC, and the late Dave Fort, Colts GDC.

Primary and backup coordinators were established for every league venue. Now there are as many as four supporting certain teams, including the Broncos. From left: Jim Schoedler, Andre Smith, Gary Pasicznyk and Kate Landow.

Even today, local GDCs may receive calls to coordinate on game day rather than at least 24 hours before. Usually, and depending on circumstances, they can be accommodated, but they'll get a stern warning to coordinate within the local game 24-hour requirement. This is important; the GDC needs to clear everything being used in his/her database, and last-minute requests are jarring at best.

TV media during a press conference.

For the most part, however, through two decades of frequency coordination, RF users have become strong allies of the program, following Jay Gerber's mandate "to help everyone do their job."

An unsung hero, John Murphy of NFL Films, continues as the software writer and IT manager for the coordination program. After Gerber's 2013 retirement from the NFL, the program continues its success under the leadership of Ralph Beaver as the GDC program manager with Karl Voss as the primary frequency coordinator.

Jay Gerber says the program is fortunate that the National Football League has supported the program's efforts and recognizes its importance, and added, "Much of the success of the program belongs to the many Game Day Frequency Coordinators who devote their engineering talent and time to making RF operations for the NFL functional."

Judith Zissman writes and consults on technology product development.

See more photos at radioworld.com/gdc, *and share your own experience about NFL game frequency coordination by emailing* radioworld@nbmedia.com.

Networkable Consoles

Priced with next-generation studio demands in mind

The Flexiva Oasis is a high-value standalone audio console for on-air and radio production applications. Simply connect microphones, source equipment and audio monitors directly into the Flexiva Oasis console and be on the air.

Flexiva Oasis allows facilities to cost-effectively and easily migrate from analog to digital whenever they're ready. In addition to capabilities for all necessary audio and logic components, Flexiva Oasis provides both analog and digital outputs enable facilities to connect to modern STLs and studio infrastructures. **Comes in 8-channel and 12-channel.**

GATESAIR™

GatesAir Flexiva Oasis Networkable Digital Console

starts at $3795.*

** This is the price for the 8-channel. Regular list is $5450.*

Call SCMS for more information

1-800-438-6040

www.scmsinc.com

SCMS INC.

YOU KNOW WE KNOW RADIO

Latin America 750-650-1427	**West Coast** 818-398-7314	**North Central** 573-478-3737	**Mid-West** 844-436-4327	**North-East** 315-623-7655	**Pro Audio/South-East** 877-640-8205	
Western Mountain States 303-674-6566	**Central** 315-623-7655	**Southern Gulf** 866-205-6905	**Audio / Video Sales** 828-394-0819	**Mid-South** 877-391-2650	**Bradley Division** 800-732-7665	

ETRS

(continued from page 8)

not afford to devote two work weeks for any one employee to this."

An FCC spokesperson confirmed the 43-hour figure but said in early August that some filers were spending an average of three hours to complete the initial filing form.

To expedite registration, the FCC recommended that filers have information about their station and their governing state EAS plan readily available when completing the form.

Questions arose around the compatibility of the ETRS system and individual state EAS plans regarding a station's operational area.

Zethmayr said his station is in Florida Operational Area 1. "But [the database] will not accept that. Instead, it wanted West Florida Panhandle, which is not how our three-county area is listed in the 2016 Florida Plan."

After attempting to add a geographic zone, Zethmayr attempted to enter Operational Area 1 only to find the database restricting his entry to Operational Area 10 or 11. "I tried Florida Operational Area 1, and it will not accept it," he said. "So far one hour of the 43 has been wasted."

Rich Parker, director of engineering for CoastAlaska Inc., weighed in: "I agree with others about [the geographical section] initially being fussy about not accepting some things, even if you tried to add them." But he listened to an ETRS webinar that was produced by the FCC with NPR, "and it was very good, like they have heard the concerns for the most part."

COORDINATE CONFUSION

Some registrants also expressed confusion over the format of coordinates used to report the location of their transmitter site. Such coordinates traditionally are given as NAD27 degree, minutes, seconds. NAD refers to the North American Datum of 1927, a geodetic reference system.

"But for some bizarre reason you must change to NAD83 decimal coordinates," said Broomall. "Ridiculous."

Said Zethmayr: "I note that [the] form asks for NAD83, yet the FCC database shows NAD27 for all stations."

NAD27 coordinates are used for broadcast authorizations and applications, the FCC said. A tool on the public FCC site permits a user to convert latitude and longitude between decimal degrees and degrees, minutes and seconds.

"There still is a major disconnect regarding coordinates," Rich Parker said. "[The FCC] wants us to be responsible for things being correct, but then they [put us] through these huge hurdles in terms of requiring stations to check things, and so we do the conversions to be sure."

Radio World Technical Adviser Tom McGinley said the coordinates issue "stumps a lot of folks at first, but then when they understand the constraints and requirements to be able to enter acceptable and valid data — including the NAD27-to-83 conversion — it's not so bad."

Others expressed frustration with the way the commission organized the database in regard to a facility's registration number or FRN, as opposed to the standard station identifier.

"I do not like the way the FCC has things set up per FRN entity as opposed to per station," said Cris Alexander, director of engineering at Crawford Broadcasting Co. and a Radio World contributor. "How much better it would have been if it were set up by station entity using FIDs."

As a result, Alexander said he can't distribute log-in credentials to his local engineers for licensed entities — because once someone logs into that entity, it brings up access to all the stations for that entity, and many of those stations will not be part of the same local market.

To make matters worse, he said, call signs are not listed on the "records" tab where Form 2 and Form 3 are submitted, so it would be a relatively easy error for someone to submit a report for the wrong station or even the wrong market, especially if they were in a hurry.

"Because of this, for my company — and likely many others as well — reporting will have to be centrally done."

As of early August, EAS participants had successfully completed more than 2,700 filings, according to an FCC spokesperson. Contacted for this article, the spokesperson said the FCC was aware of some of the concerns expressed by broadcasters over the ETRS registration process.

The commission had acted on at least some of the issues, creating a FAQ for single-facility filers; posting a user's manual in the ETRS system; setting up a dedicated email box for questions, which the commission intended to answer within 24 hours (*etrs@fcc.gov*); and planning webinars to familiarize participants with the ETRS and to answer their questions.

The commission hosted several webinars to help ease the process; during one in August, viewed by Radio World, moderators spent considerable time walking through problematic areas of the database.

Some state broadcast organizations took steps to help their members comply. The Alabama Broadcasters Association offered members step-by-step guidance on certain parts of the registration process via an email blast. It offered a direct link to the registration page, tips such as how to determine a station's operational area and a reminder that stations were to complete Form 1 by Aug. 26.

Alexa Lopez, press secretary for the Federal Emergency Management Agency, said, "In partnership with the FCC and through analyzing date from ETRS, we hope to gain insight into how state EAS plans are implemented in the field and ensure all have the operational capability to push out a test message." Additional recurring national tests are envisioned in future.

What is your experience with the new ETRS system? Email Radio World's Susan Ashworth at radioworld.sashworth@gmail.com.

MORE INFO

The ETRS registration page is at *www.fcc.gov/eform/submit/etrs-registration*. Those looking for detailed information about or assistance with ETRS can contact the FCC at *etrs@fcc.gov*, or via Austin Randazzo, attorney advisor in the Policy and Licensing Division at (202) 418-1462 or *austin.randazzo@fcc.gov*.

Beautiful. Smart. Hardworking.

The Fusion Console from Axia®

A trifecta of design, technology, and support from the guys who invented AoIP.

Intelligent features like automatic mix-minus for phones and codecs, built-in talent talkback, source EQ and voice dynamics, 99 Show Profile snapshots, and Custom Source Profiles with detailed control over every input deliver the fastest, most error-free talent workflow ever.

Super-sharp OLED channel displays. Machined metal work surfaces with rub-proof markings. Optical encoders. Aerospace-grade switches. Premium faders rated for millions of flawless operations. Fusion's elegant design sets off any studio.

And Axia backs you with the industry's only 5-year warranty, 24/7 Support, and the experience gained from having more than 7,000 AoIP consoles on the air.

Brains, beauty, or backup? Choose all three.

Broadcasters General Store | AXIA THE TELOS ALLIANCE

(352) 622-7700 | **bgs.cc** | **TelosAlliance.com**

Another Tip to Keep AC Clean and Efficient

Here's how the Bowins keep annoying seeds out of their Bard wall-pack air conditioners

WORKBENCH
by John Bisset
Read more Workbench articles online at radioworld.com

William and Sherrie Bowin handle engineering for North American Broadcasting Company Inc., licensee of WMNI(AM), WRKZ(FM) and WJKR(FM). They read our tip about covering air inlets on wall-pack air conditioners to keep out cottonwood, dandelion and other seeds.

William and Sherrie have been doing this for their Bard wall-packs but with a twist. Bard air inlets are rather large, and the Bowins have not found an off-the-shelf filter solution like the one described in our earlier column.

Rather than fabricating a custom screen frame, they opted for a simpler approach. They cover the air intake vents with inexpensive fiberglass screens, available in rolls at most hardware or big box stores for a few dollars.

Fig. 1: A fiberglass screen keeps cottonwood seeds out of the air conditioner.

Fig. 2: After just seven days, the screen is filling up with seeds.

Fig. 3: The screen is nearly completely clogged.

Fig. 4: Some of the cottonwood seeds harvested from the screen.

They cut the screen to size and attach it directly to the air conditioner with caulking. They are careful to use non-silicone-based caulking so that the screen can be removed easily later if necessary. (Apply the caulking to the air conditioner rather than to the screen. Trust them; installation is much easier that way, especially on a windy day.)

Cleaning is easy with a paint brush and should be performed weekly during peak cottonwood season.

Fig. 1 shows the initial screen installation. The photo was taken just *five minutes* after installation — before the caulking was even dry. As you can see, it was already starting to accumulate seeds.

Fig. 2 shows the same screen just seven days later. Imagine where those seeds would have ended up without the screen! Fig. 3 shows the nearly clogged screen during peak cottonwood season, and Fig. 4 show the pile of seeds that were peeled off the screen.

