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November-December 2022 – Vol. 30, No. 6

The Story of Broadcast Tools

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Contents

November-December 2022

Cover Story 6
The Story of Broadcast Tools

Studio Site 8
Processing a New Year!

Chief Engineer 10
Things Are Not Always As They Appear

FCC Focus 12
Emergency Alert System

Practical Solutions 14
Yet Another List of Apps for Engineers

State of the Station 16
Robert Shotwell, ABIP Inspector

Maintenance Guide 18
Air Filters – or So They Say

Survival Guide 20
Is Your Winter Survival Kit Ready?

Tower Topics 22
Why Climb When You Can Fly

Transmitter Site 26
Let's Tidy Up the Transmitter Building

Transmitter Topics 30
Correlation and Causation

Shop Talk 34
Misc. Tech-Tips and Thoughts

Small Market Guide 38
Another Halloween Has Come and Gone in Small Market

Station Stories 40
Dealing With Natural Calamities

Service Guide . . . . . 44 & 45
Radio Equipment, Products, and Services

Gear Guide – *New Products & Updates* 46
Angry Audio, Tieline, V-Soft

Final Stage 47
Events Register and Advertiser Information

On the Cover: The Broadcast Tools Team (l-r), Ben Nason, Christina Molina, Don Winget, Selda Molina, Connie Miller

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In This Issue

Critical Content for Radio

Cover Story – *by C. Miller (page 6)*

The Story of Broadcast Tools: *"The story of Broadcast Tools begins with the story of its founder, Don Winget. Winget got his start in radio as a teen, hired as the gofer for the CE at his hometown radio station, WBIZ in Eau Claire, Wisconsin. He'd always been interested in electronics and how things worked, even as a kid. As soon as he started at WBIZ, Don became fascinated with radio and knew this would be his career. With no money for either technical school or college, Winget received his education the old-fashioned way, on the job."*

FCC Focus – *by Gregg Skall (page 12)*

EAS – New Rules and Many Changes: *"When effective, the new rules require broadcasters and other Emergency Alert System (EAS) participants to transmit the Internet-based version of alerts when available, rather than the legacy version of alerts. The increased use of Internet-based alerts, in CAP format, will produce higher-quality audio messages, improve the availability of multilingual alerts, and ensure that more of the alerts displayed on television screens contain all the information provided by the government."*

Maintenance Guide – *by Gary A. Minker (page 18)*

Air Filters – or So TheySay: *"The air filter is such a seemingly innocuous device, that should be so simple to select and install. But as you begin to think about them, the choices are many, their names are assorted, and their functions can be misleading. Some of them are great, and some scream: "Don't use me!"*

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Cover Story

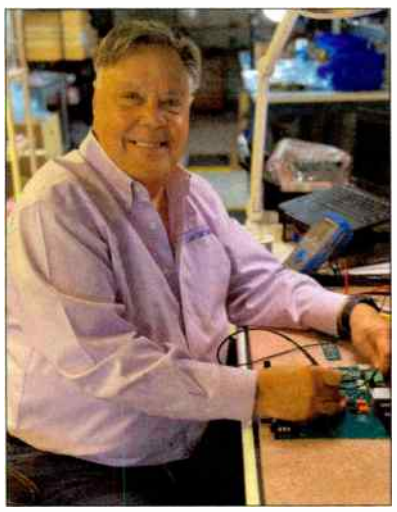
The Story of Broadcast Tools

by C. Miller

The story of Broadcast Tools begins with the story of its founder, Don Winget. Winget got his start in radio as a teen, hired as the gofer for the CE at his hometown radio station, WBIZ in Eau Claire, Wisconsin. He'd always been interested in electronics and how things worked, even as a kid. As soon as he started at WBIZ, Don became fascinated with radio and knew this would be his career. With no money for either technical school or college, Winget received his education the old-fashioned way, on the job. Later, while serving in the U.S. Army during Vietnam, Don gained formal technical training and was then stationed in Okinawa where he was assigned to Stratcom and the AutoDIN division – a forerunner to today's Internet. After the service, Don returned to Wisconsin and formed a CE contracting business in the tristate area. Given the frosty working conditions, it was an easy "yes" when Seattle radio and promotions legend Pat O'Day, owner of KYYX FM/Seattle and KORL AM/Honolulu, asked Don to move to Seattle and come work for him in 1976.

The Seattle broadcast engineering community welcomed Winget and he made many life-long friendships. One of his first friends was Lee Hurley, then CE for KJR-AM Seattle. Hurley and Winget partnered to create Sentry Systems, one of the earliest PC-based automation systems. Sentry Systems was the place where Winget designed equipment to sell, rather than just building a problem solver for himself – a true turning point in his career.

Winget realized he not only liked designing and creating products for manufacture, but he was also good at it. At that time, many CE's would wire up their own gear, but Winget recognized there was a real market for reliable, affordable, feature-packed problem-solvers that were not yet widely available. With his CE and product design experience, Don decided to make his mark in the industry in a different way – as founder, CEO and CTO of Broadcast Tools Inc.

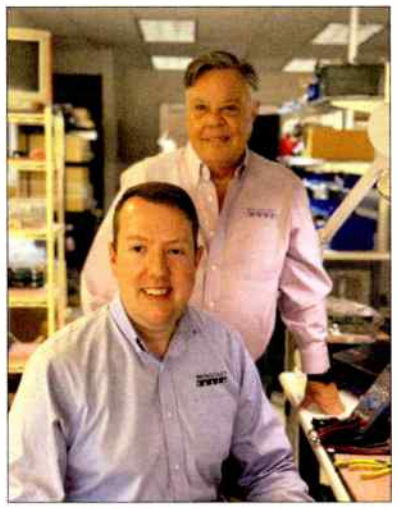


Broadcast Tools Founder, Don Winget

Broadcast Tools, Inc. (BTI) was born in 1989 while Don was still CE at KXRX in Seattle. Winget started BTI in his spare time, which was limited as a Chief Engineer in a major market. But Don found he was driven to design and couldn't stop the process even if he tried.

In the 1980's Seattle had yet to become the technology powerhouse it is today. But with established companies like Symetrix, Rane, Mackie, and Fluke already in the area, there was a local demand for companies that served the electronic manufacturing industry. As a one man show, Winget had to develop another skill: "Hunting" – Winget spent hours hunting for the right part, the right vendor, the right source. But by spending those early years hunting, Winget was able to create a network of vendors and suppliers, many of whom Broadcast Tools continues to partner with today.

But Winget still needed a way to get the products to market. Since Don had been a customer for decades, he had already built relationships with the folks at BSW, or Broadcast Supply West as it was called back then. The team at BSW were the first willing to take a chance on his young company. And within a year, Winget had added partnerships with Allied Broadcasting, Broadcasters General Store, and SCMS as well. With products coming off the assembly line and dealers in place, Winget knew the small startup had real potential.



Don Winget and Ben Nason

Through his many friends and contacts in the Seattle CE community, he was often asked to help with special projects – which often inspired new product ideas for BTI.

In 1991 Don was hired to build a mobile radio station in a 40-foot cargo container for delivery and setup in St. Petersburg, Russia. The project's budget required the use of inexpensive Mackie mixers. Winget created the CC-2 Console Controller to add monitor muting, microphone on/off control and warning light switching. The product worked so well, in 1992 the CC-2 was added to the Broadcast Tools product line.

Around the same time, Don sold his VMC-16 Voice Remote Control product design, to Broadcast Electronics in 1992. Winget used that sale as seed money to fund his operation. Not long after, Don designed the MSRP, the Multi Station Relay Panel, that was private labeled for Harris for use with the SAGE ENDEC EAS system.

After those successes, Winget decided to make Broadcast Tools his full-time focus in 1995 when he moved out of Seattle to the Skagit Valley and worked out of his home in Mount Vernon, WA. And that's when Broadcast Tools really became a contender.

Early on, Don designed two key products that proved to be anchors in the Broadcast Tools product line: The Audio Switcher and the Silence Monitor. The first switcher introduced was the 8x2A Switcher – 8 stereo inputs, 2 stereo outputs and 2 mono outputs. BTI has made some version of an 8x2 switcher since the early 90's. And after many upgrades and improvements the current version, the ACS8.2 Plus, is still one of Broadcast Tools' most successful and popular products. Today's ACS 8.2 Plus is a hardware concept not too different from the Console Blades/Mix Engines you now see as part of AoIP systems. BTI's first Silence Monitor offered the ability to not only monitor for silence and automatically switch from a main to a backup source, but also set up a restore function that would allow the unit to check main channel for valid audio before restoring the original programming. This was a unique feature not offered at the time, and is still a key selling point today, along with stereo phase monitoring. Even after 20 years, BTI offers several versions of Silence monitoring including the Audio Sentinel 4 Web, Silence Sentinel RJ, Audio Sentinel Plus Web/RJ, AES Audio Sentinel Plus Web, and the AES Silence Sentinel Standard.

Broadcast Tools' reputation had grown significantly and in early 2001, CBC radio Canada chose the Broadcast Tools 6x1 passive six input stereo switchers for use throughout their radio network. The CBC required a special modification in the existing 6x1 switcher's serial protocol to control individual switchers in their network, and Winget customized the software to meet their needs.

The 2000's also ushered in several new Internet based control products from Broadcast Tools, adding web-browser-based control, email, and SNMP capabilities to their remote controls and silence detectors and meeting unique challenges along the way. Over the past two decades web-technologies have advanced rapidly and Broadcast Tools has had to adapt its products to meet the changing needs of its customers.

With the introduction of HTML5 in the late 2000's it became clear that technologies like Java and Flash in the web-browser were no longer necessary and Broadcast Tools began a project to transition their WVRC-8 and WVRC-4 remote controls from Java-applet based web interfaces to HTML5 based web interfaces. This culminated in the WVRC-8 Plus and WVRC-4 Plus remote controls – with a very popular upgrade program that allows users of existing WVRC-8 and WVRC-4 units to purchase an upgrade kit to update their units to the new HTML5 based web interface.

When asked about what makes Broadcast Tools successful, Winget points out three key factors. First, the small but dedicated staff, who have been with Winget for decades. Second, Broadcast Tools' Dealers, who are instrumental in the longstanding and continued success in marketing and product delivery. But the third and real secret to Winget's success, he says, is "Our loyal customers," many of whom keep coming back time and again, eager to see and use the newest problem solver.

Broadcast Tools Team, l-r, Ben Nason, Christina Molina, Don Winget, Selda Molina, Connie Miller

Winget has proven to have a unique combination of talents that has helped create and sustain the story of success at Broadcast Tools. Don is a prolific product designer, with thousands of products sold over that last 30 plus years. He also is efficient at the manufacturing process, knowing when to bring work in house and when to outsource.

With his experience as a Chief Engineer, he understands what the customers need and how to market his products. He is also an involved manager, keeping an eye on the day-to-day operations of the business and the bottom line. With an experienced staff and an ever-changing market, Don still stands at the helm with no plans to slow down, ensuring the future story of Broadcast Tools has many more chapters to come. – *Radio Guide*

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Studio Site

Processing a New Year!

Listening to New Audio Improvements

by George Zahn

Right around this time every year, we start thinking about how the New Year could be better. Given economic crunches and supply chain delays, we may be looking at mid-year, but let's look at some improvements that can be made relatively inexpensively, be it our on-air delivery, on-line/podcast content, or remote voice work.

The human voice is the original musical instrument, and it remains largely the stock in trade for radio stations. Many have been born with "great pipes" but even the best voices may be able to be improved through some minor processing. For the rest of us lucky enough to be broadcasting without the deepest or most distinctive voices, we can use processing to improve our product.

Processing at the transmitter site can help to unify the overall sound of a station, but in the studio, we can mould our voices to augment the best of what we have and help fill in the gaps that can make us sound better. This isn't "voice shaming" by any means, but an idea that lets talent and stations try to get the most out of our talent or even compensate for underperforming microphones.

Inexpensive Options

Voice processing units can be had for well under $1,000 to several thousand dollars, and will vary in price, often depending on their features and settings. Let's look at a very basic way to do voice processing for a limited amount of money. This can be done with a simple compressor/limiter or a basic microphone pre-amp.

A good example of a microphone pre-amp is the **dbx286s.** It features not just a pre-amplifier for the microphone, but the single rack unit device adds the dbx Over-Easy compression that is a compressor that even a novice can use. The unit also features a limiter and expander/gate which might be better used for more advanced mixing situations, such as live sound reinforcement. The Over-Easy has a built in "soft knee" compression that is far more subtle than a hard limit.

The unit also features a de-esser for those announcers with over accentuated sibilance, and the unit even can allow additional processing through an insert jack. This is a good entry-level device or a possibility for those looking for ease of operation. The dbx unit also supplies phantom power for condenser microphones. The 286s also offers some other limited frequency adjustments under its enhancer section which allows some modification of high and low frequencies to add intelligibility while also modifying low frequencies, providing an option to enhance bass or a way to battle proximity effect for those work the microphone closely and may need to pull some bass out of the output.

"Eggs-cellent" Over-Easy

dbx also makes a general Over-Easy compressor without the microphone pre-amp for slightly less. The 266xs is a two channel line or mic level input unit that can be used for two separate microphones or even a stereo line feed (it allows a stereo couple option that allows precise control over both channels in this mode). The controls are limited, but for the price, it's a good no-frills processor for dynamic range, but it does not have frequency settings such as a de-esser.

Another similar unit to the dbx 266xs is the ART SCL2. This is dual channel unit that can also be used for stereo processing. It offers more control setting for compression for the more experienced or challenging user. It also offers a "hard knee" or "soft knee" compression setting, and a control for actual compression ratio settings, closer to a classic compressor.

Start With Quality

Keep in mind that no processor can totally counter the drawbacks of a bad or cheap microphone. One of the best ways to capitalize on any processor is to have the best possible audio going into the processor. There are other microphone pre-amps and/or compressor/limiters on the market. Others available come from Behringer, PreSonus, and Tascam among others, and these devices will get you "in the door" to processing. When selecting a microphone pre-amp/processor, it's important to make sure that the pre-amp is low noise, adding little extra amplification noise to your signal.

There are more advanced microphone processors such as a series of microphone processors from Wheatstone. These devices offer much more precise tailoring of the end result. For instance, the Wheatstone M1 or MG1 that is a single rack mount as well, but also has the ability to connect to a PC graphic display. The M1 controls are not for the fat-fingered or the faint of heart. There are no less than 20 controls on the face of the unit, but this device (in the slightly over $1,000 range) allows for incredible precisions for the educated user.

The **Wheatstone M1** is a digital unit that features analog or various sampling rate AES digital output. The unit has numerous bells and whistles: phantom power, de-esser, low and high pass filters, compressor, expander, additional bass and treble selections, plus a three-band parametric equalizer. The unit also has several pre-set settings, but it is also possible to create your own profile and store it for suture use. It can be networked and save an virtually unlimited number of presets.

Fat Fingers?

The Wheatstone MG1 is a simpler model at a slightly high price. While the M1 can connect to a computer for easier interface with the multiple controls, the BG1 is streamlined, featuring only metering on its face. The controls are all done by the computer interface. There's also an M2 unit and an M4 unit that are higher in cost but offer more connection options and dual voice processing.

The Wheatstone units are more advanced than the basic microphone processors mentioned earlier in this article, and cost goes up with connectivity, but for advanced users and station groups, these units may make a tremendous amount of sense.

How Will This Help?

So what's in it for me and my product or station? It's quite simple – quality. Used correctly, microphone processing can tremendously improve the overall intelligibility, crispness, warmth, and presence of the human voice. It can also cover up (to some degree) problems caused by sub-par microphone models or microphone usage.

I have railed in this column the often lacking quality of dynamic range control in podcast content from individuals, networks, or stations. A little compression on an overall audio product, especially in light of the Zoom-era mix of good and bad microphones from distant sources, can make podcasts more listenable. This especially goes for those who do not have a great deal of radio or technical experience. Until Alexa, Siri, et al, have playback compression settings, just being able to hear the voices on your podcast does *not* make it good audio.

