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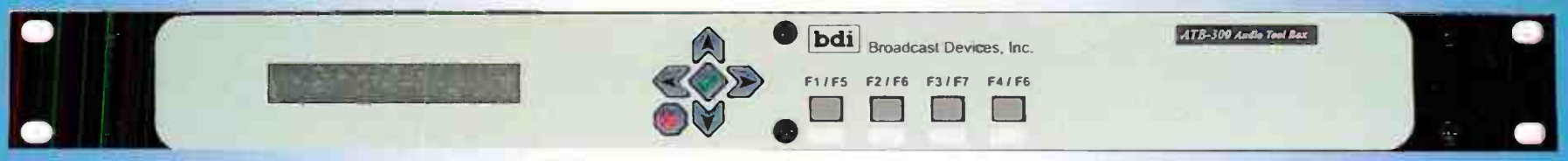

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Critical Content for Radio

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Staying Out of the Doghouse: *"The RFEngineering Watch Dog was introduced about three years ago, and while you think of a watch dog as a large and intimidating Doberman or German Shepherd, this unit comes in more like a Chihuahua, measuring about 1.5 times the diameter of a quarter in height, a few more inches wide, and coming in under $700. It can be used studio- or transmitter-side, and might replace the no-longer-made Dayton Industrial receivers as they expire. It covers FM, AM, RDS and NOAA weather bands."*

Transmitter Site – *by Gary A. Minker (page 18)*

Nitrogen vs Air: *"The same principals apply to our little environment of dissimilar metals – the disparity and elementally high voltage cries out for a super dry environment. In broadcasting, we have a simple list of elements including Silver, Stainless steel, Copper, Brass, and Bronze. To those we add finger dirt, silicon grease, and other forms of containments that enter the system during the building process. We then excite it with RF energy. You can see the recipe we end up with is complex and continues to unfold."*

Tips From the Field – *by Roger Paskvan (page 38)*

Building a Radial Sniffer - Part 2: *"Starting in the middle, take the radial sniffer and hold it vertically right at the ground level. You should see a meter reading of 20-40 uA. Sweep back and forth until you see a dip in the meter reading. The dip should be right above the wire buried in the ground. When you are confident that you have located the wire, take a shovel and carefully dig down and verify that the wire is there. Most radials are about six to eight inches below the surface.*

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Cover Story

Staying Out of the Dog House

Unleashing the Watch Dog

by George Zahn

I am constantly surprised at the ideas I get by reading trades including *Radio Guide*. One of the worst arguments we have for policies and procedures is, "That's the way we've always done it." Many stations have various devices or multiple receivers that we use for everything from monitoring signal strength, S/N ratio, NOAA, and even confirming Radio Data System metadata. There's a device that's been out for a few years that might solve multiple solutions in one unit, and I wanted to examine that option in this article.

The **RFEngineering Watch Dog** was introduced about three years ago, and while you think of a watch dog as a large and intimidating Doberman or German Shepherd, this unit comes in more like a Chihuahua, measuring about 1.5 times the diameter of a quarter in height, a few more inches wide, and coming in under $700. It can be used studio- or transmitter-side, and might replace the no-longer-made Dayton Industrial receivers as they expire. It covers FM, AM, RDS and NOAA weather bands.

The unit has a 32-bit microprocessor and Software-Defined Radio receiver core running on top of an industrial standard Real-Time Operating System. It will alert for notable changes in RSS (Received Signal Strength), Audio Levels with adjustable silence timeout in seconds before an alarm, FM RDS Monitor, FM Pilot Monitor, Signal-to-Noise Ratio for finding broadcast interference, and NOAA 1,050 Hz tones.

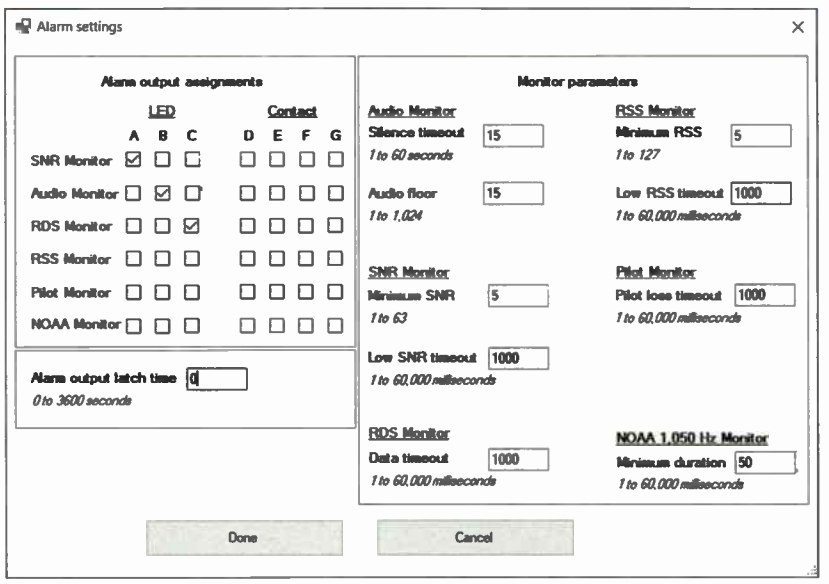
Barking Up The Right Tree?

One user of the Watch Dog places them on par with Dayton receivers, and RFEngineers in Gainesville, Florida appreciates the compliment. The antenna input has been moved to the rear of the unit from the original configuration.

"The Watch Dog was originally designed to replace the old Dayton Industrial receivers that stations were using for EAS detection," says Joseph DiPietro from RFEngineering. "The Dayton models required DIP switch and screwdriver adjustments and we've replaced that with a computer interface to make adjustments easier." The Watch Dog dashboard is shown on any external computer attached to the unit, and the adjustments can be made tamper-proof by disconnecting the control computer and leaving the settings on an internal EEPROM. In case of a power interruption, the EEPROM restores previous saved settings upon start up.

Despite the small size of the box, DiPietro adds that the Watch Dog is made for intense RF field areas. "The only signal that gets in is through the antenna input, and we created the Watch Dog with protection from RF."

He adds that the units are made to have as much protection as possible from spikes from lightning and power surges, so stations can use the devices at transmitter locations.



Man "Bytes" Dog

The dashboard software for the unit allows programmable actions based on alerts, and also allows monitoring of stereo signal for FM (the initial unit was a single audio meter), and live RDS readout when the computer is attached. The dashboard is best used in Windows, but DiPietro indicated that one engineer was successfully using a Raspberry PI unit to interface with the Watch Dog.

A glance at the dashboard shows the aforementioned ability to set time thresholds for silence and RDS (PI, PTY, PS and radio text fields), more specific settings to determine minimum S/N Ratio, low RSS, FM Pilot loss, and loss of reception for NOAA 1,050 Hz.

The output of the Watch Dog is also a balanced audio signal – less susceptible to interference to improve reliability. The efficient Class AB output is connected via a Cat 5 cable using a StudioHub+ configuration. The unit also has a Single-Ended Class AB headphone jack as well, with a separate volume control.

Stations are using Watch Dogs to connect direct to their EAS devices. It does not replace boxes such as the Sage ENDEC, but it is designed to provide a solid signal to your EAS unit. While the Watch Dog does not decode EAS, it does detect and decode NOAA tones.

The Watch Dog can monitor everything from your LP EAS stations to alerting engineering or studio for loss of signal and NOAA weather alerts. DiPietro reports that some stations have even interfaced a dedicated computer to a wall video monitor to alert staff of issues. The range of creative uses is wide. The unit comes with a mounting bar, but there is an optional DIN rail adapter available. RFEngineering is working on a swappable output section of the box that will be compatible in the future with AES3 and other audio formats.

Outboard "Puppies"

The Watch Dog also has an optional external alarm board that allows relay contact closures to key notification devices. The Watch Dog AB-1 board runs just under $100 and features heavy duty relays. RFEngineering appears to be working on an expanded Watch Dog that could support up to six tuners.

Is it right for your station? That is a question only you can answer, but sometimes engineers and managers peruse our trade media and glance past some of the ads with "best kept secrets" or just interesting options we might miss. Let me know if you've had experiences with this or other devices for critical monitoring, and I can share some feedback in future articles.

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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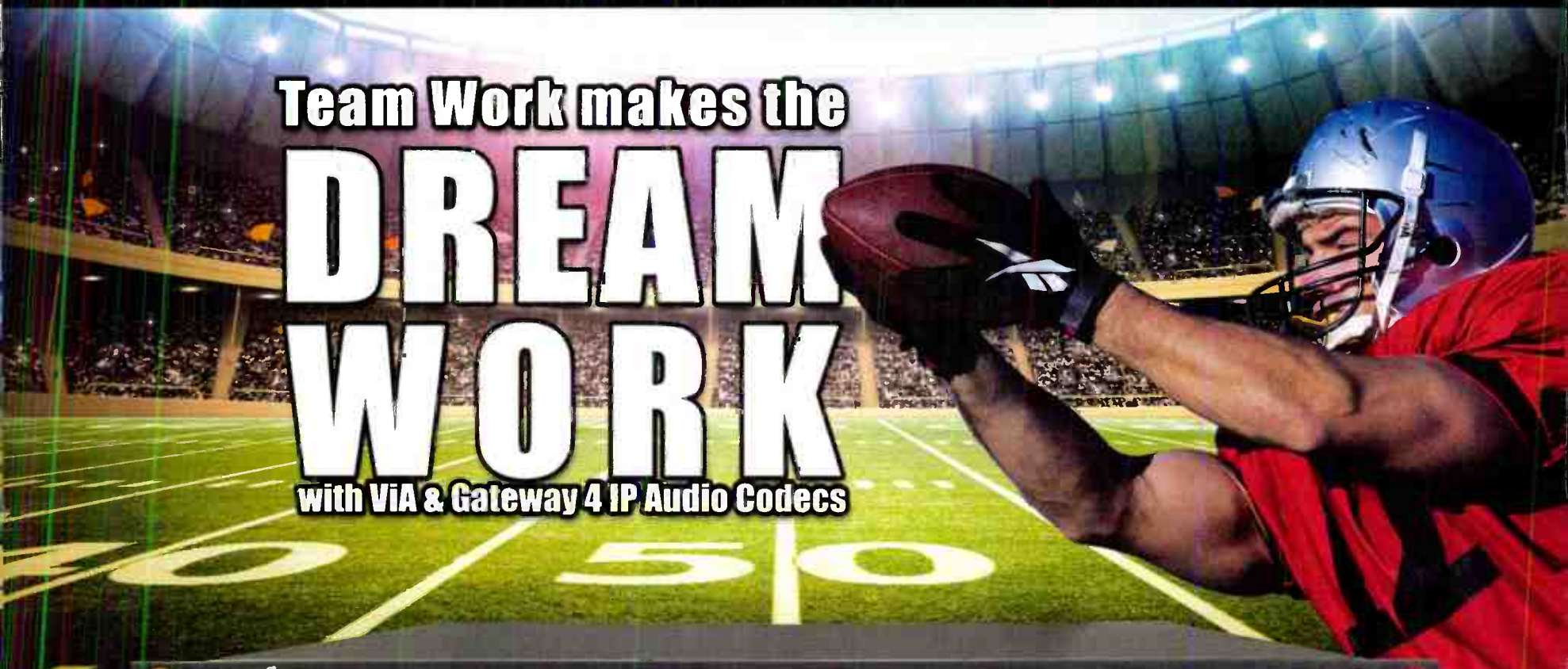

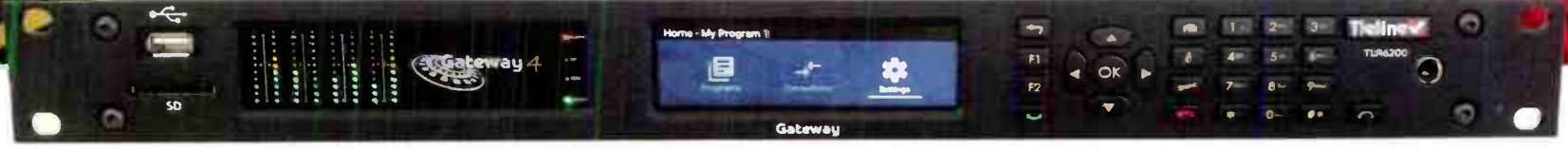

* The Gateway 4 codec supports 4 channels only and is not upgradable to support more channels.

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Studio Site

All Mics Are Not Created Equal

by George Zahn

In the annals of radio advertising, there's a spot that features two motorists talking about their car care preferences. One gentleman – the "smart" consumer – revels in the performance of his engine and the fact that a certain brand of oil made his high performance possible. The other guy simply drones on that "motor oil is motor oil," but you can tell by his demeanor that his car isn't quite so zippy, leaving us to infer that there is indeed a difference in brands.

Trying to "refine" the point here; if you have an engineer or a manager who simply says "microphones are microphones," then it's possible that your station may sound as sluggish as the "droner" in our first example.

Let's take a look at some of the things that make microphones the same, yet dramatically different. At the core, all microphones are transducers, meaning that they change acoustic energy to electrical audio.

The Sound Starts Here

Lest ye think that which microphone you're using is not important, stop and think about how much of your on-air content emanates from the microphones in your studios. The microphone is at the very front of the conduit through which your announcers pass, before continuing through processing, the transmitter, and eventually the change back to acoustic energy by the speakers in the receiver or headphones of your listener.

Yes, any part of this chain can indeed detract from the equation, but as we consider the radio studio in this column, let's give your audio the best possible start.

I've seen, worked in, or heard of radio studios that have used everything from the most crude omnidirectional dynamic microphones (which can result in an dull, echo chamber effect, reminiscent of some of the CB echo boxes out there – no amount of processing in the chain can fix that). Then, there was the overkill of the finest vintage ribbon microphone which I observed in action in the small FM studio of a local drive-in theater, where, by the way, the clientele was listening on beat up boom boxes.

A Good Mic Doesn't Need to Be Expensive

Do you need an expensive ribbon microphone to make good radio?

Absolutely not. But consider the middle denominator in the entire chain. You've likely spent good money on the board, STL, transmitter and possibly studio processing, plus a decent transmitter. You likely couldn't afford to go top grade throughout, but all else being average or above average, if you put a lousy microphone at the head of the chain, your audio is lousy throughout, when that microphone is open.

The "Condensed" Version

If you've heard that condenser mics tend to be more crisp and bright, that is true as a microphone family, and a decent condenser might be the right choice for an FM station or Internet streaming at high fidelity bit rates. Condensers, especially the really good ones, will cost more, as a rule, than a simple dynamic microphone. There are some issues that can happen with certain condenser microphones, especially in interfacing them with some analog consoles – for those who are still using them.

Which Power Source is Best

The condenser microphone family usually needs power to operate the microphone's internal amplifier, and in some cases, to help the microphone change the sound into audio by providing an electrical charge to the microphone's element.

In a studio situation with constant use, you don't want to necessarily depend on a battery for this power, although it is an option on some condensers. In some cases, a mixing console may supply power to the mic through the microphone cable (phantom power) but that is not an option on many older consoles.

In-line Power May Not be Reliable

Many professional condensers have power supplies that plug in-line on the mic cable between the console and the microphone. Don't always assume that will work well.

