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January-February 2016 – Vol. 24, No. 1

Tower Down

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noun

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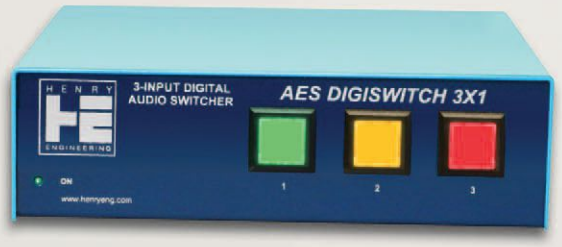

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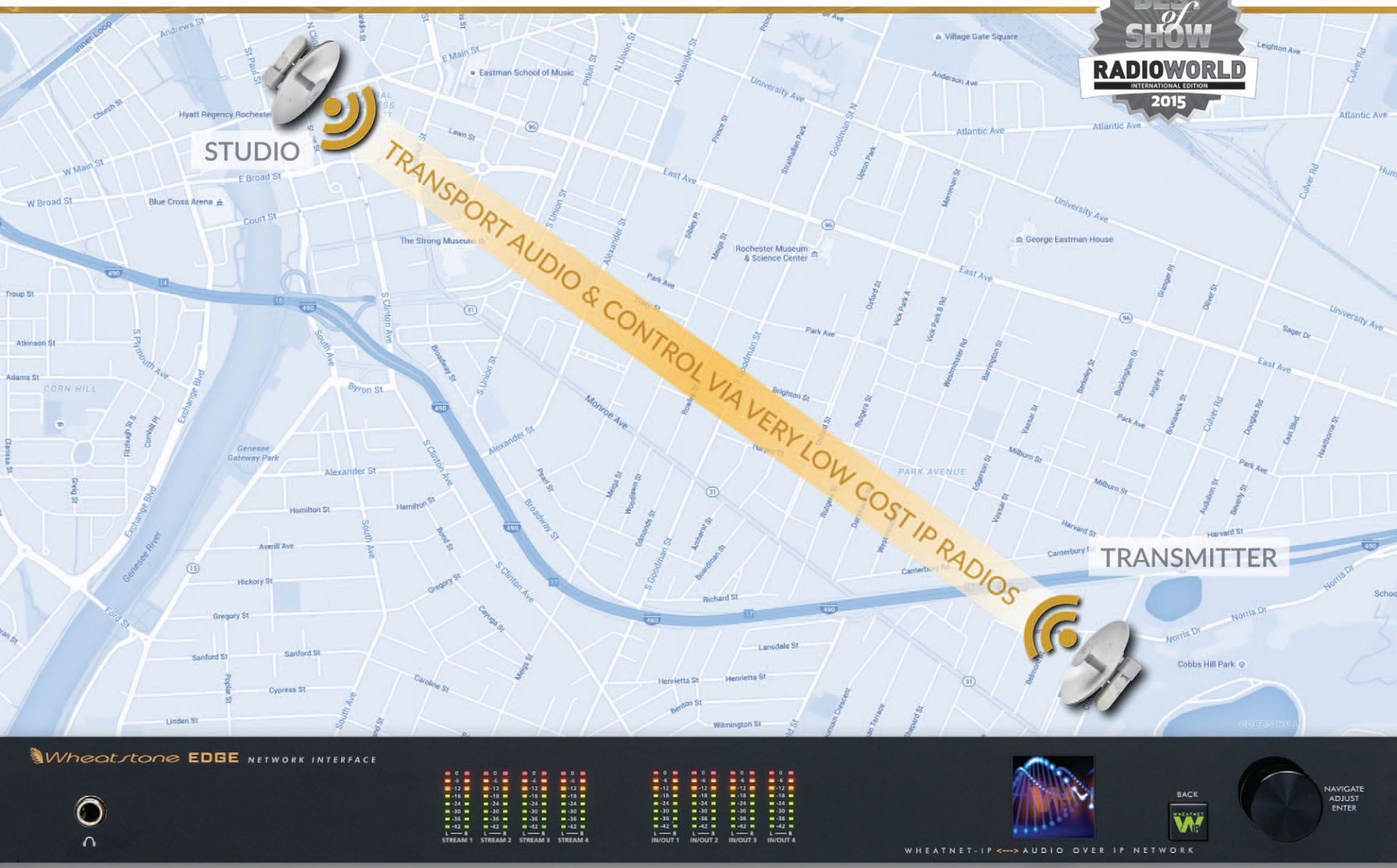

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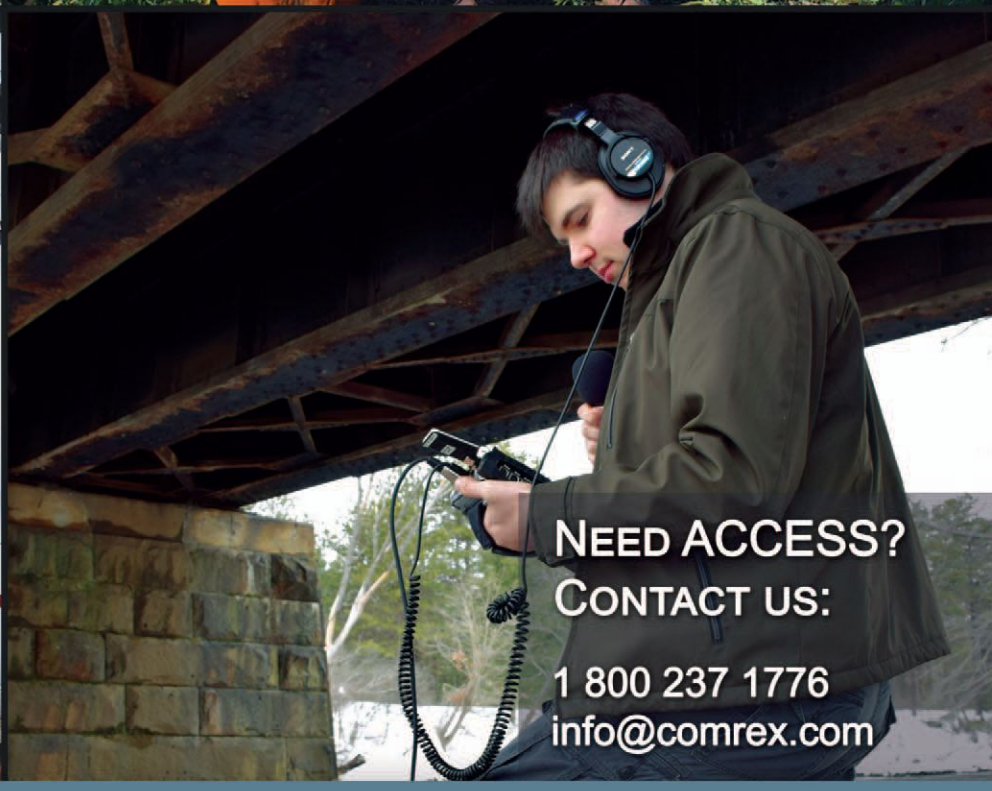

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Cover Story

Tower Down!

by Scott Schmeling

In mid December 2016, we had a "situation" developing with some stations in western Minnesota. On December 12th we were blanketed in a thick fog. And even though it was above freezing at ground level, it was colder higher up the towers. After three days the fog switched to more of a freezing mist – and we had strong winds.

We were pretty sure things were icing up because the VSWR Foldback was kicking in on some of the transmitters. In one case, however, we had auto-power turned off because it had not been functioning properly. For that transmitter we had to dial-up the remote control and manually lower power.

About 7:00 p.m. on the 15th, that transmitter shut down and neither Keith Wright (Operations Manager and my assistant) nor I could bring it back up. Past experience had shown us that, when that happened, it usually took a little tuning and loading adjustment to get the transmitter up and running again. Keith said he would make the 40-mile drive. But when he got there he called and said, "we've got a lot bigger problem than ice!"

He had driven as close as he could. There was a fair amount of fresh snow on the ground and strong winds, but more disturbing was the tangle of guy wire cables across the path normally taken to our building! Then he noticed what looked somewhat like a tower section – he sent me a picture. It was painfully obvious that this transmitter was not going on tonight ... we had tower on the ground!

A Bad Problem – On a Bad Day

What followed was a series of calls among Ownership, Management, and Engineering, plus a text to Kevin the tower guy. We started considering our options for getting the station back on the air.

The next morning, as I headed in that direction, I started going over multiple scenarios and playing the "if/then" game in my head – IF this is what we find, THEN we need to do this to get back on the air.

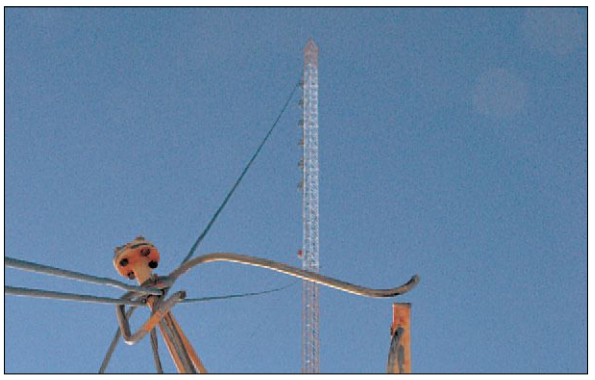
Let me pause for a second here to note a couple things. First, I tend to be more of an optimist than a pessimist. I guess you'd say, "Hope for the best and be prepared for the worst." Second, in 2011, I had written about our 12-bay antenna at this site "burning out" and fabricating a 6-bay antenna with the "good parts."

One extremely remote possibility I kept coming back to was that our 6-bay backup antenna might still be up in the sky. With that in mind, I called Luke Richter of MVTV (Minnesota Valley TV), a TV cooperative that had, in the last few years, been installing systems and providing wireless broadband Internet to rural areas in southern and western Minnesota. I knew Luke because they have systems on some of our other towers. I told Luke that at least *part* of our tower was on the ground, but I had no way of knowing how much was down or how much was left standing. In the unlikely event our backup antenna was still standing we would be needing Internet service – would that be possible and how quickly could he make it happen?

The primary antenna destroyed.

To my great surprise Luke said they were planning on working on the other tower on that same land! They would be there and would be able to get service *today* if we needed it!

I met Kevin and Keith in Marshall and we headed out. As we approached the site it was cold and the snow was blowing. But as we got closer I was able to see the top of what was left of the tower. That "extremely remote possibility" had become a reality! The 6-bay was all there, intact. The tower had broken off a mere *ten feet* above it. Yes, I said a quick prayer of thanks, and we drove up the hill.



6-bay backup antenna remained standing.

The sight that met us at the top of the hill was indescribable. Guy wires were tangled and scattered all around, as were twisted and mangled chunks of tower. One section appeared to be about 200 feet folded in half. That piece missed the transmitter building by roughly 20 feet! There were five or six other tower "chunks" on the ground. The most impressive looked like a single 20-foot section that must have slid down the guy wire all the way to the ground. On its way down, cross-members were completely separated from one leg! What we saw was that separated leg leaning against the guy wire while the other two legs were still entangled. Even Kevin, who has nearly 30 years of tower experience, had never seen anything like that!

The only apparent damage we could see was a piece of angle iron from an ice bridge had penetrated the roof. Inside, everything looked good. At the RF Patch Bay we switched the feed to the 6-bay antenna and slowly brought the transmitter up to power. So far ... so good. Except for a pressure leak on the line, everything from transmitter to antenna appeared to be in good condition.

Part down – part left standing.

Obviously, the STL was inoperable – the antenna was a twisted mess on the ground. No STL equals no audio. That's where Luke came in. If we could get Internet, we ccould plug in a codec, connect to the studio, and have audio. Considering over half the tower was on the ground, we were starting to feel pretty good right about here.

Luke and his crew were there already. They went to work getting Internet service to us. Meanwhile, Keith and I went to our Springfield studio where we had a Comrex Access codec that was only used occasionally and could be "sacrificed" for the cause. Since the IP address of the unit being connected to (at the studio) would be the same, no configuration was necessary.

On the air with a Comrex Access.

Next, we made a quick trip to Marshall to do a little audio re-routing, then back to the tower site. When we arrived, Luke was just finishing up with the broadband installation. What happened next was "smoother than a fresh jar of Skippy!" We turned the transmitter filaments on, mounted the codec in the rack, connected power and network, and within seconds we could see audio on the codec meter display. A simple move of the XLR cables and we were ready to light it up. Plates ON – little tuning and loading – and we were *ON THE AIR!*

I said a few more prayers of thanks while I drove home ... and again when I went to bed. Thank you, Lord!

The only issue so far has been a dropped connection twice. The second time we wired the "connect" closure to a normally closed contact on the remote control. If necessary, now we can reset the connection remotely.

Except for part of the tower coming down, so many things went *right!* First and foremost, the 6-bay was still standing. Add to that, the building, the transmitter, and the line to the antenna were not severely damaged. Luke was able to get Internet service to the site right away and we had a codec we could relocate. If any one of those factors had been different it might have been *days* off the air. Instead, we were back on in roughly 22 hours!

I guess you could say it was also very lucky that we had salvaged six bays to build a backup antenna. (See, you should *never* throw anything away – only partly kidding.)

Have a great 2016, and ... keep it between 90 and 105.

