

Radio Guide

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Digital Issue Now On-Line

January-February 2021 – Vol. 29, No. 1

The Dawning of the Digital AM Decade

High Efficiency Broadband Antenna (HEBA)
WorldWide Antenna Systems



Article – Page 6

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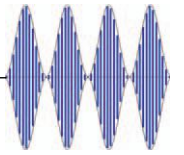
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In This Issue



Critical Content for Radio

Cover Story – by gRAdy Moates (page 6)

The Dawning of the Digital Decade: WorldWide Antenna Systems has been developing a new approach to AM transmitting antennas. It is significantly shorter than the tower it replaced – about 1/4 the height. It is a two-element antenna system on a platform that fits on a small plot of land about the size of a typical single family dwelling. The first High Efficiency Broad-band Antenna (HEBA) in the United States has been licensed by the FCC since June 2018 for WGFP, Webster, MA. It meets FCC efficiency requirements and provides coverage a bit better than the tower it replaced.

Chief Engineer – by Scott Schmeling (page 10)

'Twas the Night Before Christmas: Shortly after that, Keith called from the site. He said there was power to the building and that the Phase Master was running – but sounded louder (or at least different) than usual ... and something “smelled burned” (never a good sign)! The transmitter was totally dead, and nothing was lighting up at all. And the power input meter indicated no power being fed to the transmitter.

FCC Focus – by Gregg Skall (page 12)

Is Your Website ADA Compatible: Unfortunately, determining what is required to make a website “ADA compliant” is not entirely straight-forward. The Department of Justice (“DOJ”), the agency responsible for implementing regulations for the ADA’s general non-discrimination mandate, has yet to establish standards for private business websites. In this vacuum, many have turned to the Web Content Accessibility Guidelines, non-binding standards promulgated by an unincorporated organization called the World Wide Web Consortium (“W3C”).

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The Dawning of the Digital AM Decade Our Opportunities and Our Challenges

by gRADy Moates, Owner and Chief Scientist • LOUD & Clean® Broadcast Science

AM radio station owners and operators who are still working hard to serve their communities are about to have their diligence rewarded. Todd Rundgren once sang, “You want the obvious, you’ll get the obvious.” It is obvious that AM radio has been a challenging business since the early ‘80’s. Radio broadcast industry news is full of stories about AM licensees who have simply shut down their stations and turned in their licenses. That’s a shame, because recent results of all-digital AM testing (e.g. WWFD, Frederick, MD) are showing a dramatic increase in useful station coverage, greatly improved sound quality, and reduction of the adjacent-channel digital interference the hybrid digital system has caused in some cases.

Gregg Skall’s article about All-Digital AM in the previous issue of *Radio Guide* (page 12) underscores the potential for this new technology and is a must read. As Gregg reported, upgrade costs are coming down, the regulatory environment has become very encouraging and improvements to station coverage and sound quality must be heard to be believed. Let’s dive into a technical discussion about All-Digital AM.

providing their present audience, who have legacy analog receivers, with continued analog service after the AM all-digital upgrade. Listeners who already have AM digital receivers will soon discover the improved sound, as well as the increased coverage, which in many cases will provide better service than the FM translator.

So how much better does it sound? How much larger is the useful coverage area? Dave Kolesar, the project leader for the all-digital WWFD testing, shares the following observations. During the day, in full MA-3 mode, receivers operate at 40.2 kilobits-per-second (kb/s), of which about 37 kb/s is used for audio, the rest for metadata, etc. The listeners experience 15 kHz stereo audio! Below 10 kHz it is true stereo. Above 10 kHz it uses Spectral Band Replication, similar to AAC, but the listener still hears a very realistic stereo sound stage. Dave says it’s quite hard to break this performance within the 2 mV/m contour, and he has frequently observed this performance all the way out to the 0.5 mV/m contour. But the good news is, when the receiver becomes challenged with data loss, it auto-falls-back to core mode at about 20 kb/s, and continues to

provide the listener with a 10 kHz parametric stereo experience all the way out to about the 0.1 mV/m contour!. Can you imagine a listener tolerating analog AM audio at the 0.1 mV/m contour?

The news about nighttime performance is similarly impressive.

WWFD provides a quite-good listening experience out to about the 5.4 mV/m contour, 1/2 the level of the Nighttime Interference-Free contour (calculated for WWFD to be 10.8 mV/m). Because it is digital audio, as long as the receiver decodes the audio data, the listener hears only audio. No hiss, no background audio from a distant station, no skywave comb-filter effect.

A radio professional who lives on the northwest side of DC and frequently listens to WWFD summarizes his subjective impressions by describing an all-digital coverage increase of almost 2-times the radius of the old analog useful service, both day and night. That’s almost 4-times the land area!

However, the proof is in the diary and PPM data (not in the pudding, heh). Dave Kolesar reports that WWFD’s niche AAA format got no audience ratings for eight years when the AM was operating in legacy analog mode, even after the FM translator was added. WWFD began appearing in the ratings when the AM went digital, likely in part because of the larger useful footprint. After the Covid-19 crisis began, triggering a drop in car commuting, listening statistics dropped off as well.

As digital receiver penetration continues to increase, the all-digital AM service will be perceived as superior to the FM translator service in audio quality and coverage, and the AM station will not only survive, but will once again be competitive in the marketplace.

Challenges Faced by Today’s AM Station Owners

However, certain issues remain:

(1) Present FCC rules require that the AM station stay on the air to retain the right to use the FM translator,

(2) Cities and towns are resistant to new towers, and frequently resist replacement of towers that are beyond repair,

(3) AM transmitting towers require large land area, because their “ground system” of buried copper wires extends hundreds of feet in all directions from bases of the towers,

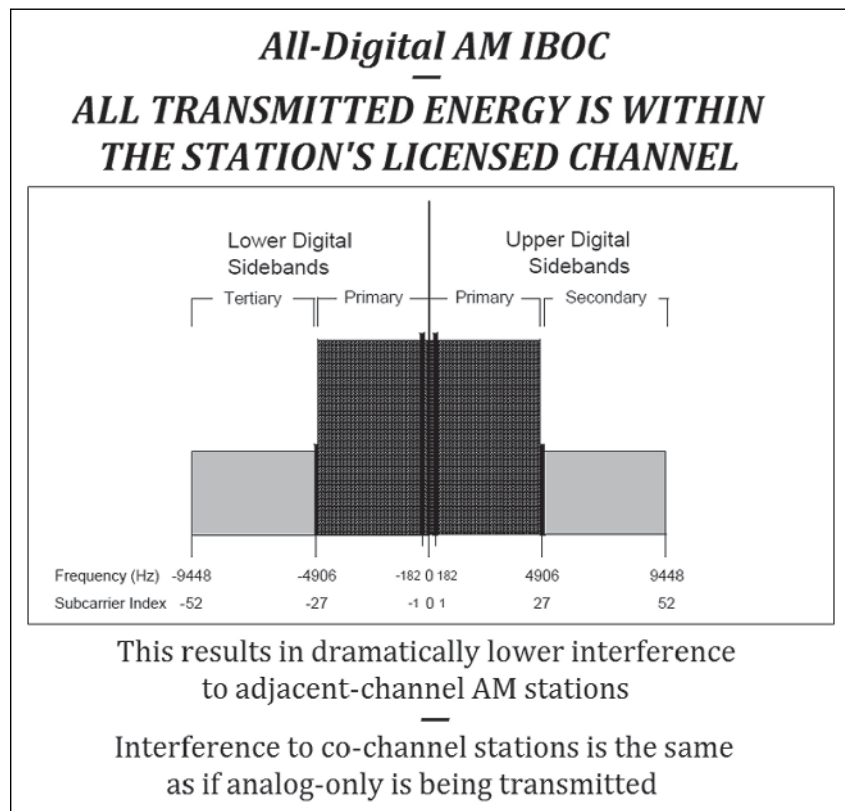
(4) AM towers, that are not self-supporting, require a guy-wire system to keep the towers in the air, again occupying a large land area,

(5) Land expenses for station operators become challenging as property taxes and lease payments increase, and ...

(6) If the land is not maintained, the radio station signal diminishes as vegetation grows and the ground system deteriorates.

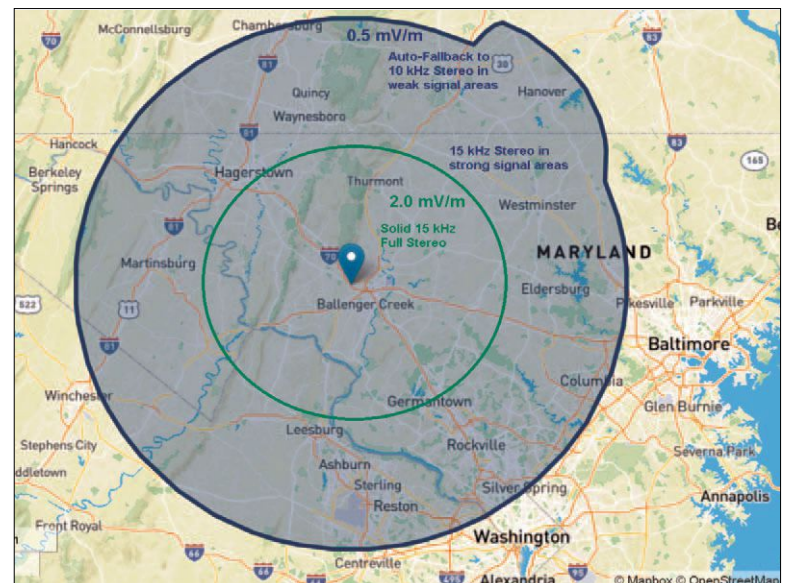
So, when station owners also own their tower(s) and their tower sites, and the physical condition of their tower(s) is good, the owners are in the driver’s seat and control their own destiny. That’s great.

However, many station owners are not in this enviable position in the 2020s. If a site lease is about to terminate, station owners can face landowners demanding 3- or 4-times the cost of the expiring lease. For many stations, this may not be a supportable business model. Or if deterioration of the tower(s), now 50-or-more years old, is so advanced that repairs are not possible, the cost to keep the AM on-the-air is similarly challenging. This is especially true if the city or town is taking the position that the tower(s) cannot be replaced. Also, the value of the land for alternative purposes creates a real pressure to reduce the land area needed by AM antenna systems.



There are now more than 50 million HD Radio receivers in North America, and all major automakers are shipping vehicles with HD Radios installed. The secret that many folks may not fully realize is that an HD Radio receiver is not just an FM thing, it is also an AM thing. *Every HD Radio receives all-digital AM* and is an AM station operator’s salvation!

Taking a long view of the AM broadcasting business lets savvy owners and operators see beyond the obvious. Success is in the details. The FCC has provided a great mechanism for the regrowth of AM, by allowing FM translators for AM stations. Hundreds of AM stations have taken advantage of the FM translator option and are already enjoying greatly improved listenership and business. These translators can also help ease an AM station’s transition to all-digital by



Many attempts over the years to develop a reduced-height AM transmitting antenna have produced several novel engineering approaches, but none of these ideas also reduce the land-area required. Other available alternative designs still require a buried-wire ground system occupying a large area of land. Maintaining a complete ground system prevents aggressive repurposing of the land.

A New, Small AM Antenna That’s a Good Match for All-Digital AM

There is one company that has developed a total solution that addresses all of the legacy AM antenna issues and provides a path forward. WorldWide Antenna Systems has

(Continued on Page 42)

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Bold Predictions for Radio in 2021

How Covid has changed how we broadcast!

by George Zahn

There's no way to know if 2021 will be less tumultuous than 2020, but the year 2020 will definitely be marked as a turning point for many things – curbside service and working from home among the many factors. But how will what we learned in 2020 affect what we do in the short-term and the long-term future?

With the vaccine rolling out slowly across the U.S., there's hope that by maybe later this year, we can regain some grasp of “normal.” When the pandemic started, I remember saying, “We don't want a new normal, just bring back our old normal.” Alas, as history has shown us, even our “old normal” will resonate, at least for a while, with some of the echoes of 2020. None of us has a crystal ball for decades from now, but here are some things we may be able to expect for 2021:

“Zooming” to the Future

Audio, for everything from radio to TV, has been “dumbed down” as we have scrambled to create new content in a time of isolation. I remember how radio purists and audiophiles wailed at the advent, and the acceptance, of the MP3 for streaming and audio distribution. While many cannot tell the difference between a really good MP3 and a pure audio file, many professionals can.

Now we have been using digital conference interfaces for video and audio recording. Yes, it allows us to quickly and easily get an interview, but we're losing quality in the haste to get something on the air. What's more, it seems that everyone's accepting it as a new status quo. A decent phone connection (hopefully without the same digital pitfalls of videoconferencing) is still preferable in my opinion to a garbled or dropout-laden live shot or recording.

Knowing that the way we interview out of the studio will be like this into early 2021 and maybe beyond, a goal would be to have better quality USB interface microphones on all ends of a conversation. If you're a station, you should either interface your studio or a decent microphone to your Zoom or other teleconferencing tools for the best audio you can get. If you're a newsmaker, it's also a good investment to have for sounding as good as possible on any interconnection. If video becomes part of the equation for social media, invest in a better web camera than comes with your new or old laptop. Also ensure that you have decent bandwidth and fast Internet.

Near the beginning of social distancing, we were forced to turn a ten person recorded radio panel discussion into a Zoom event that was recorded and edited for airplay. It took some editing and asking those with less than speedy Internet capability to repeat parts of some answers lost due to audio dropout so they could be edited into the final ninety-minute broadcast. Here's the catch on multi-person virtual meetings. You may have the greatest bandwidth and speed at your disposal, but your overall product may be limited by the weakest bandwidth connected interviewee.

The Pod Complex

What was a phenomenon in early 2020 has only seemed to grow stronger, and it looks like podcasts are going to be with us for at least the near to middle future, both helping those of us who use them to reach on-

demand listeners and fight those who see outside podcasts as strictly competition. As long as large broadcast purveyors such as iHeartRadio are plugging their innumerable podcast inventory once every stop set, the podcast will be around for a while.

The quicker we learn to use our content as podcast-friendly, the better. Try using royalty free show themes and, if nothing else, just use your talk segments as podcast content. Making podcasts may even help some millennials and Gen Z listeners discover your station – I continue to talk to younger potential radio listeners who are swimming in the Olympic-sized pool of more than 1.7 million estimated podcasts with a total of more than 40 million episodes out there.