When I was working at WVXU, we moved to new studios in 1986, bringing our on-air microphone, a Neumann U-87, with us. The mic was one of the last things connected before we threw the switch to the new studios, as it had just been used at the old studios a few blocks away.

In-line power was connected and we threw the switch, then opened the mic, and only about six words made it on the air before the power supply, the mic, and the new console decided they had irreconcilable differences. Despite attempts to fix the issue, we eventually moved to a Sennheiser 421 dynamic and scrapped the condenser dilemma in that studio.

"Reigning" Cats and Dogs

If condensers are the finicky felines of the studio microphone world, the dynamic mic family represents the loving dependable dogs – but not dogs in performance, necessarily.

The dynamic, though, doesn't need any extra power. It's not as fragile as a ribbon, either. Because of those considerations, most of us have dynamic microphones in our studios. And it comes down to what kind we're using, no matter what family.

How do we know what we're buying? As I've said in this column before, the most expensive is not always the best in every situation. Here are two major considerations that can help trim down some options if you're looking to upgrade microphones.

Transient Response

Transient Response is the hardest to notate on a spec sheet, but it is the microphone element's ability to react to sudden and dramatic changes in sound. You probably have a transient response tester on you right now – a set of keys.

Here's how to gauge a microphone's transient response quickly. Pot up the microphone while listening on a set of good quality headphones, then jiggle the keys in front of the microphone.

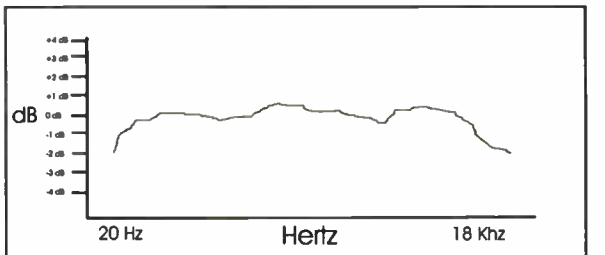
How crisp is the clanking of the keys? Does the microphone approximate the brightness and sudden changes your ear would discern? If so, the mic has good transient response and should come off as crisper, helping to bring out the diction of your announcers.

Bad transient response microphones, can make even the most precise announcers sound "mushy."

A Matter of Frequency

Another, even more important factor is frequency response, the fidelity with which the microphone reproduces the frequency range from bass to treble. This is generally indicated by a chart showing a decibel scale on the vertical plane and the frequency range on the horizontal.

A straight line at 0 dB would be the perfect microphone – the mic would show no coloration of incoming sound. Any variation above or below 0 dB shows you the predisposition of the mic to over or underperform at certain frequencies.



Ye Olde Frequency Response Graph

No microphone that I've seen or heard can boast a flat line at 0 dB. For microphones not supplying a frequency response graph, the notation in the spec section or literature might look something like this: Frequency Response 30 Hz - 16 kHz +/– 2 dB

This is actually not a bad mic frequency response at all. It tells you that at no point between bass (30 Hz) and upper treble (16,000 Hz), will the mic vary more than 4 decibels in response – note the variation is plus *or* minus 2 dB

Take Caution When Reading Specs

When we see Frequency Response 20 Hz - 20 kHz on an inexpensive microphone we should be cautious.

That notation really tells us nothing without the decibel variation range. The mic might reproduce frequencies from bass to treble, but the variation could be dozens of decibels, which for critical and professional use is a real risk. If the frequency is missing, or so far down in volume, no reasonable amount of processing can put it back.

Finding the Right Mic Within Your Budget

So how do we match budget with needs? There are a couple of good practices that managers and engineers can implement. Realizing that each station processes its signal differently, you can still listen to competitors, not just for content, but for sound.

Decide which stations in your market, or in markets where you travel, have the best sound. Contact the station's engineer and inquire about the microphone they use.

Testing One, Two, Three

One way to execute that part of the plan is to borrow the microphone, or a variety of the microphones, in question to try them with your processing. Record off-air, trying different mics, and possibly processing settings, to see what works for your station.

If you have a good relationship with a vendor, a loaner could be arranged, especially if there is the possibility of them eventually selling multiple microphones

The bottom line? If your station is a candidate to clean up your microphone sound, don't equip all the studios until you have a very, very good idea as to what will work for you.

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

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Chief Engineer

Get Your Transmitter Sites Ready

by Scott Schmelling

Evidence is all around us. The seasons are changing. Here in Minnesota, many of the leaves have dropped, farmers have most of their crops in, and it's time to prepare for winter.

Ready for the Deep Freeze?

Preparing your transmitter site is not unlike the preparations you do at home. You caulk around your doors and windows at home to keep the cold out. The same should be true of your transmitter site. Check around your doors (and windows if you have them). Shut the door and feel for any drafts blowing in. Turn the lights out and look for any sunlight showing through. If you can see sunlight, you can bet you'll have cold air – and maybe snow – blowing in. Also be sure to check around any cables entering or exiting the building.

If you see gaps, or feel a breeze, you have options. Smaller openings can simply be caulked. If it's a larger opening you might want to put some backer or "caulk saver" in first. The caulk saver is essentially a flexible piece of cylindrical poly foam. It comes in various diameters and is available in the "caulk department" of your favorite hardware store. If you see *really big* gaps you might want to use an expanding foam product. This, too, is available in various forms. The original doubles in size as it expands and cures so be careful not to overfill.

You can also get "minimal expansion" foam. This is made specifically for use around doors and windows. It doesn't expand as much, nor with the same force, as the original.

I've just discovered a *black* foam that says it is weatherproof! I've used this type to fill the gaps around my cable access. Depending on the size of the gap, you might also be able to use a product called Duct Seal (a clay-like product used by electricians to fill the gap around conduits).

One other tip – if you suspect some "critters" might be able to get inside your building through any of these openings – put a little steel wool in the gap before you foam it. I don't know about you, but I *hate* seeing the evidence of mice in my transmitter buildings

Wooden Window and Door Frames

When they're installed, wooden frames come primed but not painted. Unfortunately, they almost never get painted. The primer coat looks OK at first, but over time the primer breaks down and the wooden frame becomes exposed to the elements and the damage starts. It wouldn't take long to brush on a coat of paint and it's certainly cheaper than replacing the wood after the frame rots.

Poor maintenance by the previous owner. A door frame being destroyed due to neglect.

Time for a Good Cleaning

This is also a good time to do a slightly more thorough cleaning. The summer bugs are dead or dying. Grab the Shop Vac and vacuum them up. While you're at it, suck up any spider or cobwebs. Most of what we vacuum is fine dust from inside the transmitter. If you're getting tired of your filter plugging up with that fine dust, try Shop Vac's disposable filter bags. They're very much like the bags in your vacuum at home. In theory (I haven't been using them long enough to prove it yet), they will allow you to suck up a lot more dust before you loose suction. The time you spend cleaning now will make the time you spend at the site later a lot more enjoyable.

How About a Little Heat

In the warmer months we normally route the heated transmitter exhaust air to the outside. When it turns colder outside I like to divert at least some of that transmitter exhaust into the room for some free heat. That can be accomplished in a couple different ways – depending on your ducting. If it's round duct, you can insert a T-section with a damper inserted to divert some of the hot air out the center port and into the room.

In the summer you put a cap on that port and let the hot air go outside. If you have a square/rectangular duct you can install a register and damper on one side and adjust the damper as needed.

Air Conditioner Winter Prep

If you have a window-type air conditioner at the site, cover it up to minimize air blowing in through or around the unit. Again, a trip to the hardware store might be in order. Air conditioner covers are available. Pick the size that's right for you, and get a couple sets of bungee cords to secure the cover (the little elastic straps on the covers just don't cut it when the strong winter winds blow).

Don't Forget the Overgrowth

Outside, check any vegetation growing near the building. Take it down if you can. If you leave it there, it can become a cozy rest stop for mice, and it will grab and hold snow that blows around. Two good reasons to clear it out!

So far, none of this has been technical, but if you're like me, you wear many hats. Chief Engineer, Janitor, Grounds Keeper, Building Maintenance, and occasionally – Plumber! Since I'm the only one that goes to the transmitter sites, it's normally up to me to take care of the above maintenance issues.

Getting Your Transmitter Ready

I know you do anyway, but take a good close look at your transmitter. If you have them, how are the final and the drivers? If they're getting close to end of their life, this would be a good time to change them. It's better to do it now rather than have a failure during a blizzard when you'd really rather *not* be on the road.

The same is true of your nitrogen tanks – except the nitrogen tanks are even more fun to drag through the snow from the road to your building. (Notice the sarcasm in my voice? I speak from experience!) If your tank is getting low you might want to check on getting a replacement.

Don't Forget About Lights

Check your tower lights. If you need to re-lamp, call your tower crew now. Any tower crew I know would much rather re-lamp a tower before it gets really cold outside.

Take a close look at your tower light controller, too. Look for signs of overheating on the solid-state flashers. If your controller uses a mercury switch on a motorized cam, look at the wiring from the switch capsule. Look for any signs of fraying. And be sure the motor spins the way it should. Check the contacts of the contactor. On more than one occasion, I've discovered one of the four contacts fused closed, keeping some of the lights on all the time.

As long as you're checking lights, don't forget to check the light on the outside of your building. You may have a simple switch, a photocell, or a photo-cell/motion detector combo that turns on at night if it detects motion (like you walking up to the building at night – because you had to park back on the road!). Cover the photocell (there's usually a delay between darkness and "lights on" so, be patient), and verify that everything is working. If you have a High Pressure Sodium light fixture that's not working properly, call your favorite electrician. He may have a test set that will diagnose your problem and determine whether it's the bulb, igniter, or ballast.

One Last Bit of Winter Prep

While we're talking about winter preparations, don't forget your vehicle. It has to start when you need it. Change your oil, check the battery and clean the posts. If you can't remember when you last changed spark plugs, you might want to think about that too. Don't forget your tires; check your air pressure. And if they're getting a little light on tread you might want to think about replacing them. The last thing you need is to find yourself in a ditch on a cold winter night because of worn tires that couldn't grip the road. We've all heard the saying: "You take care of it, and it will take care of you."

Emergency Travel Kit

During the winter, I always have a blanket and a sleeping bag in my van. I have a plastic tote for a parka, ski pants, boots and really good warm gloves. I also put a winter survival kit together – just in case. You can enter "Winter Survival Kit" into your favorite search engine and find recommendations for your area. Be sure to include a set of jumper cables and a tow rope. They could be for you, of course, but also so you can be of help when needed!

Winter really *is* a wonderful time of the year. With a little advance preparation, you can enjoy it as much as I do.

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

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FCC Focus

Betting on Taking Sports Betting Advertising

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

Sports betting has to be among the biggest growth areas for broadcast advertising. Casino.org recently reported that sports betting wagering national advertising nearly quadrupled for the nine months ending May 31, soaring 281% to $282 million over that period. Barron's reports on data that shows enormous growth in gambling ads. And Nielsen reports that this growth has been a boon to local TV and, to a lesser extent, radio.

The increase is an obvious result in the change in the law, previously reported at Spin the Wheel. But some broadcasters are wary. Since the *Murphy v. National Collegiate Athletic Association* case explicitly sent the determination back to the states, the question must be asked, is sports betting legal in my state? Advertisements that encourage listeners or viewers to engage in an illegal activity can expose broadcasters to criminal charges for aiding and abetting by encouraging them to break the law. So, it's wise to be sure not only that sports betting is legal in the state of license, but that the specific type of wagering activity is allowed.

Let's use Draft Kings as an example. If a review of state statutes and regulations reveals that sports betting has not been explicitly legalized in the state, or that other state laws implicate that anyone who engages in it would be in violation of law, then broadcasters should not air any advertisements from Draft Kings or others, until the station's state legalizes sports betting, unless it can comply with detailed specific requirements laid out by the state.

Sports betting in most states would be classified as gambling. Typically, in a state where it is not legal, engaging in gambling or the promotion of gambling would be a misdemeanor. Advertising for sports betting, particularly sports betting that would occur or could possibly occur within the state, would likely be considered advancing or profiting from an unlawful gambling activity, where sports betting has not become a licensed or otherwise allowed activity. Thus, broadcasting in such a state, and accepting and running such sports book advertising could result in a charge of a misdemeanor offense, subjecting the station and its licensee to criminal and civil liability. That could subject their FCC license to challenge.

The law governing advertising of on-line sports betting in neighboring states where the activity may be legal, is unsettled. Broadcasters should use caution and take the reasonable measures described below should they decide to accept an ad relating to on-line sport betting in a neighboring state.

Furthermore, in states that have legalized sports betting, broadcasters must familiarize themselves with any related advertising requirements and ensure that any advertisements they accept comply with the law. For example, some states have conditioned such advertising such that it must:

- Not knowingly target minors or other persons who are ineligible to place wagers, problem gamblers, or other vulnerable persons;
- Disclose the identity of the sports wagering operator;
- Provide information about, or links to, resources relating to gambling addiction; and
- Not be otherwise false, misleading, or deceptive to a reasonable consumer; and include a nationally recognized problem gambling hotline phone number in promotional activity, such as: 1-888-BETS-OFF, 1-800-522-4700, or 1-800- 26 GAMBLER.

States have not adopted uniform requirements related to advertising for sports betting. For example, Kansas and Virginia have adopted similar rules with specific requirements while Nebraska and Arkansas have much more relaxed advertising requirements, merely requiring good faith. With such varied rules, broadcasters must be aware of the requirements of their state and ensure that the proposed ad complies.

Broadcasters must also be aware that Federal law and regulations regarding sports betting advertising, particularly cross-border sports betting, is unsettled. Seasoned broadcasters know that Federal statutes and FCC rules prohibit the broadcast of advertisements for lotteries or similar schemes dependent in whole or in part on chance with certain exceptions, three of which are relevant here.

First, broadcasters are permitted to air advertisements or information relating to a lottery conducted by a "state acting under the authority of state law, broadcast by a radio or television station licensed to a location in that state or any other state which conducts such a lottery." Under this exception, broadcasters licensed to a state that has a state run lottery may advertise or air information related to their state of license's lottery, another state's lottery or other legal private sector gambling activities. Broadcasters licensed in states that do not operate a state-run lottery, however, may not air information relating to lotteries, even if they are only reporting information about another state's lottery or broadcasting from a remote location in a state that does permit lotteries.

Second, broadcasters may broadcast advertisements or information related to a lottery, gift enterprise, or similar scheme, that is authorized or not otherwise prohibited by the state in which it is conducted and which is either: (1) conducted by a non-profit or governmental organization; or (2) conducted as a promotional activity by a commercial organization, which is clearly occasional and ancillary to the primary business of the organization. Thus, broadcasters may air advertisements or information related to lottery type events conducted by non-profits or governments, and by commercial businesses, that are using the event as an occasional promotional activity.

Third, pursuant to the Supreme Court's 1999 decision *Greater New Orleans Broadcasting Association, Inc.*, United States broadcasters may air truthful advertisements and information related to lawful private casino gambling, provided that casino gambling is legal in the state where the casino is located. Applying that Supreme Court principle, broadcasters may air advertisements for casino gambling activities operating legally in the state where the activity is located, even if such gambling is illegal in the state where the broadcaster is licensed.