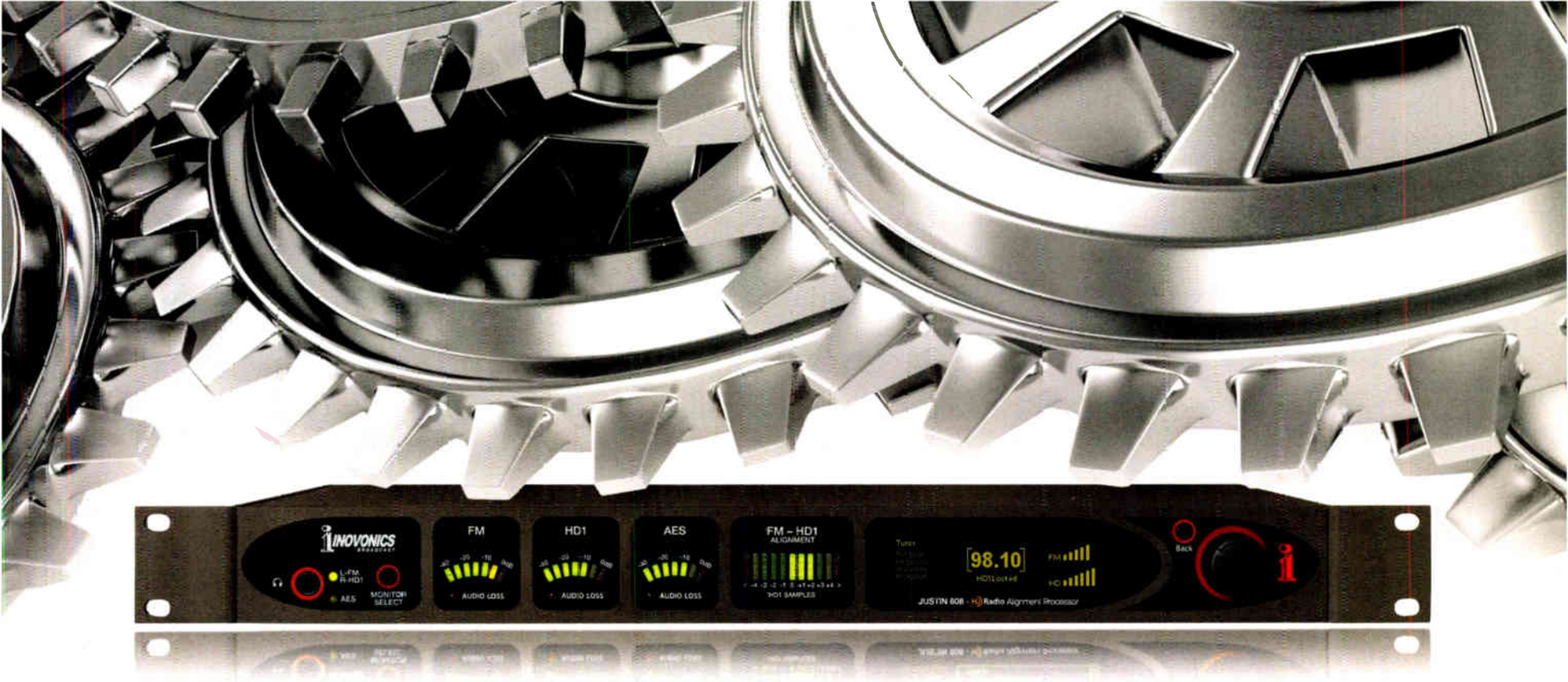
As William and Sherrie demonstrate, cleaning the external screen is a lot less labor-intensive and costly than removing the air conditioner cover and spray-washing the coils. If your transmitter building uses these kinds of wall-pack air conditioners, consider adding this option to extend your unit's life.

Engineers needing to control AC loads from devices like the Raspberry PI or other micro-controllers will want to investigate the Internet of Things control relay by Digital Loggers Inc.

Contract and special projects engineer Dan Slentz, a fellow RW contributor, tips us off to this device that sells for under $20.

Inside the thermoplastic enclosure is a

(continued on page 14)



Get in Sync

Analog FM & HD1 **Perfectly in Sync**

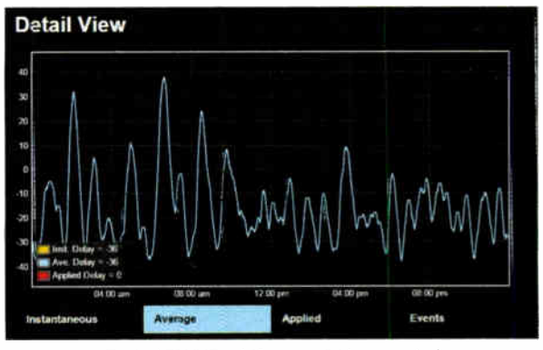
The JUSTIN 808 is a single-box solution that securely adjusts FM & HD1 Time alignment without affecting your critical FM transmission.

"The JUSTIN 808 continues to do a consistently great job at keeping our HD and analog signals in alignment… The combined time, level and phase alignment that the JUSTIN 808 provides makes any switching between HD and analog listening undetectable." – *Sam Caputa, Director of Engineering, Emmis Communications.*

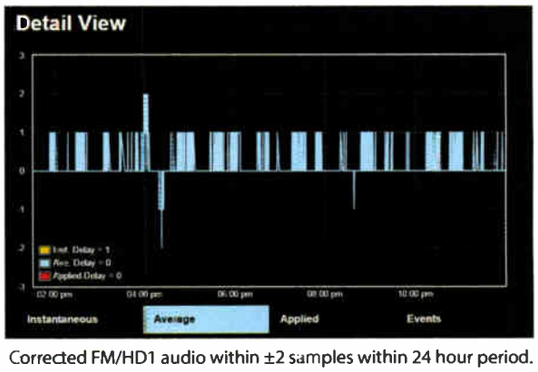
Contact your preferred Inovonics Dealer for more information. Join our TRY-N-BUY program.

GETTING FROM HERE → ***TO HERE***

+38/-34 Samples



Typical FM/HD1 drift over a 24 hour period.



Corrected FM/HD1 audio within ±2 samples within 24 hour period.

±2 Samples

Why Inovonics?

Quality Solutions. Competitive Prices. Quick to Install. Easy to Program. | Three-year Factory Warranty. Quality after sales service.

www.inovonicsbroadcast.com | sales@inovonicsbroadcast.com | 831-458-0552

INOVONICS BROADCAST

WORKBENCH

(continued from page 12)

circuit that is surge protected, includes a de-bounce circuit and status LED, and is optically isolated. Two pairs of UL/CSA outlet plugs are provided. One pair is normally "off" and the other pair is normally "on." The module is compact, but can control multiple AC loads up to 12 A.

Single units are available through Amazon. Search "IoT Relay Enclosed High Power Raspberry" for more information, or to order one of your own.

Dan writes that Digital Loggers manufactures a number of interesting products. See *www.digital-loggers.com*. Thanks, Dan, for a neat and cost-effective problem solver.

After seeing the conduit used to route cabling into a ceiling in our Aug. 17 issue, a contract engineer who wishes to remain anonymous sent in the picture in Fig. 5.

He captioned it "Not everyone takes the time to install conduit into the ceiling." The problem with fixes like this, he says, are that they tend to become permanent, even if they were intended as temporary.

Remember, anything you do is worth doing right.

Contribute to Workbench. You'll help your fellow engineers and qualify for SBE recertification credit. Send Workbench tips to johnpbisset@gmail.com. *Fax to (603) 472-4944.*

Author John Bisset has spent 46 years in the broadcasting industry and is still learning. He handles West Coast sales for the Telos Alliance. He is SBE certified and is a past recipient of the SBE's Educator of the Year Award.

Fig. 5: Quick fixes like this sometimes turn into permanent installations.

NEWSROUNDUP

NOISE: The National Association of Broadcasters urged the FCC to address spectrum noise from manmade sources aggressively and expeditiously. "Failure to do so risks devaluing licensed spectrum and drowning licensed users in a sea of noise," it wrote, calling noise a threat to all radio and TV broadcast services. It wants the commission at least to set emission limits for devices operating on the AM band and to clarify the kinds of good engineering practices that should be followed by makers of electronics that cause noise such as switching power supplies in consumer and commercial equipment; power transmission lines; LED lighting including traffic lights; and composite video display systems such as those in Times Square and Las Vegas. Read more on this story at *radioworld.com/nab-noise*.

iStockphoto RiverNorthPhotography

OWNERSHIP: Leading House Republican lawmakers were not happy with the FCC's vote on its quadrennial review of media ownership rules. The FCC's Democratic majority had already voted to retain rules in July, but the outcome became official in August. Broadcasters say the restrictions on local ownership and cross-ownership are outmoded and handicap them in a world of digital competitors. "The FCC's order is a weak attempt to fulfill its mandate, and likely sets the stage for additional involvement by the courts to prod the FCC to correctly do its job," said House Energy & Commerce Committee Chairman Fred Upton (R-Mich.) and Communications Subcommittee Chairman Greg Walden (R-Ore.) in a statement.

NEWS ROUNDUP

TRANSLATORS: Sales of FM translators spiked, driven by opportunities created in the latest application window for AM stations. BIA/Kelsey reported that from July 29 to Aug. 11, there had been 88 sales valued at about $4 million total. This window expires in October. Two more in 2017 will give AMs that don't apply in the first two windows a chance to seek new FM translators at auction, again with Classes C and D going first.

RADIO SALES: The Radio Advertising Bureau will no longer publish estimated industry radio revenue reports. Radio World and other trade publications have reported RAB estimates regularly over the years, and financial observers frequently reference them to gauge industry performance. The reports broke out revenue into on-air, off-air and digital sales figures (digital has been the big growth sector, by percentage, lately). The most recent RAB estimate put 2015 total year revenues at $17.4 billion. Shortly after the RAB news, research firm BIA/Kelsey said it plans to start issuing quarterly estimates.

