



RADIO WORLD

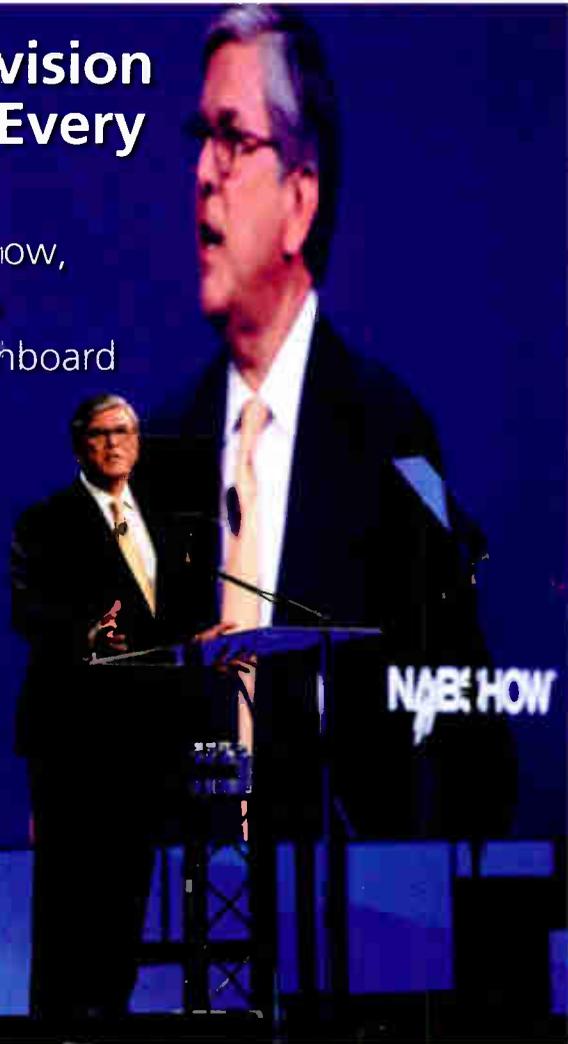
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Smith: Envision Radio on Every Device

At the spring show, NAB leader also highlighted dashboard emphasis

Over several issues, *Radio World* is reporting trends, news and outcomes from last month's NAB Show. Here we provide a wrapup of notable headlines. Contributors include Paul McLane, Brett Moss, Emily Reigart, Michael Balderston, Cameron Vigliano, Susan Ashworth, Mike Starling and Paul Kaminski.

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© NAB

NAB Tests Address Digital AM Concerns

Association releases results exploring the impact of all-digital signals on analog neighbors

DIGITAL NEWS

BY THOMAS R. MCGINLEY

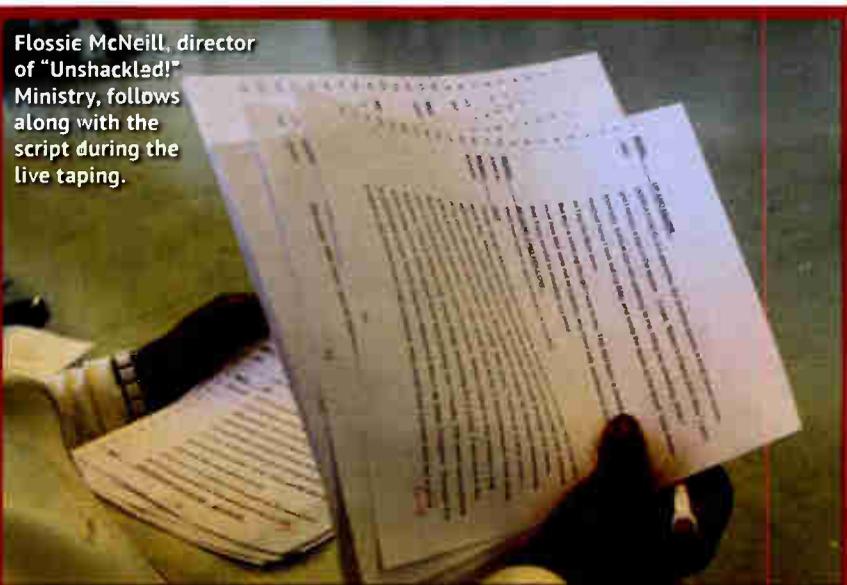
If the FCC ever allows broadcasters on the U.S. AM band to use all-digital modulation, some observers worry about the interference consequences. Now there's new research on this subject to add to the discussion.

David Layer, senior director, advanced

engineering of the National Association of Broadcasters' Technology Department, released findings in April of a comprehensive testing program undertaken by NAB Labs (now renamed Pilot) to determine how all-digital signals would affect co-channel listening if stations migrate to all-digital.

The NAB has been conducting extensive field testing into various aspects

(continued on page 10)



Flossie McNeill, director of "Unshackled!" Ministry, follows along with the script during the live taping.

"Unshackled!" Tells Stories of Transformation

Behind the scenes at Chicago's 65-year-old radio drama

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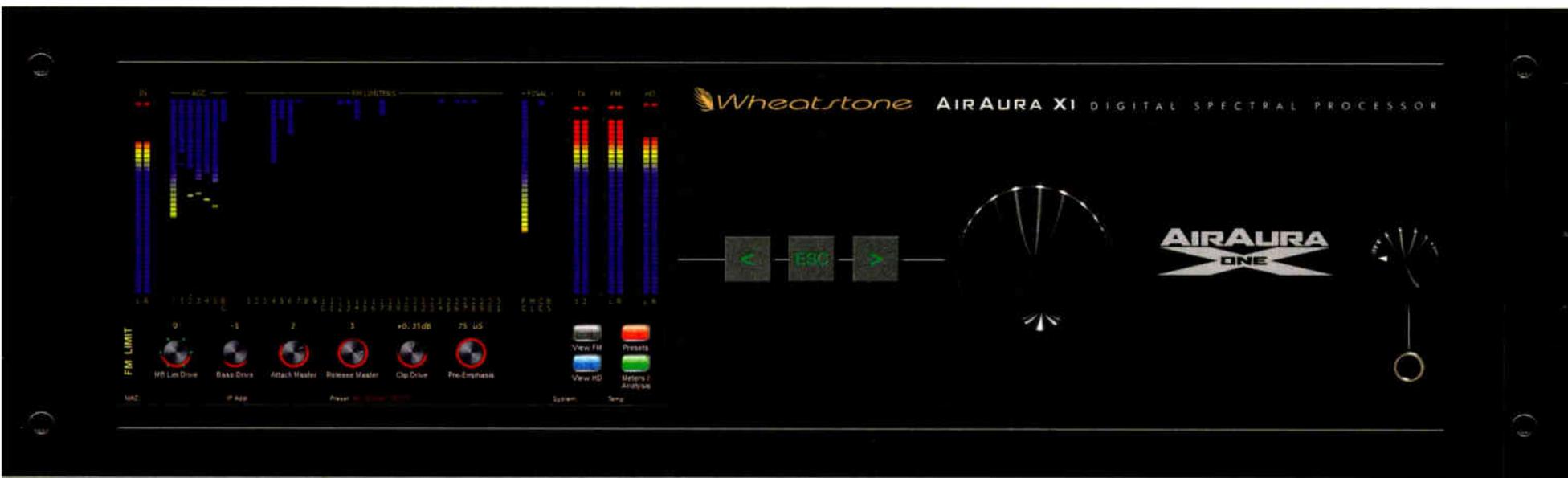


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SHOW WRAP

(continued from page 1)

SMITH TALKS DASHBOARD, MOBILE

NAB President/CEO Gordon Smith told the spring NAB Show that radio's future lies in being available on every device and making choices that support innovation.

He cited Nielsen research as to how various demographics listen to radio. "Though Boomers, Gen X'ers and Millennials all spend a lot of time listening to radio, a recent Nielsen report notes that 'Millennials have the greatest mass of listenership.' Some 66-and-a-half million of them use the radio each week. Radio's audience continues to evolve, and we must continue to evolve with them."

Smith noted ongoing efforts to persuade cellular carriers to activate FM reception in smartphones. Such commitments from AT&T, T-Mobile and Sprint will provide more than two-thirds of U.S. mobile phone users with access to FM's free entertainment and emergency information, he said. "We hope Verizon and others will join them soon."

He emphasized the importance of "ensuring radio's rightful place in the automotive dashboard of the future." He said emphatically: "We know that radio is what drivers want most, and we'll also ensure that Detroit knows it."

"The future of radio also hinges on our ability to adapt and innovate, and we continue to fight for policies that enable stations to deliver their content across emerging platforms," said Smith.

He said that "as a result of NAB's advocacy," the Copyright Royalty Board recently reduced rates for radio broadcasters' streaming services by 32 percent, which Smith called "certainly a move in the right direction."

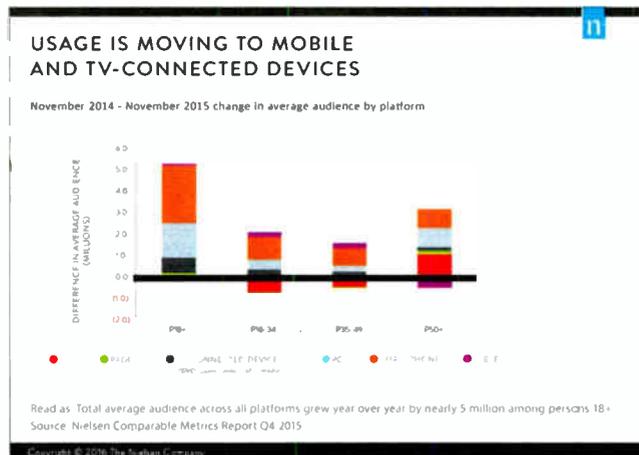
"We want reasonable streaming rates that encourage more broadcasters to stream and deliver music in new ways to their listeners." And he reiterated opposition to any new royalty on over-the-air radio content.

MEDIA USE REFLECTED IN NIELSEN REPORT

Media usage continues moving to mobile, including smartphones and tablets, as well as TV-connected devices like DVDs, game consoles, multimedia device and VCRs.

So says Nielsen in recently released data. Its latest "comparable metrics" report sets aside metrics associated with a type of content, such as video starts or page views, and instead focuses on concepts applicable to all categories of media measurement: the number of adults who use a given platform or content type in a week; the number of days per week they access the content; and the amount of time they spend engaging with content.

"From November 2014 to November 2015, the total average audience across nearly all platforms grew by nearly 5 million among persons 18+," it stated. The largest increase in average



audience came from smartphones. (Notably, more adults in the age 35-49 bracket use smartphones, tablets and PCs than do adults 18-34.)

Among radio-related findings of the report: More than 90 percent of adults listen to radio each week, including 92 percent of people 18-34.

Adults 18+ spent an average of 12 hours 54 minutes with radio per week, which is still second only to TV; but within the 18-34 demo, smartphone usage per week now exceeds that of radio (11 hours 20 minutes, compared to 10 hours 52 minutes).

The report is available for free download at <http://tinyurl.com/rw-nielsen4>.

MATHENY: BE UNCOMFORTABLE

At the keynote address of the Broadcast Engineering Conference, NAB Executive Vice President and Chief Technology Officer Sam Matheny asked attendees not to be comfortable with the status quo and accomplishments in broadcasting but to strive to increase innovation.

"I believe it is precisely when we are uncomfortable that we learn and grow the most. We can't sit idle when we're uncomfortable. We need to do something about it."

I believe it is precisely when we are uncomfortable that we learn and grow the most.

- Sam Matheny

In that context, Matheny shared the vision statement for the NAB Technology Department: "We improve lives through broadcast technology and broadcaster innovation." Though much of his talk focused on ATSC 3.0 and television, he pointed to HD Radio as one of the developments it has encouraged.

Matheny honored NAB Vice President for Science and Technology John Marino, who will retire at the end of 2016 after 25 years of service.

"His network of people is simply amazing. To be able to work with John and to learn from him has really been a treat for me. Don't say goodbye to John, say 'See you next year.'"

The presentation included a video tribute to the late Ernie Jones, principal of Consolidated Engineering, who died earlier this year. Matheny said Jones' love for broadcasting was shared. That love drives broadcasters "to be the best, most reliable source of information for the communities, and nations that we serve. It is why we put in the long hours, suffer the details, create, innovate and deliver solutions that matter."

CLYBURN CITES LPFM SUCCESSES

A phenomenal success story. That's the assessment of Commissioner Mignon L. Clyburn about the expansion of the LPFM service.

"As you know, low-power FM radio service was created as a way to serve local and/or underrepresented groups within communities," she said, according to a text of her prepared remarks. "In just over two years since the LPFM filing window opened, 1,900 construction permits for new LPFM stations have been issued with the expectation that by the end of this year, there will be approximately 2,000 LPFM station operat-

(continued on page 5)

Bop Mics, SNMP and Security Dogs

Here's a bouillabaisse of spring show flavors, trends and impressions

The spring NAB Show is past but trends and new products we saw there will affect our professional lives all year, so Radio World devotes a lot of pages both before and after the show exploring its facets. Last issue we featured show pix; in this one we summarize notable news; yet to come are our Best of Show Award winners and several issues filled with new gear in our Summer of Products series.

What caught your eye on the floor and in the session rooms? Here are some of my impressions:

No one could miss the security officers and law enforcement dogs. I personally felt safe despite a natural uneasiness one feels around heightened security. But this is 2016; and knowing that Las Vegas is viewed globally as a "symbol of America" certainly gives one pause. (Then again, I live and work near the nation's capital.) We must go on living our lives — the surest rebuke to those who would try to terrorize us. ...

It's interesting to observe a general tendency of show-related events to "shift earlier and earlier." Sure, official convention opening is still Monday morning, but there are so many important things going on days before, whether it's the **Public Radio Engineering Conference**, the **Nautel User's Group**, the **RAIN Summit**, the **SBE Ennes Workshop**, the **National Radio Systems Committee** meeting and early sessions of the **Broadcast Engineering Conference** itself. If you arrive Sunday evening or Monday, a great deal has already passed. Speaking of the NRSC, it updated digital radio guidelines (see page 5). But one participant in NRSC meetings told me it's unfortunate that **carmakers** don't take more of a role in the committee's



Photo by Jim Peck

Concentration runs right down the line at the Broadcast Engineering Conference.

activities and aren't more open in general to standards discussions. ...

I am struck by continued growth of product offerings for radio stations that want to **create and stream video**. More and more options are on the market, even since Radio World visited the topic in an ebook last year; radio facility managers seem more attuned to creating

professional-looking video content these days. The grand melding of media types and platforms continues apace. ...

TV's **"repack"** has real implications for radio facilities. This is a topic **GatesAir** has explained cogently through channels like the Rich Redmond commentary you read in Radio World's April 13 issue. RW readers should be aware of all this activity on the TV side, personified by **ERI** and **T-Mobile's** partnership enabling the antenna company to ramp up production dramatically. FM broadcasters on shared tower sites should talk to site management about any planned changes by TV neighbors. And if you are hoping to start a project that involves antennas, tower crews and transmission facilities, ask your trusted vendors whether the repack will have an impact on your schedule. ...