As noted, the FCC has treated different types of gambling in different manners. *Based on Greater New Orleans,* and other First Amendment commercial speech cases, statutes and regulations (including the FCC regulation) that penalize or prohibit broadcast advertising of legal activities are likely to be found unconstitutional. Thus, once a state legalizes sports betting, the FCC would be unlikely to penalize a station for airing advertising relating to it.

Forms of gambling that are legal in one state but not legal in an adjoining state present a unique problem for broadcasters in the state where the activity is not permitted. Generally, under the commercial speech doctrine, a station should be permitted to advertise a legal activity in an adjoining state even if that activity is not legal in the state in which the broadcaster is located. This is clearest when the activity can only occur when the participant is physically present in the state where the activity is legal. For example, California broadcasters can advertise Nevada casinos, but users can only gamble in those casinos when they are physically present in Nevada. Where the activity occurs on-line, by telephone, or in some other manner not requiring physical presence, there is a greater danger of illegal activity – specifically, acts of gambling occurring in a state in which they are prohibited. In such a case, the broadcaster should take two steps: (1) Ensure that the advertiser utilizes reasonable and adequate controls to ensure that its gambling services that are legal in a certain state are only made available to persons legally entitled to those services (e.g., adult residents of that state), and (2) make clear in the advertisement itself, probably with a disclaimer, that those services are only available to certain qualifying persons (e.g., a super or voice disclaimer stating, "Only available to Kansas residents over 21 years old"). A disclaimer alone is unlikely to be sufficient; due diligence requires the broadcaster to verify that the advertiser has in place adequate controls to screen out persons who are not legally permitted to engage in the gambling activity authorized by a particular state. For example, should the advertiser assert that its control consists of geofencing based on Internet protocol addresses of its participants, further investigation as to the adequacy of that measure will be needed, because in the past IP-based geofencing has been shown to be a very crude and highly inaccurate method of determining a user's residence. Moreover, your disclaimer may need to include other qualifications, depending on the law of the state that authorized this particular form of gambling.

Without the protection of *Greater New Orleans,* there is also potentially additional exposure to liability under other Federal laws, such as the Wire Act, Illegal Gambling Business Act, the Travel Act, and the Unlawful Internet Gambling Enforcement Act. Given that states have only been permitted to legalize sports betting since 2018, after the Supreme Court issued its decision in *Murphy v. National Collegiate Athletic Association,* there is not much guidance on how the government will interpret federal gambling laws with regard to cross state advertising. However, there is a risk that any interstate advertising may be considered a violation of these statutes and subject broadcasters to liability. We note also that broadcast networks accept Draft Kings advertising and deliver it to their affiliates with a small print disclaimer at the bottom of the screen that lists the states that can participate. Caution should be exercised as the sufficiency of such a disclaimer has yet to be tested, and it is unclear whether such disclaimers will provide protection to a broadcaster from liability related to sports betting.

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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Transmission Guide

ATSC 3.0

A Killer of ... or the Future of Radio

by Paul Thurst, CPBE

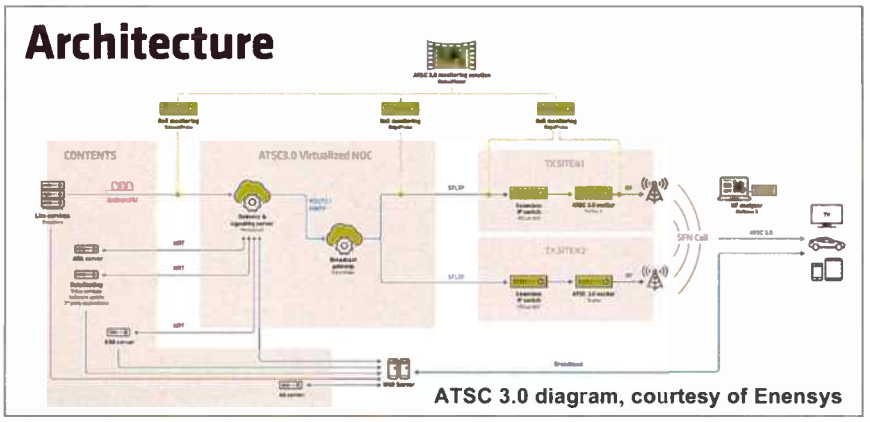
First, a bit of background: ATSC stands for the American Television Systems Committee which sets the broadcast television standards for the U.S. The current TV standard since 2009 is ATSC 1.0, which is the first generation of Digital Broadcast Television. ATSC 1.0 was a huge improvement over analog NTSC television systems. It continued to use the entire 6 MHz channel width, but with much greater efficiency which allowed for several sub-channels to be transmitted. The 8VSB (8 level Vestigial Side Band) modulation scheme allowed a 75 percent reduction in transmitter power output while keeping the same coverage area. The system also permitted several different resolutions and contains Program and System Information Protocol (PSIP) tables, multiple audio channels and so on. The data throughput on an 8VSB modulated 6 MHz channel is 19.39 Mbps.

Some 13 years later, the FCC authorized TV stations to transition to ATSC 3.0 (AKA NextGen TV) on a voluntary basis. Great! By now, everyone should be asking, what does this have to do with Radio? Good question! The answer lies in the automobile dashboard. For many decades, radio has been ever present in cars. This is something that is often taken for granted by various stakeholders in the broadcast industry. Most radio listening, indeed, happens in vehicles. While there are technical reasons for it, several car manufacturers are dropping AM receivers in some models. I notice in my Subaru the radio is much more geared toward mobile applications and satellite service than AM and FM radio. When tethered to my smartphone, the main screen is a navigation map with a link to Spotify. The radio functions are three steps down in the menu tree and are not easy to get to. The battle for the dashboard is ongoing while AM and FM radio's position is anything but assured.

Back to ATSC 3.0; Hyundai Mobis will have it implemented in some Hyundai models starting in 2023 (TV Technology, June 2, 2022). There are no licensing fees for manufacturers or end users. Current infotainment center chipsets by ST Microelectronics and NXP have wideband RF front ends and COFDM demodulators. As of this writing, there are 111 FCC-authorized NextGen TV stations; 92 are in operation, 57 are high-powered, 35 are low-powered and 2 are translators. The next question is, why people would want video services in their cars. Think about all those unfortunate bored folks sitting in autonomous vehicles with nothing to do! I see a lot of opportunities here including those for advertising.

Mobile reception tests have taken place in Michigan, where ATSC 3.0 equipped vehicles drove border to border (Detroit to Grand Haven, 190 miles) without any video dropouts. This system used a 4-transmitter MFN (Multi Frequency Network) with 1 high-powered and 3 low-powered stations. (Tvtech, June 10, 2022).

Sinclair has started a pilot program in Seattle called Stirr XT, which is a simulcast of four FM stations in the Seattle market; KPLZ, KOMO AM/FM, and KVI. Reception of the simulcast is available on any ATSC 3.0 television receiver. A broadcast app under the same name (STIRR) is available on Google Play or Apple iTunes stores for download. The STIRR app is designed to provide direct reception of ATSC 3.0 service for mobile devices.



ATSC 3.0 diagram, courtesy of Enensys

The way the new standard is applied holds a prospect for TV stations to utilize excess bandwidth any way they want. The FCC stipulates that TV stations must transmit one Standard Definition or better video stream with audio and closed captioning. Depending on the video and audio encoding, this takes about 2-5 Mbps data rate. The rest of the available data can be used for any legal purpose, which might include but is not limited to:

- Streaming additional video channels (as with ATSC 1.0) and/or audio streams.
- Leasing channels to: radio station for enhanced audio services; surround sound, album art, playlists, web links to podcasts or iTunes, etc.
- Cell carriers for mobile video services.
- Emergency Services for on-scene video distribution.
- Local or state governments for early warning systems; nuclear power plants, earthquakes, chemical hazards, etc.

- Libraries for one-way one-time transmission of copyrighted materials, e.g. checking out a book; serving special categories of patrons, e.g. with mobility or hearing problems, visually impaired.
- Public schools or colleges for distance learning.
- Newspaper publishers for subscription-based wireless distribution of a formerly printed paper

The types of data broadcast transmissions are only limited to what one can imagine.

Another Major difference between ATSC 3.0 and 1.0 is the modulation system. ATSC 1.0 used 8VSB while ATSC 3.0 uses COFDM (Coded Orthogonal Frequency Division Multiplex) which better suits mobile operations. This is the same modulation scheme that cell phones and mobile data systems use for hand-offs between transmitter sites without dropouts. SFN (Same Frequency Networks) now can become a real thing, along with geo-targeted advertising. It also can facilitate MFN (Multi-Frequency Networks) with seamless hand-offs between sites. With a smartphone app that uses cell carrier mobile data as a return path, targeted advertising can even be user-specific. The data throughput varies from 1 to 57 Mbps on a 5.5 MHz channel depending on the robustness desired. The higher the robustness, the more data bits are used for FEC (Forward Error Correcting) thus lower data throughput.

ATSC 3.0 does not bundle (or multiplex) all of the services into one large Transport Stream. Rather, PLP (Physical Layer Pipes) are used. The streams are IP-routable and services are streamed individually, which gives greater flexibility in provisioning the data bandwidth and makes lower data rate streams more robust overall. Each PLP can be configured for different levels of robustness by adjusting the FEC level settings.

On the transmission side of things, TV stations are beginning to replace their horizontally polarized antennas with circular or elliptical polarization for better mobile service. Circular and elliptical antennas require higher TPOs for the same ERP. Transmitter service based on ATSC 1.0 can be adapted to ATSC 3.0 service with a 20-35 percent reduction in name plate power depending on the transmitter. This is because COFDM has a higher peak to average power ratio than 8VSB.

Whereas ATSC 1.0 uses MPEG-2 for video and AAC for audio, ATSC 3.0 allows many different video and audio codecs including High Efficiency lossless ones that work very well.

I recently took part in a NextGen TV conversion for WCRN-LD Boston, the first ATSC 3.0 station in the Boston Market. The main effort centered on replacing the ATSC 1.0 exciter and video encoder/multiplexer. The new exciter installation was straightforward, although there were some new acronyms to learn. The transmitter power output was de-rated by 20 percent to accommodate the COFDM modulation. The video encoder was replaced with a gateway, which sets up the video streams on different PLPs and assigned robustness to each one.

Although I'm in no position to predict the future, ATSC 3.0 might be the transition to digital radio that never happened with HD Radio. It might be helpful to think of this not in terms of Radio or Television broadcasting, but rather Data broadcasting or Data-Casting. All of the enhanced features of HD Radio could be easily included: album art, song title and artist, etc. in ATSC 3.0 data broadcasting – alongside additional features such as geo-targeted or user-targeted advertising, real-time ratings information, video of any definition, Dolby AC-4 or MPEG-H 3D audio, enhanced emergency alerting system, personalization, haptics, etc. ATSC 3.0 is the broadcasting standard for the future, uniting the Internet with Over the Air content distribution.

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

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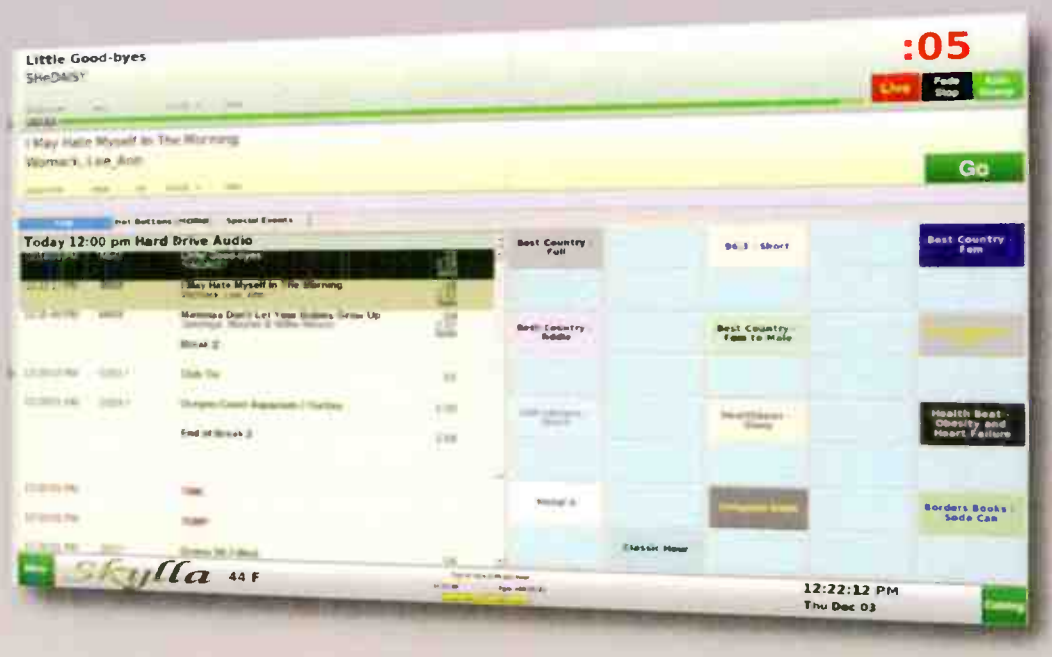

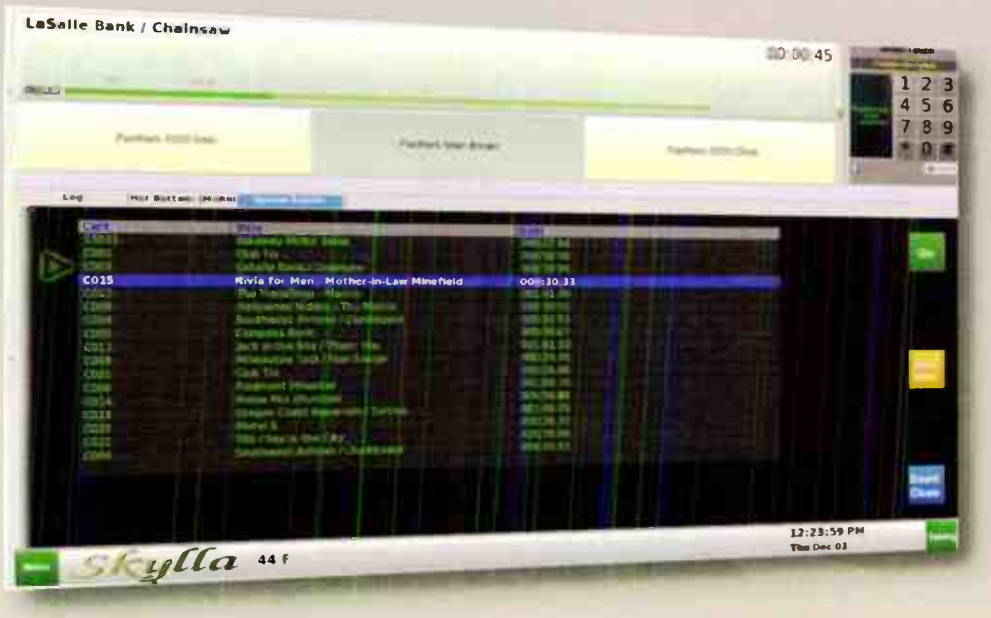

Skylla's Special Event interface, designed with the input of professional sports organizations, makes it easy to air sporting events and remotes, from youth league baseball to the World Series. Because sporting events are scheduled separately from regular programming, rainouts and cancellations require little handling returning to "your regularly scheduled programming" is a snap.