Scott Schmeling is the Chief Engineer for Minnesota Valley Broadcasting. You may email him at: scottschmeling@radiomankato.com

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Studio Site

Connecting With More Than Equipment

2016 Calls for Us to Reach Out to Listeners

by George Zahn

Last issue, we addressed the idea of a webcam in studio. As we look forward to the NAB 2016, the slogan is "Unleash," including connected technologies, audio streaming, and more interactivity with our audience. We continue the "outside the box" ideas that go beyond just having the best, latest, or most creatively connected studio equipment.

In this New Year, many stations are already running with, or just behind the pack, in social media interaction and accessibility, but some are still taking their first baby steps. As our employees and listeners get younger and more "connected," and as the Baby Boomers continue to become assimilated into new technologies, all stations can advance their ratings or at least forestall losing more listeners to other streaming and on-demand services.

It may seem daunting to the beginner, but sometimes, it helps to create a checklist that will help our radio services compete with Pandora, Slacker, Audiovroom and other "smart" music services. Most listeners may not always want to hear only their favorite songs and artists. They want new experiences and music to challenge them as well, so even those locked into Pandora will now and then drift back to radio, and if that occasional venture to the FM or AM dial is not fun or satisfying, it perpetuates the vicious circle that can challenge the future of radio.

Tablets, Phones, and TVs, Oh My!

How do we start taking steps to lure those listeners back and keep our radio listeners' lifeblood? The new concept that we must embrace is that listeners are receiving our product on more than just a simple radio receiver. Can your signal be found on smart phones, tablets, smart TVs, or other mobile devices? Additionally, listeners are becoming more demanding for some type of interactivity. Radio is the ultimate one-on-one medium, and now we have to do more than just present sound as a companion.

There are some simple things we can do in our studio and operations that will be welcome "value added" facets of our service. Many of these can be done at relatively low cost to start out.

Is your station using your website to create playlists or "recently played songs" listings on your website? If your music is largely on a digital audio delivery or automation music system such as Wide Orbit, RCS NexGen, Audio Vault, ENCO or the like, most of the work is already done. The metadata (information such as song title and artist entered into the system when the digital music data is added) can be used to place a list of songs on your website. Our station, WMKV, actually tweets each song title all day long in addition to posting the last several songs on our website. If you have a station which is not using automation or digital delivery, or have no major budget, and playing music almost solely from CDs or turntables, manual entry via keyboard is minimally intrusive on a host's time, and can be a great service to listeners. Anymore, pre and back announcing are simply not enough.

Protect Your Automation

It's important to be cautious about how the information from the automation system gets to the Internet. You absolutely do not want your automation system directly connected to the Internet. There are ways to transmit the metadata from your automation and get it to a computer that tweets or updates your website. It is critical to not use your same on-air automation computer to stream or send information directly to the Internet. As I have pointed out in past articles, this connection can leave your automation subject to hijacking by hackers who can hold your entire radio operation hostage.

Many listeners don't yet need a totally "immersive" media experience across many platforms, including social media, video content, and more, but getting a start now on offering some form of interactivity will keep us closer to the leading edge of the wave. You may even find ways of monetizing some of the new facets to help them pay for themselves by adding new on-line media clients or by adding some social media exposure to existing on-air clients.

Some of the aforementioned automation systems also offer audio streaming modules for websites as well. There are also a large number of affordable audio streaming services available and you can control costs by selecting both the quality of the content (48 kb/sec streaming is a pretty good starting choice for music), and the number of listeners you wish to allow at any one point. The lower the bit rate (resulting in less sound quality), the higher the number of listeners you can have at any point, and vice versa. Most plans have levels of bandwidth than can be increased or decreased month-to-month as you learn what your on-line streaming listeners' habits are.

There's an important factor you should consider if you're streaming audio for the first time. There will be additional streaming licensing costs for ASCAP, BMI, and SESAC. Some stations have chosen not to stream audio for that reason, but it is a cost worth exploring.

Is There An App For That?

Another form of outreach that has helped WMKV is working with outside developers to create our own smart phone and iPhone apps. After some initial setup including supplying graphics for the app, we now offer free apps at the iTunes and Google Play stores. In our case, the company that we stream website audio through also has helped with the phone apps for a small annual fee.

If you don't necessarily want your own app, there are some other radio outlet smart phone apps. One such is TuneIn radio. You can register your station and request a listing at *www.tunein.com*. An interested listener with the free TuneIn app can simply search for your station name and listen on their phone or tablet. TuneIn and some others are even available as apps on smart TVs, and streaming video/digital boxes such as Roku.

Here's another caveat that can be a rude awakening for smart phone listeners and viewers. After years of massive promotion battles between the major cell phone carriers in which unlimited data was almost a given, those same companies are starting to throttle the "all you can stream" buffet and are now selling packages with prices based on data use with significant extra fees for going over your monthly allotment. On all of our promos touting our on-line apps or TuneIn, we stress that app listeners consult their data plan.

Dirty Little Smart Phone Secret

This data stream is actually a cash flow stream for the cellular carriers. In fact, you may have read or heard about another "dirty little secret" in smart phones. According to reports on National Public Radio and several organizations such as *www.activatefmchip.com* and *freeradioonmyphone.org*, there are already built-in FM radio reception chips in most smart phones. The apparent problem in the U.S. is that more than two thirds of those phones do not have the FM radio chip activated. This would be a major point of free connectivity for FM broadcasters to reach their local listeners.

The NAB is advocating activation of the chips, and one theory purported by Jeff Smulyan of the NAB (in the NPR report on *All Things Considered* 4-17-2015) for the chips not being activated is that the free radio does not use streaming data. That gives the phone manufacturers and the cell carriers less financial incentive to turn the chips on, given the data streaming income potential. Smulyan indicates that HTC and Motorola phones may have ways to activate the chips. The argument is more than economic here. These FM chips in many third world countries allow phone owners to listen to free local radio. Public safety and emergency communication are cited as additional reasons to activate them in the U.S.

All of the tech debate notwithstanding, here are some simple things our stations can do to make ourselves more accessible and interactive for the next generation of radio consumers:

1. Look into streaming or access via a station app or services such as TuneIn Radio. make sure you know the rights fees involved.

2. Create weekly/daily podcasts of popular shows or segments. This works well with more discussion or information based content. Make sure you own rights to the content you podcast.

3. Encourage your hosts to create regular weekly or daily blogs. Doing one blog a month won't cut it – you want visitors to your website on a regular basis and fresh material brings them back more often. On your website, there are also some barter services that allow you to place a daily sudoku or crossword on your site in exchange for a few small ads on that page.

4. Go beyond your website and venture out onto Facebook, Google+, Twitter, MySpace or others. A simple Facebook presence is free and only takes a little time. If just getting started, it may be best to tackle and conquer one platform, then add others or use a multi-platform paid service such as HootSuite which takes your content and places it on multiple platforms for you.

5. Try to incorporate some form of video in your website or other offerings. We have used video from special events on our Facebook page. You can do a basic station tour or other short video feature. Make sure you know the space needed for video on your site. Video obviously chews up more storage than audio.

6. No matter what interaction you're doing, make sure you promote it on-air, in print, and in social media! The idea is to take existing listeners who want more affinity and "connectedness" to easily find these features. Those same features might also bring new listeners to you through the social media platform.

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*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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Tower Topics

Limiting Static Voltage on Vertical AM Radiators

By Phil Alexander

Few things are as much of a "welcome mat" for lightning as broadcast towers. Some of them stick the invitation as high as 2063 feet in to the air and, when the storms roll in, the engineers just take a breath and wait for it. Still, there are ways to reduce the number and severity of the hits. In this article, Phil Alexander focuses on AM towers and what can be done to protect the facility.

Since the first use of elevated antennas we have recognized the hazard of lightning strikes and tried to avoid them. Of course, once we recognized the value of series excitation of vertical radiators with their insulated bases, and deployed more and more of them, the problem became clearly pronounced.

While dissipation devices may reduce the number of strikes, even preventing some of them, some lightning strikes have a current large enough to overwhelm any protective device known to man. The only safe strategy is assuming that no amount of dissipation will prevent a massive strike in all cases. Thus, mitigation is essential because, sooner or later, any vertical radiator will conduct a massive strike.

Good Lightning Receivers

One common misconception equates lightning with a huge flow of direct current. A lightning strike is a dampening, alternating current, generally oscillating between ground and cloud at a rate in the LF and VLF radio frequency spectrum with harmonics well into the MF range. The result is that good transmitting antennas are inherently good lightning *receiving* antennas.

To fully understand our task of lightning strike mitigation we must confront and understand the implications of this fact.

No amount of DC grounding will prevent damaging strikes on an efficient AM transmitting antenna. If it did we all would be using grounded, shunt excited radiators. The need for static discharge devices on shunt-excited antennas is sometime overlooked, with very serious consequences.

Defense

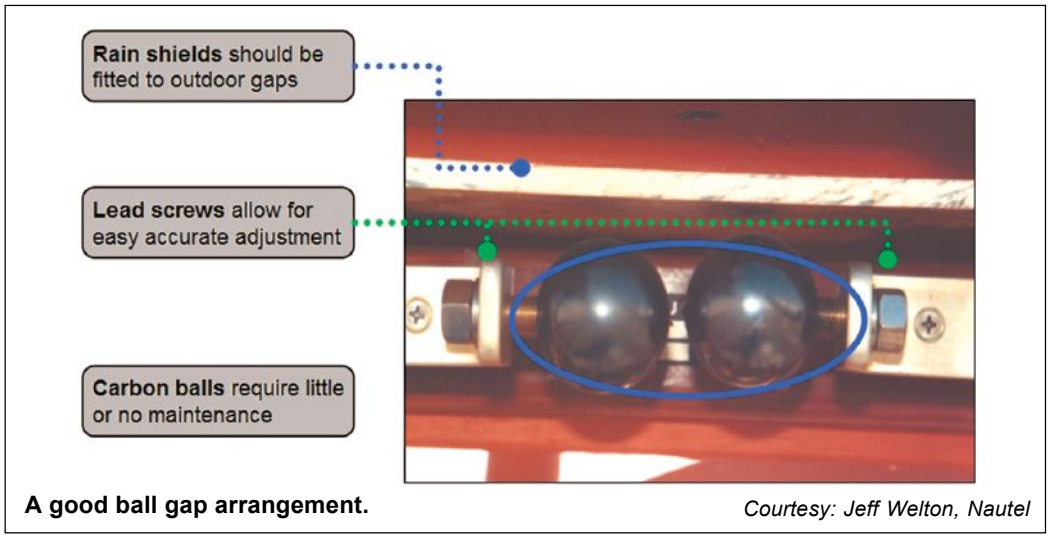
At tower bases, static ball gaps are the first line of defense, and perform two valuable functions.

First, they limit the static charge build up on the tower by furnishing an easily ionized path for accumulated static discharge, thus preventing strike potential buildup in most cases. Second, they tend to bypass most of the lightning current flow directly to ground at the tower base, reducing the risk that a lightning strike will overwhelm other mitigation and protective devices in the transmitting plant.

Ninety years ago Frank William Peek determined a spherical shape had the most repeatable arcing characteristics. Thus a ball gap could be set reliably as a static discharge lightning arrester, and the tower base static ball gap was born, based on Peek's formulas. At the time it was thought a gap between two balls would be relatively insensitive to humidity, although modern research has shown a significant humidity effect.

The Right Distance

Correctly set, the ball gap spacing is adjusted for arcing in humid air at a voltage just above the maximum voltage that will be developed by transmitter operation – with positive modulation exceeding the FCC 125% modulation limit to accommodate brief overshoots that are not prevented by normal audio processing techniques. *Thus, the aim is arcing at the lowest possible voltage that will never be achieved during a station's normal operation.*



A good ball gap arrangement. *Courtesy: Jeff Welton, Nautel*

One of the most common errors with ball gaps is setting them too far apart, making them far less effective, especially on low power installations.

Another important factor is the correct placement of the balls forming the gap. Both balls should be located in the same horizontal plane so that liquids or semi-solids do not drip across the gap, thus shorting the tower base to ground.

Just as you might imagine, modern, low voltage, solid state transmitters are more sensitive to static charges, thus additional equipment such as that made by Polyphaser Corporation and other similar static mitigation equipment may be necessary for optimal protection. However, correct adjustment of spark gaps is the beginning of AM station lightning protection.

As a static charge builds on the tower, producing a voltage above the maximum operating potential, a static arc ionizes the gasses in the ball gap, briefly acting as a very low resistance, discharging the accumulated static charge of the tower. Minimum spacing of the static ball gap at the tower base and secondary gaps at other locations limits the potential in the rare event of a direct lightning strike on the tower.

Not so good - liquids or ice could easily close this gap.

Again, the objective is getting the gap as small as possible yet wide enough that any arc that occurs will self-extinguish once the tower's static charge has drained away.

How Wide Should It Be?

There are many ideas about how to set the spark gap width. They range from the "credit card method," which may work on some average one kilowatt installations with quarter-wave towers, to "hitting it with a hammer until it arcs and knock it open with one hammer hit in the opposite direction" (by the way, this is *not recommended!*), to actually calculating the voltages and resistances encountered at the tower base.

A spreadsheet, courtesy of Nautel Corporation, allows calculation of the maximum transmission voltage at the tower base and the arcing voltage of a gap setting depending on the influencing physical properties. You can download the spreadsheet here: http://www.thebdr.net/articles/steel/twrs/gap.xls

While the positive modulation limit established in the FCC Rules is 125%, instant peaks may often exceed this value for very brief intervals in normal operation as a result of processor overshoot. Thus is it wise to assume a positive peak of 140% or 150% and allow a safety factor for preventing arcs during normal operation. This is especially true with talk program operations where sharper, more energetic peaks may be more common.