Radio stations use on-air compression in their transmitter site processing, but if you're recording in your studio for broadcast and podcast, the podcast won't benefit from the compression you normally hear on-air, so checking the dynamic range of your content before podcasting it can be a tremendous assist. I hear many professionals who should know better that have uneven podcast audio levels to the point of having to turn it off. Some of us have been made lazy by the compression on the air.

One other caveat for use in radio station environments. As with anything, processing can be best in moderation. Sometimes it's easy to fall in love with an effect or setting and overuse it. It's important to compare settings and not over-process. Also incredibly important is to listen on-air for the combined effect of the mic processing plus the on-air processing. Modifying the mic processing may be necessary to have the best broadcast, and podcasts of broadcast segments may also require separate EQ or compression for the podcast.

If you're an announcer, either at a station or as a voice over free lancer (or both), you may be able to gain a competitive edge by making some minor changes in the sound. You can also tailor your sound to meet different clients' needs. In this day of remote work for some stations, adding some basic processing to each announcer may be a decent option rather than depending on our transmitter plant EQ and compression to unify our sound.

George Zahn is a Peabody Award winning radio producer and Station Manager for WMKV-FM at Maple Knoll Communities in Springdale, Ohio. He is a regular contributor to ***Radio Guide*** *and welcomes your feedback. Share your stories with others by sending ideas and comments to: gzahn@mkcommunities.org*

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Chief Engineer

Things Are Not Always As They Appear

by Scott Schmelling

Before we "get down to business," I'd like to wish you all a very Merry and Blessed Christmas. I hope you are able to spend time with friends and family. And I thank you for reading these articles and for taking the time to e-mail me when you are so moved.

As we work with our various pieces of equipment, we get to know them. We know how they sound, how they smell, how warm they feel. That knowledge is often very helpful in troubleshooting issues – but now *always!*

I've told you about our Harris HT20 that was tripping the High Voltage circuit breaker. One of the most common causes of an HV breaker tripping is a shorted rectifier stack. After creating a crude stack tester using a trouble light, Keith Petermeier and I determined all the rectifiers were good. After scratching our heads, Keith opened the PA cavity (just for grins) and found one of the hose clamps that fasten the plate blocker had over-heated and broken causing it to fall down in the cavity and short the high voltage to ground.

Same transmitter a few months earlier – the transmitter shut down – no plate voltage and no filament voltage and we couldn't turn them back on! Again, Keith and I started troubleshooting. We traced wiring between the Sine remote control and the transmitter controller. Everything was correct. We started checking test points on the digital control card – we even swapped cards but we still could not get the HT20 to fire up.

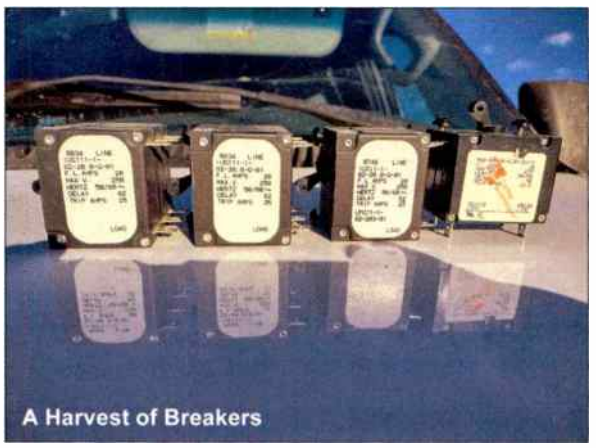
At one point Keith, as I recall, was adjusting tune and load controls (just in case), when I turned the "NORM/Local Only" switch to Local Only (for no real reason) – immediately, contactors pulled in and the blower started. We had filament voltage right away and shortly thereafter plate voltage and RF output came up and we were back in business. Walter at GatesAir shared with me *that very switch* on an HT35 got him an all-expense paid trip to Kentucky. All I got was a day trip to Lake Benton!

OK – one more – same transmitter. Again, it had shut down and we (Keith) put a 2.5 kW backup on line. The next day we started troubleshooting, starting with the blower. The air interlock from the blower, by design, will shut the transmitter down and prevent it from powering up. (That is, unless the air pressure switch gets stuck and the blower fails – that happened, but in a different transmitter.)

Normally the blower forces air across the fins of the PA tube keeping the tube cool (relatively speaking) and preventing it from destroying itself. The blower in this transmitter is a 3-phase motor and it runs *all the time.* Even though the motor may say the bearings "never need lubrication," the fact of the matter is, they do dry out and fail. If this were a manned site, someone on duty would hear screeching of a dry motor bearing and replace the motor as soon as possible. We do have a spare motor on the shelf.

But I digress ... we started our troubleshooting by manually spinning the "squirrel cage" blower blades – they spun freely, indicating the motor was likely not damaged. We started tracing the 3-phase. All three legs were present at the AC input terminal strip. But at the blower contactor one leg was missing. Keith turned the blower breaker off – then on — and we had all three legs again!

We closed everything up and, after warming up the filaments, we connected the HT20 to the line again, but with a firm resolution to get a replacement blower breaker and install it as soon as possible. As it turned out, there is a decommissioned Harris FM25K transmitter (predecessor to the HT20) that has become a "donor" transmitter. It uses many of the same parts as our HT20 and I was able to harvest *all* the breakers from the breaker panel. To my surprise, it looked like the blower breaker was considerable newer than the others – Yay! (I did a little happy dance. Fortunately I was out in the country and no one could see it.)



A Harvest of Breakers

I should also mention here that this HT20 was built in late 1988 and put into service in 1989. It has given us *many years* of reliable service. But as we should expect, some parts are wearing out and need to be replaced. Harris (now GatesAir) has a number of Service Bulletins for all of their equipment. Searching their site, you will find a Service Information Supplement for the FM25K. *Most* of that publication will also pertain to the HT series. I should look – they *might* have one for the HT series, too. If you can't find it let me know –I can e-mail you one.

OK, let's move to something else, satellite receivers. At our Mankato location we have six, or so, receivers fed by the same LNB. We had been experiencing some odd drop-outs, especially with one of the Westwood One XDS receivers. I discussed this with Fred at Westwood One Technical Servicaes. I knew the dish alignment was good, and in the conversation wondered if it might be a 5G issue. Fred said it was entirely possible. Since we did not have a 5G filter installed, I ordered one that day.

Hornets in the Horn

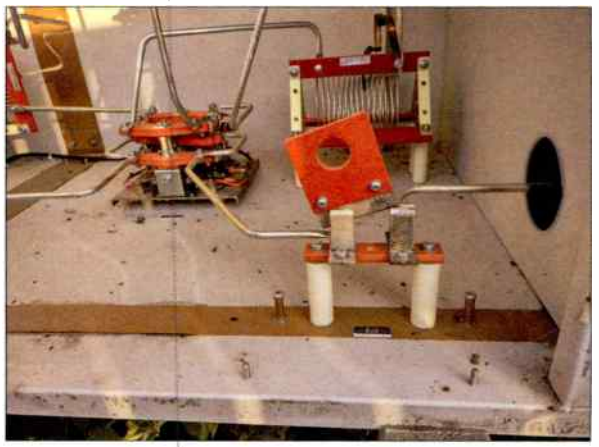
When the filter arrived, I got the ladder out and climbed up onto the dish and started unbolting the LNB. When it came loose I discovered the *actual* cause of the problem. We had a nice big *hornets nest* in the feedhorn! I cleaned out the nest and installed the 5G filter (we'll be needing it) and put the LNB back in place. Sorry, I can't give you the numbers, but signal strength was noticeably higher than it had been and we've had no drop out issues since.

This is one that I *should* have anticipated. So often, hornets build a nest in a feedhorn if it's not covered. Note to self – check all the satellite dish feedhorns for nests. It's better to clean them out *before* they cause you a problem. And install a feedhorn cover if you have one.

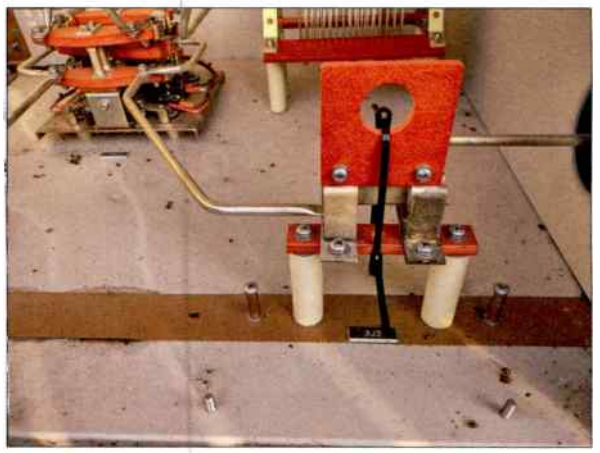
I'll share one more quick one with you. We have an AM station with a DA-1 antenna. It developed an intermittent VSWR issue on the Day (non-directional) antenna, that caused the transmitter to fold back to almost no output. The first time it happened I was out, but Keith Thelen (we actually have *three* Keiths – that I know of – but only *one* Scott – and when I retire they'll be *Scott Free!*) was there. He switched back to night, then day again. Everything was back to normal. We figured one of the RF Contactors might not have fully seated.

A couple weeks later it happened again. And again, switching back to night, then day, brought readings back to normal. The *third* time it happened switching did *not* correct it. I was there at pattern change and Keith arrived shortly thereafter.

First we checked the contactor in the phasor and all was good. Then we went to Tower #3 (the Day antenna). When we opened the ATU the cause was obvious. As you will see in the pictures, the J-Plug was barely making contact. The problem was caused by vibrations from the RF Contactor when it changed position. Apparently the vibrations from the contactor travel through the metal floor of the ATU cabinet to the J-Plug and over time (several years in this case) the plug migrates up to the point where contact is lost.



The quick fix – push the plug back down. The long term/low tech fix – to fasten it in place with a cable-tie. Sometimes the low tech solutions are the best!



That's going to be it for now. Again, I wish you all a very Merry Christmas and a Happy New Year.

And until next time – Keep it between 90 and 105!

Scott Schmeling is the Chief Engineer for Minnesota Valley Broadcasting He can be reached via email at scottschmeling@radiomankato.com

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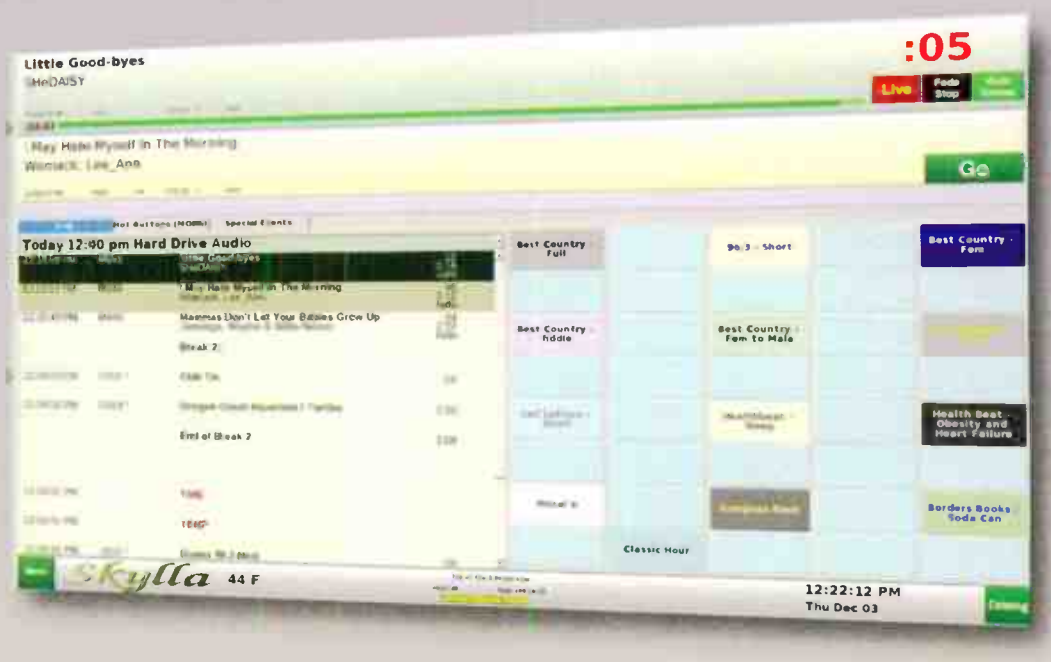

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World Radio History

FCC Focus

Emergency Alert System

New Rules and Many Changes

by Gregg P. Skall, Member – Telecommunications Law Professionals PLLC

The security of the nation's alert and warning systems is essential to helping safeguard the lives and property of all Americans. On September 29, 2022 the FCC adopted a Report and Order revising its rules regarding the emergency alert system to update and modernize the system and the messages it sends and to allow increased information about all of the EAS warnings that are provided through the Common Alerting Protocol (CAP) version of its messages.

The Emergency Alert System is comprised of both a legacy system and an Internet-based system. When effective, the new rules require broadcasters and other Emergency Alert System (EAS) participants to transmit the Internet-based version of alerts when available, rather than the legacy version of alerts. The increased use of Internet-based alerts, in CAP format, will produce higher-quality audio messages, improve the availability of multilingual alerts, and ensure that more of the alerts displayed on television screens contain all the information provided by the government.

CAP-formatted alerts disseminated over the IPAWS platform convey considerably more information. CAP alert messages utilize enhanced text which enables them to send more detailed directions for public action in response to the specific emergency, information in languages other than English, picture and video files – and URLs that members of the public can visit to obtain additional textual, streaming audio, or video information. This additional information is lost when CAP alerts are converted into legacy alerts over the legacy EAS, as only the header codes are relayed.

Under the New Order:

1. EAS participants receiving an EAS alert in the legacy format must check whether a CAP version of the alert is available. If it is, they must send the CAP version rather than the legacy version.

2. All outmoded language used in connection with national emergency must now be changed so that the text displayed to the public in the event of such an alert labels it as a "National Emergency Message" and the alert originator as the "United States Government."

3. The message sent to the public during national EAS tests must now state it is a "Nationwide Test of the Emergency Alert System" rather than the former message "National Periodic Test."

4. The visual script displayed to the public when a national EAS test alert is sent in the legacy format must now be include additional information about who is sending the test alert. It must also emphasize that it is only a test rather an actual emergency alert.

5. EAS participants are required to update their equipment to implement all of the required changes

Among other things, these rules will improve service for people who are deaf or hard of hearing by providing alerts in a viewable format that more closely matches the audible versions of these alert messages on television. In addition, people who are blind or visually impaired will have access on their radios to national alerts containing more detailed audio information.

CAP Version Polling:

Upon receiving a legacy EAS alert message, all EAS participants must now poll IPAWS to check whether a CAP version of the same alert is available. When a legacy-format alert that (i) is valid, (ii) covers a type of event and a geographic area for which the EAS Participant normally transmits alerts pursuant to its State EAS Plan, except for EAN, NPT, or RWT event codes, and (iii) is not a duplicate of a CAP-formatted message, the EAS Participant must poll the IPAWS feed for a CAP version of the legacy alert at least 10 seconds after detection of the legacy alert initial header code. If a CAP version is available, it must be transmitted rather than the legacy version of the alert.

Further, to allow sufficient time for a CAP version to appear without unduly delaying transmission of the alert, an alert in legacy format may not be transmitted until at least 10 seconds after receiving its header codes unless polling the IPAWS feed confirms that no matching CAP version of the message is available. The 10 second delay corrects for the fact that legacy and CAP alerts are received at different times, and EAS devices often process whichever version of the alert they receive first. The delay allows the EAS participant the leeway to determine whether a CAP alert is also sent. This will not unduly delay notification of the emergency as most EAS devices require at least 15 seconds to process and transmit a legacy alert after its header code is first detected.

There are two special circumstances related to the CAP polling:

1. Participants may wait longer than 10 seconds to poll for CAP messages if individual circumstances or usual polling cycle so warrants.

2. If a CAP alert message concerning a time-sensitive emergency is detected but it is taking an unreasonably long time to finish downloading the full content of the message from the IPAWS server due to factors such as IP transport latency, the EAS Participant may proceed to immediately transmit the received legacy version of the same alert.