Radio World readers are keenly aware of the importance of **cybersecurity**, which was "front of mind" at NAB because of the station stream hacks we reported in our NewsBytes newsletter last month. In that case the situation involved **Barix** gear, but lessons to be learned are not unique to any vendor or station. Strong passwords changed regularly should be a fundamental part

FROM THE
EDITOR

Paul McLane



of your work habits. (And for goodness sake, at least change them from factory defaults.) You might also take time to learn about **Shodan** — described by CNN as "the scariest search engine on the Internet" — and learn about possible abuse of such online tools. Radio World and our sister publications are increasing the amount of editorial attention we give to security issues.

This was the first NAB for **Vox-Pro** since its parent AudionLabs was acquired; folks at new owner **Wheatstone** have been enthusing about the cool stuff the recorder/editor can do.



Photo by Jim Peck

NAB VP of Technology John Marino is a familiar face at the convention. He will retire at the end of this year.

They introduced Version 6.0 and drew a crowd when Phoenix iHeart personality **Kaden** stopped in to be filmed in a demo video for the studio phone editor. Nearby, the configurable architecture of Wheatstone's new LXE IP console also was grabbing people's attention. ...

More broadly, **AoIP** implementations and terminology get lots of show time. Radio World has been covering this topic in our eBooks and supplements for more than a decade, but it's evident that for many people the fundamental concepts remain daunting. Also, despite the existence of standards like AES67, the industry is not really interoperable yet — or at least not "plug and play." Such integration remains desirable to many people. One observer told me that developments on the TV side should really help drive things forward in that direction for radio too. ...

More trends in tech? FM transmitter companies continue to add to their offerings at the **lower power levels**. ...

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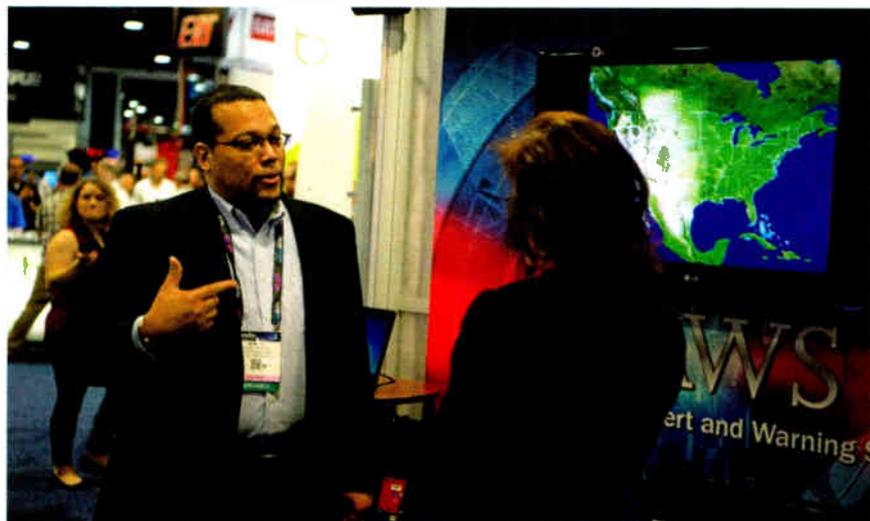


Photo by Jim Peck

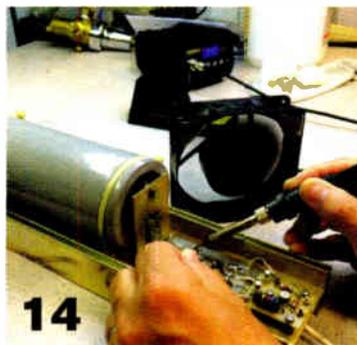
Manny Centeno of FEMA IPAWS talks to a visitor. IPAWS management offered several workshops dealing with cybersecurity best practices, proposed changes to Wireless Emergency Alerts and tips for configuring EAS devices.

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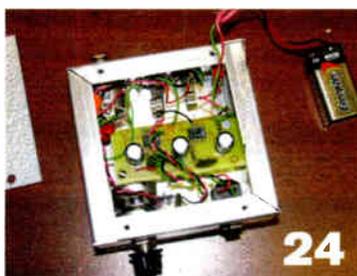


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SHOW WRAP

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ing on the air. This phenomenal success story will result in a diversity of new viewpoints and hyper-local content that is so desperately needed in our country.”

Clyburn, who holds one of the Democratic seats on the commission, also mentioned the FCC’s AM revitalization efforts, which she helped launch.

“AM radio is part of the foundation of our media landscape and has tied communities together for generations,” she said. “It is also one of the more diverse parts of our dial, which is why, since my time as acting chair, I have consistently advocated for actions that provide relief to AM broadcasters.” She said female- and minority-owned stations make up a greater percentage of stations on the AM dial than the FM dial.

More than 600 applications have been filed to relocate FM translators for AM rebroadcast use. “In practice, this means an opportunity to extend programming hours, boost listenership and increase advertiser support.” She said the Media Bureau had granted 80 percent of applications to date.

Clyburn said that the FCC soon will conduct its required review of broadcast ownership rules. “I have never been shy in saying that we need a better, more comprehensive picture of the current state of female and minority ownership.”

She noted that the commission made changes to Form 323, which tracks media ownership. “This order will enable the commission to obtain data reflecting a more useful, accurate and thorough assessment of minority and female broadcast station ownership in the U.S. And importantly for this audience, we adopted some processing changes that will reduce certain filing burdens. This information is critical in measuring the amount of minority ownership across the country.”

NRSC MAKES SOME TWEAKS

Two technical documents regarding U.S. digital radio have been updated, including one that clarifies asymmetric sideband power levels for HD Radio.

The Digital Radio Broadcasting Subcommittee of the technical standards-setting National Radio Systems Committee updated guidelines intended to help produce higher-quality digital broadcast signals.

“NRSC-G201-B, NRSC-5 RF Mask Compliance: Measurement Methods and Practice” was developed by the subcommittee’s IBOC Standards Development Working Group, chaired by Dom Bordonaro, chief engineer, Connoisseur Media.



At the NRSC meeting: Tim Anderson of Gates Air and Stephen Lockwood of Hatfield & Dawson Consulting Engineers

“NRSC-G202-A, FM IBOC Total Digital Sideband Power for Various Configurations” is an aid for engineers involved with FM IBOC facility design, operation and compliance monitoring. The document is a companion to NRSC-G201-B and expands on information in its Annex 1.

The committee stated, “While the refreshes to both documents bring them up to date, this most recent version of NRSC-G201 is significant because it clarifies asymmetric sideband power levels for NRSC-5 IBOC, more commonly known by the DTS brand name

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SPRING SHOW

(continued from page 5)

HD Radio." DTS Inc. is the owner of HD Radio technology.

The DRB is co-chaired by Glynn Walden, CBS Radio (retired), and Jackson Wang, CEO, e-Radio USA.

NRSC is co-sponsored by the National Association of Broadcasters and the Consumer Technology Association.

HD RADIO IN 37% OF CARS SOLD

HD Radio parent DTS Inc. says the digital technology was built into 37 percent of cars sold in the United States last year, in 36 vehicle brands and 200+ models. It told attendees that new models coming to market this year with HD Radio receivers include the Hyundai Ioniq, Kia Niro, Toyota Mirai, Toyota 86, Audi R8 Spyder, Lexus LC and Alfa Romeo Giulia. Acura's NSX will feature DTS Neural Surround technology as well.

The company highlighted new monitors from Inovonics, Belar, Deva, Day-Sequerre and Audemat to help stations monitor time and level alignment. It also highlighted an FM+ technology demo to promote the capabilities of an enhanced radio experience on mobile devices.

The company's live monitoring program, announced a year earlier, is now available in the top 50 U.S. markets.

Meanwhile, it said that seven stations in Canada are now broadcasting HD Radio.

SBE NAMES THREE AS FELLOWS

The Society of Broadcast Engineers' Board of Directors elected three members as SBE fellows: Wayne M. Pecena, Joseph L. Snelson and Jay Adrick.

Fellow is the highest membership level in the society; 75 people have achieved the rank since the organization's founding five decades ago. Members must be nominated by their peers and have made significant contributions to the broadcast engineering industry and/or the SBE.

Society President Jerry Massey said, "They all possess the skill, attitude, professionalism and dedication to broad-

cast engineering that is the signature of an SBE Fellow."

Pecena is assistant director of educational broadcast services in the Office of Information Technology at Texas A&M University, in College Station, Texas. He has been a member of the SBE since 1978 and has served on its board of directors since 2012, when he was also appointed the chair of the Education Committee. He received the Radio World Excellence in Engineering Award in 2014.



Wayne M. Pecena

Snelson is vice president of engineering for Meredith Corp. in Las Vegas and is immediate past president of the SBE.

Adrick has been an independent broadcast consultant since 2013, when he retired from Harris Broadcast.

PUBLIC RADIO METADATA PROJECT HOOKS UP WITH NEXTRADIO

Radio World introduced you to the PRSS MetaPub Platform the March 30 preview issue. Now the initiative is partnering with NextRadio. That announcement was made by NextRadio President Paul Brenner and NPR Distribution VP Michael Beach at the NAB Show.

Both organizations have a keen interest in exploring the idea of enhanced radio services.

The Public Radio Satellite System created MetaPub for its market to enhance programming with capabilities for displaying images, text and promo materials. Pubradio biggies NPR, American Public Media and Public Radio International have been involved in its development and supply the metadata that feeds into the system and then to public stations and listeners.

NextRadio is the "hybrid radio" smartphone app from Emmis-backed TagStation, created with partial funding from NAB Labs. It uses cloud services to provide local radio listening using the FM tuning capability in smartphones, enhanced with internet-based features.

In Las Vegas, NextRadio and PRSS said MetaPub will integrate enhanced visual features and information from certain public radio programming into NextRadio. Shows that will serve data include "Morning Edition," "All Things Considered," "Classical 24," "BBC World Service," "Weekend Edition Saturday," "Weekend Edition Sunday" and "Weekend All Things Considered."

This integration "will allow public radio stations that air national shows to

automatically set up the feed directly into NextRadio," the organizations stated. "The result is a particular program or story enhanced with visual images along with other descriptors such as the title of the show, the topic at hand, the host or other elements."

They said stations and producers thus will have the opportunity for "increased revenue potential and listener engagement," as well as the ability to collect listener data via NextRadio app tracking.

RADIO'S SUCCESS DEPENDS ON CHOICE AND CONTROL, HANSON SAYS

Broadcasters need to pay attention to the concepts of choice and control. So said RAIN News Publisher and Founder Kurt Hanson in an address at a RAIN event.

"Disruptive innovation and new business models can improve both business and your own personal success," he said. Consider the power of the Keurig K-Cup coffee maker, which gives users specific options for coffee choice and brew time. "It's a way to have increased choice and control of a consumer's device."

The same is true in the car.

"That is where [the industry] is headed: an interface where you give consumers more and more control in their audio listening choices," he said, showing a photo of a connected car with installed Apple CarPlay interface.

Hanson offered a review of audio consumption on AM/FM radio, on-demand music services, online radio and podcasting. Not surprisingly, the smartphone sits at the center of much of that consumption.

The numbers of radios per household is dropping, with one Infinite Dial study reporting that most 18- to 34-year-old radio listeners do not even have a physical radio in their house. But when you look at consumption in terms of devices that can pick up radio, the story is different.

"Smartphones are a truly society- and life-changing thing that has happened in our lifetime." For tens of millions of people, the smartphone has become their primary radio. "If you count these, the number of devices that can pick up radio stations or online radio is going way up," he said.

When it comes to next trends, Hanson pointed to potential growth in connected home stereos, in-dash infotainment systems, Bluetooth headphones and voice control.

"When you've got connected stereos in your house and voice control in every room, it's going to change our lifestyle experience," he said. "And you want to have your brand on those devices if you can."

But the industry must learn to embrace new, disruptive technologies that may significantly affect existing business plans — for example, he said, the increase in Bluetooth-enabled headphones could be a problem for NextRadio, which uses the headphone cord as its antenna.

KOMANDO: CHANGE THE CONVERSATION

The NAB 2016 Radio Luncheon featured an inspirational keynote by "America's Digital Goddess," Kim Komando, host of WestStar Multimedia Entertainment's "Kim Komando Show."



Kim Komando

The show and her daily "Digital Minute" feature are carried on some 450 radio affiliates. She told the audience it took 20 years to reach that milestone.

"Our greatest challenge was to make a humble, little fledgling three-hour weekend radio show into more than just a three-hour weekend radio show," Komando said.

She had a suggestion for radio stations and show producers: "Your website must offer unique, original engaging content that's not a repeat of something that you have broadcast earlier, or just a whole bunch of links to other things."

Each week her show's website produces more than 150 pieces of unique content.

She recommended that radio stations nourish listener loyalty by being accessible.

"I personally read every email that the listeners send me. As a market manager or VP of programming, do you?"

As for the naysayers who believe radio has seen better days, Komando said, "If you don't like the conversation that radio is a dying industry, you need to change that conversation by what you say and what you do."

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McLANE

(continued from page 4)

The “cloud” continues to lure technology companies; for instance RCS made a splash, highlighting a philosophy of providing professional music scheduling “as a service.” It introduced The Selector Cloud for radio stations and webcasters. Separately, I was tickled by the clever logo of the company **Broadcast Logger**, which provides indexed, searchable audio logs in the cloud. ...



Love the logo on the business card of Broadcast Logger President/CEO Curtis Machek.

We see more and more manufacturers highlighting SNMP, or Simple Network Management Protocol; firms that specifically called my attention to SNMP features for monitoring and control applications include **Burk**, **WorldCast**, **Inovonics**, **Davicom**, **Elenos**, **GatesAir**, **Nautel** and **DaySequerra**. Burk states the case: “In addition to transmitters, SNMP interfaces are now available on air chain and signal processing equipment, STLs and satellite IRDs, power generation and UPS systems as well as environmental and security devices, to name a few.” Burk introduced an SNMP manager option in its remote control systems. ...

You also saw the photo page we ran last issue with all the **virtual reality** and **drone hardware**. Those are huge topics in themselves, but who doesn't love a drone? When people look back at show photos from our era, they'll smile at



Gary Kline, right, has opened Kline Consulting. We were chatting when NAB Executive VP of Communications Dennis Wharton, left, swept by.

pictures of drones and big goggles, much as we smile when we look at pix of tape recorders, big computer frames or early DAWs. ...

Did you every hear the term “bop mic”? I had not in my 38 years in this biz; but a guy on the monorail was educating another: “It's a *board-op* mic. So if you see a label for a ‘bop mic,’ that's what it is.” Something new every day. ...

