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INSIDE

HFCC



SHORTWAVE SPECIAL

- What role could DRM play in shortwave? And what else is going on in SW? Two articles inside. — Pages 3 & 4

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COLD

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AM PREEMPHASIS

- Bob Orban and others weigh in on Larry Langford's call for a new curve. — Page 28

Tower Industry Set for the "Year of 5G"

But even with high crew demand, credit terms are a growing concern

BY RANDY J. STINE

The National Association of Tower Erectors leads a wireless structure industry closely focused right now on TV repack work and the 5G rollout. Those issues and others have bearing, directly or indirectly, on the radio business.

NATE Unite 2019, the organization's annual conference, is Feb. 3-7 in Grapevine, Texas, near Dallas-Ft. Worth, and will feature educational sessions, optional courses and industry speakers. Specific topics include tower safety, 5G deployment, unmanned aerial systems and other emerging technologies in the wireless sector.

Radio World asked NATE's Executive Director Todd Schlekeway for a preview of its gathering and his views of the country's wireless infrastructure issues.

Radio World: What are the most pressing issues on your radar facing the tower industry in 2019?

Todd Schlekeway: This is being billed



Peak Life Photography

FCC Chairman Ajit Pai climbed a communications tower near De Beque, Colo., last August, during a visit facilitated by NATE, SBA Communications and EasTex Tower LLC. With him are Justin Miller and Dan Hancock of EasTex Tower. Pai is a scheduled speaker at NATE Unite 2019.

as the "year of 5G" and next-generation wireless service for faster mobile internet. Our members will be on the front end of deployment. It's creating a lot of work, especially in urban areas of this country. We will have numerous sessions at our show concerning 5G deployment.

Workforce development remains a top issue. Our industry is right in the middle of TV repack work on tall towers. We have broadcast contractors and all they're doing 24/7 is repack transi-

tion work. In addition, we have members doing the FirstNet public safety broadband work.

All of those factors are coming together and it means we do not have enough workers in our industry. It's not unique to our industry. A lot of the trades are having the same problem. So we have a new apprenticeship program in the industry to talk about.

Finally, there is this issue of contract terms and payment terms that has come

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Digital Can Save Shortwave's Future

DRM can enhance HF services, eliminating traditional shortcomings

COMMENTARY

BY RUXANDRA OBREJA



Ruxandra Obreja

The author is chairman of Digital Radio Mondiale.

Recently the Australian government asked for answers to a very simple question: Should shortwave technology be used?

If this question had been raised a few years ago, many broadcasters would have suggested the closure of energy-hungry shortwave transmitters. This is exactly what ABC, the Australian Broadcasting Corp., did in January 2017 to the dismay of some listeners, particularly in the Pacific islands.

FLEXIBILITY

According to reports, the Australian foreign minister is even now claiming no support for the shortwave closure in the Pacific. Today the answer is more nuanced however, especially if the crackly analog shortwave (and medium-wave jointly known as AM) is replaced by its digital version. Digital AM has solved many of the disadvantages of analog and as such should be considered with an open mind.

Imagine being in New Delhi, London, Hamburg or Johannesburg and being able to listen to a program from the other side of the world in perfect sound and with accompanying images and extra services. All free and easy, no data plan required.

Conventional free-to-air radio broadcasting by almost all broadcasters in the world has been for many years on the medium-wave and shortwave bands. Shortwave is mainly used for overseas services. The signal is reflected from the ionosphere, which is between 175 and 300 km above the earth.

Shortwave can also be very effective domestically in covering the entire territory of larger countries such as India, Australia and Brazil, for example. These in-band analog transmissions using amplitude modulation suffer from quality degradation; on medium-wave, due to noises generated by industrialization and on SW, due to changes in the position of ionospheric layers.

Through digital, some of these analog disadvantages of medium-wave and shortwave are overcome. This is exemplified by sound samples of the same BBC transmission recorded this spring in Europe and Africa with a 5,850-km path over the equator. Listen to an analog shortwave broadcast from the United Kingdom to

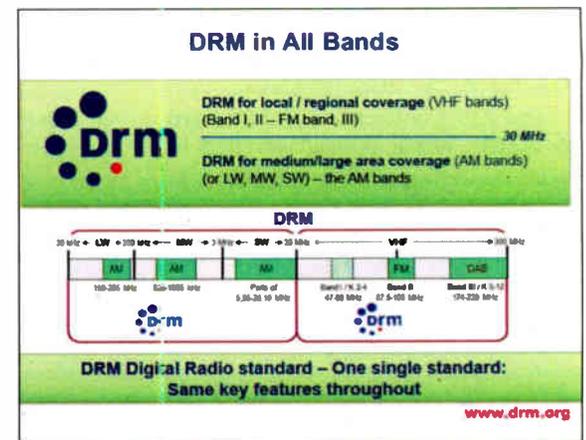
Nairobi on 6190 kHz and to a DRM shortwave broadcast from the same place in the U.K. to Vienna on 3955 kHz at www.drm.org/what-can-i-hear.

In high frequencies (shortwave and medium-wave) there is only one digital sound-broadcasting standard that can be used to great effect. This is Digital Radio Mondiale.

DRM can be used for digitizing radio in all frequency bands (both AM and VHF bands). Broadcasters can ensure gap-free coverage offering local, regional services, national and international services, whatever the size and geography of the area targeted, and at much reduced energy costs.

ADVANTAGES

Nigel Fry, head of distribution BBC World Service and member of the DRM Consortium Steering Board, comments: "DRM was seen as an efficient replacement for the analog AM transmissions. When we consider scarcity of spectrum for new uses and appreciate the



The DRM standard and its coverage possibilities

characteristics of the radio broadcast bands we recognize the tremendous properties these continue to offer broadcasters to deliver programs over sometimes very large distances and areas or in difficult terrain."

He continues: "Where medium-wave frequencies and sites exist, multichannel (therefore multi-language, too) DRM broadcasts can be offered at improved quality, with reduced energy bills and running costs. Unlike analog, DRM allows one frequency to be used repeatedly for the same service over a large area (a single-frequency network), making more efficient use of the spectrum. DRM can transform the quality of the services on the AM bands to be clear and free of any of the interference and distortion. The standard provides text information and images, to complement programs offering an enhanced experience to the listener. Recommended by ITU, DRM digital broadcasting has been proven to work excellently in the shortwave and medium-wave bands. These bands remain key for international broadcasting delivering services without constraints of local 'gatekeepers.'"

DRM also offers multiservice data including Journaline text services, slideshows, multilingual text, and the emergency warning functionality in case of disaster. DRM can deliver audio, text alerts and maps

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DRM

(continued from page 3)

to an affected area only.

Shown below is an example of how an emergency alert message can be inserted, when several programs are on air, switching from regular programs to alerts and then quickly back.

The largest digital market in the world is in Asia-Pacific. India has rolled out DRM and already has 37 transmitters on air with simulcast analog — digital and pure digital signal on air, as well as 1 million cars with line-fit DRM receivers on the road. The Indian public broadcaster is making huge strides in using it internally and internationally as can be seen in a Radio World article published in May 2018 titled “Digital Radio Mondiale an Update from India” (<https://tinyurl.com/yagu47p5>).

In New Zealand, RNZI has been using

DRM for 12 years as an inexpensive distribution method. The broadcaster reconverts DRM signals to analog in many Pacific islands, which receive the service via DRM rather than expensive satellites. Thus, DRM eliminates satellite rental costs and retains a reliable signal during heavy rain to feed local FM stations.

This use of DRM by RNZI was also highlighted in the Radio World article “RNZ Pacific Using DRM to Feed Pacific Relay Stations” (<https://tinyurl.com/y9ydooga>).

Though it might look like short-wave and medium-wave could be on the way out, several countries like India, Indonesia, South Africa, Taiwan, Russia, Hungary, Brazil, South Africa are seriously looking, testing and implementing digital AM.

China itself seems committed to DRM in medium-wave and short-wave (tested in April and July 2018).



Rangitaiki, NZ to Cook Islands 2500 km. Service covers the whole South Pacific on 50 kW. <http://www.rnzi.com/pages/technical.php>

The RNZI DRM service covers the South Pacific on 50 kW.

Moreover, according to reports, China Møreover, according to reports, China International has taken over some of the ABC Radio Australia’s old short-wave frequencies in the Pacific: 9580 kHz and 7240 kHz.

This shows that once abandoned for a perceived quick gain, these frequencies can be snapped up by others seeing value in them. Often once lost, these frequencies cannot be regained.

Whenever broadcasters are not closing but replacing old large transmitters, such as in Oman, Saudi Arabia, with new ones these are often “DRM-ready.” How about actually using them in digital? DRM allows for a smooth transition to digital as it can use existing network planning, even exiting transmitters, antennas, sites etc. In addition, DRM, delivers signifi-

cant power savings (using SW or MW in DRM can reduce the power used up to 80 percent), spectrum efficiency (more programs — up to three and one data channel can be broadcast on one single frequency used now for one program only in analog) and extra services.

There is no other band or service where the benefit of digital is more evident than in shortwave, as DRM, unlike analog, offers enhanced and stable audio quality that is FM-like (mono or stereo). Imagine being in New Delhi, London, Hamburg or Johannesburg and being able to listen to a program from the other side of the world in perfect sound and with accompanying images and extra services. All free and easy, no data plan required.



Audio programs on one frequency in a normal situation and with the insertion of an emergency alert with normal programs temporarily suppressed

OPINION: DRM ROLLOUT IN INDIA PROGRESSES

Digital Radio Mondiale has recently registered significant milestones in India. These include extensive coverage, new features and 1 million cars with DRM receivers on the road.

All India Radio has embarked on a new phase of its DRM rollout. Currently there are 35 medium-wave transmitters and four shortwave transmitters on air covering some 600 million people with DRM digital signals in both simulcast and pure DRM.

The broadcaster is focusing on improving the sound quality using the latest audio codec xHE-AAC and introducing new benefits offered by media applications such as the text service Journaline and the Emergency Warnings Functionality, both part of the DRM standard. EWF was successfully demonstrated by AIR in the spring. The extra features of DRM became available after the installation of five content servers in key cities. More are to be installed in the future.

In September, Prasar Bharati, the country’s public service TV and radio broadcaster, officially instructed all AIR radio stations to promote digital radio. This will increase the awareness of digital radio to listeners who are just learning about this platform but also to other broadcasters, the receiver and car industry, distributors and retailers.