In other words, The CAP prioritization mandate only sets the earliest time at which polling could occur. Based on their familiarity with their IP transport links and other factors, EAS Participants adopt a longer CAP polling interval if that works best for their systems.

CAP Mandate Exceptions

CAP mandated polling and prioritization applies to all EAS alert categories except for the following specific event codes:

1. EAN: National Emergency Messages using the EAN code (i.e., Presidential alerts) are excluded from the CAP Polling requirement. A Presidential national emergency alert would contain live audio which IPAWS cannot reliably carry live in CAP format in real-time and the ECIG Implementation Guide lacks the technical guidelines to support such live transmission.

2. NPT: CAP polling or prioritization would undermine the objectives of testing. In some cases, the test is intended to assess the capacity to disseminate a legacy nationwide EAN alert. Since CAP polling for an actual nationwide legacy EAN alert is not required, there is no reason to require it for a test of the system. Similarly, where FEMA uses the NPT code to conduct a nationwide test of EAS in both legacy and CAP formats to compare the relative speed and propagation patterns for each format, it would invalidate the test to require CAP polling and substitution.

3. RWT: Since RWT messages typically consist solely of tones, contain no audio or visual messages, and are used merely to ensure that the EAS equipment is functioning, there is no appreciable benefit to requiring CAP polling. However, RMT (Required Monthly Test) alerts contain audible and readable visible text for the general public, CAP polling and prioritization is required. This is also relevant to radio as some digital radio broadcasters transmit visual alerts to digital radio receivers and CAP text-to-speech is typically superior in clarity to legacy format.

Revised Alert Codes

Audible alert and viewable messages generated from three national EAS alert codes: EAN (Emergency Action Notification), NPT (National Periodic Test), and PEP (Primary Entry Point) are revised to be more understandable. Also, a scripted visual message must be displayed when FEMA conducts nationwide tests of the alert system in legacy EAS-only format.

1. The EAN event code text is changed from "Emergency Action Notification" to "National Emergency Message;

2. The NPT event code is changed from "National Periodic Test" to "Nationwide Test of the Emergency Alert System;"

3. The PEP originator code is changed from "Primary Entry Code System" to "United States Government."

These changes are intended to make the EAS more accessible to people who are deaf or hard of hearing and to make these national alerts easier for all members of the public to understand more effectively the nature of the emergency situation.

Standard Script for Nationwide Test Alerts in Legacy EAS Format

When a PEP or NPT header coded message using the "All-U.S." geographic location code is received by a video service EAS Participant, the following scripted text must be displayed:

This is a nationwide test of the Emergency Alert System, issued by the Federal Emergency Management Agency, covering the United States from [time] until [time]. This is only a test. No action is required by the public.

Since this revised text will be displayed only when FEMA issues a nationwide test alert in legacy EAS format, it cannot use the enhanced text capabilities of CAP to explain the alert visually in greater detail.

Radio broadcasters must also change the text for the NPT event code from "National Periodic Test" to "Nationwide Test of the Emergency Alert System" since some digital radio receivers display visual alerts on their screens. Such a change is important when CAP-format text messages do not include any audio content and the audio alerts are generated based on the CAP message header using text-to-speech functionality. However, radio broadcasters are not required to update their devices to accommodate the new prescribed script for legacy-format NPT messages. Radio is free to implement this updated script voluntarily, and encouraged to do so if it will improve digital radio visual displays, or for the sake of consistency across deployed EAS decoder devices.

Finally, to avoid potential confusion from associating the PEP originator code with the term "United States Government," the term "Primary Entry Point System" in the FCC rules is changed to "National Public Warning System."

Compliance Time Frame

All radio and television EAS Participants must comply with the new rules no later than one year from the effective date of the order, September 30, 2023.

This column is provided for general information purposes only and should not be relied upon as legal advice pertaining to any specific factual situation. Legal decisions should be made only after proper consultation with a legal professional of your choosing.

Gregg Skall is a member of the law firm of Telecommunications Law Professionals PLLC. He frequently lectures on FCC rules and regulations, represents several state broadcaster associations and individual broadcasters and other parties before the FCC.

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Practical Solutions

Yet Another List of Apps for Engineers

by Paul Thurst, CPBE

In the last decade or slightly more, the popularity of handheld devices has led to a proliferation of applications for said devices. Having one hand held device that can act as a phone, camera, calculator, GPS navigation device, flashlight and email reader is handy. I have found several apps for both phones and computers that are time savers and indeed can make life go on much easier. Some of these apps are specific to broadcasting, electronics or IT work. Other times, they are generic and can be useful to everybody.

The first category are those specific to technical fields. As the industry evolves, equipment IP connectivity has become the norm. The move to on-line streaming platforms as well as STL over the public network makes a certain amount of IT proficiency necessary. Electronics references calculators can speed along projects and troubleshooting.

Other applications help with productivity and some are substitutes for devices that we already own – it is just easier to have everything in the palm of your hand. This is a list (in no particular order) of my most often used apps for both hand held devices and laptop computers.

1. Angry IP Scanner *(Windows, Mac and Linux)*

Often, when putting in a new transmitter, remote control, audio processor, STL, satellite receiver, console, audio router, or pretty much anything else, it will need an IP address on the LAN. If your LAN is well documented, great! You are ahead of the game. If not, then doing a quick IP scan will save time and possible IP conflicts with an existing piece of equipment. I have found Angry IP Scanner to be the easiest to use. It scans for open ports, MAC addresses and also will list hostnames when available. It is also very helpful when projects are completed, to do a scan and save the results. Scans can be exported in .csv or .xml formats to update or create new documentation.

Screen shot of Network Scanner on an Android device

2. Network Scanner by First Row *(Android and IOS)*

Same idea as Angry IP scanner above, but for Android and IOS. Not as easy to export results, however, useful for initial setup of equipment.

3. Multicast Network Scanner *(Windows, Mac, Linux, Android and IOS)*

As more audio and video services migrate to IP based networks, Multicast is becoming a broadcast engineer skill set. The one-to-many aspect of multicast works well for audio and video distribution. Multicast coupled with IGMP and PIM create an efficient network architecture. Multicast Network Scanner finds multicast sources and destinations, creating an overall picture of a network or subnet.

4. IPv4 Subnet Calculator *(Android and IOS)*

There are some situations when a /24 (or 255.25.255.0) subnet mask cannot be used. Often, when an ISP assigns a static public IP address block, they will define the subnet as a /29 which will need to be converted to 255.255.255.248 to program a router in most cases. Another example; needing to divide a /24 subnet into two or three chunks to make a video multicast network or any other situation where network traffic needs to be separated and or isolated.

5. Speed Test by Ookla *(Android and IOS)*

IP based STL's and other streaming services are now commonplace. Need to test a new ISP installation, have questions or problems on an existing service? A speed test can help diagnose issues or perhaps show potential problems. Laptop and desktop computers can access Ookla by a web page at speedtest.net. Using the Android or IOS app can also show how fast the LAN WiFi is compared to a wired Ethernet connection.

6. PuTTY *(Windows. Mac, Linux)*

Telnet and SSH client for various operating systems. Useful console tool for command line programming routers and switches. Also can be used as a serial port TTY to connect to older broadcast equipment that does not have a web based GUI – some older broadcast tools switchers of Burk RDS generators for example.

7. FileZilla *(Windows, Max, Linux)*

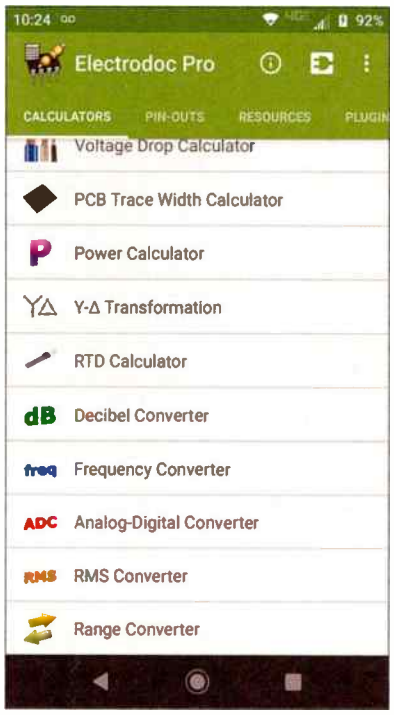
FTP client useful for downloading or uploading to FTP sites. Some manufacturers use this method to distribute manuals and software updates.

8. CPU-Z *(Windows and Android)*

A useful tool for checking an unknown PC's hardware information. Gives a concise read out of processor type, speed, cache leaves, main board chips set, memory etc.

9. Unit converter 1.1.0 *(Android and IOS)*

Having two measurement systems can be tricky. In college, we used the metric system or SI for all of the physics and science classes. Being a base 10 system, it does make a lot of sense and is pretty easy to use. However, most things here are still in the standard system. So converting feet to meters, gallons to liters, inches to centimeters and degrees Fahrenheit to degrees Celsius is a thing.



Screen shot, Electro Menu

Electrodoc *(Android and IOS)*

All in one electronics calculator for Android and iPhone. It has almost every electronic calculator imaginable; Ohm's law, reactance/resonance, voltage divider, voltage drop, capacitors in series/parallel, resistors in series/parallel, LED resistor, power dissipation, dB converter, etc. It has color codes for resistors, inductors, 25 pair wire, fiber optic cables, and so on. It also has pinouts for every connector and many other useful other resources.

Screen shot, Satellite Pointer.

11. Satellite Pointer *(Android and IOS)*

Helpful for planning the location of new satellite dish installations, locating satellite neighborhoods, checking for obstructions, etc. There are many such apps, but I have found this one (by Cappsule) to be the most intuitive to use.

12. Milebug *(Android and IOS)*

As a contractor, I drive many miles between clients, transmitter sites, etc. Having a mileage app on the phone makes it easy to keep track of all those miles for tax purposes. Every month, a mileage report is downloaded in a .csv format. At the end of the year, all that information is given to my tax preparer and I pay fewer income taxes. Always a nice thing.

13. Slack *(Windows, Mac, Linux, Android and IOS)*

Slack is an on-line collaboration and organization tool. Life is very busy these days. Coordinating efforts and keeping communications lines open can be a daunting task. Slack can be connected to various calendar apps and so on. There are computer applications for Windows, Mac and Linux as well as for Android and IOS.

14. Anydesk *(Windows, Mac, Linux, Android and IOS)*

A free remote desktop application which is useful for long distance administration. What I like about Anydesk it sends audio back from the remote desktop connection without fuss. This works well for remote monitoring when coupled with an inexpensive USB RTL-SDR.

Anydesk screen shot on an Android device.

15. Flashlight *(for Android or IOS)*

Exactly what it sounds like. For those times when you drop a lock washer in the bottom of a transmitter cabinet. I cannot think of the number of times I have used this to find dropped screws, light up door locks, gate locks, read information off of a name plate, etc. Does not take the place of a regular flashlight, however, in a pinch, works well enough.

Fifteen seems like a good number to stop at. If you have any apps that you like to use and are not listed here, contact me. I am always happy to explore new tools or other bits of interesting software.

Paul Thurst, CPBE, is co-owner of Data Wave, LLC. He can be reached at paul.thurst@datawave.us

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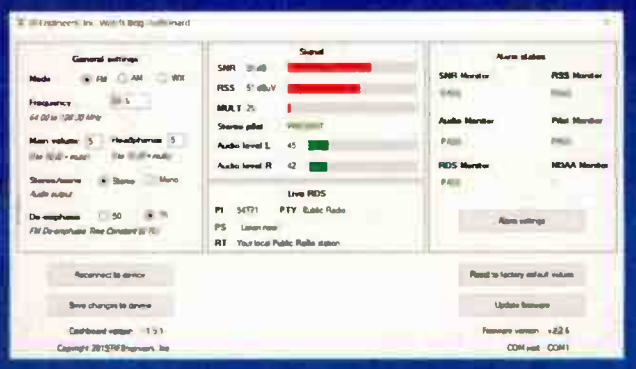

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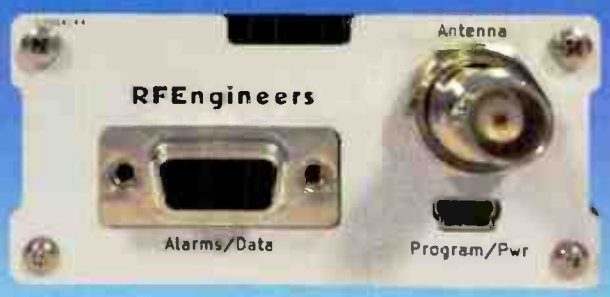

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State of the Station

Robert Shotwell, ABIP Inspector

by Steve Callahan

I've known Bob for many years and I thought it might be interesting to see the ABIP (Alternative Broadcast Inspection Program) from his point of view.

Steve: When and how did you become interested in Radio?

Bob: My interest in radio started more by accident then any grand plan. Growing up, I always wanted to be a doctor. When I was in Junior High School our local radio station WHIL(AM) in Medford Massachusetts was starting an Explorer Post and having an open house. My dad, who was in the Signal Corp in WW2, thought it would be fun to see what the inside of a radio station looked like, so we attended. One walk thru the studios and transmitter room and I was hooked. I joined the Post, was with them for about three years and completely changed my career goals. My first job in radio was in High School at WHIL teaching a Sunday morning foreign language program. After getting my 3rd Class Radio Telephone permit with Broadcast Endorsement (remember those?), I then passed my 2nd, then 1st Class License with Ship Radar endorsement – after that it was off to the races! I eventually also became both SBE and iNARTE Certified.

Steve: What are the highlights of your radio carreer?

Bob: One of the highlights of my radio career has to be what most everyone in radio dreams of – owning a station. Mine was an application for a new FM station which was "jumped" by three others. I eventually was awarded it thru a comparative hearing and it was built in 1994 as WPVQ-FM 93.9 in Turners Falls, MA. The other highlight was being asked to work with former FCC Inspector Larry Hardy doing ABIP Inspections in 2003. Larry had previously inspected stations I was involved with, both as an FCC inspector and an ABIP Inspector. When asking me to do this he stated, "You seem to know what you're doing." From Larry that was high praise!

Steve: What caused you to become an ABIP inspector?

Bob: As mentioned before, I was asked by Larry Hardy to assist him with ABIP Inspections in the six New England states. I should note that Larry Hardy actually started the station inspection program almost 30 years ago with the approval of Vincent Kajunski, then the New England FCC District Director. This program became the precursor of what is now known as the ABIP Program. Under ABIP, Larry had inspected not only the station I owned, but also two stations I was doing contract engineering for, after selling WPVQ. It was a result of these inspections that I became a big fan of ABIP. It was a totally no-risk, how-goes-it – a full FCC Field Inspection that results in no NOVs or forfeitures, but only a report telling you what needs to be corrected to get a Certificate of Compliance. Get your Certificate and the FCC agrees to not conduct a routine, unannounced compliance inspection for three years. What's not to love?! After Larry retired I acquired his business and the New England ABIP inspection program.

Steve: What advice would you give any station that's thinking about participating in an ABIP in their state?

The advice I would give a station considering an ABIP Inspection is to not spend a lot of time trying to make the station perfect for the inspection or even fret the results, especially if this is the first time doing this. These inspections are not a search-and-destroy mission. I come in as a colleague, a fellow engineer, and we work through the FCC Field Compliance Checklist to determine what is OK, what can be corrected that day, and what might need some follow-up work. Once that's done the station is good-to-go for Certification.

Steve: What do stations not understand about ABIP?

Bob: One thing stations frequently don't understand about the ABIP Inspection and the subsequent Certificate of Compliance, is it is *not* a 3 year "get out of jail free card." Though the FCC agrees to not perform a full, unannounced compliance inspection at stations which have been certified, they may, however, do an inspection responsive to a complaint. So, if post-inspection you over-modulate, fail to do proper Legal IDs, not maintain tower lights, etc., a complaint by either a competing station or disgruntled former employee (for example) could still have the FCC knocking at your door.

Steve: Do you see the same issues at every station you visit?

Bob: The most common problems seem to be Public File violations and EAS failures. And these are areas where log retention requirements and document uploads make for easy discovery. Other than that, the violations found vary widely between stations, from technical to administrative.