Yet another massive line to get into the **ham radio reception** on Wednesday evening. Love the enthusiasm, love the camaraderie and love the great **door prizes**. I always give my stub away though. The prizes are for hams; they shouldn't be sucked up by journalists, so if you see me there, grab me early! Thanks as well to the kind industry colleague at the reception who insisted on getting a picture with me and made me feel like a celeb. ...

Which reminds me that it was fun to watch **Bob Orban**, a real celeb in radio tech circles, being asked again and again to pose for pictures in his booth. He expressed amusement that he works most of the year in a relative quiet and normal environment but then comes to

the show and is asked repeatedly to pose like a rock star. ...

I enjoyed the chance to catch up with **Glynn Walden** during a monorail ride. He retired last summer as senior vice president of engineering for CBS Radio, and he looked as relaxed as I can ever recall seeing him. I suspect Glynn still has much to contribute to broadcast engineering and I know how strongly he feels about the role that digital plays in that future. Glynn remains active in the NRSC as well as radio industry technical leadership, as with the AM Radio Preservation Alliance (you saw his name as one of the authors of the alliance guest commentary in our previous issue). Clearly he is enjoying retirement while still being involved with broadcast engineering. ...

And speaking of CBS, what a pleasure to run into my old kite-flyin' friend and Philly engineer **Ben Hill**. ...

Nice also to see the new owner of Broadcast Electronics, **Brian Lindemann**, working the BE booth. By all accounts Brian plans to continue to be hands-on, even retaining his VP of engineering hat. ...

Creating new, cheaper audio distribution options is the goal of composite FM codec μ MPX, demoed by the **Telos Alliance** with **Nautel** and **Moseley**. It is intended to transport high-quality multiplexed FM signals over relatively small data pipes — a 320 kbps IP connection. It's in development, not yet a product, but CEO Frank Foti said the purpose was “to share μ MPX with the industry so we could broaden the conversation ... our intention is to make it available under license to a wide variety of interested parties.” A demo sent an encoded signal over IP from the Telos booth through a Moseley Starlink STL into a μ MPX decoder feeding a Nautel transmitter. ...

This was the first spring show since **Cumulus** appointed Mary Berner as CEO, replacing Lew Dickey. The debt and other challenges facing the company are real, as we've reported and as was reinforced in the company's latest quarterly financial report. But there

was undeniably a positive and different energy among Cumulus technical people I talked to, a general sense of “buy-in” and fresh start as a result of the changes at corporate. I had a great chat with new Senior VP of Technology and Operations **Conrad Trautmann**, a longtime friend to Radio World, and other staff there. I also spent some time with Conrad's predecessor **Gary Kline**, who recently left the company and opened Kline Consulting — “real-world engineering advice on the things that matter most.” Gary is already enthusiastically busy, chasing projects and new business. ...

At any given show, it seems, news of the outside world will intrude and creates buzz on the floor; this time it was the death of **Prince**, which I heard about as the show wound to a close. I still remember being at the spring show in Vegas in 1993 and hearing people talking about the fiery culmination of the standoff at the Branch Davidian complex in Waco, Texas; and in 2010, when we were all hearing about the Eyjafjallajökull volcanic eruption in Iceland. ...

The 2016 show had a **good vibe**, and traffic seemed good, particularly in the first two days. **NAB** said an estimated 103,000 people attended, almost exactly as many as last year.

If you haven't been, you might envision all these folks crammed into radio engineering conference rooms. No; the convention in modern times is an amalgamation of a broad range of electronic media industries and beyond; radio, frankly, is a pretty small part of it in terms of physical presence.

Radio remains a key component, without question, though exhibitors express frustration to me that the location of the **Radio/Audio Hall** — actually a part of one hall, informally grouped — has moved around the convention center year to year lately. I personally liked having radio back in the North Hall, near the Westgate. Next year the radio booths will again be in North Hall but toward its western end.

Longer-term, plans for the next big **expansion of the LVCC** are in the works, as we're reported; it's part of a bigger idea, a planned “Las Vegas Global Business District.” According to the publication Vegas Inc., the LVCC work will cost \$1.4 billion. It would put outdoor exhibit space where the doomed Riviera is (as soon as 2017); then new convention facilities will follow, plus renovations to the existing one. And there's talk of, someday, a centralized Vegas transportation hub right in the area too. If anyone has a time machine, I wouldn't mind zipping ahead 20 years to see what this all looks like (and whether my future self is still walking around the show with a badge and sore feet).

Share your own observations at radioworld@nbmedia.com.



John Lackness of Tieline talks gear with Josh Harstad of Hubbard Radio Seattle. Tieline launched the ViA codec, saying it simplifies the process of remote codec configuration.

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CO-CHANNEL

(continued from page 1)

of all-digital HD Radio on the AM band since late 2012, beginning with WBCN(AM), 1660 kHz, station in Charlotte, N.C., formerly owned by CBS and now by Beasley. Those tests were conducted on a 10 kW day/1 kW night nondirectional facility that demonstrated very promising daytime results, according to proponents.

Since then, additional field tests have been conducted on WBT and WNCT in Charlotte, N.C.; WD2XXM Columbia, Md.; WDGY Hudson, Wis.; KTUC Tucson, Ariz.; KRKO and KKXA Everett, Wash.; and WSWW Charleston, W.Va.

Layer told attendees at the NAB Show that all exhibited similar impressive daytime performance in the all-digital mode. Both day and night tests were done on most of those stations. Several employed complicated multi-tower directional antenna systems.

All-digital AM nighttime performance was not as good, and additional work and study will be needed to assess how and when all-digital AM can best be used at night.

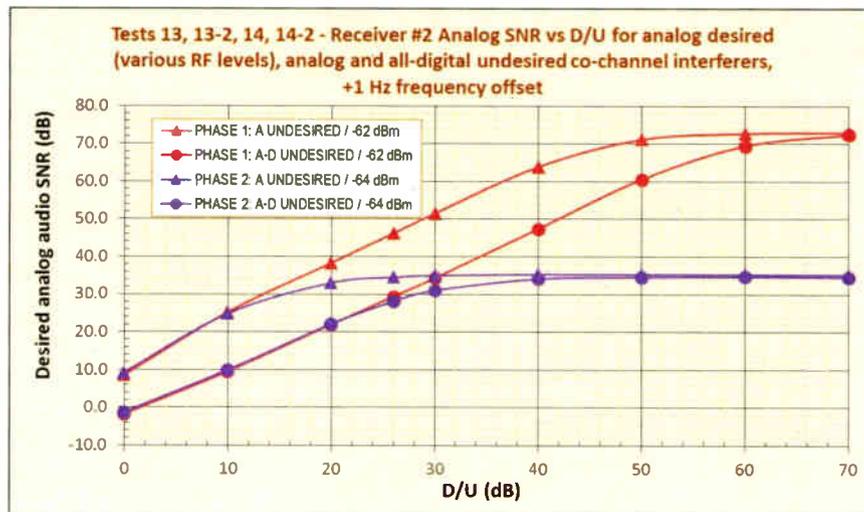
Layer said that all-digital on AM offers several important benefits and improvements over the legacy analog mode. Those include significantly better audio quality, similar to analog FM stereo, as good or better coverage than the analog-only signal (during daytime operation), more immunity to noise and interference and potential support for data and multicasting. Further, it is receivable on both new and existing HD Radio receivers.

He conceded that the hybrid AM digital MA-1 mode has not been all that successful. It is being used by only about 200 U.S. stations, and many that had con-

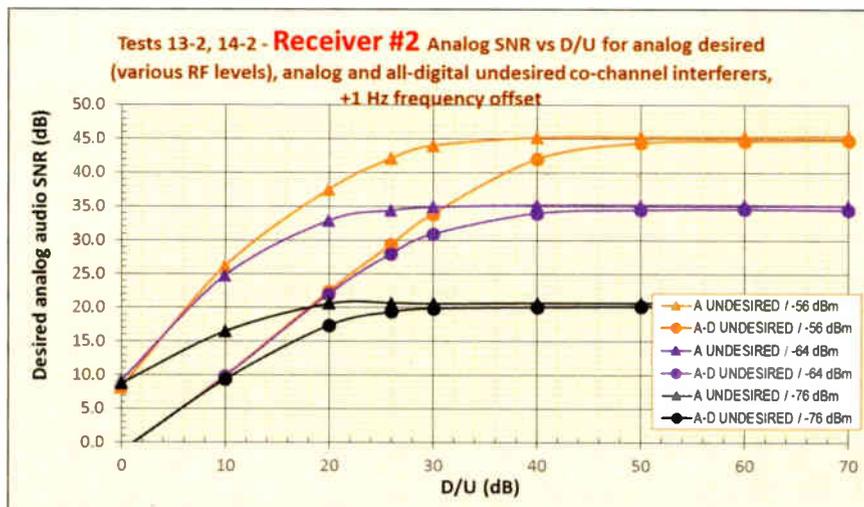
The test project concluded that “interference concerns of all-digital signals into existing analog stations should not be an impediment to the rollout of all-digital.”

verted have since turned hybrid AM HD off, because of such issues as adjacent-channel interference, excessive blending and annoying drop-outs in reception. He suggested that these challenges become less problematic and less of a concern with the MA-3 all-digital mode.

HD Radio owner DTS Inc. reports there are close to 30 million HD Radio receivers in the hands of consumers and that the number continues to grow steadily. Plus, about 50 percent of new cars being sold include HD Radio receivers. HD Radio continues to be “discovered by accident” every day by millions of new car buyers.



A comparison of Phase 1 (no added RF noise) and Phase 2 (with added RF noise). Layer said this shows how the added RF noise, which simulates a realistic listening environment, masks the additional co-channel interference generated by an all-digital AM signal.



This graph is all Phase 2, showing performance for three received signal levels: -56 dBm (corresponding to 5 mV/m), -64 dBm (corresponding to 2 mV/m) and -76 dBm (corresponding to 0.5 mV/m).

other measurement equipment.

Test receivers included an Insignia ITR tabletop HD Radio receiver; three after-market car radios including Kenwood and Pioneer HD car radios as well as a Clarion analog-only car radio; and a Delphi factory installed OEM HD Radio car unit.

A series of co-channel interference tests were performed using four different modes and varying signal strengths. The frequency 890 kHz was used as the test frequency to measure the resulting interference and noise degradation generated from the undesired all-digital signal to the desired signals received by the test receivers.

Because the foremost concern of existing analog stations is possible increased interference from stations that may choose to run all-digital, the primary focus of these tests was directed on all-digital interference into analog listening.

Layer stated categorically that first-adjacent-channel interference that is so



Receiver 1



Receiver 2



Receiver 3



Receiver 4



Receiver 5

Test receivers included an Insignia ITR tabletop HD Radio receiver; after-market car radios including Kenwood and Pioneer HD car radios as well as a Clarion analog-only car radio; and a Delphi factory installed OEM HD Radio car unit.

troublesome with the hybrid and analog modes of operation will be all but eliminated with the reduced-bandwidth mode of all-digital. The occupied bandwidth reduces from 30 kHz (hybrid MA-1) to 10 kHz (all-digital MA-3, reduced bandwidth mode), which is less than the bandwidth used by most existing analog AM stations.

“Theory predicts an all-digital signal will elevate the co-channel noise floor 9 dB higher than a comparable analog signal in a noise-free environment,” he said.

The simulations were performed in two phases. The first considered the ideal “noise-free” environment. Phase two evaluated “real-world” noisy environments by adding RF white noise.

Both phases confirmed expectations, Layer said. In the noise-free case, the induced noise differential (due to all-digital or analog undesired signals) remained essentially constant at about 10 dB for desired-to-undesired signal strength ratios from zero dB to about 40 dB. From 40 to 60 dB D/U, the difference reduced gradually to zero dB. (See noise graphs.)

(continued on page 12)

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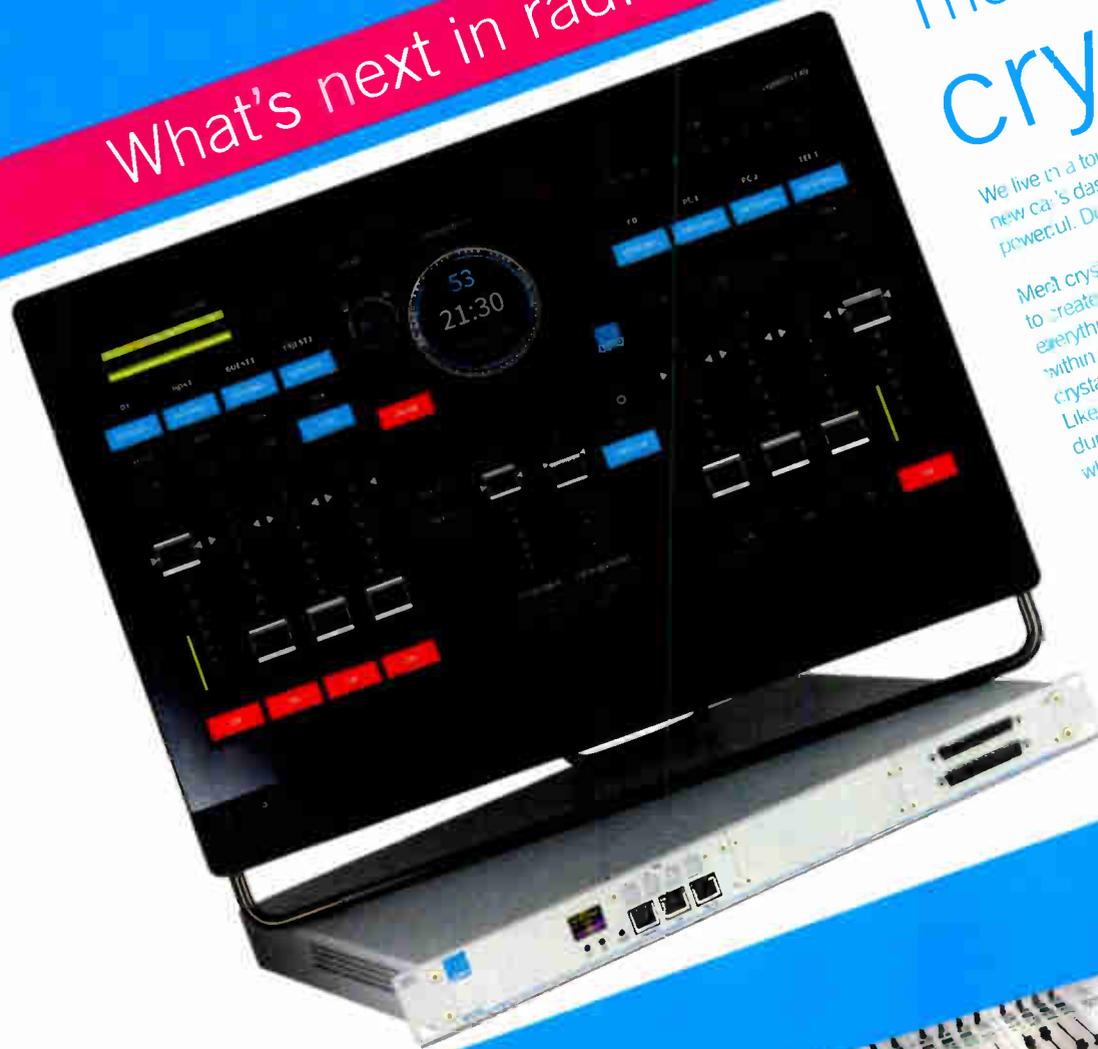
We live in a touchscreen world. From aircraft cockpits to smartphones, to the radio in your new car's dash, everyone is swiping, dragging and tapping. Touch is instinctive, natural and powerful. Don't you think it's time to bring radio into this modern world?