There are two things to remember about podcasts – one of them involves audio quality. As detailed a number of issues ago, when I spoke with radio consultant Chris Huneke of Futuri Media, the booming of podcasting is also re-training the ears of many listeners. Huneke asserts that the “no-frills” audio quality of many homemade or small studio podcasts may be what radio listeners expect to hear in the future. Obviously, we still need compression, but some of the other bells and whistles used to enhance our sound may make us “less listenable” to younger listeners used to hearing a “raw” sound. Frankly, I find some podcasts unlistenable, as a radio professional, simply because no one seems to have any idea of quality or volume control.

Phase On Stun!

It's not just the homemade podcasts and bite-size audio bits that are affected, but also segments from at least one the major networks. A recent Jimmy Kimmel monologue segment in late December, 2020, and re-played in January on streaming services such as Alexa, was a stereo recording with Kimmel's mic 180 degrees out of phase. On a little mono Echo Dot speaker, you could barely hear Kimmel's comedy until he was loud enough to be picked up the audience mics, but the mono mix of the audience laughter and applause came through loud and clear. Lots of near silence and a few giggles was the result.

No matter how we're being consumed: terrestrial radio, Internet radio, through a TV through Roku or Fire TV stick, or through any home listening device, we need to flashback to the days of mixing for mono compatibility and paying attention to the mono mix meter on consoles. In the days of early record production, many studios had the best stereo speakers for monitoring, but before they mastered the record, they ran the stereo mix (in mono) through a speaker akin to a small Auratone speaker, to more closely indicate what the song would sound like on a small AM transistor radio.



Echo Dot – 4th Gen

When I started in radio, the rule was that roughly half of listeners were still using table top mono clock radios for both AM and FM. That percentage dwindled with the Walkman, boom boxes, and stereo clock radios, but I have to admit even the worst Echo dot will outperform our old transistor radios in audio quality – but mono compatibility is pendulum swinging back to the middle as more people listen on Echo, Nest, and other devices. Quality is still critical to our product, no matter where or how it's consumed!

On The Right Voice Track

During Covid, more stations have had talent working from home, depending on health conditions or restrictions. While voice tracking was once a main entrée on the menu of larger regional and national broadcasters in which one person could voice tracks for dozens of markets from one studio, many local stations may have become used to tracking with their talent providing audio from home or coming in a few days a week to track in advance.

The keys to good voice tracking, especially for one shot stations, include keeping things local or topical and current by not recording too far in advance. Obviously, you don't want to tip off that you're not live in the studio by have substandard audio quality, so again recording using a good microphone in a home studio is critical.

The nice thing about tracking from home is the fact that we've had wonderful editing tools available for our desktop, laptops, or tablets for decades. You can clean up voice tracks and even change the read length and pacing without changing pitch to hit certain specific lengths in the more advanced software such as Adobe Audition. On the lower cost front, Audacity gives you free basic editing capability.

Getting the audio from a remote studio to the station has become easier than ever. In addition to major broadcast packages in which you download your file directly into an automation system, some smaller broadcasters are using free resources such as Dropbox or Hightail to send in audio effortlessly in decent fidelity. Most of the free resources also have premium offerings that allow you to use significantly more storage.

We may never look at sick days the same again. In the case of someone still in good voice, but a little under the weather, it may be possible for them to still track from home to enhance continuity, especially during ratings periods. Even the most rudimentary automation systems can generally be programming to allow for regular placement of voice tracks.

The Value of Backups

My station has a variety of talk and music programs and as part of our “disaster plan.” Even before Covid, we were creating ways to have enough shows in our automation system so that our Operations Director could schedule from home so that we could have at least two to three weeks of “fresh” shows in the system in case of any emergency, or even a lockout due to Covid. To date, we have not needed to utilize that strategy, but we have many shows “doubled up” in our system and we can VPN to get to the system for an emergency.

Unfortunately, in extreme times, we may find ourselves needing any port in a storm. Even though our staffs are often considered critical personnel for travel during shutdowns, it's very nice to have the option if needed. If you haven't yet created a disaster business plan, both for programming and operation as well as business, now should be a good time to consider creating one.

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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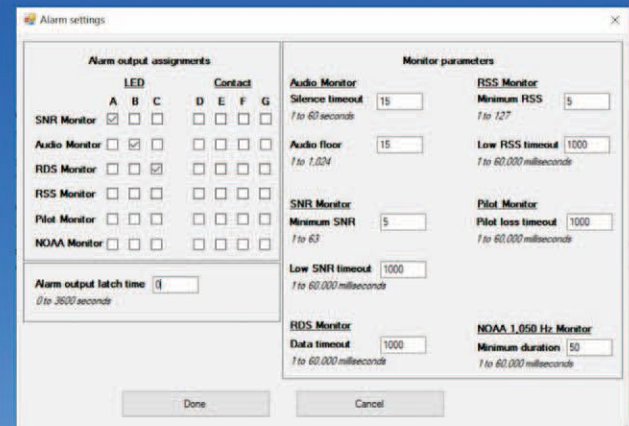
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'Twas the Night Before the Night Before Christmas ...

by Scott Schmeling

On December 23rd of last year, I left work a little before noon and headed for home. A Blizzard Warning had been issued for our part of the country and I didn't want to be stranded in the middle of nowhere! (Been there, done that ... didn't like it!)

For those of you in warmer parts of the country who don't normally get to experience a true blizzard and may not be aware of what exactly qualifies, here is the definition of a blizzard from the National Weather Service:

A BLIZZARD means that the following conditions are expected to prevail for a period of three hours or longer.

Sustained wind or frequent gusts to 35 miles an hour or greater, and considerable falling and/or blowing snow (reducing visibility frequently to less than 1/4 mile).

Our forecast was calling for up to nine inches of snow and sustained winds of 60 to 70 miles an hour for about an 18 hour period!

On the drive home, the snow started to fall and the wind started to pick up. Both increased the closer I got. When I turned onto Broadway in New Ulm (where I live) visibility in the blowing show was *less than a block!* I was glad I hadn't waited any later.

Out here on the Plains, when we have strong winds we sometimes experience what is called "Galloping Power Lines." It's like when you take a piece of rope and flick it real hard – you can watch what looks like one period of a sine wave travel down that rope to the end. With power lines, that sine wave travels back and forth between poles. These Galloping Power Lines can also cause power outages or drops. Such was the case that evening.

My first call from a transmitter site that evening was during supper (of course). At this particular site, there is no UPS on anything so the SINE remote control (telephone-based) calls when power is restored.

Just for a little visualization background, the site has a Broadcast Electronics FM-10/B transmitter which requires



3-Pole Contactor

3-phase power – which is not available here. To supply that 3rd leg of the 3-phase we have a Phase Master rotary phase converter. On the output of the Phase Master, there is a 3-pole contactor with a 2-minute delay. With this configuration, 3-phase power must be present for two minutes before power is applied to the transmitter. Then, of course, there is the delay in the transmitter between when filaments are turned on and high voltage can be applied.

So when power is restored to the site, the SINE remote control calls me to report "Power Failure." But power will not be applied to the transmitter for another two minutes, and there won't be any RF out for another 2 1/2 to 3 minutes. All that being said, when I got the call from the SINE I checked various metering channels randomly until the transmitter came back up. I did this

because I didn't want to chance being disconnected because of inactivity.

This happened three or four times that evening with the same outcome ... until the call at about 7:00 p.m. That time I did my "various channels check" as before. But there was no transmitter output. In fact, there were *no readings* from the transmitter. I called the site back multiple times until the SINE stopped answering at all. I knew this meant either a telephone line problem or a power outage.

Quick review – we are in a Blizzard Warning with blowing snow and 60 to 70 mile an hour sustained winds and we have galloping power lines. The transmitter is off and the remote control is not answering – most likely because of a power outage.

I called the power utility (a co-op). The out-going message said that they were experiencing multiple power outages caused by the storm. A check of their website indicated that their crews were being pulled in because conditions were too dangerous for them to be out. They would be dispatched again when conditions improved. Oh – and MNDOT (Minnesota Department of Transportation) had closed all roads in the region because of the blizzard conditions and had pulled their crews in. There was nothing to be done that night.

I did contact Keith Thelen (our new Engineer) to let him know about the situation and to ask if he could go to the site in the morning, after power was restored, to take a look. We have had situations in the past where the high voltage circuit breaker has tripped, resulting in no plate readings and no RF output. Keith said he would check it out.

Overnight, there were no calls from the site. Not that I expected any, since the line crews had been pulled in and the power was out. But at about 5:15 a.m. I did get a call ... power was back on, but not the transmitter.

Shortly after that, Keith called from the site. He said there was power to the building and that the Phase Master was running – but sounded louder (or at least different) than usual ... and something "smelled burned" (never a good sign)! The transmitter was totally dead, and nothing was lighting up at all. And the power input meter indicated *no power* being fed to the transmitter.

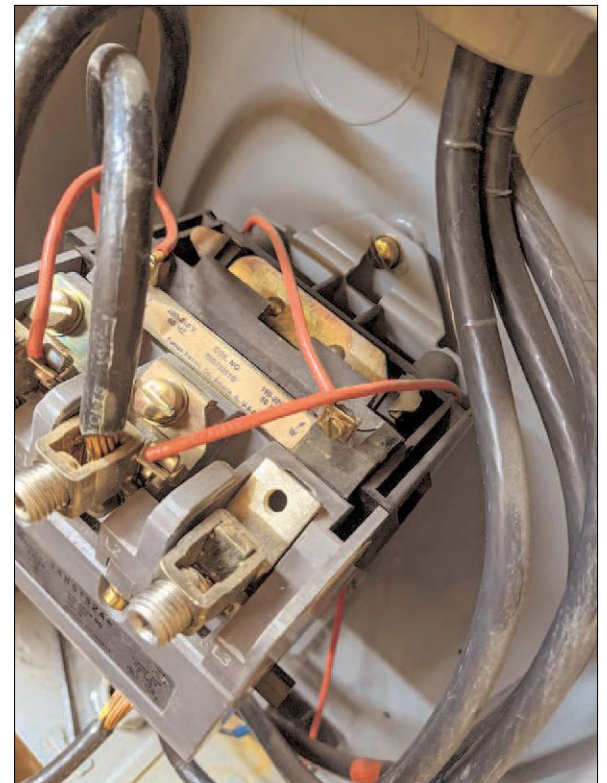
There is a RESET button on the cover of the enclosure that houses that 3-pole contactor I told you about earlier. Keith pressed that a few times but nothing happened. When he removed the cover he could see that the reset button was not coupled to anything, and did nothing! We decided we should call an electrician.

He measured and found voltage on each leg on the LINE side of the contactor but nothing on the LOAD side. He tried adjusting the time delay setting but no change. We decided he would go to another site to "borrow" a 2.5 kW transmitter in case we were not able to get the main up and running.

In the meantime, I contacted a friend, who is a lineman for a different co-op, who sent me the contact information for an electrician in the area who would be familiar with phase converters. A time was set for all three of us to meet at the site.

When we all arrived, we did a quick over-all assessment of the situation – power was on ... Phase Master was running ... no power to the transmitter. Todd (the electrician)

measured voltage at the LINE side of the contactor and said it was all correct. Voltage was measured at the output of the time delay (and at the contactor coil) but the contactor was not energizing. It was determined the coil had burned out from the repeated interruptions the night before! (The coil is what smelled burned!) I'm not going to go into detail regarding what we did as a short-term "work around." But I think you can imagine what it was.



The Contactor Coil Was Burned Out

We (Todd, Keith, and I) talked about replacing the contactor, but the only problem was the coil. That seemed like such a waste.

I have always been a firm believer in supporting those who support us, and as much as possible to shop locally. Todd was not very confident that he would be able to get a replacement coil given the age of the contactor. That being said, I went to the "Google Machine" to see what I could find.

Many sources showed them available for a few hundred dollars. Then I decided to search eBay specifically. I found one (*new in the box*) for \$30 from a liquidator – and I bought it!

Speaking of eBay, one last quick thought ... I am finding eBay to be a potential source for many hard to find older items. I was recently able to purchase for myself an early model analog/digital audio console for next to nothing. But it came with no power supply. Power supplies are still available from the manufacturer for \$1800. On a whim I searched eBay and found one for \$9.99!

And just last week we were trouble-shooting a problem with a Motorola PTP radio system. We found a connector at the radio on the tower that had obvious water infiltration. With the cable replaced, the radio was still not operating properly. I found a few replacements on eBay – one for \$100! I still prefer to shop locally when possible. However ...

Well, I've rambled long enough here. I hope you all had a wonderful Christmas and New Years and we look forward to a much better 2021!

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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Is Your Website ADA Compliant?

You could be the next case.

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

Broadcasters of all shapes and sizes have come to realize they are now engaged in a multi-platform enterprise. Television broadcasters are adopting streaming options and radio stations have developed mobile “apps” for smart speakers and promote listening over Alexa, Google Assistant, Cortana and Siri. In addition, broadcasters are trying to drive views and listeners to their websites. However, many are yet to reconcile with new issues wrought by the use of such technology, in particular the obligation to make your website material equally available to all who would try to reach it.

Good corporate citizenship and risk mitigation should lead management to invest in making station websites accessible for people with disabilities. Already trending, the COVID-19 pandemic has hastened the proliferation of business to on-line format and advances in adaptive technology have made the Internet an even more important source for many people with disabilities. As a result, it’s good business for broadcasters to make their websites accessible for people with disabilities to foster broader access, diversity, and inclusion. Another incentive: lawsuits alleging that business websites fail to comply with the Americans with Disabilities Act (“ADA”) have become ubiquitous. In recent years, more than 4,000 such suits were filed in federal courts and countless more were filed in state court systems around the country.

The case law on whether broadcasters are subject to the ADA, at all, is mixed. However, it is safe to assume, at a minimum, that when a broadcaster opens its facilities to the public, the facilities are “places of public accommodation” subject to the ADA. If a website relates to a place of public accommodation, it too is covered by the ADA.

Unfortunately, determining what is required to make a website “ADA compliant” is not entirely straight-forward. The Department of Justice (“DOJ”), the agency responsible for implementing regulations for the ADA’s general non-discrimination mandate, has yet to establish standards for private business websites. In this vacuum, many have turned to the Web Content Accessibility Guidelines, non-binding standards promulgated by an unincorporated organization called the World Wide Web Consortium (“W3C”). Though not a perfect solution, complying with these guidelines is likely the safest approach for a broadcaster seeking to make its website accessible.