AIR is now taking a wider view of DRM. At the end of August, the AIR Director General stated in a public hearing held by the Ministry for Information and Broadcasting that AIR would support the use of DRM in the VHF band II (FM) in response to the regulator’s general recommendation of digitizing FM. (The government’s decision is still awaited.)

Today there are more than 1 million cars on the Indian roads with factory-installed DRM receivers provided at no extra cost to the buyers.

— Radu Obreja

NEWSWATCH

ONLINE SECURITY HEADACHES WON’T LET UP

A report from Akamai at the end of 2018 suggests that broadcasters along with other internet users can expect continued brute force DDoS attacks, application level attacks, credential stuffing and the theft and sale of credentials.

A more specific portfolio of threats exists for those who are invested in the Internet of Things. There are weaknesses in IoT devices that make them vulnerable: Little security is built into the device, often as an economy measure but also because some safeguards may impede operation. Also, because of poor network segmentation, a device may be exposed directly to the web. It can act as a pivot to the internal network, opening up a backdoor to criminals, Akamai reported.

Further, developers of IoT devices sometimes leave behind code or features developed in beta that are no longer relevant; this hidden functionality can provide a way in for hackers. And default credentials are often hard coded, so the software won’t force you to create a unique password; typing “1-2-3-4-5” can get you into a surprising number of devices.

Best practices might be gleaned by looking at the U.S. government, which now requires that devices it buys be patchable, not have known security vulnerabilities and allow users to change default passwords.

Read the report at <https://tinyurl.com/rw-akamai-SOTI>.

— Tom Vernon

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Barry Thomas Excelled in His Field for 35+ Years

Colleagues remember a "radio evangelist" and a man who did things on his own terms

NEWSMAKER

BY RANDY J. STINE

It is easy to find colleagues of Barry Thomas eager to share their thoughts on what a dynamic man and radio professional he was. It's just hard for them to speak about him in the past tense.

Thomas passed away in early December; he was 56. A past president of the Society of Broadcast Engineers and the 2011 recipient of Radio World's Excellence in Engineering Award, he spent more than 35 years working in radio technical operations, building radio facilities and serving his industry with work for a variety of national technical organizations.

Throughout those years he made friends — by all accounts a lot of friends — within radio's technical circles. Thomas held the esteemed rank of fellow in the SBE. He was former chairman of the NAB Radio Technology Committee, past chairman of the National Radio Systems Committee RBDS Subcommittee and a participant in a number of other NRSC activities, according to his LinkedIn profile.

Thomas, who hailed from Columbia, S.C., most recently was director of engineering at KSE Radio in Denver. His technical leadership roles over the years included DOE at Wilks Broadcasting, vice president of engineering at Lincoln Financial and VP of engineering for Westwood One. For years he ran a contract engineering firm, Thomas Media Systems & Design.

"FORWARD-LOOKING"

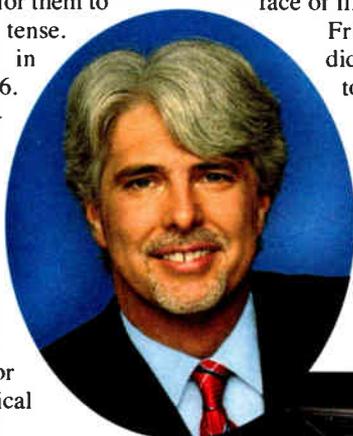
Accolades from contemporaries stretch out across the country. It was his battle with cancer and how he han-

dled it that seem to touch colleagues the most.

Thomas was diagnosed with multiple myeloma in 2008 and underwent surgery on his spine to remove a tumor. He told Radio World in 2011 he was proud of the fact that he could "continue to work full-time and be a father" in the face of illness.

Friends said Thomas didn't want a big deal to be made about his health as he went through chemotherapy and stem cell harvesting and the subsequent infusions he received.

"Barry stayed ahead of the cancer for a long time. He

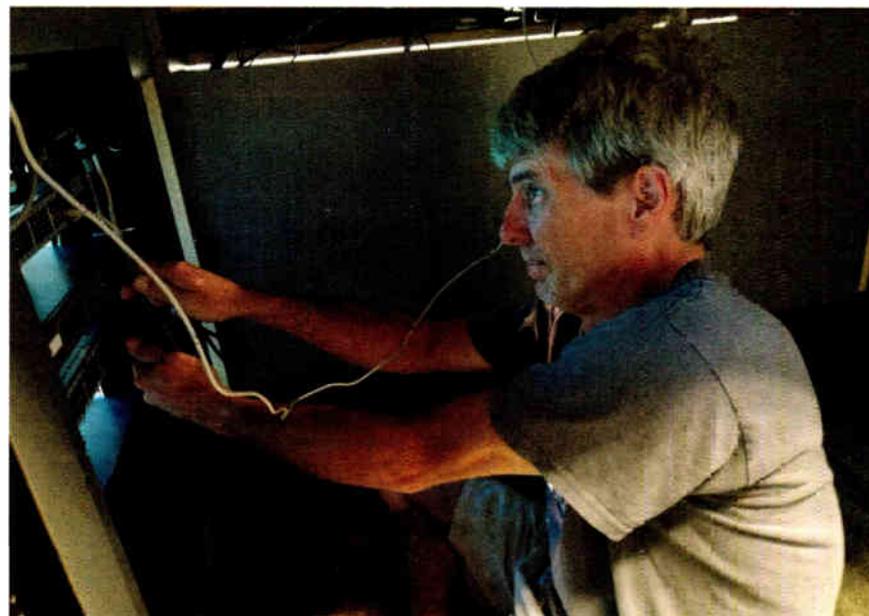


A 1994 install at WMMS in Cleveland

maintained a forward-looking outlook at all times," said Chriss Scherer, member communications director at SBE. "When I visited him in Denver in early November [2018], he was working through the latest complication of the disease. Despite that, he gave me a full rundown on the status of several work projects, including his optimism on seeing them to completion."

Scherer met Thomas at an SBE meeting in Cleveland in 1992; he described Thomas as a "radio evangelist" quick to come to the defense of the industry he loved.

"I was with him many times when someone not involved in broadcasting would question radio's relevancy today. Barry would jump right in with statistics



Barry Thomas installs a WheatNet system at KSE in Denver.

on radio listening, commercial value and many other factors. In most cases, the radio skeptic would at least have his eyes opened if there wasn't a complete radio conversion," Scherer said.

Tony Gervasi, sales manager for Intraplex Broadcast, said Barry Thomas was best man at his wedding. They met

Thomas, who earned a bachelor's degree in Media Arts from the University of South Carolina in 1985, lived and breathed radio, according to colleagues.

"Barry consumed everything he could about radio," said Conrad Trautmann, Cumulus' SVP of technology and operations. "I know his participation with the SBE board, and ultimately as president, helped him to build strong relationships with peers and vendors that helped expand his knowledge of the industry."

Trautmann, familiar with the pressures of running a technical operation for a major broadcast group, worked with Thomas at Westwood One for several years. He said he'd miss Thomas' frequent emails and phone calls. "He always had a good story to share about something going on in his life with his family or one of his stations. He was true pro."

A VOICE FOR ENGINEERS

SBE President Jim Leifer, CPBE, said that Thomas had served the SBE in many capacities and had been a voice for many engineers in the industry for decades.

"After hearing this news, I remembered so many occasions where Barry spent time developing younger engineers and being that mentor so many of us talk about. He was a devoted father, son, brother and fellow engineer who will be sorely missed by all."

The society noted that Thomas had co-authored five U.S. technology patents and held SBE certifications as a Professional Broadcast Engineer (CPBE), a Digital Radio Broadcast specialist (DRB) and a Broadcast Network Engineer (CBNE).

David Layer, VP for advanced engineering at NAB, said, "Barry was a man of exceptional engineering talent and

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THOMAS

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very generous and giving of his time to help both individuals and organizations, like NAB and the NRSC. I was especially impressed with the way Barry tackled the challenges that faced him, in particular his tragic health problems. He had exceptional courage and was truly an inspiration to me and I am sure to others as well."

Thomas had a curious nature when it came to figuring out how new technology worked; this impressed Frank Foti, executive chairman of the Telos Alliance.

"Barry possessed really good tenacity, as well as being inquisitive about technology. He was willing to try, and figure stuff out, which taught him well," Foti said.

They met in the late 1980s when Thomas was working in sales for Broadcasters General Store, Foti said. "I will miss Barry just being Barry"

Thomas was well traveled, living on both U.S. coasts and points in between; when healthy, he enjoying sailing and skiing.

He arrived in Cleveland as chief engineer for WPHR(FM), which later became alternative WENZ(FM). Thomas would eventually become DOE at OmniAmerica Group in Cleveland and stations WMJI(FM), WMMS(FM) and WHK(AM). He landed at Chancellor Media in the late 1990s, which after the easing of ownership caps merged with Evergreen to become AMFM Broadcasting and eventually part of Clear Channel. Thomas went on to direct engineering at Comedy World Radio Network and eventually led engineering efforts of Westwood One Radio Networks in New York.

He also cofounded StratusAudio, an interactive radio technology company, and worked there as chief technology officer.

A memorial fund has been set up to help support his four children — two sets of twins — Alexis, Jacob, Dylan and Luke at www.gofundme.com/6jman3c. "Due to his pre-



Thomas with his four children in a photo from the GoFundMe page of the Barry Thomas Memorial Fund

existing condition, Barry was unable to obtain life insurance as a way to aid in the provision of his children after his passing," the page states. "As a result, their mother is now faced with raising two sets of twins solely with her own finances."

"BROADCAST GYPSY"

Mike Cooney, chief technology officer and VP of engineering for Beasley Media Group, said he flew to Denver last fall to visit Thomas after hearing of his worsening health.

"There are many great engineers in our industry, but not many of them also have the personality, communication skills and sense of humor that Barry had. He wanted to make our industry better, and he gave countless hours to the SBE, NAB and other organizations. Barry also mentored more young engineers than anyone else I have known," Cooney said.

"Barry very rarely spoke about his cancer, and only when asked. I never heard him once complain, and for a long time was not even aware he was receiving chemotherapy twice a month for the last 10 years. Barry had a great attitude and was always looking to the future. He was an exceptional individual."

Longtime friend Fred Baumgartner, director of NextGen TV implementation for OneMedia, eulogized Thomas fittingly: "Broadcast engineers have a common bond. The SBE folks even more so. Still our stories and our paths, while similar, have their interesting diversions. Barry lived the ultimate radio dream. He had a great ride. In the end, all we have is our experiences, and Barry had a lot. Broadcast gypsies who enjoy others become a part of a lot of people's life. Barry knew a lot of people because he went out of his way to be of service.