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Maintenance Guide

It's Tower Time

by Steve Callahan

It's time again for another look at towers that literally support our business and how we need to keep a closer eye on them.

Whether we lease space on someone else's tower or own your tower, they are an integral part of what we do and we need to know when the tower which determines our coverage is in good shape or not.

When was the last time you visited all of your tower sites and really looked at the towers and the transmitter buildings? We are all stretched thin time-wise these days, but it's worth your time to take a close look.

One station I know of had an issue with an overgrowth of trees within the guy wire circle. I'm all too familiar of what a growing tree can do when it encounters a guy wire and the slow growth of the tree pressing against the guy wire can torque the tower in a way that it was never designed to cope with. I had to condemn a tower that was so badly damaged it had to be dropped and then replaced.

Another station that I know of had an issue with an overgrowth of trees within the guy radius. I made the licensee of that station aware of the problem with the trees and he said he'd immediately get a tree crew on the job. Well, after several months there was no progress so I repeated my warning that one tree could cause a world of hurt to his tower. Finally, the tree crew started removing the trees, but they focused on the marketable hardwoods like oak and maple and didn't pay any attention to two large pine trees that I told them also needed removal. Well, you guessed it, a big storm came through and one of the big pines split and half of the tree fell on a guy wire and put a significant twist in the tower. That station is now looking at a sizable investment in dropping and totally replacing the tower, antennas, and coax lines because it's too tall to use a crane and no tower crew will even consider climbing it in its present condition.

Bent Tower

I don't take any pleasure in telling that station owner "I told you so," but if he had taken my advice a little more seriously and acted on it faster, he wouldn't be spending a truckload of money on a new tower.

If you're a fan of You Tube like I am, take a few minutes to watch the videos of John Hettish who climbs towers and does some very interesting repairs up in the air on towers in and around Tennessee. He will provide you, and more importantly, your station manager, with what repairs look from a tower climber's perspective and will also prove to your business manager why tower climbers are worth every penny of what they charge.

Another issue that is always on my mind, when I visit tower sites in New England, is the potential danger of falling ice. I was supervising some emergency repairs at a tower in winter that had lost portions of its folded unipole wire system. The unipole normally had six vertical wires held off the grounded tower a specified distance by several fiberglass insulating rods. However, an ice storm caused some rime ice to form around the vertical wires and there was enough ice to start sliding down the vertical wires, and they did just that. As they picked up speed, they sheared off the fiberglass insulating rods all the way down the wires. Eventually, the ice slid all the way down and shattered at the spring mounting at the bottom of the wires. However, the damage had already been done. The vertical wires, energized with a kilowatt of AM energy, were now being blown by the wind and they bounced off of the grounded tower repeatedly causing the AM transmitter to suffer momentary reflected power faults.

I would never ask a tower crew to climb on wet or icy steel, but my favorite tower crew knew this station was in big trouble so they carefully headed up the icy tower with some replacement insulating rods. While they were climbing, chunks of ice were falling past them and toward me on the ground. Several of those falling chunks were the size of footballs and could have caused a lot of damage to persons and property. Luckily, the temporary insulators were safely installed and lasted through the rest of the winter until they were permanently replaced.

An ice shield would have prevented this.

One site that I know of just put in a brand new air conditioner at their tower site. It was a fine mini-split and was working great until one day when there was some ice on the tower and a piece of it fell and hit the HVAC unit squarely on the top of the outdoor condenser unit, fracturing a copper tube rendering the unit dead in the water. Fortunately, there was a relatively happy ending because the damage from the ice fall was repairable. As with every horse that's left an unlocked barn, an ice shield was installed after the damage had been done.

Lots of orphaned antenna mounts.

While you're at the tower site, take a look for any orphaned antennas, antenna mounts, unused coax or other hardware. If you're a tenant on someone else's tower, it's not unheard of for another tenant when exiting the site for the last time to simply take their transmitter with them and not be bothered with removing their antennas or coax. One station I used to visit had a bundle of a dozen coaxes all tied together on a tower leg for the vertical run up the tower to their respective antennas. Obviously the departing tenant didn't feel like digging his coax out of a bundle like that all the way up the tower so he just took his transmitter and left the site under the cover of darkness.

I was at a site a few years back where a tower crew on the tower warned me that there were several orphaned antennas and some dangerously rusted antenna mounts above. I brought that information to the tower owner and he seemed quite disinterested and said that he would clean up the tower only if there was a danger that an antenna might fall and land on someone. I'm happy to report that, as of this date no one has been injured, however, I'm sad to report that the old antennas are still hanging by their coax and rusty bolts.

The best advice I can give you is to get to know your local tower crew and trust them to give you the best advice for your tower. When they say you need a bulb change, or a guy wire tensioning or some paint, take their advice seriously and budget for the work, If you have unused antennas or coax on the tower, have it removed because every bit of windloading removed is a little more safety margin in case of rime ice.

Consider more frequent visits after heavy weather events. Bring binoculars and look for rust spots. Check your guy wires for rusting, loose or missing hardware at the fan plate at ground level, Use your binoculars to see if any of the guy wire insulators have been damaged by ice. Your tower will continue to faithfully serve you for many more years.

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

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Transmitter Site

Nitrogen vs Air

by Gary A. Minker

There has always been a disagreement in the engineering field as to which pressurization system is the best for transmission line, Nitrogen or Air – it's similar to the disagreement we find between Ford and Chevy fans.

The introduction of inert dry gasses is nothing new to our industry and food preparation as well. Noble gases and other flammable gasses have long been pumped in to bags and cans of crispy and chewy snack foods to keep Oxidation at bay and to keep the snacks crispy and free from the effects of moisture.

Notice the word "Oxidation." No, your snacks don't rust or corrode but they do age, rot and discolor in the presence of Oxygen, and the idea of moisture in your pretzel bag is just unthinkable. Argon, Nitrogen, Propane, and other combinants of Butanes, and a host of other gasses have been used to preserve everything from Twinkies to Tostito's for ages.

The Same Principals Apply

The same principals apply to our little environment of dissimilar metals – the disparity and elementally high voltage cries out for a super dry environment. In broadcasting, we have a simple list of elements including Silver, Stainless steel, Copper, Brass, and Bronze. To those we add finger dirt, silicon grease, and other forms of containments that enter the system during the building process. We then excite it with RF energy. You can see the recipe we end up with is complex and continues to unfold.

Cable Purging

The debate as to which method of pressurization is best, is a long running one and dates back pretty much to the beginning of electrical technologies.

One of the first recorded uses for purging cables with inert gas was telephone cable. These lead, oil, and paper, buried and aerial cables, had valves installed on them so that Nitrogen could be pumped through the cables to keep moisture at bay. It is true that the purveyors of the round conductor equally vacillated on the use of Nitrogen and Dehydrated Air.

But when it got down to it, tarnish, oxidation, corrosion and just plain rot, cannot happen in a Nitrogen environment – while it *can* happen in an air environment. This notion was the first thought with regard to the paper, oil and lead cables. Fungus, tarnish, rot, water intrusion, and corrosion were factors there.

Unfortunately, the conundrum does not stop with green fuzzy rot. During a burn out, other than the molten metals dripping down from the sustained arc inside the line, the Teflon insulators are the main culprits. Like any useful petrochemical, PTFE and all of the derivatives used in the transmission line, are full of nasty chemical compounds that are released during the early stages of severe heating, all the way through the point of self sustaining combustion. (OK, the arcing helps out a lot .)

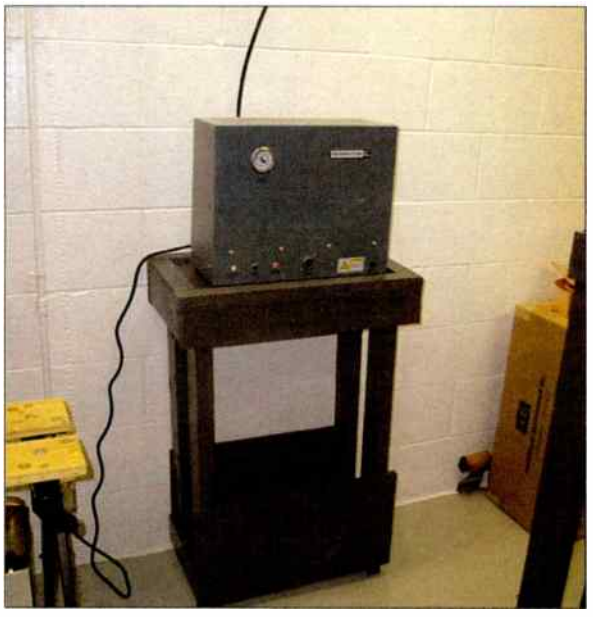
There is even a Patent for a Line Safety Monitoring Device that includes the purity of a Nitrogen atmosphere inside the transmission line system as one of the criteria for detecting a fire in the making.

Fuel For The Fire

I have spent days looking for the article published by a chemist that proves beyond a doubt that, under certain and ideal conditions, burning Teflon can create soot while in a pure Nitrogen atmosphere. I admit that I am not a chemist and while I followed the article with great interest, the chemist admits that precise conditions must exist in order for this chemical breakdown to happen. While these precise conditions are a bit scarce, I give kudos to the author whoever he was.

The practical side of the matter, after nearly 30 years of working with Transmission Line fires, is that the ones that have Nitrogen pressurization are greatly limited in collateral damage from smoke, soot, and other gaseous damages. Line with Dry Air pressurization just flames away and soots up the system with dramatic consequences. I don't know if it was the 50th or the 100th burn out that I worked that convinced me of this but I just state my case ... and have photos.

Fire is inspirational and should not be taken lightly. Soot can destroy a line and render it a total loss, if not a candidate for a total strip out and component replacement There is also the potential of future fires from the missed carbon that remains from a poor cleaning job.



Dehydrator on a stand.

Toxic Mix

As if this is not enough, there are other consequences. Severely heated PTFE products also release root base gasses. I submit the following two web sites for your reading pleasure. You have heard that cooking at too high a temperature in Teflon pans can be harmful to humans and in fact is extremely toxic to birds that may live in your home.

Here are the links to two files that deal with potential toxic pollutants when teflon is overheated or burns.

http://www2.dupont.com/Teflon_Industrial/en_US/assets/downloads/h75334.pdf

http://www.fluoridealert.org/pesticides/teflon.decomposition.prod.htm

The first document is from DuPont, and it caution users to avoid multiple forms of human contamination from everything ranging from simple ingestion to combustive breakdown. The second site is also a primer on the chemicals that are released when these materials are superheated. The one major player is Fluorine.

Fluorine Gas

This is a highly corrosive and toxic gas that has been seen to corrode the metals inside of the transmission line systems when it remains present because the line wasn't purged from a super heat incident that may not have resulted in a line fire. This includes a high VSWR condition that was caught and supposedly cured. This confirms the fact that purging is a good thing and popper valves can be your friends.

Popper Valve

This gas is sometimes known as Oxygen difluoride or Fluorine monoxide, and according to the one document, shares a top spot with another unrelated chemical for the king of respirator selection criteria. Then there are various oils and other semi solids that ooze about and can irate the technicians if contacted or once again ingested.

Which is the Best

In this debate the question then becomes, what is practical for your use? Many years ago, Litton Medical introduced a Nitrogen Generator called the InstaGas. This was a fantastic creation because it extracted and stored pure Nitrogen gas from ambient atmosphere at 35 psi and vended it to you at any pressure below that level. Unfortunately it came with a cheap compressor that did not live very long and the sieve device required periodic trips back to the factory for care and adjustment.

The unit was only on the market for a decade or so and then left many of us with them to sit in the corner sad and neglected. Bottled high pressure gas is always a good choice, for those without active leaks or a desire to purge their lines often.

High and Low pressure Liquid tanks are cheap and plentiful. Caution, liquid tanks do not have a shelf life of much longer than 3 weeks. You have to use the gas or it boils off and vents to the room which can cause an inhalation or suffocation hazard. Dehydrator manufacturers have been having some issues with deciding who will stay in the market place and who will abandon it after years of dominating the market.

The decision to use air or gas is a personal one and should be made with many factors brought in to consideration. Tight systems, remote locations, transportation problems, line size and type, all play in to the decision process. What should *not* influence your decision is what the neighbors do or how your predecessor has done "it" for years. Make this decision wisely and, for those in doubt, chat about it at an SBE meeting. The facts that I've outlined here and the experiences of fellow engineers will help you in the decision making process to ensure you implement a system that will not only do the job for you but one with which you will be happy.

Gary A. Minker is the owner of Radio Works R.F. Consulting in Titusville, Florida he can be reached at (561) 346-8494 or via email at: Gary@Radioworksrfconsulting.com

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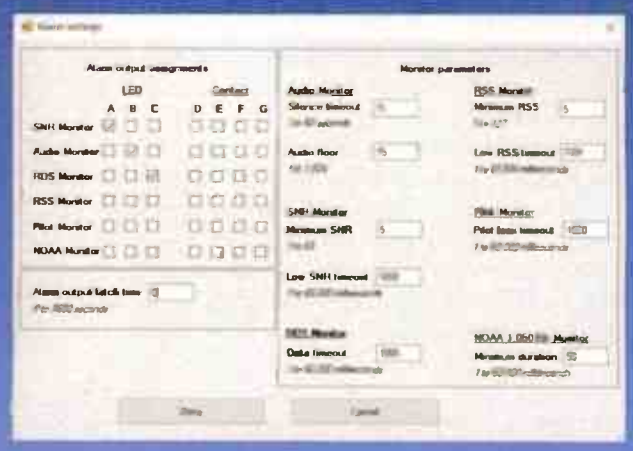

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Oh My, the Things We Used to Do...

by Jim Turvaville

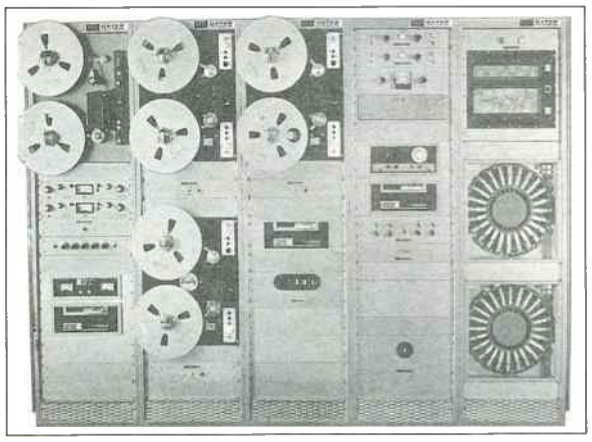
I recently received some pictures from a fellow broadcaster, of the studios of an area radio station for the first time, and immediately my mind raced back through 40 plus years of history in radio with some really crazy thoughts. Now, this station did not have the equipment in use, but it was very nicely preserved in a rack in the studio, in what appeared to be restorable working condition. It looked *really* cool and if I owned one of these, then it would find a place in my studio as well, if only to be a "QE" for those who ventured a visit. (BTW a "QE" is a Question Extractor, and it works, nearly always, first time every time). Yes, I am referencing none other than an IGM Insta-Cart unit.