I. Application of the ADA to Broadcasters

The ADA prohibits discrimination “on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation by any person who ... operates a *place of public accommodation*.” 42 U.S.C. § 12182(a) (emphasis added). Thus, a threshold question in assessing ADA liability is whether a broadcaster is a “*place of public accommodation*.” That term is defined to include twelve categories of establishments, including a place of exhibition or entertainment, a place of public gathering, a service establishment, a place of public display, a place of recreation and other categories that could be stretched to include broadcasters.

There are several federal court decisions that support a position that a broadcaster’s services are non-public spaces and do not fall within any of these categories. For example,

in a 1995 case ruling on the NFL’s “blackout rule,” in a claim that it prevented people with hearing impairments from following the games (which were only available via radio when the blackout rule applied), the Sixth Circuit U.S. Court of Appeals found that the NFL and television broadcasters were not places of public accommodation and, thus, not subject to the ADA. In 2001, a California District Court found that, under the ADA’s plain text, neither a digital cable system nor the on-screen menus used to operate that system were places of public accommodation. Other courts have held that broadcasting studios that were not wheelchair accessible were not places of public accommodation.

However, a few notable court decisions have reached the opposite conclusion. In *Rendon v. Valleycrest Prods.*, the Eleventh Circuit held that the telephone system used to screen potential contestants for the popular game show “Who Wants to Be a Millionaire?” discriminated against people with hearing impairments (they could not hear the questions asked on the system) and motor impairments (they could not operate the telephone keypad fast enough to record their answers) since the game show took place at a broadcasting studio, which falls within one of the enumerated categories of places of public accommodation.

In the 2012 decision *Nat’l Ass’n of the Deaf v. Netflix, Inc.*, the court found that the website for a paid streaming service potentially fell within several of the categories of public accommodation enumerated by the ADA, holding that the web site may qualify as: a “service establishment” that provides customers with the ability to stream video programming through the Internet; a “place of exhibition or entertainment” that displays movies, television programming, and other content; and a “rental establishment” in that it engages customers to pay for the rental of video programming.

While the Netflix reasoning seems to be directly at odds with earlier views expressed by the courts in *Stoutenborough* (NFL black out rule) and *Torres* (on-screen digital cable menus), it reflects some courts’ tendency to broaden the ADA by equating a virtual space, like a website, with the physical spaces listed in the ADA’s definition of “place of public accommodation.” Thus, it is quite conceivable that a court could extend similar reasoning to a broadcaster’s website, particularly as the services offered by traditional television and radio providers and pure streaming services become more similar.

In sum, there are solid arguments that a broadcaster’s non-public facilities and, by extension, websites are not places of public accommodation subject to the ADA. But, to the extent a website is used to invite public participation or to deliver content to the public the argument is weaker. For that reason, designing broadcasters’ websites to be accessible is a prudent risk mitigation measure.

II. The Lack of Government Regulations Leads to Significant Litigation Risk

The DOJ is empowered to establish regulations to implement the ADA. In the construction space, for example, the DOJ has detailed regulations that cover everything from elevator buttons to counter height. Thus, for most ADA issues, one needs only to obtain a copy of the applicable regulations and a tape measure to determine compliance. In contrast, there are no regulations that apply to websites

operated by places of public accommodations. Nor can most businesses undertake an accessibility analysis without retaining outside help. These factors have created a ripe environment for website accessibility litigation.

Using the ADA’s non-discrimination mandate, plaintiffs’ attorneys in numerous states have issued thousands of demand letters and filed lawsuits contending that the plaintiff, usually a blind person, was unable to access the defendant’s website and the defendant has violated the ADA and local civil rights laws.

Resolving these suits is tricky and the DOJ has shown it is willing to intervene to protect its view of the ADA, despite failing to create any standards to assist businesses in complying with the act. For example, in *Gil v. Winn Dixie Stores, Inc.*, the DOJ filed a statement of interest arguing that the ADA covered Winn-Dixie’s website and that the ADA would still apply even if Winn-Dixie had no physical stores; the court agreed and the plaintiff’s prolific web access lawyers were subsequently awarded \$100,000 in fees. So, it seems the best defense to a website accessibility suit is maintaining an accessible site to avoid being targeted, in the first place.

III. The Web Content Accessibility Guidelines Provide a Common Approach to Maintaining an Accessible Website

The vacuum created by the lack of government-issued website accessibility regulations is frequently filled by nonbinding standards, such as the Web Content Accessibility Guidelines (“WCAG”) promulgated by the W3C, an unincorporated organization that issues protocols and standards for various aspects of web development. The W3C’s standards have been gaining prominence as a best practice in web design. They require that websites are perceivable, operable, understandable, and robust to people with disabilities, including visual, hearing, cognitive, and physical impairments. From the litigation perspective, the WCAG are commonly treated as a de facto standard by plaintiffs’ lawyers. You can find W3C’s standards here: <https://www.w3.org/WAI/standards-guidelines/wcag/>

As a result of the focus by some public interest groups that advocate for the disabled and others, several services have evolved to help. Easily found on the web, these services claim to use automated intelligence and other techniques to scan your website for web accessibility compliance and quality assurance. Automated tests help to discover, prioritize, and fix website problems and improve the website interface and design to make it accessible and compliant with legal requirements.

Conclusion

It is important to implement internal and external website development policies that address accessibility. Incorporating accessibility into website design is becoming the new normal for most businesses. Whether or not broadcasters’ websites are subject to the ADA, being mindful about accessibility now will both enhance broadcasters’ sites for individuals with disabilities and help prevent the industry from being targeted in the next wave of website accessibility litigation.

Note: This article draws from materials first produced in conjunction with Jamie Dean, Esq. at Womble Bond Dickinson, LLP.

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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Tower Climbing – Awareness and Compliance

by Jeff Johnson

With our industry fighting constraints of reduced staff and budget in a tight economy, securing our property from loss and protecting the safety of our people – and doing so economically – is more important than ever.

We may think of safety and security first in terms of towers and locks, but it extends to protecting intellectual property on our computers, fire suppression technology, equipment design that is inherently safer, and extends even to stress reducing management techniques that promote worker health and productivity.

This column will address all of these areas, including that most important software of all, our minds' ability to perform efficiently and – most importantly – safely.

Let us begin with possibly the most visible safety regulated environment – and to many the most scary – that of tower climbing.

Climb, Young Man, Climb

Most of us shudder at just having both feet off the ground anywhere but in a hammock! Many managers likewise shudder at the cost of hiring tower crews for even the most simple of jobs, but at hundreds of feet – such as relamping or making ordinary repairs.

With an in-house climber, an organization can quickly correct problems at height and may be able to promptly cancel notices of tower beacon outages, inspect towers and antennas, and fix minor faults before they become major, costly disasters. Athletic and interested staff members may acquire training and certification from a number of available schools.

The author, a climber, attended a course at one such school, Comtrain, of Monroe, WI, www.comtrainusa.com. The course, "Tower Climbing Safety and Rescue," prepares and certifies the participant in an understanding of legally required equipment and procedures for safe climbing and, if necessary, rescue of an injured or incapacitated fellow climber.

This article is not intended as a comprehensive overview of Occupational Safety and Health Administration (OSHA) regulations, but as a practical guide for those overseeing such work in order to judge the general safety awareness and compliance of those working on a station's towers and property.



A climb harness including a seat strap.

Look Out Below

Those on the ground assisting or observing have safety rules to follow. Anything, even a small nut, when dropped from hundreds of feet can be lethal. Everyone within a radius of half of a tower's height should wear a hard hat. Comtrain recommends a 100% radius.

Falls the Most Obvious Hazard

Although other hazards affect a climber, falls are the most obvious. There are three terms to understand: fall protection, fall restraint, and fall arrest. Each has a particular meaning. 100% fall protection must be maintained whenever a worker is more than six feet above a lower level or the ground. Either of two methods are satisfactory – fall restraint or fall arrest. Utilizing both is recommended.

Fall restraint means preventing a climber from being able to fall. A tower climber's fall restraint consists of a harness, positioning lanyards (ropes) and possibly apparatus at the waist such as a "pelican hook." Restraint should restrict a fall to no more than two feet. Restraint equipment connects to a climber's body harness. The harness encircles the chest, waist, and legs of a climber.

There are "D" shaped attachment rings on each side of the waist belt for short horizontal attachment to the tower such as with a pelican hook, or a safety climb device. There are "D" rings for more vertical attachment via lanyards to the seat for hanging in a sitting position, and a "D" ring on the back between the shoulders.

Oops!

Should a fall occur, a Personal Fall Arrest System (PFAS) will come into play. This is a component of fall protection to control and stop a fall. The back "D" ring of the harness is used as a connection point for fall arrest. It is recommended that a PFAS be utilized whenever a fall restraint system is in use. It is a safety backup. Fall arrest comes into play when a fall restraint has failed and a fall is occurring.

Fall arrest gear must absorb energy while stopping the fall during an 18" deceleration distance. This is necessary to minimize injury. Usually a shock absorbing lanyard attached to the climber's harness back "D" ring is used.

OSHA limits free fall to a maximum of six feet and the total allowable fall to nine and a half feet. It's important to keep the attach point of the PFAS to the



Is he dead or alive?

structure as high as possible, preferably at the height of the harness attach point or higher.

Another fall arrest system is the Self Retracting Lanyard (SRL). It is a spool of cable or webbing that operates rather like the retractor on an automotive seat belt. It allows two feet (24") of free-fall then 18" of deceleration. An SRL will allow greater freedom of movement about a work zone while affording adequate fall arrest.

The PFAS attachment must be made to an anchor point rated at five thousand pounds. If no convenient anchor point is available a Temporary Horizontal Life Line (THLL) may be strung as an attach point. A secondary vertical safety rope properly attached well above the work position with a rope grab on the safety rope attached to a shock absorbing lanyard connected to the back "D" ring satisfies the 100% fall protection rule.

Should a fall occurred, and the victim is in their harness hanging from the back "D" ring, the victim is not yet safe. The person may suffer suspension trauma which is blood pooling in the legs that causes the victim to pass out. Newer harnesses may have a lanyard deployable, something like a jump rope to stand on, thus lessening the constriction of the upper legs.

Getting Them Down

The fall victim must be quickly rescued. They may be able to swing over to the tower and reattach or they may be hanging in mid-air requiring rescue. The technique taught at Comtrain is controlled descent via a rope from above the victim, utilizing a descent device. The training course discussed this technique, and all participants practiced the role of the rescuer and the victim.

Crew Safety Meeting

Although crew safety meetings are only required to be held weekly, it is prudent to hold a safety meeting the first thing each day.

Four points should be discussed: 1) the location of a first aid kit, 2) the location of the nearest emergency medical facility and the location of the work site if an emergency crew must come to the site, 3) a hazard assessment, and 4) each worker understands and agrees to an emergency response plan.

When observing a tower crew, if a safety meeting is held each morning, an inspection of equipment is made before placing it in service each day, and employment of 100% fall protection is observed when above six feet, you can be assured that a fall or other accident on your site causing injury or liability is unlikely.

The author recommends acquiring the book *Tower Climbing Safety and Rescue* from Comtrain.

Jeff Johnson can be reached at: jeff@rfproof.com.



A successful rescue.

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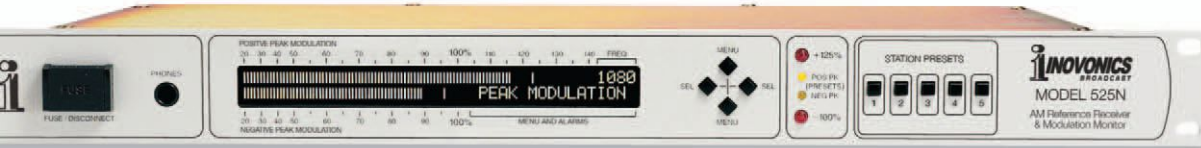


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Can It Be Saved? Extreme ATU Rebuild

by Bob Reite CBT

I got a call from a client that their one kilowatt class D AM station was showing erratic base current readings. Upon arriving at the site, I was greeted with an ATU that contained three live mice, their nests and a rusted out bottom.



I told the owner that it was time to get a replacement ATU. However, upon trying to obtain one, I found that the COVID-19 situation had closed my usual supplier. Alternative suppliers were quoting two month build times. I then decided to focus on just replacing the enclosure and cleaning up the mouse nests. I was not able to locate a new cabinet within a reasonable time frame either, and the client was balking at the cost in any case. The challenge now was to see if I could rebuild the ATU in ten days or less, so that the FCC would not have to be notified that the station was off the air and/or file for silent authority and shut off the translator that was married to the station as well.

The mice at first did not seem willing to leave. We disconnected the antenna, the incoming coax and the current sample line from the Delta RF ammeter, then stood behind the unit with the front open and started to unbolt it from the mounting posts. Once their house started shifting around, the mice took off in a big hurry to find more stable housing.

Repairing the Enclosure

The next question to answer was the availability of raw materials in this age of COVID-19. Fortunately a local metals dealer was still operating, as the state of Pennsylvania considered them to be an “essential business.” I decided to totally replace the bottom, but instead of welding the new one, as was the original, I held it in place with angle irons and 1/4-20 stainless steel hardware. I was able to order the bottom cut to exact size which saved a lot of time.

The back side was rusted out along the bottom edge. I repaired it as one would repair a rusted out auto body panel. I cut out the rusted part of the back with enough margin to give me good material to weld to. I used a good section of the old bottom to make a rectangular patch that precisely fit the opening. I made butt welds, tack welding it to get it in place. Once I was sure that the patch was where I wanted it, I stitched welded it, using an old copper heat spreader from a dead RF amplifier pallet on the back side, to keep from blowing through the sheet metal with the wire feed flux core welder.

After cleaning up the welds with an angle grinder, the enclosure was ready to be primed and painted – but first I cut the holes in the bottom. I made the clearance for the bottom feed-through (actually attached to a sub panel) very tight, so that mice could not get back in again.



The hole plugs are there for access to mounting screws, so if those bottom mounted components ever need to be replaced, one does not have to remove the whole sub panel assembly to do the job.