"Ordinarily, a progressive disease is not considered a good death. I honestly don't think Barry cared. He'd do this like he did most things, on his terms."

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TOWERS

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to the forefront. Most of our membership is made up of small-business contractors, and they are most vulnerable to the changes we are seeing. The payment terms from some of the vertical real estate tower owners and carriers keeps getting pushed out. It was pretty standard for 30- or 45-day payment terms until recently. Now that has been pushed out to 90 days and 120 days. And that is just when the clock starts for payment.

What happens is you ask these small contractors to essentially become small lending institutions and banks. I'm hearing more and more about it. We are reaching out on the diplomatic front to ask these companies to walk back those terms.

RW: The use of commercial drones in the industry is becoming commonplace. What kind of benefits are tower crews seeing?

Schlekeyway: We are very interested in emerging technologies, and unmanned



Visiting Red Rocks in 2016 with Chriss Scherer, Ken Nosé and Kevin Nosé

FCC Commissioner Brendan Carr, middle, ascends a broadcast tower in Rowena, S.D., in October, guided by Ammon Snyder, left, and Mike Young of Sioux Falls Tower & Communications.



Has that been the case?

Schlekey: By all accounts, Phase One of the repack, which is completed now, went very well. However, it is likely to get more challenging with each subsequent phase. Phase Two is currently underway. NATE's role is really to be a resource for both the broadcast community and the wireless industry. We act as a bridge between them.

NATE doesn't have a position on the timeline and whether that 39-month window that the FCC ordered after the incentive auction is long enough. We just want to make sure the industry has

the resources available to complete the work as scheduled and on time.

RW: *What specifically should radio broadcasters know about the potential impact of 5G's rollout on the tower industry, on tower crews and on infrastructure in general?*

Schlekey: The 5G rollout, as I noted, will be mostly in urban areas. Some existing infrastructure will be used for the new 5G equipment. So if you own a radio tower with space to lease, that could be an opportunity.

Densification is really the key com-

ponent to 5G, so you will be seeing a lot of these pizza box style antennas go up on light poles or even street lights in very dense downtown areas where they are allowed to do so. In the end, it's about densifying networks to accommodate more demand. I believe in certain cities you'll start seeing more and more of these small antennas hanging off infrastructure to accommodate demand. I do not expect much disruption to radio broadcasters.

RW: *There appears to be some con-*
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aerial systems are a great asset for tower workers. Commercial drones allow workers to complete tower work more efficiently and safely. We have sessions dedicated to drones at NATE Unite. Our Unmanned Aerial Systems Committee will be meeting during the conference to further explore uses for the technology.

Drones are a powerful safety tool for the industry. It can reduce some of the repetitive climbing. NATE estimates that it can reduce the amount of climbs on a site over the course of a project by a third.

But there is a lot more value added using drones. You have inspection videos and photos, 3D imaging that can be shared with clients. Even during emergencies they can be used to evaluate damage to facilities. Like anything new we continue to evaluate the technology, but we think a UAS is something every contractor should have in their toolkit.

RW: *The spectrum repack of TV stations was expected to put a great deal of pressure on availability of tower crews, for both TV as well as radio stations.*

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TOWERS

(continued from page 11)

fusion among radio engineers about tower construction and related safety standards, specifically on how to deal with a proposed additional load to an existing tower. What steps should a radio engineer engage to get the best answers to such a situation?

Schlekeyway: The ANSI/ASSE A10.48 Standard was released in 2016 and it was a game-changer for our industry. It's everything related to tower construction and maintenance. It covers everything from pre-construction to tower demolition and everything in between. It's provided a lot of clarity for contractors in the industry. NATE has a lot of great resources available covering both tall broadcast towers and traditional small cell towers.

There are three places to start looking to get answers. The first is the ANSI/ASSE A10.48 Standard. The TIA-322 Standard is the engineering standard, so that's a great reference point. And of course the TIA-222-Rev H released in 2018 covers wind loading and the tower structure itself. Those are the three standards that I would direct a radio engineer to review if they have questions.

RW: *There were five tower structure related fatalities in 2018, down from eight in 2017, according to OSHA statistics. What is the trend line for tower safety as measured by accidents and deaths?*

Schlekeyway: All of us are committed to fall protection. Falls are generally the leading cause of death in tower accidents. I can say the safety culture continues to get better and better in the industry. We have more standards, more resources and a national certification organization, National Wireless Safety



The NATE Unite convention is expected to draw 140 to 150 exhibitors and 2,000 attendees.

Alliance, which NATE helped found in 2015 that provides to provide nationwide credentialing for workers.

All of those factors are helping, but we always have more work to do. When you have people working at elevation there is no margin for error.

RW: *What policies are you pursuing in Washington that broadcast radio readers should be aware of?*

Schlekeyway: We have a stronger regulatory and legislative presence than ever before. I mentioned our industry's worker shortage. NATE's top priority is the Communications and Jobs Training

IF YOU GO

When: Feb. 4-7

Where: Grapevine, Texas

How: <https://natehome.com/nate-conferences/>

How Much: On-site registration \$349 for members, \$629 for others; single-day and free exhibits-only passes available



Act legislation that we expect will be reintroduced in bipartisan fashion in the 2019 Congress.

It would provide \$20 million to develop curriculum for certificate-based programs for community colleges, veteran's organizations and technical institutes for programs in our industry. It's part of our broader workforce development priorities. We are putting a full grassroots press on this. The measure was introduced last year but never came up for discussion.

Organizations supporting the legislation include CTIA, National Association of Broadcasters, Telecommunications Industry Association, Utilities Technology Council and Wireless Infrastructure Association.

We also have worked closer with the FCC on streamlining structure permitting. There has been positive movement in that regard.

RW: *How many attendees do you expect at NATE Unite 2019 and how does the exhibitor list look?*

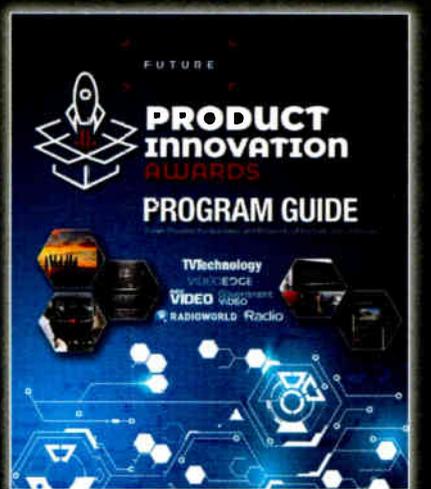
Schlekeyway: It's looking great. We expect 140 to 150 exhibitors with close to 2,000 in attendance. We are very excited to have FCC Chairman Ajit Pai as one of our keynote speakers, along with FCC Commissioner Brendan Carr. We are excited to have that caliber of speaker. They both have experience obviously on the radio and wireless side of our industry.

RW: *You and NATE COO Paula Nurnburg recently signed long-term extensions to remain with the organization. What is your vision for NATE moving forward?*

Schlekeyway: The sky is the limit for NATE, and I am ecstatic to continue representing the association in a leadership capacity. As 5G deployment begins to scale in 2019, continuity among our executive team will enable NATE to continue playing a leading role positively impacting the wireless ecosystem through the association's policy advocacy, resources development and grassroots outreach.

HERE ARE THE FUTURE PRODUCT INNOVATION AWARDS

Radio World parent Future U.S. in December announced the nominees and winners of the sixth annual Product Innovation Awards, honoring outstanding product introductions that serve TV, professional video and broadcast/online radio users. The PIA program recognizes excellence in manufacturing; winners were selected by a panel of professional users, editors and technical contributors of TV Technology, Digital Video, Creative Planet Network, Government Video, Video Edge, Radio World and Radio. The online Program Guide includes all the nominees and offers a super overview of great new technologies. Read it at <https://tinyurl.com/rw-pia-2018>.





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World Radio History

A Simple Security Solution ... for Your Toolbox

Also, electrolytic capacitor problems and fixes

WORKBENCH

by John Bisset

Email Workbench tips to johnpbisset@gmail.com

The Reverend Robert J. Geckler is with Ecumenical Communications and the Christian Podcasts Connection. An avid reader of Workbench, Bob offers a problem and a solution.

Most of us have a toolbox that contains those heavy, bulkier tools like big wrenches, pliers, hammers and the like. The weight can make the box a little unwieldy.

All it takes is one time bumping the latch just the right way, and the latch pops open and everything is dumped on the floor — and maybe on your feet! Sound familiar? If you've been there, you may be searching for a solution.

Bob's got one and it's ingenious.

Most toolboxes have a hasp for a lock. But a lock requires a key or a combination to memorize.

A less expensive but helpful solution is shown in Fig. 1. Slip an old-style metal shower curtain hook through the toolbox hasp. It can be quickly removed, costs next to nothing and will prevent a spillover disaster!

While we're looking at pictures, do you have any idea what is pictured in Figs. 2 and 3? They are both the same component, except Fig. 3 is "after" cleaning. Read on for the answer at the end of the article!

Although Tom Norman spent many of the last 21 years working in TV (as he puts it, "radio with pictures") he writes about two issues he has experienced with electrolytics.



Fig. 1: Securing the toolbox



Fig. 2: Have you seen one of these?



Fig. 3: Even after cleaning it, you may not recognize this component.

The first was tantalum capacitors exploding when asked to get to work in the cold. In Tom's case, it was the power supply in the RCA TK-760 camera. Because space inside the box was too small for standard electrolytic of the same capacitance and voltage, it was filled with tantalums.

The television studio was not heated except by means of studio lighting. So on sub-zero mornings, the guys would turn on the cameras and invariably one of them would fail to come on. Tom would open it up and clean the mess out of the box, replacing the capacitors and sometimes the series pass switching transistor and associated snubbing diode. He'd put everything back together and turn it on.

Of course, this meant there was one less camera for the morning news, so the crew had to get creative.