Steve: Do you have anonymous horror stories that you can repeat?

Bob: Horror stories – I don't know that I could call anything I've seen a horror story. With over 50 years in the industry (ya, I started as child!), I think I've seen it all. Two I'll relate are what I'd call head-scratchers vs nightmares, At a TV stations with numerous multicast streams, when an EAS test was run it cleared across all streams but one. That stream was primarily children's programming and the station decided to not alarm children with the airing of EAS! Right! The other was an AM station with an FM translator. The AM apparently was off the air for quite a while and the transmitter was partially disassembled. But "not to worry," I was told, everyone listens to the FM anyway. Well, OK, but what about the AM? I must quickly note, I do inspections throughout New England and Florida, so if you think you might know one of these stations, it's not the one you're thinking of, it's the *other* one.

Steve: What makes your professional experiance a good fit for the ABIP?

Bob: I believe my professional experience suits me well at doing these inspections. I have been on the air, worked as a staff engineer and chief engineer. As a station owner I have done billing, traffic, public files, accounting and collections. I also worked closely with legal counsel, prosecuting my comparative hearing. So not only do I have a good grasp of all areas of station operation, engineering, legal and administrative, but I also know the demands and limitations people have to work under – especially the engineers. Thus it's pretty easy to tell the difference between something which simply slipped thru the cracks – it happens – and a callous disregard for the job and the rules.

Steve: What do you see in the future for ABIP?

Bob: I think the future of the ABIP Program is bright. More and more stations are being run with fewer and fewer people. A person can keep only so many balls in the air. I've always seen my job as being an advocate for the people who are doing their best under difficult conditions. If I can help them get back on course where needed, then it's a win-win for everyone involved.

Steve: What do you do for fun when you're not inspecting stations?

Bob: What do I do for fun? I'm enjoying Ham Radio, especially the low bands and DXing, and have been licensed for almost 53 years (again, I started as a child!). I am also a commercially licensed, instrument rated, multi-engine pilot, and an FAA Certified Flight Instructor/ Instrument Instructor. Flying general aviation aircraft and teaching others what I know is both fun, challenging and a real break from ABIP inspections. Plus it's where I met the woman who became my wife. Again, another win-win!

Steve Callahan, CBRE, AMD, is a member of the engineering staff at Entercom Boston. Email at: wvbf1530@yahoo.com

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World Radio History

Air Filters – or So They Say

by Gary A. Minker

The air filter is such a seemingly innocuous device, that should be so simple to select and install. But as you begin to think about them, the choices are many, their names are assorted, and their functions can be misleading. Some of them are great, and some scream: *"Don't use me!"*

How can an air filter be so deceptive? Let's go over some of the range of what I have run into, in my experience. We find, Hog Hair, Automotive Cartridges, Glass Floss, Foam, Cloth, Hospital Clean Room Sticky Media (HCRSM), Pleated Felt, and the big daddy – Electrostatic (inactive and passive).

With these predominant types of air filters in use (or misuse) today, we should understand their advantages and pitfalls.

Hog Hair

This cheap to buy, and worse to use, filter is commonly blue in color, sold in rolls, and trimmed with a scissors or clipper into the desired shape. It has very low insertion loss and good bug rejection, but it has terrible dust stopping ability. Some manufacturers even insinuate that Hog Hair filters are washable and reusable, but not ecological.

This is *not* what I want to introduce into the sensitive areas of my RF cavity – fractionalized fiberglass.

Hog Hair Filter Material

Foam / Cloth

This is a "catch all" grouping that covers felts, cottons, and a number of woven or molded foam-based media that are often sold on a roll, and cut to shape by scissors. Some manufacturers might claim it to be reusable and washable. The main objection here is that the flimsy nature of the media really needs to be supplemented with another more rigid filter structure.

When a foam/cloth filter is used as a stand-alone filter, it often gets pulled in and shredded by the fan or blower, and distributed imprudently throughout the critical areas of the transmitter or power supply. Because of their make up, this filter medium makes for a dandy fire hazard and could cause you to do some fancy explaining to the boss.

Automotive Cartridges

These amazingly good filters have been seen in TV transmitters, as well as other critical usage systems where velocity and cubic volume take a back seat to the quality of filtration. After all, if a cartridge type unit is good on your Maserati, it should work great in your IOT. These are an inexpensive, and good choice for the right application.

In the presence of corona and high voltage, these products also tend to disintegrate, so my advice is to not use this medium either.

Automotive Cartridge Filter

Spun Fiberglass

This carry-over from your home furnace is a low price, sort-of-effective filter for bug guts, and other larger format intrusions. Even though it seems to filter better the more it clogs up, when this happens, small particles can leak around the sides and through the fibers, making a nasty mess if the filter suffers an eventual implosion from the vacuum of a transmitter's blower.

Hospital Clean Room Sticky Media (HCRSM)

This fibrous material is used very often in the critical ventilation and filtration systems in hospital surgical wards. This fibered felt has one sticky side that attracts very small particles and dust and keeps them from eating away at the insides of your gear.

This media is often applied as a supplement to another mode of filtration, as an additional filtration step. Although HCRSM does a very nice job, it is usually changed out at a ratio of 4:1 over the conventional media, because it clogs up faster. Just don't forget to install it with the sticky side up stream, not on the leeward side of your air flow.

Pleated Filters

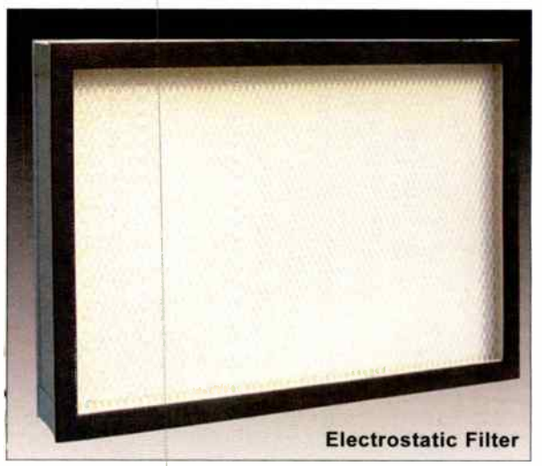
This is the most popular filter medium today. They are available in many thicknesses, from 1/2" to 3" in total depth. Between the type of felted material and the sheer surface area, it is an incredibly efficient and long lasting filter.

Pleated Filter

Some are available with a sticky side which emulates the HCRSM mentioned previously. These filters can run for quite a long time before needing to be changed, and can catch an amazing amount of small dirt and dust, depending on the manufacturer.

Electrostatic – The King of Filters

Electrostatic filters have made such progress over the last 20 years, to grow from the conventional two plates with a lethal voltage charge, to various self-excited plastics and fibers that static up just from the high speed rush of the passing air. However, like any small child or animal, they require a periodic bath, and unlike conventional filters, these are renewable, eco-green, and washable.



Electrostatic Filter

You Get What You Pay For

Don't let the potential savings of a few dollars deter you from doing the right thing. Proper, quality air filtration is the key to long equipment life and extended up-time. An effective filtration system, with a proper filter replacement schedule, can also dramatically reduce the chances of an expensive arc-over on high voltage PA cavity components.

There are even creative ways to incorporate additional filtering methods into your transmitter or device. Let your imagination run wild.

Gary A. Minker owns Radio Works R.F. Consulting in Lake Worth, Florida. He can be reached phone at (561) 969-9245 or email him at: Gary@Radioworksrfconsulting.com

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Is Your Winter Survival Kit Ready?

It is the most wonderful time of the year, or so the story goes. But more than ever, this is the time to be prepared for the worst possible weather – regardless of what the part of the country you call home.

This article is going to be devoted to ensuring that you are totally prepared to take care of – *You* – should the need arise.

It's been a long year of traveling a lot of miles between transmitter sites for some of us. For those who are more lucky, it may be only one site or two fairly close by. Now is the time when the days are shorter, the nights seem darker (usually because the roads are wet), and being prepared for getting stranded overnight at a remote transmitter site is most important.

Stranded is Stranded

Trust me – if you are one of the few engineering brethren who hasn't experienced it – nothing is worse than to get a call in the middle of the night and head up the mountain – only to find yourself stranded there.

You may find the road to site has become blocked by a fallen tree, or what was a marginally passable road up the hill becomes impassable because of blowing snow – or it has become too icy to traverse safely even with the 4WD "tank" you drive. Whatever the situation, stranded is stranded.

Winter Survival Kit

If you haven't taken the time to put together a survival kit, perhaps this list will help you to get focused. Should you only be responsible for one site, some of the items in this "road warrior" kit can be stored at the site. For the rest of us, however, this is a mobile pack.

A fold up cot – Nobody likes to sleep on a hard, cold floor, even if the building is heated. So visit a local sporting goods store and pick up a folding cot. This will give you a "comfortable" place to sleep that is above the cold floor and won't kill your back. One engineering friend packs an air mattress and pump rather than a cot because of the limited space in his truck.

A comfortable, warm sleeping bag – Even if your building is heated, this will give you some padding to sleep on and it will give you covers for the night. Also, if you get stranded while on the road, you can depend on this to keep warm without the risk of keeping your vehicle running for heat until help arrives.

Get a nice warm sack that is good to 40 degrees below zero – if you have to use it, you'll thank yourself later. Oh, and don't forget a small pillow.

Boots – A spare pair of waterproof, insulated boots. If for whatever reason, the shoes or boots you are wearing get wet, you'll want a dry pair to change into.

A folding field shovel – This not only can be used to shovel yourself out, if you're stuck on the roadside and get plowed in to the point that your truck can't get out, but it has another handy use or two as you'll read later.

A good backpack – This can be either a nap sack or a hikers pack with a rack – it will depend on you.

You should keep your sleeping bag rolled and tied to the rack, so you don't have to juggle to much – especially if you have to hike to get back up the hill for some reason. One quick grab and you've got everything you need to get out of the cold.

Suggested Backpack Contents

In your backpack you'll want your spare boots to keep them handy and dry.

A pair of socks or two – If the shoes or boots you have on get wet, chances are your socks will be wet too. So you'll want both spare boots and socks to keep your feet dry.

Gloves – A spare pair for the same reason as the boots and socks. Wet gloves mean cold fingers and hands.

A Side Note

We learn, from Artic Survival Training, that as we become colder the blood circulation to our extremities slows so the heat of the blood keep vital organs warm. That is why it is so important that you make sure your feet and hands are properly protected in cold climates. Frostbite isn't something to mess around with, and in warmer climates wet socks and feet are just darn uncomfortable.

Back to The Pack

Our list of stuff to keep in your pack continues ...

A pair of earplugs – Transmitter blowers are loud, so save your ears and use the plugs if you have to stay overnight.

Chemical heat packs – Pick up four or five; if the power goes out, you won't have heat in the building. Using these will help keep you warm while in the sleeping bag.

A spare flashlight – You'll want to see, to get to your "bed" once you turn off the light in the building, and if the need comes for a potty call in the middle of the night, you'll need to see where you are walking. You may want to take your field shovel for the walk too, just in case you need to cover things up.

"The necessities" – Oh, and don't forget to pack a role of "TP" and some hand sanitizer. I don't think this needs explaining.

Food and Drink

For sustenance, make sure to pack a couple of bottles of water and maybe some fruit juice. If you're a coffee drinker, a bottle of iced coffee might be nice. Hey, cold caffine is better than no caffine – get over it. Put these in a waterproof zip lock type bag in case of spillage.

Be sure you have a half dozen food bars so you'll have something to eat. Come to think about it, it is nutritious – nothing wrong with a little comfort food.

Remember too, if you have medication that you need to take on a regular schedule, you might want to include some of this in your pack as well. In a worse case situation, it might be a day or two before you get back down the mountain depending on conditions.

Keeping Entertained

For entertainment pack a book to read or pack your favorite copies of ***Radio Guide*** to catch up on your important reading. If you have your laptop with you, and you have Internet access, you can watch TV or catch up on your email. In fact, depending on your device and your apps, you could even do that on your cell phone.

Of course – and here's a novel idea– you could just take advantage of the solitude, put in your earplugs and catch up on some ZZZs.

Options

Your survival kit can get as exotic as you want it to be. For example, depending upon how Spartan your buildings are, you might want to pick up a small "milk house" heater in case the transmitter doesn't keep things warm.

You could also carry a chain saw so you're prepared to cut your way down the hill if a tree or two is blocking your path. Then too, depending upon the situation, you may have to cut your way into your transmitter site.

Some engineers in snow country pack snow shoes, which have a dual purpose – hiking into a site if needed or back down the mountain if your vehicle is stranded.

I know of a couple of contract engineers who carry a small contractor-site electric generator with them so they can get a station on the air with an exciter if there is no power at a site that has no back up power. This could also be used to run a small heater if you are stranded and provide power for a light source.

The contents of what you have in your "survival" kit and your backpack, and the options you choose, really depends upon your location, how equipped your transmitter buildings are, and your personal needs and desires.

The Key is Preparation

While the chances of getting stranded at a transmitter site are slim, when "slim" happens it is better to be prepared with the right stuff in advance than to be stuck without anything you could use to be a little comfortable. Not to mention staying dry, warm and not hungry while you weather out a storm or wait for a road to be cleared enough to get the truck back down the hill.

Those of us in snow country know that remote mountain roads aren't a priority in a blizzard or ice storm – routes in main population centers are – so if you get snowed in to the point where your truck can't get down the hill, or the road becomes blocked and you're stuck until morning, you need to be prepared.

Running without some type of Winter Survival Kit is like playing a game of Russian Roulette. So, make your list and go visit a sporting goods store or your favorite discount store that has camping gear – today.

Remember too, with the days much shorter, there may be a time when you might want to lay down for a short "power nap" because you are just to road-weary to head home or to another distant site.

So don't try to be a hero and put yourself or other drivers in danger. It's better to take the rest at the site rather than to fight sleep and fatigue while driving.

Your Winter Survival Kit can actually be the perfect solution for this as well. – *Radio Guide*

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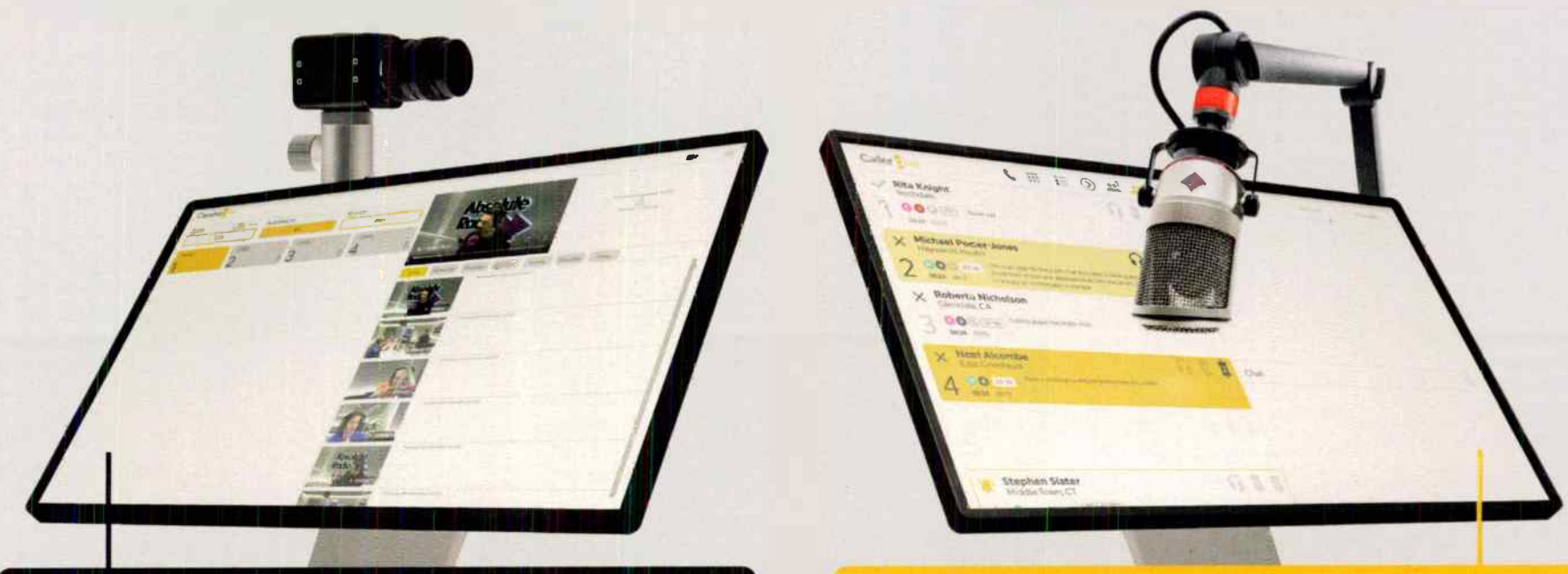

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Tower Topics

Why Climb When You Can Fly

by Bob Reite, CBT

A new tool for inspecting towers has become available. Instead of physically climbing towers or using binoculars for inspection, small unmanned aircraft systems (UAS), commonly called "drones" are now affordable. The most common form is the quadcopter. Models are available with both visible light and infrared cameras. Before one takes to the skies for compensation one must meet some legal requirements.