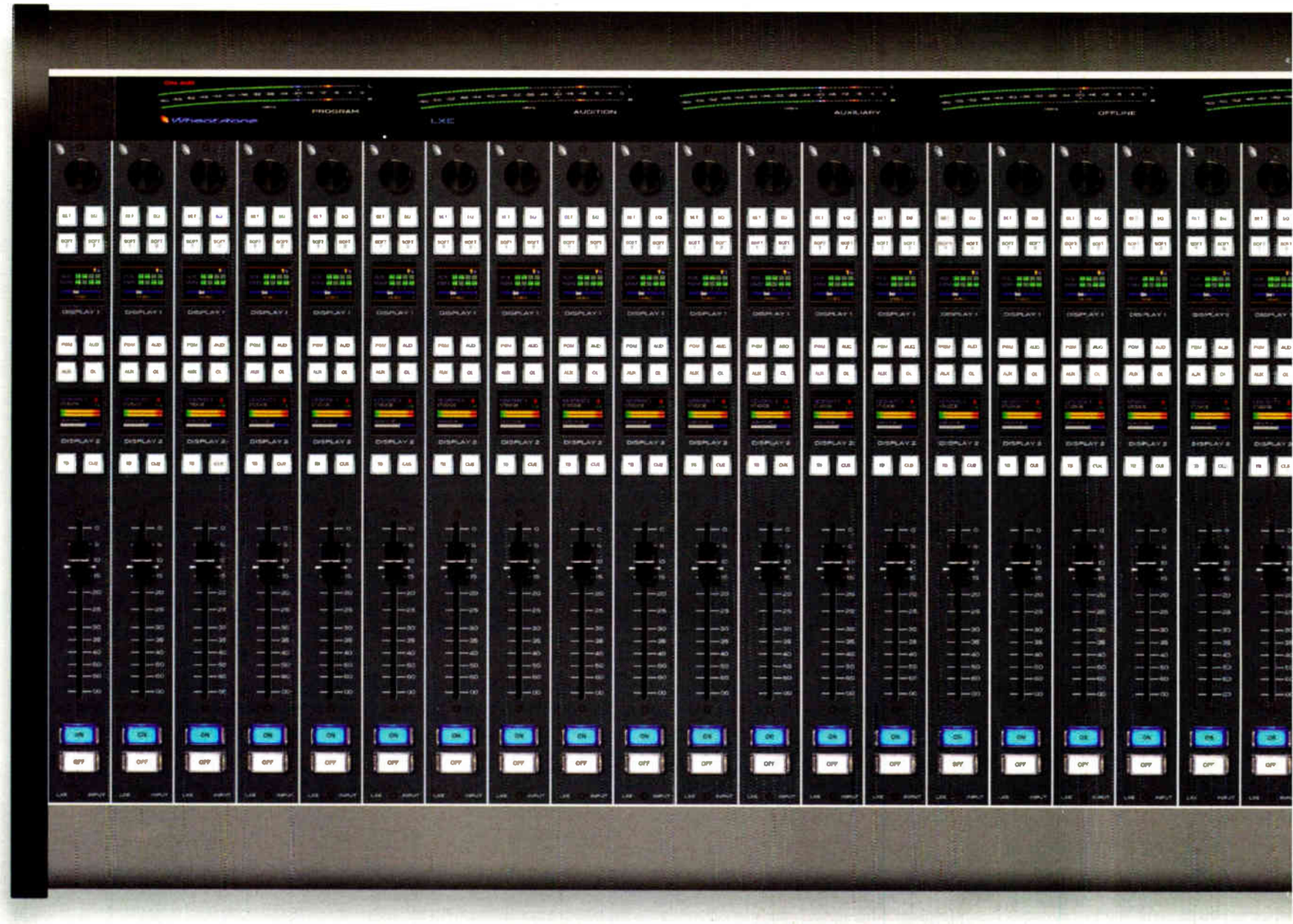
USB: The USB may push out the more venerable 3.5 mm audio jack, according to CNET. "If Intel and its allies get their way, the new USB Type-C connector that's spread to some high-end PCs and phones will replace [the 35 mm jack] in coming years," it reported. At a developer's event, Intel architects described a USB audio standard that has features to ensure a USB headphone doesn't drain too much battery power and defines how buttons for pausing music or lowering volume work. The concept "will really make USB Type-C the right connector for audio," one said.

CUMULUS: Second-quarter financial results "underscore the substantial challenges that we must overcome," said Cumulus President/CEO Mary Berner, but the company's turnaround strategy "is gaining measurable traction with significant ratings growth, improved employee engagement, reduced turnover and enhanced operational effectiveness." In the three-month period, net revenue was $287.2 million, down about 4 percent from the same period a year ago; net income was $1.1 million, down about 91 percent, and adjusted EBITDA of $63.2 million was down about 22 percent. In the quarter, about three-fourths of total revenue came from its radio station group, where revenue was pretty much flat; the rest was from Westwood One, where revenue was off about 14 percent. The Westwood One arm saw an 88 percent drop in net income in the quarter compared to a year prior. In the first six months of 2016, the company's overall net revenue was $555.7 million, down 2.6 percent. It posted a net loss of $13.4 million and adjusted EBITDA of $105.1 million, down 16.2 percent from a year ago.

TELCOM: Republicans feel they are close to being able to launch an overhaul of the Communications Act, according to the publication The Hill. It quoted Rep. John Shimkus of Illinois, who plans to seek the chairmanship of the House Energy and Commerce Committee, on his hopes for a broad revision. "You want to do a blank slate, and you want to ask people to come in and say, 'Assume there's no FCC, but we have the communication devices we have today, and we're going to create an FCC. What does it need to look like?'" Shimkus said a rewrite should address questions of privacy and cybersecurity, The Hill reported.

SBE BOARD: The Nominations Committee recently put forth candidates for officer for the next term. They are Jerry Massey for president, James Leifer for vice president, Tim Anderson for secretary and Andrea Cummis for treasurer. All are incumbents except Anderson, who would succeed Ted Hand. Also, of the following candidates, the top six vote-getters will be elected to serve two-year terms as directors: Jim Bernier, Kirk Harnack, Brian Oliger, Jason Ornellas, Wayne Pecena, Marcelo Sanchez, Mark Simpson and Justin "JT" Tucker.

LXEvolved



The Evolution of LX Radio Control Console

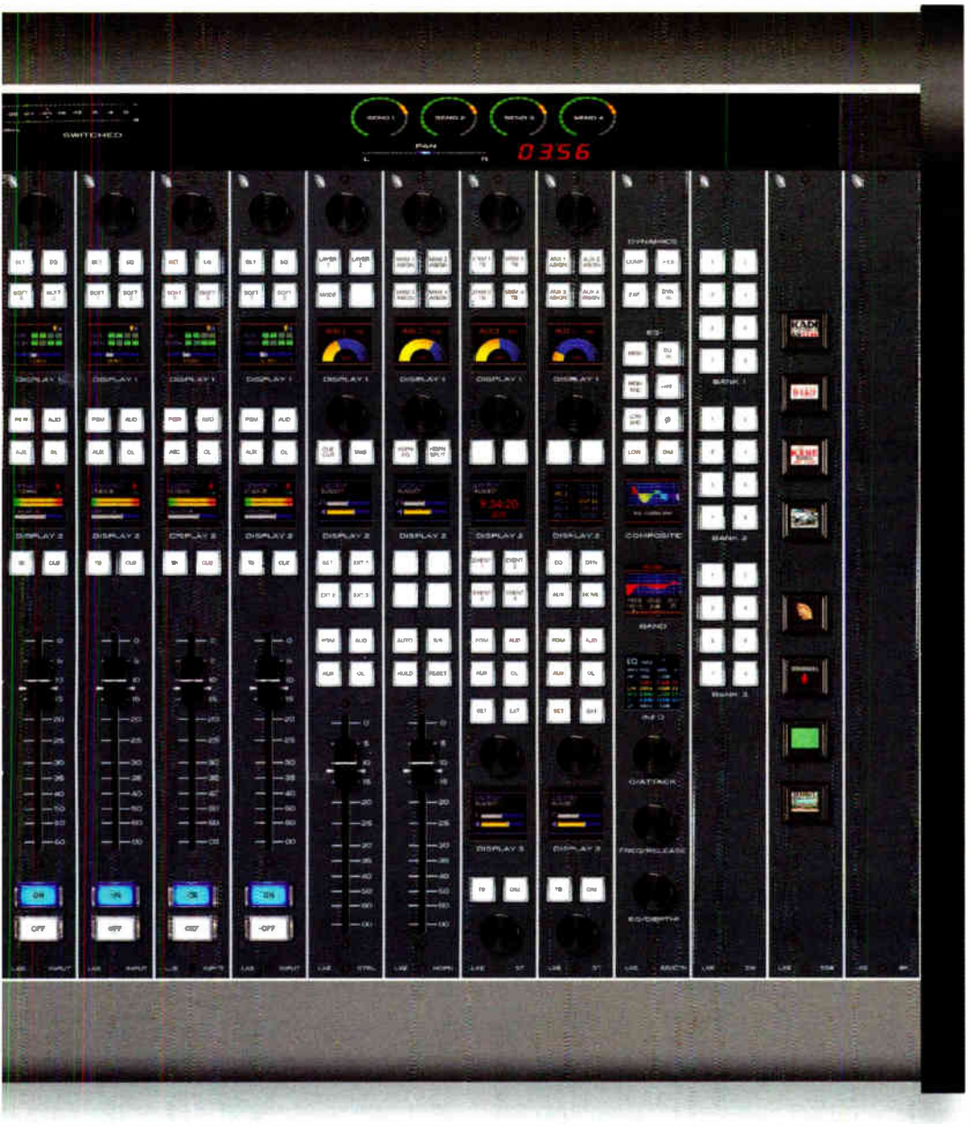
Wheatstone's new LXE console brings control surface configuration to a new level. Going far beyond the usual "any source to any fader" network concept. the LXE is a fully flexible control interface, where every switch and rotary control is programmable to perform any desired function. This means console architecture is completely customizable to client requirements, and limitations to functionality are no longer a factor. Physically compact, the LXE is available in several different form factors including countertop, countertop sunken, and split frames (split sections are not confined to one room, they can actually be in different studios).

Any Way You Want It

ConsoleBuilder software allows every switch on the surface to be programmed for function, mode, and even color (switches are RGB led illuminated). In fact, built-in software allows every button to be scriptable, letting you create powerful macros for as many controls as you want. Multiple full color OLED displays on each panel keep pace with ongoing operations, and event recall allows painless one touch console reconfiguration at the press of a button. With its inherent control flexibility and ability to access thousands of signals (sources and destinations are limited only by the size of the network) the LXE takes facility work flows and audio control to a new level.

LXE is the recipient of NewBay Best of Show Awards from Radio World and TV Technology

THE INTELLIGENT NETWORK



The World At Your (Motorized) Fingertips

The LXE can have up to 32 physical motorized faders, with full DSP processing available on all 32 channels. Surface(s) interface seamlessly into the WheatNet-IP Intelligent Network, and utilize BLADE-3s for audio, control and associated logic data flowing on single CAT6 interconnecting cables. The system can ingest and convert virtually all audio formats: analog, microphone, AES/EBU, SPDIF, AoIP, MADI, SDI and even AES67. Loudness metering, phase control, and full EQ/Dynamics are included.

All New Graphical User Interface

LXE's new GUI has pre-built screens for everything you normally use – metering, clocks, timers, dynamics, EQ, assigns, and more. All are touch-screen accessible with gestures you're used to using on your smart devices. And, the GUI is just as customizable as the LXE surface. Using our ScreenBuilder-LXE software, you simply drag and drop objects and define their functions via a simple wizard interface. You can store multiple custom screens, if you like, to go with your custom LXE setups.

THE ALL NEW LXE BROADCAST AUDIO CONSOLE

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

phone +1-252-638-7000 | wheatstone.com | sales@wheatstone.com

I Wish I'd Had This Earlier

A review of the new SBE Broadcast Engineering Handbook

BOOKREVIEW

BY JAMES E. O'NEAL

The Society of Broadcast Engineers, in cooperation with several publishing firms, has been issuing specialty volumes for the broadcast engineering community for quite some time now. These generally have focused on specific, narrowly-defined portions of the radio or television origination and transmission chain.

However, that has changed with the "SBE Broadcast Engineering Handbook: Hands-On Guide to Station Design and Maintenance." Its 52 chapters and three appendices address just about every area in which the radio or television engineer is likely to need guidance or review.