Tom's second issue was with electrolytic capacitors made by Mallory. This is a brand with a rich history (look it up), yet he had so much trouble with its electrolytic capacitors failing that he asked manufacturers whose capacitors they used. If they said, "Mallory," he would press them for the exact nature of the capacitors (physical form factor, capacitance, voltage) so he could shotgun them when the new gear came through the door. Tom was not going to tolerate Mallory electrolytic capacitors

(continued on page 16)



NM-250 MKII - Newsroom Mixer

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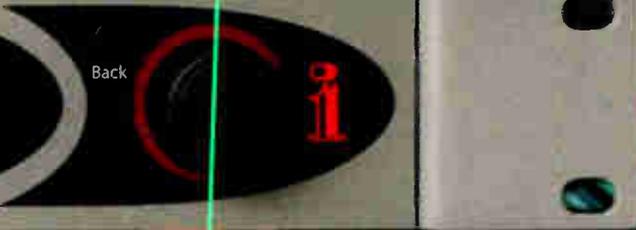
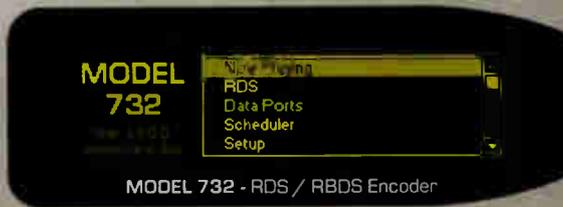
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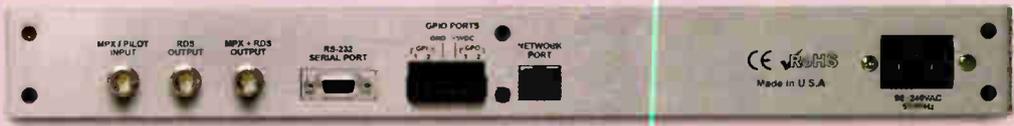


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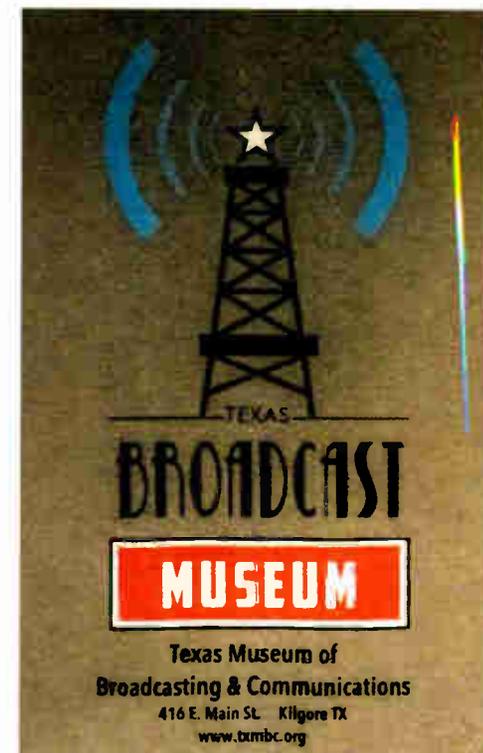
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Take a Step Back in Time in Kilgore, Texas

We dropped into the Texas Museum of Broadcasting and Communications



Mark and Paula Persons on camera



Texas Museum of
Broadcasting & Communications
416 E. Main St. Kilgore TX
www.tbmbc.org

The third studio was recently assembled using 1980s gear. The console is a PR&E that came from KLBJ Radio in Austin, Texas.

Chuck is a font of knowledge about historic equipment and events. One of the museum's TV cameras was present when Lee Harvey Oswald was shot in 1963.

A star attraction as mentioned in the 2016 article is a beautifully restored Dumont Telecruiser TV remote truck from 1949. It was used to cover President Kennedy's assassination in 1963 and provided the network pool feed at that time for the J. D. Tippit funeral. Tippit was the Dallas police officer shot and killed by Oswald as he was trying

(continued on page 18)

ROOTS OF RADIO

BY MARK PERSONS

The Texas Museum of Broadcasting and Communications in Kilgore, Texas, has been on my bucket list since it was highlighted by a Sept. 1, 2016, article

in Radio World, titled "The Birthing of a Broadcast Museum." It became a destination for my wife Paula and me on a recent driving trip from Minnesota to Texas.

We were greeted by Chuck Conrad,

creator and curator of this testament to AM, FM and TV broadcasting equipment that made it possible to reach our entire nation via the airwaves. He is seen in one of the three radio studios in the photo on page 18.

A second studio has a 1936 RCA console that came from WOAI in San Antonio.

WORKBENCH

(continued from page 14)

in the plant. Period.

It's been more than 21 years, and Tom acknowledges that things may have changed. For one thing, in 2002 Cornell Dubilier Electronics Inc. acquired the distributor division of North American Capacitor Company's Mallory Products Group. Readers, what are your experiences? Tom and I are curious.

Tom's point about shotgunning (replacing all electrolytics at once) is something to consider. Having an adequate supply of spare electrolytics on hand for your critical gear is a good idea.

Also, don't forget there is a finite life for electrolytic capacitors. The rule of thumb used to be replacing them every seven years. I've seen gear run 10 to 15 years before replacement was required. Regardless of the lifespan, if one of a series of electrolytics goes bad, replace them all.

Everyone likes free stuff. Projects engineer Dan Slentz discovered some freeware you may find of



Fig. 4: A handy offering from Charlie Davy's Software Shenanigans

interest. He found a button panel that behaves like the old 360 Systems Instant Replay. This software provides a screen of push buttons that can be tied to jingles, drops or liners and selected by the operator/talent.

Many audio playout systems offer a similar function, but if you don't have one, consider this from Charlie Davy's Software Shenanigans:

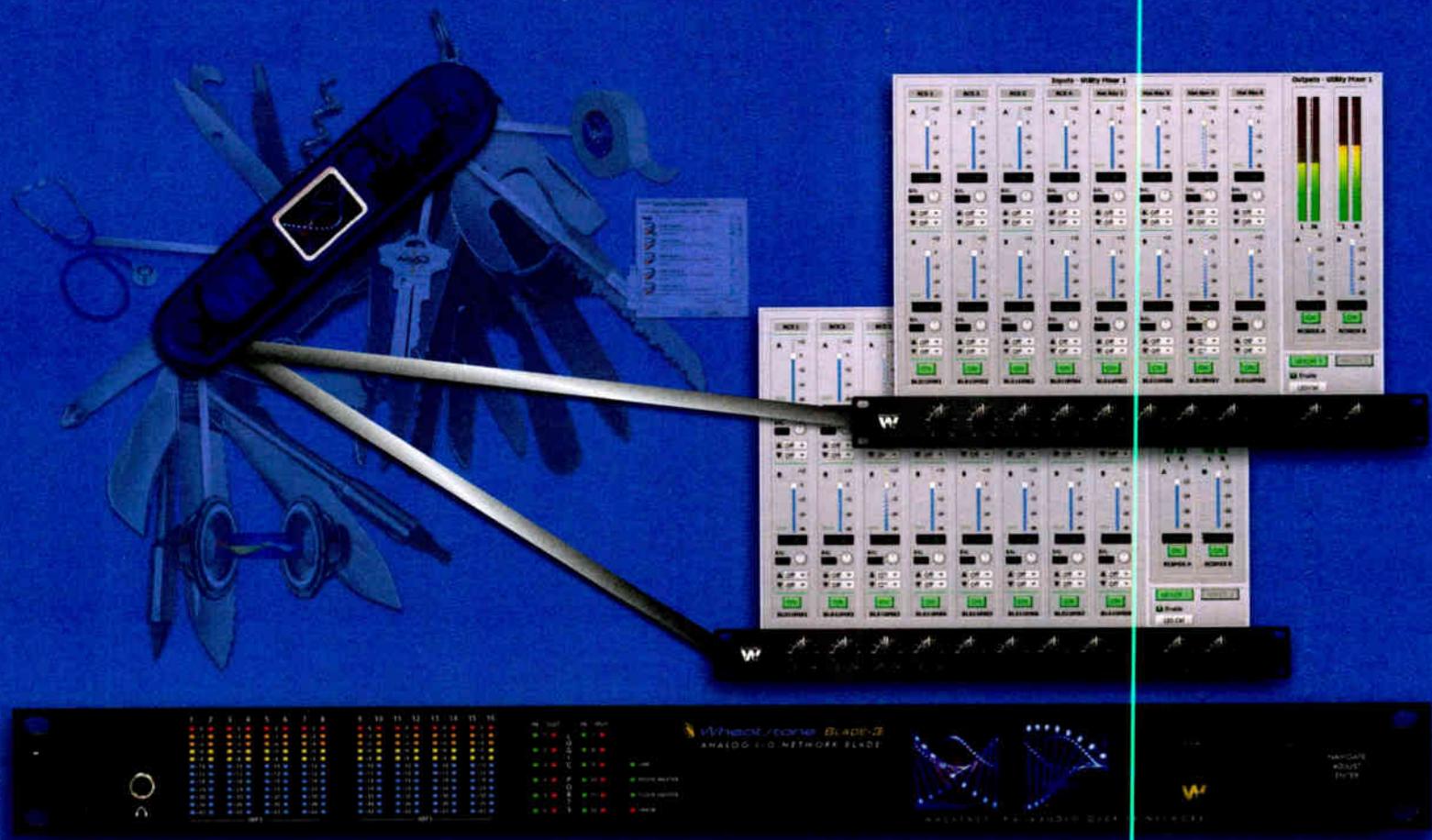
<http://www.charliedavy.co.uk/buttonpanel>.

For a low-budget operation, you can't beat free. Dan also suggests its use for high school ballgame sound effects or other similar uses. While you're on the site, look over the "Free Stuff" link on the home page.

If you identified Figs. 2 and 3 as showing a trimmer capacitor, you're right. It was sent in by engineering consultant Frank Hertel of Newman-Kees. What he finds most impressive about this capacitor is that despite its age, it adjusts so smoothly. The white base is ceramic, and the spring brass is nickel plated — and still retains its spring tension as if it were new. The insulation between the plates is mica, not plastic.

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

Author John Bisset has spent 49 years in the broadcasting industry and is still learning. He handles western U.S. radio sales for the Telos Alliance. He is SBE certified and is a past recipient of the SBE's Educator of the Year Award.



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34: Alarm Notification · 35: NTP · 36: Front Panel Locking · 37: Crosspoint Save · 38: Debugging Functions · 39: No Cooling Fans · 40: Sound Card Replacement · 41: Self Healing (and more...)

MUSEUM

(continued from page 16)



Creator and curator Chuck Conrad gives museum tours.

A star attraction: the Dumont Telecruiser



to escape. Talk about the golden days of news reporting!

Chuck said people keep donating items. There are hundreds of antique radios, microphones, audio consoles, tape recorders, audio processors and

transmitters, along with television cameras and video switchers. There is still space for more, at least for now. The back rooms look like they are filling up fast.

One of the latest acquisitions is a television news set where visitors can sit and have their photos taken while appearing as news anchors on camera. Paula and I bit on that one.