This 48-slot cartridge player had obviously been a part of a larger, GATES provided automation system, with a GATES control unit located below it. While these mechanical beasts were amazing to watch work – when they worked – they were also a huge maintenance nightmare, just like most of the companion pieces of equipment that were connected. Those early analog automation systems might have either let air talent be involved in other "more important tasks" as the promotional materials of the 60's and 70's purported, or they may have put a few air talent in the bread line. Either way, they certainly brought plenty of work for the guys and gals who were responsible for keeping the mechanical monstrosities running on a daily basis.

I will make no attempt at any kind of an accurate history of analog automation systems here; I came late to the game with these huge mechanical beasts. There have been plenty of excellent articles written which contain wonderful timelines and details of the various manufacturers and their technologies and if this is your interest, then I strongly encourage you to find those on-line. Rather, I just want to share a few of my own experiences and observations as a late-comer to the technology, and hope it might brighten your day. At the time, most of the crazy experiences I had with the old units were not amusing, but we all know that "*time heals all wounds,*" or more accurately, "*time wounds all heels,*" – and most of the scars from my past are psychological, not physical at least.

My first visual exposure to full station automation came very early in my radio work in the late 70's. When visiting family in another state, my cousin suggested that, since I was working in radio at home, I should go visit their local radio station as well. Novel idea, since I wanted to do that out of morbid curiosity anyway. I was totally blown away with the huge system that ran their local FM station – I'd never seen such equipment, and it was a marvel to watch it play music from reels, commercials from carousel cart players and time announcements from single play decks with the largest carts I'd ever seen. Those C-size carts were no comparison to the little A-size we played all those commercials from at home.

I have a collection of old Broadcast Catalogs from Gates, Harris, BE and Sparta – back when they were distributed in hard-back editions – and this is very much like that first automation system.

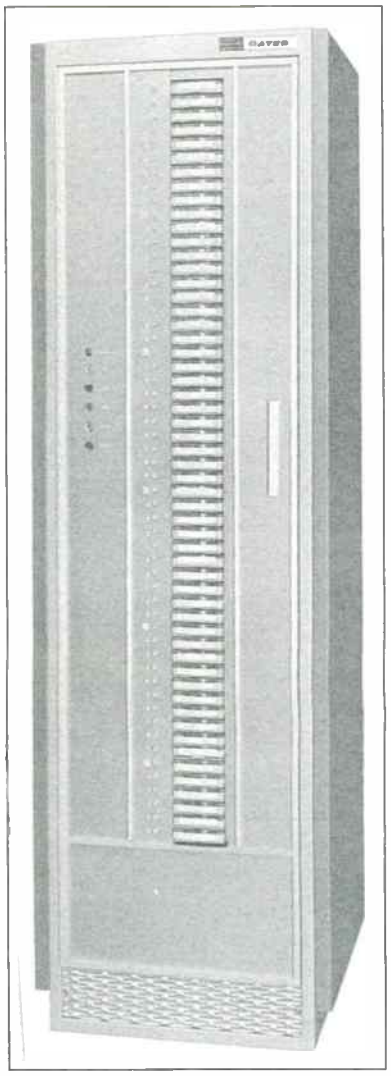


Not too long after that, I graduated from Tech school and ended up at a small market AM station with a CP for their local FM channel. It was decided to buy an automation system for it, and to record our own reels of music for the chosen format. We ended up with this beast as the programming brains for the station (that is my old friend Mike, the program director in the picture) which would let us run from 6:00 a.m. to 10:00 p.m. with several shifts of swapping out music reels.

Funny engineering story – and a lesson learned the hard way. That old Shafer Model 800T was designated with the "T" for being the first version of the brains that used Transistors instead of tubes for the audio amplifier. That long string of relays were part of the stepping system, and had to be serviced on a regular basis or they would get oxidized and the system would stop advancing in events. When we got the system (remanufactured, not directly from Shafer) it came with a contact burnishing tool, and instructions to be sure and pop the cover and clean those contacts on a weekly basis. But one thing that did not get communicated clearly was the use of 120 VAC for the switching of the stepper relays that advanced the event on the air. Guess how many times it took for me to learn just which breaker to turn off before cleaning those contacts? Yep, this old man may be old but he's never been a slow learner. I understand that old system worked for many years after I left it there, until satellite delivered formats came along and took the place of the reel players.

Through the years thereafter, I ended up maintaining a series of automation systems, mostly the SMC branded variety, with assorted cart carousels, single players and even a few still using reel players for music. Most often the reel players had been replaced by satellite receivers but all of the spot breaks and local elements (liners, ID's etc.) were still handled by the old cart players and carousel units. As they became slowly replaced by early computers, the systems got much smaller and a lot easier to maintain, having many less mechanical problems that have all been replaced with computer related problems – locked up O/S, failed hard drives, dirty floppy discs (remember *those?*) and even cats sitting on keyboards and taking radio stations off the air.

I have to share one regret of that early mechanical automation era – I never got the opportunity to see a Gates Criterion 55 unit in operation. These mechanical beasts were 6-1/2 feet tall and weighed over 400 pounds. They would hold 55 of the A-Size cartridges and used a single moving play deck to go up and down and pull a cart in for play by rubber wheels.



The entire play deck was moved via a pair of cogs and bicycle chains on each side that used a gear box in the bottom to advance its location. I'm told by those who used them that the gear box and chains were so powerful that if a cartridge got stuck going in or out of the play deck, that it would just get sheared in half as the deck advanced to the next slot. I understand that they were noisy units, and the technology got replaced with the smoother and quieter carousel units and its "go-cart" cousin in later systems. But it's about the only kind of automation equipment that I never had the chance to see in operation, though I doubt I missed much.

Today's computer based automation systems are certainly light years ahead of the early mechanical ones for functionality and reliability. But I have a really soft spot in my heart for the innovation that my predecessors used in taking our then-common studio gear – cart players, reel machines – and finding a way to make them work in an automated system. My hat is off to them for those accomplishments.

Jim "Turbo" Turvaville is semi- retired from 43 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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Where Did All the Workers Go?

By Roger Paskvan

This might seem like a strange question but it doesn't take too long to realize it's real. The workplace has radically changed in the last two years. If you're a small market radio station in a small town, good luck trying to find staff or just plain help. So what happened, it's the same community, the same radio station, the same clients and same businesses. Every door has job vacancy signs and they never seem to get taken down.

This has been a frustrating problem for almost a year now and radio is not the only player in this game. Nobody can find help; businesses can't find people to work. Our station is still running ads for sales people and accounting people for the past five months. We have tried on-air ads, digital marketing and even "Indeed hiring services" with limited results. We are desperately running ads once an hour all day and even stooping to help-wanted ads in the local newspaper. It's like no one wants a job. We pay well, with medical and 401K, but no one seems to care. The job just sits there, vacant. It's like the old workforce just vanished into thin air.

Yes, I understand that Covid had a lot to do with people not working. The mandates and the work from home concept may have something to do with this problem, but eventually you would think the people would need a job for income. For a while we could blame the current Washington administration. Now, Covid is almost gone and still no one wants to work. Are there too many social programs willing to give free handouts to those who choose to sit home every day and wait for a check? I wish we knew the answer because then we could work on a solution to this problem. This employment thing isn't just small market; it is everywhere including the big cities. As I previously mentioned, if you walk down the street in any major city, large or small, every other store has "help wanted" on the door. I just heard on the news, that Taco Johns is considering closing all their sit-in dining rooms, just offering drive through. This would be coast to coast, citing no help available. So many restaurants in small market and other places still are offering limited hours and a small menu just to stay in business. Something isn't right.

The lock down hurt many small market radio stations more than other companies since radio thrives off the success of these community businesses. In small market, by its very definition, that means the pickings are less. For radio stations in these small markets, essentially, the only hardware store is closed, the only four restaurants are closed and the scenario repeats itself in the next small market town. Encompassing your coverage area, that's the advertisers that are paying your bills to stay afloat. Last year, almost every business was either closed or on limited hours. All advertising was basically shut out of the budget. Let's face it, no people are coming into these stores and they just don't have the money to advertise. Like the old saying goes, "If you have to cut expenses, the ad budget goes first."

Let's look at wages. Yes, the current administration has made an effort to hike up wages to a universal minimum of $15/ hour. Radio, especially in small markets, can't afford to pay a "green" new DJ $15/hour and survive. $15 dollar wages have pushed the restaurant prices through the roof. The same seventeen year old. flipping hamburgers at McDonalds, has just moved the cost of Big Macs to $10.00 because McDonalds is now paying $17/hour plus a sign up bonus. So where is this all going? In small market, these businesses are especially hit hard since the work pool and the number of customers is limited. Small market radio stations have to make it on a very tight budget and that margin is forever getting thinner.

If you own a small market radio station for any length of time, I'm sure you have noticed changes in new hires, especially this past year. There seems to be a new breed of entitlement attitude that comes in the door with each new broadcast potential. What's in it for me, dominates the thinking of many new hires. "What can I get from this job for myself?" "I don't volunteer for anything unless there is a check attached to it. I don't do weekends." "I'll only do paid remotes and no community charity work." The sad part of this is, this may be your only applicant and you got your day cut out for you.

Have the values changed? Is the worker's mind set different? Is this what the Covid lock down produced? So, what is happening in our small-town marketplace? Was this attitude of entitlement always in the broadcast workplace or did it finally just catch up to small market stations? It has become a problem in the sense that this entitlement attitude directly conflicts with the values that made small market broadcasting special. It doesn't fit the community sharing idea – part of the greater good.

The Federal Candy Company (FCC) made it mandatory that broadcast stations stay on the air at least 18 hours each and every day. For some small market stations, this is becoming a serious problem. Unlike other businesses, they can't shut down during the day – radio simply can't do that. Staffing and people not coming in to work became critical during the lock down. Now they all want to work from home, period. Thank goodness for computer automation but that only goes so far and a live person has to feed the system. There are only so many radio services that can be done, working from home. Our small market sales staff did not want to have face-to-face contact with clients during the lock down period – some still refuse to see clients, face-to-face. There are only so many sales that can be closed by email and telephone. Most clients just say *NO*. Many of these small market stations lost thousands of dollars last year and have no way to recover that loss. Some operators reduced staff and learned new ways of saving cash. For some, payroll became financed by government PPP loans just to stay on the air as the only essential service in some areas. Most of these loans were forgiven which helped some of the pain go away. Some of the loans just came due, now adding to their problem.

So here we are one year later. It feels like we are digging out from a hurricane disaster. Businesses are trying to stay open since the mandates are lifted. Small market businesses are feeling the employment problem. Of course, the unemployment political bonus just made things a lot worse for some of these businesses. Why work when employees can stay home and collect the same money for doing nothing. This translates into loss of revenue for the local radio stations. When does this come to an end and life returns to normal? You would think that, after a year, people would want to work and get back on their feet.

I've talked to a number of stations that, due to budget restraints, put off buying equipment and repairs that now absolutely must get done. Engineers are getting hard to find these days, especially in small towns. I've heard stories of stations having to import engineering services from five hundred plus miles away. That only makes the bills big, but also calls out a critical need in these broadcast markets. Our local car dealers are still cancelling ad contracts because they cannot get any new cars.

Yes, some 89-cent chip, made in Taiwan is stopping thousands of cars from being built in the USA. New car orders are facing a 14 month backlog. No car sales, translate into, no radio ad sales, with car dealers cutting their large ad budgets. The sad part is that most car dealer packages are pretty hefty and this really hurts small market radio.

Small market radio faced the brunt of the Covid lock down. Many stations have simply gone bankrupt through no fault of their own. When businesses won't advertise, there's simply no revenue coming in the station door.

To make matters worse, the acquisition of large broadcast chains under one roof has produced a business model where localism really doesn't exist anymore. This may be the cause of the current labor shortage attitude problem. Just the process of cobbling up many Ma and Pa radio stations eliminates that small market ideology. Maybe this transforms down to current employees that see radio as a "job means to an end" rather than becoming part of that bigger picture – community and respect for that concept.

Small market radio may be changing. Can we protect the old ways anymore or will small market radio just become a "job," no different than any other place to work? What has changed is "... and I want a sign-on bonus, I want $20/hr. for my DJ work, a 401K plan, medical insurance plus I don't work weekends! Good Luck my friend.

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

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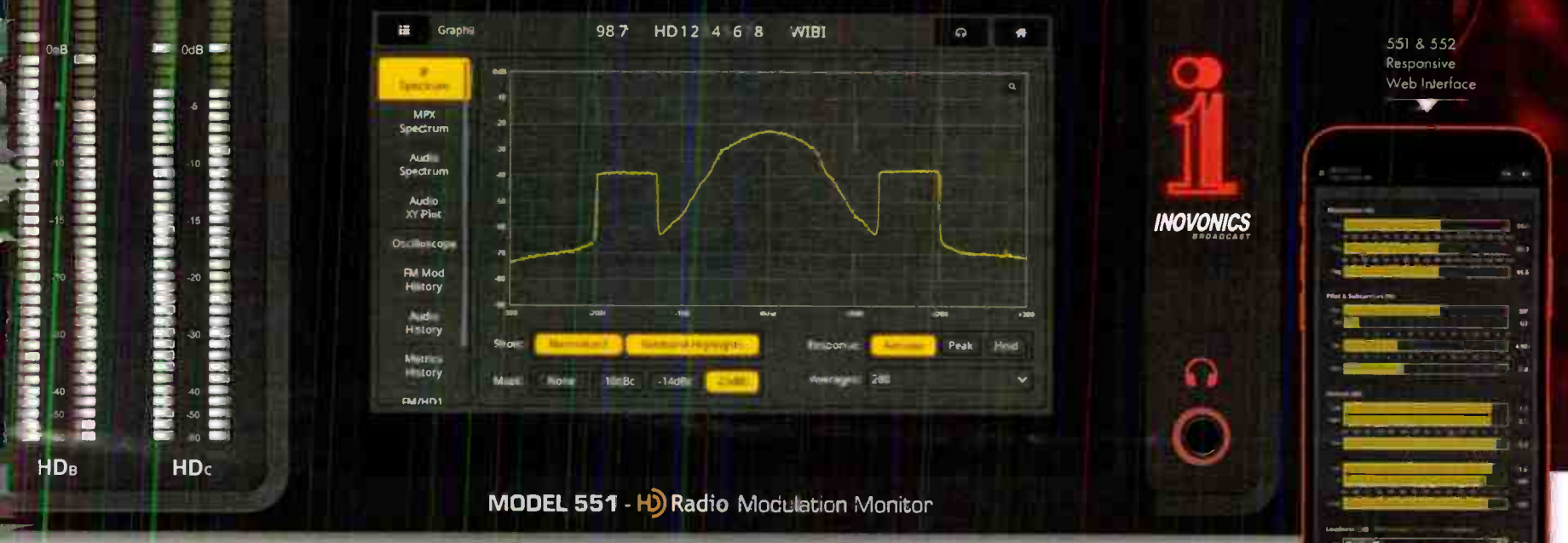

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IT Guide

Acronyms and Abbreviations Drive Me Crazy

by Tommy Gray - CPBE CBNE

Don't you hate it when folks spit out all these crazy abbreviations and assume that everyone knows what they mean? If you are a tech guy, then you know exactly what I am talking about. You read a tech article, and spend half your time looking up the definitions to understand what the information is telling you. IT, VPN, Qos, Ivp4, Ivp6, IP Address, Gateway, DNS DMZ, ports, port forwarding, etc. – and the list goes on and on!

