



RADIO WORLD

JANUARY 17, 2018

The News Source for Radio Managers and Engineers

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INSIDE

CAP-EX OUTLOOK



• Vendors are cautiously upbeat about 2018. — Page 3

TECH TIPS

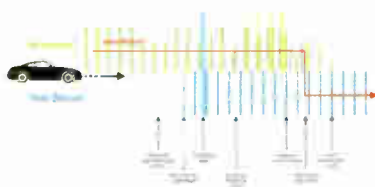
Mark Persons

• Fix it right the first time. — Page 28



HYBRID RADIO

• Buying time for a seamless switch. — Page 37



Peter Doyle Prepares to Depart FCC

Audio chief reflects on busy tenure including process reform, translators, AM and LPFM issues

NEWSMAKER

BY RANDY J. STINE

WASHINGTON — One could argue that, since the turn of the 21st century, no person has spearheaded more FCC policy affecting U.S. radio broadcasters than Peter Doyle. This is a bold statement, but commission watchers say it would be hard to make a case against it. Doyle, 66, has been the chief of the Media Bureau's Audio Division since 2001.

There have been several high-level departures in the past year but probably none better known in radio than Doyle, familiar through his work in shaping and implementing audio division policy. He retired from full-time work in mid-January but will continue in a part-time role for up to six months to aid in the transition to a new division chief.

The Audio Division of the Media Bureau licenses commercial and non-commercial educational AM, FM, FM

translator and FM booster radio services, as well as the noncommercial educational low-power FM service; it also provides legal analysis of broadcast, technical and engineering radio filings and recommends action on applications, requests for waivers and other pleadings, according to the commission website.



Peter Doyle

Doyle has been the division's active and visible face. A former legal adversary praised him for his "sharp critical intelligence." Another observer remarked on his ability to "see both sides, enabling him to serve broadcasters' licensing interests while at the same time serving the public interest." Doyle has directed a wide range of rulemakings that affected radio, from low-power FM initiatives and terrestrial digital audio broadcasting to AM revitalization and the recent proliferation

(continued on page 8)

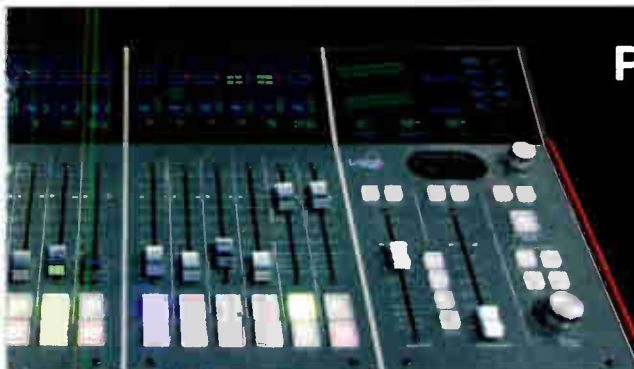
A Kathrein antenna bay being lifted into place.

Are you savvy to 10 essential rules?

Know Your FM Translator Basics

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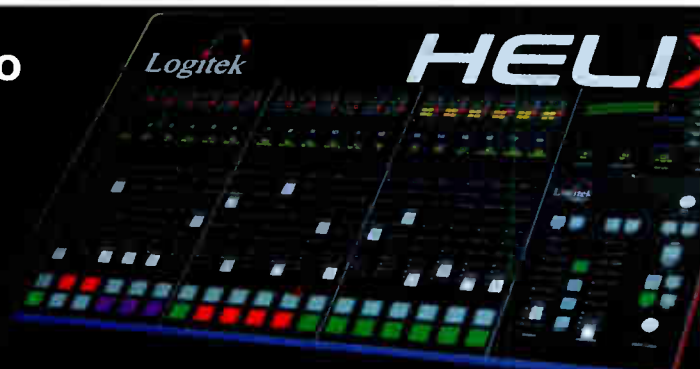
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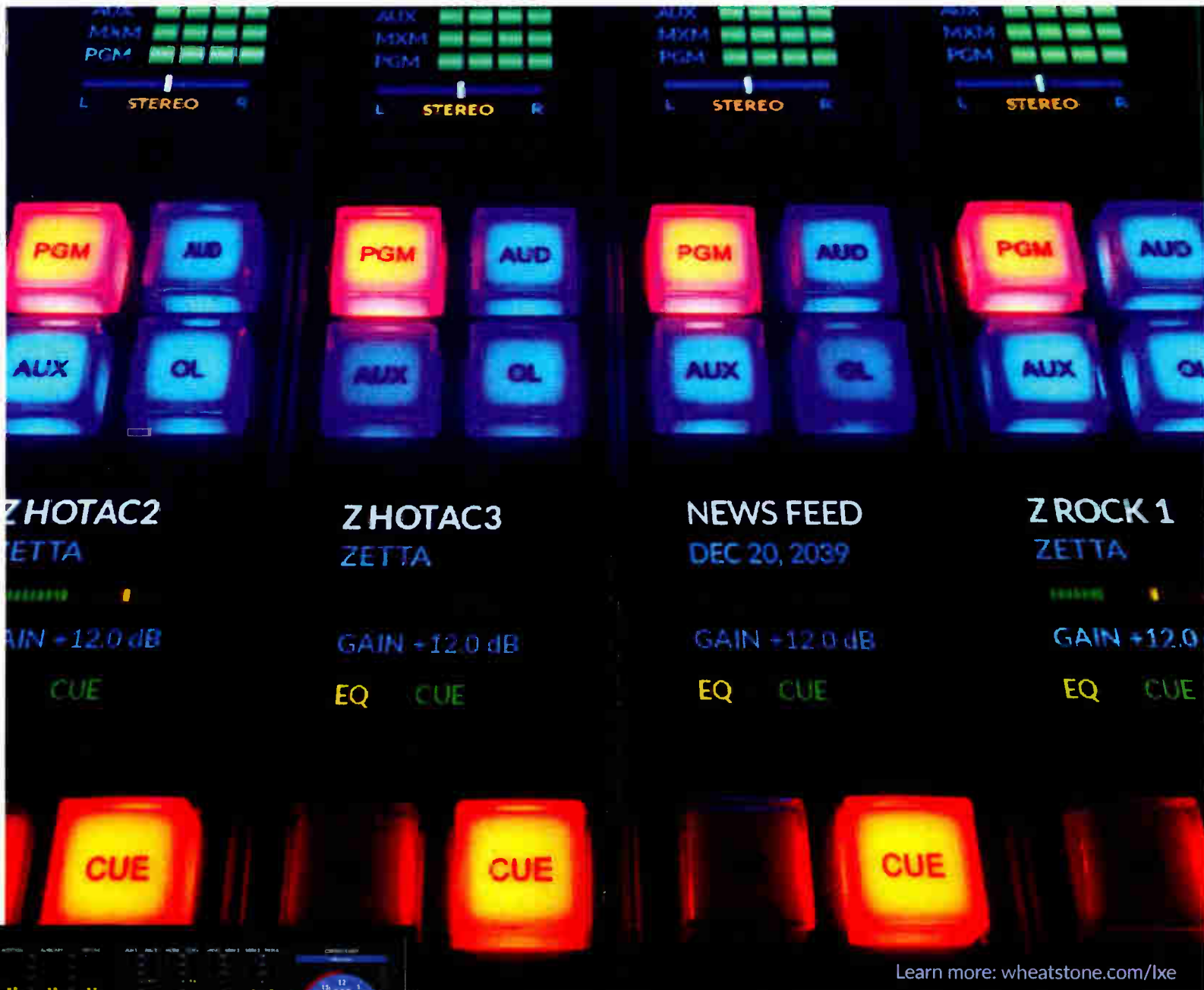
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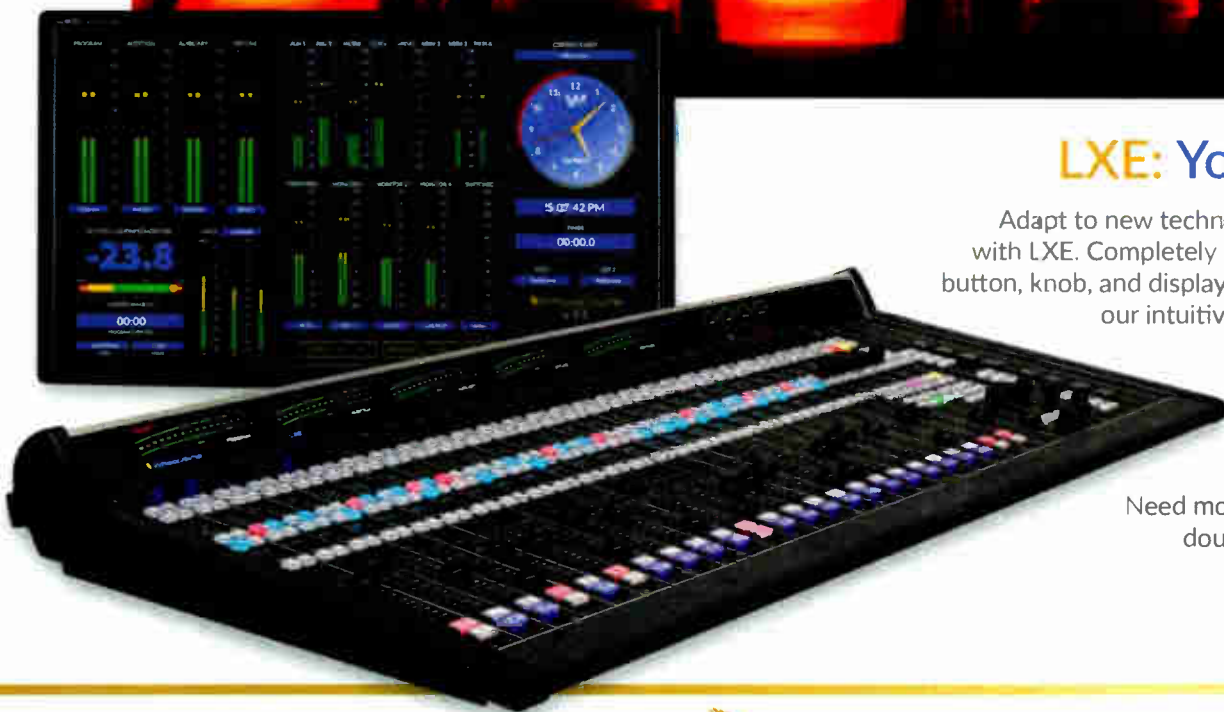
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Hardware Suppliers Cautiously Upbeat

Vendors anticipate a good year for gear sales, despite headlines about broadcaster debt burdens

BY JAMES CARELESS

With two of the U.S. radio industry's largest broadcasters grappling publicly with debt, conventional wisdom might hold that the coming year would be a tight one when it comes to capital expenditures.

But several vendors contacted by Radio World, if not jumping up and down in expectant joy, said this should be a solid year for their business.

"I expect to see a lot of sales growth in 2018," said Bob Cauthen, president of equipment distributor SCMS.

Another supplier, Eric Hoppe, founder of Progressive Concepts, said this year "should be better than 2017, which was better than 2016."

Matt Lightner, founder of broadcast/AV equipment supplier Lightner Electronics, said, "I'm not sure what will happen with iHeartMedia and Cumulus Media — both of whom are having financial issues — but I do believe that sales to other radio groups and independent stations are looking up in 2018."

Several manufacturers echoed those sentiments.

HOT SELLERS

With the Federal Communications Commission opening a fourth and presumably final window this month for AM stations to apply for FM translators, vendors expect sales of gear related to translator installations to be brisk. This is in addition to any business from AMs

that already applied during three prior translator windows and are waiting on licensing.

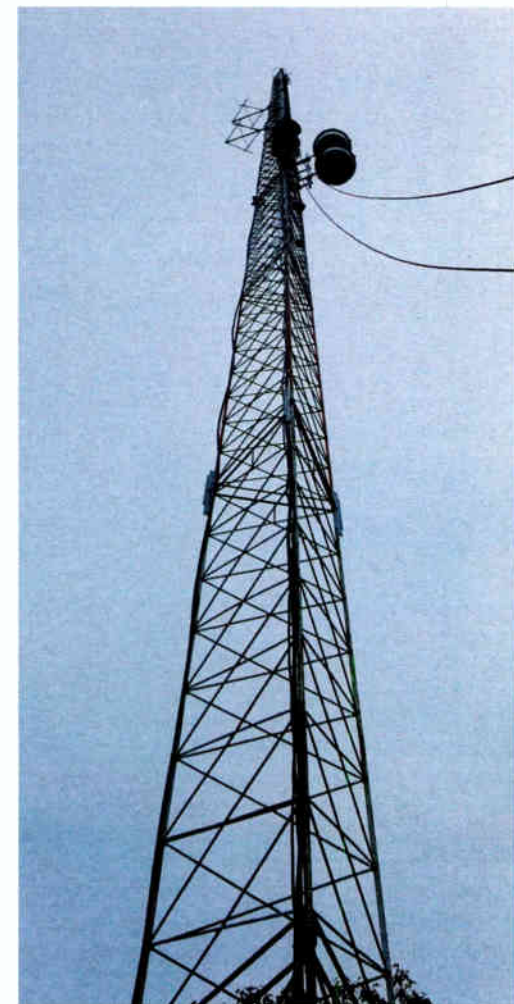
"We are all still waiting for the licenses to be awarded from the first window for Class C and D AM stations" in the summer of 2016, Lightner said. Nevertheless, "we are seeing a lot of AM stations gearing up to add FM translators, which means that we are extremely busy selling FM transmitters to address this demand."

Cauthen said sales are brisk, too, for antennas and related equipment that will be part of those translator systems.

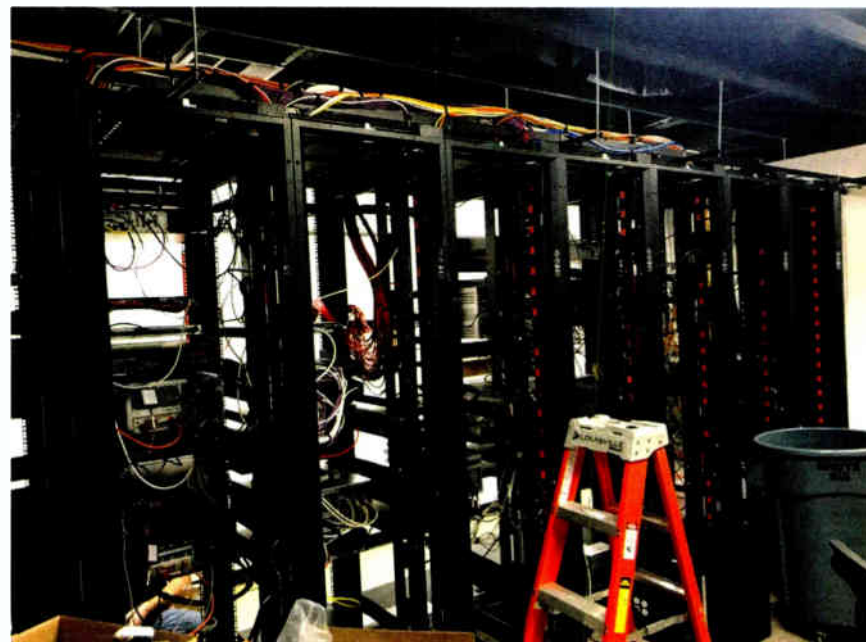
He said the FCC's TV spectrum "repack" — which will see 987 U.S. TV broadcasters change channel allocations for a share of \$10 billion from wireless carriers — should result in FM equipment sales. As RW has reported, the TV repack process has numerous potential implications for FM operators (see "Hey Radio, Here Comes the TV Repack" at radioworld.com/ebooks).

Hoppe also has seen a big increase in sales related to webcasting. "Our new WebStation from D&R is a popular seller, along with the conventional software controlled studio mixers and consoles made by D&R," a manufacturer based in the Netherlands.

Another continued big seller in 2018 are likely to be IP codecs used to send broadcast audio via wired or wireless means from studio to antenna site. They continue to grow their role in an STL market segment long dominated by microwave links.



Working on W264BZ, an FM translator on 100.7 MHz in Tyrone, Pa. — a Lightner Electronics job for WTRN(AM). Activity from the translator segment was cited by several companies as a source of likely growth.



A row of racks is seen from the rear during an installation by an SCMS customer. Vendors report cautious optimism about the cap-ex outlook for 2018.

"We have been seeing lots of codec sales to date, and expect them to increase in 2018," said Hoppe. "Compared to conventional STL, codec-based audio delivery is more secure, more reliable and easier to troubleshoot."

The codec trend is noticeable beyond STL applications. Manufacturer Tieline has quoted on systems to replace distribution and remote broadcast equipment for a number of networks in 2018. Jacob Daniluck, technical sales specialist for the Americas, said the company is "really positive" about the year, sensing interest in two main areas.

"The first area is syndication/distribution networks. As satellite costs have increased, engineers are looking for new and more cost-effective products to achieve a similar outcome over more affordable broadband infrastructure," he said. "Transmitting multiple IP streams over affordable broadband with redundant IP streaming is now the benchmark

(continued on page 6)

Spring Show Promises a Fresh Feel

Expect some changes to familiar routines at the NAB Show coming up in April



Headline events like the NAB Show Opening — here with association President/CEO Gordon Smith in 2017 — will be held at a new Mainstage in the LVCC's North Hall instead of a ballroom at the neighboring Westgate hotel

FROM THE EDITOR



Paul McLane

NAB Show conferences and events will have a fresh feel this spring; and some traditional schedules, keynotes and locations will be different.

The organizers' strategies include shorter presentations, fewer competing conference tracks, an expanded number of less-formal "engagement" sessions, a revamped plan for awards, and the addition of a 1,000-seat new Mainstage area of the North Hall of the Las Vegas Convention Center for major events like the opening keynote, instead of having these in the hotel next door.