Kilgore, a town of about 15,000 people, is in northeast Texas. It is 120 miles east of Dallas and 72 miles west of Shreveport, La. If you are traveling on Interstate 20 between Dallas and Shreveport, it is just a few minutes' detour into town. It's worth taking the

time for an adventure, a step back into broadcasting's history.

For more information, see <https://texasbroadcastmuseum.com>.

Mark Persons, W0MH, is an SBE

Certified Professional Broadcast Engineer and SBE Engineer of the Year in 2018. Mark is now retired after more than 40 years in business. His website is www.mwpersons.com.

WHO'S BUYING WHAT

Broadcaster Alpha Media has teamed up with network sales company Skyview Networks in a multi-year sales agreement to create a new range of customization opportunities for advertisers. Skyview Networks has offices in New York, Los Angeles, Chicago, Atlanta, Phoenix and Miami.



benztown

Benztown has signed a multi-year extension with Cumulus Media and Westwood One. The company will continue to provide radio imaging, production, voiceover, programming and jingles to Westwood One and to Cumulus' owned and operated stations. They've partnered since 2011.

iHeartMedia has selected Panoply Media's Megaphone platform to distribute some podcasts across its iHeartPodcast Network. iHeartPodcast Network President Conai Byrne described Megaphone as iHeartPodcast's "key enterprise and infrastructure partner." The announcement came after iHeart acquired Stuff Media LLC, which includes content already hosted on Megaphone.

OmniPlayer has entered into a partnership with Paris-based radio broadcast software specialist ACE Medias Tools to bring the Radio Automation suite to the French market, including a new French-language interface. ACE Medias Tools will also provide customer support for all OmniPlayer products.

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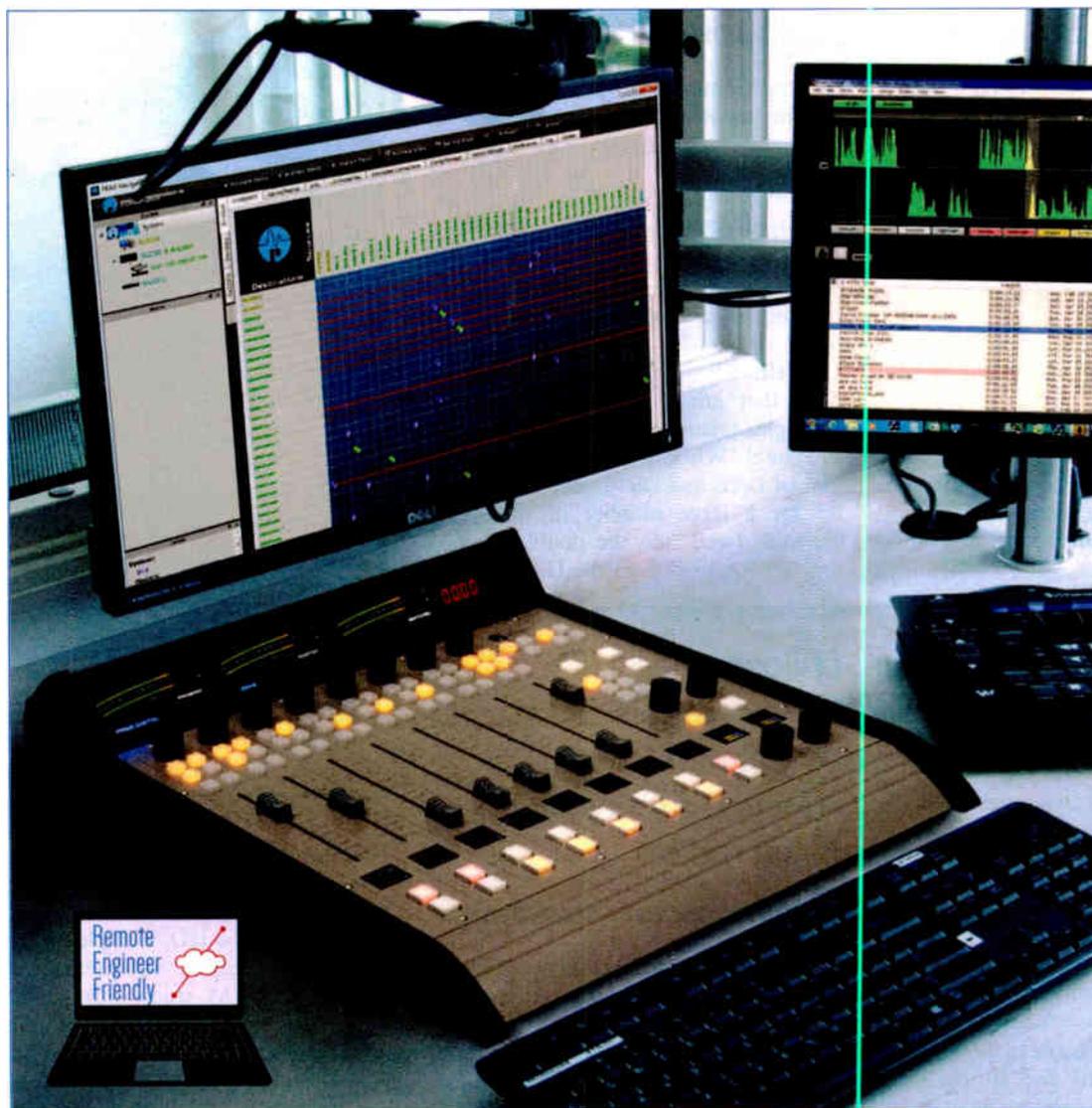
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KSL(AM) Heats Up in “Cold”

Trailblazing radio station adds true-crime podcast pioneer to résumé

21ST CENTURY PD by Dave Beasing

It won't be that long from now. On May 6, 2022, Utah's first radio station will be 100 years old. Less than two years before KSL could be heard at 1160 kHz on the AM band in Salt Lake City, KDKA/Pittsburgh had launched in time to provide coverage of President Warren G. Harding's election in spoken word rather than Morse Code. Starting KSL was courageous at the time.

So it should come as no surprise that Bonneville, KSL's owner, is once again leading the way with a new local medium — on-demand digital audio, commonly referred to as podcasting. KSL is, to my knowledge, the first commercial radio station to launch a local podcast that shot to #1 on the Apple Podcasts' national chart.

"It's so cool to work for a company that recognizes when there's a need to shift resources," says Sheryl Worsley, KSL's director of audience development.

"I had been KSL's news director for more than a decade, while also heading up our digital initiatives. As we added more podcasts, the time commitment of doing both was large, even with help. Our VP/GM Tanya Veal asked me what



Sheryl Worsley heads a new podcasting division for the venerable KSL in Salt Lake City.

I wanted to do, and I decided to make the jump into digital and podcasting full-time."

Worsley now oversees a roster of more than 70 podcasts for KSL and its local sister stations, KRSP(FM) and KSFI(FM). Thirty of them are completely original productions, not repurposed content.

"We had early success with a couple

of sports podcasts, 'Helmets Off' and 'Rivals.' Those have healthy sponsorships, and we now have a variety of podcasts that are also cutting through."

"COLD" COMING IN HOT

The biggest of them all is "Cold," an audio investigation of the 2009 disappearance of Susan Powell. After extensive searches didn't turn up a body or other "smoking gun" evidence, as authorities were honing in on her husband Josh as the primary suspect — spoiler alert — he burnt down a house with himself and the couple's two young sons in it. The tragedy made big headlines at the time, and that's how most news outlets covered the story, reporting headlines rather than launching an investigation.

KSL reporter Dave Cawley, like many Utahans, found himself fascinated by Susan's story, including "some of its unique social and religious components. Having grown up in the same faith tradition as Susan — as members of the Church of Jesus Christ of Latter Day Saints — I felt positioned to tell this story with a precision and nuance that might not come from an outsider's point of view."

Cawley kept digging into the case files. Then he dug more.

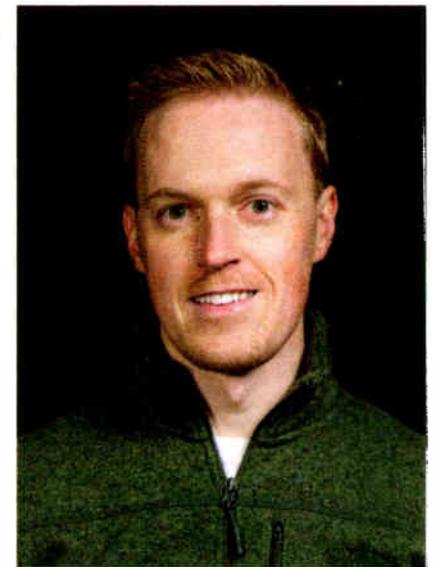
"When he found audio journals, clandestinely-taped video, and compelling new interviews, it became clear that this whole story needed to be told," says Worsley, "and that a podcast was the way to do it."

The result is addicting, a 15-part series available wherever you get your podcasts. Cawley tells the saga dramatically, while maintaining his journalistic responsibility to stick to the facts.

"We started talking with national podcast studios in August about a possible partnership, and despite some interest, we didn't have a deal in place at the time of our launch in November." During negotiations, one distributor told Worsley about the dangers of going it alone, warning that a local media outlet in a similar-sized market had declined their offers and received very few downloads of an investigative series.

So imagine the excitement at KSL when "Cold" debuted at #1 on the Apple Podcasts' national chart.

"I didn't believe my eyes, so I called a couple of coworkers over to my computer to verify they were seeing the



KSL reporter Dave Cawley investigated, wrote and edited the popular "Cold" podcast series.

same thing," laughs Worsley. Cawley agrees, "It was surreal."

The spectacular debut heightened interest, and now KSL has an agreement for "Cold" to be promoted and distributed by a national studio, and national advertising revenue will follow.

If your radio properties are planning to invest in a podcasting division, Worsley warns, "There isn't a manual to follow." But she offers three pieces of advice:

1. Podcasting is an investment. You have to devote time and resources, but it can bring a solid return.
2. Podcasting isn't the same as broadcasting. Understand the differences.
3. Time shifting your on-air content is smart, but that isn't a podcast. Producing original content grows your media brand's reach and revenue.

"Cold" proves the potential of local podcasting by radio. But telling Susan Powell's story has left Cawley with an even more important takeaway: "Domestic abuse in any form cannot be tolerated. Further, family dysfunction can cascade down through the generations. Action must be taken to interrupt the cycle."

"21st Century PD" columnist Dave Beasing works with broadcasters who podcast. His new studio, Sound That Brands, co-produces "Inside Trader Joe's" with Amplifi Media, and he's now on the road to states like Iowa, New Hampshire and South Carolina. He'll announce why soon (no, he's not running for president). Tweet @DaveBeasing.