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For those who prefer the feel of physical faders, crystal is also available with a compact and intuitive control surface.



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CO-CHANNEL

(continued from page 10)

In the "real world" case, when testing the desired signal at a 46 dB D/U ratio, which for this test corresponded to a 5 mV/m primary contour analog signal strength, only a 3 dB decrease in SNR was noted when a co-channel all-digital undesired signal was turned on, compared to a co-channel analog undesired signal. This remained the same at a much weaker 26 dB D/U ratio, for the weaker signal strength corresponding to the 0.5 mV/m contour. That was the worst-case measurement for only one of the five tested receivers. The other four receivers averaged about a 1.5 dB noise degradation increase at this same operating point.

Layer played a number of representative audio recordings of the lab test results produced by several of the test receivers. The character of background digital noise was more constant than analog, but seemed less annoying than the "bursting" nature of analog modulation interference. He also played similar recordings obtained during field testing, with similar results.

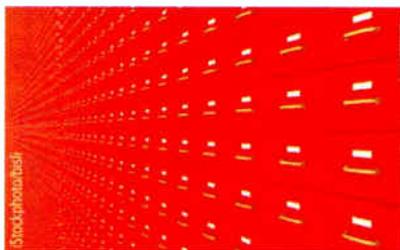
The relatively small increases of background noise contributed by all-digital signals will likely be mostly masked by the ambient noise floors already present in the listening environment of most areas. The test project concluded that "interference concerns of all-digital signals into existing analog stations should not be an impediment to the rollout of all-digital."

Subscribers to *Radio World Engineering Extra* will read the full test results in the June 15 issue of *RWEE*.

Tom McGinley is *Radio World* technical advisor and a longtime broadcast engineer. Comment on this or any story to radioworld@nbmedia.com.

NEWSROUNDUP

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The FCC will consider eliminating a requirement that commercial stations place copies of letters and emails from the public in their inspection files. Law firm Pillsbury Winthrop Shaw

Pittman, which supported the change on behalf of state broadcast associations, said this would ease burdens on stations and reduce security risks. "Stations will no longer have to grant access to an individual just because he knows the 'open sesame' phrase of American broadcasting: 'I'm here to see the public file,'" it wrote. The FCC recently mandated that stations move to online public files but the migration did not apply to letters. ...

Cumulus Media acknowledged a shrinking time frame for recovery during an earnings call to report first quarter results. The big broadcaster is approximately \$2.5 billion in debt. It hopes to negotiate a discounted exchange with debt holders. "Until we address the balance sheet, we will continue to be hindered in our ability to capitalize on the early progress we have made on our turnaround initiative," said CEO Mary Berner. "We still are in the early stages of a multiyear turnaround." ...

Apple Inc. plans changes to its music streaming service to make the interface more intuitive, better integrate its streaming and download businesses, and expand its online radio service, Bloomberg reported, citing unnamed sources. It said changes would be announced in June. ...

E. Harold Munn Jr. died at age 87, according to the Michigan Association of Broadcasters. In 1950 he started consultancy E. Harold Munn Jr. & Associates and ran it until his retirement in 1992. Munn received an FCC radio license at



age 14. He had owned several radio stations, beginning in Coldwater, Mich., and was an early developer of cable TV systems. Munn was an inductee of the Michigan Broadcasters Hall of Fame. ...

The Multicultural Media, Telecom and Internet Council pressed the FCC to change its mind about multilingual EAS communications, describing a recent decision as "deeply flawed." They want the FCC to ensure that individuals not proficient in English have "in-language" information from a "designated hitter" station at times of crisis. The League of United Latin American Citizens has described the so-called Katrina Petition as a critical one for the Hispanic community. ...

LPFM consulting/advocacy group REC Networks hopes the FCC will recognize a growing number of performance issues facing LPFMs. It reiterated a call for a higher-power 250-watt service. It also said "LPFM stations have no codified recourse" when it comes to interference from direct reception from another station. While REC supports Class D and C AM stations' access to FM translators, the proliferation of translators should not come at the expense of original "hyperlocal" services provided by LPFMs, it wrote, adding that the problem may be exacerbated when translator windows widen. It also believes the Audio Division has misapplied the law in denying waiver requests from LPFMs for co- and first-adjacent channel translator protections. ...

About 550 people came out to support the 2016 NAB Show's 4K 4Charity Fun Run, helping to raise approximately \$35,500 for global and local charities. Funds were raised for relief organization Mercy Corps and local charity The Shade Tree.



ON AIR LIGHTS: Wall and Desk Top Models



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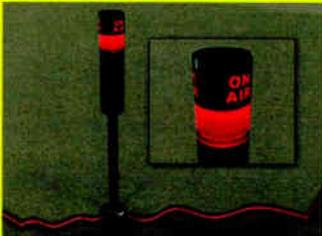


OAL-101W



OAL-101R

-12 Volt DC - 30 mA - Custom text optional at no extra cost - LED Colors Available: blue, green, orange, yellow, white, red



DT-OAL-RR



3LB-RRR

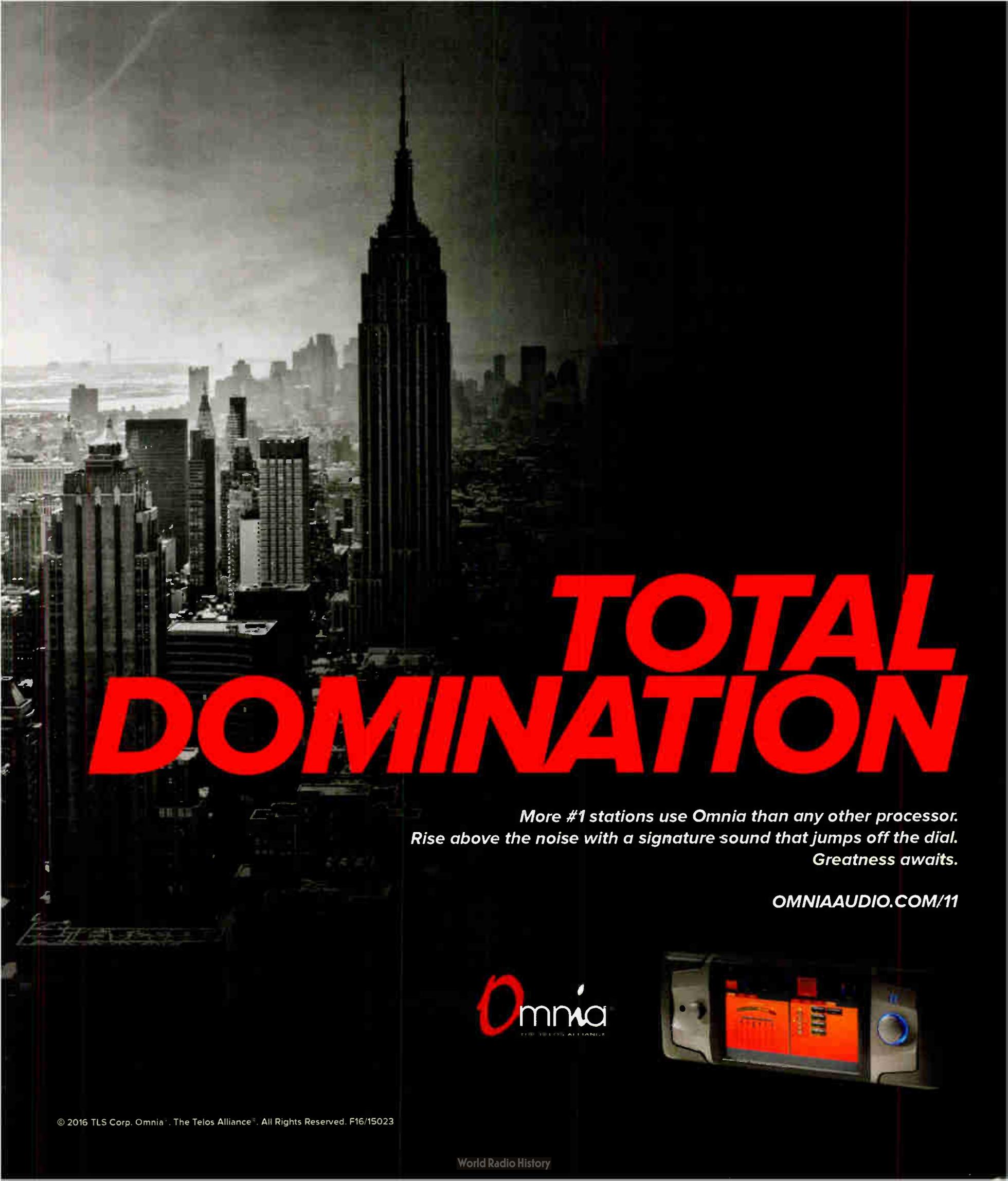


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How Would You Use This Cooling Fan?

Also: Art Reis wasn't the only one to weigh in about considerations when using LED lamps

WORKBENCH

by John Bisset

Read more Workbench articles online at radioworld.com

Steve Tuzeneu, CBT, is a network staff engineer for the Bible Broadcasting Network in Charlotte, N.C.. Steve periodically submits tips that readers find helpful, and the one shown here is no different.

When soldering, Steve uses an old cooling fan to keep fumes from your face; see Fig. 1.

An old 115 VAC cooling fan isn't a bad accessory for your tool box, especially if you are a contract engineer. I've seen them hung to keep an exciter on the air until the proper replacement fan can be ordered, or used for cooling satellite receivers mounted in hot, non-air conditioned rack rooms.

You probably have a few favorite uses. Email them to me with a high-resolution picture to share with other Workbench readers. The address is johnpbisset@gmail.com.

Engineer Randy Wells handles engineering for a number of stations based in Santa Rosa, Calif. He writes to tell us he enjoyed reading the detective

work about Art Reis and his flashing LED lamps (April 27 Workbench).

Randy points out, though, that if one of the incandescent bulbs remains in the circuit, it will act like a shunt across the

remaining LED bulbs, and the LED versions will not flash.

Randy wasn't the only one to notice the flickering LED problem. Hank Landsberg, principal of Henry Engineering and Sine Control Technology, experienced similar flickering and flashing LED "on-the-air" tally lights connected



Fig. 1: Use an old muffin fan to keep fumes from your face when soldering.

with LED bulbs and light switches.

First, those old ceramic push-button light switches are highly desired by preservationists. Donald has seen them go for \$30 to \$40 apiece on eBay. Donald writes that the replacement push-button switches manufactured today and available at the big box store are off-shore replicas, cheaply made. The originals, with ceramic bodies and heavy contacts — if not abused from over-current or damaged by lightning surges — are likely to work perfectly, even though they may be 100 years old or more.

In his home, Donald has a couple of LED bulbs controlled with the original push-button switches; they have operated for years with no problems, ever since LED bulbs became available. Some electricians have the idea that something about them is unsafe and routinely replace them with \$2 plastic-junk toggle switches from the big box stores, but what can be unsafe about a solidly-built SPST switch isolated from ground with a heavy ceramic body? In any case, if a metal box is used to house the switch, according to code, and the box is grounded properly, it is extremely unlikely to be any conceivable safety hazard.

If you have a friend who insists on replacing them, tell him not to throw them away but to send them to Donald.

Art Reis offers a final suggestion when replacing incandescent with LED bulbs. The quality of LED bulbs varies widely, apparently. That being the case, beware of the cheaper ones for use with "lit" switches. Test each type you get and stick with LED bulbs, which will work with either dimmers or lighted switches.

avel Ureno is owner and chief financial officer of Exell Battery. The company can provide part number Exell Battery 457, an Eveready "B" battery direct replacement for the 67.5 V battery used in the older AM field intensity meters.

Delta Electronics President Bill Fox points out that Exell also provides the battery that powers the DC amplifier in the Delta OIB-1 Operating Impedance Bridge.

For the OIB-1, the 10.5 V Duracell PC177A or Mallory TR177 is used. This battery is also available from Exell as part number A177.

Exell provides a range of batteries. Visit its website at exellbattery.com. For service information on Delta products, visit deltaelectronics.com.

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PRODUCT SPOTLIGHT

ADVERTISEMENT

Audio-Technica BP40 Large-Diaphragm Dynamic Broadcast Microphone

Audio-Technica's new BP40 broadcast vocal microphone offers a rich, natural, condenser-like sound from a large-diaphragm dynamic design. The 40 mm diaphragm features patented floating-edge construction that maximizes diaphragm surface area and optimizes overall diaphragm performance, while the humbucking voice coil prevents electromagnetic interference (EMI).

With rugged construction and stylish, waveform-inspired design, the BP40 delivers clear and articulate reproduction. Optimized capsule placement helps maintain a commanding vocal presence even at a distance, while the multistage windscreens provides superior internal pop filtering. See the BP40 review on www.radioworld.com. U.S. estimated street price \$349.

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to Henry Engineering's Superrelay.

When the Superrelay turns OFF, the LED tally light will sometimes flicker. This is because the 115 VAC solid-state relay that powers the light has a miniscule amount of leakage current even when it's off, and this causes the LED light to flicker.

To solve this problem, the new Superrelay II, introduced at the NAB Show, has a dedicated "LED" DC output that's controlled by a transistor (not the 115 VAC solid-state relay), so the LED will turn off completely when it's supposed to. Another advantage of this approach is that the Superrelay II also provides 12 VDC to power the LED light directly, eliminating the need for a separate power supply or "wall wart" transformer.

Henry Engineering is celebrating its 34th anniversary this year. Seems like only yesterday I was building studios in 1982 and wiring up a Superrelay to the on-air lights. Congratulations, Hank!