Phil Alexander CSRE, AMD, is a veteran broadcast engineer based in Indianapolis, IN. Contact Phil at dynotherm@earthlink.net

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Depending on its ordered configuration, the OPTIMOD-PCn can run multiple instances of monophonic or stereo processing, and these can be mixed and matched as required. Orban's exclusive Optimix® stereo → 5.0 surround upmixer can be applied to stereo source material to create "instant surround" with excellent downmix compatibility. The OPTIMOD-PCn is equally suited for mastering, netcasts and digital radio broadcasting.

Tips From the Field

Flying Solo

by Jim Turvaville

In the crazy industry in which we work, there are lots of guys (and gals) who find themselves taking on maintenance and even construction projects with little or no help. When I was working daily in the business, there were lots of occasions where there was plenty to do and too few hands to accomplish it effectively. It goes without saying that most contractors, like myself now, more often than not are flying solo on the jobsite. Here are some thoughts on working alone that may warrant your consideration for safety and efficiency.

Safety

This first item on the list is there not just to keep OSHA and the Corporate HR Department from freaking out – if something happens to you while on the job, the effects of that can have many ramifications beyond the station. I do not have to remind any of my fellow engineers that there are not very many of the younger folks coming up behind us in the ranks; there is no need to further limit the number of us available now by being foolish or failing to be safety conscious. You should always remember that Murphy was often an optimist, and *"whatever can go wrong most often will."*

We all have routine things we do which can be safely accomplished without another warm body present – ranging from studio wiring to changing air filters at the tower site. But when you have a dead transmitter and it looks like you need to dig into the High Voltage Power Supply, by all means keep your head clear and your hands with it. Those grounding rods are euphemistically referred to as "Jesus Sticks" because He will be the next one you see if you don't use it properly. Having been kicked by 5 kV in an old Gates AM transmitter, and had nothing but the memory as a lasting reminder, I can say with certainty that interlock shorting bars and bleeder resistors do, in fact, fail on occasion.

I took to carrying an 18" screwdriver from the discount tool mart with a 3 ft wire and a 3 inch alligator clip on it for a portable grounding stick. Not only is it handy for those older boxes which were not equipped with the standard safety ground stick, it can be used to reach into places not normally accessible by them. While it should go without saying, it is unwise to take apart a High Voltage Power Supply by yourself at any time of the day or night, but reality says it is often necessary. When at all possible, have someone with you who can at least dial 911 in case of an emergency – not much technical skill needed for that process.

We also find ourselves pressed into other branches of our work at times, specifically making an electrical repair for our equipment. While I have grown up in that field and was at one time certified as an electrician, I can comfortably open a service panel and make measurements and minor changes knowing what not to touch – but not every engineer shares that experience. Approach all electrical work with a level of caution equivalent to your knowledge and experience; it is no shame to step back and call in someone with more expertise if faced with a specialized situation. One sign of true wisdom is to know your limitations and live to tell that to your successor. I also carry one of the $5 voltage sensors that clip in your pocket, and use it often when touching any electrical wires; it has saved me numerous times from putting my hands into something which I thought was safe but turned out to be live. Amazingly, breakers can be – and often are – labeled incorrectly as well. If you find one in such a situation, save yourself and others from possible harm by correcting the notations in the breaker box.

Efficiency

As one who works alone most of the time, I am always eager to read tips and tricks on working efficiently with little or no help. Our industry has several good sources of that kind of knowledge, in both print and on-line; utilize them when possible, and even cut out or print them if needed. I still have a bulging file folder of the past 20 years of such items in my desk. No idea is too good that it cannot be plagiarized; read them and share your own when possible.

In a recent conversation with another engineer, I realized one procedure that I use often may not be as widely known as I thought – how to maneuver things into an equipment rack solo. While extremely large items will still require an extra set of hands behind the rack, I've mounted a Crown FM500 alone; which only worked because it is not very deep. Weight is not as serious a consideration as is how deep the equipment protrudes into the rack, the more shallow the item, the easier it is to install solo. Since only the bottom set of screws in a rack-mounted piece of equipment holds the majority of the weight (and should be the set of choice if you are short on screws) this process lets you mount gear by the lower pair, with only 1 extra screw needed.

Here is a quick example showing a rundown of the process:

1. Desiring to mount a processor in Rack Unit #38, temporarily place a rack screw in the top hole in Rack Unit #37 on *both sides*. Tighten the screw enough so that the distance of exposed thread is slightly more than the thickness of the front plate of the unit. A large head screw is advantageous for this – one with a permanently affixed washer is almost a necessity. ***See Figure 1.***

Figure 1

2. Set the unit on both screws and ascertain that it is stable before letting go. I've dropped an item before not checking both screws properly. Tighten the screw on one side (I chose left since I'm right handed) snugly against the front panel; this should make the piece of equipment almost level front to back in the rack. Your gear is now temporarily mounted just 1/4 inch below its destination. ***See Figure 2.***


Figure 2

3. Carefully lift the other side of the gear up the needed 1/4 of an inch to align the equipment's mounting hole with the destination in the threaded rack. Because the vertical lift is minor, the screw on the other side should be able to safely hold the equipment against the rack while you install this permanent screw. This is also the one extra screw needed in the process if you are short on rack screws, or just screw #3 if you are mounting the gear properly. Snug the screw but leave it loose enough to install the other side in the same manner. **See Figure 3.**

Once both bottom screws are in properly, install the top pair as the holes are already aligned; then snug everything up tightly. It's by no means a perfect method, but one can mount switchers, patch panels, processing, and other smaller gear quickly and efficiently with no extra hands.

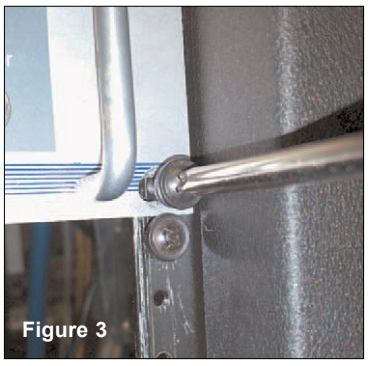
Figure 3

In my 37 years of experience, I find that most Engineers are part of a relatively close-knit community, and working with another is always synergistic – the level of accomplishment is greater than the sum of either's abilities. But when that's not possible, be sure and remain safety conscious and find ways to be efficient in your work.

Jim "Turbo" Turvaville is semi- retired from 37 years in full-time Radio Engineering and 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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Nasty Blast – Sponsorship ID – Contest Disclosure

by Peter Gutmann

Nasty Blast

What can you do if an anonymous listener posts a nasty blast on some website?

Many websites are becoming increasingly sensitive to the need to uphold their reputations by blocking or censoring postings that are inaccurate in content or inappropriately harsh in tone. Others, though, have picked up the slack by providing a resource for venting frustration or, in extreme cases, vindictive attempts to hurt competitors or enemies. Often the poster uses a pseudonym. When confronted with such an attack, what can an employer do?

A recent Delaware case suggests an answer, although it is one that most businesses would prefer not to hear. The result is particularly surprising because Delaware, of all jurisdictions, has cultivated an image as business-friendly (and derives a considerable share of revenue from registration and filing fees of corporations and other entities from all over the US that seek to be domiciled there and to benefit from litigation sited in Delaware courts).

The case involved a lawsuit in which a corporation and its owners claimed that a former employee had posted defamatory comments on a job search website. After the former employee swore that he had not authored the comments, the plaintiffs sought to discover who did. The court refused to let them.

The company understandably was concerned. The comment called the owners "so vulgar," and stated, among other things: "The CEO will yell and pound on his desk, when unhappy with someone, so loudly that my office walls (down the hall) would shake ... or he will start stating lies about you ... this company's culture is one of oppression, untruths and bullying spearheaded and condoned by the owners."

The court balanced the company's right to identify the author against the author's First Amendment right to free speech, which included the right to remain anonymous. The court further focused on the key determinant of any libel or slander charge – whether the expression was one of pure opinion or whether it contained or even implied allegations of fact.

Here, the court observed that the Internet has evolved to the extent that the most popular travel and merchandizing sites routinely allow users to post virtually anonymous reviews about all aspects of their experiences. As for the site in question, "it should be obvious to any reasonable person that the authors (all listed as current or former employees) are using the website as a vehicle to express their personal opinions about the company in question ... so that prospective job-seekers can get a feel for the company in question and if it is a place where he or she might want to work."

On that basis, the court concluded that the posting was subjective, that the writer had a proverbial axe to grind, that the "content is nothing more than a rant by a former employee, citing anecdotal evidence," and contains "no objectively provable factual assertions" – and that "no reasonable person would think otherwise."

But why even bother trying to identify the poster? Why not just sue the website?

In a word – you can't. (Or, to be more accurate, you could – anyone can sue anyone else in America – but it probably would be a waste of time and resources.) The Communications Decency Act of 1996 has been interpreted by courts as granting immunity to all interactive services from defamation due to content provided by third parties.

However, the actual creator of questionable content is not exempt from liability – hence the need to nail an errant poster, as opposed to the website that made it available to the public. Special considerations might apply to a site that substantially alters the content (as opposed to merely filtering or screening it). But merely providing a platform for others does not expose a website to liability. Since the Act is a federal law it preempts any local or state laws to the contrary.

That, in turn, raises a question that increasingly haunts responsible reporters, editors and news organizations – with the proliferation of sources for unverified information that are largely beyond the scope of the law, does the public have the tools to distinguish substantiated fact from fiction – or does it even want to? As the electorate is becoming increasingly aware, nowadays candidates can make outrageous statements of purported "facts" that have no basis in reality and that get buried in the news cycle before they can be adequately rebutted by fact-checkers or opponents. Nevertheless, to answer our original question, the law provides no remedy against a website, and you can only rely upon the decency of the operator – unless you can identify the author.

Sponsorship ID

Sponsorship identification was back in the news following Cumulus's payment of a massive $540,000 fine. According to the FCC, Cumulus had broadcast 178 announcements in support of a hydro-electric energy project without adequately identifying the sponsor, a company with a financial interest in the project. Although the lapse had occurred in 2011 and only at a single station (which it had already sold), in addition to the fine Cumulus agreed to implement a comprehensive compliance plan at all 195 of its Citadel stations.

The FCC has strict rules requiring disclosure of when programming has been broadcast in exchange for consideration rather than out of the licensee's editorial judgment – and further requiring identification of the sponsor. The FCC does not regulate non-broadcast advertising, such as in program guides and social media. But the FTC (Federal Trade Commission) does. Increasingly, this includes radio station websites and other marketing platforms to which traditional broadcasters are turning for enhanced revenue opportunities.

Broadcasters are familiar with the concept of "native advertising" in the form of news segments and plugola – content that seems to be editorial content rather than a sponsored message. But the FTC regulation extends to non-broadcast advertising and applies in areas in which the FCC does not venture. Late last year the FTC issued native advertising guidelines for businesses.

The underlying principle is the FTC's concern that the context or format of an ad can mislead consumers into assuming that the content is independent, impartial, or from a source other than a sponsor. The FTC assumes that knowledge of the source will affect the weight and credibility of the information conveyed. The key is that consumers not be misled as to the nature of an advertisement or the identity of the sponsor.

The FTC emphasizes two basic elements of its policies that apply increasingly to the digital marketplace:

First, an ad must be transparent in not suggesting or implying that it is anything other than an ad. The FTC notes that in digital media native ads often resemble the overall appearance, design, content and functionality of the medium. This can arise indirectly by embedding sponsored material in social media, by displaying it or a thumbnail in proximity to non-advertising content, or through a clickable icon that leads to an ad. Republication of excerpts can obscure distinctions apparent from the original. Newsfeeds, social media sharing and search engines seem especially ripe for this type of problem.

Second, the sponsorship disclosure must be clear and prominent. The FTC guidance suggests that disclosures be in unambiguous language, displayed as close as possible to the native ad, in fonts and colors that are easy to read and stand out from the background, appear long enough to be noticed and, if audio, read at a cadence *that can be understood.* The FTC advises against displaying unexplained logos or brand names and ambiguous terms such as "promoted" rather than explicit statements such as "paid advertisement" or "sponsored advertising content."

As with FCC regulation of broadcast sponsorship, a broad exception is provided for ads that are so clearly commercial that they are unlikely to mislead consumers as to their nature or source.

The FTC concludes its guidance with a caution that while advertisers are primarily responsible for compliance, it also takes action against others who create or distribute deceptive advertising content in all media. So beware!

Contest Rules Disclosure

As of this writing (early January) the opportunity to post contest rules on-line in lieu of announcing them on-air has not yet taken effect, as it still awaits final approval of the Office of Management and Budget. Currently, broadcasters still face the challenge of cramming all the "material" terms of a contest into a comprehensible spot. Once that burden is lifted, all that will be required, after an initial announcement of the material terms, will be to refer listeners to a website where rules are posted.

One question that remains unsettled is the extent of disclosure that will be appropriate (or required). Without the need to actually announce the rules constantly, it's tempting to make them more complex, including "gotchas" that can work against an unaware listener.

We already have an interesting portent. In January iHeart launched a national contest with 260 $1,000 prizes – and uploaded rules that comprise six very dense pages full of detailed provisos, qualifications, conditions and disclaimers. (The current rules permit a licensee to augment on its website its broadcast of the material rules.)

iHeart's rules raise the practical question of whether anyone with any semblance of a life would bother to read them thoroughly. (I'm guessing not.) If they did, they might notice some provisions to which reasonable listeners might object, such as mandatory arbitration of disputes. (Does that mean that instead of informing the FCC of irregularities, a disgruntled listener would have to spend many tens of thousands of dollars to go through formal arbitration in the hope of proving entitlement to a $1,000 prize?)