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PEOPLE NEWS



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Sheridan Broadcasting Corp.
 promoted to president of Sheridan Radio and Digital Division



Rex Hansen
SummitMedia
 has retired nearly two decades as Springfield, Mo., cluster general manager/vice president

Hetal Patel
iHeartMedia

to serve as executive vice president of SmartAudio Intelligence Insights



Linda Wei

Alaska Public Media
 to serve as chief content officer



Dane Ericksen
Society of Broadcast Engineers San Francisco Chapter

was honored with the chapter's Dick Parks Award

Cat Thomas
Entercom Communications

named as operations manager for St. Louis

Peter Timmons

GatesAir
 named business development director for EMEA and India



Darrell K. Brown
National Association of Broadcasters Education Foundation

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Software Tech: Can Studios Live in the Cloud?



Craig Anderton isn't daydreaming as he looks at the future of recording studios

IN THE CLOUD

BY CRAIG ANDERTON

Cloud computing has taken over the business world, as more companies rely on Microsoft Azure, Amazon Web Services and others. It's easy to understand why: The basics of computing services, like storage, servers, analytics, applications and databases are all in the cloud, and you connect there via the internet when you want to use those services.

Numerous attempts have been made to create online collaboration sites (remember Rocket Network?), but none of them gained traction. However, that was before technology reached the level

of maturity we enjoy today. Once again, companies are forming around the idea of cloud-based, online studios and collaboration.

Avid offers several different cloud plans, from an Artist version (10 GB, \$5/month) to a studio version (80 GB, \$25/month). These are mostly so that people can collaborate on projects, as opposed to having the tools themselves in the cloud. However, other companies are pushing the envelope and offer cloud-based DAWs — with varying degrees of sophistication and pricing plans — where you can transfer tracks for yourself or others to access from anywhere. Probably the most developed is Ohm Studio (it uses a combination of cloud- and local-based attributes), but there's also SkyTracks, Soundation Studio, UJAM, BandLab, Audiotool, Splice, AudioSauna, Soundtrap and others. Some are Flash-based, some run in a browser and others are apps you access directly — and may be mobile-friendly as well.

While compared to a pro studio, these may seem like toys, some are fairly powerful toys indeed, with built-in instruments and plug-ins. Ohm Studio can even wrap your VST plug-ins. Also,

most sites play up the collaborative element. This can be as basic as finding other musicians for a project, or being more like a social media site.

ONLINE

For pro audio, at the moment, online DAWs are not going to replace your terabytes of storage, fast processing, rendering with video, gigabyte orchestral libraries and the like. However, technology has a habit of becoming increasingly powerful, and given the issues surrounding the desktop market (we don't know exactly what Apple has in mind for 2019, and currently Microsoft seems more interested in its cloud services than Windows), we may all be hanging out in the clouds sooner than we think.

Of course, the cloud isn't the ideal solution for everyone. As just one example, when Sony Pictures was first considering using an external cloud service, the cost of bandwidth to deal with the massive amounts of data generated every day was problematic. Bandwidth continues to get less expensive, but still, huge companies will have to decide whether to use commercial cloud services, or build their own.

As for pro audio, it's likely that any transition to the cloud will be incremental. For now, cloud storage is the main attraction. At least in theory, the data is

ON THE WEB

AudioSauna: <http://audiosauna.com>
 Audiotool: www.audiotool.com
 Avid: www.avid.com/solutions/cloud
 BandLab: www.bandlab.com
 EastWest Composer Cloud:
www.soundsonline.com/composercloud
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 Roland Cloud: www.rolandcloud.com
 SkyTracks: <https://skytracks.io>
 Soundation Studio: <https://soundation.com>
 Soundtrap: <https://www.soundtrap.com>
 Splice: <https://splice.com>
 UJAM: www.ujam.com

more secure than it would be if stored locally, and you can access files from anywhere. I doubt anyone will miss the days of shipping 24-track reels of tape around.

The next step is specialized services. To some extent, we already have that with EastWest's ComposerCloud and Roland Cloud, where the cloud integrates with your local setup. However, Roland expects to create instruments that could exist only if hosted in the cloud. Perhaps another step is having the cloud equivalent of studio instrument rentals, where you could rent time on specific plug-ins when you need "just that one sound" and don't want to commit to a purchase.

To graduate a complete studio to the cloud isn't trivial. Singapore-level bandwidth is the exception, not the rule, which impacts transferring and storing large amounts of data. Servers go down, and the internet isn't secure from hackers, so you'd still need a Plan B — ultimately, you're the only person you can trust with your data.

There could be major advantages. You'd always be using the latest version of an online DAW, and there would be no compatibility issues with collaborators. Backup would be automatic. As to cost, although it may not be less expensive to run an online studio — those monthly subscription charges add up — you'd potentially have access to more instruments, sounds and plug-ins than you could ever purchase. And if the cloud studio eliminates piracy, virtual gear costs could come down even further.

Maybe the future isn't so bright that you have to wear shades ... but you might want to check out the price on prescription sunglasses to go along with your regular pair.

Craig Anderton's new book series, "The Musician's Guide to Home Recording," is available from Hal Leonard in softcover, and <https://reverb.com> as a series of ebooks. Visit www.craiganderton.com for more news.



MARKETPLACE



DASDEC-II Is More Secure: Digital Alert Systems has upgraded the operating system for its Digital Alert Systems DASDEC-II emergency alert devices to provide greater security in its release of Version 4.0 software.

"The upgrade also includes industry-first Triggered Common Alerting Protocol Polling, a powerful tool for presenting more complete alert information to the public, as well as support for the new Blue Alert Emergency Alert System code," the company stated.

Noting the risk of hackers and the lure of EAS infrastructure to bad actors, DAS said cybersecurity is "a paramount concern" in system design. Version 4.0 provides a new mechanism for more rapid security updates. A new login screen is designed to prevent hackers from finding devices that might have been attached to the internet with no firewall present.

Triggered CAP Polling offers better message handling when messages come from both EAS and CAP sources. "This feature ensures that for every over-the-air EAS event, the system will immediately start looking for a matching CAP message and, if one exists, use it instead of the EAS alert for better message propagation."

Customers who bought or upgraded since March will receive version 4.0 at no charge. Other users of V3.0 can buy it for \$495. For users of DASDEC-I and original One-Net devices, an upgrade/exchange program is available.

For information email support@digitalalertsystms.com.

Pesky Noise Be Gone!: De-essers, a god-send when they became affordable, have been a useful tool for voice pros for a couple of decades. Sometimes there were trade-offs but each technological trudge forward was applauded.



Once these tools became software-based improvements became more rapid.

Waves feels it has moved the needle yet again with its new plug-in, Waves Sibilance.

It says that its Organic ReSynthesis technology is at the heart of the plug-in.

According to processing software maker Waves, its Organic ReSynthesis engine allows "precise identification of unwanted sibilant sounds such as "s" and "sh," resulting in smooth, glitch-free,

effective de-essing that maintains the timbre, duration and natural resonance of the original vocal sound."

The company adds, "Unlike most de-essers, which act like narrow-band compressors, the Waves Sibilance plug-in uses Organic ReSynthesis spectral filters to identify undesirable bursts of sibilant energy, then completely separates the nuances of sibilance from the vocal signal, leaving the rest of the signal untouched."

The plug-in is compatible with all major DAW and music creation platforms — with AU, AAX, Audiosuite, VST/VST3. Price: \$69.

Info: www.waves.com

Hittin' the Røde: Røde Microphones has shipped its new RødeCaster Pro integrated podcast production studio.

While Røde released its first podcast product, the Podcaster USB mic, in 2004, the new unit finds the company broadening its reach with an all-in-one console/recorder approach. The unit includes four Class A, servo-biased inputs able to power studio condenser microphones as well as conventional dynamic microphones. The unit also offers inputs via Bluetooth, a 3.5 mm port for a phone or device, and a USB port.

Also onboard are eight color-coded, programmable pads that can trigger jingles and sound effects. These can be programmed within the RødeCaster Pro or via a computer using PC/Mac software that comes with the unit.

A central touchscreen provides control of all settings, including EQ presets, compression, a de-esser, high-pass filter, ducking and noise-gating. Processing within the unit is provided via Aphex Exciter and Big Bottom processing.

There's four headphone outputs and a stereo speaker out, each with independent volume controls. Users can record to a microSD card internally or to a computer via USB; the unit can record to both outputs simultaneously.

Info: www.rodem.com



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READER'S FORUM

BOB ORBAN ON AM PREEMPHASIS

Larry Langford makes some excellent points in his online article "AM Preemphasis — Time for a New Curve?" (<https://tinyurl.com/ycmbok26>).

In the manual for Orban's XPN-AM processor (currently in beta), I wrote last year that "the receiver equalizer is of limited benefit to narrowband radios with abrupt rolloffs. We believe that these radios benefit more from a boost at 3 kHz, combined with very little HF shelving EQ. These radios have almost no response at 5 kHz and above, so boosting frequencies above 5 kHz wastes modulation. Using a bell-shaped boost at 3 kHz causes the boost to decline naturally at frequencies that the radio cannot reproduce. You can use the midrange, all-frequency, or HF parametric equalizer to create such a boost."

Anyone who is serious about developing non-NRSC equalization to overcome the HF limitations of typical AM radios should seek out the 2006 NRSC study "Consumer Testing of AM Broadcast Transmission Bandwidth and Audio Performance Measurements of Broadcast AM Receivers," by Dr. Ellyn G. Sheffield and John Kean. A summary report is available at www.nrsstandards.org/reports/nrsc-r101.pdf.

Fig. 1 of the summary report shows the mean and standard deviation frequency response curves for the 30 consumer AM receivers measured in this study. The mean -3 dB frequency is 2450 Hz and the mean -10 dB frequency is 4100 Hz.

In Orban processors, instead of using a bell-shaped equalizer, you can try using the shelving receiver equalizer (which provides a third-order boost starting

at 2 kHz) in combination with a relatively low frequency setting of the low-pass filter (like 5.0 kHz).

To address Larry's concerns about filter ringing, Orban AM processors starting with Optimod-AM 9300 offer a parametric cutoff shape that controls the sharpness of the transition region between the filter's passband and stopband.

Those interested in the detailed curve shapes of the parametric lowpass filter can download the 9300 manual from ftp.orban.com and look at Figs. 2 to 7 on pages 2 to 33.