Donald Chester, who does AF/RF consulting from Woodlawn Tenn., also commented about Art's experience

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Remote Web Interface



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Rear Panel

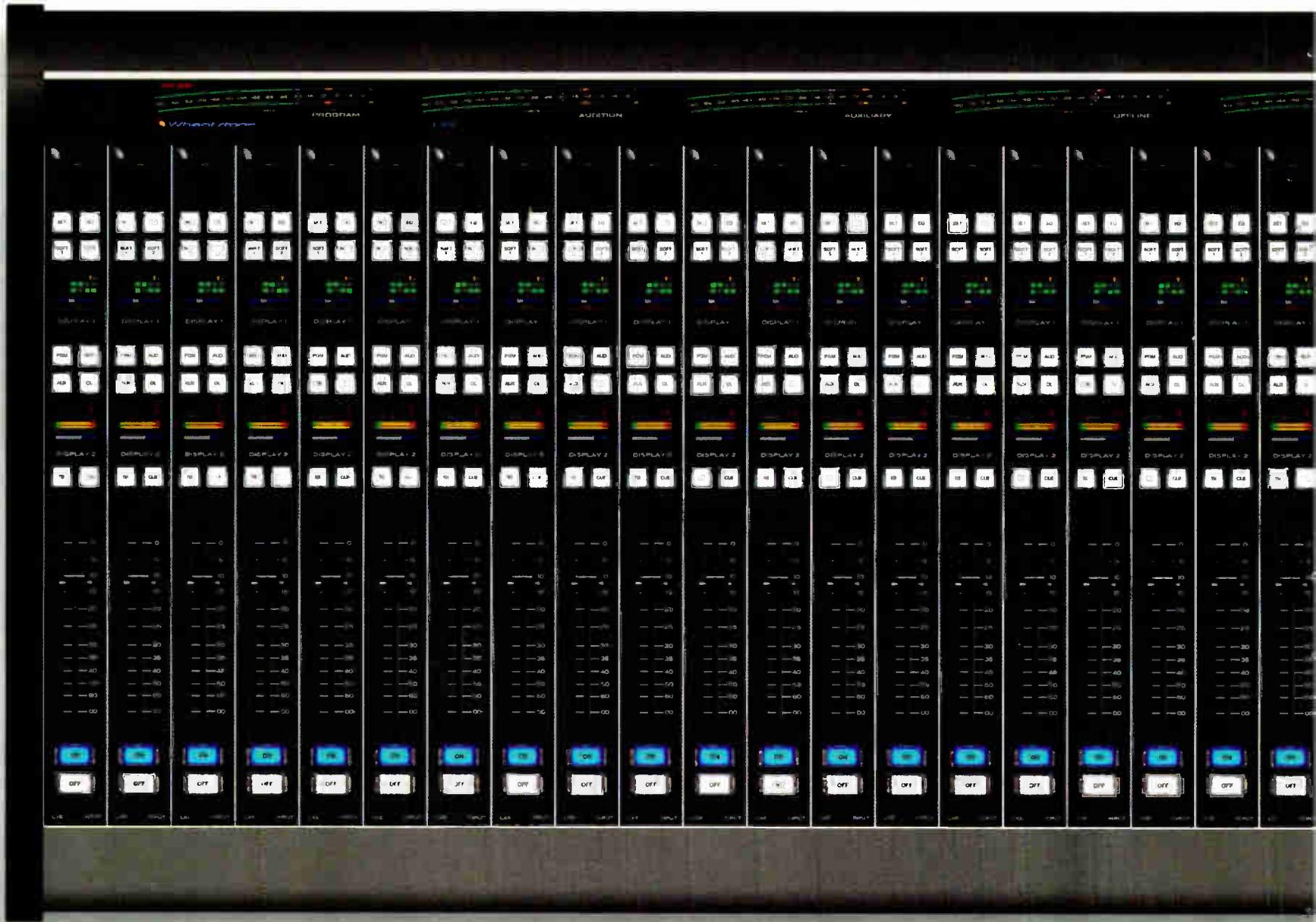


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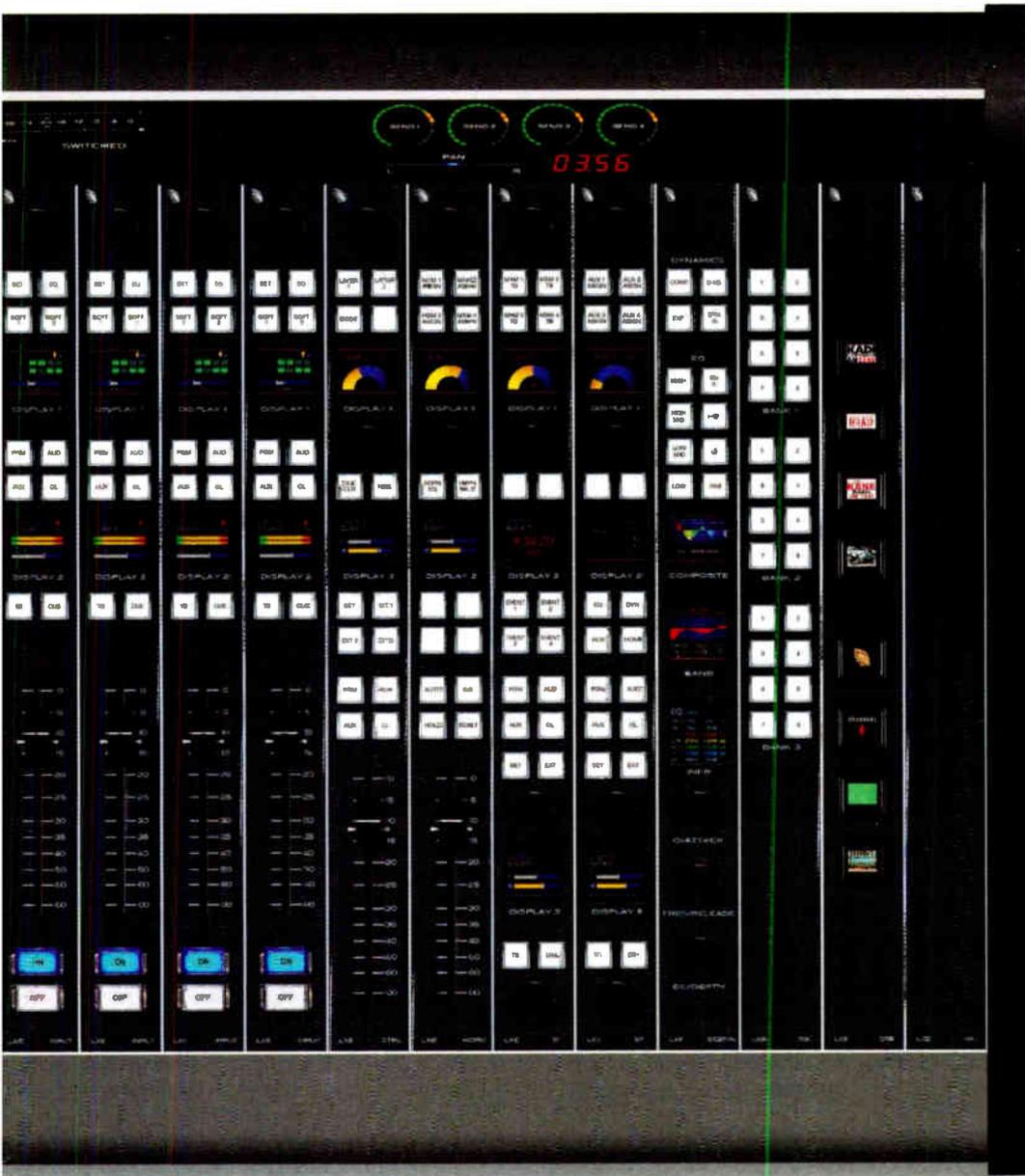
The Evolution of LX Radio Control Console

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

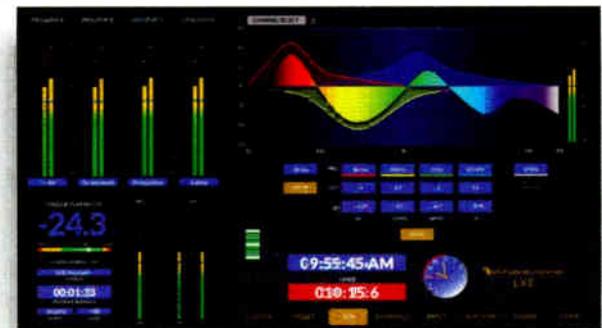
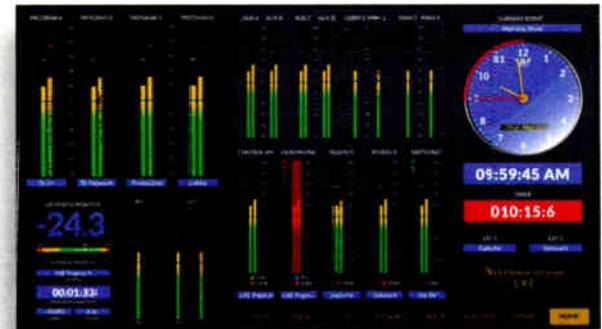
ConsoleBuilder software allows every switch on the surface to be programmed for function, mode, and even color (switches are RGB led illuminated). In fact, built-in software allows every button to be scriptable letting you create powerful macros for as many controls as you want. Multiple full color OLED 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.





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 is 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

Avoid Paying a King's Ransom

How to be a smarter internet consumer: avoid and mitigate nasty malware attacks

CYBERSECURITY

BY TODD DIXON

Click, click, click. Your computer or network is now in big trouble.

Despite all of the commerce, knowledge and connectedness that the internet provides us, we feel betrayed when we're hit with the stark reality that not everybody in the community has the best intentions.

Beyond run-of-the-mill malware, adware and virus attacks, the most insidious is ransomware. A downloaded piece of code can encrypt your entire drive and require you to purchase a "key" to access your content. That's just wrong on a number levels.

NO ONE IS IMMUNE

You may be thinking, "I'm glad I'm not a Windows user." Think again.

Recently, the iOS version of the Transmission bittorrent client was downloaded 6,500 times before it was determined that the file had been corrupted with ransomware. Apple responded quickly by changing security keys. It was the first ransomware attack for the Apple iOS platform. You can rest assured there are more attacks on the way.

However, there are ways to minimize your exposure to such attacks. It all depends on becoming a smarter consumer of the internet.

The number one method to protect yourself and your network from these assaults is a firewall between your computer and the internet. I've written about the one we use (radioworld.com/clearos) for our market. In fact, we've standardized on it in all of Crawford Broadcasting's markets for both office and radio automation networks. Putting a barrier that filters websites and links against established blacklists is the single best way to make sure your computer or network remains healthy and safe from the internet at large. A firewall simply overrules a user's bad internet browsing habits before your network is exposed to them.

Still, the harsh reality is that without ongoing user education about good computer practices, even a good firewall at your place of business doesn't protect you from users who bring their own devices.

Users need reminders about not opening attachments on emails they were not expecting, keeping all of their software up to date and downloading software and media only from reputable sites.

NOT ALL OF THE BEST THINGS IN LIFE ARE FREE

Sometime during the heyday of peer-to-peer networks, the term "on the internet" became synonymous with the term "free." Malware creators take full advantage of that belief by attaching their code to music, video and software downloads.

Torrent and the dark websites that house seemingly free media content can lead to disastrous consequences

for computer operating systems.

Recently, one of our email server users downloaded a torrent file laced with malware. His email account was compromised, and soon after, our email server landed on email blacklists everywhere. One user had caused our nearly 450 email accounts to become virtually useless!

It is also a common practice for malware pushers to mimic the look of legitimate websites in order to dupe

If you back up with regularity, the idea of ransomware attack on a system really isn't that scary.

I am a huge fan of "live" CDs (or USB thumb drive) to troubleshoot computer problems and malware issues. A live CD is simply a bootable disk image with (usually) a base Linux operating system that has a number of useful programs that include anti-virus and other scanners. Live means that nothing is installed on the physical hard drive of your machine as everything runs from the computer's RAM memory and the actual disk or stick. The scanners are able to download the latest virus definitions and generally knock out what is ailing the machine.

As a starting point, the one that you should have in your arsenal is called the Bitdefender live CD, but there are a number of them, including full-blown Linux operating systems and other specialized distributions.

Additionally, Bitdefender has recently come out with a "vaccine" of sorts against certain families of ransomware. When users pay the ransom to unlock their computer, several ransomware authors leave a trace piece of code signifying that the user has already paid the ransom once. It helps the criminals when people go to search for a solution and find that users who paid the ransom report removal of the infection, but also that it doesn't return again. Bitdefender is capitalizing on that knowledge by creating a code inoculation that makes it appear that the computer has already paid the ransom before.

Last, let's look at your actual machine.

It is imperative that the individual computer's firewall is active. It isn't helping your machine if it isn't on.

Make sure restore points are enabled on your system. Restore points allow your computer to use registry settings from a previous time when your computer wasn't compromised by malware. Restore point settings can be found in the control panel under system settings. If registry values were changed by a malware infection, restoring settings to a previous time may remove the infection. Many times, malware is simply short-circuited by booting up in safe mode — *without networking*.

For Windows users, safe mode is where a base minimum driver set and system function is loaded. In order to get into safe mode, simply reboot the machine and, in between the BIOS screen and the initial Windows bootup, hit the F8 key a number of times. Once loaded, safe mode starves the malware's ability to function in the way it was intended and lets you go to work removing the infection.

Increasingly, the internet is becoming a place of incredible potential — both good and bad. Vigilance and a little knowledge will go a long way to minimizing your exposure to the seedier side of the internet. Hopefully, these tactics will not only keep your systems protected, but also compel you not to panic, or pay, in the face of an actual malware infection.

Todd Dixon is an assistant engineer at Crawford Broadcasting's Birmingham, Ala., facility and a regular RW contributor.

Got a question for Todd to discuss in a future article? Email radioworld@nbmedia.com.



Ransomware similar to this looks "official" and triggers emotional response. Fight back with preparation and information. Image from the State of New Jersey Cybersecurity website.

people into believing they are at the right place to get software.

If you are a Firefox, Chrome or Opera user, one of the best ways to ensure you are connecting to legitimate websites is to use an add-on called HTTPS-everywhere. The add-on basically determines if the web page you are browsing is available as a "secure" page and then loads the secure page. Seeing the "s" in "https" in a URL always gives me more confidence that I am on the correct site and can trust its contents.

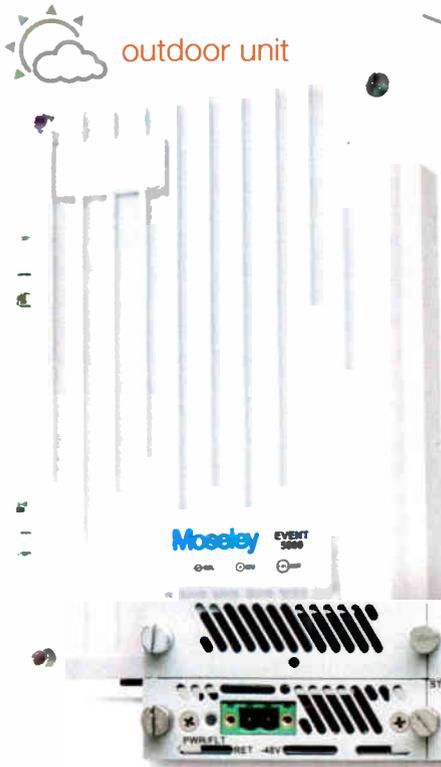
DEALING WITH THE CONSEQUENCES

There are a number of commonsense things you can do to limit harm from viruses, malware and ransomware.