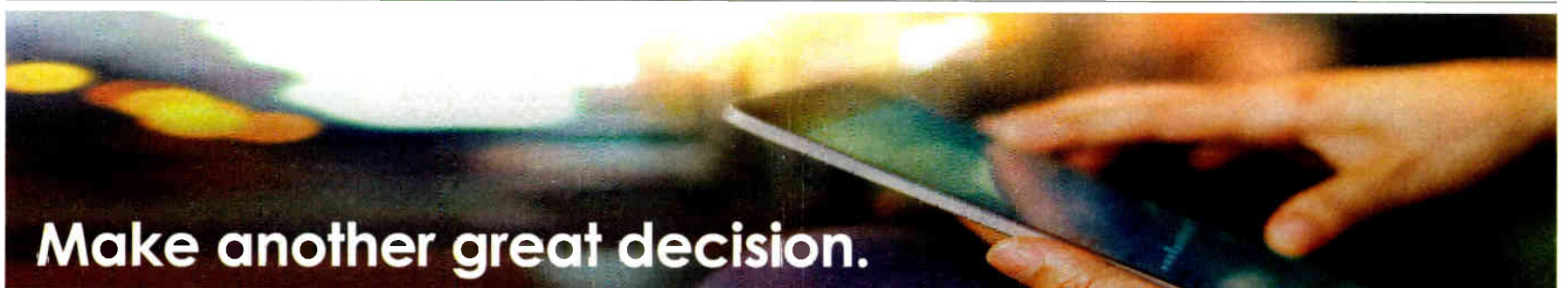
Radio World will tell you more about the spring show in our annual preview issue. But I wanted to share this info now for the many readers who attend and may be making travel plans.

Some specifics:

All NAB Show conferences will now use identical session schedule formatting, in four "blocks" daily of 80 minutes each — two blocks in the morning, two in the afternoon.

That's not something you might notice or care about; but it should help reduce conflicts for people who attend more than one conference, and make it easier to plan.

More obvious to us attendees is that conferences *(continued on page 5)*



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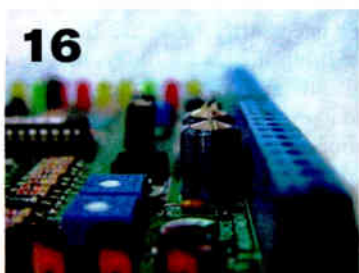
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also will make expanded use of engagement or e-poster sessions — under the name “ENGAGE!” — with which NAB experimented last year. At each session, four or five speakers, all on a given theme, are scheduled at once in a large room equipped with individual stations equipped with a laptop and 55-inch monitor. Attendees can hop from one to another speaker or stick with just one.

The speakers are encouraged to have about 20 minutes of material and will then either repeat it or can dig deeper depending on attendee interest. Presentations may include some equipment demos. As you might guess, the experience is less formal, more energetic and more interactive.

Also new will be two events highlighting industry achievements; these replace the Television, Radio and Technology Luncheons.

The NAB Achievement in Broadcasting Dinner will be held Monday evening April 9 at the Encore Las Vegas. It's a ticketed event with networking reception and dinner, and it includes presentation of the NAB Radio and Television Hall of Fame Awards and NAB Digital Leadership Award.

Then on Tuesday April 11, the “NAB: We Are Broadcasters Celebration” will be held at 3 p.m. It's open to all attendees and will be held in that big new Mainstage at the west end of the North Hall (a location that's also likely to help with North Hall traffic).

The Tuesday event includes presentation of the NAB Crystal Radio Awards and the NAB Crystal Heritage Award, in addition to the Radio and Television Engineering Achievement Awards and the Television Chairman's Award. A networking reception follows.

As always, Radio World will be on site for news coverage of the keynotes, conferences and new product displays.

I peeked at the agenda for the Broadcast Engineering & Information Technology Conference, which is always strong and received 400 proposed presentations this year. Topics will include mobile field strength measurements, AES67, FM boosters, audio processing, connected car trends, IP network timing issues, crypto- and cyber-threats, implications of the TV repack, ATSC 3.0 implementation, “big data” in media, advanced newsgathering in the post-ISDN era, and several sessions on the implications for media of artificial intelligence.

By the way, if you are interested in technical content but plan to arrive late Sunday or early Monday, you're missing a lot of great stuff. Tech activities start Saturday morning and run through Sunday; and there will be more of them. They include the “Digital Strategies

NEWS

Exchange [DFX]” targeting broadcasting's online leaders, the Global UHD Conference, a joint U.S.-Korea daylong presentation on Ultra HDTV status and prospects, the SBE Ennes workshop on “Tomorrow's Media Toolkit — Today”

and an IEEE BTS Symposium. So consider arriving earlier this year.

Watch for the full conference program at <http://nabshow.com/education/conferences>, and for RW's detailed preview coverage in late March.

CHANGES AT RADIO AND RADIO WORLD

Effective this month, our sister publication Radio magazine will no longer be published as a standalone print publication. While select Radio magazine content will appear in Radio World moving forward, the bulk of the excellent brand of coverage that Radio is known for will be delivered exclusively via its new turbo-charged website radiomagonline.com, three times per week via the Radio Magazine Today e-newsletter and daily through its branded social feeds.

Radio magazine was first published in 1994 as a spinoff to Broadcast Engineering magazine called BE Radio; it has been an industry staple for more than three decades under the editorial leadership at various times of Skip Pizzi, Chris Scherer, Shane Toven and Doug Irwin. I'm proud of the

work it has published since NewBay acquired it seven years ago and I look forward to working on its reinvention as a digital-only brand.

Doug Irwin will continue to be involved as a contributor and trusted advisor to both Radio World and to Radio. He has done a great job since taking on leadership of Radio magazine's content and has his own long relationship with its readership and writers, which we value.

Thanks for reading both (or either) Radio World and Radio. Your input and your voice are valued here as both brands continue to report on digital trends, new technology and the changing radio media landscape — albeit with different lenses. Write to me anytime at radioworld@nbmedia.com. Your ideas will be welcomed.

CAP-EX

(continued from page 3)

for many networks. It's reliable and delivers significant cost savings."

The second area is with remote gear. Daniluck said. "Broadcast networks are interested in codecs that deliver high-quality audio with multiple IP interface options, to cover every connection possibility. Multiple cellular, LAN and Wi-Fi interface options are essential, as is redundant IP streaming and IP bonding capability."

Because ISDN and even POTS are still used by many networks, options for connecting over these networks are still desirable. "Simple and intuitive user interfaces, with one-touch configuration and connection capabilities, are also highly sought after."

But IP-based technology continues to grow across the radio enterprise.

"We are seeing lots of IP console sales," said Matt Lightner. "One reason radio stations like them is because these consoles can be diagnosed and reconfigured remotely, which is a real advantage for radio groups with shared engineers."

Manufacturer Wheatstone says such infrastructure is changing assumptions throughout radio.

"In a few years, we might see an entirely different way of operating — regional centers, for example," said Director of Sales Jay Tyler. "All that is going to be leveraged off of IP. And, fortunately, one of the benefits of IP audio compared to the traditional system is you don't have to do it all at once. We've never really run our business on broadcasters' cap-ex budgets for this reason."

In the past, Tyler said, broadcasters budgeted hundreds of thousands of dollars for a new project, then did it all over again when things changed. "They don't necessarily have to do that now; they can add onto their existing IP infrastructure. They are hanging onto their equipment longer and making changes as they occur."

Thus, he said, while the industry is experiencing a second wave of audio-over-IP project buildouts, "we are also adding more and more functions and devices onto those studios that have been IP networked for some time." Major-market groups are using virtual tools to add more customized work-

flows to studios, and smaller and mid-market groups are streamlining stations with IP connectivity and routing, many for their first time.

On the RF front, Bob Cauthen of SCMS hopes that synchronous boosters should be big sellers, helping FM stations fill in coverage gaps. SCMS was recently named U.S. and Latin America sales rep for the MaxxCasting system developed by Geo-Broadcast Solutions and GatesAir. It combines radio and cellular techniques to enable FM stations to enhance their signals by reducing multipath interference between main and booster transmissions by using a cluster of high-power, directionalized and synched booster sites.

DEBT

One big shadow over vendors' business outlook is the debt situation of iHeartMedia and Cumulus Media, which have occupied industry business headlines of late.

"Because of the debt structure of these companies, their cap-ex have been very low compared to previous years," said Cauthen. "This has certainly bitten into our sales. Fortunately we're a 41-year-old company with no debt, but we still feel the effect of their lower purchase volumes."

Harder to gauge is how much money might be owed to the industry's various equipment suppliers by Cumulus, which is currently under a voluntary, court-supervised Chapter 11 proceeding to restructure its debts.

These trends do have a flip side: "We are getting lots of repair work from iHeartMedia and Cumulus," said Lightner. "It makes sense: When you're



A studio used by Dutch DJ Ferry Maat, with equipment provided by Progressive Concepts.

not buying new equipment, you have to fix what you've got to keep it running."

Another factor to watch is how the recently completed merger of Entercom Communications with CBS Radio will affect equipment buying. Such mergers and acquisitions often are followed by a period of facility integration or conversions as the acquiring company begins to convert studios and RF plants to its preferred hardware brands or switches station business relationships to its favored dealers.

Tyler said the recent consolidations involving Wheatstone customers like iHeartMedia, Entercom, Beasley and CBS "didn't really take IP audio expansion off the table. It might have even sped it up. And yes, we understand that there's debt, but stations are still having to deal with leases that end and

so forth. We work with broadcasters that don't necessarily have the budgets for everything they want today, but we try to give them the upward mobility they'll need to eventually get into their ultimate studio."

Meanwhile the official end of the main studio ruling may translate into business and new product opportunities. And all of this plays out in a national context of generally soaring stock prices on Wall Street, low inflation and low unemployment.

Overall, the vendors who spoke with Radio World were cautiously optimistic that 2018 will be a good sales year for their market.

"There's going to be a lot of business coming in, with all the FM translator sales," said Lightner. "All told, things are looking up for us in 2018."

IN CASE YOU MISSED IT

A sampling of recent headlines delivered to Radio World readers in their free daily NewsBytes e-newsletter. (Click the *Subscribe* tab at [radioworld.com](#), then *Newsletters*.)

► Elenos Acquires Broadcast Electronics

An Italian transmitter maker makes a notable U.S. move.

► FCC, Emergency Groups Work on WEA Changes

The Federal Communications Commission has proposed a series of improvements to the nation's Wireless Emergency Alert system that are designed to better target alerts to specific geographic areas.

► NextRadio Goes for a Drive

The app's parent, part of Emmis, has a new in-car business relationship, linking with in-vehicle infotainment systems that use the Abalta Technologies Weblink platform.

► Spotify to Go Public

Could the audio streamer be worth \$15+ billion?

► White House Sends Carr Nomination for Full FCC Term to Senate

If approved this would keep commissioner on the board until 2023.

► World Christian Broadcasting Names New President

The Franklin, Tenn.-based organization announced Andy Baker will replace Charles Caudill.

► Pai Passes on CES

The chairman canceled his appearance at the big consumer electronics technology show, reportedly after threats to his safety.

► 2017 U.S. Broadcast Deals Crack \$8B, Highest Since 2014

Some big mergers in TV and radio boosted the numbers.

► It's (Crystal Radio) Awards Season

Entries are being accepted for the 2018 NAB Crystal Radio Awards, which recognize outstanding community service by NAB member stations.



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DOYLE*(continued from page 1)*

of FM translators. He has appeared numerous times at industry conferences to explain commission processes and answer broadcaster questions.

In a recent bio for a convention appearance, the National Association of Broadcasters described his work thus: “[Doyle] has been a major contributor to several rulemaking proceedings to streamline broadcast application processing and licensing procedures, reform FM allotment rulemaking procedures and Section 307(b) processing policies, initiate electronic filing and increase flexibility in the radio technical rules. Recent policy efforts include rulemakings to implement the Local Community Radio Act and promote a vital community radio service, to permit AM stations to use FM translators and, more generally, to revitalize the AM service, to raise terrestrial radio digital power levels and to promote the growth of tribally owned radio stations.”

The veteran communications attorney reflected on his FCC tenure with Radio World.

Radio World: Give us a quick overview of what the Audio Division chief does.

Peter Doyle: The job has to meld together the legal and technical issues when it comes to licensing. The Audio Division is responsible for licensing of all radio stations, whether new, modifications or renewals. The Audio Division also takes the lead on most radio-centric rulemakings, like AM revitalization. So getting the legal and engineering teams here to collaborate and work together is our top responsibility.

RW: What role does the chief fill when it comes to making policy and setting policy?

Doyle: I like to say it's up to the Audio Division to propose, and up to the commission to dispose. It's really a wonderful collaborative process. [The division] has been encouraged to take a bottom-up approach; and if we see things that can make a difference, we have been encouraged to make it. We get direction from all sorts of places though, including the general counsel's office, who sometimes tell us what we can and can't do.

RW: Does the job differ as U.S. presidents and FCC chairs come and go?

Doyle: Honestly, my job has not changed much based on who is chairman. My first challenge as division chief is figuring out how to work effectively with my bureau chief and his or her management style. The one notable exception is Chairman Pai, who has been very supportive of new radio policy initiatives and licensing matters, more interested than any chairman since Jim Quello back in the early 1990s.

RW: What do you think your FCC legacy is when it comes to radio broadcasting?

Doyle: A few things really.

We've made tremendous strides in reducing our backlogs, and in particular with applications for review. We've taken a backlog of 160 applications for review and we've taken that down to zero.

I'm also very proud of the implementation of the Local Community Radio Act. Congress, as you may recall, broke a logjam between translators and LPFM stations in terms of access to remaining spectrum in 2010; and in very vague language they told us to take care of both services.

“It's up to the Audio Division to propose, and up to the commission to dispose.”

We undertook very detailed engineering in over 150 markets and found where the spectrum was and came up with licensing policy that in the end resulted in robust licensing for both low-power stations and FM translators.

I think another great accomplishment the past few years has been the soft migration of two-thirds of all AM stations to the FM band with FM translators. It's been an enormously successful transition.

A smaller thing has been the creation of a tribal priority for licensing. We've been able to develop a model to fast-track licensing in grossly underserved Indian country. We have licensed some full-power stations and dozens of LPFM stations in just the past few years.

And last is a process change when it comes to a station changing its community of license. It used to take a rulemaking to do that, and it was slow and tedious. We overhauled that and created a whole new way for stations to better reach and serve listeners. It was a very streamlining reform.

RW: What does your departure mean for the remainder of the AM revitalization rulemaking?



Photo by Jim Peck

Doyle talks about FCC rules at the 2014 Radio Show in Indianapolis as part of a panel with Al Kenyon of FEMA, left, and Nancy Ory of Lerman Senter.

Doyle: Oh, it's a team process. It will go forward quite well.

We have some final strands to work out. We have a significant technical issue in terms of whether or not to tweak our nighttime protections. Clearly the

right during the process of establishing digital audio broadcasting, and are there regrets on your part?

Doyle: What we did right was let the [National Radio Systems Committee] do wonderful work, and for us to support that work and come up with what was really a de facto standard. Really, the praise goes to them. This was a spectrum recapture initiative, a voluntary one.

I was hoping for better penetration of receivers at this point, but certainly in major markets the group owners have done some wonderful things. We could have started with some higher power levels in the sidebands, but people wanted to move carefully and not impact the technical integrity of the analog service.

One of the great ancillary benefits of the DAB proceeding has been creating the opportunity using FM translators to rebroadcast those HD2 and HD3 channels in analog. That has promoted greater program diversity for listeners.

RW: Do you still think the iBiquity IBOC standard should be the U.S. standard?

Doyle: Let me put it to you this way: The commission announced that we were going to have a horse race; and one horse showed up. And that horse won. Until there is another horse in the race, I'm not too sure what there is to debate.

RW: At what point did the FCC become aware FM radio was going to be affected as a result of the TV channel repack process? In hindsight, should higher priority been placed upon that potential impact?

Doyle: I really haven't been involved with that and can't comment. The repack people would have to be the ones to answer that question.

RW: We are at least a decade into HD Radio. What do you think the FCC did

(continued on page 10)

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DOYLE*(continued from page 8)*

RW: You were in private practice prior to joining the FCC. What advice do you have for attorneys approaching the commission on policy matters?

Doyle: I think we have a very savvy bar right now — very good at representing their clients' interest.

If you look at our adjudicatory practice we have done outstanding work. The D.C. Circuit [Court] has commented favorably at least three times on staff decisions that have made it that far.

Here's my one piece of advice: There are times when licensees or objectors seem willing to pursue frivolous issues. And I'm not sure to which end, but I think the record of the division in terms of getting things right, mostly the first time, is good. I guess there could be less litigation on issues that seem to lack merit.

RW: The commission in December announced a window [Jan. 25–31, 2018] for all classes of AMs to file for a new FM translator; so more will

reallocation is way above my pay grade. I will say that the recent translator and low-power FM licensing and our ongoing full-power FM auction work, along with the 2007 and 2010 NCE windows, [suggest that] the demand side of the equation seems to be strong and enduring.

One of the biggest surprises for me has been underestimating the demand for FM spectrum. We know tons about the supply side, like how much spectrum there is and where it is and where it's not; but we leave the demand to the marketplace. And when we have had pools of applications for this and that, inevitably I have been on the low side with my estimates.

RW: How much do you listen to terrestrial radio, and how have your listening habits changed?

Doyle: A bunch. I like news, sports and politics. I consume podcasts and satellite radio. I listen to it all. I'm happy to have so many options.

RW: Leaving aside political and regulatory restraints, if you had three wishes for the Audio Division, what would they be?

“One of the biggest surprises for me has been underestimating the demand for FM spectrum ... When we have had pools of applications for this and that, inevitably I have been on the low side with my estimates.”

be coming on board. Which way is the division leaning with regard to the translator/full-power FM interference resolutions?

Doyle: I don't know which way it's leaning. My personal view is that there are problems that we need to fix. The commission will have an opportunity to weigh in on the issue. There's an application for review that is pending with us and working its way through the process. We should be able to address some aspect of the complaint process from that. I'm not sure if that is a full solution. I think right now we need to think big picture, but I'm not sure that commission is focused on it — other than recognizing how valuable translators are to so many broadcasters and trying to figure out a reasonable way to make them a reliable part of broadcast operations.

RW: Do you ever see a day when demand for new FM stations warrants the allocation of additional spectrum for more opportunities on FM?

Doyle: I see it, but the issue of spectrum

Doyle: Hmmm, three wishes.