A corollary question is whether courts would uphold the validity of "adhesion" rules that are unlikely to be read, and which place a listener in a position of being unable to negotiate them prior to agreeing to enter a contest.

In adopting its new contest rules the FCC might have overlooked this unintended result. In the meantime, broadcasters will have to weigh the temptation of using the opportunity to fortify their contest rules with technicalities against the risk of offending listeners who might not appreciate a feeling of being taken advantage.

Peter Gutmann is a partner in the Washington, DC office of the law firm of Womble Carlyle Sandridge & Rice, LLP. He specializes in broadcast regulation and transactions. His email address is: pgutmann@wcsr.com

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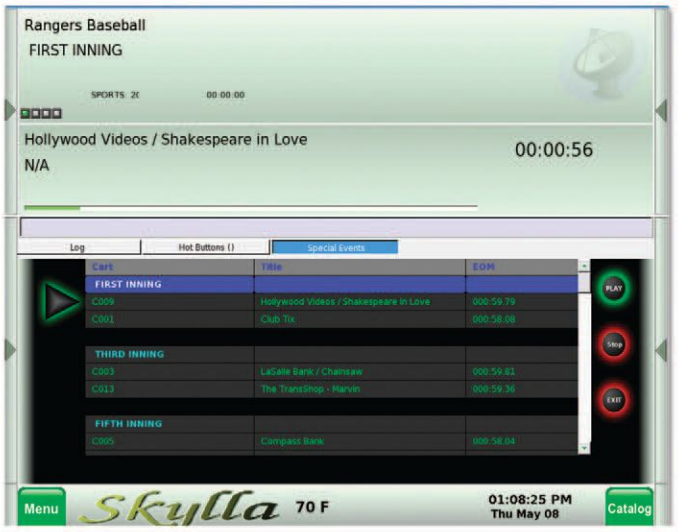

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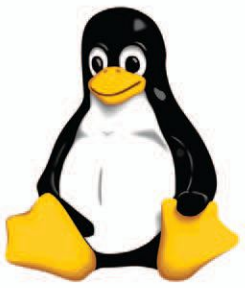

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Transmitter Site

Quick and Temporary Fixes to the Transmission System

by Mike Hendrickson

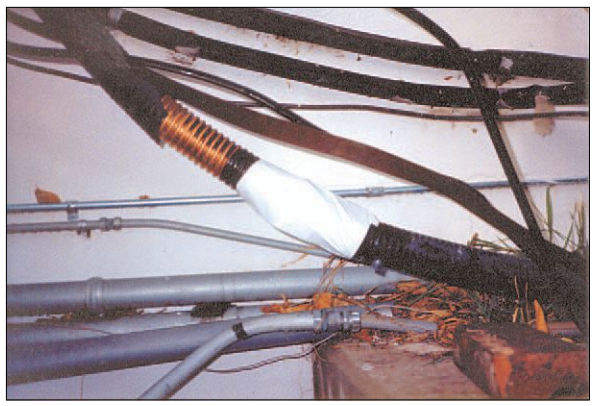
The first thing I need to do with this article is to point out an important omission in the previous article about the rebuilding of a transmitter. Steve Brown of Radio Rangers, LLC reminded me of the supply of stainless steel and brass hardware that was purchased from Fastenal, Inc. to replace missing hardware in the transmitter. Fastenal is an excellent source of stainless steel and brass hardware. They can be found at: www.fastenal.com

Coffee Can Coax

A few years ago (okay, *many* years ago), I ran into a situation at an FM radio station that began showing increased reflected power on the VSWR meter on the transmitter. Due to my lack of experience I did not realize that this could be the beginning of a problem that would let all of the magic smoke out of the transmission line and cause the station to go off the air. Of course, I was not prepared to catch the magic smoke so it could be reinserted into the line to make it whole again.

This station was a combo AM/FM station utilizing the AM tower as the support for the FM antenna. Because the tower was located in a marsh, the transmitter building was located a couple of hundred feet from the tower base. At the point where the transmission line left the building there was a gentle curve in the line so it could be buried. This curve was well within the bending specifications of the manufacturer of the transmission line. But, over a period of a couple of decades, the center conductor in the transmission line gradually shifted until it shorted to the outer conductor of the transmission line.

At this point the station was off the air until repairs could be completed. As is typical of most radio stations, there was not a spare length of transmission line and extra connectors on hand that could be installed quickly. A jury rigged solution had to be created to get the station back on the air.



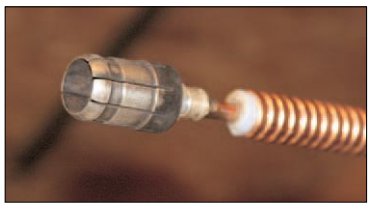
The solution was to make an emergency splice. First, the transmission line was cut at the location of the short. Then the outer conductor was cut back several inches on both sides of the short so the inner conductor could be exposed. The inner conductors on both pieces of transmission line were slit length wise a few inches from the cut. One of the inner conductors was slightly spread apart so it would slide over the other center conductor, which was slightly squeezed together. Then the transmission line pieces were pulled together to force one of the inner conductors to overlap the other inner conductor.

The inner conductors were soldered to make a good electrical connection. There was a gap of a couple of inches between the outer conductors of the two pieces of line. I used a coffee can for a piece of sheet metal to wrap around the outer conductor. This coffee can was secured to the outer conductors with hose clamps. The whole jury rigged assembly was wrapped in a plastic garbage bag to provide some protection from the weather. Needless to say, the repaired transmission line did not hold pressure. *But*, the station was able to get back on the air at reduced power until the emergency shipment of transmission line and connectors could be delivered a few days later.

Less is More Than Nothing

If the normal transmission line is burned out, many times you may be able to use another transmission line. At another station, a thunderstorm damaged the antenna and transmission line. But there was an abandoned 7/8-inch foam coaxial transmission line that had been used for an STL system. A single bay antenna was placed near the top end of the 7/8-inch transmission line. The connector on the line was changed to a flanged connector. Adaptors were used to transition the line to mate with the input connector of the antenna. The transmitter was connected to the input of the line through another set of adapters. The transmitter power was adjusted to about 3 kilowatts. You would be surprised at how well a single bay with less than 3 kilowatts of input power will cover an area, especially if the antenna is located 450 feet above ground.

In the event you don't have enough adapters you can sometimes jury rig an adapter to mate a smaller line with a larger line. The pictures below show a bullet for a 3-1/8-inch inner bay line from an old ERI antenna that has been fitted to the center conductor of a 7/8-inch transmission line. The base of the bullet was drilled out to permit it to be soldered to the center conductor of the 7/8-inch transmission line. Copper strap was secured with hose clamps to form the outer conductor. Fortunately the other end of the 7/8-inch transmission line used an EIA flanged connection and we had enough adapters to couple to a single bay antenna.



Another time we received alarms from a station that had high VSWR. The transmitter had folded back power to about 1%. Upon arrival at the site, we discovered that the transmission line had water in it – the water had accumulated in the drip loop between the transmitter building and the tower. The line's pressurization had failed due to a crack in an antenna flange and the nitrogen had run out.

Water by itself will not damage a transmission line. The damage generally occurs when the RF arcs over and burns the line. In this case, the transmitter shut down before any damage was done. We drilled a hole in the bottom of the drip loop and drained out the water. The hole was plugged and the line was purged. The station was able to resume broadcasting. A tower crew was called in to repair the antenna flanges a few days later.

After a few weeks the same thing happened. This time there was pressurization, but there was still water in the line that had been purged. We inserted a small valve in the line at the location of the previous drilled hole. We ended up draining the line a couple of times following this. It has now been several years since there has been a problem with this system – and the line still holds pressure.

Another situation that can arise is when you have a failure of a FM antenna and you need an emergency antenna. If you have an ERI antenna you may have an emergency antenna built in. Each bay of an ERI antenna has a specific impedance for that antenna. For example, each bay of a three-bay ERI antenna has an impedance of 150 Ohms. The three bays in parallel produce the 50 Ohm impedance to match the transmission line. While the 150 impedance of a single bay will not work with a 50 Ohm line, you can easily convert a single bay to a 50 Ohm antenna.

The design of the ERI antenna has the radiating elements located away from the base of the bay by about 30 inches. The impedance of the actual elements is 50 Ohms and the roughly 30-inch length of line between the elements and the "T" block at the base of the bay is an impedance transformer. This impedance transformer converts the 50 Ohm impedance of the radiating elements to the impedance needed for the entire system. In the case of the three-bay antenna, the transformer changes the 50 Ohm impedance to 150 Ohms.

The high power ERI antenna uses a length of 3-inch outer conductor for this transformer. The center conductor is custom built to transform the impedance. To convert a single bay to a 50 Ohm antenna, just replace the center conductor of the bay with a length of line that is the center conductor from a 50 Ohm, 3-inch transmission line. The bullets at each end of the transformer are standard bullets for 3-inch line. Just be sure not to split the bullets when inserting the replacement center conductor.

You may have noticed that two of the emergency repairs mentioned in this article were needed due to a loss of pressurization of the antenna system. In my opinion, it is not enough to simply check the nitrogen tank or dehydrator once a month when you inspect the site. If the station is using a dehydrator, be sure to connect the dehydrator alarms to the remote control system. You can also obtain a pressure sensor or switch for a couple of hundred dollars. This switch can be connected to a remote control system to provide an alarm when the pressure has failed. This small amount of money can save the station large amounts of money by the timely notification of a pressure problem.

At very remote or inaccessible sites, you may want to consider installing some type of remote or automatic system to switch between nitrogen tanks or a nitrogen tank and a dehydrator. Again, the expense of such a system is fairly low compared to the cost of repairing a transmission line system and antenna.

In my next article I'm going to describe in detail how to make an emergency single bay antenna from a multi-bay ERI antenna.

Hendrickson, CPBE, CBNT is the retired Chief Engineer of American Public Media Group. He has been involved in Broadcast Engineering since 1969. Over this time period he has been involved with all aspects of broadcast engineering from the technical to the budgeting.

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In The Field

Headscratchers

by Steve Callahan

As radio engineers, we all have something in common – we like to fix things. We aren't happy until we thoroughly understand how something works and, preferably, have taken it apart and put it back together again. Many a radio engineer got their start taking apart a broken radio, finding the problem, and then putting it back together without any extra parts left over!

However, there are times when even the best engineer has to look twice (or thrice) at something that doesn't make sense. When something doesn't make sense to the logical mind, it takes a little head scratching to figure out the "how" and "why" of a problem. I've gathered a few head scratchers of my own from recent projects and how I stumbled headlong into a solution that solved the problem.

The Case of the Missing Signal

This 3000 Watt FM station had the opportunity to move its tower site to increase power and also move closer to a population center. The new site was built, and a brand new, three-bay full-wave-spaced antenna was purchased and delivered. The tower crew had already arrived at the site and assembled the antenna according to directions on the bays. With the antenna assembled, they then installed the radomes and raised the antenna into place at the top of the new tower, where it was connected to the transmitter with flexible coax. We arrived at the new tower site and when the transmitter was turned on and there was little or no reflected power – there were smiles all around the room. However, when I drove away from the site to listen to the new and improved signal, I was very surprised to find that it disappeared within a mile of the tower in all directions. Back at the base of the tower, I found that I could pick up the station on at least 20 places on the FM dial. The transmitter readings were still good and everything looked like it should.

Are You Scratching Your Head Yet?

We all agreed that the transmitter seemed like it was doing what it was designed to do, but the problem was still above our heads. We took the antenna down and looked at the three radomes. They were the style that fully envelopes the bay so we had to remove them to check the bays. With the radomes removed, the problem was obvious. The middle bay of the three bays was upside down! However, the stenciling from the manufacturer on that bay indicted that it was intended to be mounted that way.

The tower crew merely followed the manufacturer's instruction as indicated by the stenciled "This Side Up" instruction and had mistaken the antenna for a half-wave spaced antenna. Well, the antenna manufacturer was more than embarrassed by the situation. Seems there was a new employee working in the stenciling department and that newbie had mislabeled the middle bay. The manufacturer immediately sent out an entirely new antenna, this time with proper detailed instructions, and it was hauled up the tower and installed. This second antenna worked as expected and the station now had a much improved signal.

When is a Neutral Not a Neutral?

I got a call from a nearby 5000 Watt AM station that had a transmitter issue. It seems that they had a problem with a burning smell around the transmitter when they went to full power. I arrived at the station and gave the transmitter and its associated equipment a thorough examination. It was a relatively new solid state transmitter which replaced an older tube transmitter a few years ago. I noticed a burned place on the terminal block in the transmitter's power supply on the connection marked "Neutral."

The local engineer told me that the neutral connection had overheated and it was the cause of the burning smell. He had replaced the burned neutral wire but the burned spot on the terminal block remained. With the transmitter operating at full power, I put an amp-probe around the neutral lead on the line side of the station's transfer switch expecting to see little or no current. I was more than surprised to see over 40 Amps on the neutral lead!

Are You Scratching Your Head Yet?