Well this time, I hope to shed a little light on just a few of these that you may encounter when setting up new equipment these days. Recently, I was setting up a new remote control unit to replace one that gave up the ghost, and had to get into this a bit. The original remote unit was connected to an old fashioned POTS line (See another acronym!) as are many still in service everywhere.

As you are probably aware, POTS (or "Plain Old telephone Service") lines are going away. In fact there was a cut off of August 22, 2022 for new service, but most carriers realize that not everyone can come up with a replacement right away and are still servicing the lines. One reason, I am convinced, is that they are charging a ridiculous amount of money per line in most places and when things change they will lose money!

Not all sites have Internet available, so VOIP lines (Voice over IP) are out for those remote places. However, with the proliferation of the Cell service in the U.S., there are not a lot of places where you cannot get some cell signal, albeit external antennas may be required to get sufficient signal to make them useful to our purposes. I have replaced numerous POTS lines with cell-based service in the last couple of years with great success. The upside to these POTS replacements, is that they are much more inexpensive in most places, and usually come with a certain amount of Internet service as well as static IP addresses (I will explain later).

The ones I use, make use of cellular service for talk and data. They come with a wireless router, and a POTS converter. All that is required, in most cases, is to situate them where they can get signal or connect up an external antenna, and then simply plug in your existing phone connection to your remote unit and you are in business. I take great satisfaction in disconnecting a phone line that is costing a station almost $1,000 a month with one that costs less than $100 and is more reliable!

Remotes, IP Addresses ...

Most remote control units these days contain a built-in web server that will allow you to use a common web browser and connect to your transmitter or site and see everything that is going on in real time. Most major transmitter manufacturers these days have a web server that shows you an AUI or GUI. (Advanced User Interface or Graphical User interface). These interfaces allow you to monitor and control your sites through the Internet.

In order to connect to a web service you have to know its "street address" (IP Address or Internet Protocol address). IP addresses are equated simply to a street address. With an accurate street address you can navigate to an exact location and find it without a problem. A street address is a unique identifier to an exact place. It only exists in one place in a city, as an IP address only exists in one place in a network (normally). With an IP address, you can connect to your remote device through a common web browser by entering the address into the place you would enter a URL (Another one – Universal Resource Locator). Is this starting to make sense?

Now if that were all there was to it, it would be easy. In a proper world it would be just fine and you would be safe. However we do not live in a proper world, and for every IP address there are literally thousands of hackers, and automated hackers (Robots they are called) that are trying to hack into your site.

Allow me to inject a clarifier here. When you enter a URL into your browser such as www.fcc.gov, you are entering an address that is just a common name for an IP address. If you had the IP address,you could just enter it and get to the same place. These understandable names are called "Domain Names." A website is a "Domain" so to speak. I realize this may be over simplified but you get the point.

(Continued on Page 28)

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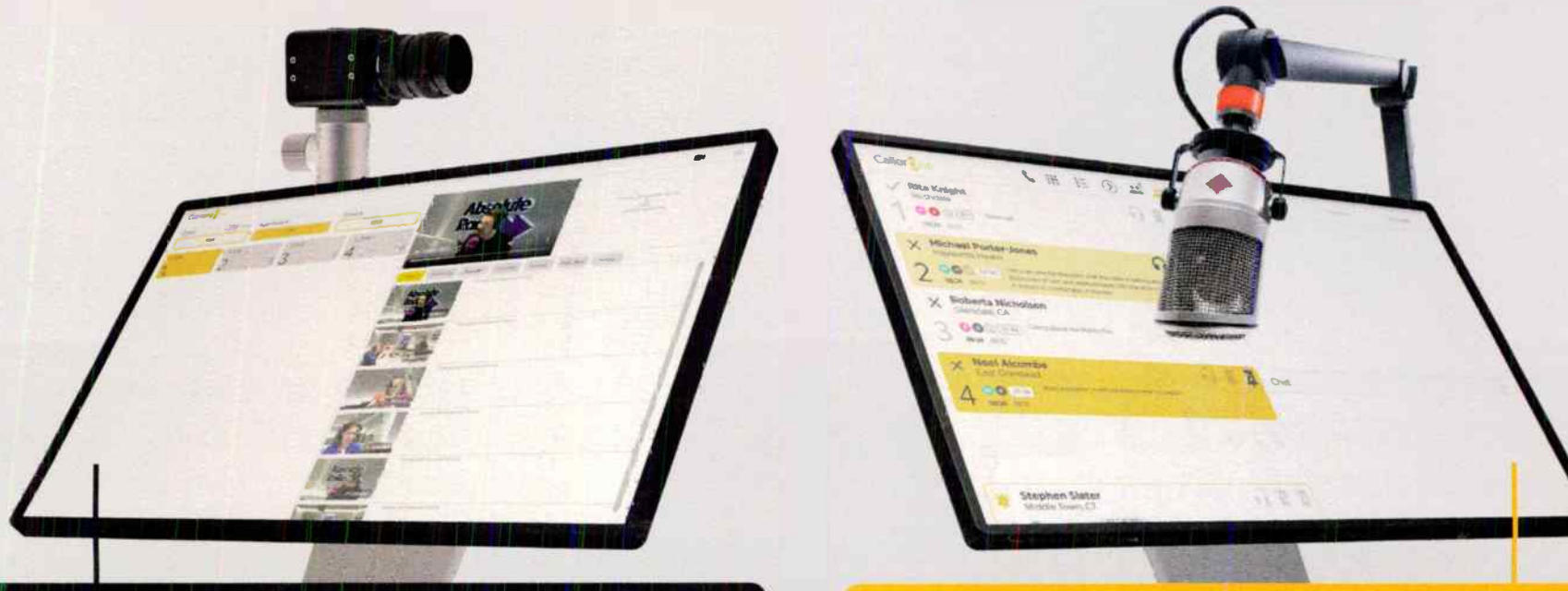

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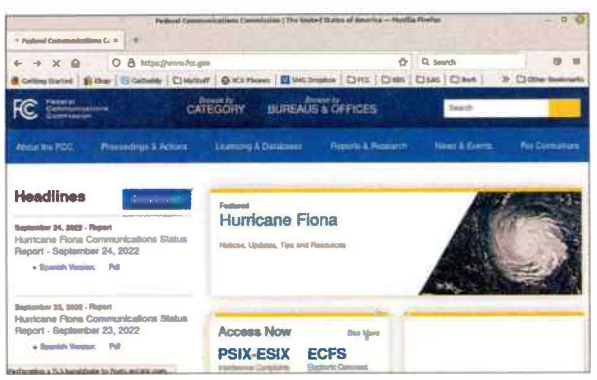
– Continued from Page 26 –

Typical Web Browser Connected to a Domain

As you can see below, there is a domain name that has been typed into the place for the URL and the browser has used a system that translated that domain name into an IP address and located the site. A system called DNS came into play to make it all work. DNS stands for "Domain Name System." These "name servers," as they are otherwise called, take the human readable web site address, and translate it into a machine readable IP address. One of the most common DNS servers is the google server whose IP address is 8.8.8.8. The backup Google DNS server is 8.8.4.4. When you are setting up an Internet connection you can use these for your DNS servers and they will work just fine.



How Do I Connect to My Transmitter?

How does all this help me to access my transmitter? Well I am glad you asked! Your built-in web server in almost every piece of equipment you have these days (Satellite receivers, STL equipment, etc.), can be accessed with an IP address and a web browser. As I stated earlier however, the problem here is that anyone else who has a web browser and your IP address, can also access your equipment as well. Do you want everyone who has an Internet computer anywhere in the world to have access to your systems? I don't think so. So what is one to do? Well the best way, is to somehow hide your IP address from prying eyes. How do you do that? This involves a lot of steps that I don't have space to explain in this article, so I will try to simplify it a bit.

Routers use a feature that is called "NAT" or "Network Address Translation." This is a feature of most common routers that allows a single IP address to be mapped to multiple addresses internally within a network. It changes the header information of an IP "Packet" while it is in transit to its destination. This improves security and will help to decrease the number of IP addresses necessary for a site to be able to communicate with the internal network. For more on this, lookup NAT in your search engine.

This is the invisible part of the operation for the most part. Then we have to have a way to connect to a certain IP address inside the actual local network. How do we do that? Well think of it this way. Let's say your Network is a large apartment building. Each apartment has the same street address (IP Address) but a different apartment number. How do I find a certain place? I go inside the complex and look for the desired apartment number.

Now how does this work in networking at your transmitter site? Well we don't have apartments, but we have the equivalent. We have "Ports." A port is an assigned number for a certain device you are wanting to access. There are common ports that folks use for certain things but I will not get into that for space reasons. When you are setting up your network at the transmitter site you decide on an IP address range for everything and then you assign an IP address for each device.

For all this to work you usually have what is called a "Static IP Address," which is an address that remains the same and does not change. Usually you pay extra with your Internet provider for such a unique address. This Static IP is your Internet 'Street Address." How do you access your transmitter? You, for safety purposes, use a feature in your router called "Port Forwarding." This allows you to use your static IP address and tack on a port number at the end (Done with a colon ":" and a number). From the public side of your Internet IP address this tells your router where to direct all traffic for that Internal IP address.

For example, say your static IP is 69.134.152.201 (just made this up). To access your transmitter which internally is let's say 192.168.1.200, you need to assign an apartment number to the transmitter. Say it is "2000". In your router you setup port forwarding to direct any traffic that is sent to "69.134.152.201:2000" to IP address 192.168.1.200. Look up Port Forwarding on your search engine for a better explanation and more detail.

Now when you enter that IP and Port you are automatically routed to your transmitter and the world does not know what its actual Internal address really is. With Nat and Port Forwarding you have basically hidden your transmitter from prying eyes. There is really a lot more to it than that, but that is basically how things work. Internet security is a whole other animal these days so I would suggest that if you don't have a lot of experience with it, you solicit the help of someone who does, to keep things safe at your site. I hope this has helped to shed a little light on some otherwise confusing "stuff" you may encounter as an Engineer these days.

Happy Networking!

Tommy Gray is a veteran broadcast engineer currently staying busy as National Director of Engineering for Tulsa Based Stephens Media Group. You can find him at www.BEandT.com

The Reporter.

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Visit AngryAudio.com/callme to learn more.

Practical Engineering

Line Sweeping: a Cost-Effective Maintenance Item

by Gary Minker

There is a nagging question Mr. Three Piece Suit is going to ask you, because your engineering budget is an expense to him and not a tool as valuable as the sales staff.

It might even be that this is partly your fault.

The Memo

TIME: 16:52.47

TO: Chief Fix-It-When-It-Breaks

SUBJECT: Is this Line Sweeping thing you asked for an effective tool as a maintenance item? If so, why wasn't it a regular, planned for expense as part of your last budget? What are we going to get in return for this *expense*? Let me know by 16:59:59 today or we'll just forget the whole thing, and maybe your department too.

Do you smell the smoke yet? Is it coming from your ears or the front office? You might surmise that there are a couple of problems brewing here.

Failure to Communicate

In previous articles, we touched on the possibility that you need to be a bit more proactive in your communication with the Suit up front.

In his mind, Engineering usually is not a valuable tool because: "You geeks sit back there cleaning your pocket protectors, show up when stuff breaks, speak to no one in understandable sentences, and then skulk back to your inner sanctum where all those weird meters and rosin smoke plumes live." This segregates you from the rest of the tribe – and most importantly Mr. Suit.

When you last talked with the guy you should have assured him things such as Line Sweeping *will* be included as a regular expensed maintenance line item starting next year. Unfortunately, even if you did, he may have conveniently forgotten that thought.

Communication Necessary

It is critical to consistently – and as kindly as possible – remind the Suit and the rest of the staff that while you and your staff (if it exists) may be different. You are people too, and your department is a part of the solution and not the problem.

However, you still are on the block for the memo. OK, here is the help you need. The question is pretty direct: Is Line Sweeping a cost effective tool as a maintenance item? This is best answered through consideration of the following documentable questions:

1. Did you receive a booklet of proof of performance on your antenna system when it was installed?
2. Why should you save your line sweeping reports?
3. What are the pros and cons of testing; why test?
4. Do you really like to be off the air?

Developing the Right Response

Did you receive a booklet of "proof of performance" data on your antenna system when it was installed?

When your system was built, a data booklet with the system drawings and the factory test data on the antenna at the test range was supplied. (You did have that new antenna range-tested, right?) Also attached is the test data from when you installed the system, when the factory, or your other favorite Line Sweeper, came out and tested the system for you. (You did have it swept when it was installed, right?)

This booklet of data is your system Bible, and it must be updated like a clean bill of health every year or your job could expire. Mr. Suit needs to know about this very impressive compilation of letters charts and graphs – the EKG of the system – and that without a current report, all bets are off because that nice shiny Watt meter is always the last thing to know that you are having a system problem and the on-air jock is the first.

You should try to get Mr. Suit to see that you understand what the report says – in five minutes or less – and you are really on the ball.

System Documentation

Why should you save your Line Sweeping Reports?

This is the CYA (cover your "posterior") portion of the drill with Mr. Suit. You were the happy and lucky recipient of a great Line Sweeping adventure when your system was put in 17 years ago, yet you have not had the system tested since then. Mr. Suit wants to know why not – and *why now*?

You could tell him that this was an oversight. Of course, you may well be looking for a job in about five minutes. Or, you can tell him that it is now the industry recommendation that such things be conducted annually.

Alternatively, you could note that from your intensive involvement in the new standards, and as part of your self-avowed continuing education, the practice and art of Line Sweeping has come to your attention. Having saved the initial report in the station files, it is high time to have a new one this Sunday night during the maintenance window in order to avoid catastrophic damage from a sudden creeping failure.

(Continued on Page 32)

"When your competitors ask what you put on the air, you can chuckle knowingly."

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"marvelous"

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Practical Engineering

– Continued From Page 30 –

Benefitting From Documentation

What are the pros and cons of performing these tests?

This gets easy. First the cons: Without continuing maintenance, things at the transmitter site get really really loud, and then they get really, really quiet.

Indeed, after the fire trucks leave from extinguishing the fire that started in the grassy field and woods next to your tower – from the flaming molten metal and plastic shroud parts dripping from your previously good old antenna – the GM will hold you are up for the "silence is golden"

This is not what you want to see, but often is the result of maintenance-free operation.

award and the ensuing tens of thousands of dollars that the repairs will cost, which will immediately precede your being fired for losing your crystal ball (and your gross negligence and obvious incompetence).

The proactive stance in order to avoid these things is to make the case that the most frequent cause of antenna and line failure is not lightning, but actually the slow and methodical mechanical wear of the bullet joints.

These jointsm which include the actual fingers themselves and most importantly the watch band springs, wear down and make silver dust which is highly conductive; the now bare joints, which often consist of dissimilar metals of brass, stainless steel, and beryllium/copper, eventually fade to fatal.