First, that the Audio Division continues to have the resources it needs to get things done. While we are vastly better in doing our licensing work and far more efficient than when I began, we are working in an era of more limited resources. There is always a fight for IT resources and personnel. I'm not the only retirement in cue, so I hope they can maintain the level of resources needed to operate efficiently.

Second, I hope they can solve the FM translator interference issue. The current process just isn't working out well. We have injected thousands and thousands of FM translators into the FM band over the past few years. And we have expectations by AM broadcasters and other broadcasters to use these translators to reach listeners and grow their businesses. The current complaint process is very unwieldy. So I'm hoping the commission can better accommodate licensees' expectations about translator and full-power FM service.

And lastly, I hope the division can

Peter Doyle was born in Brooklyn, N.Y., where his childhood friends included Chuck Schumer, the future U.S. senator. Doyle graduated cum laude with a juris doctor degree from Georgetown University Law Center in 1985; he holds a bachelor of arts degree from the University of Rochester and a master of arts in philosophy from the University of Virginia.

In the 1980s and early '90s, Doyle was an associate at Dow, Lohnes & Albertson and at Arter & Hadden. His work included broadcast, wireless cable and cable matters, according to the FCC. He joined the commission in 1995, became assistant deputy chief in 1998 and was promoted to chief of the Audio Division in 2001, succeeding Linda Blair.

A successor as head of the bureau hadn't been named as of December. A posting on USAJobs, a federal jobs website, for "Supervisory Attorney Advisor (Division Chief) in the Audio Division" ran in the fall. The closing date to apply was in late September; the position's salary range was given as \$131,767 to \$161,900 per year.

Doyle and his wife Anita live in Alexandria, Va. They have two grown children and several grandchildren, with another on the way.

continue to be a leader in process reform.

RW: Have you closely followed the search for your replacement? And have you been involved at all?

Doyle: I have shared my views, but the important thing is trying to figure out how it will work after I leave. This is clearly a decision for [Media Bureau Chief] Michelle Carey and Chairman Pai to make. I want to make sure the division remains a vital and happy workplace if key to the process. I'm happy with how the search is being carried out.

RW: If you were to leave a note behind in your desk drawer for your successor, what might it say?

Doyle: I think the key is figuring out which fights are worth fighting and which are not. And being judicious about figuring out what is really going to make the division a responsive unit that can discharge it responsibly. Sometimes the resources that are required just aren't there to make it worth the fight. The most important thing is making sure the industry know they can count on us to get their sales applications [and] modification applications done, and the adjudicatory process will be fair and predictable and transparent for all interested parties. You can do that, but you have to be careful about the issues you take on.

RW: Plans call for you to remain in a part-time position beginning with the start of the New Year. Do you know how many hours you'll be putting in?

Doyle: The program I was approved for



Peter Doyle at the 2011 Radio Show in Chicago.

Photo by Jim Peck

is a 20-hour a week position for up to six months. I'm here for as long as my successor is happy to see me in the office. And as long as I'm happy to be in the office. As long as those things happen I will stay through the entire six-month process. I love the work I do, but it's just time to work a little less than full time.

RW: Any final thoughts as you look ahead to sweeping out the office?

Doyle: The management team I worked with every day is outstanding and has been very stable for a long period of time. Jim Bradshaw, deputy chief of engineering, has really been like a co-chief with me the past decade. Lisa Scanlan, Mike Wagner, Rudy Bonacci, Tom Hutton, Nazifa Sawez, Annette Smith, Tom Nessinger and Christine Goepf have been unbelievable to work with. I would not have been able to accomplish much of anything without those folks.

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VRT Preserves Its Audio Heritage

The project involves the digitization and archiving of approximately 38,000 records



Pictured in the VRT studios are, from left, Koen Renders, media manager music archives, VRT; Anouck Gauvain, audio engineer, Gecko; Emiliano Flores, project leader, Gecko; Ben Vanderweyden, audio engineer, VRT; Klaas Janssens, audio engineer, VRT; and Jean-Baptiste Meunier, CEO, Gecko.

BY MARC MAES

BRUSSELS — Nine years after the Belgian Dutch-language public broadcaster VRT decided to launch a digitization and archiving project, the massive transfer of audio-visual content is entering the final stage.

By 2019, some 38,000 lacquer and shellac record sides will be digitized and stored for use and future reference.

THE BEGINNING

In 2008, the VRT initiated several projects to ensure the digital safeguarding and archiving of its massive sound and image library.

Then in 2012, the government launched Vlaams Instituut voor Archivering (VIAA), an organization taking on the sustainable archiving and access of all Flemish audio-visual heritage content.

“Whereas VRT’s projects focus on the public broadcaster’s audiovi-

sual archives, VIAA takes a broader approach, archiving all of the audio-visual content within the collections of public broadcasters, heritage libraries, museums, archives and performing arts organizations,” explained Brecht Declercq, Digitization and Acquisition manager with VIAA. “VIAA acts as coordinator for the entire digitization strategy of audiovisual heritage in Flanders and manages the financing [with government subsidies].”

With efficient archiving and access being key, VRT opted for a central music archive management system, manufactured by Austrian archiving specialists. NOA. The NOA mediARC system includes the mediARC web function, which serves a few hundred users, MediaButler transcoding and the NOA Ingest-Line CD Lector migration device.

CENTRAL MUSIC ARCHIVE

Christine Fettweis, head of VRT’s Music Library and Documentation department, adds that from day one, the NOA system has offered great results and has been key in the VRT’s evolution toward a centrally managed music service, whereas in the past each channel had its own audio library.

A team of 18 people continuously adds metadata to the music tracks for users’ reference, and performs maintenance on the NOA front end user interface.

“NOA Mediarc is a user-friendly, central system that allows direct access to all VRT workers,” said Fettweis. “The big advantage is we can now import audio content into our Dalet+ and MusicMaster playout systems, and that the full catalog can be consulted by staff working remotely.”

VRT has completed the digital archiving of its audio and Betamax cassettes, DAT tapes and CDRs and, as of press time, had nearly finished the file transfer of its 1/4-inch audio tapes. The next big chapter in VRT’s digitization process is the restoration, digitization and archiving of some 6,000 self-recorded lacquer discs, plus another 11,000 commercial shellac discs, mainly containing Belgian music.

Because transport of these fragile items is not easy and very expensive, VIAA, together with VRT, decided to keep them in-house instead of shipping them to an external digitization service provider.

UNUSUAL APPROACH

Normally, VIAA picks up audiovisual media at VRT (or another broadcaster) and groups them in batches for shipment to specialized external digitization companies.

“In this exceptional case, we agreed to do the digitization at VRT’s headquarters, and for a significant part, by VRT engineers,” said Declercq. “The public broadcaster has both equipment and expertise in-house to digitize part of these records themselves.”

The massive lacquer and shellac sup-

(continued on page 14)



Christine Fettweis cleaning the surface of a disc.



Operators wash a lacquer disc with ammonia.

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PRESERVATION

(continued from page 12)

plied by the VRT and Flemish heritage institutions, which add up to about 38,000 record sides, urged VIAA to open a tender bid for a third partner. This company had to agree to transfer part of its staff, digitization and archiving equipment to VRT's studios and to work with VRT operators," Declercq explained.

"Via a European tender, we appointed French company Gecko, specializing in the digitization of records, tapes and audio cassettes. Gecko will digitize 11,000 commercial discs from VRT's vaults as well as and approximately 3,000 disc sides from other heritage institutions."

incorporated defined frequency curves and integrate digital plug-ins into the recording system. We make a simultaneous double recording of each record: a flat signal recording with the original content and a file with the curve we think is a best fit for the recording. The signal is then channelled through a Lynx Aurora eight-channel converter, which allows us to determine the version that results in the best modulation."

The record files are stored in a WaveLab environment at a 24-bit/96 kHz rate — a reasonable quality according to Janssens, considering that that the recordings were made when dynamics and frequency characteristics were rather limited.

"Contrary to the other media types



Each side of every record is washed with osmosis water, ammonia, nonalcohol-based detergent or lamp oil and, if necessary, repaired with additional wax or glue.



A lacquer disc is played on one of VRT's vintage EMT 921 record players equipped with a dedicated stylus.

OPTIMAL CURVE

VRT's specialized engineers are focusing on the lacquer discs. It is a quite labor-intensive process, as every record is individually checked and then washed with osmosis water, ammonia, a nonalcohol-based detergent or lamp oil and if necessary repaired with additional wax or glue.

"One of the challenges was to find the best suitable stylus," explains Klaas Janssens, sound engineer of VRT's Music Library and Archiving department. "The VRT ordered a number of needles from Expert Stylus, a U.K.-based manufacturer of tailor-made needles. Today we have styli for records going back as far as 1934." VRT still plays the records on its own vintage EMT 921 phonograph players.

The next step for VRT was to implement the most suitable frequency correction curve on the records. "Before the RIAA standard, every record company used its own optimal curve to cut the record. We had to decide on a frequency curve, which had to be selected for each recording," said Janssens.

"We use a Vadlyd MD12 MK4 Multicurve Disc preamp with a number of

we digitized, we are repacking all discs that are in the realm of the project for heritage reasons. The heavily damaged or irreparable discs can wait for upcoming new technology, such as optical reading. The commercial discs are stored for legal {copyright} reasons," explained Fettweis

According to Declercq, the business model (collaboration of a public broadcaster and a commercial content digitization company, under the wings and management of VIAA) is catching international attention.

The digital audio content will be available for public radio broadcast and educational purposes, granting some 30,000 lecturers and student lecturers access to samples from this extensive library.

VIAA's future plans are to set-up access points for scientific research and for the wider audience via public libraries. "Finding the right balance between making heritage content available to the public, the national broadcaster's interests and the author's rights legislation will be the next issue," concluded Declercq.



A disc ready for playback.



The VRT's stylus vault for the digitization project. A specific needle is available for each type of record.

Looking Ahead

RW has been featuring online Q&As with industry thought leaders asking their prognostications for 2018. Here's a sampling; find full stories and more interviews at the News Makers tab under News & Business at radioworld.com.



Walter Sabo is a consultant, president of Sabo Media and host of the Westwood One weekly talk show "Sterling on Sunday."

Radio World: *What is the most pressing technology challenge radio broadcasters will be facing in 2018?*

Sabo: Let's see, what year is this? TV, cassette, VCR, videodisc, 8-track, CD, DVD, it's always something. The unheralded genius of radio is for 100 years it has had the most elegant distribution of all. The newbies will spend billions to match radio's distribution system, and fail.

RW: *Do you see any technologies relevant to broadcasters that interest you?*

Sabo: QGoLive from Harris Media lets me broadcast from my smartphone and it sounds as though I'm in a studio. As a result, the need for actual format studios will diminish, and that's a good thing.



Patrick Hannon is president of WorldDAB and VP Corporate Development at Frontier Silicon.

RW: *What electronics trends will have the most impact?*

Hannon: An obvious area of growing importance is voice-enabled devices. Early evidence suggests that a high proportion of online listening via these devices is to live radio — this is positive news. One word of caution: Broadcasters should ensure they do not become over-dependent on the gatekeepers of these platforms.

RW: *What trends or changes should we be watching for as regards digital radio?*

Hannon: A key development is likely to be in the area of receiver regulation — an issue where there were several important developments toward the end of 2017.

The most significant was in Italy, where in December a law was passed requiring all radio receivers (consumer and automotive) to be capable of receiving digital transmissions from Jan. 1, 2020.

France has a similar law, which will be triggered when DAB+ coverage exceeds 20 percent of the population. In a statement published at the end of December, regulator the CSA confirmed that this threshold is expected to be passed in 2018.

Support for regulation at a European level is also growing. ... In total, stakeholders from 11 different countries have

asked for receiver regulation.

Ken Freedman is general manager of noncommercial station WFMU(FM) in Jersey City, N.J.

Freedman: The most pressing technology challenge for radio broad-



casters remains unchanged from what it has been for over a decade now: how to marry streamed/broadcast radio to native digital technology and social media in a way that leverages radio's traditional strengths. Digital technology is much more difficult and expensive than traditional broadcasting, with constantly changing platforms, operating systems, security and privacy considerations, etc. Many legacy media organizations have opted to utilize large advertising

platforms such as Facebook to address this problem, but this is a short-sighted strategy. Radio broadcasters should not send their audiences to third-party platforms, who will mine metrics from those audiences for their own benefit, leaving broadcasters bereft of the metrics that would benefit them. Broadcasters should be using digital technology to improve the experience for their audience and for the broadcaster. This is not the aim of large third-party online advertising platforms, but broadcasters have little choice, given the complexity and expense of building rich, modern online platforms.

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WORKBENCH

by John Bisset

Email Workbench tips to johnbisset@gmail.com

Ron Huckleby, CBRE, of Butte, Mont., handles engineering for a number of stations. Ron says there are times when you are in the hinterlands and you just have to use what you have on hand to fix a problem.

Ron had a station whose Harris FM-2.5K transmitter lost its screen capacitors. This happened when one of the voltage balancing resistors on the two 450V computer grade capacitors that were in series opened up.

After diagnosing the problem, Ron

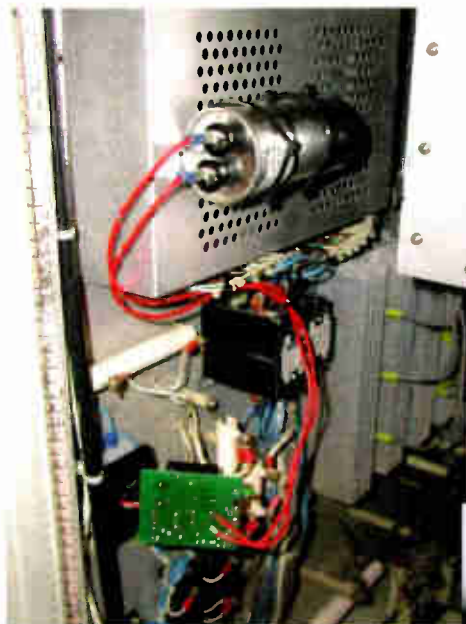


Fig. 2: Another temporary capacitor fix returns a transmitter to air.

found several 2000V capacitors at the AM site, of a few microfarads each. Using “what was available” (shown in Fig. 1), Ron got the station back on the air at full power.

A temporary fix, but it worked.

As for safety, Ron was the only engineer with keys to the site, but the capacitors were covered with a box and a handwritten warning sign. Ron writes that the transmitter has since been replaced with

a Nautel NV-5LT, but the FM-2.5K is still in place as a backup and was properly repaired. That’s the key — make a point to not leave temporary repairs as a permanent solution!

Ron also included a photo taken by Greg Muir, principal engineer of Wolfram Engineering and a frequent Workbench contributor.

Fig. 2 shows a similar “fix” inside a transmitter. In this case, the phase loss relay in a Harris HT-25 was acting up, causing the blower circuit breaker to trip.

The site was over an hour from Greg’s home and had to be accessed by an off-road utility vehicle on

tracks. In this case, Greg found a high-voltage capacitor from a retired tower strobe light system, and was able to get the relay back in service. As the site is single-phase and the transmitter uses a Roto-phaser, bypassing the relay was not an option.

Although neatly implemented, Ron points out, this was just a temporary repair in order to get the station back on the air.

Temporary fixes are supposed to be just that, but do you have some that have become permanent? We’ve all done it. Make a resolution for 2018 to repair such issues correctly and permanently.

This past summer, a thunderstorm barreled through Hamden, Conn. A lightning strike got Bob Meister’s attention. The strike induced some rather high voltages to the power grid and



Fig. 1: Stringing a few capacitors together got the transmitter running.



Fig. 3: Bulging electrolytics due to lightning.

transmitter site. One of the surge protectors on the 4,800V AC line to the building’s step-down transformer shorted, taking out a fuse on the street. It also charred the wiring on the primary side of the transformer.

The surge also made its way to the sliding gate controller board, either by traveling along the chain-link fence, or via induction through the underground power line. The 24VAC power transformer output apparently exceeded that voltage by quite a bit, as it blew several electrolytic capacitors, seen in Fig. 3, and completely vaporized foil traces on both sides of the circuit board, shown in Fig. 4.

Bob writes that this is fourth time in about 17 years that the gate controller has had to be repaired or replaced. There’s a wireless remote control attached to the transformer that has also suffered shorted power supply diodes and vaporized traces over the years.

What’s curious is that nothing else at the facility sees to suffer ill effects from storms, except one instance when a storm caused an Astron RS35M power supply

(continued on page 20)

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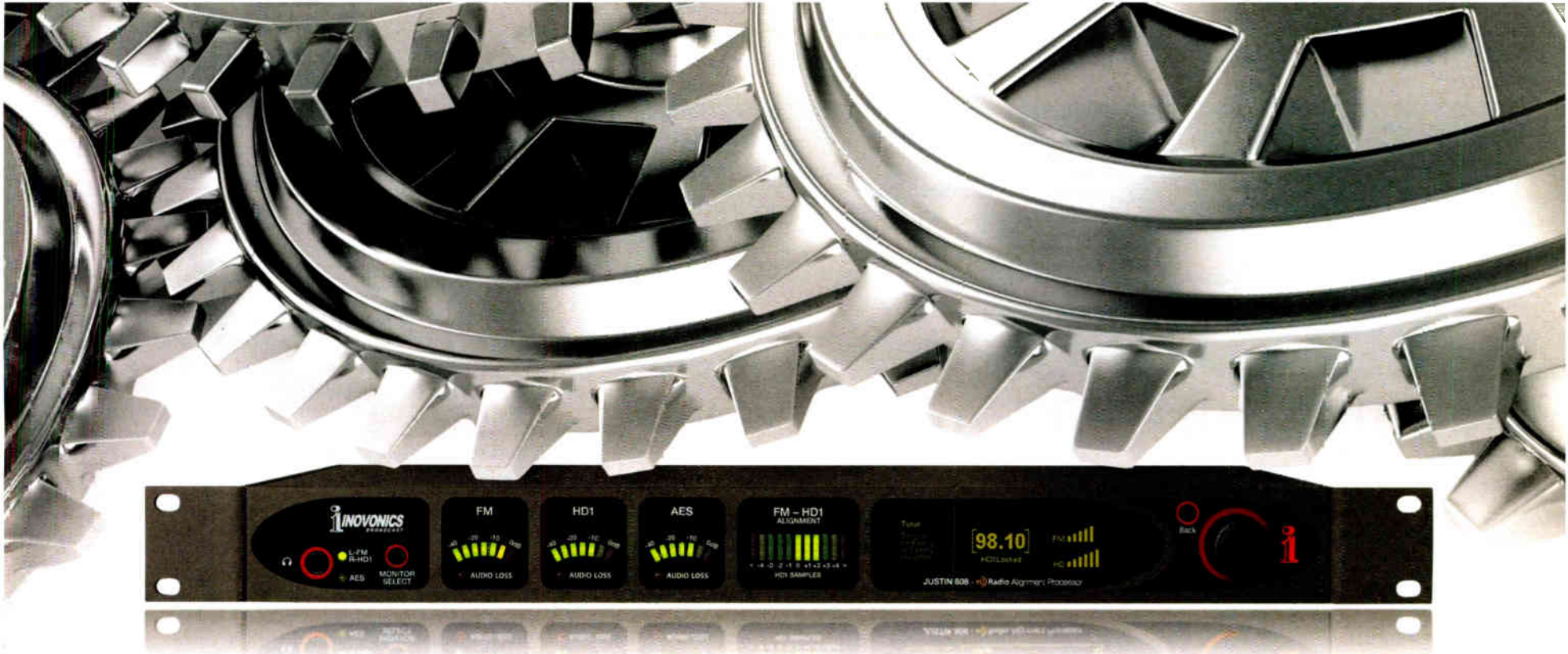


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— Sam Caputa, Director of Engineering, Emmis Communications.