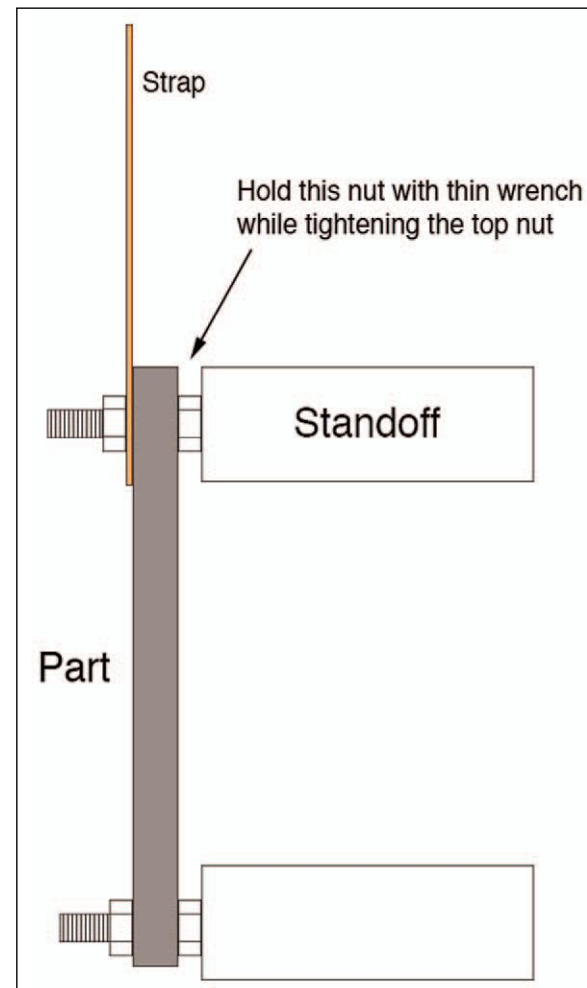
Repairing the Internal Parts

The next step was to attack the mess that the rodents had made. I totally dismantled the ATU, taking photos as I went, so that things could go back where they belonged. I wore a mask and gloves while vacuuming out the interior to avoid catching any diseases from the mice. The best thing that I found to clean up rodent stains was Awesome Oxygen Orange All Purpose Degreaser & Spot Remover, which is for sale at Dollar Tree stores for ... a dollar. Be sure to wear chemical resistant gloves and keep your mask on when using this stuff – it has a pH of 10. While not as strong a base as drain cleaner, you still don’t want to get this on your hands. It made the painted surfaces of the sub panel look brand new, and did a pretty good job of cleaning the silver plated coil conductors, although there was some damage to the plating from the mice urine. I made sure to wash off everything with distilled water to keep any residue from reacting with aluminum parts.

While it was apart, I tested the mica capacitors. One was in perfect electrical condition, one was leaky, and I’m surprised that the third capacitor still worked. In the third one, the tar potting compound had fallen out of the bottom. Inside was the remains of a mud dauber nest. I would not be able to get replacements within ten days, so I decided to have a go at repairing these. Figuring that the leaky one had taken on moisture, I baked it in an electric oven at 250 degrees F for 24 hours. At the end of the bake out, some of the tar had seeped around the joints. This was a good sign to me, as that seepage would seal it from future moisture problems. It now tested good electrically, to the full 10,000 Volt rating. The mud dauber capacitor was washed in water to get out the dirt, baked out like the first capacitor, tested, then the tar replaced using a heat gun to reseal it and tested again.

Another damaged item was a cracked ceramic standoff. The output mica coupling capacitor was hanging by

just one screw. I don’t know why manufacturers attempt to hold down parts to brittle ceramic standoffs and also expect it to be a good electrical connection. It’s a fine line between getting it tight enough for a connection that has to pass 15 Amps of RF or more, yet not crack the ceramic. The correct way to do it is use studs and nuts as pictured below. The stud and the first nut are tightened just enough to hold things in place. The capacitor is then placed over the studs, the strap connecting it to the rest of the circuit and then a lock washer and another nut. Finally use a thin wrench to hold the nut behind the part and a second wrench or nut driver to tighten the top nut. This way, the assembly can be made really tight for a good electrical connection without damaging the standoff.



In any case a replacement ceramic standoff was nowhere to be found. Fortunately McMaster was open for business. After looking at the price tag for “machinable” ceramic, I decided that at standard broadcast frequencies, the electrical properties of polystyrene were good enough and ordered one foot of one inch diameter rod which I cut in half, then drilled and tapped 1/4-20 holes.

Reinstallation and Tune Up

This part of the story was anticlimactic – it powered up just fine, and owing to the care I took to put taps and settings the back the way they were, the impedance to the transmitter was exactly 50 + j0 with no adjustments required. After running the ATU for an hour, I shut down the transmitter and checked components for overheating. All were close to ambient temperature. The rebuilt ATU has been in service for five months now and still going strong.

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

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The Linux Connection, Etc!

Linux, Servers, Virtual Machines, and "Engineering Stuff"

by Tommy Gray CPBE CBNE

Back at it (Redux)!

In my last article, I talked about Virtualization. The examples I used included the Linux Mint Cinnamon computers we have been talking about over the span of the last year or so. It also included a very powerful Server platform and one that is almost the industry standard, and that is Ubuntu server. The versions at the time of the last writing were LMC (Linux Mint Cinnamon) V. 20 and Ubuntu server 20.04 LTS (LTS standing for long term support). Both are powerful operating systems with a ton of versatility. Linux is no longer in its infancy and has tons of very good apps available and, as usual, they are free. There are some paid apps out there but you know I only use and discuss totally free ones. In the last article, I did a fresh install of LMC 20 on an old Dell Inspiron Laptop I got for \$50 on Ebay. It had 4 GB RAM and I added a 500 GB hard drive for another \$25. On this machine I installed VirtualBox from the LCM software manager. I then followed instructions I found on the Internet on installing Ubuntu server into a Virtual Machine (VM). One worked so well that I created two more VMs for a total of 3 on this machine. I installed Apache Web server on them and created three clones of existing websites I already had for testing purposes on one of them. I can access any of the three from any web browser on my local network.

Now all that would be necessary to publish these sites on the Internet would be to have a domain name and a suitable IP address. Since I did not want to have to deal with all the necessary security you would want on a webserver I just left them accessible to my network. I had actually set up something similar for a client at a station, and used the individual websites for different departments of the organization to house documents and information specific to each department (Sales, Marketing, Engineering, Programming, etc.).

On one of the other VMs I also installed a fully functional Wordpress™ site. This made it easy for anyone with proper login credentials to be able to edit the sites. I mainly did it just to see how well it worked. I won't waste space here telling you how I did it, as that information is easily obtained from a simple web search, and is in numerous places. This also holds true for installing and configuring the VirtualBox app, as well as the Ubuntu server VMs. I encourage you to try it when you have time. It is easy and fun.

Well, I think I have given you enough to think about for a few days with regard to VMs, servers, etc., so now I want to pass along some useful real "Engineering Stuff".

Engineering Stuff

Recently I had a problem with a 4" line at one of the stations we maintain. I had a transmitter down for a couple of days waiting on parts, and ran on the aux in the interim. When repairs were made to the transmitter and it was turned back on, all of a sudden at about 1/3 power it

shutdown with a VSWR alarm! Scratching my head, since there have never been any problems with this line before, I took a quick look at the Bird meter to see if it was seeing the same thing the transmitter was, and sure enough it was showing a horrendous amount of reflected power.

A sweep with a network analyzer showed a serious problem at just over 550' on the 1200' line. There was nothing else to do but contact a tower company to come down and go up and see what was going on. It turns out that there was a splice that was installed up there when the site was originally built back in the 70's. It was made up of one gas pass connector and one gas block connector. The block was on the bottom which as it turned out was probably a good thing. When the line was opened up there was water sitting on the insulator of the block. The two connectors were connected externally with a copper tubing line. Cleaning it out and sealing it properly got the return loss back to a very good number and everything was fine again. I put the transmitter back on the air and it is humming right along.

Since I got rid of my analyzers when I retired (semi), I had a friend come in to check this line out. Shortly after that, I was poking around on the Internet and ran across a little network analyzer that had some great capabilities and decent PC software to boot. It can do Smith charts, return loss and VSWR. It can do DTF/TDR and a host of other things. When I saw the price I bought one. I did a good deal of research over the next day or two to see what was the best and latest to get. I bought the one with the "type N" connectors, and which had capability to work up from about 50 kHz to over 3 GHz. Being skeptical about how something that cheap could be any good, I read everything I could find on it and also looked at all the YouTube videos of comparisons with high end analyzers and I was hooked.

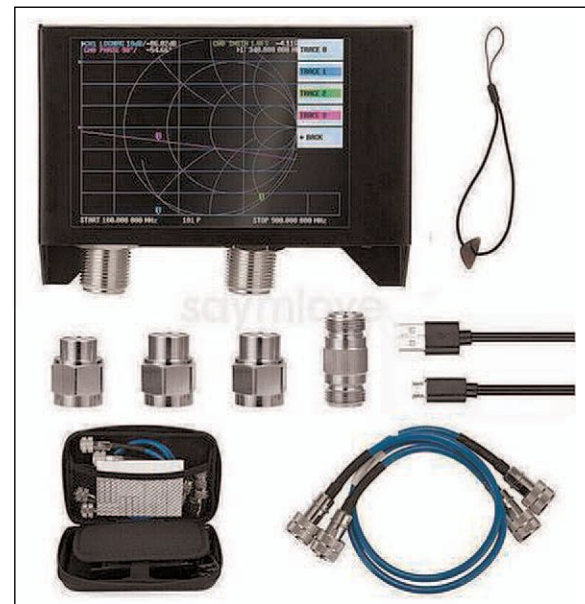
Well are you waiting there with baited breath? I know I was! The unit is called the "NanoVNA" (Vector Network Analyzer). It comes with two nice N-to-N cables, and even a CAL set. If you are familiar with a VNA, you know that one important tool you need is a calibration set.

A CAL set for a high end analyzer can sometime cost thousands of dollars. The NanoVNA included a complete CAL set as well. It has the usual Short, Open, and Load adapters, as well as a type N barrel to connect the two cables together, or to aid in connecting to something requiring a different gender from the cables. This little analyzer, with everything you need including a long life rechargeable battery and a nice case, cost just about \$100. There is a cheaper version with a smaller screen and SMA connectors but the one I got is more powerful and also more accurate. The one I got and the one I recommend is called the "NanoVNA SAA-2N." I have had a lot of time to play with it and to do things like, find cable length, check return loss, SWR, and impedance matches. Just about anything you can do with a \$40K

analyzer you can do with this little unit. It is just not a "Lab Quality" analyzer. Now before you scoff at the \$100 price tag and say it has to be junk at that price, do a little research on your own. you will find that other than the dynamic range being not quite as good as a high end units you can do a ton of stuff wit this little analyzer.

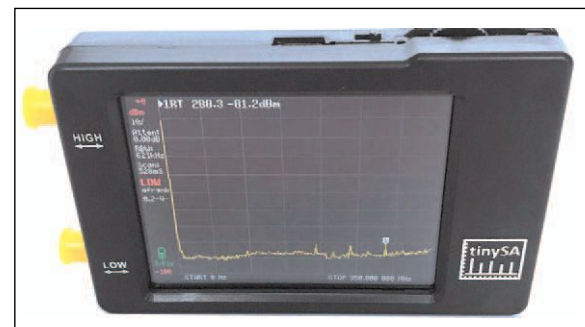
The NanoVNA SAA-2N

It also has free PC software for Linux (and Windows!) you can download that connects to it with the included USB cable. I got my unit off Ebay, but it is available at several places on the web. However, be careful, as there are clones out there that are not as good as the "genuine article."



TinySA Spektrum Analyzer


Oh, did I mention that there is also a full blown Spektrum Analyzer along the same lines that also includes PC software, and does DTF/TDR too? I will tell you about it next time! o here it is with details coming later. Oh, and by the way it is only \$50!



Until next time ...

Tommy Gray is a semi-retired veteran broadcast engineer currently staying busy doing Engineering and IT in the gulf south, through "Broadcast Engineering & Technology LLC", a Louisiana based Consulting and Contract Engineering Firm, serving the US. www.BEandT.com

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Is There Life After Broadcasting?

by Steve Callahan

Thank goodness it's 2021 and 2020 is in the past. Among many other revelations, it's made all of us think about how this business we call broadcasting is changing right before our eyes.

I'm very flattered that I get a lot of inquiries to act as a contract engineer at various stations. Some offers I explore and others I pass along to other engineers that I know are looking for contract work. I also have been approached by quite a few engineers, including one with over 30 years experience at one station, who have told me that this is the year that they will be retiring.

Frankly, this scares me a bit in that we don't have anyone "waiting in the wings" to take over these soon-to-be open jobs. It's all too common for a station to try to operate for as long as they can without anyone with technical experience on board. However, when the first big thunderstorm rumbles through, they start calling frantically to try to find someone – anyone – who will drive out to the far side of nowhere to put them back on the air. Many times, that good Samaritan will then have to wait 90 days or more for his professional fee. It really shouldn't be that way.

You probably remember that I've been on both sides of the checkbook when it comes to long-term radio station ownership. I like it when the radio station is operating as it should, within the limitations of its authorization and is in adherence to the FCC Rules and Regulations. Any technical task that I couldn't do, I was more than happy to pay one of my fellow engineers to do the work.

If you are contemplating retirement, there are some things that you should consider before you stand in the door, jump out and pull the ripcord. If you don't have a hobby, you will be quickly bored watching the fake judge shows on daytime TV day after day. Consider continuing your higher education at a nearby college in an area of interest that you've always wanted to explore. After many years of the all-consuming life of a Chief Engineer, you will need some thing to look forward to each week and you will broaden your understanding of something other than broadcasting.

If you still want to keep your hand in the game, there is really a lot of contract work available out there. Some stations are rather good and some are really bad. If you don't already know the players involved by their reputations, it's really easy to determine if their radio station is a place you'd like to be associated with.

Start at the transmitter site. What do you see first when you drive up? Does it look like anyone's been there in the last few years? I once drove up to a station that didn't have an Antenna Site Registration sign on the tower fence or at the public entrance to the site. When I explained the need for signage, the station owner had a blank look on his face. Obviously he never knew about the need for ASR signs. It only took three months for him to buy the two signs he needed.