I asked the station's management if they had made any recent major changes in the building's electrical system. They said there had been no changes in the building. I noticed that one of the three pole transformers outside the station looked like it had been changed at one point and the other two looked like they were quite old and had overheated and leaked at one time. I suggested that they have the local power company check the transformers and the connections to make sure that there was no problem outside the building.

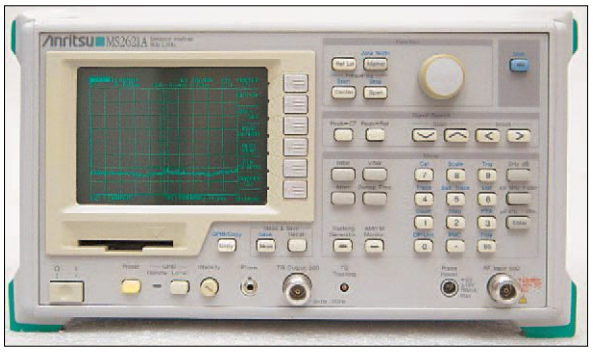
It took the utility company three visits of just putting a meter on the transformer leads, but eventually one lineman took the initiative to tug on the connections to check for tightness and one lead literally fell off the transformer. It had been loose for quite a while. While I was waiting for the power company to revisit the site, I ran the scenario through my mind time after time. I thought I had remembered that this particular brand of transmitter didn't require a neutral connection, even though there was a labeled connection for one. A quick call to the manufacturer confirmed my recollection.

With the broken transformer lead fixed and all of the other pole transformer leads thoroughly checked for tightness, we removed the neutral lead from the terminal block in the transmitter. The transmitter was turned on a low power and the amp-probe now showed little or no current on the neutral and the transmitter's low power readings were normal. We felt confident, so we flipped the switch to high power and the transmitter came up with normal readings and no current on the neutral. We speculated that the bad pole connection channeled the building's neutral through the transmitter where it shouldn't have been in the first place.

When One Minus One Equals One

I was sent to a nearby city to check on some listener reports of interference to their favorite FM station in a specific area. I drove around the area of suspected interference and found there were indeed some reception issues in the vicinity of another FM station's tower site. I contacted that station's engineer, shared my observations and he invited me to meet him at the tower site.

A quick check of the site with a spectrum analyzer showed a graphic picture of the problem. One spike was the FM station and there was another spike adjacent to the station that was being interfered with.



Are You Scratching Your Head Yet?

There was also another spike on the spectrum analyzer – an AM station. The FM station used to be part of an AM/FM combo and the AM was sold but it remained on a tower adjacent to the FM tower. The interfering spike was a mixing product of the FM and the AM and the difference of their frequencies caused that mysterious interfering spike. The AM got into the FM via the coax that connected the exciter to the transmitter across the room. Some double shielded coax installed in a metallic conduit made the problem go away and the interfering spike disappeared.

It feels so good to say "Problem Solved."

Steve Callahan, CBRE, AMD, is the owner of WVBF, Middleboro, Mass. Email at: wvbf1530@yahoo.com

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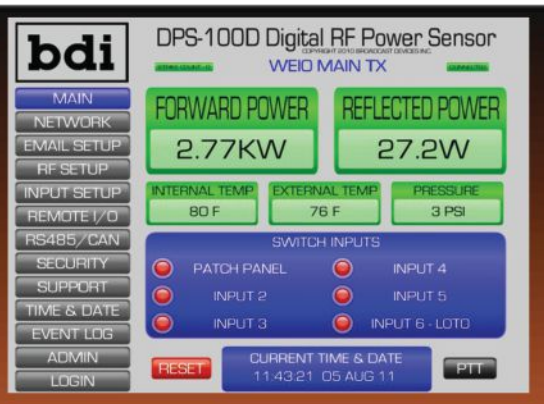

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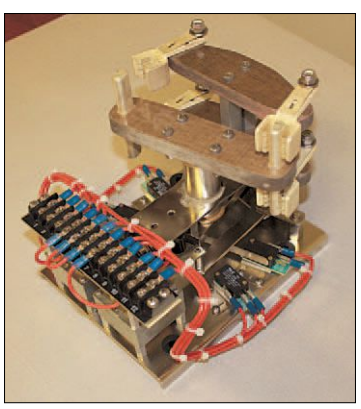
Maintenance Guide

Everything You Wanted to Know About Contactor Maintenance

by Barry Mishkind – www.thebdr.net

There are many stresses on the broadcast transmission system, winter weather being but one of them. One critical part that needs attention at many stations is the contactor. Here is some information that may provide the answers you need.

The contactor is a workhorse at the heart of most directional antennas, where they are most often found at tower bases and in phasors. They are also used to switch main and backup transmitters between the antenna and dummy loads.



RFC-40-20-1-110 Contactor
40 Amp, 20kV SPDT, 110VAC

When they are properly adjusted and working well, transmitter, power, and antenna DA mode changes are accomplished easily and reliably. When they fail, it can take a station off the air. One poorly maintained station had so many contactors fail that it took a man and a broom about half an hour to change power/pattern. That makes regular inspection and maintenance important.

Stress Points

The contactors at tower bases are usually the most heavily stressed physically, especially the solenoids and finger stock. These parts have to deal with the dust and dirt, the wide changes in temperatures, humidity, and even lightning surges that happen at transmitter sites. They also have to deal with voltage variations from different causes.

Inside the phasor or transmitter switcher, the contactor's finger stock usually is the most vulnerable, especially if the RF interlocks permit enough power to arc and burn the fingers. This often happens at stations where the interlocks are not set to kill the RF in order to shorten the brief interruption in programming during the switching. The program interruption may be shorter, but there is definite damage to the fingers.

Maintenance Shift

As with any gear, a regular maintenance program will keep your contactors working better.

Visual observation, adjustment, and the occasional grease are the key points for normal operation. But when a solenoid fails or has insufficient pulling power, or the finger stock gets burned or deformed, it is time to effect parts repair and replacement.

Because it is not if, but when, contactors will need maintenance, having a full set of spare parts on the shelf seems like a logical thing.

Unfortunately, too many stations do not have spare parts – hence the story above (sadly, not unique) of the station with the bad contactors, where power change was not only time consuming, but dangerous for the engineer, to keep a legal operation going.

A Maintenance Tutorial

Kintronic Labs has put together a very nice half-hour of instruction on how best to repair/maintain your contactors. This tutorial takes you through each part of a contactor, showing how to replace or adjust each one.

If you are looking for a specific part of the assembly in the video, for a visual display on how to work with it – below are some timing marks on the video. The YouTube video may be found at:

https://www.youtube.com/watch?v=yqg2AkzWW5w

The approximate starting time for each part:

- Solenoids: 0:26
- Finger stocks and contact bar: 9:00
- Micro-switches: 10:16
- Linkage arms: 12:30
- Tension adjustment: 12:47
- Movable bar replacement: 16:00
- Stationary bar replacement: 20:30
- Finger stock adjustment: 26:00

Of course, the Kintronic Labs folks are always ready to answer your questions, supply parts, or explain how to keep your contactors working at their best. You may contact Kintronic Labs: www.kintronic.com, phone: 423-78-3141, email: ktl@kintronic.com

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Small Market Guide

Retaining Personnel in Small Markets

by Roger Paskvan

People: the commodity that keeps our broadcasting business *in* business. Small market radio has its uniqueness and an "aura" about it that, in my opinion, is not shared in larger markets. This is a loyalty that comes from the very nature of small market radio.

Yes, I know we all would like to just have a totally automated radio station that could just be programmed and walk away – no headaches, no worries or problems. No sick days, no employee problems, no conflicts on the job, and let us not forget Mr. Automation requires no FICA, social security or health benefits. Also, Mr. automation works round the clock with no overtime charges. Yes radio would be great and profits would be high, but this scenario is not reality. We can only dream!

Radio in any size market is a people-driven medium. It survives only because people are interacting with people, providing the information and entertainment that other people desire. In small market radio this concept takes on a new form called "localism." Small market radio becomes synonymous with the community, and a majority of small market stations have been there so long that they are the default station everyone listens to, morning and evening. Many of these stations are still AM's.

This concept of small market economics drives most AM and FM stations in little towns across this great nation. It is the core of the "Radio Aura" we mentioned earlier. Many small market stations share the community interests and have become the hub of that town or region. Like a small town doctor, radio provides a service to the community and the community respects that service in return. It's almost like a handshake and an acceptance that makes small market radio an important part of the community values.

Unlike automation, quality radio needs people to fuel its very existence – people to talk to their audience, people to interact with that audience and most of all, people to keep your broadcast business alive. The retention of personnel in small markets is actually better than in larger markets. The average small market employee is usually older and a serious part of the community. They live in small townville for a reason and usually enjoy their job. In smaller markets, radio station employees enjoy that "personality status" that is so hard to attain in larger markets. This is usually because of the lack of competition that makes climbing that ladder so difficult in those larger markets.

In our small market stations, many of our employees have been with us for twenty years or more. They enjoy their job and express a loyalty to our company. Many small market stations consider the staff as a family which gives reference to the phrase, "Ma and Pa Radio." Of course taking care of a radio family does require the necessities of good employment practices and nurturing that family.

A good medical plan is essential. At one time, our company covered the employee's entire families. This was fine until Obama Care made the employer healthcare costs prohibitive, but you do need to at least cover your employee's healthcare for retention. A retirement plan or, at a minimum, IRA – something to have a "nest egg" so employees can look forward to retirement. In small markets, many employees cover for each other when absent and take care of sick kids or the family obligations that come up. It's all just part of the concept of small market employee retention. Consideration, respect, and helping others, all play into this process of keeping an employee smiling. When an employee is happy on the job everything goes better and your business thrives. They feel part of that family concept and know that their contributions are respected and rewarded, not only in the community but by the company.

The employers golden rule: "Do good to others and they will give back to you." If your small market station has several 20 year radio employees, you've got this concept down to a science.

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

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Photo courtesy of AES.

Wheat Goes To Washington For AES67 Plugfest

Wheatstone's engineers arrived at NPR's headquarters in Washington, DC in November with a WheatNet-IP audio network to participate in the second AES67 plugfest. This plugfest was a follow up to the AES67 system compatibility testing conducted in Munich last year, and provided for further testing on multicast as well as unicast streaming.

AES67 requires support for both multicast and unicast streaming, the former of which needs the Session Initiation Protocol (SIP) for connection management. A number of products participating in the plugfest support unicast and SIP, including our WheatNet-IP audio network.

Thirteen products were tested, with AES67 implementations varying from software on a PC to hardware-based FPGA solutions.

According to a preliminary AES report summing up the plugfest, "Although these tests involved a growing number of devices compared to the previous plugfest, a majority of unicast streams interoperated successfully." However, because SIP interoperability was not achieved in some cases, the report suggests that an SIP technical overview and recommendation be published prior to subsequent AES67 plugfests in order to ensure the best possible conditions for SIP interoperability.

Multicast interoperability was also thoroughly tested during the plugfest, and according to the preliminary report, "most combinations (94%) were successful. Many of the receivers were able to interoperate despite some conformance issues."

The plugfest took place in November to confirm the interoperability of various products according to the AES67 standard that was first published in 2013 and revised in 2015. AES67 requires interoperability with linear PCM audio coding, a sampling frequency of 48 kHz, 16 or 24 bits-per-sample, 1 to 8 audio channels (2-channel stereo presumed to dominate), and a packet time of 1 ms.

The next plugfest is expected in 2016 in the U.K.

For more IP Audio News: INN31.wheatstone.com

IP Audio, Par For Australian Open Course

By George Biagioni

George Biagioni is IT Director for Crocmedia, an independent syndicator of sports content located in Victoria, Australia.

We recently returned from the 2015 Australian Open Golf Tournament, where my crew and I spent the better part of a week making the rounds and reporting live to spectators there as well as to listeners tuning in to sports radio station, SEN, in Melbourne and SportFM 9.13 in Perth. This marks the second year for Australian Open Radio, a temporary low-power station that Golf Australia contracted my company to set up in order to bring fans closer to the action. This special-event broadcast presented some unique challenges, and therefore required a most interesting mixture of technology to reach the ears at the tournament as well as those listening elsewhere.

To learn how we made it all work using 4G iPhone 6s with Report-IT, Tieline Genie distribution, a 5W transmitter, and Wheatstone IP audio networking, audio processing and IP console...

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Your Question Answered

Q: What are the benefits of multiband voice processing?

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Practical Engineering

Avoiding the Single Point of Failure

by Stan Adams

The concept of the "single point of failure" is an old concept and it has been used since the formation of the modern building industry, telephone companies, and railroads, and about any other industry you would like to name.

On a bit more personal level: when the body is engulfed in a massive injury or illness, doctors must think about the frailty of the most important systems. Whatever might be the weakest of all the links becomes the most important, or as we might say: "a chain is only as strong as its weakest link."

The Smallest Part

In the broadcasting industry single points of failure (SPF) can be found all though the chain from microphone to antenna. Only a careful review of the entire system can illuminate where those points may be – and sometimes we do not find them out until after an actual failure, because some of them are hidden to our eyes and thinking until after the fact.

Not long after I joined MCI Telecommunications in the very early 1980s it was discovered that one of the weakest points in the system, and the cause of outages for our million plus customers in those years, was a simple one dollar BNC connector.

We used thousands upon thousands of them to carry baseband, timing and multiplex signals – the old fashioned solder tip and compression ground braid type. My father would have trouble understanding how anything soldered would fail because he was totally set against any type of a compression or mechanical fitting for audio or video and pulse usage. Of course, we know better today.