The silver coatings wear off or pit from the thermal expansion and contraction every 24 hours for years at a time and – oops! – you have smoke. This smoke often comes from the high resistances that develop in these bare metal joints from the lack of silver and/or the arc path that develops from the silver and other metal dust that has landed on the next lower insulator in the system.

Line Sweeping can see these joint failures. In many cases you will see the corrupted insulator that the conductive metal dust has landed on, or the small carbon path that has started to burn the surface of the next lower insulator. The eventual generation of high heat, smoke and toxic Fluorine gas, which is also highly corrosive, spells the end of anything in the system with which it comes in contact, including your lungs.

Line Sweeping will also let you know if your antenna tuning has slipped, due to any of a number of problems on the tower. A "favorite" is when some goof mounts another antenna in your aperture without telling you.

Other things that *do* happen: a giant buzzard bends your elements; slot covers rot off and wet minerals splash on the gas barrier face, porcelain insulator/centering pins, and the ensuing arcing in the antenna sets the gas barrier on fire; or the three wraps of magic tape dried out and your slug slipped a few inches.

By bringing in your favorite Line Sweeper you can usually catch these things before they turn in to a problem.

What is going on up there?

To Air or To Err

This one is the family favorite of all time: **Do you really like to be off the air?**

Even with off-the-air insurance and a back up facility, is the expense and grief really worth it if you are burnt to the ground? I have heard of only one instance where the station made out on the insurance claim, otherwise the off-the-air part is pretty bad.

This is where Mr. Suit gets to realistically question your competency and could actually have a point there. As I have said before: there should be no space, thing, place or procedure that you do not touch at least one time per year in your plant. If you blow this point you are up for the Engineering Darwin Award – and face it, rightly so.

Sharing the Credit

All in all, here is where you tactfully turn the tables. It should not be a stretch to get Mr. Suit to agree with you that the idea of Line Sweeping that he just came up with is really a great idea to secure ***his*** job, and that you will get right on it.

Even if the reverse psychology does not work with him, he will have to agree with you that in the interest of everyone keeping their jobs this is a necessary expenditure and the station and the owners are best served by the annualization of this activity. – *Radio Guide* –

Shop Talk

by Steve Tuzeneu, CBT

Misc. Tech-Tips and Thoughts

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

Reader Email

In the previous edition of *Shop Talk*, I posted a picture of a tower and asked you to tell me what you could see that was wrong in the photo. I got three responses. The first one was from Craig Seelig, who spotted the problem. Yes, Craig, there is no drip loop. Good job!

Craig wrote: "It's hard to tell for sure but I don't see a 'drip-loop' on the feedline. Also, I don't see a ground bond of the feedline to the tower nor a ground buss."

Thanks – Craig R. Seelig, PG025682, WA3ZCR

I also heard from a good friend of mine. His name is Sid. He noticed other problems:

Hey Steve: Saw your article in Radio Guide ... a well-written article. The photo you posted made me gasp a bit. That ice shield is not going to protect the coax line from anything that hits the roof and rolls down. It should have extended down to the roof. Also, it's a bit difficult to tell from the photo, but it looks like there's another wire, possibly a ground, which was bunched with the coax, and which possibly attaches to the tower. Hopefully it's bonded and not just clamped on.

Sid Schweiger – IT Mgr., Engineering, Audacy Boston

Thanks, Sid, for the kind words about my column. I appreciate it. As for that ice bridge, they had nothing before what was recently installed. So, it is an improvement over what was there.

I got another email from another engineer: Michael DeLarosa from Illinois. Michael also responded to my request for thoughts on Clean Feed.

Good afternoon, Steve:

Love reading your articles; always informative and insightful.

Picture question: I see three things wrong with this picture. Not a big enough drip loop on the Heliax, and the lower supports for the ice bridge don't seem to be placed properly. Looks like anything of any weight falling from the tower will collapse that ice bridge. If that is white paint (can't tell if it is a painted or stainless tower), the bottom section of that tower should be aviation orange.

Cleanfeed: I use it and I love it!

Pluses: its free, studio quality sound from anywhere in the world you have Internet access (cell phone hotspot works well), simple to use, and did I mention that its free.

Minuses: access code works for 24-hours. Also there is a delay, sometimes as much as a second. Which means when doing remotes or ball games, no headphone monitoring of air or the feed coming back from the studio (at least while you're talking). If you have multiple guests on one session, it can get frustrating with people talking over one another because of the delay.

My laptop bag contains a SoundBlaster Live external sound card. Plug in a quality mic (I use an SM58), and you're ready to go. At the studio, program is fed into the Cleanfeed computer for monitoring. I have my Cleanfeed output wired directly into a NexGen switcher. That way no matter where I am, I can use my Datto connection to bring up a studio computer, remotely press a switcher button, and I am on the air – no board op needed.

Michael DeLaRosa (Michael Rose) – CBRE

Market Engineer – Quincy / Hannibal

Thanks Michael, for your kind words about my column. Thanks also for your thoughts about the tower and Clean Feed. You are right, there's no drip loop to speak of. Yes, the ice bridge should have been a little better, but it's better than nothing. The tower was just "painted." It's a galvanized tower. Because it is shorter than 200 feet, no lights or paint are needed.

Five Seconds of Fame

I like to watch *This Week in Radio Tech* with Kirk Harnack as often as I can. When I watched episode 606, I heard my name and saw my column on the show. Thanks,

(Continued on Page 36)

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Shop Talk

– Continued from Page 34 –

Kirk, for my five seconds of fame. He even pronounced my last name correctly. Extra brownie points for that.

EAS Security Advisory

In case you didn't get it, here is an email I received from the FCC:

Emergency Alert System (EAS) Participant:

On August 1, 2022, the Federal Emergency Management Agency (FEMA) issued an advisory on a potential vulnerability in certain EAS encoder/decoder devices that have not been updated to most recent software versions **(https://content.govdelivery.com/accounts/USDHSFEMA/bulletins/3263326)**. FEMA observes that if EAS devices are not up-to-date, an unauthorized actor could issue EAS alerts over the EAS Participant's infrastructure.

The Public Safety and Homeland Security Bureau (PSHSB or Bureau) of the Federal Communications Commission has released a Public Notice **(https://docs.fcc.gov/public/attachments/DA-22-828A1.pdf)** advising all EAS Participants to take steps to ensure the security of their EAS equipment. PSHSB has previously warned EAS Participants about this vulnerability and encouraged them to secure their EAS equipment by installing current security patches and using firewalls. The Bureau again urges all EAS Participants, regardless of the make and model of their EAS equipment, to upgrade EAS their equipment software and firmware to the most recent versions recommended by the equipment manufacturer and secure their equipment behind a properly configured firewall as soon as possible.

In addition, the Bureau urges EAS Participants to take the following steps to improve their cyber hygiene:

- Install software security patches issued by the manufacturer as soon as they become available.
- Change default passwords.
- Continually monitor EAS equipment and software and review audit logs to detect and report incidents of unauthorized access.

Review the list of recommended best practices to address potential data security vulnerabilities issued by the Communications Security, Reliability, and Interoperability Council in 2014, which are available at: https://transition.fcc.gov/pshs/advisory/csric4/CSRIC_IV_WG3-EAS_SECURITY_INITIAL_REPORT_062014.pdf

Under the FCC's rules, EAS Participants are responsible for ensuring that EAS equipment is installed so that the monitoring and transmitting functions are available during the times the stations and systems are in operation. Failure to receive or transmit EAS messages during national tests or actual emergencies because of an equipment failure may subject the EAS Participant to enforcement.

The Bureau thanks you for your efforts to ensure the continued effectiveness of EAS.

Debra Jordan

Chief, Public Safety & Homeland Security BureauFederal Communications Commission

Engineers and Communication

Earlier in this column, Sid Schweiger complemented me on how well I write, which brings to mind an observation. I know of engineers who are poor writers. If you are a contract engineer who deals with radio station owners, you really ought to have a good grasp of the English language. Some of these same engineers who are poor writers are also on Facebook. The whole world can read what you write on Facebook. If your writing skills are lacking, it will make a really bad impression on any clients you have or might get in the future. I have to cringe when I read one engineer's posts on Facebook. He writes like a high school dropout from West Virginia. As an engineer, you make yourself look really bad when your writing and communication skills are less than stellar. I wish I could tell this guy to go to night school and get a better grasp on English, grammar, punctuation, and spelling. Over the years I have learned to be a better communicator. There used to be a commercial on TV that said: "People judge you by the words you use." That is so true! If you talk or write like one of the Beverly Hillbillies, you might not get that new client, and your current clients will think you're not a professional worthy of your rate. Just remember: First impressions are important. Would you trust an attorney who sounded like Jed Clampett?

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

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

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

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Tips From the Field

Building a Radial "Sniffer" – *Part 2*

by Roger Paskvan

In the last issue, we showed you how to build a neat little device to sniff out radials that are buried around your AM towers. Some reader emails requested the type of diode to use, which is a 1N34A small signal diode. These are the germanium type and operate at 0.3V making the instrument more sensitive. Regular power rectifier diodes will not work.

Finding Your Radials

A tower has 120 radials, made of #12 copper wires that are one quarter wavelength long, equally spaced around every AM tower. There are 120 radials in a 360 degree circle, each radial is spaced every three degrees around the tower. The radial length varies, but it is equal to the height of your tower. Before you begin digging, use a cable locator to find all existing coax feed line runs. You do not want to cut any buried feed lines.

Pick an entry point for your new coax cable run between two adjacent buried radial wires. This path should come from a direction that favors the shortest coax cable length, yet will not cross any of your existing buried radial wires. You will be locating the ground radial wires on each adjacent side of your selected new coax path. Stake out the full length of each of these two adjacent radial wires, digging down to them for verification at selected intervals, from the tower center to the wire ends.

Before you start walking all over looking for these two selected radial wires, do some simple Trigonometry to calculate the adjacent spacing between the wires at their ends and in the middle. At our frequency, 1360 kHz, for example, the radials are 181 feet long. Knowing three degrees is the angle, and it's 181 foot length, you can calculate how far apart the wires should be at 90 feet and 181 feet respectively.

The Tangent of three degrees is multiplied by the wire length, providing the distance between the wires at right angles (.0524 x Length = spacing) Knowing the approximate spacing between the selected wires will be a big help when you are electronically sniffing for these buried adjacent wires.

Working the Sniffer

Starting in the middle, take the radial sniffer and hold it vertically right at the ground level. You should see a meter reading of 20-40 uA. Sweep back and forth until you see a dip in the meter reading. The dip should be right above the wire buried in the ground.

When you are confident that you have located the wire, take a shovel and carefully dig down and verify that the wire is there. Most radials are about six to eight inches below the surface. Now move ahead toward the end in ten foot increments and repeat the above process.

Each time you locate the wire, put an orange flag in the ground. Eventually you will have a straight row of flags that has unveiled the location of one radial. When you have reached the end, move back to the middle and start the same sequence toward the tower.

Proceed until you reach a distance from the tower that you notice two wires a few inches apart. From this point you will have to carefully hand dig to the tower over the buried wires.

It's Easy From This Point

You now have one radial exposed and must locate the second adjacent radial. Start at the middle again and measure the calculated right angle distance from the above Tangent equation to get you in the ball park. Utilizing the radial sniffer, start sweeping until you locate the adjacent wire. After digging down to verify, go through the same procedure all the way to the end marking every ten feet. Locate and mark the entire adjacent radial. When you are finished, it will look like a race track with flags outlining the edge limits of your new coax path.

On the big day, we carefully trenched in the new cable to put a closure to this process. To help in the future, my son Troy went to the local hardware store and bought 200 large washers. As he pulled out the marking flags along each radial line, he dropped a washer on the ground, stepping on it. The idea was to have a buried row of washers, in line with the two radial paths, that could easily be found with a simple metal detector should the need for this location ever be necessary again. Just another clever idea from the family tree in small market radio.

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

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Tower Topics

High Intensity Tower Light Project – *Part 3*

Ask Questions and Read the Fine Print

by John L. Marcon, CBRE CBTE 8VSB Specialist

From the second part, we looked at the four different sources of the LED tower light system. It came down to two brands: Dialight and Technostrobe. Lumenserve, Slatercom and Unimar are all dealers of the Dialight system while Drake is the provider of Technostrobe. Dialight has been in the LED business much longer than Technostrobe. We also looked at other brands but they did not pass our requirements. At any rate, as a broadcast engineer, we simply have little knowledge of high intensity systems, let alone high intensity LEDs. The best way forward was to ask as many questions of as many people as we could. We were dealing with two groups of people to inquire from: the vendors and the owners. The first set of questions below were for the vendors:

1. Are the manufacturers and vendors legit?
2. What is their record of accomplishment?
3. What is the total labor and material cost?
4. What is the warranty on the lights?

will share it right away. Likewise, they also endorse a product if it is a good one. Sometimes people are kind of regionalist and they tend to promote those companies from their state or city. The third thing I thought of is a financial statement. A large enough company could be publicly listed and they submit quarterly financial reports. You can more or less determine from the report how the company is doing in the present and in the long term. Dialight is one such company. Technostrobe is not a listed company but there are websites that provide some information about them and one of them even shows their past income. The vendors, on the other hand, are actually just small companies and there is scant data on the Internet about them besides their webpage. One possible source of information about them is from tower owners that they already have worked with.

For comparison, I entered all the questions and the answers from the vendors into an excel file similar to the one in **Figure 1**.

Figure 1: Comparison between the four dealers.

Company		A		B		C		D	
Contact person									
Prices									
Conduit options		Old conduits	Hybrid Cable	Old conduits	armor cable	Old conduits	New condts	Old conduits	New condts
Materials									
Labor									
subtotal									
Freight/Shipping cost									
Optional(Inspection commisioning)									
Total price(not including taxes)			$ -	0	$ -	$ -	$ -		
Important information:									
1	LED brand	Dialight, 270k cd white		Dialight, 270k cd white		Technostrobe(Canada) 270k		Dialight, 270k cd white	
2	Warranty on lights	5 yrs-manufacturer		5 yrs-manufacturer		5 yrs-manufacturer			
3	days quote valid	30 days fr 3/4/22		30 days		10 days fr 1/28/22			
4	Customer list, 1 yr and 3 yrs	yes		yes		yes			
5	Have tower crew?	yes		yes		yes			
6	Average time between service	15		??		no service in 3 yrs V2			
7	LED lifespan	24 yrs		11		20 yrs			
8	Install time & off-air time	10 days		2-3 wks		9 -11 days, min downtime			
9	taking down old lights?	yes		yes		yes			
10	Voltage*, Power consumed	208-277V,220W wht day		208-277V/220W wht day		120/208/240V, 135W day			
11	Lightning and surge protection	yes		yes		3 step protection			
12	Lights only on tower?	No		No		Yes			
13	Installation warranty	1 yr		1 yr		90 days			
14	Forms to apply	FAA 74-60, FCC form(VTN)		FAA 74-60, FCC form(VTN)		FAA 74-60, FCC form(VTN)			

5. Do they have a tower crew?
6. What is the Lifespan of the LEDs?
7. How long is the installation and off-air time?
8. Voltage, phase (single or three) & power consumption?
9. Any Lighting and surge protection?
10. Is there an installation warranty?
11. Can you provide a customer list?
12. Are you taking down the old lights?
13. Are the electronics on the ground and not on the tower?