Compared to using the bell-shaped second-order peak EQ, the audible results of using the shelving EQ/parametric lowpass filter technique will depend on the individual radio being auditioned and is, to an extent, a matter of taste, although it is important to test any settings on several radios representative of the lowest and highest bandwidths that appeared in the NRSC study cited earlier.

AM processing requires more compromises and judgement calls than any other type of processing because it can't ever be "high fidelity" (the radios' bandwidths simply don't permit it) and because the disparity between radios is so large.

In my opinion, the goal should be highly intelligible, smooth, non-fatiguing sound quality regardless of which receiver a listener uses. It's the most extreme example of trying to "pack a gallon of sound in a one-quart container," and it's one of the most difficult challenges in broadcast engineering.

Fortunately, modern Optimod-AM processors give practitioners all the tools they need to customize AM receiver equalization to their preferences and the needs of their target audiences.

Robert Orban
Orban Labs
Pennsauken, N.J.

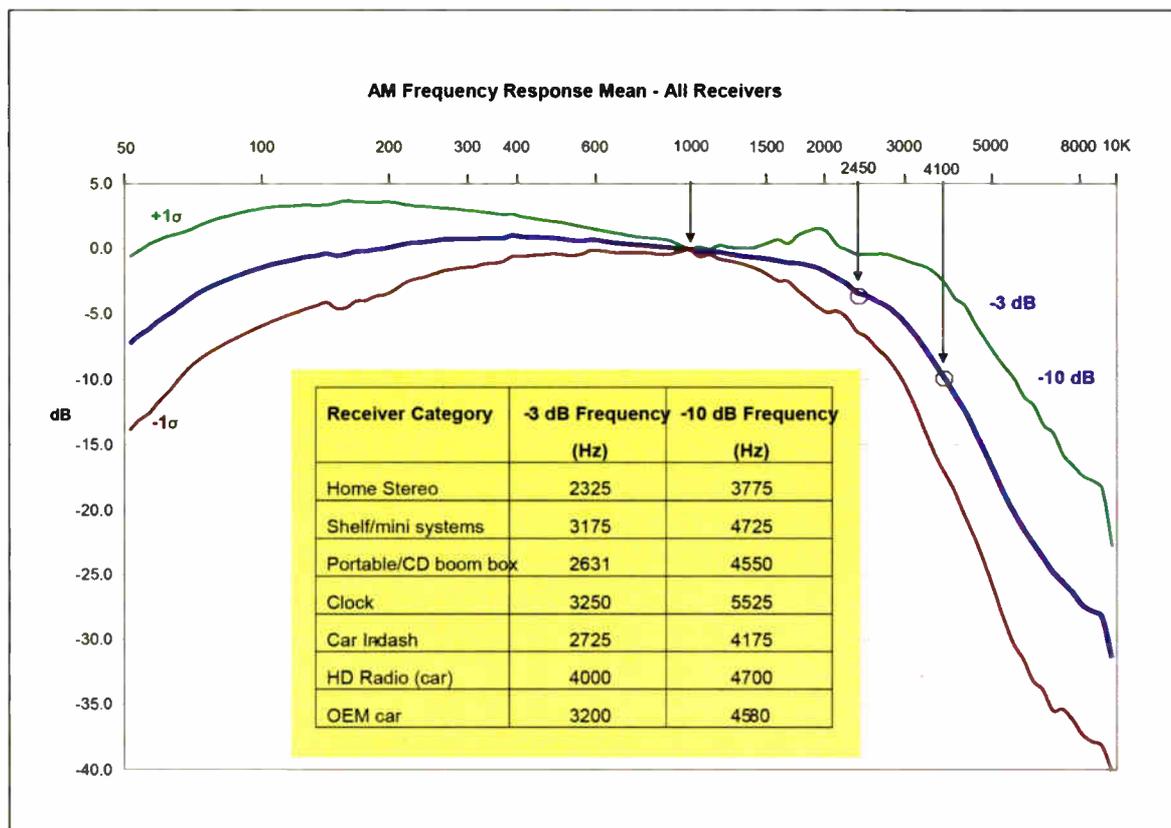
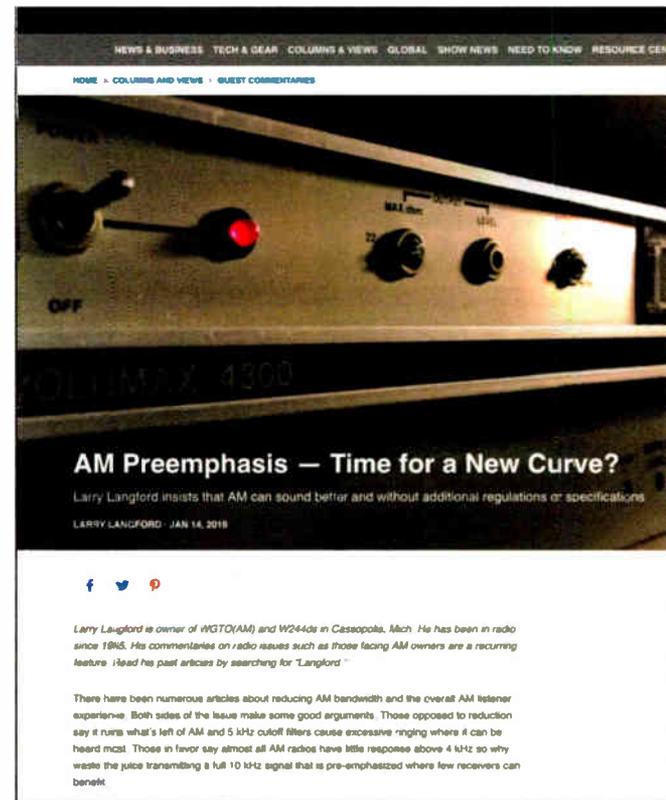


Fig. 1: AM frequency response mean for all measured receivers



AM Preemphasis — Time for a New Curve?
Larry Langford insists that AM can sound better and without additional regulations or specifications.
LARRY LANGFORD, JAN 14, 2018

Larry Langford is owner of WGTO(AM) and W244ds in Cassopolis, Mich. He has been in radio since 1965. His commentaries on radio issues such as those facing AM owners are a recurring feature. Read his past articles by searching for "Langford."

There have been numerous articles about reducing AM bandwidth and the overall AM listener experience. Both sides of the issue make some good arguments. Those opposed to reduction say it ruins what's left of AM and 5 kHz cutoff filters cause excessive ringing where it can be heard most. Those in favor say almost all AM radios have little response above 4 kHz so why waste the juice transmitting a full 10 kHz signal that is pre-emphasized where few receivers can benefit.

BRAVO, LARRY!

Larry Langford's article "AM Preemphasis — Time for a New Curve?" gets a resounding "Bravo!" from me as the first idea to come down the pike that makes common sense and can be implemented on the station side with no change to the hundreds of millions of AM radios in existence.

What do AM stereo, AM preemphasis and AM IBOC have in common? They all required buying new radios — and all flopped in the marketplace.

AM is no longer primarily a music entertainment source, having been eclipsed decades ago by FM, with three times the bandwidth. AM's 5 kHz audio bandwidth is not HiFi, but does perform acceptably for country and rock, and marginally well for other music genres with higher sonic frequency content. AM is dominated by ballgames and talk, where there no need for any frequency over 5 kHz to be highly intelligible.

I love the idea of a bell curve centered on 4 kHz, and I plan to experiment with this idea myself.

Thank you, Mr. Langford, for this fantastic idea! This one actually could help resurrect moribund AM by providing listeners with something spiffy to listen to for a change.

James B. Potter
Owner & CEO
Cutting Edge Engineering,
The Little Spot Shop and JBPotter Agency
Kimberling City, Mo

Write to RW

Email radioworld@futurenet.com with "Letter to the Editor" in the subject field. Please include issue date and story headline.

4 KHZ IS OLD THINKING

I keep reading in numerous articles that AM receiver audio bandwidth is limited to 4 kHz or so. This is not correct and has not been correct for many years.

That 4 kHz number comes from the old "all Japanese six (transistor)" reference design, which as far as I can tell has not been produced by any manufacturer in over 30 years.

I have done an extensive analysis of what is actually produced today in home and portable radios, and posted it at http://learmark.net/gesr/Current_Radio_Design.htm.

If you are using one cheap ceramic filter as the AM IF element, a completely unintended side effect is that the radio is inherently broadband. I have seen some ugly filters out there with responses as wide as +/-30 kHz, even wider. It is usually in very cheap radios with small ferrite bars intended for local station reception only. If the audio bandwidth is limited at all, it is limited by a simple one-pole RC lowpass filter, which is easily defeated by removing the capacitor.

I think these sloppy AM IF bandwidths are also used so that bad mechanical tuning mechanisms can still land you somewhere in the IF bandwidth, and you can hear the station.

That — or in digitally tuned models it allows a cheap DAC to generate imprecise voltages to the varactors and you can again land on local stations. Put a better quality IF ceramic filter in these cheap radios — it does narrow the bandwidth and increase the selectivity, but it also makes the analog-tuned radios hard to tune, and the digitally tuned radios miss some of the frequencies.

Car radios fare a little better; AM is being ported over to DSP code which can allow decent performance but at the cost of dynamic range. It is very easy to get in situations with fluctuating signal levels where the AM audio is clipped. Older car radios used multiple ceramic filters on AM and had very good performance. I own a newer car radio with DSP AM — sensitivity and selectivity are very good, but clipping is an issue.

I have had the opportunity to rent a number of cars in recent years, and AM per-

formance varies widely. In some cars AM barely receives even local stations. It is definitely an afterthought and I would not be a bit surprised to see the band omitted completely.

HD AM is sometimes touted as the savior of the Senior Band, but for news talk and sports, high-quality audio is not needed; neither is stereo. Stereo is only used during commercials and musical beds. The big elephant in the room is the low bit rates involved. We were promised AM music quality approaching FM. HD has failed to deliver, as high-frequency musical content can be aliased and down-shifted to create surreal effects.

YouTube is full of examples of HD AM musical quality compared to C-Quam, with C-Quam the clear winner. I am not a C-Quam fanatic holding onto a failed standard, but it should be pointed out that it was a high-quality musical standard that worked for hundreds of miles at night — as opposed to HD AM, which is nearly impossible to decode anywhere but in a narrow radius around the towers, usually much smaller than the market involved, and unfortunately, it loses lock if there are power lines beside the road, which is probably 99 percent of roads and highways. That is, if there is any market left for AM music other than small ethnic and foreign language niches.