If you suspect your computer has contracted malware code, pull the network cable. Don't forget to turn off or disable your Wi-Fi. Malware is co-dependent on your computer host and the internet, but you can get rid of one of those enablers pretty quickly! By removing the network connection, you cut off the malware's ability to phone home and mitigate the damage to other computers in your system.

The word "backup" needs to become an integral part of your computer vocabulary. There are too many good file duplication solutions, and large capacity external hard drives have become too inexpensive, to have the excuse that you just couldn't do it. In fact, the first backup is always painful as it generally covers all of your data, but subsequent procedures only back up the changes that have been made and are much quicker.

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outdoor unit



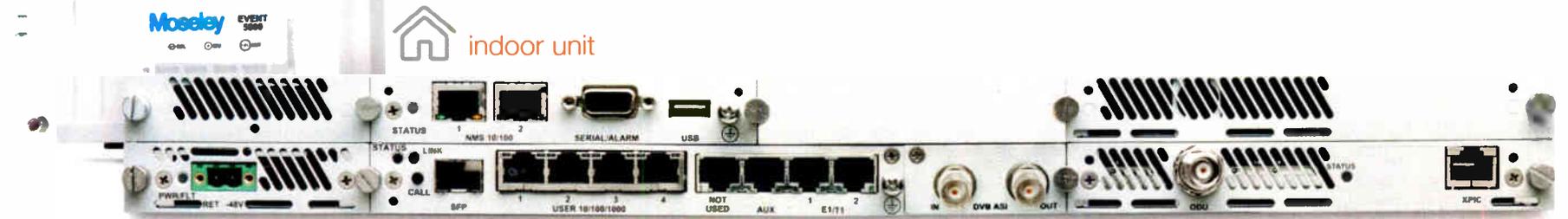
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indoor unit



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Next-Gen Engineers: Dominic Mendicino



Name: Dominic Mendicino, 27
Company/title: CBS Radio Chicago,
 Remote Broadcast Engineer
City: Chicago

"Engineers seem to play the part of full-on miracle worker at times, and it's essential to have a clear head to be able to execute well under pressure."

ENGINEER PROFILE

This is one in an occasional series highlighting engineers in their 20s and 30s, men and women who are building the "next generation" of technology leaders.

Radio World: How did you get into radio/broadcast engineering?

Dominic Mendicino: Prior to being hired at CBS Radio Chicago, I freelanced as an audio engineer within the production industry. I have traveled the world (Paraguay, India and Kenya) recording and mixing location audio for film, toured the country with major label artists mixing live sound, installed and maintained audio systems in venues around Chicago, and spent 7 years in recording studios all around Chicago recording and mixing various musical acts.

For 7 years, I would take the bus from one side of Chicago to the other — without a vehicle, it was the only way to get to the recording studio where I primarily worked. With a commute that lasted roughly an hour and a half each way, I typically arrived at 3 p.m. and left at 3 a.m., sometimes later into the next day. Artists don't necessarily like to work during the day, and I was always at the mercy of their schedule.

As I opened the door to the control room upon my arrival, the smell

of cigarette smoke would be the first to greet me, followed by "Mimi" the studio cat and then the studio owner. I would take a seat in that black rolling chair in front of the recording console, fire up a Pro Tools session, and start working with one goal in mind: to hear a song I mixed on the radio. I had always envisioned how amazing that moment would feel, and I chased that goal every time I stepped foot into a recording studio.

This is what ultimately led me to the radio broadcast industry. I have always had a fascination with the ability to get information to the masses, and the fact that hundreds of thousands of people are listening to the same song or voice at the exact same time absolutely amazes me.

I realized I had virtually no connections in the radio industry, so I decided to go to CBS Radio's job board multiple times a day, every single day, until I found an engineering position I was qualified for.

Since coming aboard at CBS Radio Chicago, I have been able to utilize all of the skills I have learned in my previous experiences, and have been completely submersed into a whole new world of engineering that I can't get enough of.

RW: How do you think your age affects your approach to your job? Or do you think it doesn't have an impact on how you work?

DM: There are two ways I feel I should answer this question.

The first involves the way that I work. I have grown up in a technology-driven world that can literally change daily; I have never known anything else. This has conditioned me to not only be able to adapt quickly and embrace change, but to anticipate and actually look for new and more effective ways of getting

a job done.

Secondly, my youth in the radio broadcast industry has put me in a unique position and absolutely affects how I approach my job every day. I am surrounded by a wealth of knowledge in engineers whose combined years of experience can more than quadruple my age, let alone the length of my career.

I have the most valuable resource right in front of me, and that is the people to learn from. I take advantage of this fact as much as I possibly can, even if it means being the annoying "kid" that tags along with an experienced engineer to soak up whatever information they are willing to divulge.

While a lot of my generation's engineering work force has gravitated towards app building and web-based platforms, I am fascinated about learning the art and skill it takes to maintain such things as an AM radio transmitter. I have a lot to learn and have only scratched the surface. In a time where some may find it difficult to deal with IT-based technology, I have a learning curve in the opposite direction. I am leaning on these engineers to learn the fundamentals of AM and FM radio transmission that they have already mastered.

RW: What do you see as the most important industry trend affecting broadcast engineering today?

DM: The lack of young broadcast engineers coming up in the industry today. As the broadcast engineering population ages, it's only natural that a younger generation will soon take the reins. When I take a look around, it's difficult to see young engineers anywhere, let alone enough to close the gap the older generation is leaving behind. This may lead into an even more specialized field in the future with fewer engineers working on more and more sites.

I also see the broadcast engineer becoming more of an all-encompassing profession, integrating more with IT and all other aspects of technical operations.

For example, here at CBS Radio, the building, running and maintaining

of performance stages have been a big trend across our company. These venues have been taken on the broadcast engineering departments and involve full-fledged video switching systems, camera robotics, production lighting, multitrack audio recording and mixing, and live video streaming on the web, and a whole lot more. This expands the broadcast engineer's skills beyond the traditional scope of the profession, and the responsibilities of the department and reach seem to be growing.

RW: What advice would you give to other young engineers or to aspiring engineers?

DM: Get your hands on everything you can imagine that's even remotely related to the field. I can't tell you how much my past has helped me excel beyond my years in the broadcast engineering world not only technically, but it has also prepared my mindset to not be afraid of getting my hands dirty on things I know very little about. All the years of curiously tearing apart electronics, rebuilding recording studios, and soldering seemingly millions of cables have all played a key role in my ability to learn and learn efficiently.

The other piece of advice I can give is to find a professional in the industry whom you can latch onto and learn from. There is no school, paperwork or website that can even come close to a mentor's knowledge. Especially in an industry where most of the professionals have decades of experience and have seen the way radio has evolved over the years. I am fortunate to have more than one in Chicago.

RW: What's the most important thing that you've learned from an industry mentor?

DM: Sam Cappas, our regional director of engineers, always tells me, "Never let them see you sweat." This is a profession [in which the] main responsibility is to make sure everything works and works well. Problems arise on a daily basis, and that is one of the primary reasons we have jobs. When something inevitably goes wrong, it's important to stay levelheaded and focused on the issues at hand, while everyone else around may seem like they are losing their minds.

Engineers seem to play the part of full-on miracle worker at times, and it's essential to have a clear head to be able to execute well under pressure.

Do you know a younger engineer you'd like to nominate for the series? Are you a broadcast engineer in your 20s or 30s? We'd like to hear from you. Email Emily Reigart at ereigart@nbmedia.com.



“Unshackled!” Tells Stories of Transformation

Behind the scenes at Chicago’s 65-year-old radio drama

RRADIODRAMA

BY JENNIFER WAITS

On a warm Saturday afternoon, I headed to Pacific Garden Mission in Chicago for a live taping of the 65-year-old radio drama “Unshackled!”

Said to be the longest-running radio drama, the show is recorded live every Saturday. When I arrived, Flossie McNeill, director of “Unshackled!” Ministries, was busy with last-minute preparations, telling me that the week’s story (Episode No. 3,421) was 3 minutes too long in rehearsals. We peeked into the green room, where Director Timothy Gregory was going through the script with cast members, making last-minute edits. Although they receive the script three weeks before taping, rehearsal happens right before the live recording.

The story, “Jane Page Part One,” will air the week of Aug. 7 over some 3,100 stations in 148 countries. Like all “Unshackled!” episodes, it is based on the real-life experiences of an individual who has struggled and finds redemption through spirituality.

The program began in 1950 under the leadership of the mission’s then-Superintendent Harry Saulnier, who “yearned to reach the masses for Christ and earnestly prayed about the possibility of a radio program,” according to the show website. The program name is said to have been prompted by a Navy veteran who recalled, “In beginning a radio call at sea, we’d say ‘shackled’ and end with ‘unshackled.’” Saulnier, according to this account, liked the connotation that “Christ can break the fetters of sin.” The first episode told the story of Billy Sunday, a baseball player turned evangelist.

McNeill showed me file cabinets full of information about the subjects of the weekly programs, telling me that listeners from all over the world send in their stories in the hopes of having them dramatized. People with a story to share can download an application on the program website; they must provide personal references and a recording of their voice.

DRAWN TO SALVATION

“Unshackled!” doesn’t shy from serious topics including philandering, drugs, addiction, mental illness, abortion, suicide and gambling. The engaging episodes resemble modern soap operas and old-time radio dramas — not surprising since the production is much as it was in the olden days, with actors performing

alongside live music and sound effects and in front of an audience.

Audience members filed into a large auditorium for the April 16 taping and McNeill gave introductory remarks, gearing up the crowd for the show. She promised that “the stories are absolutely captivating” and said that through the program “many listeners are drawn to salvation.” After the technical team

developed a tough exterior that led her to a life of crime and self-destruction. Then, she found freedom in the most unlikely of places, and her heart, and mind and life were ‘Unshackled!’”

Keyboardist Scott Griffin warms up before the show.



Flossie McNeill greets the audience.



Pacific Garden Mission is the home of “Unshackled!”

was introduced (the engineering booth tucked behind stage right, a keyboardist positioned towards the front of stage right, the sound artist on stage left) and after we were reminded to remain quiet (“Get that one last cough in”), the show began.

In his timeless, perfect-for-radio voice, Director/Announcer/Actor Timothy Gregory launched into the show.

“How do you do? A sensitive soul is hard to find in a cruel and violent society. The young woman in our story loved people and animals, and wanted others to return her love. When they didn’t, she

Musician Scott Griffin punctuated that line with old-time organ music, emphasizing the drama that was about to unfold. I was riveted.

The performance began, but after about a minute, Gregory yelled, “Cut! We had traffic.” The cast paused until the outside noise stopped, then resumed telling the true story of Jane Page, a tale that starts in a mental hospital, then

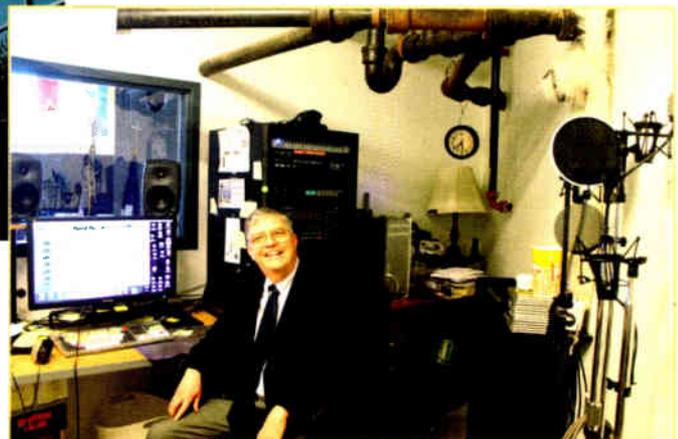
flashes back to Jane’s childhood.

Sound/Foley Engineer Nadine Aloisio-Sorenson adds sound effects, including Bible pages turning, saloon noises, cocktails, a 1930s car, horses, a gunshot and birds.

Many of the sounds that she used



Sound/Foley Engineer Nadine Aloisio-Sorenson riffles the pages of a book during a Bible-reading scene.



Engineer/Editor Kim Rasmussen in the radio booth.

were on CD, but it was fun to see Aloisio-Sorenson making live sounds by flipping book pages, ripping paper and pouring a cup of water in front of a microphone.

BREAKING “BONES”

The performance concluded after about 40 minutes and was met by thunderous applause. It’s a cliff-hanger;



A portion of the "Unshackled!" audio archives

the two-part episode's ending was to be taped the following Saturday, but McNeill gave the audience a sneak preview.

After the show, I went backstage to speak with the cast. Professional actors, they had a range of experiences including theater and voice work. I was interested to hear that for them, "Unshackled!" is unique because it allows them to play a wider variety of characters than they would be able to perform on stage, since the lack of visuals allows them to expand their repertoire, playing different ages and nationalities (with a long list of accents and dialects).

The cast was made up of three men and three women, plus the male director. They told me that in this week's episode they enjoyed pretending to be ladies in an asylum for a scene that needed background chatter.

Learning about the production of "Unshackled!" provides a fascinating glimpse into radio history, too. Within the program's basement home are displays of historic photos, awards and press clippings, as well as rooms full of archival recordings on reel-to-reel, MiniDisc, CDs and cassette tape. Many of those responsible for the production of "Unshackled!" have been involved for decades. Engineer/Editor Kim Rasmussen has been a full-time staff member since 2004, but started working on "Unshackled!" as an actor in the 1970s.

Aloisio-Sorenson has an interesting history, telling me that she is the fourth-generation Foley engineer for "Unshackled!" She recounted that her grandfather Ed Wojtal "started the sound effects for 'Unshackled' in the late 1950s" and was followed by her uncle Don Wojtal in 1967 and then by her father Nick Aloisio in 1972. She explained that her

dad "stepped up, trained on only five shows, and was on his own for the next 39 years!"

After retiring in 2011, he trained Aloisio-Sorenson in two or three sessions and she's been with "Unshackled!" since.

Onstage alongside Aloisio-Sorenson is her audio setup — she calls it a sound truck because it is "a moveable working machine" — consisting of two turntables for 78 rpm records, four CD players and a cart machine. When adding sounds to a production, she selects from recorded audio from a collection of four cabinets full of 78s (many of which her grandfather used), 200 CDs

WHAT THE TECH?

According to Engineer/Editor Kim Rasmussen, "We use Avid's Pro Tools 10 software to record and edit. I then make a master CD. It is distributed by mail to some stations, or we put it on an FTP site and the stations can download it from there.

"The mics we use for the actors are KSM32s produced by Shure. Our synthesizer is a Yamaha Electone HX-1. The sound cart has a number of CD players and even two turntables along with two live mics for live sound effects our Foley artist creates. The audio feeds into our MOTU 8pre interface, which distributes it to our Mac as well as our amp that feeds our headphones and the audience in the auditorium.