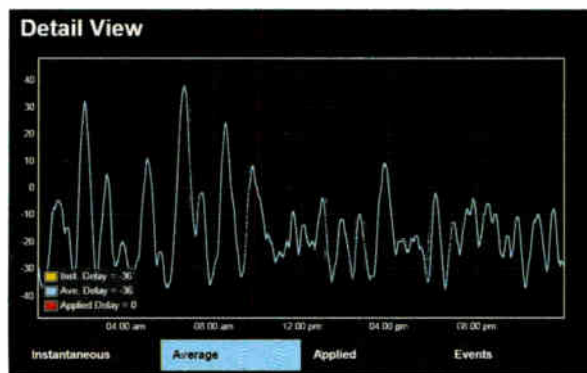
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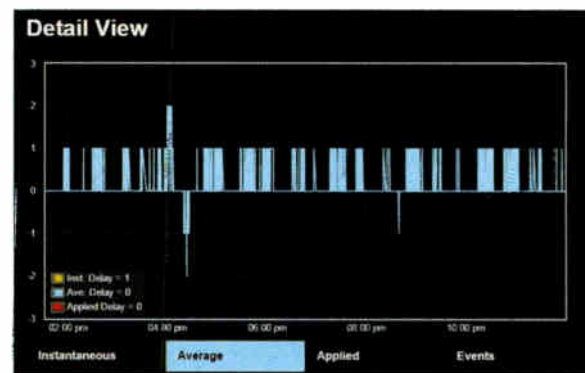
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A stack of 4440s. Note the different logo on the top unit, a 4440A. It was manufactured after 1975, when CBS Labs was reorganized, and the manufacturing end was sold off to Thomson-CSF. The original 4400 has illuminated meters, the 4400A does not.

Recalling the CBS Audimax 4440

Its magic came from the Gated Gain Stabilizer circuit

PLUGGED INTO THE PAST

BY TOM VERNON

CBS Labs ruled the roost long before names like Orban, Texar and Cutting Edge came to dominate the on-air audio processing scene in the late 20th century. Its Audimax AGC and AM/FM Volumax peak limiters were introduced in the late 1950s and early 1960s, respectively. Improved models continued to dominate the market well into the 1970s.

This installment of “Plugged Into the Past” looks at the last of the Audimax series: the 4400.

Audimax I was introduced in 1959 as an all-tube design. Sales were not brisk, probably due to a rather exorbitant price. Subsequent designs in the 400 series were solid-state and more reasonably priced. Sales soon took off. In 1972, the 2RU 400-series Audimax was replaced by the 4400, in a slim-line 1RU package.

Audio amplification was provided by a push-pull balanced circuit, with transformerless input and transformer output followed by a 6 dB pad. The input signal is sampled after the first stage, rectified, and used as the control voltage for the logic circuit.

The Audimax’s magic came from the GGS or Gated Gain Stabilizer circuit. Its purpose was to decide when to increase gain, and when to freeze it at a low level. Conventional AGC amps would increase gain to the maximum during periods of dead air or very low levels, sucking up all the system noise along with it. Gated AGCs all had some type of circuit to prevent this.

The first 4400s were designed so the bottom chassis and electronics could slide out of the rack mount, speeding up bench tests and repairs, and these are illustrated in our photo shoot.

As long as you had the mating Blue Ribbon connector wired to an audio oscillator and distortion meter, along with a matching AC cord, bench work was a plug-and-play operation. For servicing, PC boards would snap off the chassis, and wiring was terminated with pin connectors. Test points were clearly marked.

As a practical matter, these units were very well designed, and component failures were rare. All that was usually required was to change out the power supply caps every five years or so, and go through the alignment annually. The manual was comprehensive and well written.

The pictured units are 4440 mono devices, but field conversion to 4450 stereo was a simple process. All that was needed was the installation of an additional

AI audio board on the right side of the chassis, replacement of the blank panel on the right side with one which had input/output pots and a control switch, along with wiring it all up with pin connectors. Conversion kits to make a 4440 into a 4450 were readily available from CBS.

CBS LABS

CBS Laboratories has its origins in 1936, a time when the leading radio networks and manufacturers had their own research facilities. The intent was to keep the organization ahead of the technology curve by developing advanced devices. In the case of CBS and

a few others, the sale of said devices would also defray some of the development costs.

Originally located in New York City, the labs eventually outgrew the space, and in 1958 moved to more spacious headquarters in Stamford, Conn. CBS Labs developed many innovative products for both radio and television, and several of the TV products won Emmy Awards. The original CBS Audimax I was introduced in 1959. Other memorable audio innovations from CBS Labs include the 33 1/3 RPM record and in 1971 the SQ system of quadrasonic sound.

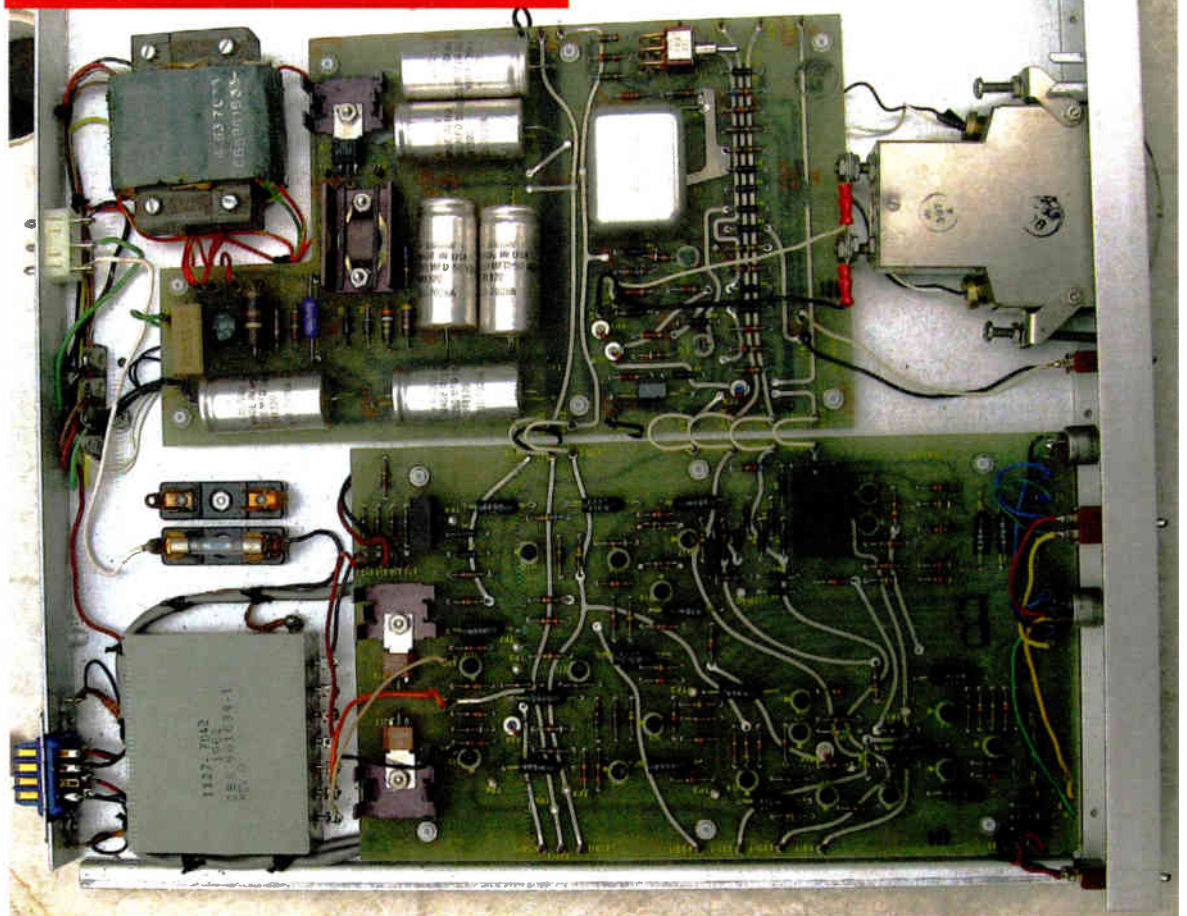
In 1975, CBS Labs was reorganized. The manufacturing arm, CLD Professional Products Department, was sold off to Thomson-CSF and renamed Thomson-CSF Laboratories. Although Thomson was a French company, manufacturing continued in Stamford. The R&D division was renamed CBS Technology Center and remained in the original Stamford headquarters.

The end came in 1986, when Laurence Tisch assumed the helm of CBS. At that time, the network was in a state of financial and operational turmoil. Soon after taking over, Tisch closed the Technology Center as part of a belt-tightening move.

While Audimax and Volumax were the company’s best-known radio products, there were others. The CBS 4500 Dynamic Presence Equalizer, dating from 1973, was designed to enhance poor quality voice content, as might come from noisy remote lines, azimuth alignment errors or incorrect line equalization. In the speech-only

(continued on page 20)

The slide-out chassis with blue ribbon connector on the 4400 Audimax made servicing and alignment a breeze. At the front of the power supply is a square enclosure which is a CBS “mystery module.” This one contained the logic circuit that controlled gain increase/reduction.



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AUDIMAX

(continued from page 18)

mode, the 4500 would detect speech content and boost the signal in the 2–4 kHz “presence band” if it was too low. It could also be set to process everything.

The Model 700 loudness indicator was introduced in 1968 and was the outcome of a three-year research project with the CBS radio and television networks. It had long been known that some program content seemed louder than other material, even though the VU meter readings were the same. The

lab’s research uncovered several factors that contributed to perceived loudness, and the 700 provided a quantitative indication of these. This was a landmark device, and a major turning point in the AM loudness wars.

CBS products are also remembered for their “mystery modules,” bits of proprietary circuitry encapsulated in potting compound contained in small metal modules. One of these is pictured on the power supply board of the 4400. It controlled the logic of the gating action. The origin of these modules in industrial electronics is murky, and CBS was

probably not the first to do this. They certainly brought the practice into the broadcasting realm. Other manufacturers followed suit, particularly with audio processors. Orban had some, as did Modulation Sciences, with its CP-803 composite processor.

PRE-WAR PERIOD

In the history of audio processors, the CBS Audimax belongs in the chapter titled “The Calm Before the Storm.” It was designed and used at the time when the sole purpose of processors was to maintain modulation between 85 to 100 percent modulation, as specified by the FCC. Soon, the AM loudness wars would begin, then AGCs and peak limiters would evolve into tools to create a unique “sound” for the station and also to blow the competition off the dial.

Along the way, the basic broadband gated AGC would take some important evolutionary steps. When pushed hard, the sound of the AGC could best be described as unnatural. That was usually because one portion of the audio spectrum, typically the bass, was controlling the AGC action. This was particularly noticeable with disco.

At this time, much of the brain trust in broadcast engineering resided in the

engineering departments, particularly at major market radio stations. Research, brainstorming, designing and tinkering with the broadband AGC design began. One of the outcomes was multiband limiting. The optimal number of bands, how to set the crossover between them, and how to process each was an ongoing debate.

Those first multiband processors were really hybrids of manufactured gear and homemade devices. One of the earliest was at WRKO in Boston. It occupied an entire equipment rack at the transmitter site. Similar efforts were underway at WABC New York, CKLW Windsor Ontario, and other stations. The first commercially available multi-band processor was the Dorrough Electronics 310 DAP.

No less than three Audimax 4440s live in my attic. One was found while cleaning out a transmitter building, the other two were being tossed when a station moved for consolidation. At the time they were acquired, we were well into the Age of Orban and the Age of Texar, so no attempt has been made to test or revive them. As with many pieces of broadcast gear that are well past their prime, they make great display items for the office.



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WORKBENCH

(continued from page 16)

tripped its over-voltage crowbar, and needed to have its power cycled to reset it. Those are the simple kind of post-storm issues engineers like!

If you are troubleshooting defective equipment after a storm or power surge, look especially for the vaporized traces, or the distended or blown out tops of radial electrolytic capacitors shown in the image,

or bulging ends of axial-mounted electrolytic capacitors. The bulge is a sign of an unhappy cap — replace it! As for the vaporized traces, I’ve seen some repairs where the engineer has used short pieces of insulated buss wire or fine wire wrap wire to replace the traces. The repairs may or may not work, but it’s probably worth a try.

Got high-resolution pictures of similar repairs you’ve made? Email them to me and share your experiences with fellow Workbench readers. Send them to johnpbisset@gmail.com.

Hubbard St. Louis Chief Engineer Bob Hoffman, CPBE, read the Workbench submission by Dan Slentz, “Your 2018 Resolution: Document Everything,” referring to Visio and Draw.

Bob writes that he has used NCH Software’s “Clickchart Diagram Flowchart Software” for simple schematics. It’s easy to use and lets you save your diagrams in PDF form.

You can find out more at www.nchsoftware.com/softwareindex.html.

Your ideas, submitted for Workbench, can help fellow engineers and qualify for SBE recertification credit. Send tips and high-resolution photos to johnpbisset@gmail.com. Fax to (603) 472-4944.

Author John Bisset has spent 48 years in the broadcasting industry and is still learning. He handles Western US Radio Sales for the Telos Alliance. He is SBE certified and is a past recipient of the SBE’s Educator of the Year Award.

Fig. 4: The lightning also vaporized traces on the control board.





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Know Your FM Translator Basics

Here's some help in staying atop this important industry segment

TRENDS IN TECHNOLOGY

BY DOUG IRWIN

AM revitalization continues to move along, and thus 2018 will see many stations adding FM translators. Let's review the latest FCC window, recent regulatory changes and some basic rules that remain unchanged, then consider a couple of real-world examples.

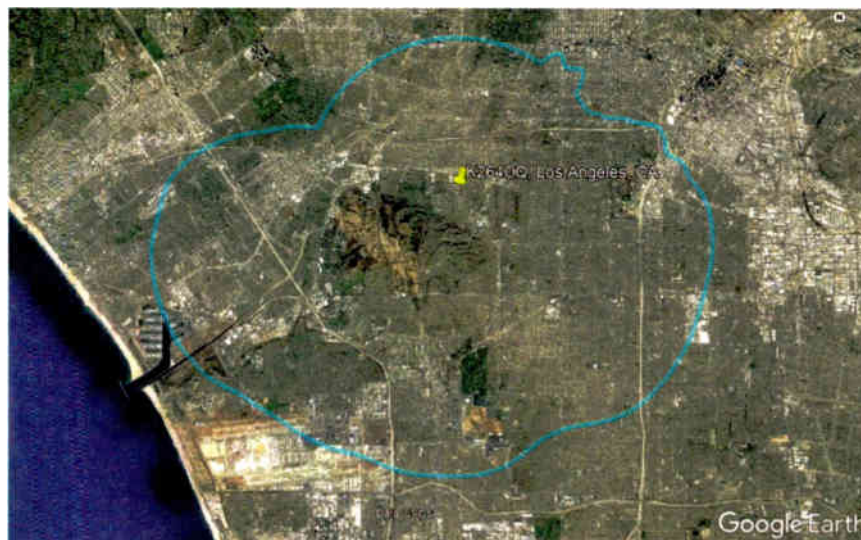
In December, the Federal Communications Commission released the public notice detailing the instructions for the final window for AM stations to get FM translators. This window will be open Jan. 25–31 and is primarily for Class A and B AM stations that were not permitted to file in summer 2017's window, when Class C and D AM stations were allowed file for new FM translators.

However, any AM licensee that did not file in last summer's window and that did *not* acquire a translator during the period when AM licensees could acquire existing FM translators (and move them up to 250 miles) to rebroadcast their AM station, can participate.

An online tutorial is available to provide an overview of the application filing requirements for applicants seeking a new cross-service FM translator, available at the Auction 100 website: www.fcc.gov/auction/100.

The tutorial intends to help potential applicants further their understanding of the application process, allowing them to navigate the presentation outline, to review written notes, to listen to audio recordings of the notes, and to search for topics. This tool will include links to auction-specific commission releases, email links for contacting commission licensing and auctions staff, and screenshots of the online application system.

Back in 2015, when the translator windows were first mentioned, the FCC solicited comments on whether it should relax the siting restrictions to permit FM translators to operate from transmitter sites further away from the AM station's transmitter site. Eventually, the



The FCC's predicted 60 dBu contour for K264CQ, transmitting from a tower in the array of its associated AM, KWKW, with 60 W vertical polarity.

commission adopted rules to permit FM translators serving as a fill-in service for AM stations to be built such that their 60 dBu contour is contained within the *greater* of the 2 mV/m contour of the AM station, or a 25-mile radius centered on the AM station's transmitter site.