Take a look at the site's overall appearance. Is the building in relatively good shape? If it's an AM site, are the tower fences in good shape? Does the grass and brush qualify to be called a jungle? Is the access to the site secure but clear for you or anyone else to get to it?



Base Jungle (courtesy of engineeringradio.us)

How does the tower look? I took over an FM station once that has vines growing 40 feet up the tower. One of the first things I did was climb up and cut the vines off the tower and in the area inside the tower fence and gave it a good dose of weed killer. It looked so much better after what must have been years of neglect.

Here comes the real fun part. When opening the transmitter building door, can you at least get into the room or is your access blocked by empty boxes, old promotional material, obsolete studio phones and dead photocopiers or printers? Of course, you made a copy of the station's license from the FCC's website before you even left home so now you can check to see of the station is anywhere near to being legal. One time I visited a station that was running on the output of its IPA and no one there knew how long it had been like that. I guess it could have been worse if it was running just on their exciter.

Do you see any rodent or pest occupation? I recently visited a rural site that had been totally taken

over by field mice. I've seen transmitter sites with mouse problems before, but this one was monumental. Aside from the fact that their juicy little bodies can play havoc in the high voltage section of a transmitter, their "output" can burn holes in circuit boards and harbor very serious diseases.

After you taken copious notes at the transmitter, make a trip to the studio. Take time to look behind the equipment racks and in the studio furniture. If there is anyone live in the studio, take the time to chat with them about how well the studio works or doesn't work and what would make their job easier. .

If I'm assessing a station, instead of giving the owner or manager five pages of things that are broken or need replacing yesterday, I break it down into three easily understood categories. Category #1 are things which are presently not in compliance with the FCC rules which have to be fixed or risk a fine which will most likely be in excess of the cost of the repair. Category #2 contains items which will be requiring repair, replacement or attention in the near future and would be prudent to replace them on your schedule rather than the equipment's. Category #3 would be items which would be an eventual enhancement to the station and its operation.

The goal here is to get the immediate needs taken care of and not put the owner or manager into shock with a long list of things which will be just too expensive for them to consider now or in the future.

If I haven't scared you away by now, and you want to take on a challenge, plan that the paid time you will have on-site to be minimal. Have a service contract drawn up which favors your needs and wants and get a "security" deposit which is equal to the monthly stipend. Always bill in advance and not in arrears – that is, get paid for the upcoming month in advance. Never, never, *never* buy or pay for parts or any equipment. Outline in writing where the station owner or manager can get the needed supplies and ask them to let you know when they arrive. Many years ago, I made the mistake of "helping" a station owner by buying an 833 tube that he desperately needed for his transmitter. I'm still waiting to get paid.



833 Power Tubes

Contract work for the right station can be extremely rewarding and a positive experience for both you and the station. There are a lot of small, hometown stations out there in the hinterlands that need your experience and expertise.

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



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State of the Station

Where Are the Future Techs?

by Wiely Boswell

To me it becomes more apparent every day, how many stations need on-site engineering help. A lot of engineering positions seem to be open and the requirements on some job descriptions can seem quite intimidating. Requirements will be tailored to the systems used at your station or network. Where is your future support going to come from? This question needs more attention as many major changes are occurring, with the big networks actually reducing staff. Early retirement can absorb a lot of this but boomer engineers are getting old. Some people work until they are unable to perform some of the more strenuous parts of the job, and having an assistant would be great. How many will have the advantage of having help (safety issues) when they have to go in to a transmitter or a transfer switch?

The Society of Broadcast Engineers (SBE) is well aware of the engineering shortage challenge that may be coming. SBE chapters try to welcome in new younger members and encourage them. I remember one younger engineer who attended several meetings and was smart enough, if not too smart. He worked for a cluster of several local stations.

I have always enjoyed our SBE chapter meetings. We learn about new equipment. We get to hear about past endeavors from the “in the know” engineers that have been in radio or TV for over 40 years. I sure have been missing real meetings. Almost our entire SBE group is in the high risk category. Their experiences have been vast, working through some of the biggest changes in broadcast. Never underestimate the value of your friends who can help you. We do help each other at times because most of us do not have assistants and naturally we have different skill sets. You need extra help to cover when out on vacation or now quarantine issues. If you think they are just old war stories, as the bored younger engineer once said, he was missing the opportunity. He did leave the profession. I think he jumped right into a better paying computer job.

There is so much that has to be learned from others experience. We do try to share in various forums and of course articles in *Radio Guide!* There are many ways an assistant and *all of us* have an excellent opportunity to learn. It really is a learn on the job type career and new equipment and software has us all busy learning. The SBE has a vast assortment of training webinars and the Alabama Broadcasters Association has been offering some of the best in-person classes in the country. They bring in guest presenters and arrange field trips. Another great thing is the engineering session presentations by the experts at the ABA annual meeting. Both are great places to meet others and to compare notes. Everything is on-line only for the time being. Watching on-line is not as fun but has its advantages. You can replay as needed, keep up thru interruptions, and you can pick the time to view it. It is self motivated and that is what any new assistant engineer should be. State broadcast association meetings are also another good place to hunt for an engineer that would not have to move so far. They

post job openings as well. Join your states’ broadcast association and the SBE. It takes people networking and these are a couple of the “hubs.” NAB and NRB also can be an opportunity for finding younger engineers.

I have been thinking about why that younger engineer left the profession (exit interview thinking here). Some possibilities are, too much demand, stress, or fast pace from a station owner – or not challenging enough. It could have been a feeling of subservience, not really feeling appreciated, a low pay scale or no benefits provided, or just a better offer.

Networking, Audio, RF, or general system support, will have a lot of the same skill sets. The broadcast skill sets are changing with less mechanical skills like cart machine or reel-to-reel alignment and repair. The new electronics are complex, somewhat more reliable, but getting harder and more expensive to repair. It is becoming just swapping boards to some extent. Of course we have to know which boards do what. You need a contingency plan for all types of failures as budget allows. The complexity of networking/IT side of things has gone way up. Computer software issues have gotten so tough with OS updates, bug fixes, malware, and driver issues. This may be the reason you have to pay for tech support with automation systems, but not every thing else.

I personally expect a lot when we have to pay for support. Remember to respond to surveys on any help tickets. Not much room to complain when it comes to free support for less expensive products but if you can, review honestly. Support calls are training also. Take notes on what you learn from the tech support wizards. You can tell a lot about an assistant by how they deal with factory support. Tech support becomes quite important when not familiar with a certain system.

So a young person who is willing to move to another town, be dependable, be on call 24x7, and be ready to learn a new station layout will have a chance to move up in the broadcast field. Your reputation can easily precede you and the same for an employer. You both need to check references. It is worth noting here, a contractor had better be timely paid or a station owner will really have an even harder time getting help.

When TV stations run short of tech staff, they can recruit from radio. They typically have an actual tech staff and higher budget compared to radio. Benefits can be better as well. Pay needs to go up – but easier said than done for a small station. Full time positions or no wide area travel positions are decreasing. Things are being cut back, or should I say consolidated and restructured. It is a big opportunity for the large groups to streamline using the latest technology. It will be a sophisticated remote studio. All new equipment will run flawless for some time and one engineer can be tasked to cover a whole state or more. You get your routes down, gate codes, and ability to get into remote cameras and remote controls all on your phone using secure authentication over a VPN.

Fewer young engineers are coming into the broadcast field. Contract engineering support groups stay busy and work hard with the support role farmed out. It can be hard to schedule them. Contract help can involve a lot of paid windshield time too. They are the main solution to a full time engineer. It is expensive because occasionally assisting stations has no benefits and all the overhead. A contractor has to have learned a lot of systems spanning 25 years of technology. He needs to have spare equipment to restore outages quickly. Contract engineers will get overloaded at times.

So back to the subject – where are new candidates to be found? The number one option is a trade school graduate that might even intern for the station. The entry level pay would be right but there needs to be “specific station/network” training. Engineering staff supervision teaches them when and how to do things and start taking more responsibility. This overlap certainly needs to happen for a retiring engineer who might agree to part time and answering questions. This makes a new engineer feel better about taking the lead on the job if he has some backup. Word of mouth can be another way to find young people that have a true interest and the ability to learn. The local Ham club could be an option. Not a lot of young Hams either, but there are some. It takes their RF skills to the next level by getting into broadcast. You are looking for a candidate with aptitude and the desire to be in the broadcast field and stay with it.

A cable Internet provider might also be a place with some talent and they seem to downsize at times. They might be tired of doing the same thing over and over. The number of late night and weekend callouts for radio stations is likely low in-comparison.

So the compensation needs to go up. Long travel to sites, late night in bad weather, and responsibility, justify good pay. Being equipped for most reasonable events when you get to a site is a sign of a good engineer. The engineering portion is going to have to be a bigger part of the budget. Spares are expensive, but spares can be regionalized if you are a wide area broadcaster.

If you are an owner, put your kids to work in the profession. We have a local owner who has a son doing great while getting into the technical side. The more tech savvy an owner is, the more ways to limit expenses and plan for contingencies. An engineering position has you take on a whole lot of various tasks. A station manager on a shoe string has even more tasks if he takes on maintenance. Small stations may opt for part time on-site tech support, keeping the contract engineer in business. A retainer gets you priority when things go down. So it will be a lot of time invested getting the support you really need.

Wiely Boswell is Chief Engineer of Faith Broadcasting, located in Montgomery, Alabama; CBRE, CBNE, and SBE 118 Chairman. He may be contacted at: Wiely@faithradio.org

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Frequency Counter Accuracy

by Dave Dunsmoor

I've been doing broadcast engineering for quite a while now. And when I started, I did not own a full toolbox of test equipment.

Many years ago I was asked to take over the engineering duties of a daytime AM station on a part time, as-needed basis. Prior to accepting the job, which was described to me as "this will only be a few hours a week" by the operations manager, I had gained some military electronic experience, then worked a few years with The Boeing Company, and had recently graduated from a two year tech school. By that time I'd had a couple of years with my full time employer, the Federal Aviation Administration, where I was working on electronic maintenance repair for navigation and communication systems.

When I worked for Boeing, and then the FAA, I had access to all manner of top quality test equipment which was regularly calibrated. As I did not yet have my amateur radio license, and didn't do much tinkering at home, there was not much need for me to have any test equipment of my own.

So when I accepted the position of contract engineer, test equipment was nearly non-existent. I soon purchased a Fluke 8050A digital voltmeter, and that suf-

ficed for most of the troubleshooting and repairs that I was called upon to accomplish for a while. I did not yet own a frequency counter, but the station had one sitting on a shelf in the transmitter building. I don't recall the brand, but it was a cheap little unit in a plastic case, powered by a small "wall wart." It had an RCA jack and a short cable with clip leads. With this little jewel, I did regular frequency checks on the old Gates BC-5P transmitter late at night, following shutdown – I always wondered what its accuracy might be.

That prelude was to demonstrate my need for some measure of accuracy in frequency measurement. And no, I'm not in the class of folks who have home labs with cesium standards on the shelf. I've gone through a few frequency counters over the decades and, a few years ago, I settled on a couple of Hewlett Packard models for my shop. An HP 5315A, then a 5315B. The B model has the advantage of using either the internal 10 Mhz clock or, by changing an internal jumper, an external clock signal can be utilized.

But even though the HP units are most likely to be far more accurate (and stable) than the little plastic unit I first used, I still wondered, how do I know for sure just how it compares to a standard? As I'm mostly retired,

sending a counter, that I rarely use to document transmitter frequency, to a cal lab doesn't seem to be warranted. However, I do want to know that the counters I'm using are reasonably accurate.



The HP5315B Frequency Counter

One way to confirm the accuracy of the 10 Mhz oscillator is to compare it to WWV using a communications receiver. These two signals should be close enough so that the s-meter gradually peaks and dips – very gradually. According to NIST, WWV's transmitter frequency accuracy is stated to be: "... to about 3×10^{-16} ...", which would be a very good standard to use for checking a 10 Mhz oscillator's frequency – if you have a short-wave receiver, and if you're close enough to northern Colorado to receive a decent signal.

But, instead of running a cable from a GPS receiver over to the communications receiver, and messing around with coupling factors trying to match signal levels with the over the air signal, I chose to use the 10 Mhz output of a GPS disciplined oscillator as the external clock input to the HP5315B counter, while measuring the second GPS oscillator.

(Continued on Page 28)

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Frequency Counter Accuracy

– Continued from Page 26 –

Several years ago, I purchased a Trimble Thunderbolt GPSDO, and placed it into an old rack mount chassis I had laying around. After I confirmed that it worked, I let it sit on the shelf, and went on to other more pressing projects, assuming that it was correct. And yes, comparing the 10 Mhz output from a GPSDO to WWV could be done quickly enough, but truthfully, that wouldn't be as interesting, nor as convenient. I added LEDs to the chassis front panel, mainly so that I could see what was occurring while trying to make initial communications with the receiver. Well, that and I find it to be more assuring to glance over and observe some evidence of activity. I selected the +5 VDC power supply and pins 2, 3 and 4 of the RS-232 connector for this purpose.



I eventually purchased a commercial Symmetricom GPSDO. By using it as the external oscillator for the 5315B, the Trimble 10 Mhz was then checked as I would any other frequency source. The difference between these two 10 Mhz frequencies over several days and weeks, is less than 0.1 Hz according to the HP-5315B.

Now, this is great for shop use. But, I'll not ever drag this entire arrangement with me to check a remote transmitter! Two options are available now. I can return the 5315B to use it's internal oscillator (and confirm it's accuracy with one of the GPSDO outputs), then take it with me to make field checks, or I can split one 10 Mhz signal and run it to the 5315A and the 5315B, and compare the two. The 5315A does not have an external oscillator input option, so that is the one I'll take to the field when necessary.

And now, when I first checked the 10 Mhz frequency as indicated by the A model, a slight problem showed itself. The 5315A was reading the 10 Mhz signal ~200 Hz high.

So an adjustment of the 10 Mhz oscillator in the 5315A was in order; upon opening the counter, I found two 10 Mhz oscillators. One was the original onboard unit, and the other a "high stability" unit. I set them both as close as I could, and now they are within 1 Hz of 10 Mhz I then left the selector in the high stability position. I like having options, so I can revert back to the original onboard oscillator if necessary, and be relatively confident in it's accuracy. Now I can use either of these GPS receivers to supply a master oscillator to the frequency counter, and the HP-8656B RF signal generator. I like options.