The Costs of SPF

It cost millions of dollars of company funds and manpower to change out most of those connectors to a hex crimp tip and sleeve. We had to have Amphenol design a whole new series of connectors for us, with cable to match.

The effort was worthwhile: it dropped cable related outages by over 90% in the space of about three years. If you have ever worked with blue or purple 75 Ohm cable with a jacket similar to TFE, then you have used the product produced for MCI Telecom.

In broadcast, perhaps the most obvious candidate for a single point of failure is the station with one transmitter, one antenna, and just one source of power. The failure of any of these immediately puts the station off the air, instantly costing significant money in lost revenue, as well as the loss of the listeners' confidence that the station will be there when they need it.

The solution seems obvious: install a spare transmitter, stand-by antenna, and a generator. However, having been in the broadcasting field now both full and part time for over 40 years, I know how hard it can be to justify such an expense for the Mom and Pop facilities.

Mitigating the Costs

Perhaps the answer is in budgeting for and resolving these single points of failure – one at a time – over a reasonable period of time. This is one place where the large broadcast groups have an advantage: a better leverage of finances for such endeavors.

Certainly, consolidation has had benefits, especially when a number of studios or transmission systems are built together – similar equipment or facilities which are close by will help increase the speed and success of quick repairs.

SPF Combat Tool Box

It is important to have and use the right tools in order to eliminate single points of failure. Among the more potent are redundant equipment, fault tolerant gear, and protective devices.

By the way, redundant systems do not have to mean complex or real expensive. An auxiliary transmitter does not need to be brand new, nor at full power. But do not be fooled into thinking that redundancy will always work, because it will not. An automatic switch will fail to activate, or a loose wire will fall off at the worst possible time.

If a broadcast operation uses standby power generation equipment in which more than one unit is required, how do you know that both will come up and synchronize properly without already switching the load to the gensets? Can you imagine the potential damage if you are trying to cover multiple stations (radio and TV), microwave, STLs, and the like?

Fault Toleration

Being fault tolerant means a failure of one part or subsystem will not cause complete system failure. Hardware fault-tolerance sometimes requires that broken parts can be swapped out with new ones while the system is still operational. Such an implemented system represents the vast majority of fault-tolerant systems.

(Continued on Page 28)

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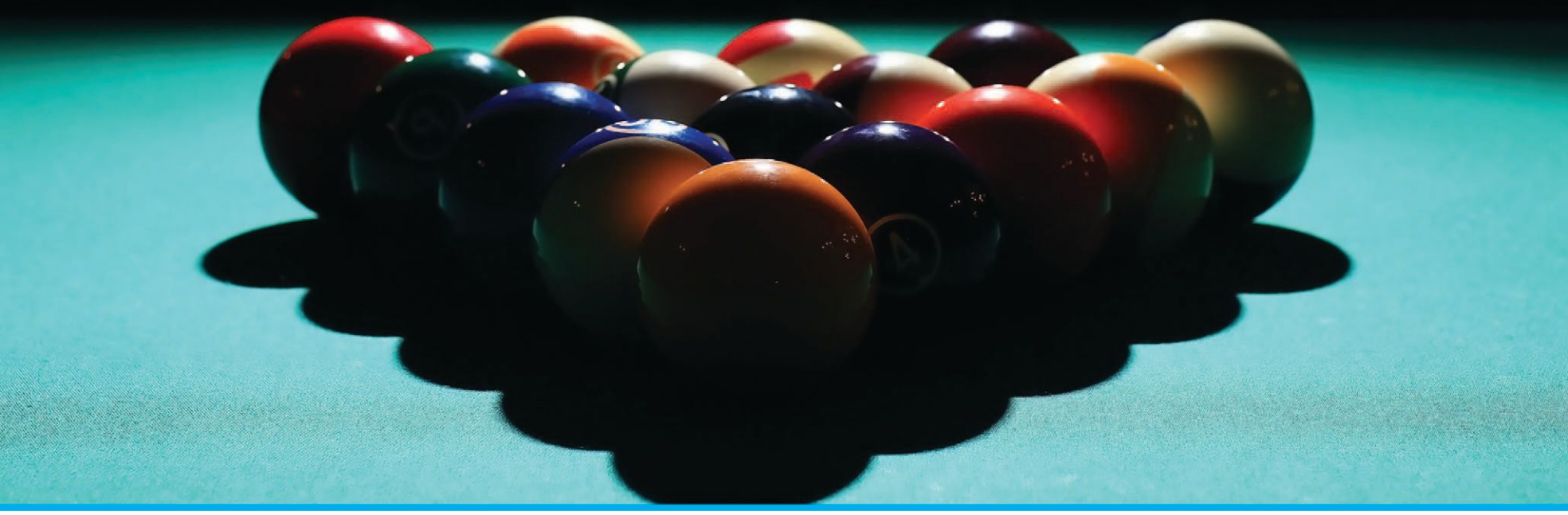

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INOVONICS BROADCAST

Avoiding the Single Point of Failure

– Continued from Page 26 –

In such systems the mean time between failures (MTBF) should be long enough for the operators to have time to fix the broken devices before the backup also fails. It helps if the time between failures is as long as possible, but this is not specifically required in a fault-tolerant system.

An example of a device that is not fault tolerant might be a ten dollar float switch that sticks in a cooling tower, not allowing fresh water into the tower. Eventually the remaining water evaporates leaving a hot building full of computer chips. (Suppose it is Sunday morning at 5:00 a.m. How are you going to get 100 gallons of water quick enough to cool down a building that is already above 90 degrees? Hint: been there, done that – call the fire department!)

Protective Devices

These devices are generally considered as being somewhat passive in nature. For example, you likely have a well-known manufacturer's surge protector box on your power entrance. Other protective devices include spike filters, UPSs, lightning rods, and other grounding schemes.

However, does it have lights to show if the protective fuses are in proper operating order? Some of these units have no lights at all. So how does one tell if the surge cell on a specific phase is properly working?

Reliable protection for your equipment is not hopeless nor is it necessarily expensive. The most valuable tools are a good mind set and a willing set of hands.

Generally, stations located south of the Ohio River have far more trouble with lightning than do stations in the north – of course, a 500-foot tower anywhere is a major lightning "arrestor!" So use all means to make a quick path to ground for any potential surge.

When you specify a new tower you might consider putting multiple ground rods on the top and running 0-gauge wires down each of the legs to the master station ground, cad-welding all ends. This may be one of the quickest paybacks that you will find in your situation.

A Look at Your Station

Next time, we will take a look at your station and try to help you identify as many single points of failure as possible. And as we do this, I want to carry along the idea of how we can verify that our monthly and quarterly inspections are really working.

We must have a verifiable, documented method by which we inspect and have confidence in our communications system. While a total program may be out of the realm of possibility except for the largest broadcasting of chains, there is no reason to not follow the spirit of the principle.

Perhaps your Director of Engineering pops in to visit you and your facility. How does he know that you are following a proper method of doing, for example, monthly generator checks? By the way, are you dropping the breaker at the pole? If so, you better keep a spare breaker or be prepared to quickly wire around a switch that mechanically fails.

The DoE will also want to know how long your generator has been run under load. If it never does, you are only asking for carbon build-up in the genset and a failure when you really need it. Are your essential and non-essential power sections marked in colors, or in some way that a quick inspection will reveal their source? If you are using diesel fuel, your day tank had better be connected to one of those essential circuits.

Understand the System

An approach I have always used in my work, when checking a station, is to actually place my hands on each piece of the puzzle and then conceptualize about that part. (I should not have to tell you to make sure you de-energize anything you work on, right?)

For instance, using dual power feeds from the utility provider is a great idea when available. But if there is any place where the lines come within six feet or so of each other, you still have a potential single point of failure in the event someone wants to get in there with a backhoe.

Does cooling or heating come into play in your general thinking? If so, start with the power feeding the building and place your hand on each single section that the power goes through, to ensure the HVAC will run when you need it.

Follow the same process for the RF system. And what about RF grounding, especially for small signal cable, racks, and satellite receivers? Back at MCI we would separate all those grounds – except to run a single line back to the master ground buss bar, which would hang on the wall.

As with other components, if you run your satellite feeds in through the same outside entrance, then again you have a single point of failure – especially if one of those receivers is meant to back up your main program receiver.

Set Up Your Own Program

Since every facility is different, not every idea will work in every case. But that should not stop you from seeking to find and prevent as many of these single points of failure as possible.

Now, I know I am going to get both some "love" and "hate" mail over this, but at the end of the day my answer will be: "it is your facility, not mine." Perhaps together we can develop a checklist. Do the original equipment manufacturers consider any of these principles as they build their systems? I would like to see what they would have to say about this, too.

What have you found that we can share with others?

You may contact Stan at: stanleybadams@yahoo.com

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Operations Guide

Due Diligence and Keeping Things Legal

by Tommy Gray CPBE CBNE

Well, a new year has begun. Some of you are in the throes of winter with all the associated snow, ice and cold temperatures. For some parts of the nation, however, we are already having spring like weather and are already starting our first of the year maintenance schedules. Wherever you are, one thing is for sure. If you don't keep up with your maintenance it will eventually come back to bite you.

We have regular maintenance schedules, as probably most of you do, that cover everything from transmitter, buildings, HVAC, electrical, tower, and you name it. Preventive maintenance is just that – "Preventive." We do it to prevent things from cratering on us at the worst possible time. If you don't have a relevant maintenance checklist for your station(s) I would suggest sitting down at the computer, or with a pad and pen in hand, and make yourself a list. Try to cover everything you can think of that needs a periodic look. First and foremost, include the transmitter and associated equipment. Next, the building AC and Electrical – the building itself – and the list goes on.

Somewhere in your checklist you need to include taking a look at your station licenses, etc., to make sure that everything is right. I cannot tell you how many times I have inspected a station and discovered that, when the current owner bought the station, they had all the licenses transferred in fine fashion but failed to update the ASRN (Antenna Site Registration Number) or as we usually call it, our tower registration. I have found many times, that the tower was still registered to some previous owner. This will open you up to a fine if you don't get the thing in your name when you purchase it.

Due Diligence:

This is a term that gets a lot of use these days. I have to attend a lot of meetings with people in every facet of the business world, on projects of one sort or another. I hear them talk about doing Due Diligence on their projects as a matter of course. To them it means one thing – to us another.

One definition I found on the web definies it this way: *"Due diligence is the process of systematically researching and verifying the accuracy of a statement."* I like that one better than a lot of the others. To us as technical people, it means checking out everything from FCC licenses and permits to environmental assessments, etc. We are verifying the accuracy of our compliance and records.

We usually think that when a station is bought, that is the only time you need one. I want to dispel that notion. A good Due Diligence from time to time can be a great thing. You would be amazed at how many things you would uncover sometimes, were you to dig a little deeper into the "bowels of the beast." Hopefully, you will find nothing that needs attention. If you don't, then you have done a good thing and verified that your station is in full compliance. Compliant not only with the FCC and FAA, but also with Federal, State, and Local authorities.

Most of the time all we think about is making sure we are in full compliance with FCC rules and regulations. We often forget about things like EPA, OSHA, etc. All these things impact us in one way or another and getting a citation from them is a lot messier to clean up than violating an FCC rule, I can promise you. I've known operations who had to pay thousands of dollars a day while they were trying to clean up something that violated an EPA or OSHA rule, not to mention the money it cost to do the actual "fix."

It is much better to be proactive than to be reactive! Fixing problems is a lot easier when you don't have some government official or corporate executive breathing down your neck. On top of all that, if you find and help fix something that keeps your organization from getting a fine or even worse, being shut down, you will be a hero to management. Friends, that is never a bad thing come personal assessment time next year!

Simple Things

Simple things like posting. Making sure that items like your EEO Report is posted and current are important.

Is your station's EEO report posted on the station website? According to regulations, you have to. Here is a clip from a document on the FCC's website regarding posting of the report:

(Continued on Page 32)

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Due Diligence and Keeping Things Legal

– *Continued from Page 30* –

"Broadcast stations with five or more full-time employees, and multichannel video programming distributors (MVPDs), including cable and satellite TV companies, with six or more full-time employees, are required by FCC rules to maintain an EEO recruitment program. They must also create a report each year providing information about the program and place it in their public files. Requirements for EEO public file reports are outlined in the EEO rules for broadcast stations (Section 73.2080(c)(6)) and MVPDs (Section 76.1702(b)). ***Those stations and MVPDs that have websites are also required to post the current year's EEO public file report on their websites.*** *Failure to create the report with all required information, to place it in the public file, or to post it to the station's or MVPD's website are violations of our rules and may result in enforcement action."*

A great many stations make it easy for folks to find the report by putting a simple link at the bottom of the home page that takes you directly to the report. Some make it a little harder to find by burying it about five pages deep in menus. I personally like the home page idea myself. Trust me. If someone is looking at your hiring practices, they are going to find it anyway so there is no benefit to trying to hide it somewhere on the website.

This is just another thing to check on your Due Diligence. Things like wheel chair access ramps for handicapped guests and staff are important. However, before you go out and buy a pile of lumber from the local DIY store, check with your authorities to see what you are required to do. Handicapped restrooms and handicapped parking spaces are things we all need to provide to those who need them. Now I am not handicapped (My wife may argue that however ... sometimes she thinks I am a little OCD!), but when I drive up to a station or business and see that the farthest parking spaces from the front door are the handicapped spaces, or that the wheel chair ramp is way around on the side of the building, I want to tell someone to get with the program and be considerate of those who need them.