The handbook was edited by Jerry Whitaker. He and more than 50 other experts in broadcast engineering have teamed up to make this possibly the best and most comprehensive work of its kind.

WHAT'S IN IT?

It covers such basics as safety, ADA considerations, AC power systems and project management, and includes specialized and cutting-edge technologies like bonded cellular transmission from the field, precision time protocol, IP transport and the ATSC 3.0 next-generation digital TV transmission system standard.

While a skim of the table of contents might lead one to think that the book is somewhat "television-heavy," there's plenty of meat on the radio side, with sections on AM and FM antenna systems and transmitters, studio soundproofing, EAS, disaster recovery, audio systems, AC power, remote broadcast technologies, cable management, intercom systems, FM channel combiners and just about everything you could possibly want to know about transmission lines. And while not many of us are involved in shortwave (HF) broadcasting, there's a chapter on that topic that makes for interesting reading; it includes a section on ionospheric behavior affecting long-range transmission of radio signals.

I was particularly impressed with a chapter on grounding, authored by Whitaker himself. In coming up through the ranks, as I did, the topic of grounding always seemed to border somewhere on the "black arts," with little explanation of why something was done in a particular way (if it was done at all). Whitaker's 14-page "Facility Ground System" chapter sheds a lot of light and opened my eyes to some interesting points that I never picked up, even after a three-day course I took "way back when" that dealt more or less exclusively with grounding and bonding.

BUT WAIT, THERE'S MORE

With most books, it's easy to ignore the appendices, which can be pretty dull; but don't do that with this one.

There's page after page of relevant and useful information. Whitaker has included such niceties as conversion data for almost any unit of measure you'll ever encounter, tables delineating the various bands of the electromagnetic spectrum, information about standards organizations, a dB reference table, wire sizes and much, much more.

I know that I'll be returning again and again to this part of the book, as it sure beats Googling or remembering which book in my library I can reference for such things as that chart equating standing wave ratios to return loss values, or what size U.S. drill bit I'll need to make a hole for a 6 mm bolt.

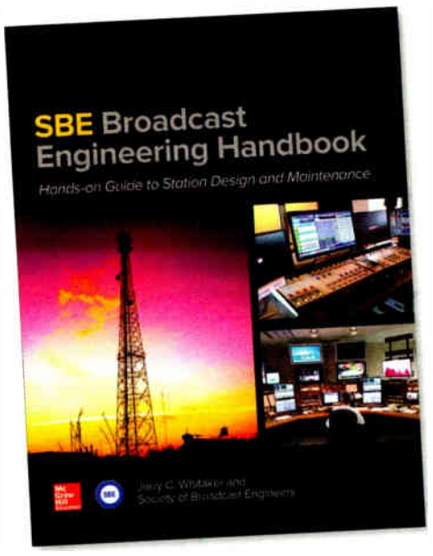
This is not the sort of book that you're going to plow through like a best-seller. However, I guarantee that once you open it and skim through some of the chapters, you'll keep returning to it and digest section after section, as I did.

I just wish such a book had existed when I was coming up through the ranks. It answers many of the questions that I formulated as I got deeper and deeper into broadcast engineering and had no easy way to get answers.

WHAT'S THE CATCH?

Are there any negatives? This old curmudgeon does offer a few.

One is the page numbering. It doesn't run consecutively from one to "n" (or in this case, one to 912), but rather starts anew with each chapter (1.1 to 1.35, 6.1 to 6.24, etc.). I found this awkward but gradually got used to it as I became more familiar with the book. (No, I didn't take the time to count the pages to arrive at the 912 number; the book's editor provided me with the total.)



Another slight "gripe" concerns the size of the type used. It's on the small side, and as my eyes aren't what they used to be, it's a bit difficult to read the excellent material presented without putting my "cheaters" on. However, that's just me; younger eyes may not have this problem.

Last, some might find the nearly $200 retail price point somewhat daunting, but when you do the math, this works out to less than a nickel per page — a real bargain for a hardback technical volume these days, and certainly a lot less than the price of admission to any technical training class that I ever attended. SBE members pay $159; see the SBE Store section of *www.sbe.org*. I also checked the Amazon website and the book can be had there for $165 and change; there's a Kindle edition going for less.

If you're serious about moving ahead in the technical side of broadcasting, you need this book.

James O'Neal is a retired broadcast engineer who worked in the field for some 37 years before joining Radio World's sister publication TV Technology, where he served as technology editor for nearly a decade. He is a regular contributor to both publications and a number of others.

Studio Technology Scores in Baltimore

Personal touch pleases WIYY

USERREPORT

BY DREW PINKNEY
Chief Engineer
WIYY(FM), WBAL(AM)

BALTIMORE — In 2016 WIYY(FM) renovated the 98Rock control room studios due to a dysfunctional layout and limited space to accommodate new technology. The update was all-inclusive as we replaced cabinets, countertops and furniture and redesigned the layout of the workspace.

The original studio had been installed in 1999. As our on-air talent grew in numbers and improvements in technology became available, we were soon in need of more mic locations and PC workstations. Most recently, a need for sightlines became critical for live video camera shots of the talent as 98Rock streams their "Livewire" morning show online.

It was soon decided that the studio needed a major redesign to keep pace with our ever-changing industry. With our unique design needs in mind, we sought a designer with extensive modern studio renovation experience. Vince Fiola of Studio Technology proved to be an excellent choice.

Vince came to our Baltimore studios and examined our current layout. He then met with our engineering and programming staff so we could describe our needs directly and brainstorm for ideas on basic layout, clear sightlines and functional access. Also discussed were additional talent locations to engage all studio parties.

Vince took ideas and requirements and started putting them to virtual paper.

After numerous revisions, our design was complete and Studio Technology went to work. The installers were prepared, arrived early and worked quickly. The delivery and major installation were done in one day, with a single follow-up day for final counter modifications. During the install, Vince made sure that he and I worked closely to maximize the efficiency of the installation.

Though the install was completed quickly, Vince never overlooked details such as an incorporating design-line features that allow for a smoother, rounded look instead of a hard, wood, boxy appearance that appears dated. He also recommended spring-loaded pull-off panels that allow for easy access when necessary. Vince also advised the use of Corian material for counter top surfaces, due to its long-lasting functionality and Formica covered wood cabinets that allow the flexibility to mount anything needed internally. The colors of the counters and cabinets were matched seamlessly to our building's color palette.

Once the counter and cabinets were installed, the focus shifted to the placement of our new furniture. Vince created a layout that allowed for both stand-up and sit-down talent locations. The smart design allows anyone who comes to our studios to be on air. Plus, with the new layout, talent and guests no longer have to struggle to enter or leave due to a confined space. The new layout feels more functional, open and inviting.

Studio Technology enabled us to create a studio workspace that is as attractive as it is functional, but most importantly, will grow with us as we adapt to technology changes in broadcasting. Everyone at 98Rock is thrilled with the results of all the hard work and design.

For information, Vince Fiola at Studio Technology in Pennsylvania at (610) 925-2785 or visit www.studiotechnology.com.

TECHUPDATE

ARRAKIS ADDS FLAIR WITH ACCENT PANELS

Arrakis Systems says that its Accent furniture collection is notable for its beauty, function and durability. It highlights its aluminum frame, attractive panels and "gorgeous" tabletops for broadcast studio applications.

Custom configurations allow users to decide what fits best for their needs, and the available custom features give it a fingerprint that is matchless, Arrakis says.

A new option from Arrakis is introducing is custom lighted panels. These are made using semi-translucent acrylic plastic that is durable and attractive. Colored backlighting will make any studio pop out, giving a station a distinct and professional look.

The lighted panels are placed on the outside of the pedestal racks. These are available for the Balanced U, Unbalanced U, Short U, Long L and Short L configurations. Custom colors are available.

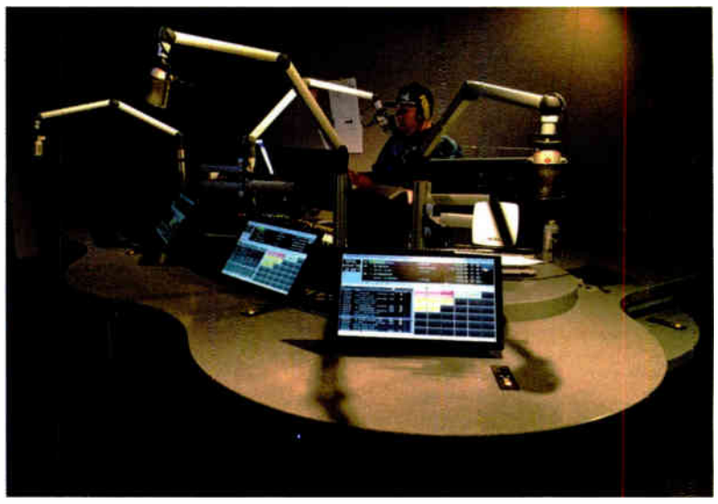
For information, contact Arrakis Systems in Colorado at (970) 461-0730 or visit www.arrakis-systems.com.

EMF Upgrades With GatesAir Custom Furniture

Design aims to combine looks with functionality

USERREPORT

BY JONATHAN OBIEN
Manager of Studio Operations
Educational Media Foundation Broadcasting



ROCKLIN, CALIF. — From our network operations center in Rocklin, Calif., the Educational Media Foundation Broadcasting produces and broadcasts the Air1 and K-Love music radio content. We deliver this programming as a centralized head-end to more than 400 radio markets in our network.

As part of a recent upgrade at our Rocklin headquarters, we purchased and installed custom furniture from GatesAir via broadcast equipment dealer SCMS. This furniture has elevated both the look and functionality of our facilities, including our four on-air studios and a control room.

DESIGN

We were looking to take a fresh design approach — with efficient ergonomics enhanced by clean modern styling — and GatesAir custom furniture fit the bill beautifully. With this upgrade, the layout of the room was designed with a "visual friendly" look to enhance photos, video footage and conversational experience for the on-air talent.

The difference between what we had before and what we have now is night and day. Before this upgrade, the technical layout of our studios was inefficient, with tall racks of equipment piled on top of the studio consoles, blocking everyone's view and creating a need to extend beyond reach to access functional equipment. Whenever visitors toured the facility, they would peer into the studio's window, and see the back of the DJ who would have to stop tending to the on-air product to turnaround and acknowledge them.

Fast forward to today, where our jocks now sit in sleek, modern, visually pleasing studios with finely-crafted grayish-black solid-surface furniture and with a better view of the windows all around. At the center of the layout, which is identical for all four of our production studios, the GatesAir furniture draws your attention, and fits each room's unique space and operational requirements.

With the freedom to customize the desks any way we wanted, we chose a nonsymmetrical, three-tiered configuration that includes a high 39-inch surface where the show host can stand up and work. A second, standard 36-inch sit/stand counter height surface provides contoured cutouts to accommodate seating for up to four people, including co-hosts, news people and guests.