BASIC RULES

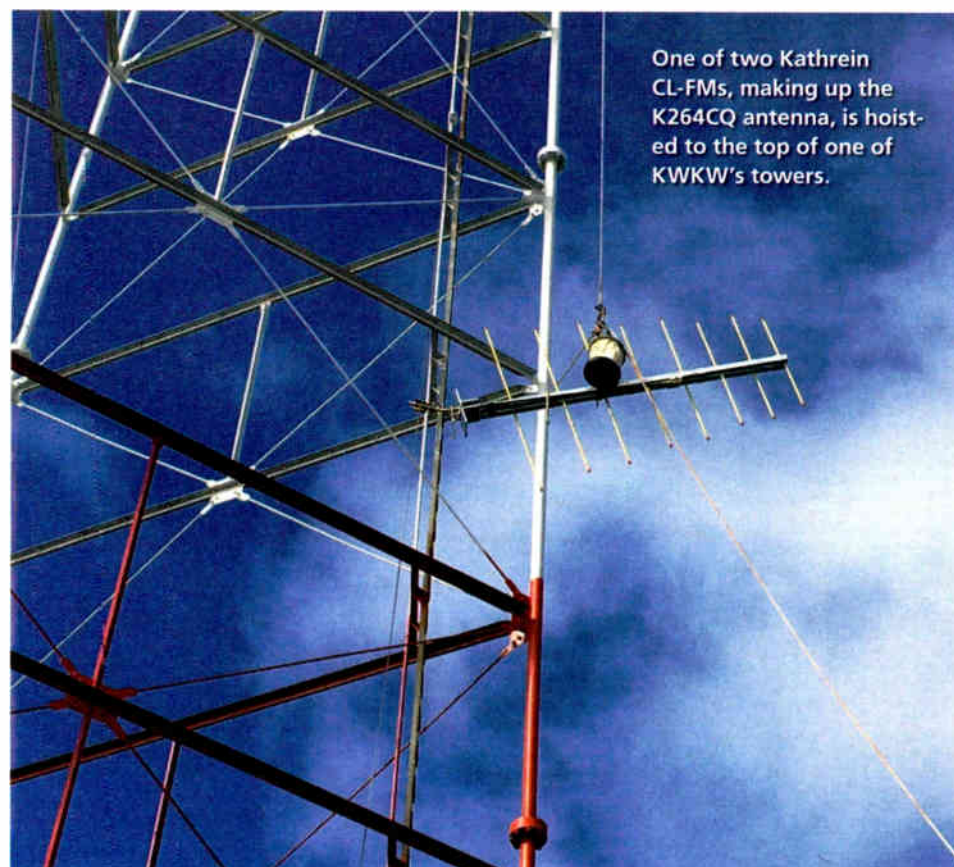
Let's review 10 basic translator rules, since our system design will have to fit within their guidelines.

- The maximum effective radiated power for any translator station is 250 watts.
- If the translator is a fill-in translator, the ERP may be further limited by the need to maintain the translator's service contour within the primary station's service contour. Composite antennas and antenna arrays may be used.
- A commercial fill-in translator may receive a primary station's signal via any terrestrial transmission method, including (but not limited to) microwave, phone, internet, and dedicated fiber optic cable.
- An FM translator station rebroadcasting the signal of an AM or FM primary station shall not be permitted to radiate during extended periods when signals of the primary station are not being retransmitted. FM translators rebroadcasting Class D AM stations may continue to operate during nighttime hours only if the AM station has operated within the last 24 hours. (74.1263(b))
- If the translator site cannot be reached at all hours and all seasons, means shall be provided so

- The apparatus shall contain automatic circuits to maintain the power output in conformance with § 74.1235(e). (74.1250(c)(3))
- Apparatus rated for transmitter power output of more than 1 Watt shall be equipped with automatic circuits to place it in a non-radiating condition when no input signal is being received in conformance with § 74.1263(b) and to transmit the call sign in conformance with § 74.1283(c)(2). (74.1250(c)(4))
- For exciters, automatic means shall be provided for limiting the level of the audio frequency voltage applied to the modulator to ensure that a frequency swing in excess of 75 kHz will not occur under any condition of the modulation. (74.1250(c)(5))

COLOCATION VS. SEPARATE SITE

Some FM translators associated with AMs will collocate at the AM transmitter site, some will not. Each option presents a separate set of problems.



One of two Kathrein CL-FMs, making up the K264CQ antenna, is hoisted to the top of one of KWKW's towers.

that the transmitting apparatus can be turned on and off at will from a point that is readily accessible during all hours and all seasons.

- FM translator and booster stations may use FM broadcast transmitting apparatus verified or approved under the provisions of part 73. (74.1250(a))
- Radio frequency harmonics and spurious emissions must conform with the specifications of § 74.1236. (74.1250(c)(1))

In the case of collocation:

- Is the tower physically strong enough to hold the FM antenna and transmission line specified?
- Will the inclusion of an FM transmission line running up the tower (by way of the isolator, as mentioned below) change the base impedance to the extent that it cannot be compensated?

(continued on page 24)

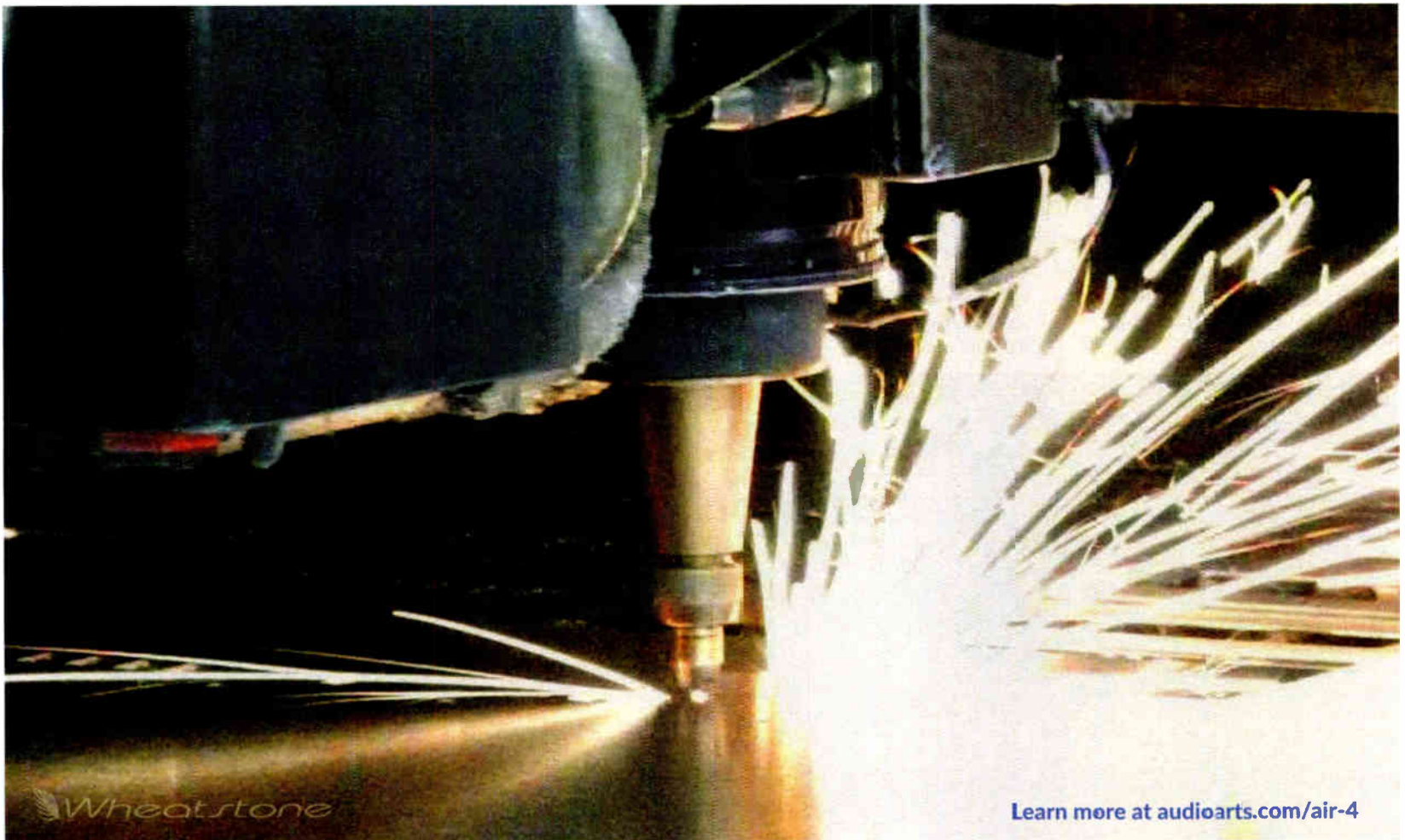
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TRANSLATOR

(continued from page 22)

Answering the first question will require consultation with a mechanical engineer — preferably the same firm and/or engineer that designed the tower in the first place. Don't just assume the tower can hold up an FM antenna (no matter how small).

The second question should be put to your consultant — probably the same one you have used during the allocation and application process.

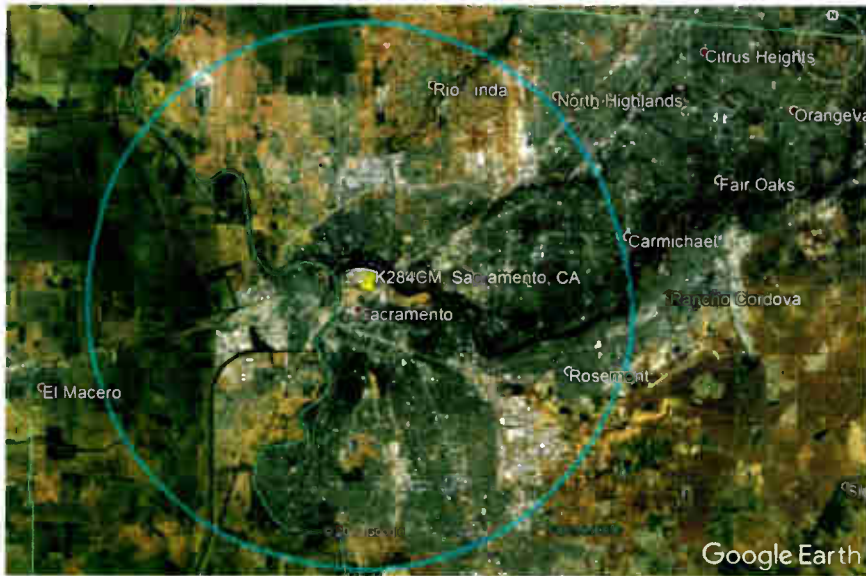
Use of a hot AM tower for the FM translator antenna is a common technique, and it's typically done through an iso-coupler. The iso-coupler effectively isolates the AM and FM systems from one another. Sources for iso-couplers include Kintronic Labs, LBA Group and ERI.

Another approach to this issue is operating with the tower grounded and skirting the tower, converting it in to folded-unipole system. Nott Ltd. and LBA Group provide technical resources for that approach.

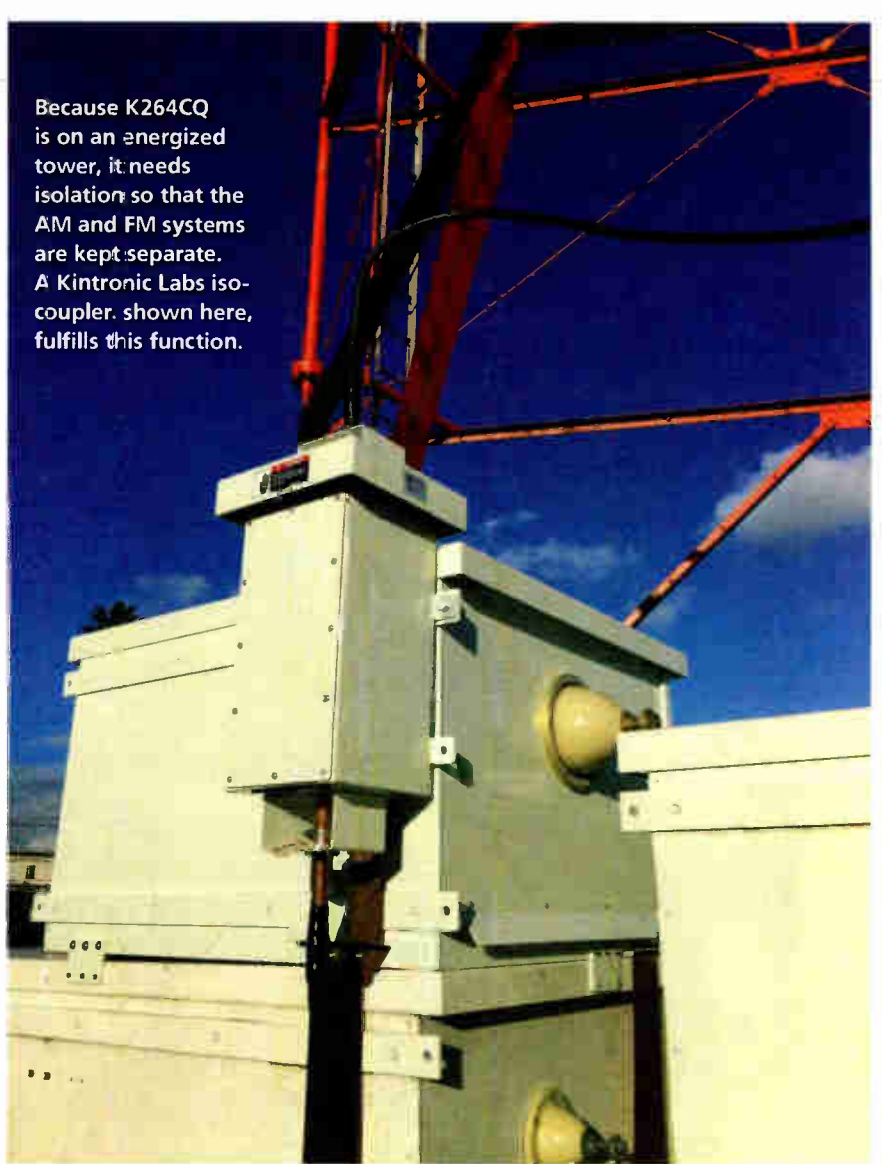
If your translator site is not co-located with the associated AM station, then you trade one set of issues for another.

In this second case, you are essentially building a low-power FM site, with all the attendant needs of STL and remote controls:

- *Program delivery.* Just like any other remotely located transmitter site, you will need to deliver programming, and as we saw earlier from the rules, this can be done via microwave, wirelines from your local exchange carrier, or even via the public internet.



Now that the antenna for K284CM has been made omnidirectional, it covers a substantial portion of the Sacramento metro, inside of its FCC-predicted 60 dBu contour.



Because K264CQ is on an energized tower, it needs isolation so that the AM and FM systems are kept separate. A Kintronic Labs iso-coupler, shown here, fulfills this function.

- *Remote control.* Unless the site is accessible on a 24/7/365 basis, plan to install some sort of remote control so that the translator can be turned off and on remotely.

Lotus Communications is one of the largest privately owned radio station groups in the United States. Founded in 1962, it 34 stations in Arizona, California and Nevada, along with two low-power television stations in Arizona and Texas. Jason Houts is the company's director of engineering.

REAL-WORLD CASES

Let's look at a couple real-world examples of translator builds.

(continued on page 26)

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Ken Squier Got His Start at WDEV

He enters the NASCAR Hall of Fame

PROGRAMMING

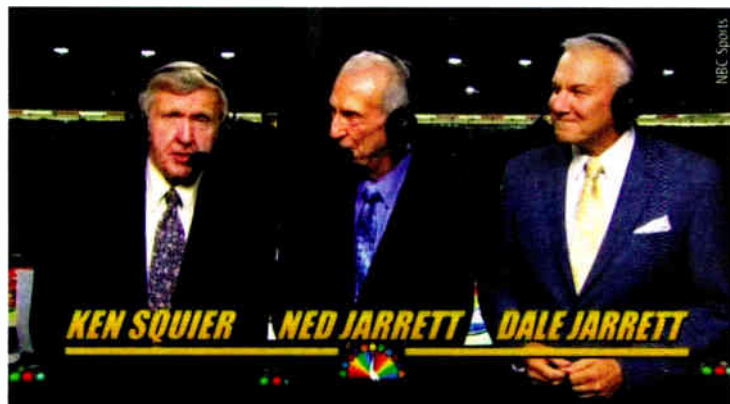
BY PAUL KAMINSKI

Fans of NASCAR racing remember Ken Squier for his historic CBS Television broadcast of the 1979 Daytona 500 and his description of a post-race rumble that helped to propel the sport from a regional pastime to its place today as America's most popular form of motor sport.

But the newest member of NASCAR's Hall of Fame — inducted in mid-January — has even more solid credentials as a radio broadcaster.

He was one of the co-founders in 1970 of the Motor Racing Network (MRN), which broadcasts the majority of all Monster Energy NASCAR Cup and other NASCAR series races on the radio. Squier drew upon his experience at WDEV Radio, literally growing up behind the scenes and even behind the microphone at the family-owned Waterbury, Vt., AM since age 9. That, and his experience around racing at "short tracks" (small racetracks of less than a mile in length as compared to tracks like the 2-and-a-half-mile long Daytona International Speedway) in New England helped to guide MRN through its inception and early years.

The co-founder of MRN was NASCAR founder William H. G.



Ken Squier, left, newest member of the NASCAR Hall of Fame, in the broadcast booth at Darlington Raceway in 2016 with fellow Hall members Ned Jarrett, center, and Dale Jarrett (Ned's son).

"Big Bill" France.

"That was the France family, who really understood the value of radio. They did some of the best missionary work I've ever experienced in radio," said Squier.

France wanted NASCAR to have a voice similar to baseball play-by-play broadcasts, so France named Squier as its on-air voice. Squier painted many a word picture, with phrases such as "common Americans doing uncommon deeds" and the now-famous description of the Daytona 500 as the "Great American Race."

Squier took over WDEV when his father died in 1979.