"I'm glad to have software [Unveil] that takes at least most of the echo out in post."

and more than 50 carts. Additionally, she's equipped with a microphone for live sounds.

"I use tons of live props ... and one prop has multiple uses. A stick can sound like a bone break as well as someone walking through the forest breaking tree branches."

Sounds vary from production to production and Aloisio-Sorenson must think of creative ways to express them, ranging from notoriously difficult "bomb and artillery scenes" to foot-steps in the snow (she rubs together two pieces of Styrofoam) or face slaps. She added that "body hits and face slaps are popular" and revealed that she will slap her thigh or arm and dramatizes punches by dropping her dad's fully stuffed (with bed sheets) army duffle bag from over her head. Additionally, she likes to "bring in leaves and sticks" to use as props. "Live sounds are always better. They are much clearer and more believable."

After each week's recording, Kim

Rasmussen spends five to six days in post-production, whittling the show to 30 minutes. As part of that, he is "editing out the actors mistakes, enhancing (or adding) sound effects and leveling all the elements of the program." He said it can be tough because the show is recorded in "a very open room," which he likens to an airplane hangar.

Rasmussen said, "Every live episode of 'Unshackled!' is a balancing act technically. For our audience to clearly hear the episode, we need to sacrifice a studio quality sound in the recording." However, the sense of the liveness of the performance is critical to the program for the enjoyment of both the live and radio audiences. Listeners from around the world, who flood the mission with calls and letters stating their engagement with the real-life stories, likely would agree.

An archive of episodes can be found online at www.unshackled.org. Historic show photos are at www.unshackled.org/photo_historic.html.

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Build Your Own Headphone Amp

Curt Yengst takes on a fun (and useful) DIY project

DIYPROJECTS

BY CURT YENGST

A small battery-powered headphone amp is a useful item to keep in your tool bag or remote kit. It can provide additional monitoring options when the headphone jack on your mixer is already taken or the talent is too far away from the mixer. It also comes in handy when troubleshooting audio gear and you need a quick means to listen to an output. There are suitable offerings available from numerous manufacturers, and the price ranges are just as varied.

But if you're anything like me, you don't mind taking some time, maybe getting your hands dirty, and keeping your fabrication skills sharp.

To that end, here's a simple, easy-to-build, DIY headphone amplifier. It uses some fairly common components, some of which you may already have laying around, and runs off a single 9 V battery. It's built around the popular Texas Instruments LM386 low-voltage audio amplifier IC. In fact, the basic design comes straight from their data sheet. The chip is designed to run on a wide supply range — 5 VDC to 18 VDC. It doesn't require bipolar power, so no complicated power supply is needed. Its default gain is 20x, which is ideal for most line-level applications, but that can be increased to as much as 200 if needed. External components are kept to a minimum.

With just a dual-gang log pot, a few capacitors and a couple resistors, all of fairly common values, two LM386s make a good stereo amp. It's quiet and can faithfully reproduce signals from as low as 40 Hz (the lowest tone my test CD had) to well above what these high-mileage ears can still hear.

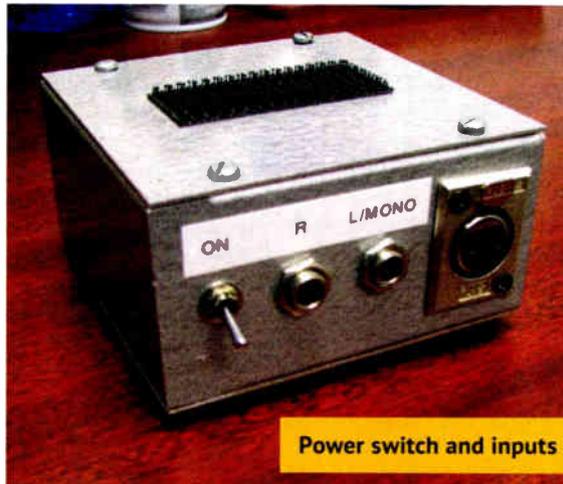
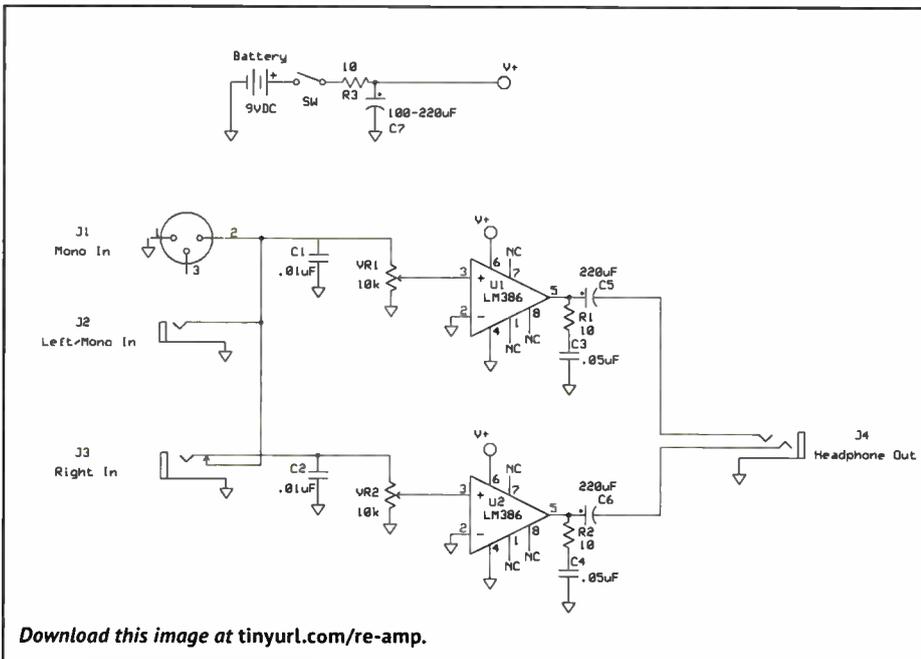
As mentioned, the input stage for this build is simply a dual-gang 10 k log pot, creating a variable pad on the input signal. I added a pair of 0.01 μ F capaci-

tors between the inputs and ground to shunt any RF that might hitch a ride. The output (wiper) of the pot goes directly to the LM386 input. Some designs I've seen online include an additional coupling cap here.

The output of the chip is coupled to the output jack via a 220 μ F electrolytic capacitor. Before the signal gets to the coupling cap, it sees a low-pass filter comprising a 0.05 μ F capacitor and a 10 ohm resistor. In the various versions of this circuit, some have the capacitor between the resistor and ground, and others have it the other way around. In this case, it's the former. This serves to prevent high-frequency oscillations.

The 9 VDC from the battery passes through a 10 ohm resistor on its way to the supply pin of the IC. This is also filtered through a 100 μ F electrolytic capacitor to clean up any oscillations that may appear.

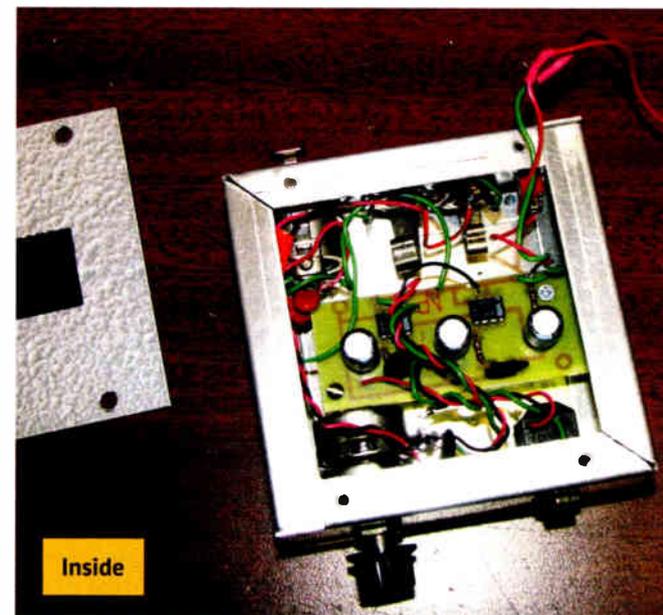
When I first built this amp,



HEADPHONE AMP PARTS LIST

2 LM386 Low Voltage Audio Amp	Mouser Part No. 513-NJM386D	\$1.54
1 Dual 10k Potentiometer	Mouser Part No. 313-2420F-10K	\$3.19
3 10-ohm Resistors	Mouser Part No. 279-CBT25J10R	\$0.42
2 220 μ F/35V Electrolytic Capacitors	Mouser Part No. 647-UVY1V221MPD	\$0.36
1 100 μ F/35V Electrolytic Capacitor	Mouser Part No. 647-UVZ1V101MED	\$0.18
2 0.05 μ F Ceramic Capacitors	Mouser Part No. 594-S503Z69Z5UL63L0R	\$1.82
2 0.01 μ F Ceramic Capacitors	Mouser Part No. 594-D103Z25Z5VF63L6R	\$0.20
1 XLR-F Panel Mount Jack	Mouser Part No. 568-NC3FPP	\$1.64
1 1/4-inch TRS Phone Jack	Mouser Part No. 502-12B	\$1.85
1 1/4-inch TS Switched Phone Jack	Mouser Part No. 502-12A	\$1.84
1 1/4-inch TS Phone Jack	Mouser Part No. 502-11	\$1.85
1 SPST Toggle Switch	Mouser Part No. 108-0008-EVX	\$2.04
1 Hammond 1444-6 Enclosure	Mouser Part No. 546-1444-6	\$9.84
1 Hammond 1434-6 Cover	Mouser Part No. 546-1434-6	\$4.48
Miscellaneous: 9 V battery, wires, perf board, screws, spacers, etc.		

Total: \$31.25



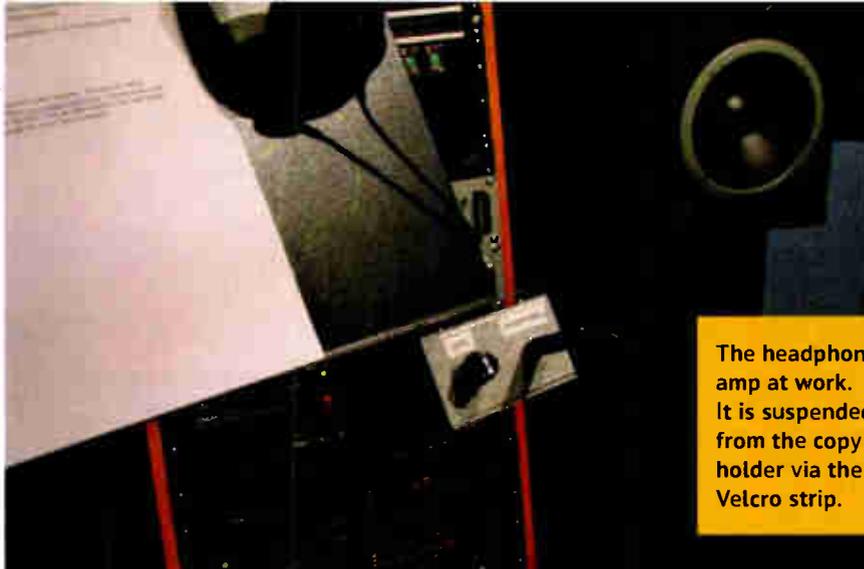
I gave it discrete left and right inputs. Then I thought of the possibility of feeding it from a single-channel output, like the aux send of a mixer. Even if I were feeding it a mono input, I'd still want to hear the signal in both ears, without having to use any sort of adapters or splitter cables. As you can see in the schematic on page 24, this was addressed by using a switching audio jack for the right-channel input. A mono signal plugged into the left-channel jack will feed both amplifiers; but if a cable is plugged into the right-channel input, that will interrupt the left channel signal to the right-channel amp and feed it the right-channel input instead. I added an XLR jack, wired in parallel with the left input, to accommodate connections from consoles with XLR sends.

The original build was done using a piece of perf board, but I recently came across a free program called ExpressPCB for creating schematics and PCB layouts. (Regular readers will be aware of how much I love finding free software!) The program is easy to use, and the online help had me setting up a good layout in short order.

Using MG Chemicals' presensitized positive etch process, I created a small, neat circuit board. Their 3-inch x 5-inch board has more than enough room for three circuits. If playing with corrosive chemicals isn't up your alley, there's always perf board, or ExpressPCB will take your layout, created in their program, and fabricate a PCB for a fee.

The enclosure I used is a Hammond 1444-6 4-inch x 4-inch x 2-inch metal box I found in the engineering shop, but any similar enclosure will work. I've seen similar builds mounted in old Altoids tins!

Sourcing all the parts from Mouser, the amp can be built for a little over \$30; but as I said, most engineering shops may have some or all of these components on hand, making it even cheaper. What's more, the simplicity of this circuit makes it easily customizable. It's small enough that it could even be used to add a headphone output to a piece of gear that lacks one. Just power it with a tap from the +12 or +15 VDC rail of the power supply. Because the audio load impedance is rated at 4 to 16 ohms, it can also drive a small cue speaker. By the way, if you're wondering why mine has a piece of Velcro hook-and-loop fastener attached to the top, I have a corresponding piece attached to the bottom of my copy stand, so I have handy



The headphone amp at work. It is suspended from the copy holder via the Velcro strip.

control of headphone volume during VO sessions.

Looking for an extra headphone amp for your audio arsenal? Need something on the bench to check outputs? Or maybe you're just looking for a "rainy day" project. Fire up the soldering iron and have fun!

Special thanks to my friend and mentor Ron Habegger for checking my work on this project. Even on something this simple, it never hurts to have a second pair of eyes!

Curt Yengst, CSRE, is a regular contributor to Radio World.

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Radio Goes to the Movies

This inter-media connection is all about capitalizing on fun

The pulse of our modern media culture started booming in the 1920s when radio was born and movie theaters brought national audiences together like never before.

The longstanding relationship between radio and the movies is a natural, with each providing unique entertainment value and easily playing off the other.

How can the movies help you entertain and grow your listening audience? Let's focus the projector on this frenzy of opportunity.

People love to talk about movies, especially new releases. Consider a few potential summer blockbusters that are

into Dahl's fantastical world.

Who ya gonna call? After a cultural evolution of 30 years, the "Ghostbusters" remake hits the screens July 15. Will Kristen Wiig and Melissa McCarthy be better than the originals?

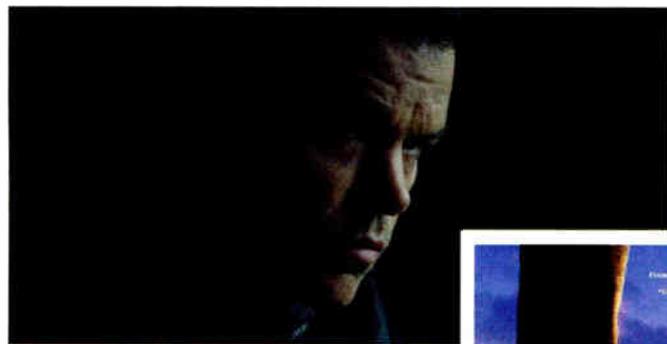
And July 29, people will flock to see Matt Damon return as the larger-than-life Jason Bourne.