The desk's third level has an ADA-compliant jetty that extends out at a lower height that's comfortable for someone in a wheelchair. The lower level also has a contour cutout that allows a handicapped guest's wheelchair to be pulled right up to the desk. We also installed an on/off cough button module into the desk for the wheelchair position. Prior to installing the GatesAir furniture, we had to prerecord handicapped guests in a separate production room because we

(continued on page 23)

Omnirax Becomes Friend of the Family

California broadcaster discovers it likes curves

USERREPORT

BY RICK SMITH
Sr. Director, Finance & Operations
Family Stations Inc.

ALAMEDA, CALIF. — It all started when Tom Evans, our president and GM, visited the Omnirax Furniture Co. booth at the 2015 NAB Show.

We needed to furnish four radio studios, and it didn't take long to figure out that Omnirax was the obvious choice. Their preconfigured Phoenix line boasting custom-quality, simplicity and affordability was the perfect solution.

But our new offices also required 34 workstations, six conference tables and five mobile printing stations. We were delighted to learn that Omnirax was a "one-stop-shop" to furnish our entire facility. However, there was one issue. The Omnirax signature design concept is curves, curves, curves. And though curves in the studios was no problem, for the offices, we were more comfortable with and preferred the traditional rectilinear shapes generally available from the "usual suspects." We needed to move past this.

To help with this, we visited a local Omnirax client to see their office furniture in a real-life environment. The quality, versatility and the functionality derived from the curvilinear shapes (form follows function) were obvious. We were hooked.

David Holland, Omnirax VP of design, guided us through their "Collaborative Discovery and Design" process. He asked a series of structured questions that helped us get beyond what we thought we wanted to a place where were able to identify what we really needed.

David proposed overall shape, and together we customized color, trim, hardware and pedestal/storage configurations. He also designed a custom locking mechanism for our storage pedestals and custom privacy panels.

Additionally, during our suite buildout, David worked directly with stakeholders, including the project manager, designers, construction team, et al, to ensure our furniture solution fit layout and electrical considerations.

During production, I visited the Omnirax manufacturing facility in Sausalito to meet the team and select hardware.

As is often the case, our buildout took months longer than anticipated — Omnirax was accommodating and when we were finally ready for delivery and installation, it went off without a hitch.

The Omnirax delivery/build crew was terrific. Workstation and conference tables were placed and built according to layout and within a fairly tight window. The team did a lot planning, which made delivery and installation a snap!

We've been using — actually living with — our new studio, office and conference room furniture for almost three months now, and we love it. The workstations are very comfortable and functional; employees appreciate the wrap-around work surface.

Even after the sale and installation, Omnirax customer service continued to be stellar. We had minor issues around a handful of privacy panels and workstations chairs — no problem — replacements for both were handled with flawless, seriously excellent customer service. They really did make out "furniture headache" go away.

Our goal was to create an open, collaborative, highly-functional working environment, and Omnirax delivered and then some. If you are looking for studio furniture, workstation desks, conference room tables, mobile print stations or even custom side tables or chairs — Omnirax is for you.

As a not-for-profit charitable organization, we are required to use resources responsibly, and Omnirax delivered exactly what we needed, on time and darn near within budget.

Building to budget is an Omnirax specialty. The fact that their furniture comes in "Three Flavors" — Custom, Product or Semi-Custom — makes it possible to get not only what you want, but also what you need at a price you can afford. The Phoenix product line enabled us to reallocate resources from studios to office.

Most important, the folks at Omnirax are our friends, we trust them and we will be doing business with them for years to come.

For information, contact David Holland at Omnirax in California at (800) 332-3393 or visit www.omnirax.com.

TECHUPDATES

ACOUSTIC FIRST DEVELOPS SOUND CHANNELS

With the push for broadcast to become carbon-neutral and LEED-compliant, Acoustics First now offers an acoustic treatment option "tailor-made" for the broadcast market — Sound Channels acoustic wall fabric. Hard surfaces in a studio can affect the clarity of the performance, so a good approach would be to cover them all and that's what Sound Channels does.

Sound Channels installs like wallpaper and changes walls from reflectors to absorbers.

One yard of Sound Channels acoustic wall fabric utilizes 15 used plastic bottles. Recycling one ton of plastic from bottles saves approximately 7.4 cubic yards of landfill space.

Recently, an improved Sound Channels design has increased its sound absorption by 25 percent (NRC of .25). The uniform coverage you get with treating the walls with Sound Channels eliminates the flutter/slap from reflective parallel walls, while helping to control excessive reverberation and noise buildup.

For information, contact Acoustics First in Virginia at (888) 765-2900 or visit www.acousticsfirst.com.

FRONT PANEL EXPRESS DELIVERS CUSTOM FRONT PANELS

Front Panel Express says it provides custom front panels and enclosures with no minimum quantity requirements and optional same day delivery. Designing and ordering is can be easily and quickly done through the free Front Panel Designer software.

Design a front panel or enclosure to your specifications, click on order and you are done! Your machined parts will be on their way to you only five days later or even within 24 hours when choosing express.

Front Panel Express offers powder-coated finishes, epoxy bonded studs and standoffs, machining of material provided by clients and more.

For information, contact Front Panel Express in Washington at (800) 373-9060 or visit www.frontpanelexpress.com.

TECHUPDATE

PRIMACOUSTIC PAINTABLE ROOM KITS

Primacoustic, a division of Radial Engineering Ltd., developed London Room Kits to fulfill the acoustical control requirements of small home based recording and broadcast studios.

The company says the performance and value of these turnkey solutions has made them popular with users of podcasting rooms, teleconference rooms, boardrooms and home theatre/media rooms.

Primacoustic also developed a series of paintable acoustic panels that provide the same absorptive properties while offering the user various possibilities for color and design.

The company now offers the London 8 and London 10 room kits in the paintable option. These room kits are designed for rooms between 80 and 120 square feet.

Should a bass trap be required, the London Bass trap is also available in the paintable option. The room kits come with panels and mounting hardware including screws and drywall anchors to make installation simple. For larger spaces the user could add another London kit or expand using the paintable series of panels to create the desired acoustic and aesthetic environment.

Primacoustic also offers a variety of wall and ceiling mounted acoustical solutions.

For information, contact Primacoustic in British Columbia at (604) 942-1001 or visit www.primacoustic.com.

GATESAIR

(continued from page 21)

couldn't accommodate them in the on-air studio.

GatesAir gave us the option to outsource or assemble the furniture ourselves. Since it arrived as large, partially assembled modular pieces packed in crates, we found the actual assembly to be very intuitive and everything went together smoothly.

The furniture also allows us to mount our studio equipment and infrastructure components in a way that keep them readily accessible, yet inconspicuous. There's also a cable trough between the top surface and a plywood panel underneath that allowed us to tuck touchscreen monitor mounts and cables into it for a lower profile so the screens don't block anyone's view, and are still easy to see and access.

A few small cutouts on the top of the furniture allow us to drop microphone and Ethernet cables down through the holes and plug them into special faceplates on the underside of the desks. We were also able to surface-mount electrical boxes and fiber panels to the plywood underside of the desks, all without damaging the furniture or ruining its appearance.

So today, instead of being buried by equipment racks as we were with the previous studio layout, our studio equipment is situated neatly and ergonomically on one side of the room and under the desks, making it easier and more convenient for our technicians to service it.

Not only is our new GatesAir custom furniture ideal for our needs, the whole process of ordering and installing it went smoothly without interruption. This was a major decision and investment for us but with GatesAir's craftsmanship and attention to detail, we have the beautiful, ergonomic studio makeover we were hoping for.

For information, contact Keith Adams at GatesAir in Ohio at (513) 459-3447 or visit www.gatesair.com.

WSDG Designs KEXP's New Digs

Retail, live, gathering spaces are desirable features for Seattle pubcaster

SPECIALREPORT

BY JOSHUA MORRIS
Project Manager
Walters-Storyk Design Group

SEATTLE — An essential component of Seattle's celebrated music scene, KEXP(FM) 90.3 exemplifies the significance of public radio for the local, national and global radio/internet listening community. Following a six-year fundraising, design and build program, the new 25,000-square-foot, $15 million, state-of-the-art broadcast/live production complex was completed in April 2016. Located in Seattle Center, home of the iconic Space Needle, KEXP continues to serve is listeners as a primary source of live (and recorded) music, news, and special programming.

KEXP's new complex was created in collaboration between lead designers SkB Architects and WSDG-Walters-Storyk Design Group. The facility features a 400-square-foot on-air DJ booth, a live room, two production studios, two audio and two video edit rooms, a video control room, two DJ iso rooms, a green room, production/mastering, open office space, a library and conference rooms. A 4,500-square-foot reception area was created to facilitate the station's commitment to airing live performances. It includes a stage and room adjacent to the record/retail store and café for an audience of up to 75 fans. The 1,100-square-foot live room designed to support the station's broad live streaming/video production mandate is another integral element of the design. An additional DJ booth for back-up and educational outreach is on the drawing board.

As project manager of this assignment, I knew WSDG's design mandate was to make the studio accessible to the public, ensure the comfort and security of the station's personnel and guest artists, improve the synergy between the studio's aesthetics and its functions, and accomplish these goals within the limits of a realistic but not excessive budget.

We paid particular attention to the needs of the eclectic artists invited to perform live at the station. Whether rock, rap, grunge, country, jazz or some uncategorized future format, they all had to be able to set-up and break down their equipment quickly between 30-minute live sets. Fortunately, because the original structure was designed as exhibit space for the 1962 World's Fair, we had plenty of room to work with.

KEXP's audio/video broadcast systems integration design is based on a dual-application Wheatstone audio for radio and TV system. WSDG AV engineer Federico Petrone specified Wheatstone Glass-E virtual mixer software and a Blade routing system with enhance networked connectivity. The station's extensive assemblage of equipment includes an Avid S6 control surface and Pro Tools/HDX DAW, 32-channel Yamaha LS9 console, Nexo PS15-R2 15-inch two-way speakers with PS subwoofers and a substantial collection of outboard equipment ranging from Grace Designs, Millennia, Neve mic preamps, compressor modules from API, Great River, Neve and LaChapell, 500 series EQ, plus kit from Eventide, Empirical Labs, SPL and Bricasti.

Commenting on the project, WSDG founding partner John Storyk remarked, "We were pleased when SkB Architects' co-lead designer/co-founders Kyle and Shannon Gaffney and Steve Olson invited us to participate in this significant assignment. This was a smooth, efficient and totally supportive collaboration. These technical facilities represent nearly 60 percent of the overall footprint of KEXP's new facility. SkB's level of understanding and appreciation for acoustic issues, and an infinite number of related concerns was outstanding. Every member of the project team was an extraordinary professional, from general contractor Sellen Construction, to project management by Costigan Integrated, this team was first tier. KEXP has already aired (and streamed) live performances by such diverse artists as Ben Harper, Bob Mould, Andrew Bird, Wussy and Dengue Fever. We're told they all sounded great, and they were all delighted with the venue."