Far from being the savior of AM, HD appears to be receivable only by hardcore DXers who know how to make it actually work — myself included.

Not that the one remaining HD AM station in the area has a format that I have any interest in hearing. At 80 miles away, it has a weak but listenable analog signal; it is indeed remarkable to hear it decode into perfect digital speech, but it only does so if I am more than a quarter mile from any power line. And in my wife's and daughter's new cars, which have shark fin antennas instead of a whip, there is no HD decode, although it tries. The switch to shark fin antennas on cars could not have happened at a worse time for HD AM.

In summary, the best thing that could happen to AM, in my opinion, is for broadcasters to go to wideband mono, concentrate on the core elements that make AM desirable — talk, sports, news and niche audiences — and vigorously lobby the FCC for stricter interference standards on their band. Otherwise, migration to low-power FM may be the only viable business model because receiver design is unlikely to improve for home and portable use, and cars will increasingly delete the band altogether.

*Bruce Carter
Former programmer
WAPN
Houston*

LEAVING LOCAL AM BEHIND AGAIN

The article "The 'Reference Radio' Looks Ahead" (RW Jan. 2), is about another attempt at leaving local AM radio out of the mainstream for listeners.

With all the push to clean up radio as we know it, and the emphasis on local content, why would we want to have a vehicle that prevents us from getting local information in our communities?

Even with the "local emphasis" being pushed by the FCC, most FM stations here in rural Colorado are still automated "sat content" originating from some major hub, such as Chicago or New York, with very little local content or live hosting.

The AM stations are the source of current weather conditions, programs with agricultural information and local politics and town activity information.

In my opinion, the Reference Radio is being targeted to the bored commuter in large cities, where the average listener is either interested in his current commute or wishes to escape with programming of the cookie-cutter content of music and gossip.

Yes, I am an older radio enthusiast, a retired radio engineer at 70. Yes, I miss the days of true radio entertainment and meaningful pro-

gramming. Where is my "local DJ/host" who I can rely on to tell me what's happening in my community? The guy who lives here and is an integral part of the community. The music is the commercial break and the local, live announcer is the link for all the listeners to keep us informed of what is happening now.

This is the stronghold of the AM band, and eliminating it from



the Reference Radio is a further attempt to hijack the listener to a commercially driven, conglomerate atmosphere of controlled commercial content.

I, for one, would not want such a device in my vehicle. Give me an "information station" in my vehicle, where I, the listener and end user can have total selection of content.

I guess I am one of the vanishing breed which "Big Radio" is just waiting to die off and stop being a thorn in their side.

*Richard A. Bell
Montrose, Colo.*



READER'S FORUM

INTEROPERABILITY OF EAS EQUIPMENT

It appears that the results of the recent National NPT Test were not significantly different than the previous test in that some of our Gorman-Redlich EAS units which received the test over the air before receiving it from IPAWS failed to record the audio and subsequently forwarded the message without any audio. In instances where the Gorman-Redlich equipment received the NPT from the IPAWS source first, the message was forwarded along with the included CAP-based audio.

The Gorman-Redlich EAS1 line of encoder-decoder equipment implements several audio quality-control features, among which is filtering on the incoming Attention Tone. As the dual-tone attention generated by Gorman-Redlich EAS equipment is kept within 0.1Hz of the 863 Hz and 960 Hz tones specified in Part 11 (at a temperature span 20° wider than required), the equipment also implements a sharp filter on incoming attention tone, as well as the FSK Header Tones.

Gorman-Redlich alerting equipment implements filtering on the Attention Tone and FSK frequencies not only to strictly adhere to Part 11 specifications, but also to make it difficult for those with malicious intent to inject unauthorized messages into the EAS ecosystem.

The Attention Tone's two constituent tones are supposed to be equal in amplitude. If one cannot hear the 107 cycle beat frequency during transmission of the attention tone, the amplitude is not close.

After receiving the three bursts of FSK for a pre-selected event header, Gorman-Redlich EAS equipment looks for the eight seconds of Attention Tone and, if the tones are present, turns on the voice recorder at the end of the tone to record the incoming audio message.

I suspect that some deployed EAS equipment allows the Attention Tone to

be shortened beyond the 8-25 seconds required by 11.31(c) and 11.32(iv), or even turned off altogether. Anecdotally, the same Gorman-Redlich EAS units flawlessly detect, record, and forward the audio portion of alert messages from the National Weather Service, which always uses the 1050 Hz tone.

Another inconsistency with received messages that we have noticed is the inability to receive lengthy FSK header tones from upstream over-the-air stations using certain EAS encoding equipment. Some installations using Gorman-Redlich equipment will receive messages from an LP1 without issue when the alert contains few locations with slight FSK degradation when the alert contains 5-10 location codes and unreadably degraded FSK with messages containing 10-15 or more location codes. I speculate that some deployed EAS encoders which do not implement such tight frequency tolerances are experiencing frequency drift in their FSK tones in instances where the number of location codes gets lengthy.

This is frequently not an issue for alert dissemination as most events are sent only to a small number of counties and the alert is decoded without issue. A problem arises, however, when LP1 stations insist on sending RWT messages addressed to dozens of counties in their listening area, when only one is required for all stations to receive and log the test.

I have also observed messages from a LP1 in which the amplitude of the Attention Tone takes 4 seconds to reach its final level. Could this be because the output of the EAS unit is passed through an audio processor?

In other instances, I have received CAE messages from an LP1 station that, following the Attention Tone, the received audio message contains several additional Attention Tones before the spoken message. As the audio portion of EAS messages is limited to two minutes, including additional recorded Attention Tone signals within this portion of the message drastically infringes upon already limited time that could be used to relay vital information to the listener.

Instead of unnecessarily expanding the list of event codes, we should be improving the interoperability of the equipment from manufacturers. A good first step toward this goal might be to implement tighter tolerances adhering to the specifications listed in Part 11.

James Gorman
Gorman-Redlich
Athens, Ohio

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GETTING IN PHASE

The article "KB5LPG Signing Off" (RW Jan. 2) contained a discussion of electrical concepts, including three-phase power. Longtime technical consultant Mark Persons wrote in to clarify and correct some of the concepts discussed in that commentary.

Residential power is single-phase because it is simple and easy to work with. Three-phase power works best on high-power devices. The power supply in a three-phase transmitter has more parts, but is less costly because of the size of the parts.

The downside is that the engineer has to think of power on three wires, rather than two. The voltage on each wire, in relation to the other two, is displaced in phase/time by 120 degrees, thus three-phase power.

Some transmitter sites are not near three-phase power lines, so they use single-phase power to drive a motor/inverter, such as a Phasemaster, to create the otherwise missing phase so a three-phase transmitter can run. The efficiency is not as good, but it is an answer to the problem.

— Mark Persons

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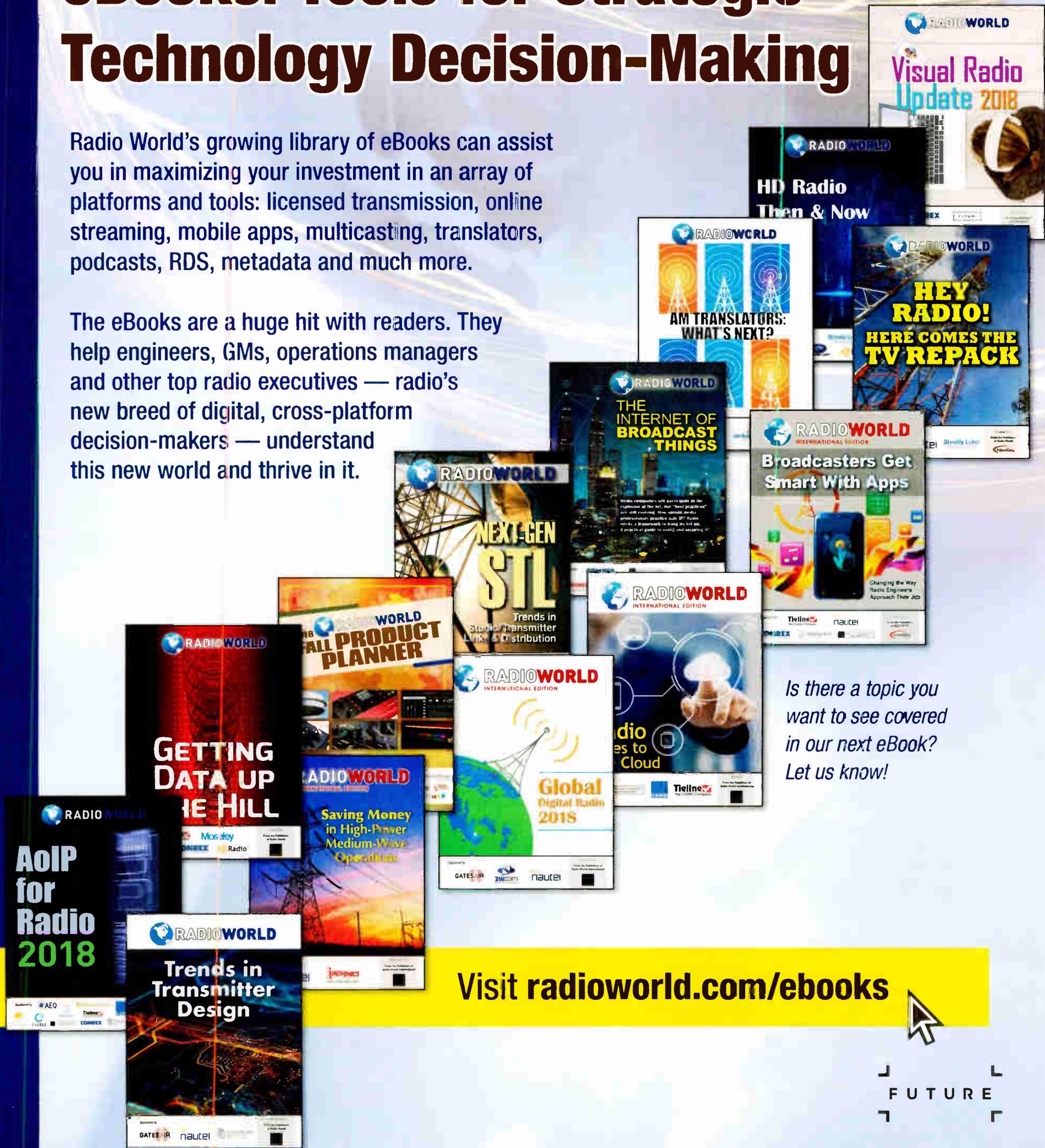
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