FAA Remote Pilot Certificate

Anyone flying a UAS for other than hobby purposes must first obtain the FAA Remote Pilot Certificate. The only exception is if one already holds a Part 61 manned aircraft pilot certificate and has completed a flight review within the previous 24 months. Even so, Part 61 certified manned pilots will need to take a Part 107 rules course available from the FAA on-line so that they will know the rules that are specific to small UAS operations.

One must pass the initial aeronautical knowledge test related to small UAS operations.

Knowledge test topic areas include: Applicable regulations relating to small unmanned aircraft system rating privileges, limitations, and flight operation. Airspace classification and operating requirements, and flight restrictions affecting small unmanned aircraft operation. Aviation weather sources and effects of weather on small unmanned aircraft performance. Small unmanned aircraft loading and performance. Emergency procedures. Crew resource management. Radio communication procedures

Determining the performance of small unmanned aircraft. Physiological effects of drugs and alcohol. Aeronautical decision-making and judgment. Airport operations. Maintenance and preflight inspection procedures. Operation at night.

Although the FAA has a study guide available for the test, it is not complete and others have found the test to be tricky. While it is multiple choice with a passing score of 70%, some of the choices are very close in context to one another but only one choice is correct. There is a two hour time limit, so make a first pass answering the questions that are easy for you and that you are sure of, then work through the harder ones. A lot of the test is focused on the different classes of air space around airports and how they are indicated on sectional charts such as this example.

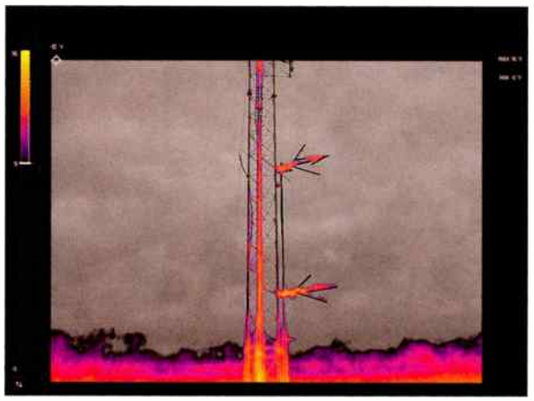
At the end of the test, you are not told what questions were answered incorrectly, but just the subject area of the question. I found it worthwhile to pay for an on-line course, such as remotepilot101.com or dronepilotgroundschool.com for study as it costs $175 to take the test, pass or fail, and I wanted to pass on my first attempt.

Once you have the certificate it is good for two years (even though there is no expiration date printed on the card). Because of COVID-19, the FAA dropped the requirement for the in person recurrent exam, the recertification is handled by a free on-line training course from the FAA.

UAV Choices

There is a wide range of UAS available. The majority are quadcopters with four rotors. A system comes with a controller, charger and usually two spare batteries. A smart phone or tablet is used in conjunction with the system for the display. Some will allow the use of just the phone or tablet for the controller, but this method does not give near the control of physical joysticks. Many take videos in 4K resolution as well as still photos.

A very useful feature is an IR Camera. With IR, one can look for hot spots on transmission lines and check that antenna deicers are working. Models with IR photography include the Parrot ANAFI, DJI Mavic 2 Enterprise Advanced and the Autel EVO II 640T



Infrared Image of 2-bay Antenna Showing Operating Deicers

One important final consideration. Starting on September 16, 2023, all UAS must have remote ID, so that all flights can be tracked. Any drone manufactured after September 16, 2022 was to have Remote ID, but this date has been moved to December 16, 2022 because of manufacturing difficulties. It might be best to wait until 2023 to purchase a new drone. Broadcast Module Remote ID will be available as an add on for existing aircraft, but the operator must take care not to take off if the MIRD system is not functional. Like the deadline for manufacturers, the final date for compliance may be extended, as problems with getting Broadcast Module Remote ID systems working have been reported.

FAA UAS Registration

Before first take off with a new drone, it must be registered with the FAA. This is an easy on line process. Create an account then supply the make model and serial number of the aircraft. Cost at the time of this article is five dollars. and the registration is valid for three years. The system will generate a number. This number must be written somewhere on the outside of the drone. There is no specification for location outside or what to mark it with, I used a Brother white tape label maker and placed the number on top of the main body.

Flight Insurance

Most business insurance policies specifically exclude coverage for UAS operation. I don't know why this is, there is really not that much risk. Probably because drones are so new that insurance underwriters don't understand them, and there is no long term historical of accidents involving drones. For the occasional flyer, there is per flight insurance available at a reasonable cost. I use Verifly. Download and install the Verify App to your phone. Unfortunately, there is a another app with a similar name for getting through airport security quickly, you have to be careful to get the correct one.

Provide the initial information before you set out on your first flight. On the day of the flight, after all your pre flight preparation is done, but before you take off, set up the options. A broadcast user only needs the area around the tower to be inspected so choose the minimum amount of 1/4 mile. Space would be outdoors and "no" to racing or contests. Coverage limits from one million to five million dollars are available. Time is only available as one, four or eight hour durations. I would have liked to have a two hour option, as I have a total possible duration of one and one half hours with my UAS, but in practice I have found that an hour is more than enough time to complete a typical inspection or troubleshooting mission.

Before Taking Off

One must check if flights are authorized at your location. Besides permanent locations such as prisons or military bases, there may be temporary flight restrictions such as when the President of the United States is in town. The easiest way to comply is to use the B4UFLY "app" available for Android and IOS devices.

Pilots should always make sure that the software for the drone, controller and phone/tablet are up to date and make a short test flight in an open area after visually examining the drone for broken propellers or other damage that may prevent safe flight. Make sure that the "return to home" function is configured correctly and works as intended during your test flight. Select a high return altitude with the 400 foot limit to make sure that the drone does not crash into tall trees or other obstruction when it decides to make a bee line to the launch point. The mission should be planned ahead to make the best use of limited run time, which is typically 30 minutes, but can be less under windy conditions as the drone must expend more energy to maintain position compared to flights on a calm day. Be sure to fly within the limits of your system. The Parrot ANAFI is rated for 26 MPH while taking off or landing and 31 MPH in flight, but operating at those extremes will quickly deplete the battery and make the aircraft harder to control.

Once Aloft

Small UAS fights are limited to 400 feet altitude above ground level (AGL). This provides for safe separation from manned flights which are not permitted below 500 feet AGL except when taking off or landing. An exception to this rule for certified remote pilots is that near a tower or other structure, higher flights are allowed up to 400 feet above the highest point on the tower or structure. Unmanned remote controlled aircraft must always yield right of way to manned aircraft.

Some considerations unique to the radio and communications industries. One must stay aware of guy wires which can be hard to see. It is helpful to have a second person as a spotter that always is looking directly at the drone while the pilot may be looking at the display screen to compose photographs. Part 107 pilots must maintain direct visual contact by looking up at the drone, they cannot rely on the first person view from a display for situational awareness.

The other consideration is RFI from transmitters. Small UAS aircraft operate on the 2.4 GHz band shared with WiFi and many other services. The receiver in the UAS may get overloaded if the aircraft is flown too close to an active transmitting antenna. The better systems give the operator a warning of impending loss of control and if control is totally lost the aircraft will return to the launch point via GPS navigation provided that the GPS receiver is still working.

Bob Reite operates his contract engineering firm, Telecentral Electronics, Inc. servicing radio stations in Pennsylvania and New York state and may be contacted at br@telcen.com

World Radio History

The Reporter.

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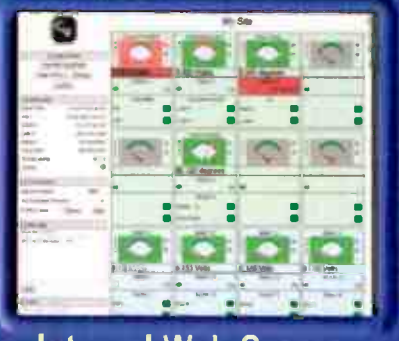

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World Radio History

Transmitter Site

Let's Tidy Up the Transmitter Building

by Dave Dunsmoor

I am again writing today, to those of you who are new to the job of broadcast engineering, or perhaps you're not even the engineer on record, but perhaps you're the station owner, manager, or even the one on staff who has been given "additional duties as assigned." This article describes some generally easy work, but it's important to get it right. I ran into a couple of small problems, and I'll describe what I did to get it to work out well. So, onward!

Winter's soon coming, of that I'm sure. However, so far the weather here has been quite pleasant. It's been warm, calm, dry – and with no indication of what's sure to come, which will be severe cold, blustery, wet and snowy! The pickup has winter gear in the toolbox: snowshoes, blankets, shovel, tire chains, anchor for the winch (and I hope *never* to need this!), cold weather clothing, and so on. I wrote of this some time back, so refer to the *Radio Guide* Sep/Oct-21 issue to see what I thought was worthy of your time then. So now it's time to make the rounds and do building checks. This ought to take most of an afternoon, and I'll describe what I look for and what importance – what priority, each item seems to deserve, or require.

The first thing I'd suggest you watch for is your building, or site security. The gate(s), doors and locks certainly warrant attention. Particularly their presence, or accessibility. I've seen (rarely) gates locked with a chain and a few locks (one for each tenant) interlocked, but with one which has bypassed one or more of the other locks, effectively locking all others out. It would be preferable to know who owns each lock, but that's almost never the case. My answer in this situation is to cut the lock with large bolt cutters, and leave a note for the offending tenant. Yeah, I know, this doesn't seem "civilized," but then neither is locking others out of a common facility. Also, don't *you* be "that guy!"

You may be the only person who requires access, but consider what happens in your absence, if a backup engineering, or perhaps the station owner, manager, whomever, needs access. Where are the keys, or the combinations to the locks? And are the locks serviceable – do they operate in cold weather, are they lubricated? I prefer liquid graphite in a spray can, it really soaks in and flows everywhere inside (and outside) the mechanism. Nitrile gloves are really useful here. Liquid graphite runs and stains very easily – doesn't wash off well either. This may be overkill for some locales, but I have resorted to a propane torch to thaw frozen locks.

Once inside the gate, and inside the building, the obvious would be to check the building for damage. Ice fall from last season, bullet holes from careless hunters, or vandals. All these can offer additional ingress points for mice or other vermin. Mice are common, other animals are not, in my experience. But mice can do a lot of damage, and they are able to gain access through the smallest of openings. I once found a mouse nest inside a Gentner remote control box, and the only way in was through an open DB-9 connector hole!

Environmental conditions inside the building are important to note. I recently was asked to install a building heater in a small concrete transmitter building. I'll go into further detail regarding this installation shortly, but one thing I noticed immediately was the floor in the vicinity of the transmitter. The transmitter cabinet wall itself was coated with what looked to be residue of melted "snirt" (snow with blown dust/dirt mixed in with it). This is a common mixture up here near the Canadian border.

Our winter snow is dry powder, and with all the farm fields nearby, the powdered snow and powdered

(Continued on Page 28)

World Radio History

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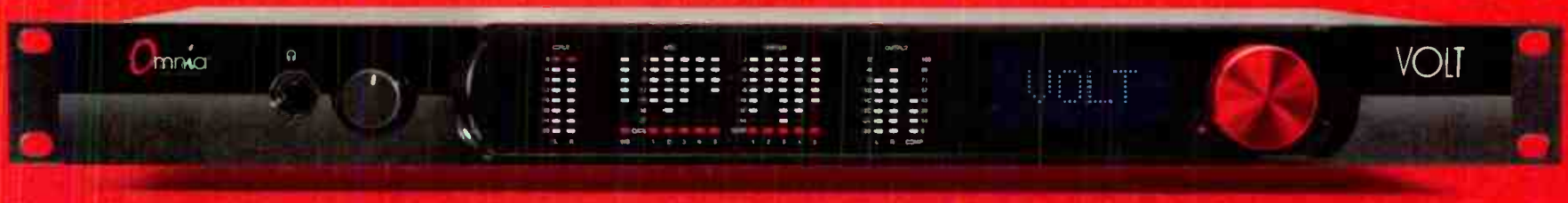

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World Radio History

Let's Tidy Up the Transmitter Building

– Continued from Page 26 –

soil mix together well, and can easily blow in through any small crack.

This particular ingress event was due, I believe, to the snow blowing in through the louvers of the barn ventilation style fan which was used for building cooling when the transmitter was an old Gates BC5 transmitter. It generated a lot of heat as compared to the current solid state transmitter.

And all this seems to be a bit of a long way around to get to the point of my story today: I was asked recently to install an electric heater in this transmitter building, as it wasn't keeping warm enough to suit the director of engineering. Management had specified and purchased the heater, the wiring and various supplies – it was then my responsibility to do the installation. Building cooling was taken care of by a "split unit" air conditioner, but heating during cold months had been relying on "space heaters," and they were not doing well. Besides the hazards associated with leaving space heaters on unattended, the cords were in the way. It was now time for an upgrade.

The heater is a 220 VAC. 5000/4000/3000 Watt unit, and securing its mounting bracket directly to the cement block wall did not seem to me to be truly solid. I settled on using a 1/2 sheet of 3/4" plywood, mounted to the concrete blocks with Tapcon screws. This is similar to what many utility companies use when mounting electrical panels, Telco equipment, etc. I decided on this approach as having the plywood rest on the floor provides vertical stability, and fastening the top of the plywood to the wall provided horizontal stability. I use an impact driver (over a drill motor) for this type of work as the rapid impact action seems to drive screws into hard material far better, more solidly, than a drill motor can. The heater mounting bracket was then secured to the plywood with 5/16" bolts, countersunk on the back side so that the plywood mounted flat against the concrete blocks. It is quite secure now.

I was supplied with a length of 1/2" flex conduit, 3 rolls of #10 solid wire and single hole mounting straps, for making the connections to the electrical panel.

Problem: Pushing the three #10 wires through 25 feet of flex conduit was a bit of a challenge. I taped the three wires together and began the arduous task of getting them all through to the far end. About 10 feet in, everything ground to a halt – stuck.

Solution: Push until the wires bind, then "slap" the entire length of flex on the floor, thereby releasing the tension, then push more and repeat. No, this was not as elegant as using a fish-tape, but I really didn't want to run all the way back to the shop for that, and I was finished before I could have completed the trip.