He says WDEV began broadcasting on July 15, 1931, for all the right reasons: "Providing a service that was based upon public good, need and necessity. If you took care of that, the world would take care of you."

Squier continued to own WDEV and its parent company, Radio Vermont,



Ken Squier during a media availability at Darlington Raceway in September 2017.

until the fall of 2017. He and his late father Lloyd were inducted as charter members of the Vermont Association of Broadcasters Hall of Fame in 1995.

MENTORING

Squier mentored Dave Moody, host of SiriusXM's "SiriusXM Speedway" daily auto racing show and turn announcer for MRN race broadcasts. Moody worked for him at WDEV calling basketball and was the public address announcer at

Thunder Road Speedway, a track Squier owned in Vermont.

Squier says Moody has come a long way: "He's become quite an authority; his home is where the race tracks are. He (Moody) speaks with a very powerful voice." The show, he says, "has gone past the business of cars going around a track; it gets into why the racing was successful or unsuccessful."

Amy McGovern, now a midday air personality at WKOI.(FM) "KOOL 105" in Burlington, Vt./Plattsburgh, N.Y., also worked for Ken Squier at WDEV.

"For so many, he was instrumental in getting us to learn motor sports, by learning first at the small arena of Thunder Road then pushing us to go further. If you had a love for the kind of music he shared, he would encourage you and see if there were ways that he could use you to help you build your skills," she said.

"For me, he knew my passion was racing, and producing; so right off the bat, I became his producer for Ken Squier Productions and I began producing audio for national radio stuff, then working at Thunder Road and finally going on to NASCAR and PRN," the Performance Racing Network, which broadcasts most of the races not broadcast by MRN.

Squier, 82, makes an occasional television appearance to call the Darlington Raceway's Southern 500, and will continue to have a role at WDEV, to include his popular Saturday morning program "Music to Go to the Dump By."

Asked for advice for aspiring race broadcasters, he said to get into American short-track racing (the kind one sees in small towns and fairgrounds, usually run on smaller dirt or paved racetracks on Friday or Saturday nights in the spring and summer).

"Everybody thinks that what they see and hear on television is it. They're wrong. It's something where you've got to learn about people and fans and what they really call their sport, no matter what the sport is," he said.

"If you get in on that level, you begin to feel what they (the fans) feel and what they want to know about, you can pretty much figure you can deal a steady hand any time you try it. People want to know about people; that counts for everything."

Paul Kaminski, CBT, is a Radio World contributor and columnist. For many years, he covered all forms of auto racing on the radio for national and international broadcasters and the Motor Sports Radio Network. His Twitter handle: msrp_kom. Find him on Facebook as PKaminski2468.

TRANSLATOR

(continued from page 24)

K264CQ is associated with the company's first station, KWKW, and transmits from one of the towers in KWKW's directional array, located about 6 miles west of downtown Los Angeles.

I asked Houts if the coverage of the translator (60 W, vertically polarized, 110 M AGL) is living up to its expectations.

"It actually meets the predictions we had for it, and we even have it advertised on bus benches and whatnot, showing that actual frequency for KWKW." (The translator is on 100.7, and KWKW is on 1330.)

Lotus has been using Nautel VS300 transmitters for its recent translator projects. K264CQ uses a directional antenna made up of a pair of Kathrein CL-FMs.

K284CM is another translator recently put on-air by Lotus, near Sacramento. This translator is associated with KVMX. Unlike K264CQ, which is located at its parent sta-

tion, K284CM is located away from the KVMX transmitter site — about 7 miles to the northeast.

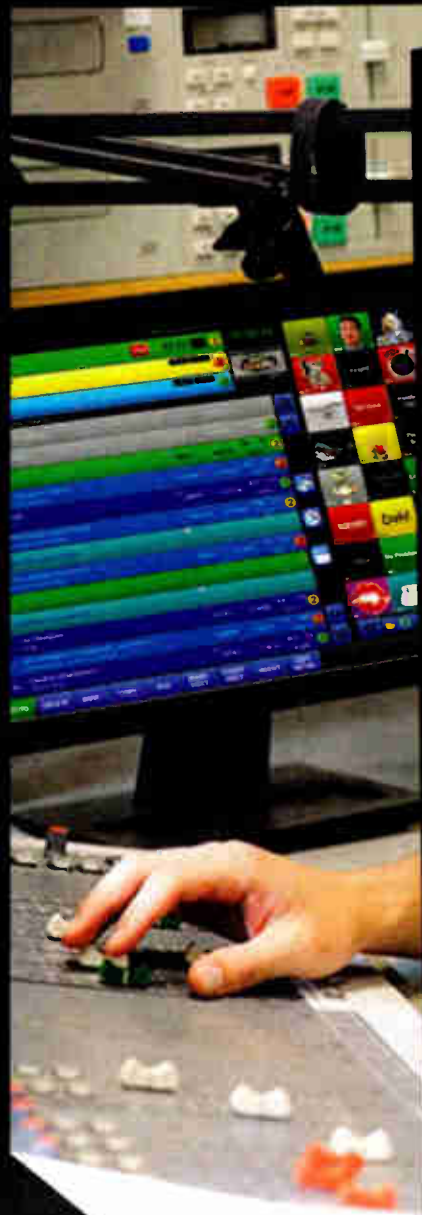
"That one is the top performer. Really has some coverage," said Houts. "It's running 250 Watts. It went on the air directionalized, and then we had done some things with another translator and basically opened that up — we were able to remove the parasitics off the antennas and turned it into an omni. Doing that actually made another big difference, and that has really helped that AM up there. It's been really useful.

"It's a great signal for a translator. It actually deserves an auxiliary transmitter, which we are installing so we can have some kind of redundancy."

Over the last several years, the AM revitalization effort, as manifested by previous translator windows, has provided a chance for many stations to attract more listeners by getting on the air in the FM band. At least one more opportunity exists — if you are an eligible. For AM owners, the time is right to gain an extra foothold.

Doug Irwin, CPBE AMD DRB, is vice president of engineering at iHeartMedia in Los Angeles.

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Repair It Correctly the First Time

This tip might seem basic, but it's key to long-term success

TECHTIPS

BY MARK PERSONS

It is easy to do the minimum on a job. You've seen it happen, and so have I. Sloppy work degrades an installation and can be an eyesore. Ultimately, it can become a "house of cards" that collapses upon itself. Why should anyone settle for that?

I make a conscious effort to do clean work, even if previous work was done poorly in that location. In essence, I kicked it up a notch. You should, too. It's better to take a little extra time to do it right the first time than have to face the consequences of a bad installation later.

TAKE PRIDE IN YOUR WORK

Fig. 1 illustrates a method of doing clean installations. Two shielded pair audio cables are prepared for termination. The otherwise bare shield drain wire is covered by clear heat shrink tubing. Likewise, the foil shield end of the cable is protected from touching something it shouldn't by black heat shrink tubing. It takes less than a minute to do the job and is worth it because it prevents problems.

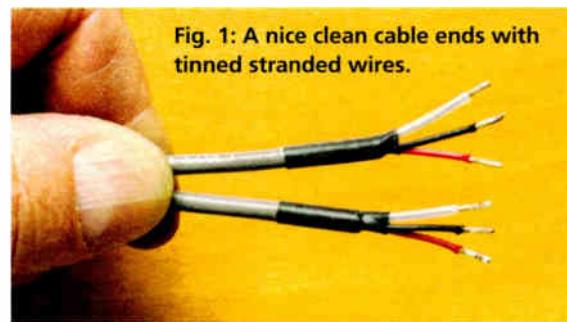


Fig. 1: A nice clean cable ends with tinned stranded wires.



Fig. 2: Two shielded pair cables tied together.

Fig. 2 shows two shielded pair cables that have been twisted together to form a stereo pair. Yes, I know there are stereo cables that come from factories bonded together. The point here is that heat shrink tubing is used to keep the cables from being separated from each other. This kind of organization is the right thing to do to avoid confusion later.

RACK GROUNDING

Sometimes broadcast equipment winds up in a wooden rack. In that case, the equipment needs to be grounded more than ever.

Fig. 3 shows such an arrangement, in which copper braid is run vertically on a cabinet member, then short jumpers are screwed to the braid and to each piece of equipment. The braid was the shield, pulled from a piece



Fig. 3: Good grounding in a wooden rack.

of RG-8 cable. The jumpers are two-pair audio shielded cable with all conductors bared and crimped into a terminal at each end. These are larger than normal size wire terminals because they have to handle five wires at a time. The jumpers are short with rounded corners, not square, to make it easy for lightning to follow to ground. The best practice is for jumpers to have an insulating jacket so they don't cause a problem when accidentally touched to something else in the rack.

On that same point, bonding wires between equipment and a rack are still proper even when the rack is metal. Paint on the rack can, in some cases, insulate the rack from equipment. The best choice is to run a one inch or larger copper strap on the inside of a rack, top to bottom, bolted to one side. Make sure that strap goes to station ground — you'll be very embarrassed if there is lightning damage, if you haven't connected it.

Fig. 4 shows a three-bay equipment rack system that was constructed on site with a minimum of expense. The area started out as a closet, which was accessed from the other side. The wall was partially dismantled and reconfigured with metal rack rails. Middle-Atlantic Products makes model RRF-45, 78-3/4 inches, just for this purpose.



Fig. 4: A custom wood equipment rack.

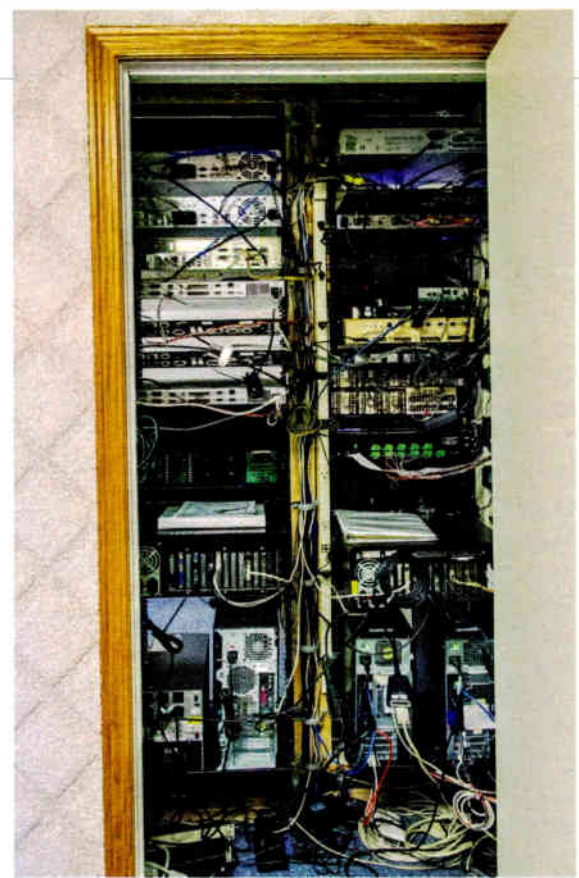


Fig. 5: The back of the rack seen in Fig. 4.

Smaller rails are available too. The rails are L shaped to screw to the wood sides. They have a series of drilled and tapped 10-32 holes where 19-inch equipment can be bolted in. (Measure twice and cut once when doing this.)

The station had a carpenter install three 2x6 studs, side by side, at each dividing point between rack bays. The carpenter left an additional 3/16 inch between the sides to make up for errors. Rack rails were then screwed to the wood with small flat washers to get the spacing exactly right. Fig. 5 shows the closet door open so the equipment can be worked on from the back side.

There are plastic cable clamps used for routing cables and outlet strips to plug the equipment into between the rack bays. Yes, there are grounding conductors running behind the wiring too. The photo was taken after a few years of use, so the wiring is not as neat as I would normally like to see.

STL PROBLEM

This is an interesting and true tale of hum and buzz in a 950 MHz STL system.

At first, it was assumed that there were bad electrolytic capacitors in the STL transmitter or receiver. Replacing the pair resulted in the same problem. Further examination revealed that an external 950 MHz RF preamplifier, at the receive end of the system, was the cause. How could that be?

Fig. 6 shows the preamp was powered by a 12 VDC wall-wart that has an electrolytic capacitor inside to smooth out DC. The capacitor failed by opening up, resulting in DC with a high component of AC ripple feeding the preamplifier. Fig. 7 shows what the supply voltage looked like on an oscilloscope. Ouch! The preamplifier, in essence, turned on and off at a 120 Hz rate, thus the buzz in an already weak FM STL signal.

SITE CLEANING

You've seen it before, a transmitter site that is overgrown by brush. There is at least one good tower contractor in Minnesota who brings a "brush hog" to sites when doing inspections. The operator clears a path from the tower to



Fig. 6: An STL preamplifier with a problem.



Fig. 8: "A brush hog" works to clean up transmitter site grounds.

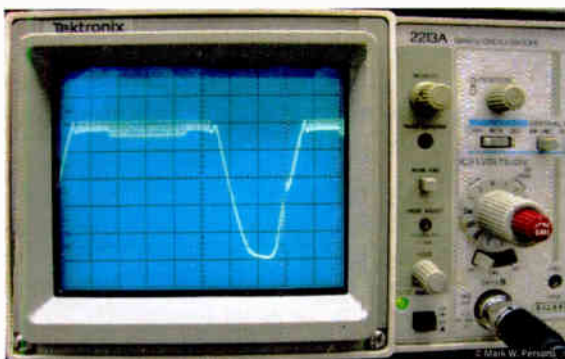


Fig. 7: An oscilloscope reveals the answer.

each guy point and then around each point to facilitate maintenance.

Fig. 8 shows a brush hog clearing around the transmitter building too. Nicely done. Hogs have large tires that are unlikely to damage an AM ground system. Best

to stay away from in front of a machine as it might throw a rock in your direction.

AM ground system damage can be repaired easily — if discovered when it happens.

The normal specification for an AM ground system is 120 #10 bare copper radials going out for about 1/4 wavelength like equally spaced spokes of a wheel. The usual practice is to bury them 4 to 6 inches below the ground surface.

When a copper ground wire is cut, just grab the ends and pull them up so 6 inches or more is showing. Mark them and come back with a 12-inch or longer piece of #10 bare copper wire. Twist the ends together and then braze with an oxygen and acetylene torch. You can use a Mapp gas torch, but they don't get as hot.

For brazing rods, I use Sta-Silv 15, which contains 15 percent silver. You don't use a lot, so the cost is not

that steep. Do *not* use ordinary tin/lead solder. It will deteriorate underground and fail.

Fig. 9 shows a tower worker with blue skies and the early morning moon nearby. If you work indoors, you miss some of the great scenery that engineers often witness.

Use your head to do the job right the first time. It makes perfect sense.

Comment on this or any article. Write to radio-world@nbmedia.com.

Mark Persons, WØMH, is a Certified Professional Broadcast Engineer and has more than 40 years' experience. His website is www.mwpersons.com.

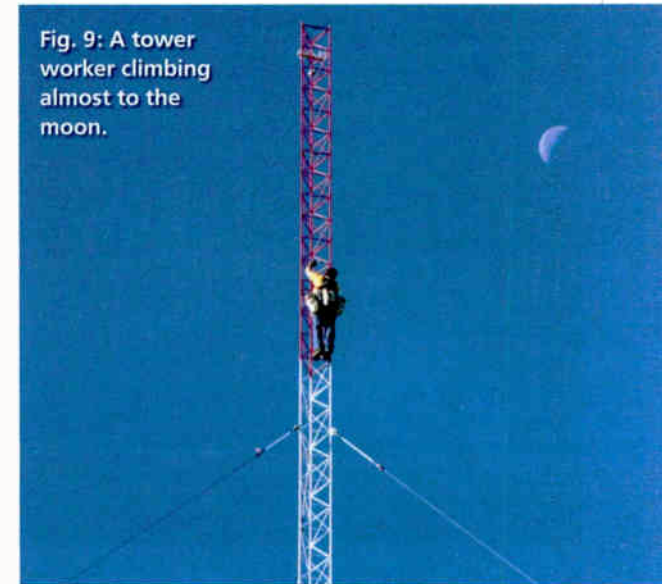


Fig. 9: A tower worker climbing almost to the moon.

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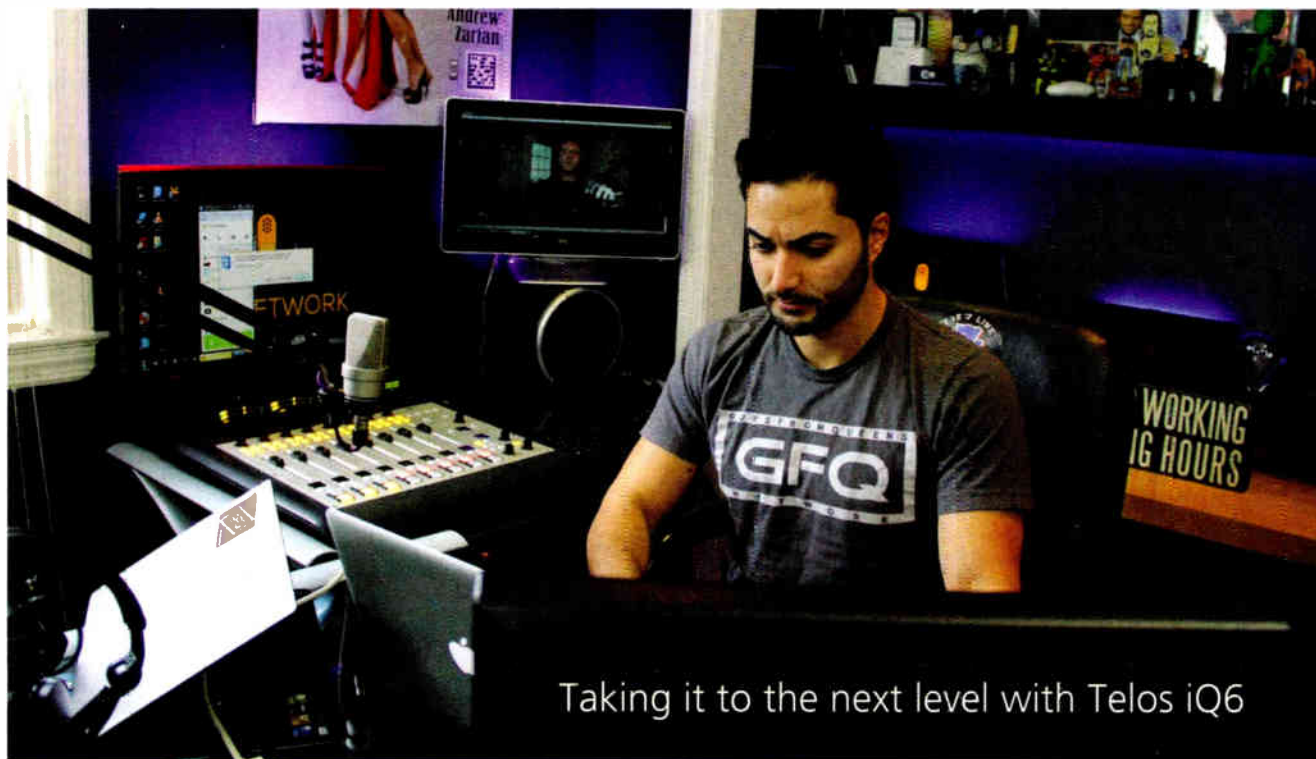
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GFQ and Internet Talk Show Success



Taking it to the next level with Telos iQ6

USERREPORT

BY ANDREW ZARIAN

Founder

The Guys from Queens Network

NEW YORK CITY — In April 2009, I founded The Guys From Queens Network with the simple idea to bring internet talk radio to the mainstream. I was joined by over a dozen others in my GFQ family to cover everything from

current events and pop culture to the latest tech news, editorials and entertainment. Like most internet broadcasters, our equipment started off patched together and eventually evolved into a full-fledged studio.