Disney/Pixar



Disney



Jason Bourne / Universal

sure to provide good hooks. It will become obvious as to why audiences will want to engage with your station when these flicks are the subject of discussion.

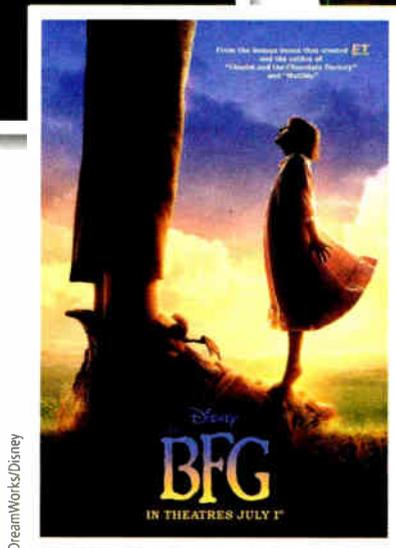
MUCH ANTICIPATED MOVIES

After a 10-year gap, Pixar releases "Finding Dory," the sequel to "Finding Nemo," on June 17. This one picks up six months after the last story line. This will be a must-see for little kids with their parents — but don't be surprised to see teenagers or early 20s crowds there who want to feel young again.

On July 1, the screen adaptation of Roald Dahl's "The BFG" finally arrives. Talk of Hollywood's efforts to produce it goes back to the 1990s, and anticipation is big for the fan base. Again, even the older millennials may crave a throwback to their childhood escape



"Ghostbusters" / Columbia Pictures



DreamWorks/Disney



"Independence Day: Resurgence" / 20th Century Fox

This is just a small taste of what's in store this summer.

WHY SHOULD STATIONS CARE?

How can radio get in on the action? Here's one idea you can execute with one theater or a chain: Have your morning show host your city's first showing or regional premiere of "Finding Dory" (or a much-anticipated movie of your choice) early in the morning.

I'm talking 7:30 a.m., a time when theaters are usually closed. Yes, the kids are up. The parents are awake. They will be thrilled. If you can get the movie company or theater to do this for free, more power to you. If not, buy out a movie theater — or two or more — and

then give the tickets away for two weeks before your big day.

Maybe do your morning show from the movie theater. Alert the media and invite a TV show to broadcast from there as well. (No TV morning show can resist talking to little kids and their parents about such a hot property. Did you like it? What was your favorite part? Who is your favorite character? How does it feel to see a movie so early in the morning?)

The buzz you will create with families will be off the charts. How do I know this will succeed? I did this type of promotion for a Harry Potter movie once, and even though Daniel Radcliffe is now 27, people still remind me about it.

PROMO POWER



Mark Lapidus

Could you get one of the movie stars, even someone with a minor role, to show up? Get a closeup. Interview the stars of the movies and let locals ask a few questions to add color. While not usually open to interviews, even big stars have to promote movies. No, you won't get them all, and large markets have it easier than small towns; but you won't get anybody if you don't try. If you can't get anyone, maybe you can use an interview that's been done already and cut out sound bites you can play.

Don't be afraid to ask "Can we have that?" Sometimes studios will give scripts, props, action figures, or at the least, movie posters, to radio stations. If you're not willing to ask the production studios, try your local movie theaters for posters, or ask local toy stores for those cute movie toys. They may want some on-air promotion in exchange.

Speaking of which, how about a partnership? Can you find a movie theater or chain in your city that will show a short spot — maybe a 15-second commercial

about your radio station or morning show — in exchange for a bank of commercials? This is a good idea year-round if you're able; if not, the summer blockbuster season is a great time to give it a shot.

As part of the deal, will the theater also play your radio station before and after the movies are shown? A great way to do this is to make playlists with a DJ's voice-track and all the trimmings. Sounds just like the "real" thing but it's predictable, focused and commercial-free!

This movie-radio connection is all about fun. But if these ideas aren't for you, do your own dreaming big about other possibilities. Free popcorn for everyone? It's so simple, it just might do the trick!

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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, KSF, KOBY, KCBS, KQW, KRE, KTIM, KYA, etc, I will pay for copies... Feel free to

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OPPORTUNITIES IN RADIO — Page 20

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READER'S FORUM

ENFORCE AM RULES

I could not agree enough with Larry Langford's commentary ("The Free Ride Should Be Over for Dual Expanded-Band AMs," *radioworld.com*).

The FCC has got lost in government muck! The rules must be enforced. Look how many stations today are just radio stations in a closet. No local involvement, news or even local public service. It is a total shame. As a broadcaster for over 50 some years, it truly amazes me how broadcasters forget the rules of the game. It is lost in the bottom line to get by as cheaply as possible and to say "Forget the audience. Let's try to sell these stations and find another sucker." Let me tell you, they are gone!

The expanded-band stations have never made any ratings worth any revenue. They should find a way to sell them to local people rather than the usual suspects. FCC, follow your rules. Find *broadcasters* to get involved in the FCC. The lawyers are making enough money off all of us.

Let's get it together. Do your job! Take those stations away that are still operated by the expanded-band owners and move forward.

You wonder why everyone is listening to their phone? Listen to the stations; there is nothing worth listening to. Play the listener — would you listen to canned programming just to fill the time? I wouldn't, nor would you.

Bob Hamilton
President
Hamilton Communications
Palm Springs, Calif.

SIT IN THE PROGRAM DIRECTOR'S CHAIR

Regarding "Is Broadcast Radio Doomed," *Radio World International*, April issue:

I am so tired of hearing the rants about "corporate radio."

I agree that there are a couple of the bigs who are screwing things up with their bland, generic programming and the need to use one music log on 200 stations.

That having been said, there are companies, owned by corporations, who operate locally in their markets and, frankly, provide good, locally oriented formats.

I constantly hear this drumbeat about playlist size. Yet, typically, not one of the people who want 10,000 song playlists have ever — ever — sat in a PD's chair and tried to actually do it. I've seen it tried — in my town — and it fails every time.

Sorry, but radio is a *business*, not the personal playground of DJs and wannabe PDs. If formats are being discriminated against, it is not at the behest of consultants or corporate radio. It's at the behest of the advertisers who refuse to spend their money on such formats.

Kevin Fodor
Dayton, Ohio

WRITE TO RW

SEND A LETTER TO THE EDITOR:

Email radioworld@nbmedia.com with "Letter to the Editor" in the subject field. Please include issue date.

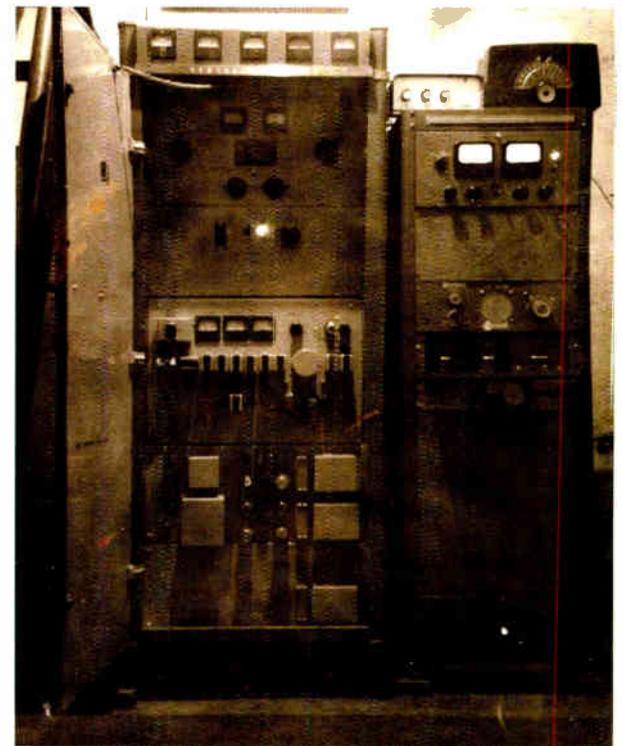
THE GE PHASITRON FM TRANSMITTER

Regarding the 2007 article "The General Electric Phasitron FM Transmitter" by Charles S. Fitch (*radioworld.com*, keyword Phasitron):

KPCC at Pasadena City College in Pasadena, Calif., operated a 250-watt Phasitron transmitter with an antenna on top of the college's administration building into the 1980s, when they got a CP for more power and moved the transmitter site up into the adjacent mountains.

The GE transmitter and most of the other original KPCC equipment came from KWKW(AM)/FM, also in Pasadena, who decided that FM wasn't going anywhere.

John Hazlet
Pasadena, Calif.



Transmitter shown with door open, WBJC.

PART 15 FOOD FOR THOUGHT

Regarding reader comments about "legal but unlicensed" stations, posted to the story "FCC: Pirates Remain a Priority," <http://tinyurl.com/rw-pirates4>.

It should ... be noted that [FCC rule] 15.221 also covers AM broadcast band and a neutral loaded carrier current operation can cover substantial square mileage, while still remaining legal along the length of the power line system.

I have a friend in Wyoming running such an operation ... over the neutral lines on his local power grid. He has been investigated by the FCC on multiple occasions for both his FM and his AM and found to be in compliance during all the field inspections on both his FM, which covers two blocks to a car radio, and his AM, which covers 4 square miles.

There is also 15.219, which is authorized by power and antenna limits, and there have been several occasions of a legal 15.219 installation covering 3 miles to a car radio.

So not every signal on the AM and FM broadcast bands covering a couple blocks for FM and as much as multitudes of miles on the AM broadcast band is a pirate. Of course, receiving setups dictate range as much as the transmitting setup; with a combination of a good receiver setup and transmitter installation, legal ranges can be a long distance. So if an FM operation is only going a couple city blocks to a car radio or an AM operation going 3-4 miles to a car radio, or in the case of carrier current, a house radio, maybe the station might be legal. Some food for thought.

Robert P. Chrysafis, KC8GPD
Arvada, Colo.

It should benefit the operators of unlicensed systems using the AM/FM broadcast bands in the U.S. to ensure that they accurately understand and comply with FCC Part 15, if they hope either to avoid or successfully defend any citations/actions that result — no matter which enforcement agency produced them.

If it accurately can be shown/proven that such unlicensed AM/FM systems don't comply with Part 15, then, by definition, aren't those operators "pirates"?

But that said, probably no enforcement agency in any state has the technical training, test equipment and field experience needed to make an accurate determination of compliance or non-compliance of unlicensed systems/operators with Part 15.

Unlicensed systems/operators complying with Part 15 are not pirates, and therefore should not be considered as such by any enforcement agency.

Isn't the FCC the only agency mandated by U.S. law to regulate and enforce the use of the electromagnetic spectrum in the regions subject to its jurisdiction?

Richard Fry
RF systems engineer (retired)
Quincy, Ill.

READER'S FORUM

MORE CAUTION

Your Tech Tips article "Testing and Using Power Transformers" in the April 27 issue was useful. However it overlooked one serious safety hazard.

After the bake-in is completed, slowly turn the voltage down. Do not disconnect the DC voltage when the full 10 Amps or so is flowing. With power transformers this large "inductive kick" can be very dangerous.

Using the formula $V=L(di/dt)$ and with the rough values of $L=0.5\text{Hy}$, $i=10\text{Amps}$ and $t=1\text{ms}$ you get 5,000 Volts! The stored energy is $L(i^2)/2$ or 25 Joules (Watt-seconds).

These are typical back-of-the-envelope calculations and results may vary. Still it could ruin your whole day or whole life.

*Eric V. Berger
Merritt Island, Fla.*

YOUNGER ENGINEERS

Nice to see the article in RW showcasing young engineers ("Younger Engineers Defy Common Wisdom," April 27 issue). Since our industry has become so IT-based, it is no wonder you see so many younger people adopting the title "engineer."

I became a radio chief engineer as a college student in the late 1980s at the ripe old age of 19. Back then, you needed a General Radiotelephone (reduced from the First Class Radiotelephone) license to be the CE of an AM DA. I was, by far, the youngest person in the room taking the exam. Back then, a teenaged chief engineer was nonexistent. Most of the older engineers didn't like me much because I was really quick at getting things done, and I didn't smoke. However, thanks to two brilliant engineer mentors Alan Graft and Richard Green (both passed on now), I became a successful broadcast engineer.

Fast forward to today. I admit to falling behind in

the latest information technology, but know enough to tell an IP address from a MAC address. The group of stations I call home today has a dedicated IT person, so all I have to worry about is radio most of the time.

Big difference between an IT person and a traditional broadcast engineer. No matter how smart the new breed of IT people are, I doubt many of them can design and build (let alone maintain) a directional AM array or troubleshoot to the component level. I also find that most IT people are deathly afraid of high RF fields and the equipment that generates them.

That is why it is refreshing to read about the young engineers in the April 17 edition. Most of all, I am proud to have younger people coming into the ranks and glad to read about them and their success. Please do include more stories as they become available.

*Paul Shinn
Valley Springs, Calif.*

I appreciate your article "Younger Engineers Defy Common Wisdom."

I remember an old TV commercial where two job candidates sat next to each other in a waiting area. One was a young college grad, the other was older and seasoned. The question was "Do you want *his* eager energy or *his* vast experience?"

On the eve of our 40th high school reunion I arranged with the principal for the reunion committee members to tour the building. I was initially dismayed to see the electronics lab no longer had the high-voltage power supplies, tube-type oscilloscopes, RF and audio oscillators, VTVMs and so on at each workstation. Now it was a computer lab. Upon reflection, it occurred to me that while such equipment was in common use in my time (1969-73), it is no longer.

Today's broadcast engineers must be fluent in IT and network technologies. That is the present and the future. On the other hand, the program audio must be delivered to the audience. This is accomplished by the transmitter.

Transmitters of the past employed tubes, whereas most of today's models are solid-state. The transmitter



produces RF, which is fed to an antenna. The engineer must also be familiar with RF technology in order to diagnose problems and ensure proper operation.

I totally agree with the sentiments of thinking outside the box and coming up with creative solutions. I have mixed feelings with seeking out help for a problem from someone who may have faced the same issue prior. Experience is the best teacher, and unless the situation is critical, it may be best to resolve it on your own and value the lesson learned.

The sole purpose of this email is to express my appreciation for the article. The perspective is enlightening. When I wired studios I used (expensive) multipair audio cable. Today an inexpensive Cat-6 cable is all that is needed. Crosspoint AoIP allows more features at less cost and greater flexibility. Progress ...

*Thomas G. Osenkowsky
Radio Engineering Consultant
Brookfield, Conn.*



Our readers have something to say:

“I've enjoyed RW since 1985, and look forward to every issue!”



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