WSDG was also privileged to work with an outstanding group of broadcast professionals. KEXP Executive Director Tom Mara, CTO Jamie Alls, Operations Manager Chris Kellogg and Broadcast Services GM Ethan Raup were deeply committed to the goal of making KEXP's new home handsome, and future-proofed.

KEXP has served listeners for over 40 years. This new facility will play a pivotal role in helping continue their important work.

For information, contact Walters-Storyk Design Group in New York at (845) 691-9300 or visit wsdg.com.

TECHUPDATE

GRAHAM STUDIOS EXPANDS RXP TALK SERIES TABLES

Graham Studios now offers four new sizes in the RXP Talk Series tables. The talk tables range from the 8-foot by 4-foot Talk-8, to the smallest 5-foot Talk- 5 "Podcaster" version (shown).

These tables take a high-design approach, inspired by a visit to the winter home of Frank Lloyd Wright at Taliesin West in Scottsdale, Ariz. The architect preferred to use 4 x 8 sheets for their strength and utility.

The Talk Table Series are manufactured with balanced panels, HPL on both sides of the top and Melamine on both sides of the cabinets. Industrial-grade particle board is used in the standard versions; Baltic Birch plywood is used in the upgrade versions.

The company highlights the attention to manufacturing detail evident in the RXP Talk Series and its other products. Graham has been making broadcast furniture since its first appearance at the NAB Show in 1984.

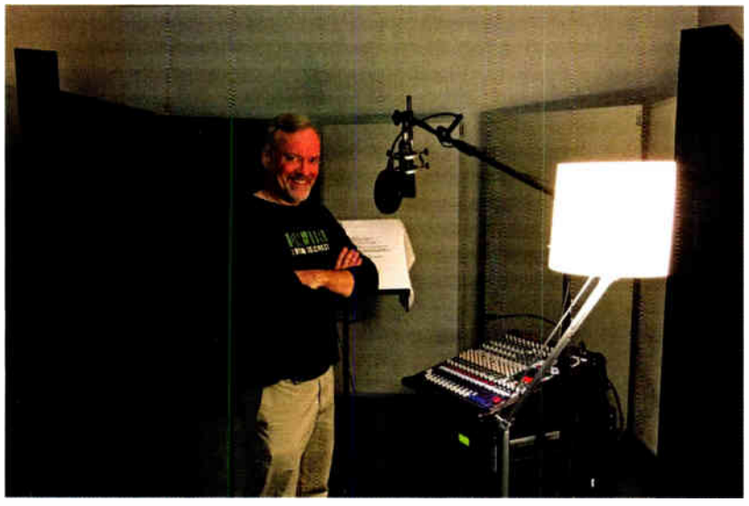
For information, contact Graham Studios in Colorado at (970) 225-1956 or visit www.graham-studios.com.

RealTraps Soothes the Savage Sound

Traps tame annoying frequencies for freelance announcer

USERREPORT

BY DOUG KASTILAHN
Freelance Announcer



NEW MILFORD, CONN. — I am a freelance announcer who has worked for major radio networks, including ESPN Radio. I have been a user of RealTraps products since 2005 when I purchased six MiniTraps and MicroTraps to control some low-frequency issues inside my Acoustic Systems RE-142 sound booth. Since I do live voiceover work for a major network news provider and my other clients over an ISDN line, it was crucial that I fix the problem.

I shot out a few emails to acoustic treatment companies outlining my needs. Within minutes I received a response from Ethan Winer, one of the owners of RealTraps, who was ready to help with my issues and offered to come to the studio two days later to diagnose the problem. The traps took about two weeks to arrive and once placed inside the RE-142, made an immediate impact; tests with engineers at my news client and ESPN in New York, Bristol, Conn., and Washington showed that the frequency issues had been removed entirely.

The quality of the product is top-notch. The powder-coated steel frames are made to last. and there are several options for mounting. Not only are the products long-lasting but the customer service has withstood the test of time. Eleven years after my purchase, when I was working on the Republican and Democratic conventions, the guys as RealTraps were still there to help.

In July 2016, we moved our studio and had to leave the RE-142 behind. We built an extremely isolated recording booth but after completion we were faced with severe reflected bass with variations as high as 35 dB. Again, I called Ethan and he was able to come by the next day to help. Unfortunately, our move took place three days before the start of the RNC, for which I had to do live recordings. This crunch time should have been stressful, but Joe and Sean at the RealTraps factory turned my order of four MiniTraps and one MicroTrap plus RealTraps stands around within 24 hours! Our new traps plus the ones from 2005 (which still look new) have created a recording area that sounds better that my original RE-142.

My most recent interaction with RealTraps was around the beginning of August, when I went to the factory to purchase three more sets of RealTrap stands to use with my original MiniTraps, which had leaning stands. I brought along one of my MicroTraps to get some advice on how to remove some ink stains on the material. Joe asked if he could have my MicroTrap for a minute … and when he returned he had completely replaced the MicroTrap with new material. It looked like new.

In today's world, it's difficult to find good customer service, let alone a business that is willing to go way out of their way to help a customer. We couldn't be happier with the guys at RealTraps and their products. They are more expensive than similar products but you really do get what you pay for. I have nothing but positive things to say about RealTraps.

For information, contact Ethan Winer at RealTraps in Connecticut at (866) 732-5872 or visit www.realtraps.com.

BROADCAST EQUIPMENT EXCHANGE

Submit your listings to: minderrieden@nbmedia.com

ACOUSTICS

ANTENNAS/ TOWERS/CABLES

WANT TO SELL

TOWER SIGNS: Antenna ID Products. AM-FM custom&ASR. PDF product list. antennaid@msn.com, 610-458-8418, www.antennaid.com.

CCA FM8000G Trans 107.9, great cond; 4-Bay Jampro antenna w/deicers; 3-bay Shively antenna FM. D Brockman, 606-965-3436.

WANT TO BUY

Circular single-bay FM antenna, worked great for a translator at 105.7, make offer, Paul Wilson, 662-627-1450.

AUDIO PROCESSING (INCLUDES ON-AIR)

WANT TO BUY

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST - 214 738-7873 or sixtiesradio@yahoo.com.

Wanted: real plate reverb. abgrun@gmail.com.

AUTOMATION EQUIPMENT

WANT TO SELL

DIY-DJ Version 2.0 is now available. Over 500 copies of DIY-DJ, a Linux based radio automation system, have been distributed and now version 2.0 is available. Voice tracking, join satellite feeds, do unattended sports and remote events, temperature announce, scheduler, automatic cut editing on import, and much more. It's FREE. If you are using version 1.0 or would like to try DIY-DJ, go to krwsfm.com, register and down load your free full version. The only thing we ask is that you let us know if and how you are using the software. Call (406) 679-0527 or email krws@digitaldevelopment.net for a copy today.

MICROPHONES/ HEADPHONES/ SPEAKERS/AMPS

WANT TO SELL

1934 RCA 77A double ribbon microphone, originally used by Arthur Godfrey at WFBR Baltimore. 100% perfect condition. Contact Bill Cook, 719-684-6010.

WANT TO BUY

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 214 738-7873 or sixtiesradio@yahoo.com.

CONSULTANTS

MISCELLANEOUS

WANT TO SELL

I'm selling between 150 and 200 cassette tapes that consist of old-time radio shows, sports shows, some local New York radio talk shows, etc... Must take entire collection and the price is negotiable. Please call me for details and, my phone number is 925-284-5428.

Radio broadcasts of Major League Baseball, NFL, and some college football games that are on cassette tapes, approx 100 to 125 games, time period of entire collection os from the 1950's – 1970's, BO. Must purchase entire collection. Contact Ron, 925-284-5428 or ronwtamm@yahoo.com

WYBG 1050, Messina, NY, now off the air is selling: 8-chnl console w/mics & access; 250' tower w/building on 4 acres, collection of very old 78's, 12' satellite dish on concreate base, prices drastically slashed. 315-287-1753 or 315-528-6040.

WANT TO BUY

Collector wants to buy: old vintage pro gears, compressor/limiter, microphone, mixing consoles, amplifiers, mic preamps, speakers, turntables, EQ working or not, working transformers (UTC Western Electric), Fairchild, Western Electric, Langevin, RCA, Gates, Urei, Altec, Pultec, Collins. Cash - pick up 773-339-9035 or ilg821@aol.com.

2" plastic "spot" reels 6.5 or 8" diameter, as used for quad video. Wayne, Audio Village, 760-320-0728 or audiovlg@gte.net.

Equipment Wanted: obsolete, or out of service broadcast and recording gear, amplifiers, processing, radio or mixing consoles, microphones, etc. Large lots preferred. Pickup or shipping can be discussed. 443-854-0725 or ajkivi@gmail.com.

I'm looking for San Francisco radio recordings from the 1920's through the 1980's. For example newscast, talk shows, music shows, live band remotes, etc. Stations like KGO, KFRC, KSFO, KTAB, KDIA, KWBR, KSFX, KOBY, KCBS, KQW, KRE, KTIM, KYA, etc, I will pay for copies... Feel free to call me at 925-284-5428 or you can email me at ronwtamm@yahoo.com.

Looking for a broadcast excerpt of a SanFrancisco Giant's taped off of KSFO radio from 1959, interviews with Willie Mays, Dusty Rhodes & some play by play excerpts, also features a homerun by Willie Mays and Felipe Alou stealing second base, running time is 18:02, also looking for SF Giants games and/or highlights from 1958-1978 also taped off KSFO Radio. Ron, 925-284-5428 or ronwtamm@yahoo.com.

Looking for KFRC signoff radio broadcast from 1930 Andy Potter, running time is 0:22 & also the KLX kitchen the program guest is Susanne Caygill, a discussion of women's affairs with a long promotion for Caygill's appearance at a local store. Anne Truax, Susanne Caygill, running time is 13:44. Ron, 925-284-5428 or email ronwtamm@yahoo.com.

Looking for KTIM FM radio shows from 1981-1984 if possible unscoped. R Tamm, 925-284-5428 or ronwtamm@yahoo.com.

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

RECEIVERS/ TRANSCEIVERS

WANT TO SELL

Johnson Electronic SCA880 module, 67/92 Khz, 417-881-1846.

RECORDING & PLAYBACK HARDWARE

WANT TO BUY

1960s-vintage MacKenzie Repeater machines, magazines, spare parts and manuals, complete or "parts" machines considered, James, 870-777-4653.

Large or small collections of 16" transcriptions or 12" transcriptions, not commercial LPs. Bill Cook, 719-684-6010.

Schnader telescriptions 16 mm musical films produced in the early 50 s. Bill Cook, 719-684-6010.

Standard Short-tune series. Bill Cook, 719-684-6010.