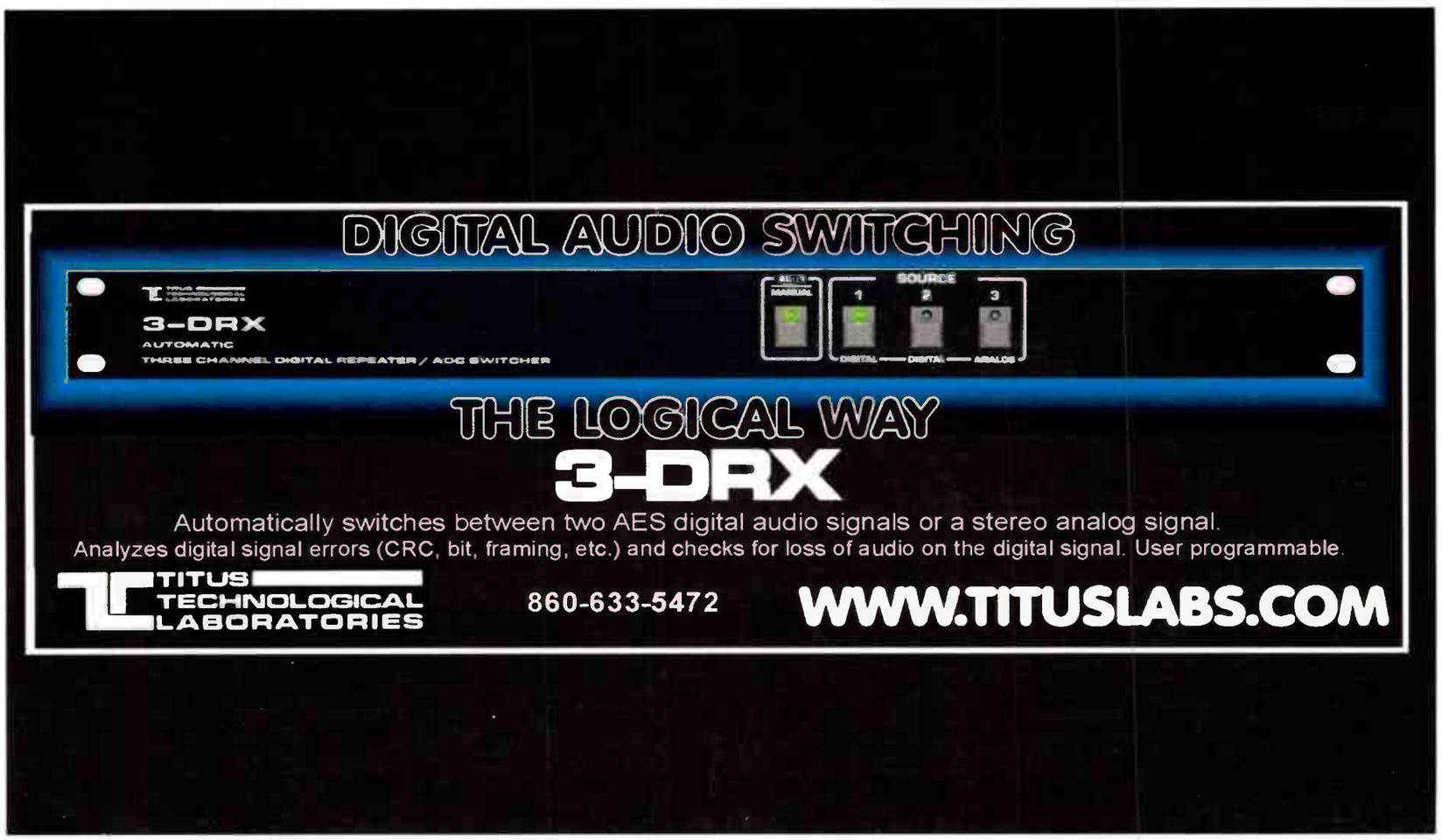
Now to make the connections, and fasten the flex to the wall. The Tapcon screws came with a concrete bit which worked quite nicely, but...

Problem 2: The hole(s) occasionally ended up being slightly too large for the Tapcons to bite well enough.

Solution 2: Cut off some short pieces of "zip-ties" and insert them into the holes, then run the screws in with the impact driver. Worked perfectly! Everything is now connected, secure and tight.

Now as the building has air conditioning and heating, the barn ventilation fan can be covered for the winter blowing snow season, and left operational for summer as an emergency backup, should the A/C fail.

Dave is mostly retired, and does backup engineering for Air-1 and I-heart Media as requested. He can be reached at: mrfixit@mtn.midco.net



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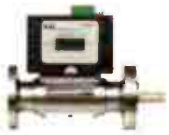

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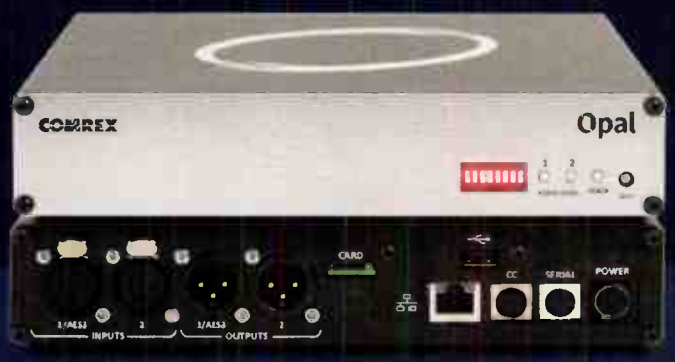

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World Radio History

Transmitter Topics

Correlation and Causation

by Jim Turvaville

At one time or another, we've heard someone intelligent tell us that "Correlation doesn't imply Causation," but then we are plowing around on Social Media and someone posts a meme on-line and we see lines sloping together, bars rising together, or points on a scatterplot clustering together and the data practically begs us to come up with some logical reason. But the truth is that just because it looks logical, statistically, we can't make that assumption. Those charts that show a close correlation between seemingly unrelated things are often relying on a visual parlor trick to imply a relationship. If you are interested in a good chuckle, then look on-line for Tyler Vigen, a JD student at Harvard Law School and the author of *Spurious Correlations,* who has made sport of this on his website, which charts really unrelated correlations.

For example, the charts can show a direct correlation between U.S. per capita margarine consumption and the divorce rate in the state of Maine; and deaths by falling down stairs tracking exactly with the sales of iPhones. Well, there might be an actual correlation on that one, with the zombie effect we see nowadays from people walking down the street staring at their phone instead of looking where they are walking.

But there are some real things that happen in our radio engineering world that might fall into the same category, though not as totally unrelated items as some of Mr. Vigen's correlations. I've actually experienced one of these recently where I thought that, because I found two problems at the same time, they just *had* to be caused by the same issue. Well, since I am old enough to not be afraid of admitting when I was wrong, I thought my troubleshooting and series of errors might be of benefit to you as well, if only for a chuckle.

I had a call to a tower site, a combination AM/FM/Translator on one tower. I'd been there back in the 90's as a contractor, which was like four owners ago, and neither of the transmitters I ever serviced was still there. The FM translator was also added since, so this was a relatively cold call for the new owner of the station who had only been there a few months. The tower is grounded with a skirt for the AM, and has the FM antenna and translator antenna above the skirt on the top of the tower – all neat and in one nice package for the licensee. A bad thunderstorm had blown through – typical West Texas summer event – and we were certain we had either taken a lightning strike on the tower, or to the power line coming in the building. All signals were off the air, and the tower beacon was out; wow, that's not a fun visit to make.

Upon arrival, some surveying found some of the problems: The tower light was easily checked, and found that 120V was coming out of the flasher and up the conduit, so the bulb(s) must have been bit in the storm event. I began to think that a lightning event had indeed happened on this site, so that began to become a correlating event in my mind as I looked at other problems on the site. Well, time to make a quick call to the NOTAM reporting line and then on for more troubleshooting.

The 300 Watt transmitter on the AM fill-in translator was functional, but showed full VSWR and would not make but a few Watts, and the Nautel main FM transmitter was not able to turn on at all.

The AM had blown the main PA fuse (250W solid state transmitter) and since that's not an unusual event, I had a box of 10A slow-blow fuses on hand. That simple swap got the little AM box back humming just fine.

Then I turned my attention to the ones that were not so easy. That translator was a bit of a mystery, but since the main FM was already off, I used the opportunity to get a basic line sweep to the translator antenna. I carry a hand-held Rig Expert analyzer for simple checks just like this. I mainly use it to tune antennas before we hang them, or to at least check to see how it might radiate before the tower guy gets called. I have a 10-foot piece of conduit out back of the shop to mount a 1-bay antenna on for testing, and it really does translate into the real world once that antenna is installed. However, that little meter does not perform very well out in the field, especially if there's a lot of RF on the tower; but since the rest of the facilities here were either already off, or easily turned off, it was likely to be reliable. Sure enough, next to zero return loss and VSWR off the scale – in fact, it pretty much told me that the coax was seeing an open circuit on the other end. Ouch, that will require a tower climber; and that will be a few days or more; and I'd like a second opinion if possible. Fortunately, the station has a backup antenna that could be pressed into service, mounted on the STL tower by the

(Continued on Page 32)

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World Radio History

Transmitter Topics

Correlation and Causation

– Continued From Page 30 –

building – and being a small West Texas location, 250 Watts from 30 feet above the ground still covers the entire town just fine. I'd have to circle back to the antenna problem when I have more help.

Checking the main Nautel, it just was telling me that it was unhappy from a power outage, and a reset caused it to come back up at reduced power. Now it's seeing high VSWR and the brains are keeping it from harming itself – a great feature – so the 1.4 kW it is making into the 3-bay antenna are going to more than serve the local audience until more troubleshooting is done to get it back to 5 kW TPO. I also did not have an adapter for 1-5/8" to Type-N with me, so decided not to make any attempt to connect the hand-held to the main FM antenna; since it *was* on the air, I could wait until I had more help and better test gear.

That follow up troubleshooting came in the form of another engineer with a "real" antenna analyzer, and turning off all the RF and checking the two FM lines and antennas. Quite surprisingly, the little hand-held was correct on the translator – it was a total open circuit on the other end of the coax; the translator 1-bay vertical antenna had clearly taken a lightning strike and opened up the RF connection inside. Being just 230 feet off the ground, the old standby binoculars could get a pretty close view of the antenna, but that visual still failed to give any clue from about any angle. A tower climb will have to be next for that problem; and in the mean time, that standby antenna was keeping the signal serving the local community.

Then the "real" analyzer was connected to the main line – because I had remembered to bring that 1-5/8" to Type-N adapter this time – and that's where my correlation strayed away from causation. After all, the main 3-bay antenna is mounted on the opposing leg of the tower from the interleaved 1-bay translator antenna; and that 1-bay had quite apparently taken a direct lightning strike and was an open circuit, so a similar fate *must* have befallen the main antenna and at least one of the bays should read bad, right? Well, not so quickly there.

A full sweep of the main antenna clearly showed all three bays and the tuner at the bottom; the full run of coax and ... nothing more. Well, there was one catch – the operating frequency of the antenna was 800 kHz lower than the licensed channel, checking it on the proper frequency, the VSWR was nearly 1.4:1; something we might expect to see nearly the exact value of reflected power on the main transmitter. It was pointed out that the Nautel had no module or power supply errors, just high VSWR and fold-back; there was apparently *nothing* wrong with the transmitter, only the load it was trying to feed.

But as the late Paul Harvey might have said, "This is the *rest* of the story." The station manager then reported that the main transmitter had not run more than 1.4 kW for the past couple of years! Once again, correlation did not lead to causality, since the high VSWR had no connection to the recent incident that had taken out the translator antenna. Of course, it would have been nice to know that up front, but often contract engineers can only do the best we can with the information we are given, and this was the case in this situation. As to why the main antenna likes to operate at a frequency 800 kHz below what it was supposedly installed to operate on, well that is a mystery that will have to remain until the next chapter in this saga is written. As tower guys are kind of scarce in this part of the world – well, they are not really scarce as much as they are booked months in advance – I'm on a waiting list to get that translator antenna replaced. A new 1-bay antenna is $400, which is a fraction of the labor to change it out, so I'll get one on hand and have them swap it out and check out the old one on the ground later. And while they are up there, they can check to see if there's any reason that the main antenna is not wanting to operate on the assigned channel.

All in all, stations are functioning to some capacity, and I've learned a few lessons. See, you *can* teach old dogs new tricks every now and then.

Jim "Turbo" Turvaville is semi- retired from 44 years in full-time Radio Engineering and lives in Rural Wheeler County Texas in a tiny house where he maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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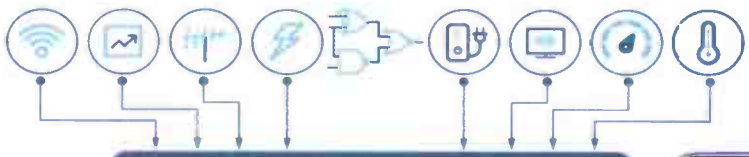

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World Radio History

Shop Talk

by Steve Tuzeneu, CBT

Misc. Tech-Tips and Thoughts

With the busy schedule I have, it's always a challenge to find the time and material to put into this column. One of the sources I have is you, the reader. I always welcome thoughts from readers who can spare a few minutes to send an email. Emails from my readers make writing this column worthwhile. When contacting me, please use this email address: stuzeneu@sbe.org

Reader Email

In my last column I mentioned that it is important for engineers to be good communicators. Your spoken and written communication leaves an impression on the people you meet and communicate with. In that paragraph on communication was a hidden gem.

Robert E. Richer, Owner, International Media Consulting, Ltd., Farmington, Connecticut, caught the hidden gem: "Enjoyed your column, as usual. But in reference to the note from Sid Schweiger, and your comments on good English, I would suggest that you start at home. My guess is that he didn't complement you, he sent you a *COMPLIMENT*." Yes, Robert, it does in fact start at home! Good catch, Robert. I wondered if anyone would notice.

FCC and Pirates

Back in January 2016, I read that the FCC was closing offices in Anchorage, AK; Buffalo; Detroit; Houston; Kansas City; Norfolk; Philadelphia; San Diego; San Juan, PR; Seattle; and Tampa. Now it seems easier for pirates to broadcast as they please. In some parts of the U.S., state governments are taking matters into their own hands.

In April of 2015, Linden, New Jersey police shut down a pirate that was interfering with Townsquare-owned 101.5 FM WKXW. Now there's an idea that should spread all across our nation.

In addition to giving states the right to shut down pirates, maybe they should work with SBE chapters and amateur radio operators and give them the authority to shut down pirates as well. Since the FCC doesn't seem to have the manpower or the budget to seek and shut down pirates, these could be free or inexpensive sources of help.

If the FCC and state governments gave the people I mentioned the authority, it could be an effective means to police and enforce the airwaves.

EAS Changes

By now, you should know that all EAS equipment software will need to be updated. According to Chris Vournazos from Sage Alerting Systems, "Support for the new behavior required by the FCC rules will require a software update. It will be available early 2023, with plenty of time to meet the December 2023 deadline set by the new rules. We'll send out an email when a release date is set..." I joined the Sage email list so I will know when the update will be available. If you would like to be on the email list, go here: **https://www.sagealertingsystems.com/support.htm**

There are also reporting requirements like these:

1. EAS participants will be required to report to the Commission any incident of unauthorized access to their EAS gear within 72 hours.

2. EAS participants will be required to annually submit a certification that stations have a plan for cybersecurity and are implementing these measures on the EAS gear.

3. Wireless providers will be required to transmit authentication sufficient to make sure false/invalid alerts are not sent to users.

Additional information is available here: **https://www.thebdr.net/latest-eas-news/**

Cat 6A

Over the last two years, I have been rebuilding three studios. It has been a lot of work, but I have learned a lot in the process. All three studios are finished, and as I reflect on my experience, I have learned how valuable Cat 6A cable is.

When I began planning, I contacted the manufacturers of our on-air computers and the manufacturers of our AoIP system. I wanted to know what kind of ethernet cable they recommended. Both companies said Cat 6A. When my IT guy and I started working with this cable, I noticed that Cat 6A is shielded cable. Shielded cable is more immune to noise than the previous versions of Cat cable. I relearned this fact near the end of my studio rebuilding.

Everything in the server rack and the rack with the workstations, as well as the AoIP network, used Cat 6A.

(Continued on Page 36)

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Shop Talk

– Continued from Page 34 –

Most every one of my KVMs use Cat 6A as well. One of my studios had a few Cat 5 cables running from the TOC rack to the production studios. In the smaller of the two studios, the KVM was connected at both ends using Cat 6A. In the second studio, I used an existing Cat 5 cable. My staff was complaining in that second production studio that the image on the monitor was blurry.

My first step was to replace the KVM units one at a time. After replacing both the local and remote units, I noticed that the problem was still there. Then I got to thinking about the smaller production studio and how the image on the monitor was crystal clear. Then it hit me: I used Cat 6A in the smaller studio to connect the local and remote KVMs and regular old Cat 5 in the larger studio. With the help of my building manager, we ran some Cat 6A cable between the TOC and the larger production studio and that fixed the problem. The monitor was crystal clear.