I submitted this list of questions to the vendors and they all submitted their answers the next day. However, I also looked at other sources of information about these companies. Google is, of course, the first option and then the second source I thought of was social media like FB. There are engineering groups in Facebook and whenever engineers or owners have a bad experience with a product, they

As you can see, I also included some other items that are not in the questionnaire above, like #3 and #14. Notice also on the Prices rows that there is a "conduit options." The tower has an existing 1000-foot-long metal conduit for the tower light power and communication lines. The existing conduit and wires needed to be checked if they are still OK or not – the pipes could be badly rusting or leaking. The wires maybe have cracking insulation already because of age. The vendors gave an option of installing their own conduit or cable if the old one is not usable anymore. Slatercom has a "hybrid "cable while Lumenserve offers a metal armor cable. The replacement cable costs an additional $9,000 to $10,000 so we carefully examined the condition of the existing conduit.

As we can see from **Figure 2**, the conduits are 1-3/4 inch galvanized pipe and it looks to be in good shape. The 10-inch junction boxes are from Hughey and Philips, which are quality materials. They are also in good condition.

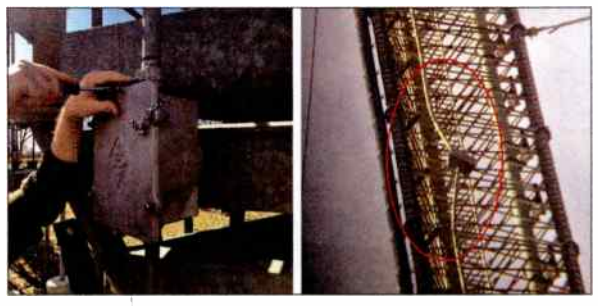

Figure 2. Existing tower light conduits and junction boxes. The bent conduit picture on the right is a bit hazy because it is a picture at 400 ft level taken from the ground.

However, as we can see from the picture above, the conduits were bent at around 400 feet up the tower. There was also another bent section at around 900 feet. We have no idea what happened to these conduits. We showed them to the vendors and they said that the cause was likely loose U-bolts that attach the conduits to the tower. They may have later fell off the tower. They said that they can fix the problem but we do not really know what the outcome will be. It was literally a $10,000 question. We were in a bit of a pickle here but we later decided that, once the crew was on site, we would let them inspect the conduits first to see if they were still viable. If not, then they can just add the cost of the new hybrid cable to the agreed upon total contract cost of the project. Fortunately, after the tower crew checked the conduits, they concluded that they are still in good condition. They also straightened the crooked sections. We saved $10K right there, or so we thought.

On another note, some engineers said there is electricity cost savings with LEDs. However, the power consumption difference between strobe and the LED is not really much – about $74 annually.

One other thing to be noted is that when we purchase a transmitter, we first look at the output power of a transmitter. With tower lights, we think that the vendors would also make a test on the intensity of the light, since this is the one and only "output" of the system. The FAA also specifies the light intensity level as part of their requirement on tower lights. However, the vendors do not test the light intensity. They just assume that since the manufacturer is certified, the light intensity would be OK. So, if you are doing a similar project, do not expect them to do a light intensity measurement.

Other noteworthy items: Dialight has a 5-year *material* warranty on their product. However, the costumer will shoulder the cost of tower climb to replace the parts that are on the tower. The shipping of all the items require a trailer truck and we requested that it should have a lift gate. Otherwise, a forklift will be needed, which is an added cost. The installation warranty (second to the last row) means that if there is a defect due to improper installation, then the vendor will fix it for free. This is different from the material warranty.

Customer References

The next crucial thing is the feedback from the customers. This is where the three companies differ a lot. Lumenserve said they have around 900 installations, Slatercom said they have about 90 and Drake gave me four. Not all of their installs are high intensity. My list of questions for the owners or their engineers- in-charge are as follows:

1. Why did you select this provider over others?
2. Did the vendor stay within the approved timeline/ budget?

(Continued on Page 42)

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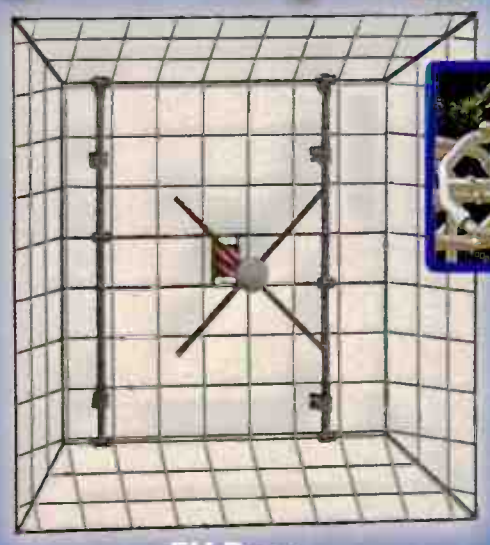

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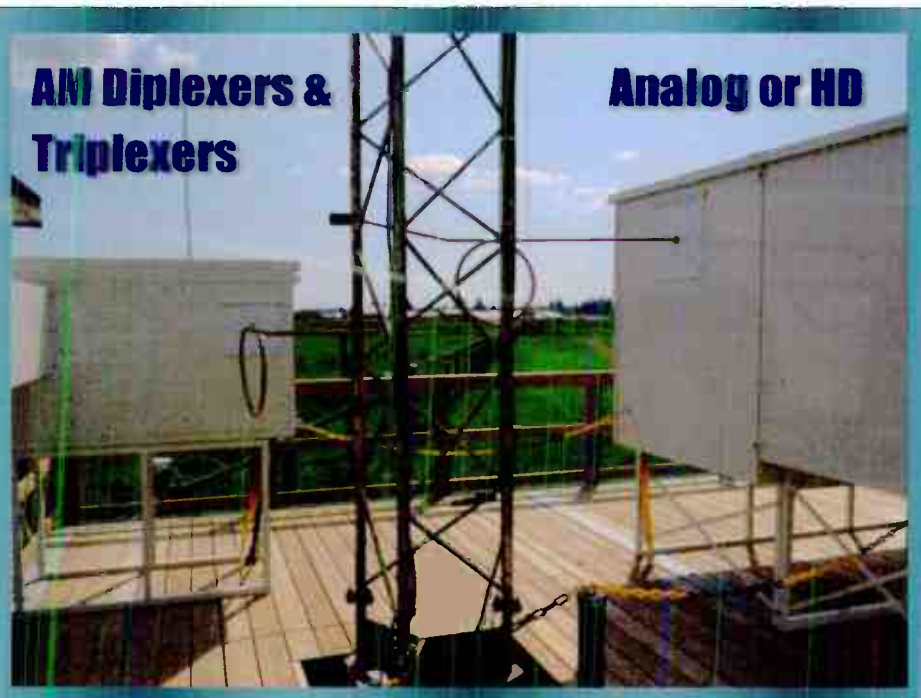

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High Intensity Tower Light Project – *Part 3*

– Continued from Page 40 –

3. How would you describe the performance of the tower crew? (Slow, fast, diligent, etc.)

4. What tasks were you responsible at for completing the project?

5. Would you select the provider again knowing what you know today?

6. So far, have there been repairs? How many and how often?

7. Is there anything else you can share to help us make a decision?

Lumenserve gave me four references, Slatercom also sent four but they said they could provide more if requested. Drake also gave four. I asked them for installs that were done within 3 years, not the older ones. The references were from radio networks, cell tower sites, windmills and from TV stations. Many of the contacts are chief engineers. I sent the questionnaire via email and the engineers were helpful in answering the questions. Some of them even went beyond the questions I asked. It just proved that there are many people out there with a good heart. Each one of them were satisfied with the work of their dealer/contractor and this made it a bit tougher to decide which vendor to pick.

At any rate, we did choose one and, as I have said before, the decision came down to the price. The shipping and installation went smoothly but there was a hitch

Figure 3. Left and middle are the high intensity lights. On the right side is the AOL (aviation obstruction light) on top of the antenna.

when we started to test the lights because the AOL (the one on top of the antenna) was giving a false alarm. The culprit was RF interference from the main antenna that was getting through a circuit board connected to the AOL. Dialight recently revised this circuit board. To fix the problem, they reverted to the original circuit board and improved the shielding of the system. These changes fixed the problem of the false alarm and it has been working fine since they finished the repair on June 11, 2022.

I mentioned the "fine print" on the title. Well, this was about two things. First is the clause on the contract that said, "If any unknown conditions out of control of (vendor), such as unknown tower condition, unexpected weather, then this may cause delays… and as such may add additional costs." This clause is always included in a contract but what we are unaware of are the details of the penalty. There were two days during the project that were very windy and the tower crew stayed on the ground. The vendor then charged us an additional $5,000 for those two days. That is for doing nothing. Essentially, half of what we saved with keeping the old conduit was gone. The second item is the "FOB vendor warehouse" clause on the contract. We usually gloss over this line but the FOB means that once the items were out of their warehouse, we, the costumer, will shoulder any damage. In addition, any other equipment needed to unload the items will be the costumer's responsibility. Luckily, this did not become a problem because we were able to insure the items when it came out of their warehouse.

So, if you are a doing a big-ticket project, make sure all these fine details are well understood.

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

Service Guide Radio Equipment Products and Services

Broadcast Signal Lab

With humble origins as Cambridge Crystals and Cambridge Thermionic in the 1940's, Rick Levy purchased and expanded the enterprise in 1982. As Broadcast Signal Lab, BSL came to include onsite transmitter measurements and calibrations, coverage maps and surveys, annual and periodically required measurements, RF safety surveys and compliance assistance, reports for inclusion with FCC filings, and off-air frequency measurement done from a NIST compliant laboratory.

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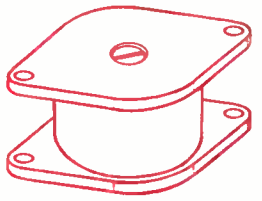

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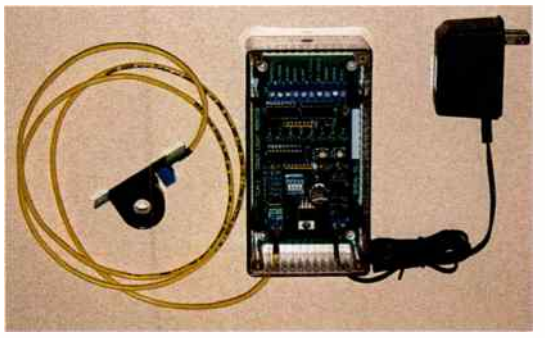

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Gear Guide ——Nautel - Sine Control Technology - Axia Quasar™

Nautel

Nautel Adds 6kW Model to New VX Series

New VX Series, low/medium power Analog FM, increases to 11 models with a compact, serviceable and affordable design architected for long service life and lowest cost of ownership.

Nautel's new **VX Series** of FM transmitters is now being offered in 11 power outputs ranging 150 W to 6 kW. Building on the legacy of the company's proven VS Series, the new analog VX Series offers advanced control, instrumentation, and features in a compact footprint. The architecture of the new Series incorporates state-of-the-art DSP, power supply, and FET technology to ensure robust performance, serviceability, and value.

Advances in Nautel transmitter engineering include an updated RF power chain utilizing a new high voltage FET with superior analog FM performance; the power chain has been mated with a dual core DSP for ultra-clean signal generation. Nautel also adopted Titanium-grade industrial power supplies, which are hot-swappable with easy front panel access.

Control of the VX Series is accomplished via Nautel's new HTML5 Advanced User Interface (AUI), which itself has been the result of a complete re-design over the past few years.

The VX Series offers multiple features and outstanding value:

- A choice of 10 TPO levels ranging from 150 W to 6 kW.
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- Compact rack-mount design, only 20" to 25" depths.
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Sine Control Technology

New Lower-Cost PowerClamp Surge Suppressor for Solid-State Transmitters

The new **PowerClamp HP200-1-TX** ultra-high performance Surge Protective Device (SPD) is ideal for use at broadcast transmitter sites, network studio complexes, and other mission-critical installations.

The PowerClamp HP200-1-TX is ideal for solid-state transmitters that use switching power supplies, as they are especially vulnerable to powerline disturbances. PowerClamp SPDs use a hybrid of multiple technologies to greatly reduce the amplitude of AC spikes and surges that often damage these switching supplies. The new PowerClamp HP200-1-TX is rated at 200,000 surge-amps per phase, and will attenuate powerline spikes and surges to within a few Volts of the AC sine wave.

The Series 200 has more surge-amp capacity than previous PowerClamp units, but costs less thanks to newer production technology.

The HP200-1-TX is for single/split phase 120/240 Volt power; other Series 200 models are available for 3-phase WYE electrical service from 120 to 480 Volts. LEDs monitor the unit's fuses, with Remote Status Monitoring optionally available. Load matching is not required. There is no insertion loss or risk of power cutoff.

A detailed datasheet is available at: **https://henryeng.com/powerclamp/**

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Axia Quasar™ AoIP consoles are the ultimate AoIP Broadcast Mixing Consoles, putting the power at your fingertips for next-level content creation. Including XR and SR models—the Quasar family offers broadcast engineers and less seasoned board operators alike boundless production possibilities, modularity, scalability, and workflow flexibility.

Quasar XR is our top-of-the-line mixer featuring extensive metering built into the surface right where it needs to be – on every channel display and next to each fader, as well as on the monitor module. These LED meters allow users to live mix rather than merely confidence monitor, giving users active control over their environments for the best possible outcome.

Quasar XR offers Quasar Soft and Quasar Cast remote control and monitoring solutions, delivers full integration with Telos Infinity® IP Intercom products, and adds support for new Quasar Accessory Modules, along with numerous other powerful features. This advanced scalability addresses new workflows, like Work from Home, and gives broadcasters more flexibility when it comes to the number of channels they need in their Quasar Engine, starting at 16 channels and scaling up in blocks of 16 channels, up to 64 channels.

Quasar SR delivers all the power, ergonomics, industrial design, and star appeal of our flagship Quasar XR console. Quasar SR is not reserved for the most knowledgeable broadcaster but is approachable to any board operator thanks to its streamlined surface design. Quasar SR fader modules are non-motorized, there are fewer, larger, and easier-to-reach buttons on each channel strip, and features confidence class metering.

Quasar Soft is a customizable remote control solution that lets you control the Quasar surface from your browser. You can generate up to eight HTML-5 pages and configure them to display any of the 64 input channels. Quasar Soft comes standard with Quasar XR consoles and is an optional upgrade for Quasar SR consoles.

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The Radio Guide Event Register

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https:www.wi-broadcasters.org

AES New York 2022
October 19-20, 2022
Jacob Javits Center, New York, NY
www.aesshow.com

Ohio Broadcast & Technology Conference
October 28, 2022
Columbus Convention Center – Columbus, Ohio
http://www.mbmtc.oab.org

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

2023 NAB Show
April 15-19, 2023
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https://nabshow.com/2023/

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https://nrbconvention.org

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