RADIOWORLD
Equipment Exchange

TAX DEDUCTIBLE EQUIPMENT

Donations Needed: All Volunteer, Non-profit Low Power community radios stations need Equipment. Will offer tax deduction letter, You determine donation value, We will pay shipping. Equipment shared between three Wisconsin stations. Looking for Mics, Mixers, field equipment, etc. You name it. Email: Dan@WIECradio.org.

TRANSMITTERS/EXCITERS/TRANSLATORS

WANT TO SELL

NAUTEL 25 KW AM TRANSMITTER, THE BEST, TWO YEARS OLD, NOW ON 810 AM, MOVING SITE & DOWNSIZING, 3 PHASE, NOW. CARL 386 566 4299, ORLANDO.

For sale-5kW collins-ITA FM xmtr, $2000/BO. 432-559-1738.

TUBES

www.radioworld.com

EMPLOYMENT

POSITIONS WANTED

Are you a small market station needing a good nuts & bolts engineer in the Los Angeles area? I will make your station shine! CET, fully FCC Licensed. Available for Full/Part-time/Contract work. Available immediately. Mitchell Rakoff, 909-446-6820, mitchellrakoff@yahoo.com.

Experienced radio station manager seeks new management opportunity. More than 39 years experience in radio. Willing to relocate. Family-friendly format(s) preferred. Send details about your management opening to: radiogm@hotmail.com.

Extremely knowledgeable and articulate racing writer/talk show host Adam Amick is available for shows, correspondent, features, etc. Check out www.bleacherreport.com for samples. Call 214-384-5812 or email: adam@rubbinsracingshow.com.

Authentic and Original. Practical, bold, observant, creative broadcaster with excellent people skills and confidence. Very adaptable news, copy, on-air etc. Layla, 720-606-9621 or layla-settles2014@gmail.com.

The Birthing of a Broadcast Museum

Chuck Conrad and friends had a lot of old equipment so they started a museum. But it wasn't that easy ...

COMMENTARY

BY CHUCK CONRAD

A friend of mine once described me as a prodigious collector of electronic manure. That's probably true.

If you are a lot like me, and I suspect you are or you wouldn't be reading Radio World, one day you will wake up and ask yourself: "What am I going to do with all this stuff I've collected?"

For me, collecting has been a lifelong passion. Even as a kid, I frequented junk shops, radio and TV repair shops and even the town dump to find various electronic treasures. It was a very sad day when my father insisted that I clean out my collection of accumulated stuff before leaving home for college. I suspect he knew that I wouldn't be returning for any extended period of time and didn't want to have to deal with my junk if I never returned.

COLLECTING ADDICTION

The addiction to accumulating old things never disappeared. As I've gotten older, I've tried to figure out what to do with several decades of accumulation. It's a bit overwhelming, but for me, the answer seemed to be a museum.

In fact, I already had one but it just wasn't easily accessible, nor open to the public. It resided in the same building that houses two working radio stations (that's what I do in my day job), several antique cars and a DuMont Telecruiser TV remote van.

They have been a space-eating passion for most of my life. The problem is, the space was getting quite crowded. What's more, I had two nearby friends with similar afflictions. One prefers to collect radios and TVs, with several hundred tucked away in various storage lockers. The other has a peculiar affinity for extremely heavy radio transmitters, though he is generally interested in anything old that uses electricity. If it make noise, or produces a picture, that's all the better.

We all needed some place to put this stuff. As a result, I ended up starting the Texas Museum of Broadcasting & Communications.

This seemingly ancient automation and playback equipment looks almost new. Starting on the left in the first rack group, on top of the Schafer 901 automation system are: a Marti remote unit, Raytheon, RCA and General Electric remotes mixers. The next group has, starting at the top, a Magnecord reel-to-reel recorder, a Schafer studio remote control, CBS Audiomax and Volumax processors and a Hewlett-Packard audio oscillator. The third group contains a variety of test equipment built by RCA and General Radio. The fourth group is an RCA BTA-1MX 1000 watt AM transmitter. On the far perpendicular right is a General Electric TV audio console and an Autogram console.

And here's part of the old radio collection — from wood and tubes to plastic and transistors.

Right now, it is a work in progress, located in the downtown area of Kilgore, Texas.

Why Kilgore you ask?

Well, I live near there. But it is a nice small town with an interesting history, several other museums either open or underway, a junior college with some 5,000+ students, and most importantly, an available building! It is also bordered by Interstate 20, located about two-thirds of the way between Dallas and Shreveport, La. Did I mention that real estate there is *way* cheaper than in Dallas, Los Angeles or New York?

So Kilgore it would be.

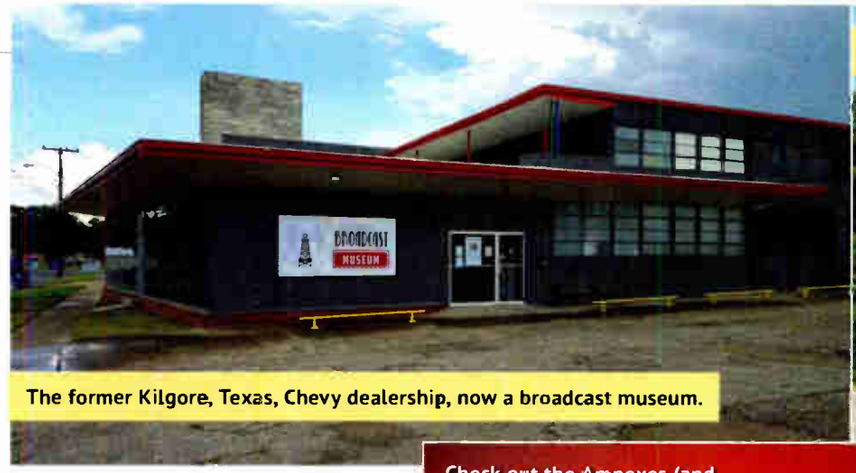
The idea for the museum came into focus when an eight-year-old Cub Scout visiting my radio station asked me how people got on the internet in an era when they didn't have smartphones. He really didn't know. He's never known life without a cellphone or a tablet in his hand. Somehow he, and his generation, need to know more. A public museum seemed like an ideal way to do it.

I don't mean to discourage anyone from trying to do something similar in their neck of the woods, but launching this has not been easy. Even though I have had quite a bit of experience in the management of an automobile museum, I'd never attempted to start something like this from scratch. There were quite a few obstacles along the journey, which isn't over yet. Almost every day, I anticipate some pitfall. It's the kind of thing that gives you something to think about around 4 a.m.

ASSESSING MY OPTIONS

After searching for a suitable building in the area, our choice came down to two: An abandoned TV station a few miles away in Longview, Texas, and a former car dealership in downtown Kilgore.

The TV station had a lot going for it because it still had their old analog equipment inside. The cameras had disappeared, as had any of their new digital equipment, but there was a lot left behind. That would be a plus, and the seller agreed to include everything with the deal. So I started the process of



The former Kilgore, Texas, Chevy dealership, now a broadcast museum.

The Telecruiser

Photo by David Temple

meeting with the various city officials to find out what the city would require. The brief answer would be "a lot."

It seems when you say the word "museum," you trigger a lot of expensive requirements. That designation turns a building into a "public gathering place" and gives you the same fire-rating as a theater or auditorium. The code requirements are stringent.

This building was going to require extensive asbestos abatement, a fire sprinkler system and a fire alarm. The city required that the parking lot area be increased, but for the life of me, I don't know where they expected more parking space to come from.

Check out the Ampexes (and other reel-to-reel recorders).

A smattering of the museum's microphone collection including (left to right) an American Microphone D-33 (used as a prop in Oliver Stone's "JFK"), American Microphone D9-A (also used as a prop in many movies and commercials), RCA 77-DX, Electro-Voice 630, RCA 74-B "Junior Velocity," Electro-Voice 654 and a Turner Model 33D.

It also needed a new roof, which would not be cheap on an 18,000-square-foot building, as well as extensive interior restoration because of that leaky roof. It also was going to need a lot of work on its barely-working circa-1984 air conditioning system.

All of these things seemed possible, but expensive.

I eventually talked the seller into a 50 percent reduction in their asking price because of all the work it needed.

Then the city dropped a real bomb shell: In one meeting, they said, "By the way, you will need to install a fire hydrant in front of the building." That didn't seem too bad, until they announced, "Oh, there isn't a water main on that street" — which happens to be the access road to Interstate 20. "You will have install around 600 feet of 12-inch water main at your expense."

That was a huge deal breaker.

KILGORE

Thankfully, I'd also looked in Kilgore and discovered the building we now own.

It was built in 1949–50 to be a Chevrolet dealership. It is a bit over 19,000 square feet and was in reasonable condition.

It hadn't been used as a car dealership for many years. In fact, most people thought it was vacant. It wasn't. A family owned it and used it as playroom and a place to store their collection of cars, a motor home and various and sundry toys that wouldn't fit in their house.

Through mutual acquaintances, I met with the family to see if they were interested in selling. When I told them what I wanted to do, and with the assurance that we were an established 501(c)(3) not-for-profit, they volunteered to have it appraised and donated over 65 percent of the appraised value in exchange for a tax deduction. We were able to make up the difference with private donations, including some from my pocket.

We finally had a building, which the museum owns free and clear.

But it wasn't as easy as that sounds.

The city of Kilgore also has code regulations, and we would need to make the building comply with them before we could open to the public. We are still working through that process.

We had the same fire code requirements as anywhere else, which has included installing a very expensive fire sprinkler system that included installing a new 6-inch water main to connect the sprinkler system to. I got the city to cut us a deal on digging up the street, but it still was quite expensive. I would have rather spent the money on some vintage TVs or radios.

We also had to install an elaborate fire alarm system, replace all the exit doors with modern steel fire-rated doors with panic bars, and widen some doorways for better access (it seems we are a lot wider than people of the 1950s). We've had to install an external fire escape for the second floor. There were a bunch of minor renovations including installing illuminated exit signs and battery-operated emergency lights, which generate incredible RF interference.

We also had to comply with the Americans with Disabilities Act, which has required us to remodel the existing restrooms and build two additional ADA-compliant restrooms, as well as a series of ramps and easy-to-open doors.

The building needed some basic cosmetic upgrades, including painting. It takes a lot of paint to cover such a large structure.

We have also changed out all of the display lighting to LED. That technology has come a long way recently and isn't much more costly than using less-efficient quartz lighting. The savings in power consumption and the life expectancy of the lights should pay dividends in the long run.

This seems like a lot of trouble just to house the junk collections of a few eccentric collectors. Perhaps it is, but I think it will be well worth it.

Our mission is to save technology so future generations can see how we got to the present day. Far too much of this kind of stuff seems to head for the landfills or the recycling center.

WHAT'S INSIDE

When we are done, we will have a working TV studio where kids can run a camera, do a newscast or be the weather person.

There will be two working radio studios, one a 1960s-era top 40 re-creation using authentic equipment, including turntables, cart machines and reel-to-reel Ampex recorders. Another that will

(continued on page 30)

MUSUEM

(continued from page 29)

be a 1970s-era talk radio studio which will also be useful for recording radio plays and the like.