So the lesson learned was, use Cat 6A for a new, all-digital studio complex and everything will work well. The shielding really helps keep the noise from other equipment and anything electrical from getting into the wires in the jacket.

Telos ZIP/1R

We had been streaming our station using a Windows 10 computer and it was working just fine with the software encoder we installed. We replaced an older Windows XP computer with the Windows 10 computer for security reasons. About three months went by, and the Windows 10 computer took an update and then locked up. So, I went to that computer and restarted the encoding software, and all was good. Another couple of months later, the same thing happened. So, I went and restarted the encoding software, and we were streaming again. Then another month went by, and the Windows 10 computer took an update and wanted to reboot. By this time, I was getting tired of restarting the encoding software and/or rebooting the computer.

After some research, I decided to purchase a Telos ZIP/1R streaming device. I don't normally endorse products in this column, but I have to tell you, that little box is great! Since I installed it and connected the audio, it has run perfectly without a hitch and it's not looking for updates from Microsoft. It's great not to have to go and get the Windows streaming computer working again. People who listen to our stream say it sounds great. We recently upgraded our stream to 48 kbs, and the audio sounds even better. I have compared our stream to our on-air signal; it's hard to tell the difference between the two. If you are thinking about buying a streaming device from Telos, go for it. They make great products.

SBE Mentoring

I know I have mentioned the SBE Mentoring program before in this column, but I mention it again because it is a great program. With so many engineers retiring or passing away, the need for mentors and fresh engineering students is urgently needed. If you are an experienced engineer who is willing to mentor young or inexperienced engineers, let me encourage you to contact Cathy Orosz at the SBE at this email address: **corosz@sbe.org**

Labeling Wires

My favorite way to label wires is to use a labeler that prints directly onto white shrink tubing. After you print on the tubing, you simply heat-shrink it to the desired location on the jacket of the wire you wish to label. It's much neater than writing on a label and wrapping it around the outer jacket of a wire. Most fine point marker writing fades with time, even if you wrap it in a clear jacket of some kind. Some engineers don't write as clearly as others, so trying to read what someone wrote is another concern. The print on the heat-shrink tubing lasts for many years and it's easy to read. To learn more about these labelers, visit this website: **https://www.galvinpower.org/best-heat-shrink-label-makers/**

The heat-shrink tube printer I purchased was less than $200 and comes with a cartridge of shrink tubing than you can print on. The shrink tubing comes in different sizes for use with wires of different diameters. Here is the picture of the unit I purchased and use frequently.

Thanks for reading my column. I hope you found something interesting or useful.

The thoughts, ideas, and opinions in this column are my own, and do not necessarily reflect the views of Radio Guide or its publisher.

Steve Tuzeneu, CBT, is the general manager and chief engineer for WIHS 104.9 FM in Middletown, Connecticut. He is licensed by the FCC as an engineer and is a Certified Broadcast Technologist with and a member of the Society of Broadcast Engineers, and an extra class radio amateur who has been in broadcasting since 1973.

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Small Market Guide

Another Halloween Has Come and Gone in Small Market

by Roger Paskvan

Yes, that time of year again when "All Hallows Eve," becomes a dominant setting in most small market communities. Halloween, contraction of All Hallows' Eve, a holiday observed on October 31, the evening before All Saints' (or All Hallows') Day. The celebration marks the day before the Western Christian feast of All Saints. The name goes way back to the eight century. In the eighth century, Pope Gregory III designated November 1 as a time to honor saints. Soon after, All Saints Day came to incorporate some of the traditions of feast. The evening before All Saints Day was known as All Hallows Eve, and later changed to just Halloween. The celebration centered in medieval England, especially among the Irish but it is known throughout the Christian world.

Let us not forget that 84 years ago, on the Columbia Broadcasting Network, H.G. Wells, capitalized on this day by broadcasting his play, "War of the Worlds." This broadcast, emanating on October 30, 1938, shocked the world and left a standing salute to the power of radio. Thousands of people thought that the Martians had actually landed and were going to take over the country. It was a cleaver Halloween disguise that changed the way we think about radio forever. The power of radio can influence a very large number of audiences.

In small market, the merchants play on the Halloween traditions with displays, sales and storefront Halloween decorations. It has become a reason for sales, a prelude to Thanksgiving and a good reason to run more ads promoting the event. Let's face it, NTR is big in broadcasting and don't let any opportunities slip by, especially in small marketville.

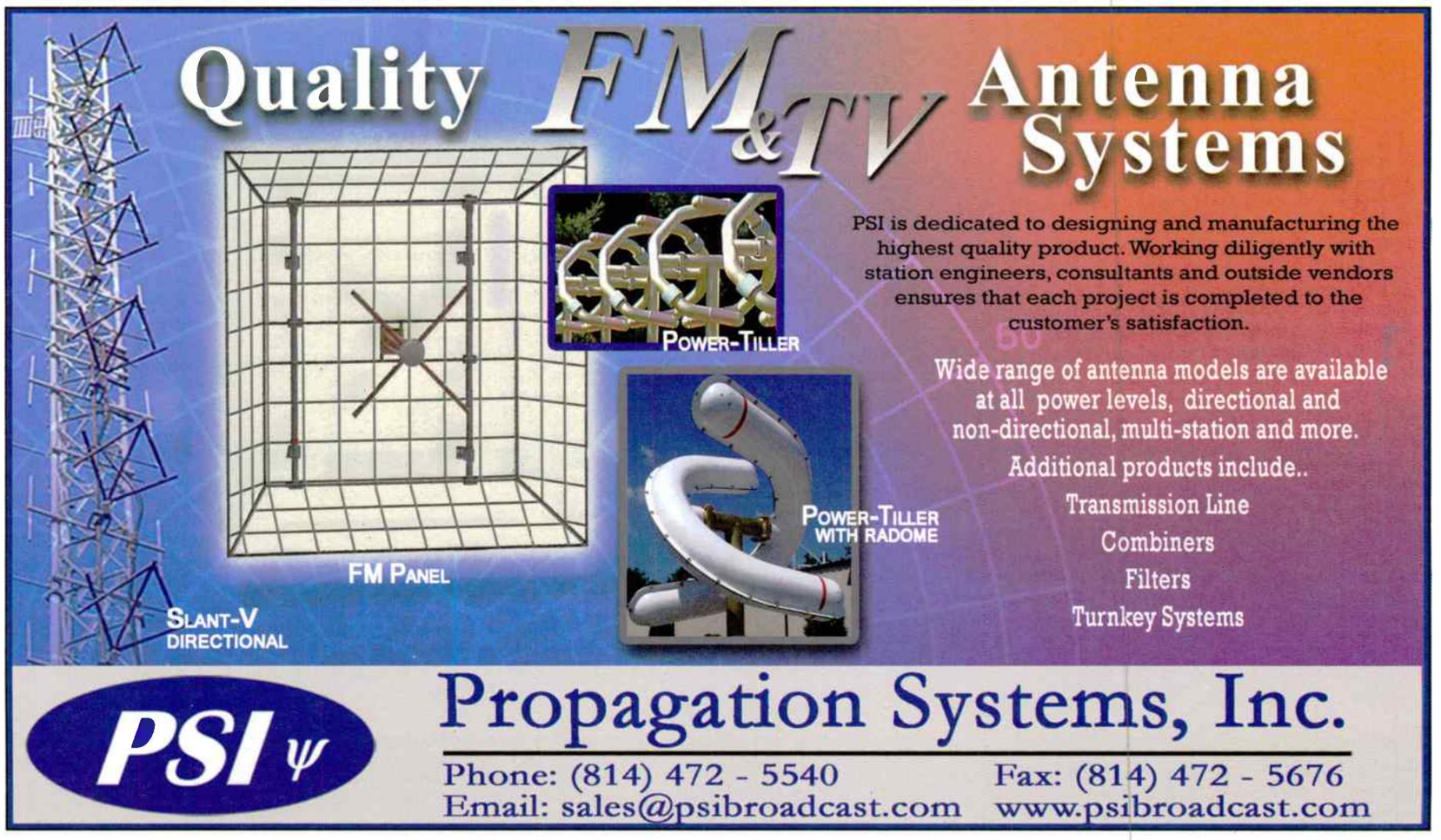
NTR, or Non-Traditional Revenue as it is more commonly known, has been one of the main buzzwords in the broadcast world for the past fifteen years. Although a lot of focus has been put on NTR, the concept and several of the practices of NTR for radio stations have been around nearly as long as commercialized radio. By definition, NTR is any means by which a radio station brings in revenue through means other than on-air spot sales. Until about fifteen years ago, this meant that NTR revolved around events and promotions. With the advent of widespread Internet webpages, Halloween fits right into your customer's webpage. So, make a big deal out of it. Some stations text Happy Halloween on their RBDS feed that displays on the modern radios under your station call.

This Halloween will be our stations 32nd year of what has been known in the community as "Treat Street." Yes, in 1990, we capitalized on the concept that parents needed a good, well supervised place to bring their children for the traditional trick or treat ritual. Each year, our station rents the local event center and provides a place for the kids to play games and get candy.

As you can see from **(fig 1,)** attendance is always great, this year topping out at 4,000 kids and parents standing in line. The event is sponsored by local businesses setting up booths and a crazy "best costume contest." Some merchants go all out, see **(Fig 2 and 3.)**

So, make Halloween, a station event, especially in small markets. Help out the community and they will give back to you in return. This year, was our biggest treat street – number 32.

Roger Paskvan is an Associate Professor of Mass Communications at Bemidji State University, Bemidji, MN. You may contact him at: rpaskvan@bemidjistate.edu



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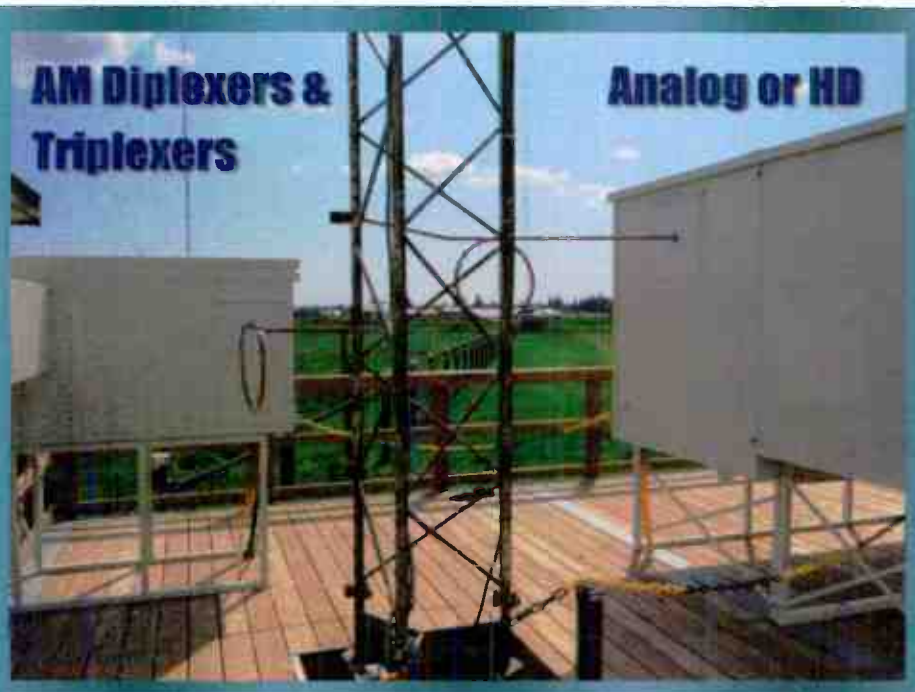

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Station Stories

Dealing With Natural Calamities

by John L. Marcon, CBRE CBTE 8VSB Specialist

No, the antenna below is not broadcasting to the aliens. We are not there yet anyway. This is just how nature would "design" an antenna. Joking aside, this is the 10 kW FM antenna of DYFR-FM, 98.7 MHz in Cebu city, Philippines, after super typhoon Rai hit the area in December 2021.

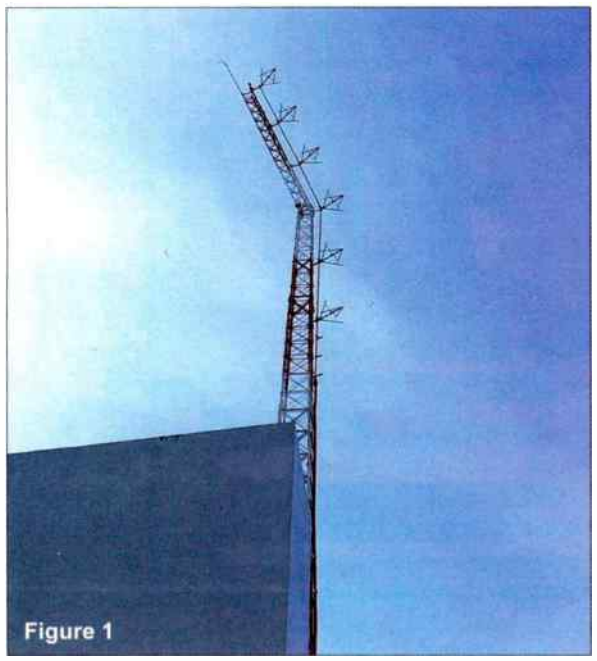

Figure 1

As people working in broadcast, we are often in the forefront of calamities or natural disasters because these are big news events that are always part of our broadcast. Every living thing on earth is not immune to nature's wrath such as hurricanes, earthquakes, volcanic eruptions, floods and so on. Just recently, people living in Florida and South Carolina experienced the wreckage brought about by hurricane Ian. Florida took the brunt of the hurricane force. There was widespread destruction of houses, commercial buildings, boats, piers, roads, and many other infrastructures. Dozens lost their lives in the aftermath. Radio, TV and even cell towers went out of service because of flood or weather-related equipment failure.

But calamities only become more real to you and me when we personally experience it. Like many other people, I happened to experience nature's worst as well. Interestingly, all of them happened in the 90s; nothing as bad after that decade. I am originally from the Philippines and the country is not only in the path of western pacific typhoons (the equivalent of the hurricane), the volcanoes are also always active, and then earthquakes sometimes join the party as well.

I was with Far East Broadcasting Co. (FEBC) back then and the first major natural disaster in the 90s was the 7.7 magnitude earthquake in the island of Luzon(northern Philippines). I remember it vividly because I was in front of our Continental 20kW FM transmitter checking the front panel meters when suddenly everything was shaking violently. It was not just side to side but up and down as well! I ran outside to look at our 300 foot FM antenna and it was swaying fast from left to right. The next one was the eruption of Mt. Pinatubo in 1991. We were doing a remote broadcast when it erupted. The whole sky darkened and the ash was raining down on us. It was like the apocalypse we see on TV. The destruction was widespread and many died. Despite these two major tragedies, none of our studios, towers or transmitters were damaged in the aftermath.

A few years later, we had a 10kW transmitter project in Davao city, which is in the southern part of the country and an hour's trip by plane. We replaced an old tube type transmitter with a new Nautel XL12. The project went on smoothly. Then years later there was a major flood in the city and mud and water flooded the transmitter up to half the building height – the new transmitter was halfway under water. For those who are familiar with the XL12 AM transmitter, you know that the main transformer is on the floor and some of the control relays are also near the floor. So, all of these parts were under mud and water. Fortunately, the electrical power was shut down before the flood came in.

I told them to take out the transformer, power wash it with clean water and let it dry. Then they enclosed the transformer with a wooden box and installed a few 100W incandescent bulbs inside – the heat from the bulbs dried the transformer after a few days. I went back to the site and, after making sure that the transformer and all the parts inside the transmitter were dry, we reinstalled it and powered up the transmitter (I used a hi-pot tester to check the transformer). A control relay failed to engage so we replaced it with a new one. Believe it or not, the transmitter worked again and is still in use today.

To prevent the transmitter getting flooded again, we decided to build another room but this time, on a higher elevation. We used a 20x8 ft steel shipping container as the new room and then mounted it on four concrete posts. But nature as it is, that structure just barely survived the next major flood that happened a few years after.