There is a lot involved in being compliant these days. Being in compliance with FCC regs is just one thing we have to deal with. Due Diligence can take many forms and the FCC is just a good starting place. In many cases it is up to the station engineer to help police things. One word of caution here, is that when you find something, do as an old boss once told me when I was a young engineer: use plenty of "Tact and Diplomacy" when you bring it to everyone's attention. It is a lot easier to make enemies than friends, and the easiest way I have ever seen to make enemies is to start throwing things in someone's face, with regard to what they have failed to do or have done wrong. One of the easiest ways I have found to make friends at your station is to – when you find something that needs attention – come there as an advocate, and offer your information along with an offer of assistance, should they need it. It is amazing how many people prefer the latter.

Finding My Records

Most folks know where to find their station records, but just in case I will pass along a few links.

To find a copy of your station authorization and associated paperwork and links use the following links:

For an FM Stations you will want to go to:
https://www.fcc.gov/media/radio/fm-query

This will take you to the FCC's FM Query page where you can search any station and get current (for the most part) information, as well as copies of applications and authorizations, etc. You will usually find a link to your tower ASRN in the data. I would suggest using the option from the drop-down box that says, "FM Query (detailed output + CDBS Links)." The new page they put into service recently gives you two options to retrieve your data. The first is to send the results to this page, the second is to send it to the next page/tab.

For an AM Stations you would want to go to:
https://www.fcc.gov/media/radio/am-query
Similar option choices apply.

To get a coverage map, which you will want to keep at your site, you can click on the KML file (60dBu) on the FM side and it will give you a file that can be displayed on Google Earth. If Google Earth is installed on your machine, the file should open up, or at least give you the option to open it.

The options for AM are different and you will need to decide that you want. One other simple way to get a fairly decent coverage map is to go to radio-locator.com and enter your call sign. These are not necessarily technically accurate, but give a good representation of your coverage.

One final link is to a data page you may find helpful: www,fccinfo.com

I hope that gets you started for the New Year. One final word: "Give due diligence to everything" is a good motto to follow!

Have a Great Year!

Tommy is the Senior Director of Broadcast Engineering and Technology at KSBJ Educational Foundation, Humble (Houston), Texas.

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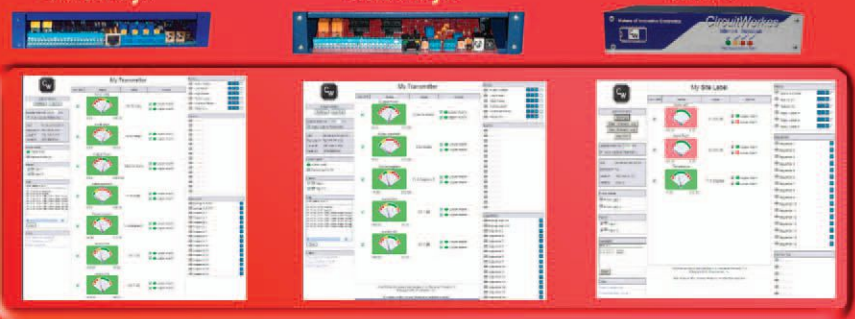

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Outside the Box

Confessions of a Modern Day Pirate Hunter

By Ted Schober, P.E & Karen Maneely

The movies portray pirate radio as revolutionaries fighting against conformity, but the reality of pirate radio is that it is more harmful than good – no matter how noble the "cause." Pirates transmit illegally, which is costly for the stations that transmit legally on the same frequency and first adjacent channel stations. It can be heard during cell phone calls, interferes with the legal transmission, can interfere with both aviation and public safety radio services, or even run the chance of endangering the general public.

Additionally, most pirates do not pay music license fees and taxes, violate building codes, fail to identify sponsors, and dismiss employment regulation. It is common for the pirates to overlook safety issues – just like the pirates of old.

Although the FCC has the power to track down and shut down pirates, confiscate their broadcasting equipment, fine the pirates, and prohibit the individuals from obtaining legal licenses to broadcast, in all reality, they are unable to provide too much help. When the FCC does eventually track down a pirate, their first step is to send a letter to the property owner. The owner is usually only the landlord for the transmitter site. The letter generally results in the pirate moving the transmitter to a new location. When a pirate station interferes with a legally broadcasting station, it is usually up to the legal station's management to go pirate hunting.

Dashbord Receiver

With a receiver that has a good RSSI indicator, mounted to the dashboard, a magmount antenna, and a 30 dB RF attenuator, you have a "pirate hunting rig." A few hours after acquiring the signal (traffic permitting), and a smart phone, anyone can find the transmission source of a pirate station if they are methodical in their search.

The receiver will find where the signal is the strongest to pinpoint the location of the transmitter. RSSI measurements bounce around in the urban seas and the readings over a block or two must be averaged to determine the pirate's proximity. The urban buildings and other structures can cause the signal to be enhanced, attenuated or even bounced across the façade. Accurate visualization and map orientation is necessary to be able to not get horribly confused with where you are – and where you have already been.

Brazen "Studio Door"

Your smart phone will determine the exact location of the pirate and take photographic evidence of the transmitter location and antenna. Some pirates are brazen enough to put up signage or website advertising, of both the station and the times they are on the air.

In the case of W248CG in Jersey City, NJ, there was not one, but *four* separate pirates transmitting on 97.5 MHz in the New York City area. They were seriously interfering with a translator. In some states there are additional laws against pirate radio stations, but this is not in all states.

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Confessions of a Modern Day Pirate Hunter

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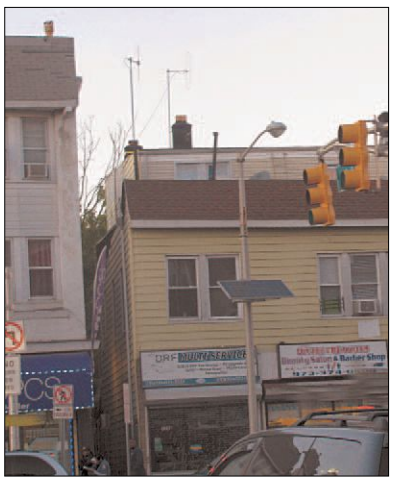
Over the course of many days, the we tracked down the transmitting locations of all four pirates. The first pirate, a hobbyist in East Orange, NJ, was accommodating enough to cease transmitting after we sent them a letter. The second pirate, Super KQ 97.5, was a high power New York City pirate located in Bayonne, NJ, operated by a well-known broadcaster. W238CG caused enough interference with his operation that he changed frequencies once the translator began broadcasting.

The third pirate, "WBLR", was a commercial operation in Patterson, NJ. The transmitter location was discovered and reported to the FCC and town building officials, with pictures, coordinates, and street address. The FCC wrote a letter to the landlord and "WBLR" responded by moving the transmitter location. The new site was located and reported, and Patterson officials cited the new building owner. Before the landlord of the new transmitter site responded to the city, the studio was located and that landlord was informed of the illegal operations. (As of 1/20/16 "WBLR" is silent.)

The last pirate, in Irvington, NJ, was a multiple operator broadcasting in Creole on 97.5 MHz, and Jamaican programming 102.3 MHz, which interfered with WUPC-LP. Initially, the pirate was a cluster of two high power pirate stations with transmitters in the same building. The authorities and landlord were informed. The pirate promptly moved to a new location. An additional hunt determined the pirate had reestablished its transmissions at a new site only a few blocks away from the building officer's office. The township's building officer was alerted to the situation and his eyes lit up with glee as he promised to hand deliver a citation the next day. It is believed that the studio site has been located, but has not been confirmed at the time of this printing.



A "Cluster" Pirate Location

Working with the FCC can be challenging to any legally operating station. Treasure hunt to find where to report it on the FCC website – otherwise it may be years before the pirate is silenced. The only way to report a pirate station to the FCC is via their website and there is no feedback that the information has been read or even received. It was only after involving one of New Jersey's Senators that the FCC gave feedback that a letter was sent to the original landlord for the Patterson pirate.

Local police have little interest or time to investigate pirate radio stations in their jurisdiction. Despite the state laws making pirate broadcasting a fourth degree crime in New Jersey, with possible jail time, the police are over taxed and see it as a victimless crime. Additionally, they are unmotivated to prosecute because local government officials are sometimes guests on the pirate broadcasts.

Town building departments have a greater interest in finding the pirates. To install the antenna would usually require a building permit, something that the pirates fail to do. There is no assurance of the safety of the installation of the broadcasting antenna – either in the structure itself, lightning or electrical hazard, or even just falling on anyone below it.

Most pirates transmit from residential locations not zoned for commercial broadcasting. Additionally, all municipalities require that only legal activities can take place in residential zones.

Driving in sketchy neighborhoods and traversing through the New York City Metro area traffic, with frequent U-turns, and monitoring the equipment, is not for the weak of heart. It is best to not go pirate hunting alone! Once the pirates are located, official action slows to a snail's pace. Taking the action to write to the pirate and the pirate's landlord often is more effective than the FCC. The FCC actions usually result in the pirate re-locating and starting the process all over again. Local building officials usually are more efficient and invested in collecting fines.

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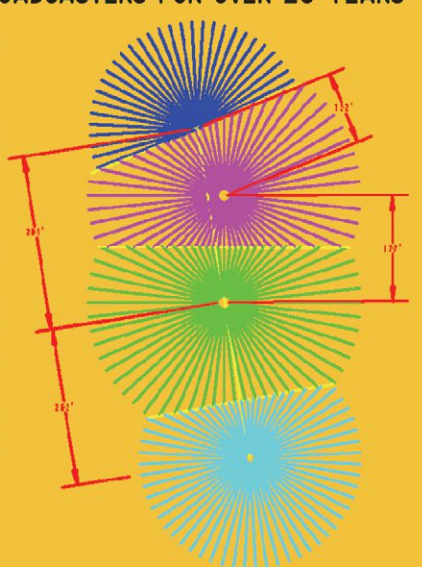

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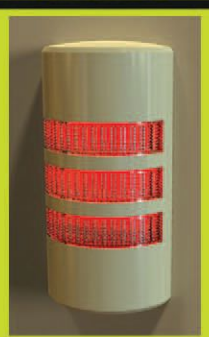

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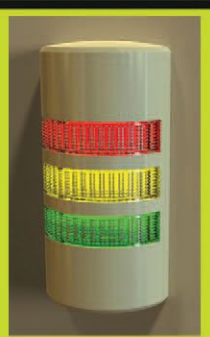

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Facility Focus

The Benefits of Virtualization for Automated Studios

by Dave Turner - Vice President, ENCO

Outside of the smallest independent single-station operations, most radio facilities today house more than one studio. Whether a large network or a small cluster of FM/AM stations, most facilities have a collection of on-air and production studios outfitted with dedicated equipment.

The traditional automation architecture requires a PC in each studio. This physical box connects to a central server, or operates as part of a separate production or on-air cluster that share a common network. However, the fact remains that this architecture is comprised of space-consuming, high-maintenance hardware distributed throughout the facility.

This architecture certainly suits staff working on projects across various workstations. Today's hardware is faster, and the strategy of distributed hardware protects individual studios and stations. Each studio has its own hardware to accommodate its specific automation needs, and while shared data is typically pulled from a central repository, users can typically cache data locally to support daily playlists. That distributed storage protects against failures elsewhere on the network, ensuring the local operation continues without disruption.

The downside is complexity in maintenance, which intensifies as operations scale. Engineering staff not only has to move between rooms to work on the physical boxes, but every box is generally unique in design. Most will have a different complement of motherboards and hard drives, the latter of which delivers the most significant wear and tear on an automation system. And since hard drives require periodic replacement, the various workstations distributed across the facility will require a variety of different drives to maintain optimum system health.

This mixture of physical space requirements, system health and system maintenance are some of the key reasons that broadcasters are beginning to look to virtualized server and automation strategies.

The Benefits of Migration

Migration from legacy systems toward virtualization eliminates many of these problems. The transition to a virtualized architecture further centralizes the automation operations, technology and associated engineering. The end game is a central core with one specific physical location and complement of hardware – not to mention significantly lower operational costs.

The caveat of virtualization is that the broadcaster puts all his eggs in one basket. Therefore, it's necessary to build in the appropriate level of redundancy to sustain multiple points of failure. This is achieved through build out of a highly redundant server mechanism that can host many virtual workstations – all used remotely from the same studios where the physical workstations were once located.

These physical workstations are instead replaced with a "thin client," a simple, compact and generic computing device that contains little built-in intelligence. Its main purpose is to boot and run remote sessions that are displayed on the studio monitor. The intelligence once provided through the PC in the studio now lives in a protected, redundant core in the central equipment room. All features of the automation system are presented to the operator in the studio over a simple network connection and a thin client appliance.

The redundancy built into the server ensures that even if the thin client were to fail, the operation is not halted; all automation is handled in the virtual core. In these cases, repairs are limited to replacement of the thin client. Once the new thin client is booted, the entire operation picks up immediately where it was left off.

Simply put, the studio is a harsh environment. Drinks are spilled, and equipment is not always handled with care. There is an advantage of moving the electronics to a protected core and replacing it with a generic device like a thin client. Furthermore, building redundancy into the central server – both physical and virtual components like disk arrays – ensures that moving to virtualization will provide a feeling of safety without distributing hardware around the facility.