Now after doing, and describing all this, I still do not have a NIST traceable frequency calibration of my 10 Mhz source(s), but they are extremely close to "spot on," and certainly sufficient for any purpose I will have.

I mentioned earlier that I had extended the Trimble RS-232 port to the front of my makeshift GPS receiver, and the purpose of this was more for my interest and education than any specific need to run the receiver.

Turn it on, and it just runs itself. There is a control and monitoring software package available that is written by Trimble. It provides initial setup and some basic monitoring functions. The Symmetricom receiver can be accessed via any serial comm package. Both will control various oscillator functions, and allow for monitoring of some parameters. Currently, for me, this is all "gee-whiz" information.

Now to go a step or two further, there is another software app that provides a far greater amount of information and control for the Thunderbolt receiver titled "Lady Heather" written by KE5FX, and is found at www.ke5fx.com. I have just begun to dig into this application to see what all it does, what might be useful to me, and what is far beyond what I'll ever use/need to know. The one bit of data that I find useful is the data field titled "OSC ADEV", the oscillator's Allen deviation, which indicates oscillator frequency error. And, as I write this, it's showing 4.7762 e-13. And truly, that is close enough for me.

Finally, if you find yourself about to go on-line and buy a GPSDO, may I offer an opinion? Stick to U.S. made units, or at least those sold by U.S. vendors who will stand by and warranty the products they sell. I've not purchased any of the current cheap/inexpensive GPSDO offerings one finds on eBay, so I cannot speak with authority to their usability or longevity. But I have had seriously less than stellar experiences dealing with a variety of other Chinese vendors in the past few years. And due to this, I say Caveat Emptor! As always, do your research carefully.

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



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Life Lessons Learned

by Jim Turvaville

I watched with a smile as the calendar rolled over from 2020, and mused at the avalanche of people's wishes that the old year never come again. If one is a student of history in any part, then what we had to endure last calendar year was pretty mild in light of some of the things our ancestors endured. I will not try to compare and contrast, but rather I beg of you, my readers, to allow me to exercise a bit of writer's liberty and share some deeply personal thoughts which just might also be beneficial to you, and to our new year.

Like far too many in the world, my year of 2020 was spent mostly in and out of hospital facilities; but not for me, rather for my oldest brother, Glen, who was in the final paces of his extended battle with Leukemia. I put aside a lot of my radio work, and spent a great deal of time and resources being close to family, until we finally buried my brother last fall. It was 4 years ago at this same time that I was in the same mode for my sister-in-law, his wife of 42 years, who lost a very short and shocking battle with Cancer. I had lived with Glen and his wife for two years after my corporate retirement, before realizing that coming back here was to be my final destiny. He played a large role in that decision, as well as helping me get established when I bought property and began building my own house. We prob-

ably got to be closer than ever in our lives in the past five years, helping each other on our own various projects. Being eight years older than me, he got "the genes" from our Dad on how to do mechanical things, rather than the electronic bent that fell my way. So his wisdom and instruction was very valuable to me, and something I will cherish all my days. Let me share some of that, and I hope it will bear useful for you as well.

"Life is about choices ... and choices have consequences."

A sage piece of wisdom that hardly a day went by without me hearing from him, my brother was well known to remind people that sometimes the situation they find themselves in is a product of their own hand and not fate or bad luck. We have all made bad choices, that's human. The adult thing to do is to realize that we have made bad choices, man up and accept the results of those choices; and work to do better next time. While very true in our personal lives, this spilled into my professional life many times – practice looking a bit farther down the road than today or tomorrow, and see how your decisions will affect you later or, sometimes more importantly, your successor. Yes, there will be one, and they need all the help you can give them.

"If you don't have something nice to say, then don't say anything at all."

A very big man – 6'5" and 325 pounds – my brother was also very quiet like our father; so when he talked, it usually meant he had thought about it, and you needed to listen. He served as the Outreach Minister for our church for nearly 20 years, and our young Pastor came to lean on his wisdom when it came to dealing with people in need. But this personality trait is one which I, and probably the majority of people in our lives, should take to heart. This socially driven society in which we live is full of everyone's opinions – and most of them would be best kept to themselves. It has taken a lot of years of living and working with people to come to realize that most often I need to keep my opinions to myself, and only answer questions with the facts. True, if you are near my age or my tenure in this business, we often know things the rest of our associates do not. I've been guilty of being called "the guy who knows where the bodies are buried." Just because I know that stuff, does not mean that I try to work it into the conversation, rather I need to exercise *wisdom* and know when I should talk and when I should listen. I make a concerted effort to *never* be the smartest guy in the room – if I am, then I'm in the wrong room. God gave us 1 mouth and 2 ears for a hint, we should listen twice as much as we talk.

"Anything worth doing, is worth over-doing."

This has been a running joke in our family about my brother Glen for most of his adult life. Time and space restrictions do not allow me to annotate all of the ways he lived his life by this philosophy. But suffice to say, there

(Continued on Page 32)

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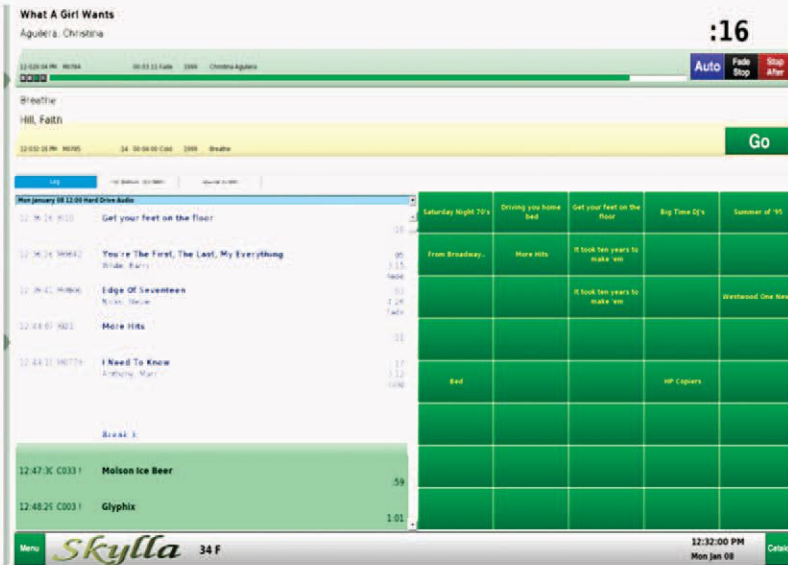
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Life Lessons Learned

– Continued from Page 30 –

was never a trailer he built (he was a welder) or a barn or shed that was constructed under his watch that will ever have a point of failure. If the design would have used 1-inch steel tubing, he built it with 2-inch; a 2x4 would be a 2x6 or bigger, and the good Lord only knows how many screws went into everything he built. I was on vacation when we set the guy anchors for a little 190 foot tower, the specs called for 2 yards of concrete in each; so with the 3 anchors and the tower base, I was expecting 8-10 yards of concrete on my bill. Nope, 23 yards of concrete got poured in that project; and when an EF-2 tornado was within 1/2 mile of that tower, there was nothing disturbed but an STL dish 90 degrees out of alignment.

While I'm not advocating the over-doing of things, just for the sake of over-doing them, there is wisdom to considering a project in front of you and thinking just a bit farther than today or tomorrow. I admit that 2 yards of concrete in a 5-ft deep guy anchor might be spec, but going with at least 3 or maybe 4 does have some merit if you live in West Texas where we regularly have 50+ mph winds. When I run cables, I always run at least 2 spares – just in case one fails or unknown expansion has to happen. When designing a transmitter building or new room, add just a couple more electrical circuits than you think you need, because you will need them one day. And get just a bit more HVAC than the specs say, so when it

ages or has a problem you've got some overhead built into it already. Carry a couple more spare parts than you think you may need, because you will need them more often than not, and it's better to have and not need, than to need and not have.

“You can do about anything if you have the right tools.”

This is probably a corollary to the previous statement about over-doing things, since my brother did have just about every tool that one could imagine (and for me, ones I had no clue what they did) and usually had at least 2 or 3 of the ones that were most used. As the guy who was left to clear out his estate, even I was shocked at the assortment of tools he had in his possession – but it was never said that he could not do something; he was certain that if he had the right tool, then he could do anything. And most often than not, he did.

I carry a lot of tools with me at all times – I've written articles before making note of some of them and the way I keep them organized. There's no need to go overboard like my brother, but you do need to be adequately equipped at all times. No, I do not spend a lot of money on most of my tools, because I do not use them enough (or I lose them) to invest heavily in expensive tools. But there are some affordable, if not downright cheap, options out there for a lot of what is used on an infrequent basis – both hand tools as well as test gear for our engineering work. I do not own a Spectrum Analyzer – and if you do or you can, you should – but I have some cheaper options for accomplishing a lot of the things those can do. I have learned that having lesser quality tools is a lot better than having nothing at all, simply because I could not afford the big stuff. Those cheap things

have gotten me out of a bind more times than I can count, and have more than paid for themselves along the way.

“Don't forget to keep the main thing ... the main thing.”

My brother Glen was a graduate of Bible College and an ordained minister for nearly 40 years. He was a fixture in our small community and a vital part of our local church. He had a passion for serving, and was truly wise as well as smart about lots of things. He was quick to help someone in need – no matter the day or hour – and everyone who knew him thought he could fix or build just about anything. That's a lesson for us all to learn – be a doer when things need to get done; be a giver when there's a need; reach out a hand when one reaches up to you; and don't forget why we are here. It's not about us, no matter how much our society seems to try to tell us that every day.

Our church operates a food bank, and my brother was in charge of it all – the orders, the warehousing, the organization and distribution. He was told on many occasions “*you shouldn't be helping those people, they are just taking advantage of your generosity,*” to which he always replied, “*no, they can't take advantage of us, because we're not doing it for them, we're doing this for the Lord.*” And that is how we all should act. Glen leaves huge shoes (size 15 as a matter of fact) to fill, which no one ever will. Rest in peace, my brother. Thank you, my readers, for your indulgence today.

Jim “Turbo” Turvaille is semi-retired from over 42 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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Misc. Tech-Tips and Thoughts

If you have ever read this column, you know that I welcome feedback. I have enjoyed getting emails from readers over the months that I have written this column. Sometimes it's a question about something that I wrote, or it's from another engineer who tells a story of his experience with something I discussed. I would especially enjoy hearing from those of you who have discovered new or different ways of resolving a problem. I understand that you are a busy engineer, but when you share your thoughts with me, I, in turn, share them with my readers, and we all get to benefit from your experience. Feel free to contact me using the email address at the end.

Do Your Research Now

I became a chief engineer again in the fall of 2020, but I am also a general manager. I have to balance proper engineering practices with keeping costs under control.

When you have done something before, sometimes you forget exactly how you did it years later. If you get a new job as an engineer or pick up a new client as part of your contract work, make a habit of going down your checklist. Research those things now that you might need later. For example, do you have a record of the impedance of your AM tower? It may be in a neatly

kept three-ring binder where you can find it in a couple of minutes, or it may be buried in a pile of papers in a file drawer in an engineering shop and no one knows where it is.

Do you know the efficiency of your FM antenna system? Can you calculate that? Where did you get those numbers? Can you confirm those numbers are correct if your alternate broadcast inspection engineer asks?

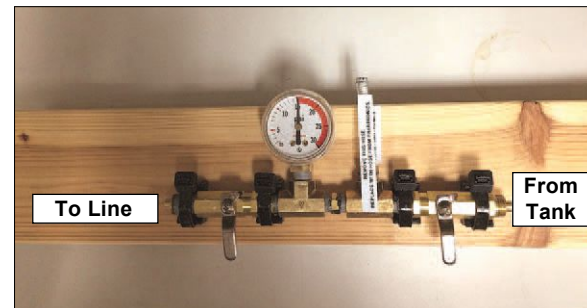
There is nothing more embarrassing than having an FCC inspector or alternate broadcast inspection engineer ask how you arrived at your conclusion. Document how and where you got your numbers when calculating efficiency. Are those numbers in an engineering file, and can you produce that document should someone challenge you?

What about the coordinates of your tower? Are they correct? I have read in the trade magazines where some towers were located far away from the location of record. It never hurts to make sure you have accurate information. I have also read where at least one station was fined for being located outside the coordinates of record.

Wire Marking

When I was an engineer for a group of stations in the Midwest, I installed a couple of new studios. I used a

special label maker that prints on shrink tubing. I would print out what a particular wire was for – for example, "Microphone 1," then I would use the heat gun to shrink the tubing on that wire. Then it would get punched down on a Krone block. If anyone needed to find which wire went to Microphone 1, it was just a matter of looking at the labels on each wire. The shrink tubing will outlast the writing on the wire with a marker, or an adhesive label. The lettering with this label maker is much easier to read than another engineer's handwriting. The machine I like to label wire with is made by KSUN, and you can purchase it from Image Supply at this web address: https://www.imagesupply.com/collections/shop-by-brand/brand_k-sun



Pressure Gauge Assembly

When I was an engineer for a large radio network, we helped maintain the radio stations in our group. Sometimes we would visit one of our transmitter sites and do some upgrading. Maybe it would be a satellite receiver, sometimes a new transmitter would get installed, and sometimes we would install our own pressure gauge assembly (see photo above). This neat little device was

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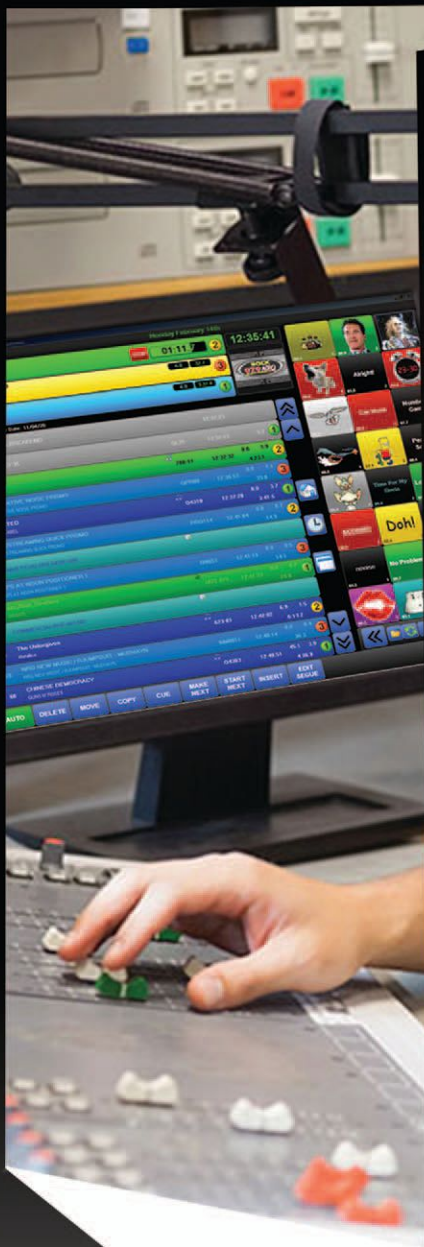
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Misc. Tech-Tips and Thoughts

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made by another engineer before my time. The nice thing about this assembly was that it could allow you to keep pressure on your transmission line while you changed a bottle of nitrogen. It had a gauge on it that could read what pressure was on your transmission line.