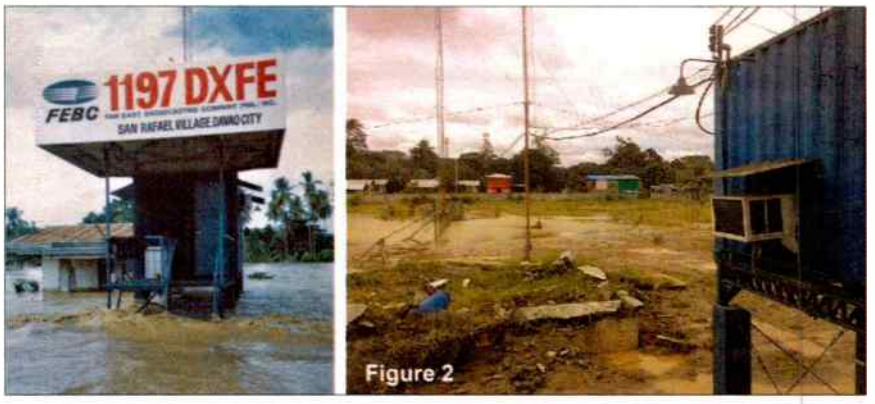

Figure 2

In **Figure 2**, is the transmitter and antenna site at the height of the second major flooding. The old transmitter building is at the back and the new transmitter room is at the front. The flood water level almost reached the floor level of the new room while the old building was halfway flooded. On the right is the aftermath on the antenna site after the flood receded.

As shown in **Figure 1**, FEBC also has an FM station (DYFR-FM, 98.7 MHz) in Cebu city. It is about 40 minutes by plane to the south of the capital Manila. Cebu city is a favorite tourist destination. I was sent there in the 1990s to familiarize myself with the operation of the station as I was a newly assigned support engineer for the different stations of the network. Unfortunately for me, I did not check the weather forecast for the next few days because, just a day after I arrived, a super typhoon struck the city. I was staying in the guest room of the station and for the whole night, the wind was so loud I barely slept. The typhoon caused widespread damage across the whole city and nearby islands. Because of the damage to the power lines, there was no power and water in the whole city for more than a week. The station was on generator power during the outage and we were still able to be on-air during that time. Despite the strength of the typhoon, there was no damage to the station and the staff were able to help in the city's recovery effort. At that time, DYFR only had a small 3 kW CCA transmitter, a 5 kW antenna and a locally made studio console (FEBC used to manufacture its own mixing console during that time).

Fast forward to the 21st century, and the station had upgraded from the 3kW CCA tube transmitter to a new Nautel GV10 solid state. They also built a new building for the studios, offices and transmitter. The new studio also has a new Axia console. They also built a new and higher tower for the 10kW antenna from SWR Inc.

Little did I know that another super typhoon would rampage in Cebu city again and it happened just last December of 2021. Like what happened in the 90s, much of the city became a disaster area. This time around there were more damages because the city has more infrastructures built in the past two decades. There were more high-rise buildings, shopping malls and they even just inaugurated a new sea-crossing, cable-stayed bridge that linked the city to the airport. I happen to visit Cebu a few months ago and I noticed that the city has not yet fully recovered from the devastation of the typhoon.

In **Figure 3** (p. 42), shown on the left, a gin pole was used to repair the tower and antenna. The crane they were supposed to use did not make it to the site because it was too heavy for the bridge. On the right side, moments after the tower and antenna were repaired.

I also got in touch with the Chief Technician of DYFR, Noel Ubod, and this is his account of what happened the day super typhoon Rai arrived:

"On December 16, 2021 at 6:00 p.m., strong winds started to hit the station. It lasted until almost 11:00 p.m., the technician on duty noticed the increase in the transmitter VSWR reading. It was higher than usual but still within safe levels. We made a visual inspection of the antenna and we noticed that the tower and antenna were bent badly to one side. We decided to turn off the transmitter to prevent further damage while the typhoon was still raging on.

The next day we checked to see if the damage had become worse but fortunately it was the same as it was

(Continued on Page 42)

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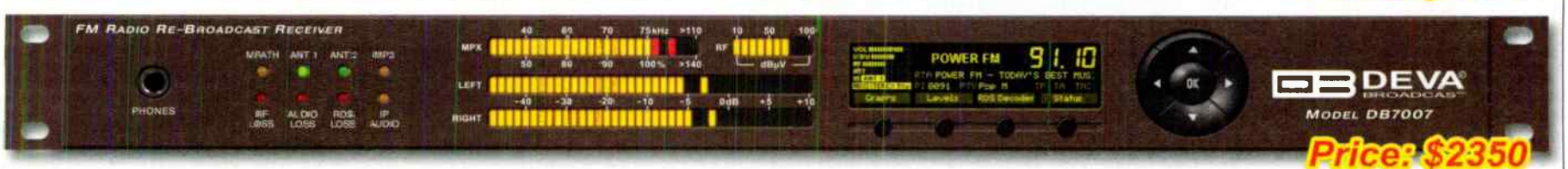

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Figure 3

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World Radio History

Dealing With Natural Calamities

– Continued from Page 40 –

yesterday. I decided to power up the transmitter at the lowest power first, then slowly raise the power while keeping an eye on the VSWR. We found out that, despite the damage to the antenna, we were still able to broadcast at 5 kW power with 21 Watts reflected power (1:1.13 VSWR or -24db return loss). Despite the damage, we were able to shift the normal programing to FRR or First Response Radio. FRR programming is specially catered to the severely damaged area of the city. The station was able to help the city by broadcasting out vital information like source of clean drinking water and food, government assistance and even location of functioning ATM machines. The whole of Cebu city and the neighboring towns were in total black out and it took almost three months to completely restore the power."

Figure 3

The city slowly recovered and electric power was finally restored after three months. Fortunately, there were no other problems at the station besides the antenna and tower. Like what happened before, their modern generator kept them on-air. Noel and his crew started looking for contractors to repair the damaged tower and antenna. It took a while before the repair started. There were many issues before the repair. For example, the crane that they were supposed to use did not make it because was too heavy for the bridge that leads to the tower site. They switched to disassembling the damaged tower members piece by piece and used a gin pole to replace the top section where the FM antenna was mounted. They tried to fix the bent antenna section but they could not run it to full power so Noel ordered a new 12 kW, 6-bay antenna from Shively Labs. The antenna arrived in Cebu but is still held up in Customs as of this writing. Noel is confident that with the new antenna, the station will be in full power again and will be much stronger and ready should another super typhoon come their way.

John L. Marcon, CBTE CBRE 8VSB Specialist, is the Chief Engineer for Victory Television Network (VTN) in Arkansas, with international experience in both Radio and Television Broadcast, and has an Electronics Teaching background.

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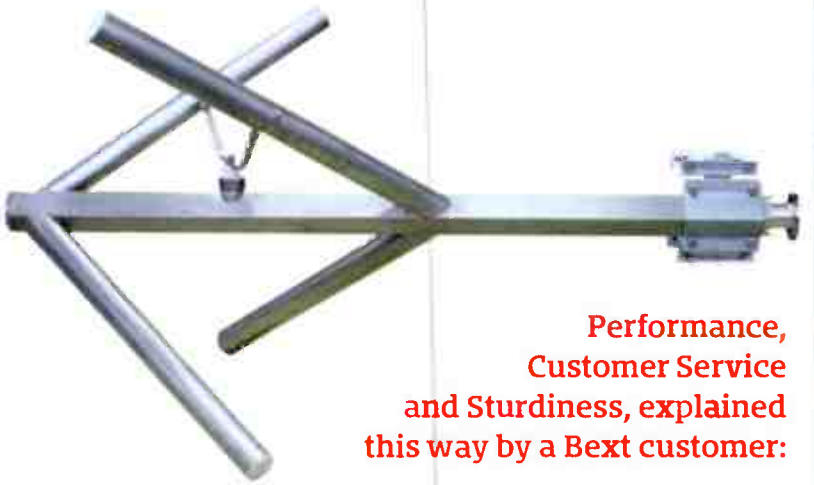

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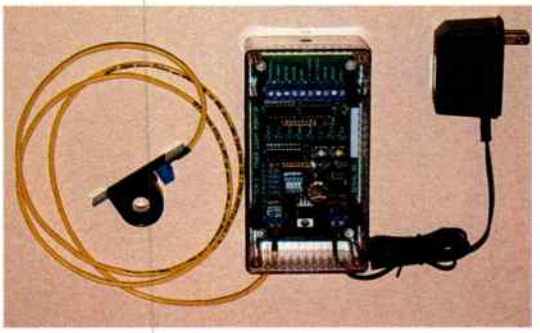

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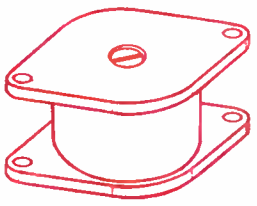

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Angry Audio

Angry Audio Announces New Livestream Audio Processor

"Radio engineers are stretched so thin these days," says Angry Audio founder Michael "Catfish" Dosch. "Many tell us they don't have time to tune and tweak their audio processing. Believe it or not, we've got a gadget for that: the world's first audio processor with 'autopilot'!"

The software in Chameleon is created by Cornelius "Corny" Gould, world renowned expert in broadcast audio. The system continually monitors incoming audio and adjusts its parameters dynamically to fit. Chameleon delivers clear, clean, punchy audio with consistent loudness, independent of format. Rock, talk, jazz, oldies – no matter the content, streams sound fantastic.

"We are eliminating the cost and complexity that prohibit many stations from processing their streams and HD channels," Catfish explains. "Our new Audio Chameleon C4 instantly makes your streams sound amazing. Plug it in, flip a few switches, and it will sound like you spent weeks dialing it in. Don't worry, we won't tell."

Loudness standards are a hot topic for everyone now, especially live streamers. Major platforms like Apple, Amazon and YouTube are demanding adherence to their own loudness criteria. If you don't comply, you don't get carried. Chameleon C4 solves this problem with a unique loudness controller that lets you set a target anywhere between -24 LUFS and -14 LUFS. It will even support the proposed AES loudness standard. No other processor does this.

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Tieline Adds Native Livewire Support in Gateway

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The recent integration of native Livewire+ support into the codec facilitates simple stream discovery and advertisement when streaming real-time IP audio across Livewire AoIP networks. Previously the Gateway could only connect to Livewire+ devices in AES67 compatibility mode.

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The Gateway supports HTTP Shoutcast or Icecast streaming, plus multi-unicasting, multicasting, and up to 8 channels of phase-aligned surround sound audio. All functions can be fully remote controlled using the Toolbox HTML5 Web-GUI, or the Cloud Codec Controller.

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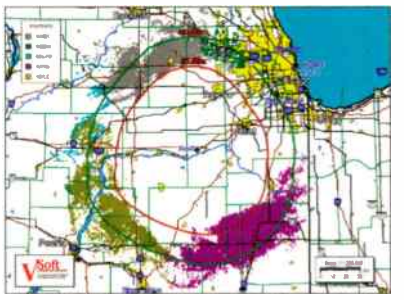

With the recent addition of authentic U.S. topographic map backgrounds, Probe 5 produces spectacular "atlas-type" maps, integrated with the latest U.S. census high-resolution population databases.

Probe 5™ features propagation modeling algorithms such as Longley-Rice, Okamura-Hata, Cost-Hata, PTP #1 and #2, line of sight, shadow density, and standard contour-based FCC. (The ITU propagation model {P. 1546} is optional). The new Probe 5 now comes with the 2020 census and TIGER boundary files. These include mapping boundaries for consolidated city areas, county, state, and urban areas, as well as the core-based statistical areas, combined statistical areas, metropolitan division boundaries and county subdivisions. For path profiles, Probe 5 includes an interactive profile tool that graphs the terrain elevation and signal profile between transmitter and receiver points.

For upgrading existing FM stations or finding new channels, Version 7.1.69 of FMCommander™ combines terrain impacted contour-to-contour and minimum separations mapping, producing high quality coverage/interference maps and text printouts. The program integrates FCC station, census, terrain, tower, airport, AM station, roads and highway, city and county boundaries, lakes, and oceans data into one complete FM channel searching and mapping package.

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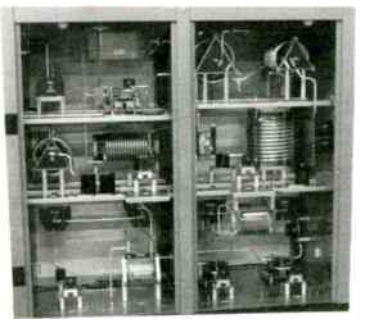

World Radio History

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

Email your dates and info to: ***radio@rconnect.com***

CES 2023
January 5-8, 2023
Las Vegas Convention Center, Las Vegas
www.ces.tech

NATE Unite 2023
February 20-23, 2023
Ceasars Forum – Las Vegas, Nevada
https://natehome.com/nate-unite-conference/nate-unite-2023

2023 NAB Show
April 15-19, 2023
Las Vegas Convention Center
https://nabshow.com/2023/

Dayton Hamvention
May 19-21, 2023
Greene County Fairgrounds, Dayton, Ohio
https://hamvention.org

NRB 2023
May 22-25, 2023
Orlando World Center Marriot, Orlando Florida
https://nrbconvention.org

Texas Association of Broadcasters (TAB 2023)
August 2-3, 2023
JW Marriot Downtown – Austin, Texas
www.tab.org/convention-and-trade-show

Radio Guide Advertiser Info – November-December 2022

Advertiser - Page	Website
Altronic - 32	www.altronic.com
Angry Audio - 23, 37	www.angryaudio.com
Arrakis - 13	www.arrakis-systems.com
Bay Country - 44	www.baycountry.com
Besco - 44	www.besco-int.com
BEXT - 42	www.bext.com
Broadcast Bionics - 21	www.bionics.co.uk
Broadcast Devices - 3, 48	www.broadcast-devices.com
Broadcasters General Store - 29	www.bgs.cc
Broadcast Signal Lab - 44	www.broadcastsignallab.com
Broadcast Software Intl. - 17	www.bsiusa.com
Broadcast Tools - 4, 47	www.broadcasttools.com
CircuitWerkes - 25	www.circuitwerkes.com
Coaxial Dynamics - 41	www.coaxial.com
Deva - 41	www.devabroadcast.com
Davicom - 33	www.comlab.com
D&H Satellite - 26	www.dhsatellite.com
Econco Tubes - 42	www.enco.com
Enco - 34	www.enco.com
ESE - 47	www.ese-web.com
FM Services - 44	www.towermonitor.com
Henry Engineering - 2	www.nenryeng.com
Ice Krackers - 42	www.icekrackers.corns
Inovonics - 1, 19	www.inovon.com
Kintronic Labs - 39	www.kintronic.com
Lawo - 35	www.lawo.com
Lightner Electronics - 45	www.lightnerelectronics.com
Mega Industries / MCI - 39	www.mcibroadcast.com
Nautel - 5	www.nautel.com
Nicom - 43	www.nicomusa.com
Orban Legacy - 44	www.orbanlegacy.com
Orban Legacy - 47	www.orbanlegacy.com
Owl Engineering - 47	www.owleng.com
Phasetek - 46	www.phasetekinc.com
PTEK - 24	www.ptekpower.com
Propagation Systems (PSI) - 38	www.psibroadcast.com
RF Engineers - 15	www.rfengineers.com
RF Specialties / Nautel - 43	www.rfspecialties.com
Shively - 36	www.shively.com
Smarts Broadcast Systems - 11	www.smartsbroadcast.com
Stackley Devices - 46	www.stackleydevices.com
Studio Items - 30	www.studioitems.com
Surcom - 44	www.surcom.com
Telos Axia - 31	www.telosalliance.com
Telos Omnia - 27	www.telosalliance.com
This Week in Radio Tech - 45	www.thisweekinradiotech.com
Tieline - 7	www.tieline.com
Titus Labs - 28	www.tituslabs.com
Transcom - 43	www.fmamtv.com
V-Soft Communications - 44	www.v-soft.com
Wheatstone - 9	www.wheatstone.com
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