Laying the Foundation

The road to virtualization begins with transitioning the broadcast and production infrastructure to Audio over IP (AoIP). Since there are no physical cards associated with virtual machines, AoIP offers a far more effective path to virtualization versus shared hardware resources. AoIP allows for use of a virtualized network card to deliver packets over the virtualized network to a physical network, which then connects with various Audio over IP devices across the facility. This includes production consoles, routers and even the GPIO devices that live on the network. This paves the way to move automation operations to the virtualized world.

This strategy also enables the broadcaster to gradually transition systems to the virtualized core. A multi-studio facility can start with one or two workstations running through

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The Benefits of Virtualization

– Continued from Page 38 –

a thin client, and later transition other physical boxes into the virtualized environment.

Naturally, this also means building a server that can scale to support the amount of data needed for an eventual facility-wide operation. Once the server is transitioned into place, the data for all virtualized operations can be moved onto that server – along with any attached storage systems required. From this point, the physical systems can be connected, and the associated physical streams can be transitioned as desired to a virtual machine within the core.

This strategy works especially well in facilities with older infrastructure; as equipment begins to fail, centralized storage is the first place in the workflow to address in order to protect content. Installing a server that's capable of virtualization will enable that centralized storage. As necessary, the engineer can begin creating virtual machines and transitioning physical devices – such as automation – to the virtualized core.

This is also a very handy architecture for broadcasters relocating to a new larger, consolidated facility. Once transitioned onto a virtualized environment, everything lives inside one box. These are generally compact 4RU boxes that can house eight to ten workstations. Therefore, a facility with a few radio stations can fit everything into a single box and seamlessly move to another building. Once plugged into a network infrastructure, the broadcaster is quickly up and running from its new consolidated home.

While the AoIP network simplifies the path toward virtualization, it's helpful to establish a separate data network for office systems outside the studio environment. This still enables connectivity to external systems, like a scheduling system, that exist on PCs in business offices. Typically, these systems work well in a stand-alone design for standard file transfers into the automation core, and do not require virtualization since they do not have the same processing requirements as audio systems. Though they can be brought into the core if desired down the road, it makes more sense that office systems remain on a separate network for the foreseeable future.

Higher Efficiency

The ability to incorporate 10 workstations into a single 4RU box will also return a large amount of real estate to the facility. In a legacy installation, each automation workstation will typically equate to four rack units of PCs. A station with 10 workstations therefore would require about 40 rack units in a legacy architecture. Using this math, transitioning to a virtualized environment effectively returns 36 rack units of space.

The efficiencies continue with the central virtualized server. Though it's a powerful device, these servers typically reduce power consumption by up to eight times – translating to a significantly lower monthly utility bill. This is magnified through changes to the HVAC requirements, since cooling needs are substantially reduced as well. The benefits extend to the studio, where the thin client appliances generate a very small fraction of the heat of a PC.

In addition to compressing the footprint and reducing bills, another noticeable benefit is the reduction of noise in the studio. Since PCs require cooling, they inevitably produce some amount of fan noise. Even the quietest PCs require a large amount to processing power to support automation and other tasks, and will inevitably produce noticeable noise.

Working to reduce or eliminate that noise in the studio can be complex and expensive. One solution involves creating custom furniture structures that focus the noise downward toward the floor. Alternatively, the PCs can be mounted backwards so they face out the rear of the rack instead of toward the studio. Or, they are mounted in an adjacent room and connected via a KVM (keyboard/video/mouse) system to extend the keyboard, monitor and touchscreen. Typically, this is the preferred method when it comes to PC-related noise reduction in the studio.

The benefit of moving to a virtualized system is that the thin client connects to the workstation over IP – the same philosophy as a KVM system, but with a much broader reach. While a KVM system effectively supports point-to-point connectivity – and can support multi-point connectivity through more complex switching designs – the thin client can connect remotely to any workstation in the virtualized core. The cost of a thin client is far less than a KVM system. In addition to eliminating noise from the studio, the move to a virtualized environment significantly cuts costs while enabling simpler routing and connectivity to more workstations.

Days Between

We are still in the early days of transitioning automation platforms to virtualized environments. ENCO's design ensures a fully redundant architecture across the server and its components, including hot-swappable network cards, processors, disk arrays and power supplies. This redundancy allows the operation to remain on the air during a simple maintenance procedure if a component fails. There is no requirement for an IT specialist since the systems are self-healing once the failed component is replaced, automatically rebuilding itself as its redundant twin keeps the operation on the air.

The benefits of transitioning to a virtualized environment for mission-critical, 24/7 operations like broadcasting are abundantly clear. By keeping costs low and laying the groundwork for a modular and staged transition, we believe that this migration will accelerate industry-wide in the coming years. *– Radio Guide –*

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Field Report

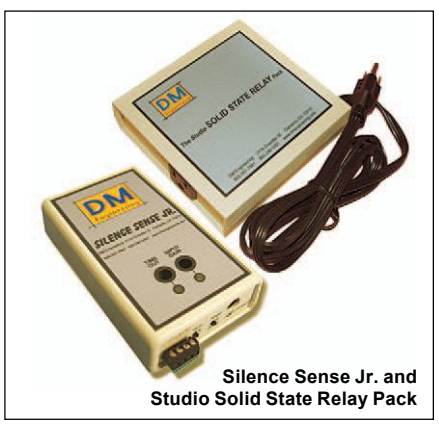
DME Silence Sense Jr. & Studio Solid State Relay Pack

by Dave Mandelbaum, DM Engineering

We often get calls from folks with requests for strange or uncommon applications and solutions to one-of-a-kind problems, and love to help if we can. Recently, I received a call from Frank Stas of the Talking Info Center in Marshfield MA, (ticnetwork.com), who had a problem with his Internet modem, and other equipment in his primary audio chain, locking up and not coming back on-line when they experienced a momentary power failure or spike. Sometimes they would go berserk all by themselves, thereby losing his primary audio feed. When this happened, Frank had to drive over 40 miles to reset the power to the equipment. Of course, Frank didn't like doing this, and felt that this may be a problem that others could possibly experience to varying degrees – especially now that more and more transmitter sites are beginning to rely far more heavily on their Internet connections for IP-based remote controls, STL's and audio processing tweaks.

We talked about the situation and Frank wondered if we at DM Engineering had anything that would save him the trip. He required something to sense the silence and automatically turn the affected equipment off, and then back on – after a few seconds delay – to correct the problem.

After a bit of noodling the problem around, I recommended our Silence Sense Jr. Silence Detector with its relay output set to the normally closed option, and with its momentary output option selected. The momentary option acts as a one-shot, with the relay contacts operating momentarily, only once at the end of the pre-determined silence delay time, and automatically resetting the device with the re-application of audio – and only then will the relay operate again with an audio failure. The N.C. output of the Silence Sense Jr., is controlling our Studio Solid State Relay Pack, which will switch 120 VAC and up to a 5 Amp load. This combination of products will sense the lack of audio after a user pre-set period of from 7 seconds up to 4 minutes, (it was set to 2 minutes for this application), and then duck the AC power for a second, to allow the affected equipment to re-boot properly. Frank felt that this time period might be a little short, so for Frank's application we rewrote the code and increased the momentary relay option time constant from one second to four seconds, to guarantee a proper power reset. This process will be done automatically when the audio to the transmitter fails, saving Frank the time and trouble of a long trip to the transmitter site. Wow, what a relief it is!



Silence Sense Jr. and Studio Solid State Relay Pack

Frank had an additional idea that made his situation even more bullet proof. He already had a silence sense device – let's call it silence sense #1 (set to 30 second delay) – that had no momentary contact capability, but had a couple of form C relay contact outputs, that stayed energized as long as the device experienced audio. Frank also has a secondary, though less desirable, audio stream to the transmitter site, so he plans to hook up his main audio stream into the normally closed relay contacts and the secondary audio source into the normally open contacts of the form C relay on this silence sense device #1. The common terminals on silence sense #1 will feed the program audio to both the transmitter, and the Silence Sense Jr. If the Silence Sense Jr. does not detect audio, even after the switch has been made to the secondary path, it will assume that the Internet modem or other equipment in the audio chain has failed.

The end result of this configuration will be an automatic reboot, and reset the AC power to all the devices that are vulnerable to the power glitch or failure. After the reset of the Silence Sense Jr. and Studio Solid State Relay Pack, and the primary audio feed is restored, the silence sense device #1 controlling the audio routing relay will reset and return to normal operation (the relay will de-energize), and the main air feed will be restored through the normal equipment chain. Problem solved!

We always invite inquiries for solutions that may seem a little off the beaten path, as that's one way we get ideas for development of products that are needed. As a further example, we have found in the past that our Silence Sense Sr., our silence sense detector that dials predetermined phone numbers and transmits DTMF tones down the line (originally developed primarily for pagers), was being used to monitor a grain storage facility for cattle and called out to the farmer when a certain low level of grain had been reached. Who would have guessed?

Frank Stas may be reached at frankj5@comcast.net and Dave Mandelbaum may be reached at dave@dmengineering.com

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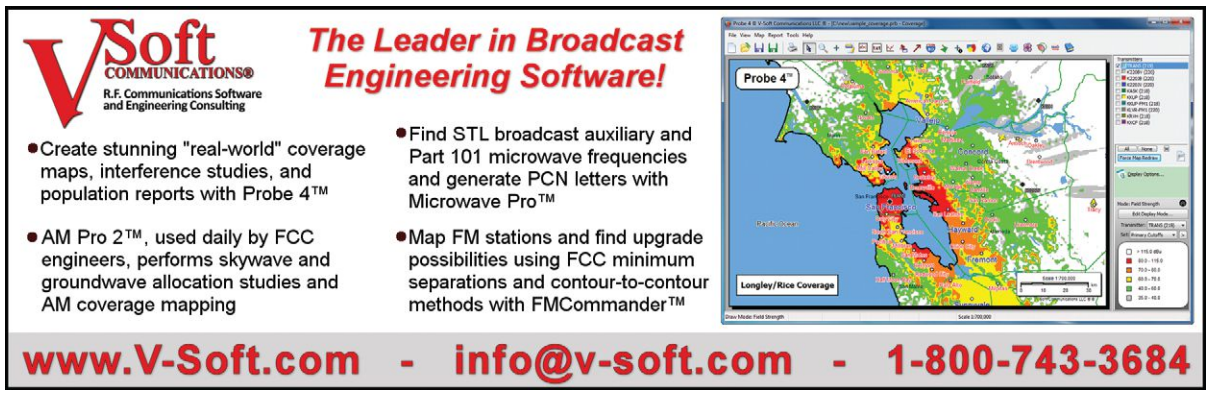

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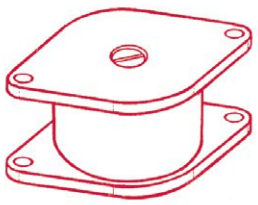

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Comrex – Connect Modems

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To learn more about the Comrex Connect Modem, visit www.comrex.com, or email us at info@comrex.com

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For more information: www.dhsatellite.com

Henry Engineering – AES Digiswitch 3X1

Henry Engineering is pleased to announce a new product! The AES DigiSwitch 3X1.

The AES DigiSwitch 3X1 is a switcher for AES digital audio signals. It accepts up to three AES sources, selecting one which is sent to the output. It can be controlled using front panel pushbuttons or remotely controlled with any GPI contact closure.

AES DigiSwitch 3X1 is ideal as a studio switcher, AES source selector, or for automatic switching under the control of a playout system or other remote control device. AES DigiSwitch 3X1 uses passive relay switching, so the AES stream remains bit-accurate with absolutely added no delay or latency.

All AES I/O is via XLR connectors; remote control is via a 9-pin D connector. The AES DigiSwitch 3X1 is 1/3 rack width and can be mounted in an optional rack shelf, or wall-mounted using optional wall/cabinet mounting brackets.

AES DigiSwitch 3X1 is now in stock at all Henry Engineering dealers. The list price is $325.

For more information: www.henryeng.com

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

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February 23-26, 2016
Nashville, Tennessee
www.nrbconvention.org

NATE Unite 2016
February 22-25, 2016
New Orleans, Louisiana
http://natehome.com/annual-conference/nate-unite-2016/

NAB 2016 Spring Convention
Convention Center – Las Vegas, Nevada
April 16-21, 2016
www.nabshow.com

Great Lakes Broadcasting Conference
May 2-3, 2016
Lansing, Michigan
http://michmab.com/ProgramsEvents/GreatLakesBroadcastingConferenceGLBC

Texas Association of Broadcsters (TAB)
August 10-11, 2016
Renaissance Austin Hotel
www.tab.org/convention-and-trade-show

NAB Radio Show
September 21-23, 2016
Nashville, Tennesee
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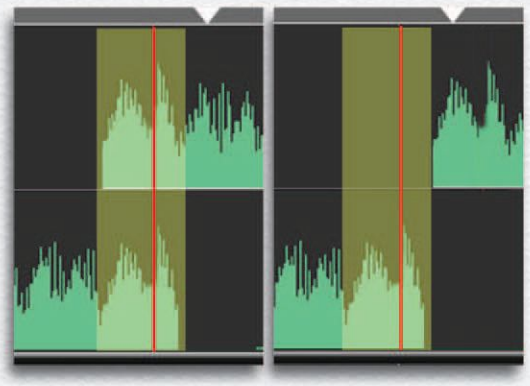
VoxPro saves your work and starts a new clip with you on one track and the caller on another. If you talk over each other, fixing it is easy.



How easy? Just mark to highlight what you want to edit and push a couple buttons. Instantly, one channel of audio is shifted and ready to air.

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