The ability to take phone calls from our audience is something we had always wanted to do. Most internet broadcasters struggle with taking calls live on the air. I know many can relate to trying to be successful at this by taking a cellphone with the speaker pointing to

the microphone or using multiple Skype machines, but is it the proper way? The answer is an emphatic no.

NEXT STEP

I had recently spoken to a friend who is in broadcasting, and the topic of the evolution of internet broadcasting came up. We were both intrigued by how the industry, in just a couple of years, had transitioned into something that most content creators would be proud of.

A few months ago we decided to take

the next step and add a multiline phone system to expand our studio setup and take lives calls the right way. With the addition of a Telos iQ6 six-line telco gateway, we are doing just that.

We started out by doing some research as to what would be the best fit for GFQ and decided the iQ6 with the Telos VSet6 handset would be just the ticket. In 2012, we upgraded our studio to mostly Telos/Axia equipment and since the iQ6 is easily configurable with our current system it was an easy choice. In just a few short hours we were up and running. After testing all the features, we were ready to start taking calls.

FEATURES

One of the most notable features on the iQ6 is that it connects directly to the Axia network via Cat-5 cable, simplifying the setup process. The iQ6 is equipped with dual Telos hybrids, utilizing Digital Dynamic EQ and Acoustic Echo Cancellation, both of which work with analog or digital phone lines. That makes the iQ6 the most viable choice for most internet broadcasters looking to expand to live calling.

Since adding the iQ6 and VSet6 to our studio we have incorporated this digital phone system into nearly every show we produce and have been so successful doing so that we recently decided to add three new sports-themed shows to GFQ's show offerings. With topics ranging from professional wrestling to technology-based programming, and even as far as the topic of hair loss, each of these shows depend on the iQ6 every week to maintain the interconnectivity between host and audience, which is vital.

One of our longest-running shows, "The Bald Truth," has been using an iQ6 for several years and remotely connects to our studio from Los Angeles. Each week, men and women around the world call in to connect with the host on the topic of hair loss, which we believe is the lifeblood of the show.

As our industry continues to grow and evolve, more and more internet-based broadcasters are going to need high-quality products that can move their broadcasts from a standard "podcast" to a true internet-based radio show. We are just getting started in this new age of broadcasting, and over the next few years I expect more studios to begin to rely on the iQ6 and Telos VSet6 when they're ready to take their broadcasts to the next level.

For information, contact Cam Eicher at The Telos Alliance in Ohio 216-241-7225 or visit www.telosalliance.com.

TECHUPDATE

UPDATED NEOGROUPE NEOSCREENER TARGETS LARGER FACILITIES

NeoGroupe has introduced new features to its NeoScreener live talk show system to accommodate larger networks, multicity and multistudio facilities.

NeoScreener, a set of applications designed to allow live radio talk shows to efficiently manage the flow of incoming phone calls, now features user logins that can be defined, and specific access rights assigned, to telephony devices such as those from Telos or AEQ. This, says NeoGroupe, offers protection against unwelcome activity.

The upgraded version allows users the ability to log staff actions and record telephone calls. It also offers an analog clock, segment timers and a completely new look.

In addition, the company says that all of its applications comply with General Data Protection Regulation and a majority of existing personal data protection laws worldwide.

For information, contact NeoGroupe in France at +33-972-23-62-00 or visit www.neogroupe.com.



Transitioning to IP Is Easy With Comrex VH2

Radio Engineering Services helps WDST bring its phone system into the IP world



USERREPORT

BY RANDY MILLS
Engineer
Radio Engineering Services

HUDSON VALLEY, N.Y. — I work for Radio Engineering Services, a New York-based company. We maintain, design and build systems and studios for a range of clients including Cumulus Media, Townsquare Media and others. One of our jobs is helping clients find the appropriate equipment for their needs and integrate that new technology into their systems.

A station we work with, WDST(FM)/Radio Woodstock, recently switched their studio to VoIP. They had a traditional phone system, which doesn't really work with VoIP, so they needed to make a change. The multiple-line VoIP hybrid systems they were familiar with costs upward of \$6,000, and they weren't ready to spend that much money.

While looking for a better solution, I learned about VH2, a two-line VoIP hybrid from Comrex. I asked my client if they'd be able to work with just two lines — this turned out to be better for their purposes.

Installation was straightforward. I connected the VH2 to a standard network, and was able to log into it through Device Manager (a straightforward browser-based program, used to configure settings and monitor connections).

DIRECTION

The directions and the layout are intuitive, so it was easy to set up. The details of the SIP network took a little longer to put together, but after that was taken care of, tying the VH2 into the audio console and setting up the phone took less than an hour.

Since we installed the VH2, it's been perfect for their needs. They've found

it to be quiet and easy to use — not to mention cost-effective. To teach the studio staff how to use the VH2, I went over it twice with a couple of people, then printed a three-paragraph section out of the manual, laminated it and stuck it on the wall by the box. As of now, I have not heard a peep out of anybody, they understood it right away.

The person who uses it on a regular basis is not a professional jock or a radio person. For her to just settle in and get it to work to the point where she doesn't want to rip it out of the wall and throw it down the street — that's saying quite a bit.

I've already recommended it to more people. For my clients who need a hybrid that sounds good, is easy to install and isn't going to break the bank, VH2 is perfect. Call quality is great, it's stable, it plays nice with networks, installation is easy and it's priced such that many people can afford it. It's a solid product, and it's on my short list for people who are looking for VoIP hybrids.

For information, contact Chris Crump at Comrex in Massachusetts at 978-784-1776 or visit www.comrex.com.

TECHUPDATE

YELLOWTEC B-LINE AND INTELLIMIX UNITE PHONE CONTROL

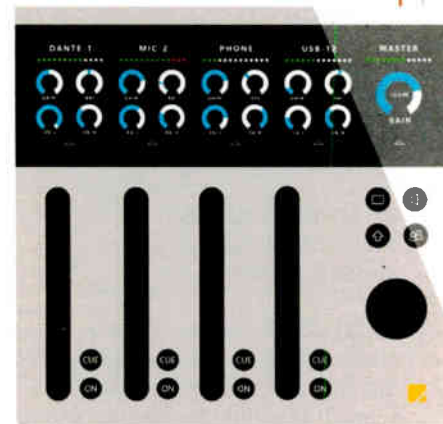
Yellowtec's b-line digital hybrid and phone system is a multi-line talk show system that offers worldwide connectivity for POTS and VoIP. It enables the integration of telco and control lines over a single LAN interface, and now offers a new way to control calls by working with the company's Intellimix Desktop Mixer.

This allows users to take control of calls directly via the Intellimix unit, adding usability when it comes to producing talk shows. Callers can be prepped (pretalk), placed in a waiting position on hold or assigned to one of the on-air channels via four buttons on the Intellimix's touchscreen.

With special digital echo cancellation (up to 100 ms) for tricky VoIP and cellular calls as well as adaptive function, the b-line reduces feedback interference in open-speaker applications. With the help of an expander, caller signal noise is lowered. The balanced AGC delivers smooth, consistent caller level, according to the supplier.

Choose b-line XT or b-line bold according to the number of lines needed. The Talkmaster screener software package is integrated in both models. POTS/ISDN connectivity comes standard. An Ethernet hub provides an interface for Talkmaster installations and AoIP. VoIP is available as an optional extension. Audio interfaces are analog (balanced studio level) and AES3 on XLR. A/D is selectable in the system setup.

For information, contact Yellowtec USA in California at 805-931-6081 or visit www.yellowtec.com.



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Radio Agricultura Renews With AEQ Systel IP

Chilean broadcaster gets new features and capabilities with latest generation

USERREPORT

BY **MARCOS REYES**
Technical Manager
Radio Agricultura

SANTIAGO, CHILE — Radio Agricultura is a leading Chilean radio network that has been operating for over 75 years. It is a 100-percent live, with current affairs, sports and, above all, entertainment radio. We cover all of Chile in FM and AM through a large radio station network.

We have used all three generations of AEQ multi-conference telephone systems. Back in 2001 we installed AEQ Systel 3000, based on phone hybrids. In 2008, we deployed an AEQ Systel 6000 to achieve central management of all incoming and outgoing calls related to the programs produced in the company. It was based on digital ISDN technology but also enabled to make use of analog lines.

Now, as Radio Agricultura moves to a completely revamped building, we are betting on AEQ's third-generation multi-conference system: Although AEQ Systel 6000 remains fully operational in the new studios, working mainly on analog lines, the installation has been completed with a new Systel IP 12 platform. It allows for the touchscreen management of up to 12 simultaneous IP calls, dynamically distributed for the three on-air studios.

DIFFERENT

Leaving apart the fact that, so far, testing a new AEQ piece of equipment has always been a success, in this case we have been pleasantly surprised by some differentiating Systel IP features.

Systel IP allows for the connection of broadcast telephony to current, IP-based, corporate PBXes. This way, maintaining conventional lines exclusively for broadcasting is no longer required. As an example, before the Systel IP, when a call for an editor was

coming in through our Cisco PBX and it was deemed as interesting to air the call, we had to take note of the incoming number, and then call control and instruct the producer there to dial it. This was always assuming the risk of an error when noting the number or that the



The phone system's software controller user interface can be seen on the screen.

caller would be busy, so an important guest could be missed or lost.

Systel IP is integrated with Cisco Call Manager, and calls can be transferred from any extension in the phone system to Systel IP, which acts as a multi-line telephone with 12 extensions. This also means that we can benefit from advantageous IP telephony fees, instead of paying the cost of hiring ISDN phone lines, which are becoming more and more expensive as they are getting quite difficult to obtain.

Another advantage resides in the user's interface. The workflow is quite user-friendly. We can call from the system's onboard phone book or from an auxiliary phone. Calls can be received and when the caller's information is stored in the phone book, its name appears on the screen. Otherwise, the producer can still label it and simultaneously type some comments in a special field in the screen that is duplicated on the controller's PC and in the studio. Once labeled, the call can be put on hold while listening to the program into a playout queue, or left waiting for further instructions. A counter tells us how long this call has been waiting from the last time we spoke to the caller.

Besides, a chat is available between the producer, controller and presenter in order to better organize the show.

The phone book allows us to prepare a list of calls to make during a program.

Annoying numbers can be placed in a black list, so when they call, a busy tone is returned and the call is disconnected. Previous calls can be cleared from the line before starting a phone quiz or contest.

Individual programs can maintain separate private phone number lists, avoiding the spreading of "sensitive" phone numbers corresponding to important people.

automatic gain control can be enabled, letting the equipment take care of the input level according to the characteristics of each line and the sound volume of the incoming voices.

Calls can be queued on one or several faders, allowing for great flexibility when putting them on air. Further, several interlocutors can be on air, even all 12 at the same time — provided that they are well-trained not to talk at the same time. Even in this case, it is simple to push or move someone that is interrupting others aside, talk to him/her privately and then return him/her to the discussion.

For all these reasons we are delighted with this third generation of AEQ talk show systems. If the former generation provided a substantial improvement in communications quality, this one has supposed a big leap in regards to operational convenience that pleases producers, controllers and presenters. Also from the technical and management points of view, the flexibility and communications savings provided by the system are remarkable.

Integration with the company's phone system was remotely prepared, but as this had to be done at the same time as a large equipment installation, we were lucky to count on AEQ technical services *in situ* not only during the configuration and start-up phases of the system but also for the system's installation and training.

For information, contact Peter Howarth at AEQ Broadcast International in Florida at 800-728-0536 or visit www.aeqbroadcast.com.

TECHUPDATE

D&R WEBSTATION HAS PHONE HYBRIDS

D&R recently announced the release of a new broadcast mixer, the Webstation. D&R's U.S. distributor Progressive Concepts says it has them in stock.

Built around low-noise circuitry, the company says, the Webstation is an "intelligent" mixer with internal USB control section designed for daily production, voice tracking, webcasting and on-air use.

Features for the Webstation include the ability to display incoming phone calls onscreen, onboard VoIP hybrid functionality CRM and phone outputs, clean-feed output for external hybrids, six dual inputs, drop-through design, two-band equalizer, Windows/Mac-compatibility, built-in auto silence detector, three USB stereo in/out channels, internal nonstop switching and bidirectional cue communication buss.

For information, contact Progressive Concepts in Illinois at 630-736-9822 or visit www.progressive-concepts.com.



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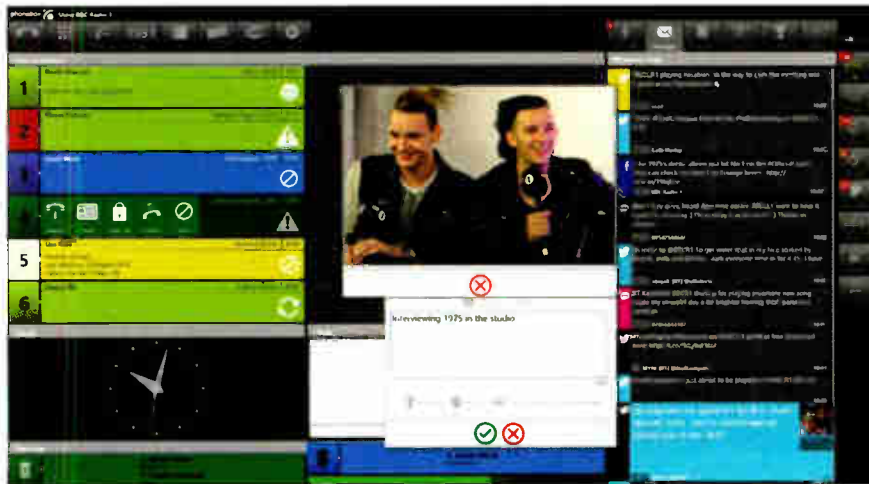
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TECHUPDATE

BROADCAST BIONICS PHONEBOX IS A MULTIPLATFORM TOOL

PhoneBOX from Broadcast Bionics is a studio communication multi-tool. The company calls it a feature-rich software interface that includes everything needed for a talk show system and allows for additional possible workflows. It enables a station's content to become discoverable quickly and shareable easily, suitable for the demands of multiplatform broadcasting.



Working with PhoneBOX are several other programs. Before a mic is opened, Broadcast Bionics says, the Oasis social media monitor can show the mood and mind of an audience as well as directing users to the best social media content. Virtual Director will switch cameras automatically to visualize and stream every link. To edit and share video clips to social media after a fader is closed takes only moments, according to the manufacturer.

Users can make videos searchable using PhoneBOX's plug-in Voice Transcription, which delivers full text search of recorded. Then, the MOR> multi-track editor can be used to repurpose content for other platforms. Jobs which used to take hours of painstaking work are reimaged and object-based production is a reality.

PhoneBOX software is easy to use and consolidates studio communication into a single screen. It's compatible with all line types, incorporates Skype TX for Radio, and operates as a standalone system but is also compatible with TelosVX hardware systems.

For information, contact Broadcast Bionics in England at +44-1444-473999 or visit www.phonebox.com.

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Radio World publishes User Reports on products in various equipment classes throughout the year to help potential buyers understand why colleagues chose the equipment they did. A User Report is an unpaid testimonial by a user who has already purchased the gear. A Radio World Product Evaluation, by contrast, is a freelance article by a paid reviewer who typically receives a demo loaner. Do you have a story to tell? Write to bmoss@nbmedia.com.

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Radio broadcasts of Major League Baseball, NFL, and some college football games that are on cassette tapes, approx 100 to 125 games, time period of entire collection or from the 1950's - 1970's, BO.

Must purchase entire collection. Contact Ron, 925-284-5428 or ronwtamm@yahoo.com

WYBG 1050, Messina, NY, now off the air is selling: 250' tower w/building on 4 acres; collection of very old 78s dating back to 1904; 12' satellite dish on concrete base; prices drastically slashed or make offer. 315-287-1753 or 315-528-6040

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I'm looking for KFRC radio special of Elvis Presley which aired on January 8, 1978. I'd be willing to pay for a digital copy. Ron, 925-284-5428.

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I'm looking for the Ed Brady radio show in which he did a tribute to Duke Ellington, the station was KNBR, I'd be willing to pay for a digital copy. Ron, 925-284-5428.

I'm looking for KTIM, AM, FM radio shows from 1971-1988. The stations were located in San Rafael, Ca. Ron, 925-284-5428.

I'm looking for San Francisco radio recordings from the 1920's through the 1980's. For example newscast, talk shows, music shows, live band remotes, etc. Stations like KGO, KFRC, KSFO, KTAB, KDIA,

KWBR, KSFX, KOBY, KCBS, KQW, KRE, KTIM, KYA, etc. I will pay for copies... Feel free to call me at 925-284-5428 or you can email me at ronwtamm@yahoo.com.