Satellite Feed Horn Cover

There was a time when I had to go to a station to find out why they were not receiving the news from their satellite receiver. Just as I imagined, there was a bee's nest in the "throat" of the feed horn. I know that some

people place a plastic Dixie cup in the outer grooves of the feed horn and, while that works, it doesn't look so good to me. I did a lot of searching the Internet for an inexpensive plastic cap to cover the feed horn, and found something that fit nicely. I placed a bit of putty on the inside of the cap and it stuck to the feed horn, forming a barrier that kept bees and other flying insects out (see photo). A little bit of research and some creative thinking, and I came up with a nice looking solution to an annoying problem.

EAS Screen Problem

I once noticed the screen of a Sage model 3644 that had a very strange looking display (see photo). I had never seen this before. I contacted the great people at Sage and I was told reloading the firmware would bring back the normal display. Somehow the firmware must have become corrupt. Maybe a power surge or a quick drop-out of the power caused the firmware to suffer damage. In any case, the reload seemed to do the trick. The only other time I saw a Sage EAS unit do something strange was when the year displayed a strange date.

New Solid State Transmitters

There are good things and bad things about the new solid state transmitters. I like the full-sized solid state transmitter, the kind that comes in its own cabinet and stands five feet tall or so. You can lose an RF module and replace it while the transmitter is still on the air. Many of the new solid state transmitters have more than enough RF capacity built in, so you can lose one module, and the rest ramp up to bring you up to full power. Replacing a module is an easy process of sliding out one module and sliding in a new one. I love that!



The smaller, rack mounted three kilowatt transmitters aren't so easy. There are a lot of components packed into a small space. Repairing one of these transmitters takes a lot of time, patience, and the removal of a lot of screws! I wish these smaller units were easier to work on. Why couldn't they be as easy and modular as their big brothers? Perhaps one day the engineers who design these transmitters will figure out how to do that.

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 of WIHS FM in Middletown, Connecticut. He is a member of the SBE, and an extra class radio amateur.



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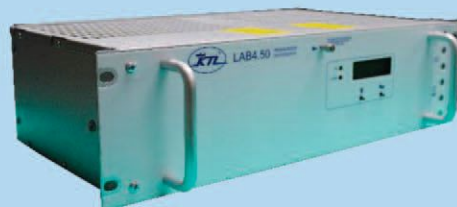


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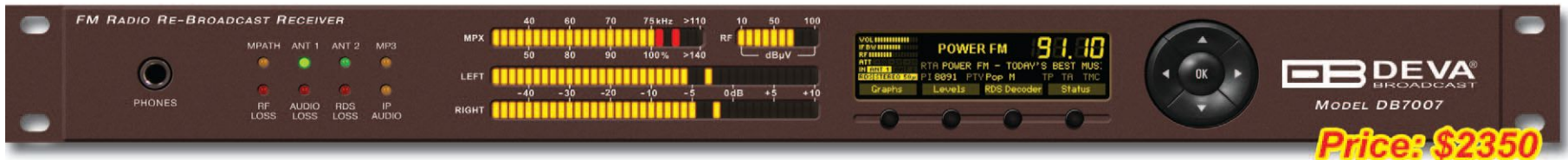
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Small Market Guide

Small Market Digital AM Radio

The Good, the Bad and the Ugly

by Roger Paskvan

Being in small market radio for over 30 years, you get the idea that radio becomes synonymous with the community. It basically becomes a staple in the community diet. Now AM for small market communities still is king in many areas of the country. During many disasters, the tall FM towers go down and AM radio becomes the only means of information. What I'm saying is, people rely on certain stations on a daily basis especially in small towns.

The excellent article by Greg Skall, *All-Digital AM: The Time Has Come*. (Radio Guide, December 2020), prompted this take off of digital radio in small markets.

His article cites some of the good qualities of AM radio and how AM radio fills that gap in small communities. AM radio can provide specialty programming for minorities and religious groups. Clearly, AM radio remains an important source of information and entertainment—specifically targeting locally originated content.

Now the FCC has finally made it possible for AM station owners to convert their analog format into all digital MA-3 mode. Will this be better? What will it do to small market stations? Better, yes—the quality will surpass current analog FM. The AM signal will actually sound like you owned an FM station, having all the crisp highs and lows that make music sound great. In addition to increased fidelity and transparency, it removes the AM restraints of programming issues. Now small market owners can offer music programs instead of talk shows enabled only due to sound quality restraints.

Even the FCC's own report and order indicates that improved digital signal quality will provide access to more format choices to serve your AM communities.

The coverage of an all-digital station is improved by the capture threshold of the digital receiver. It means that when the signal gets weak and is in the noise, many digital receivers will still provide crystal clear quality audio. This translates into greater daytime/nighttime range for your existing station. The NAB also found that nighttime coverage was improved by digital reception.

Other added benefits of all digital AM include the ability to offer various services on your station enhancing your NTR revenue by utilizing multiple streams of programming. This can encompass text, billboards, and advertising type services. A digital AM broadcaster could also offer pay-per-view type programming. The FCC Report and order will require one free-to-air audio channel in multiple stream situations. In so many words, the door is open to your NTR imagination as long as the programming fits the FCC's rules.

So that's all the good. What about the bad? Well, each broadcaster will have to spend the money to convert to digital, although the FCC made it possible to use your existing transmitters, if they are compatible. The cost of digital conversion is coming down. Everything sounds wonderful and great but, presently, the day after you convert to all digital, you may lose a high percentage of your existing audience. Now that is definitely bad and of real concern. Remember, no

one has an easy means of listening to your all-new, clean digital signal. Until that problem is solved, why do it? In small market, it may be broadcast suicide. Remember the wheels of change in small markets turn very slowly.

So now we have introduced the ugly. As of today, there are very few owners of digital receivers, like a household

item. Your new signal will now appear as a nice loud hiss on everyone's analog AM radios. To shed a ray of sunlight on the problem, the industry is trying to catch up. According to Skall, the number of HD radio equipped cars was over 50 million in 2018. This is growing at a rate of 9 million per

year. But what about the personal radios, the radio in the local barber shop. The radio at the family restaurant and the local bakery. These all must be changed to digital and small market listeners do not like change.

As a final word, like Digital TV, nobody wanted to throw out their perfectly good TV set, but it happened. The only difference with digital radio is the conversion is not mandated by the FCC, like DTV was, and that will make the transition much slower. So make way for the future, digital AM may be coming to a local community near you.

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



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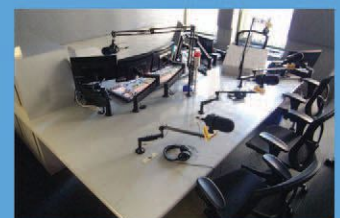
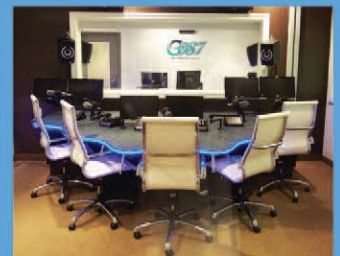
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Product Report

CallMe-T IP Audio Codec

by Ian Prowse, Director – Vortex Communicationns Ltd

CallMe is now available in the US and Canada thanks to the Partnership announced in January between Angry Audio in Nashville TN and Vortex from London UK.

In a nutshell: Rather than the usual complexities that come with IP Audio codecs – multiple algorithms, multiple modes for various types of connections and so on – CallMe takes the “essentials” approach, making it easy for radio stations and their guests to go live with high-quality, low-delay resilient audio, with a minimum of setup, complexity and cost.

CallMe-T Hardware IP Audio Codec is housed in a small box with connectors for Internet, balanced analog stereo and USB audio. A user can plug in an ordinary USB headset, plug the box into wideband ethernet with a CAT5 cable and be ready for a remote. It really is that simple.

There is also a software version that runs in standard browsers (no installed apps), so you could have someone with an iPhone or Android phone or tablet, or Windows PC – or Mac at one end, and a hardware codec at the other. Or you could have hardware at both ends. You can even use the browser at both ends – there is an accompanying service that runs in the cloud (AWS) for connection management and telemetry.

CallMe Click-&-Connect: Browser-to-Hardware

The story begins after listening repeatedly to mediocre audio connections on flagship programs that were using consumer connectivity applications for live broadcasts; fine for speaking to the grand-kids in Hawaii but often disappointing and unreliable on air. CallMe Click-&-Connect provides a solution designed specifically for Broadcasters to get the most from their hardware codecs and put guest contributors on-air with as little hassle as possible, and without compromising audio quality. It's a cloud Codec service running on AWS that works with most manufacturers' IP Codecs at the back-end. CallMe puts the connection firmly in the broadcaster's hands, without guests having to download software or have their own hardware.



BBC Correspondent Live with CallMe Click-&-Connect

It's simple to initiate a call. The guest contributor clicks on a web link sent by the studio, using their

smartphone, computer or tablet browser, to connect to one of the studio's hardware codecs via the station's own branded CallMe portal. Stable high-quality, low-delay 20 kHz audio connections are the result – far better than trusting the broadcast to a consumer application with indifferent sound and connectivity.

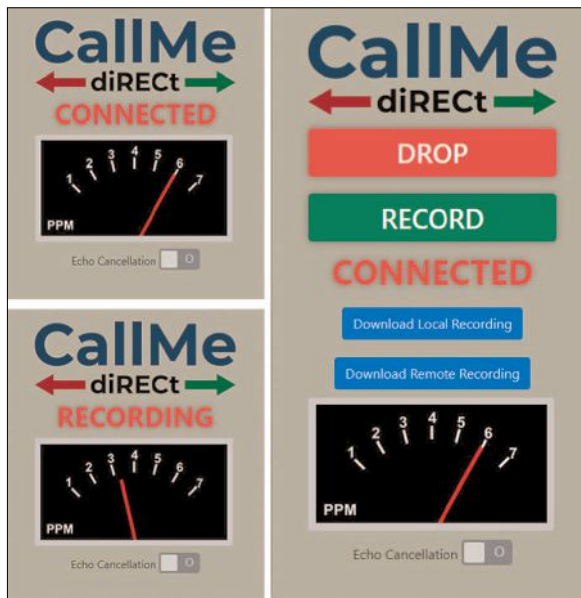
In addition to guest contributors, reporters can have the web link available on their smartphones to make ad-hoc live broadcasts without the need for any special hardware codec or software download.

CallMe diRECT (NAB Radio Product-of-the-Year): Browser-to-Browser

CallMe diRECT is a real game changer. It eliminates the need for an application download by exploiting the audio codecs embedded within most Internet browsers. It simplifies the connection process by generating a simple web link for the Guest within the browser, with the live connection initiated by the show host from the intuitive CallMe-diRECT web interface. SIP connectivity is used seamlessly in the background in case of firewall issues that could block the direct connection.

CallMe diRECT is a live service with a free 7-day trial period, and Monthly or Yearly subscriptions available for unlimited use. Enterprise packages are also available.

CallMe diRECT is similar to Click-&-Connect, except that no hardware codec is needed. Ideal for podcasts, home studios and off-air interviews as well as for live shows. Not only does it stream “Live,” the host can initiate a lossless recording at both ends of the connection that is downloaded to the Host's browser in real-time in case of connectivity issues. No special software download or custom hardware is needed to get reliable high-quality two-way connections with low-delay. For socially-distanced face-to-face interviews, the Host can display a QR code on their smartphone that the guest can scan to initiate the connection.



CallMe-diRECT Screenshots for Host and Guest.

Radio Guide • January-February 2021

CallMe-T (as in ET Phone Home): Low-Cost Multi-featured Hardware Codec

As the CallMe Click-&-Connect service rolled-out, it was obvious that many smaller stations could not afford even the cheapest full-blown codec. To meet their needs, CallMe-T was designed as a low-cost hardware back-end for CallMe Click-&-Connect. It uses Opus and G.722 encoding and everything it does, it does well. Customer-suggested enhancements are now included to provide a unique feature set at an amazing price point. CallMe-T uses industry-standard protocols and the audio coding algorithms most commonly-used in broadcasting – and is of course compatible with most manufacturers' IP Audio codecs. It has balanced stereo inputs and outputs on 1/4" jacks, plus RJ45 Ethernet connectivity and a web interface for control and setup. Ideal for home studio use, its USB Audio Interface allows direct connection to low-cost plug-in audio mixers, USB Headsets and even full-blown ISDN commentary units.

In addition to the Web interface, front panel “Quick Dial” buttons provide one-touch connection to up to 8 stored destinations, each of which includes the codec configuration – ideal for broadcasting from remote locations where a computer connection isn't possible.

SmartStream™ multi-destination streaming lets CallMe-T work as two separate mono codecs, each connected to a different destination – two codecs in one! This provides resilience and allows simultaneous connection to multiple destinations, with the ability to choose the audio channel or channels that are sent to each. QuickDial locations include destination information plus the audio channel or channels that are to connect to it (left only, right only, or both).



CallMe: Enterprise Solutions

CallMe Enterprise Solutions provide unlimited use of the cloud services, and the ability to initiate new accounts for CallMe, Click-&-Connect and CallMe-diRECT. Since this service makes it possible to have many simultaneous connections, CallMe provides Server Analytics for each call; subscribers can see a complete list of their current and historic call connections showing call time, duration, and statistics every step of the way – between the contributor's browser, the CallMe Server, and the studio codec.