There will be an extensive display of broadcast TV cameras and equipment, as well as a large display of radio and TV receivers. Our second floor houses our restoration shop and a library. In what was once the body shop, we have a working wood shop and paint booth for restorations and set building.

Our Great Hall, will be the home of my 1948 DuMont Telecruiser, one of the first black & white TV mobile units ever built. This area will eventually include a stage, with AV and lighting support to make it suitable for various events, parties, lectures or even small concerts. This is one way we will have to generate some income to sustain the facility.

The good news is the city of Kilgore and its residents have really embraced the idea. I think it will become a big asset for the community.

If you are headed to Texas, I hope you will put us on your itinerary. It will be worth the trip. Our grand opening is scheduled for Sept. 16.

Because we don't have a paid staff, we will only be open limited hours; however if you will call or write ahead, we'd be happy to see you by appointment.

Even if you aren't able to join us in person, I'd encourage you to become a member. You will get free admission, receive a periodic newsletter, and best of all, become an important part of preserving a little bit of history.

Find us online at *www.txmbc.org* or on Facebook at *www.facebook.com/txmbc*.

Chuck Conrad is a longtime east Texas radio vet and, now, chief cog for the Texas Museum of Broadcasting & Communications.

READER'SFORUM

AM REVITALIZATION QUESTIONS

I read the article (*"Alliance Engineers: First Do No Harm," RW May 11*) about AM revitalization by the "alliance," comprises mainly representatives of the Class A stations that could lose some of their dominant signal around the nation.

It's no wonder that they paint a dim picture of any increase in Class B, C and D signals; they don't want to lose the dominance they've enjoyed for nearly a century.

Over the past several decades, I've always wondered why the local Class D station had to shut off at sunset and allow a station 900 miles away to come booming in. There wasn't any special programming to be had from the distant station; it repeated the same information that one finds on local stations. I wondered about the commercials the distant station aired; I wasn't going to drive 900 miles to buy a new car or purchase groceries in Boston. Then there are the weather and traffic reports for a place I may not visit for several years, why would I want to hear that? It just doesn't seem relevant to me, Joe Public.

Someone said that the EAS system would be compromised if these Class A stations lost coverage. Is the EAS system even working anymore?

I'm kept up to date on various weather warnings, abductions and other emergencies quite often with my cellphone and cable TV. My cellphone is always near me *and* provides 24/7 warnings. You can't get that with a radio that's turned off or in your parked car.

I've seen the population count maps and wondered just how many "actual listeners" were in those areas. Sure, there are lots of people included in the footprint, but are they actually listening to AM radio right now, or are they streaming music, listening to FM, playing CDs?

Then I wonder about nighttime listening. How many people are actually staying up to listen to these Class A skywaves? Do they enjoy the static and crackle while listening to stations 900 miles away? Or would they be better served by a local Class B,C or D with 250 watts providing local weather, traffic and locally relevant programming?

If you want to save the AM band, you must save the AM broadcaster. Give the little guy an opportunity to make a buck.

Dave Dybas
Owner/Engineer
Sparks Broadcast Service
Buffalo Grove, Ill.

WGFM'S FIRST BROADCASTER

Regarding: "How FM Stereo Came to Life" (RW Jan. 20 issue):

My father, David Kidd Sr., was the first person to broadcast on [WGFM in Schenectady, N.Y.] June 1, 1961. He was introduced by Pat Ryan. We could hear it in stereo at home, as we had an FM multiplexer (I don't know if we bought it or the station gave it to us).

This event was published in GE's "The Monogram" in June of 1961 (shown here and online in greater detail at *radioworld.com/themonogram*).

Barbara Kidd Seddon

CLARIFICATION

SANGEAN PRICING

A caption in the article "Sangean Renews Its HD Radio Family" (Aug. 17 issue) showed a price of $159.99 for the new HDR-16 portable receiver. That is the manufacturer's suggested retail price, but the other prices listed were MAP or minimum advertised "street" price. The MAP for the HDR-16 is $99.99.

ADVERTISER INDEX

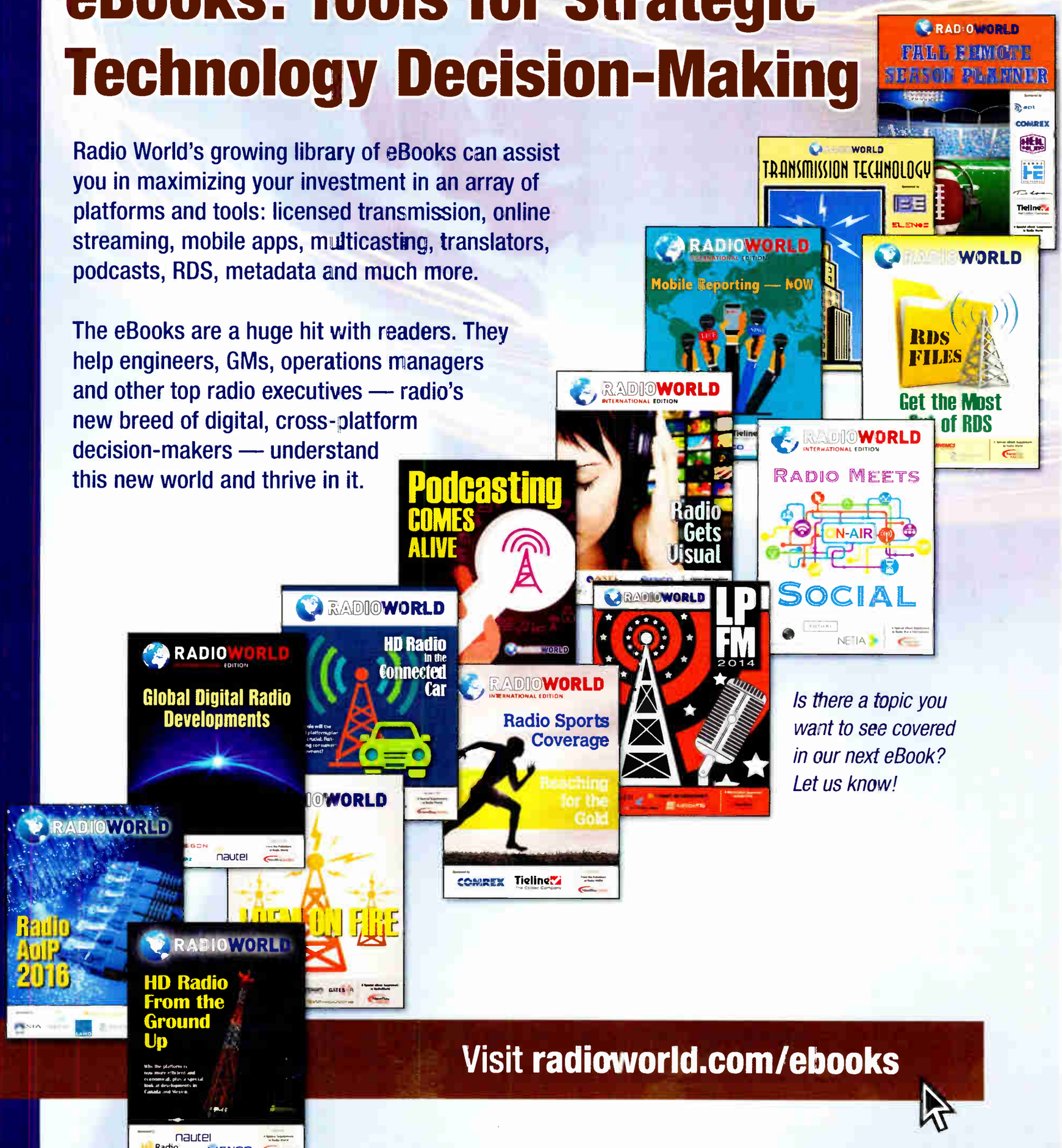
This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

PAGE	ADVERTISER	WEBSITE/URL
20	Acoustics First Corp	www.acousticsfirst.com
15	Arrakis Systems Inc.	www.arrakis-systems.com
11	Axia - The Telos Alliance	www.axiaaudio.com
5	Broadcast Bionics	www.phonebox.com
4	Burk Technology	www.burk.com
7	Comrex Corporation	www.comrex.com
14	Deva Broadcast Ltd	www.devabroadcast.com
1	ENCO	www.enco.com
10	Front Panel Express	www.frontpanelexpress.com
30	Heil Sound, Ltd.	www.heilsound.com
24	IEEE	www.bts.ieee.org
13	Inovonics Inc	www.inovonicsbroadcast.com
12	Lightner Electronics	www.lightnerelectronics.com
1	Logitek	www.logitekaudio.com
6, 18, 22	Nautel Ltd.	www.nautel.com
19	Omnia - The Telos Alliance	www.omniaaudio.com
21	Omnirax	www.omnirax.com
25	Radio Systems Inc	www.radiosystems.com
9	SCMS	www.scmsinc.com
23	Studio Technology	www.studiotechnology.com
18	Titus Technological Laboratories	www.tituslabs.com
2, 16-17, 32	Wheatstone Corporation	www.wheatstone.com

eBooks: Tools for Strategic Technology Decision-Making

Radio World's growing library of eBooks can assist you in maximizing your investment in an array of platforms and tools: licensed transmission, online streaming, mobile apps, multicasting, translators, podcasts, RDS, metadata and much more.

The eBooks are a huge hit with readers. They help engineers, GMs, operations managers and other top radio executives — radio's new breed of digital, cross-platform decision-makers — understand this new world and thrive in it.



Is there a topic you want to see covered in our next eBook? Let us know!

Visit radioworld.com/ebooks

THE INTELLIGENT NETWORK

VOXPRO MAKES YOU THE BEST DJHOSTENGINEERPRODUCER YOU CAN BE

VoxPro, the only audio recorder/editor/playback system designed for live on-air operation, is absolutely indispensable to those who use it. It provides a unique set of software tools designed to record, edit and play back audio in real time, as well as a dedicated hardware controller that intuitively lets you get your job done with absolutely no fuss. It literally becomes a part of your routine.

For VoxPro 6, we're adding new features to let you enhance your productions. For instance, you can now, at the push of a button, simultaneously record audio while editing/playing back other audio. There's a Gap-Buster function that automatically removes silence. Detach the Hot Keys panel and hide the Editor and File lists to reduce on-screen clutter.

WheatNet-IP routing and playback tallies (with warning flash) let you control your network. And there's foreign language Unicode label support, color-coded Markers, and plenty of user interface streamlining. There's so much more.

For the whole story, check us out at voxpro.wheatstone.com

VOX 6 PRO

RECORD/EDIT/PLAYBACK AUDIO – LIVE, IN REAL-TIME, ON THE AIR

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

phone +1-252-638-7000 | wheatstone.com | sales@wheatstone.com