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

KSFO Radio. Ron, 925-284-5428 or ronwtamm@yahoo.com.

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

Looking for KSFX radio shows, Disco 104 FM, 1975-1978. R Tamm, 925-284-5428.

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

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Rage Against the Machines in 2018

Radio needs to fight fire with fire to compete in the modern marketplace

COMMENTARY

BY THOM CALLAHAN

The author is president of the Southern California Broadcasters Association.

It was not without some satisfaction that I learned 2017 was a disruptive year for digital advertising.

Procter & Gamble and JP Morgan pulled over \$200 million out of their digital ad budgets based on poor ROI results or — to use digital's term — ROAS (return on ad spend). Meanwhile, Facebook has endured blistering criticism and scrutiny about the accuracy of its audience data and reporting standards.

Adding to client rage is the nagging issue of bots, malware and the environment of what sites are carrying a client's image through the numerous, unknown third-party "networks." It is now projected that audience fraud, which is mostly ads seen or heard by non-humans, will



approach a worldwide loss for clients of \$16.1 billion (with a "B") in 2017.

VALUE AND RESPECT

Material disruption in any industry always leads to significant change and opportunity for other industries to advance; and so it is that 2018 should finally be the year that radio and its pure digital platforms begin to receive the value and respect from major advertisers that radio so richly deserves.

And here is why:

According to Ad Age, 64 percent of marketers are unclear about the origins of their data sources, and three of four admit they are not confident that their digital ads are reaching the right people. In an effort to make their ad budgets work harder and provide more return on investment, advertisers are starting to demand more transparency from the digital giants, including transparency on fees, which could cause consolidation for digital media buying.

The trend towards actually knowing if major brands are reaching their target will continue as Amazon looms over every marketer's thinking. Without fanfare, Amazon has created a \$1 billion-per-year digital advertising monster convincing vendors to spend their advertising on Amazon's platform. Kroger has launched a similar model for its vendors, touting its loyalty program and consumer shopping habits. There has never been a more disruptive time for media spending at all levels and in all media.

According to GroupM, the projected



Thom Callahan

share of media in 2018 will perform as follows: 43.3 percent for TV; 33.1 percent for digital; 10.9 percent for magazines; 6.2 percent for newspaper; 4.2 percent for radio; 2.4 percent for out of home.

Additionally, when asked, 97 percent of agencies indicated they will invest in social media site Facebook, 64 percent will use Instagram, 60 percent will use YouTube and 38 percent will still invest in Twitter.

Despite all of its ad fraud, lack of accurate consumer targeting, poor commercial and image environments and documented non-human viewership, digital remains as broadcast radio and TV's main ad budget killer. Our collective response to digital's encroachment on "our" clients is either aggressive denial or, worse, a belief that if we keep staying the course on how radio does business, we will survive. Right.

May I suggest a better approach to growing our industry?

JOIN THE CLIENT CONVERSATION

Radio needs to be in "the room where it happens" when target marketing, same-store sales, market share, conversion rates, brand awareness and actual, documented audience delivery are discussed. Not at the buyer's desk, but at the planning meeting and the account team meetings and preferably, at the client meetings.

The Internet Advertising Bureau continually hosts client industry events on both coasts using various aspects of internet advertising to begin (and continue) a conversation with clients. Radio should host its own industry summits; not just to sell, but to help facilitate the dialog and learn how best to blend radio's strength with client advertising goals and concerns.

Representatives of the Southern Cali-

(continued on page 38)

READER'S FORUM

DIGITAL AND ANALOG DO NOT MIX

Due to the way that IBOC technology works, stations that choose to use the tech essentially send out their original analog broadcast with two digital "sidebands" at the bottom and top of their allotted frequency.

If the power allotted is enough to bleed into the adjacent channels in the frequencies immediately above and below the station that is utilizing IBOC, even if the digital signal is too weak to be received on a digital radio, it will still cause interference to an adjacent analog channel.

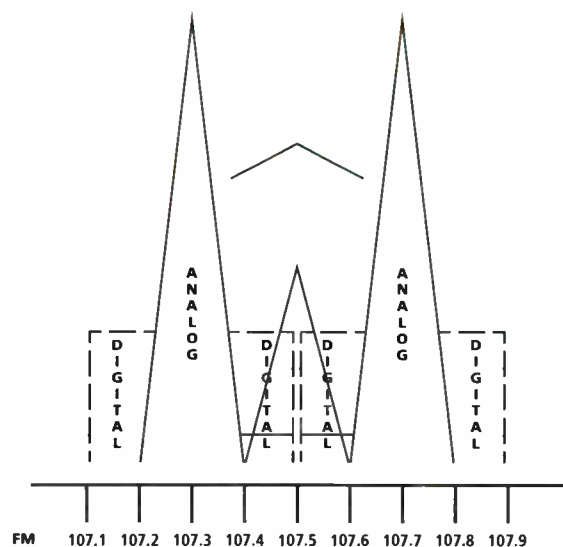
This is causing interference and destroying the listening experience for anyone who attempts to tune into those stations. In the same way that the digital sidebands can bleed into adjacent frequencies and cause interference, they can also interfere with their own associated analog signal.

This is a pretty big problem, since one of the most important selling points of IBOC is that it allows digital and analog signals to share the frequency once occupied by only an analog signal.

It is also a kind of Catch-22, due to the fact that a low signal strength results in an HD Radio broadcast that nobody can receive, while a strong one can interfere with the analog signal, which is the one that almost everyone is actually listening to in the first place.

I am an LPFM operator experiencing severe noise from these very high power stations 80 miles away! Many complaints from listeners hearing noise on my frequency. Many analog stations are unaware of this interference because it masks itself by just inducing white noise, noise that you would normally hear on a vacant frequency. Many of the stations I listened to are no longer available due to digital radio.

Digital does not belong in an analog band!



Frank Vela
WFJV(LP)
Citronelle, Fla.

Buying Time for a Seamless Switch

Hybrid radio comes with its own set of technical considerations

COMMENTARY

BY SEBASTIAN SCHARRER

The author is product manager for automotive audio at Fraunhofer IIS.

Advancements in technology enable a variety of new platforms for consumers to enjoy audio in their cars. Despite the plethora of programs and podcasts available online, broadcast radio remains highly preferred for local programming, news and information.

In fact, according to Pew Research, traditional terrestrial radio continues to be the most common form of in-car listening, as compared to online platforms. The well-known challenge, of course, is to maintain audio quality as a driver moves away from a local station's broadcast area and signal strength gradually weakens.

Hybrid radio combines broadcast transmission with an accompanying web stream, but it's not as easy as simply switching between the two transmission channels based on signal strength.

Delays between the two sources are common, such as the typical lag from a web stream that can range from a few seconds to a half-minute or more. Making matters worse, delay times are not consistent between radio stations. Without any intelligent handling, a simple switch from broadcast to web stream will result in content that is either lost or repeated. Such delays can negatively impact listener enjoyment.

Now, innovation in the way users receive radio transmissions are increasingly available. Through the growing adoption of hybrid radio, automotive radio manufacturers are focusing on delivering an engaging and seamless listening experience, even when radio signal strength declines due to distance.

SYNCHRONIZATION

Fraunhofer IIS, developers of advanced audio technologies, now offers Sonamic TimeScaling, a technology to synchronize both signals to produce a precise transition.

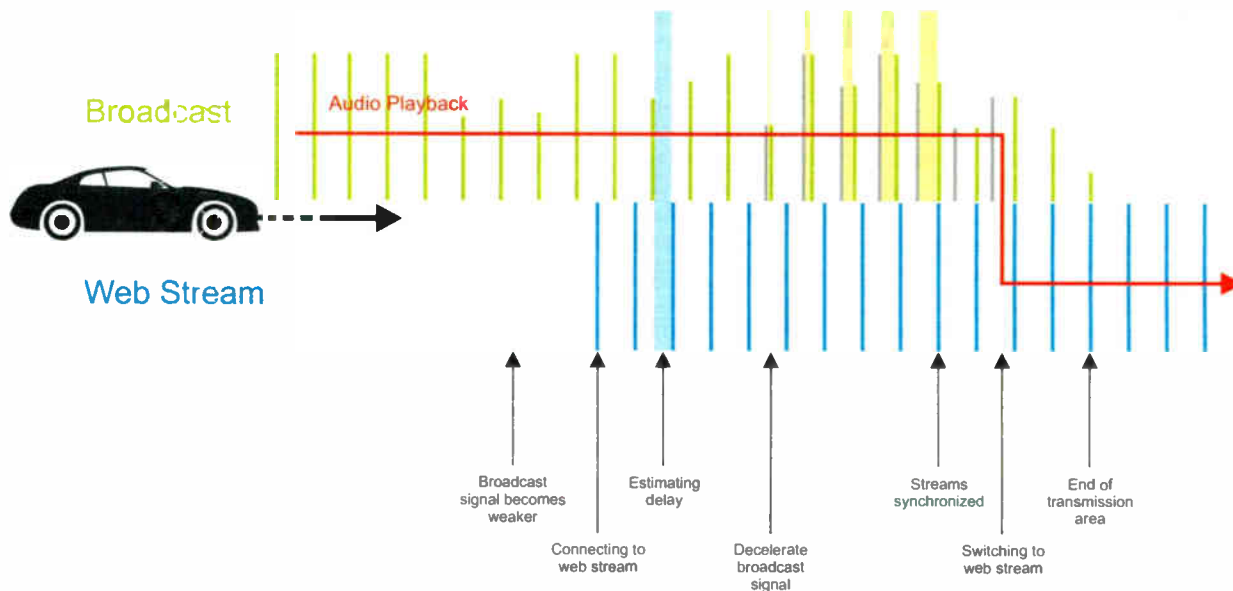
The Sonamic TimeScaling technology works by enabling the radio platform to anticipate that the radio signal may soon be interrupted. This is possible because the technology is designed to recognize weakening signal strength. When this happens, Sonamic TimeScaling starts to calculate the existing offset to the web stream. Once the offset is estimated, the next step is to decelerate the signal that is ahead of the other, which continuously



Sebastian Scharrer

usage to a minimum. Again, this is a transition inaudible to the listener and accomplished without loss of content or duplication. The pitch of the original transmission is also preserved, resulting in no audible degradation of audio quality.

In today's evolving media world, consumers have come to expect an uninterrupted audio experience across multiple media platforms. The automotive industry is responding with fully integrated, multichannel playback systems tailored to the manufacturer's specific vehicle. This presents new opportunities to take the in-car listening experience to the next level. New intelligent audio processing technologies such as Fraunhofer's Sonamic TimeScaling increase this potential, seamlessly delivering an uninterrupted in-car audio



reduces the delay until both signals are synchronized.

Listening tests prove that this compensation process is imperceptible. While driving, a 3-percent deceleration of the audio signal is not recognized. For most listeners, 5 percent is still tolerable, though when enjoying a favorite song, for example, the playback speed difference can be recognized. The technology allows the platform to retain the transmission instead of losing the audio signal or producing an irritating repetition or signal drop-out. Most stations come up with delays between DAB+/FM and IP streams of around five to 10 seconds. Compensating this delay with 5 percent means that the process will sync both signals within two to three minutes.

The process also works in reverse, enabling the radio to switch back to analog broadcast when signal strength is restored, which also keeps mobile data

experience for consumers.

The accompanying graphic illustrates this process. It depicts a radio station's two broadcasting methods: radio signal and web stream. The offset between the two signals is marked in light blue.

The green lines represent an area where a radio signal can be received. The height of those lines indicates that the reception quality varies by location — sometimes better, sometimes worse.

A car driving from left to right will, at some point, leave the transmission area.

Reception diminishes and the listener can no longer hear the broadcast at the same level of quality, if at all.

The red arrow indicates which playback stream the listeners are enjoying.

At some point, the main unit establishes a connection to the Internet, and identifies the right web stream for the broadcaster. Before reconciling the offset, it first determines how big the delay

is between the two sources.

This intelligent process does not change the audio signal in any perceivable way. Instead, it retains the original pitch of the transmission.

The gray lines represent the original signal and the green lines represent the decelerated signal parts. The growing distances between the grey and green lines depict the deceleration generated.

This gradually reduces the delay until both sources are in sync.

Once they have been synchronized, the radio signal continues at its original speed.

From this point on, both signals are synchronized with each other, so that the system can switch from radio to web stream at any time.

Independent of the growing importance of streaming services the necessity of broadcast will remain. Technologies such as Sonamic Timescaling combine the advantages of both worlds to enlarge the transmission area tremen-

dously. Due to its physical nature, over the air transmission, unfortunately, has some limits of reaching listeners while traveling across the country. The benefit of this hybrid approach is data transmission volume will be saved, for the listener as well as for the broadcaster.

With advancements in technology, such as Sonamic TimeScaling and more efficient audio codecs, high-quality audio is delivered to listeners even when outside the OTA transmission area.



MACHINES

(continued from page 36)

California Broadcasters Association recently spoke to 350 auto executives at a J.D. Power Auto Conference in Los Angeles as the run-up to the massive LA Auto Show. We met with astute auto industry people who asked solid questions about radio and professed a lack of awareness of radio as “digital is the big dog now.” It became obvious that if we could speak (and listen) to these executives at these types of conferences every month, we could change budgets, minds and, yes, misconceptions about radio and our digital platforms.

REDISCOVER RADIO

From audience cume and TSL listener growth, as measured by Nielsen’s actual listening data (and not bots), radio’s popularity is at an all-time high, with a 97 percent reach of the U.S. population. No other digital medium can claim such audience reach, not even TV.

The commercial environment offered by radio is filled with engagement, personality, peer-to-peer relatability, attentive and captured consumers in their vehicles, and a trust and believability from its listeners that no other media enjoys. And it’s all delivered in real time.

There are no ad blockers with radio, no “skip this ad after 5 seconds” links, and certainly no doubt as to the target audience each radio station is reaching. And since radio licenses are still controlled by the FCC, clients can be assured their message will not be heard surrounding vulgar, racist or unsavory

programming. A client’s public image should be everything.

REAL, MEASURED, TARGETED

Radio’s digital platforms, mobile apps and social media extensions are the ideal media full-circle touch point. With broadcast radio providing the needed reach and targetability, clients can then utilize the same station digital offerings to reach the same loyal audience again, in a different environment. And with a visual ad that complements the audio ad, and on a different device, and all at a different time of day.

Imagine the client’s message mentioned to the morning team’s Twitter followers or at station-sponsored concert or event? Imagine the trust clients have just built for their brand, and the affinity associated with their targeted consumer.

Can we also discuss zero ad fraud with radio’s digital platforms?

The average radio station in the U.S. in 2017 generated 90 percent of its revenue from over-the-air commercials, NTR and events, and 10 percent from its digital platforms. The cold reality is that the percentage has not changed in years. If radio is to grow its digital revenue, it must learn to collaborate with its clients in new, forward-thinking partnerships that allow for multimedia ad spending while increasing radio’s voice and spend in these right-brain conversations.

Radio can “rage against the machines,” but it’s a non-productive emotion. If we know “the machines,” their strengths and their weaknesses, then radio has the unique and enviable

ability to adapt and grow with any of our clients and their digital partners. We will not be a tag-along, but rather the equal and powerful partner that we are.

If the radio industry develops this positive approach to creating value with a deeper dialog about our digital and broadcast worth, we will be serving our clients with richer and more robust solu-

tions to their growing marketing and competitive challenges.

We can “rage against the machines” or we can harness our inherent value and grow with them.

We can control radio’s destiny — and our own.

Comment on this or any article to radioworld@nbmedia.com.

READER'S FORUM

MODERN HOMEBREW

Responding to “Doesn’t Anyone Build Anything Anymore,” RW Oct. 25 issue:

Like many, my first brews were HeathKits, Eico kits and Knight kits, then the carrier current AM 6146 transmitters in my college radio station.

With a background in homegrown amateur radio gear (Rochester VHF group president, home-made 2m FM, [single] sideband and test equipment), I went to HCJB to build the HC100 series transmitters. I was responsible for the DSP solid-state modulator.

Now I am doing FM again, and find the need for FM “heat maps” simultaneously recording the signal strengths of multiple FM stations on the same channel as a function of location to combat the rampant piracy on today’s FM band. The prototype uses a Raspberry Pi and laptop, but the distributable units will use an Android pad or phone. The detector is a USB RTL stick. Directivity is provided by an electrically rotatable four-square array on the car roof, which can also serve for a Doppler DF system when only one signal is receivable.

*Bob Moore, WB2L
Indiana*

It was in the early '60s, as I recall, at station WRKT(FM) in Cocoa Beach, Fla., when the FCC was requiring stations to carry news in addition to their regular programming. Our FM station was automated with a Schafer 800 system, nothing digital about it. The station didn’t have the money to buy their network joiner from Schafer, so I was faced with finding a way to “make it happen.”

The only thing I had to make the station ID was a reel-to-reel playback that we had been using to give time breaks (a Schafer unit) which I converted to have the station IDs on. How to cue it ... the only thing available was the Schafer one-hour timer that ran the whole system. I took my cue from that to start the tape deck to provide the station ID, then to switch the audio from automation to NBC for the news. I built a two-step switch that dropped the audio level in 3 dB steps to fade the automation to NBC. When the news ended (five minutes), the timer cued the two-step switch to go back to the automation.

The only problem I had with the system was on the weekend when the NBC announcers jumped in too quickly after the news ended (didn’t happen all the time); they were supposed to wait a few seconds to allow stations not carrying the “weekend show” to make a clean break. The two-step faded them just fine, but it didn’t sound good. Complaints to NBC helped only a little. I think it was Harry Morgan who was the worst about that; jumping the gun.

The station ID was recorded on the reel to reel Schafer “clock” tape that had “windows” in the tape that allowed the photo cell to stop the machine after the ID and be cued for the next break.

The station had the #2 rating behind a local top 40 and ahead of its AM counterpart. Not bad for a non-live radio station with only one recorded voice, 24/7, excepting the commercials. The engineer (me) was that voice, although I think it was my wife who recorded the IDs!

*Mark Manucy, W4FJE
Orlando, Fla.*



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