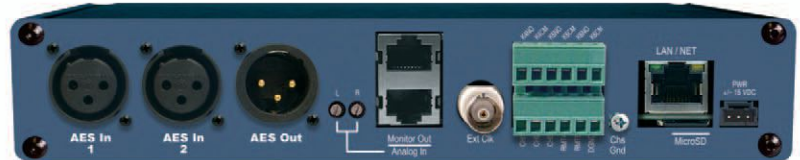


CallMe Analytics – server statistics for Enterprise

Graphical displays show packet loss, jitter, connection bitrate and round-trip delay – invaluable engineering information both in real-time and after the event.

The whole CallMe family is available from Angry Audio, including pay-as-you-go options for the entire product line. Visit www.angryaudio.com to find out more.

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The AES Switcher Sentinel 2+1 is a web-enabled three channel AES/EBU silence monitor combined with an integrated 3×1 AES switcher. It is designed to monitor two AES audio sources and one analog to digital (ADC) audio source. When silence is detected on the primary AES input it can automatically switch to the back-up

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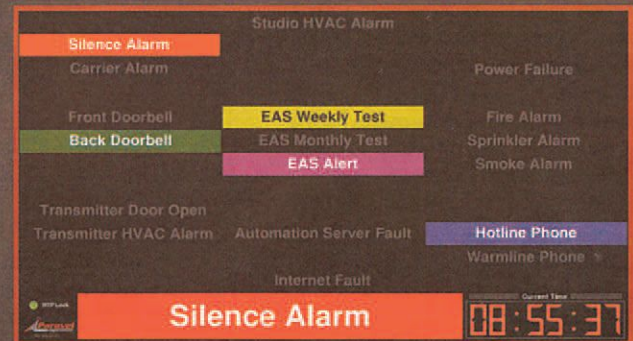
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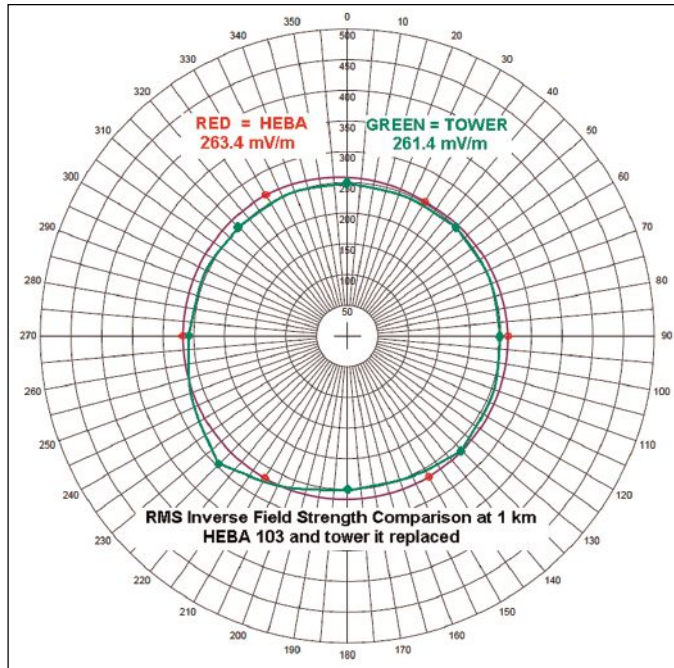
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– Continued from Page 6 –

been developing a new approach to AM transmitting antennas. It is significantly shorter than the tower it replaced – about 1/4 the height. It is a two-element antenna system on a platform that fits on a small plot of land about the size of a typical single family dwelling. The first High Efficiency Broadband Antenna (HEBA) in the United States has been licensed by the FCC since June 2018 for WGFP, Webster, MA. It meets FCC efficiency requirements and provides coverage a bit better than the tower it replaced.



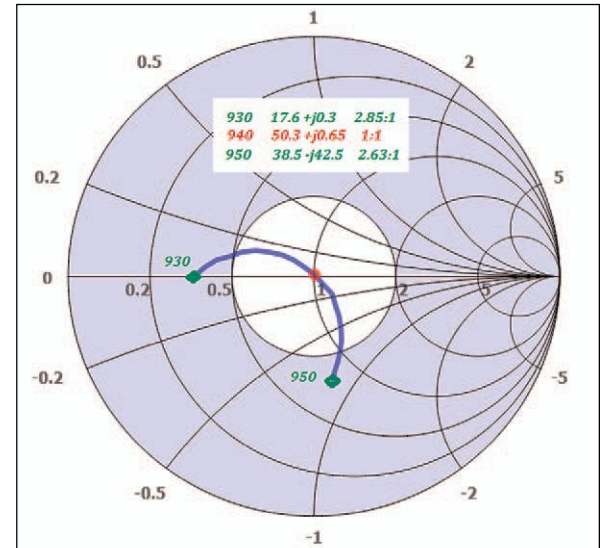
Operating with 1,000 Watts at 940 kHz, the system has been completely stable for three years, with no downtime at all, through wind and rain and snow and ice. With forward power at 1 kW, the Harris DAX-1 transmitter never shows more than 1 Watt of reflected power, even under fully competitive audio modulation and with 4 inches of ice on the antenna. The overall height of the HEBA is only 72 feet, meeting town zoning height restrictions. The platform is 40 feet square overall, occupying only 1,600 square feet of land. Even after adding a buffer area of 13 feet around the platform, the entire system occupies only one tenth of an acre. The tower formerly used for WGFP and its ground system occupied more than 7 acres.

Independent measurements of human exposure show the antenna to exhibit very low readings, even immediately adjacent to the platform. A side benefit of the reduction in near-field electric energy is that RF noise pickup disappeared in the audio systems in the office/studio building, which is only 40 feet from the platform edge.

Full disclosure: I have been the site technical manager for the HEBA development project since it began in 2010, and I direct development efforts today. One of my best decisions was to convince the investors to engage the services of Kurt Gorman (Phasetek, Inc.) to figure out how to make it work well; and work well it does.

A plot of the impedance sweep of this antenna, across the channel for which it is licensed, is extremely smooth, and it easily passes WGFP's analog programming without any bandwidth correction. Bandwidth flattening and phase shift adjustments to optimize All-Digital AM IBOC operation are a simple matter, using techniques developed decades ago. My personal thanks to Grant Bingeman (may he rest in peace) for his magazine articles back in the late '70s that taught me how to tune AM antennas for AM

stereo. For more details on the subject of antenna tuning for IBOC, check out Chapter 12 of *The IBOC Handbook*, David P. Maxson, ISBN 0240808444.



This is an exciting time for WorldWide Antenna Systems. The FCC has granted a Construction Permit for another new HEBA in southeastern Massachusetts, and a third project is under development in Atlanta, Georgia. As presently designed, a standard HEBA can be operated at powers up to 10 Thousand Watts, and WWAS has developed designs to handle the higher peak voltages and currents in higher-power installations. Here are a few links to more information:

- <https://www.loudandclean.com/dl/HEBAcomparison.pdf>
 - <https://www.loudandclean.com/dl/HEBAefficiency.pdf>
 - <https://hdradio.com/all-digital-am/>
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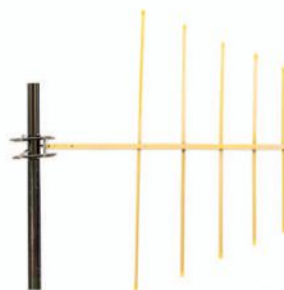
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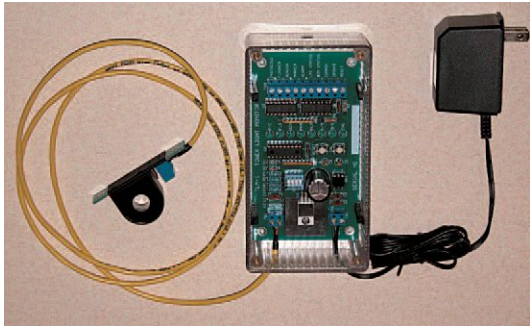
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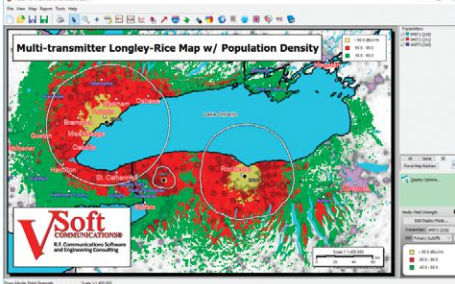
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That Professional SOUND

By Ron Erickson



Just a quick note, as this is my first article written in 2021. On Christmas, I received a new tee shirt that shows the *Back To The Future* car with the words, obviously spoken by Doc Brown, “Marty, whatever you do don’t ever go to 2020.” On New Years Eve I stayed up to make sure 2020 was really gone. I had thoughts of a time-loop making us all repeat it, like in the movie *Groundhog Day*. Seriously, if you’ve experienced a traumatic loss in 2020, I am very sorry and I hope that you’ll find comfort in loved ones or in your faith. Let’s all hope and pray the pandemic is close to finished.

My radio career has found me on the air at 100,000 Watt FM’s, 50,000 Watt AM stations, many sizes in between, down to 1 kilo-watt daytime-only facilities and 100 Watt LPFM’s. I’ve used top notch studios and the most bare-bone equipment you could imagine. One small market station I filled in at for about a week had no production room. In fact, the studio consisted of a small Gates board, two Russco turntables and two Tapecaster cart decks – one play-only and the other a record-play; like this one in the photo below. I found this deck for sale on Ebay.



In order to record a spot onto a cart, you had to unplug the record-play machine from the studio, take it into another room and plug a mic in direct. While I was recording a cold voice spot onto a cart, the on air DJ had only one cart deck LEFT and, as I recall, a full spot load. What an experience, for both of us! With rare exception, I still believe all stations have one thing in common: they want the best sound they can produce in order to attract more listeners.

Commercial stations have no problem obtaining the music, jingles, production elements and even syndicated programs they want, because they can barter airtime for these items. Non-commercial stations are shut out from

obtaining program or production materials this way. Today, I’m going to give you a list of places you can go on-line to make even the smallest station sound pro.

Start at **imagingthing.com** – when you see the one-eyed green thing, you know you’ve come to the right place.



This has to be the company with the strangest logo ever. Once on the website, the intuitive program walks you through; you simply choose your format, frequency and choice of slogans from a pretty awesome list. You can choose male or female voice talents and, at the push of a button in just seconds, you will hear a very cool, highly produced image liner for your station. It gets even better. Let’s say you already have a “big voice” saying your call letters. You can upload your own audio to Imagingthing and it incorporates your audio into the end product. Can you say WOW? They go one step beyond and give you choices to add up to four song hooks creating a music promo instead of just a liner. The cost for this amazing service is nominal although you can get carried away making more and more of these. The price starts at \$2.00. Enjoy!

I intended to spend much more time on this program, but space and time prevent that. Just go to **greatesthitsusa.com**. This is a well produced syndicated show that fills three hours of your weekend airtime. As the name states, it’s the greatest hits of the 60s and 70s, re-sung PAMS jingles hosted by Chuck Mathews, a talented host who has a great voice and multiple Marconi awards to his credit. The show is free, without barter to virtually all stations.

One on air product that you may want, but can’t find “cheap to free,” is a network newscast. One low cost alternative from Feature Story News (FSN) is available with a thirty second headline, a three minute cast and a five minute cast. All are commercial free and available to community stations for as little as \$15.00 per month. Perhaps a plus for some, minus for others: most of the news presenters have a lovely British accent. More information at **featurestorynews.com**. Cheers!



Affordable programming elements like generic jingles, shouts, top of hour stagers, production music beds, specialized sound effects and the like are available again. Some of you may remember a custom jingle company called Ken R. in Toledo Ohio. My friend Ken R. Deutsch ran the company for years and re-sung a lot of classic Pams cuts and created some great new jingles too. Ken retired from the jingle business in 2005 and set up his friend and fellow jingle collector, Ted Tateman to market what he called Pro-Paks. These Pro-Paks feature every conceivable generic jingle, shout, music stager,

sonovox liners and production beds, plus so much more. Honestly, you should try to buy as many of the five giant collections as you can. You won’t be disappointed. Pro-Pak5000 just came out but while supplies last, Pro-Paks 1000, 2000, 3000 and 4000 are still available.

Pro-Pak 5000

Go to **www.jinglesamplers.com** for more information.

Next on my list is music. Oh sure, you can grab songs off the net almost anywhere, but if you’re trying to program a station, you’ll want the highest quality and the “original hit” version. Bob Tomarkin is the man behind the music at **www.msamusicforradio.com**. The database lists over 25,000 songs

which includes the original versions of the songs as first played on the air. They also feature many special versions which correct errors in songs and they offer clean and safe versions of the songs that have “those” words in them. Regardless of format, from Oldies and Classic Rock to Adult Standards and Classic Country, MSA Music For Radio probably has what you need or want and at a very reasonable price. If you pay music royalties, you can shop for music at MSA.



Supplying songs to radio stations is fun, but this alone just doesn’t pay the bills. Bob’s main business is Creative-Com. His company produces radio spots that are so much more than just commercials; they are full campaigns. These are created for business clients, whether initial contact comes through a radio station sales department or direct to business clients. In a telephone interview Bob told me, “I brand specific businesses with their main product or service, much like cola isn’t just cola, it has a brand name. People always ask for it by the brand they want. My spot campaigns rely heavy into humor, and that makes them stand out from other spots in a cluster on the air. I’ll use effective story-telling and other ways to grab the audience. I believe this is one reason I have clients returning year after year for new creative ads. Stations love my stuff because they can keep advertisers on the air for years instead of just a one-off sale.” The R.A.B. used Bob about 14 years ago for that “Business is in the crapper” campaign which promoted radio sales over other media. Listen to the his demo on-line at **www.creative-com.com**.

Ron Erickson may be reached by calling 541-460-0249 or at ronerickson@gmx.com

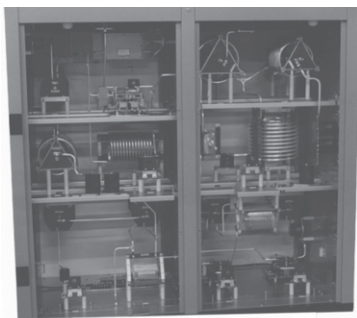
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www.aes.org/conferences/2021/education/

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JW Marriot Downtown – Austin, Texas

www.tab.org/convention-and-trade-show

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