Radio Guide

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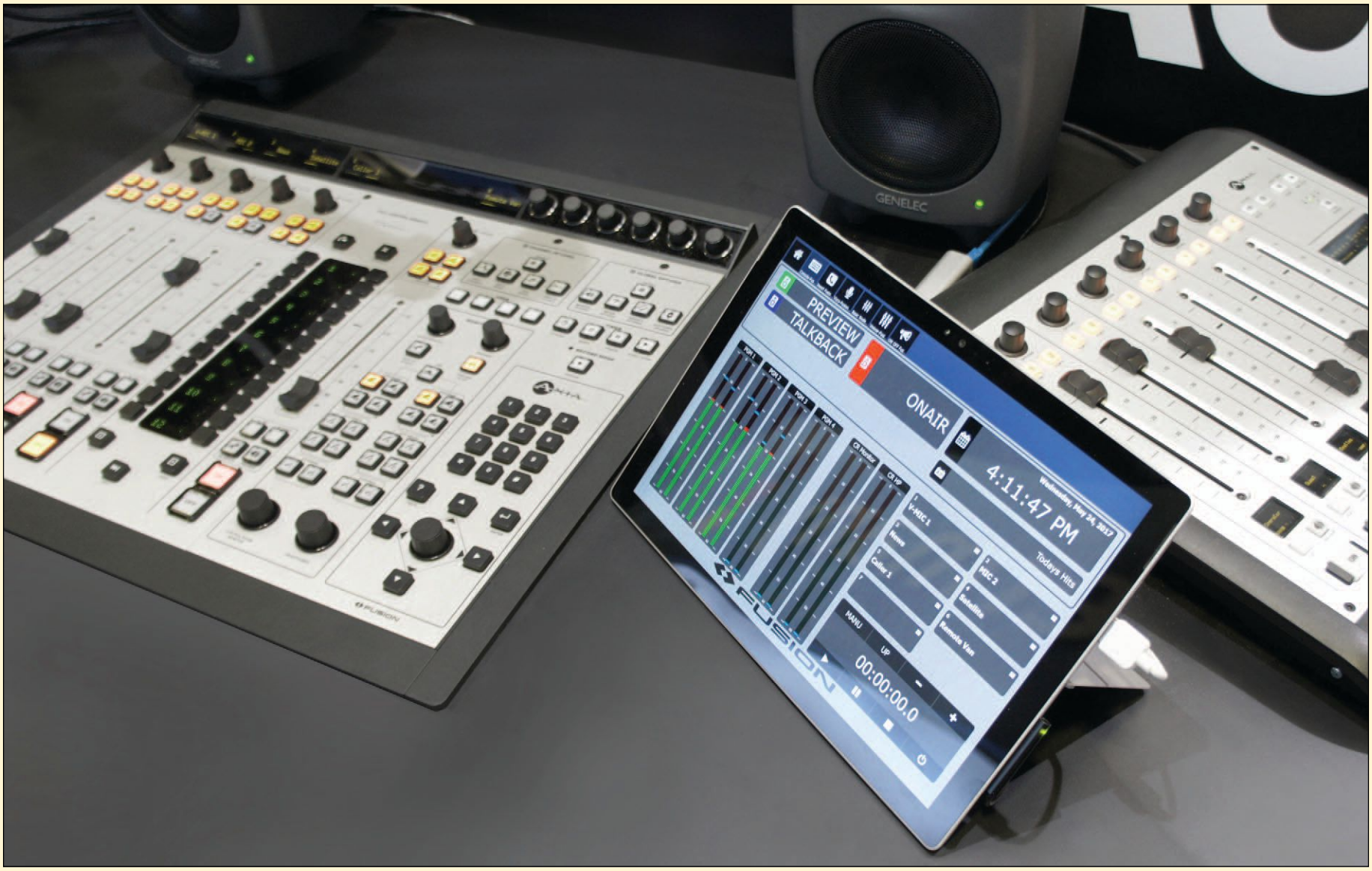
Virtual Radio: The New Broadcast Frontier



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Cover Story

Virtual Radio: The New Broadcast Frontier

AoIP is here to stay. But now, everyone's talking about virtual radio. What does it mean and how can it benefit you in the future?

By Marty Sacks – VP Sales, Support & Marketing, The Telos Alliance

The Telos Alliance has had a front row seat for the broadcast industry's transition from analog and primitive digital systems to Audio over IP following our invention of the first broadcast AoIP protocol, Livewire, back in 2003. And what a view we have had! The broadcast industry is moving toward AoIP infrastructure, both in radio and TV, with system after system being swapped out for faster, cheaper, and better broadcast AoIP equipment. The pace of adoption is extraordinary.

But technology marches forward to the beat of a relentless drum, and now, broadcast engineers are thinking about taking more advantage of what makes AoIP great – leveraging the IT industry's push toward virtualization to do AoIP in different ways than we do it today. Enter the next frontier – we call it **virtual radio** – where products that were previously only found in hardware instances (think rack units) are available in other form factors or as hybrids. Some broadcasters are skeptical while others are already virtualizing their studios and have indeed told us they've purchased their last piece of physical broadcast equipment! Here, we discuss what virtual radio is and some of its potential benefits.

What Is Virtual Radio?

Back in the stone age of radio, the idea of connecting a computer to a console – or anything other than a turntable or a CD player for that matter – was almost unheard of. All the associated studio equipment had to be physically connected to the console with a row of connectors. You might remember that, before the days of AoIP and CAT5, this bundle of wiring could be as thick as your arm! Now, many broadcasters are connecting directly via Ethernet using audio drivers or sources centralized in the equipment room coming through to the console over the network.

Whether you are talking analog, primitive digital or AoIP, however, the words "radio console" conjure visions of hard surfaces lit up with blinking lights, filled with faders and switches. The concept of virtual radio takes studio design out of the physical realm and into the world of software and apps. Just like you can use your smartphone to listen to music or play games without a CD player or a game console, virtual radio software and apps let you execute all the functions of a radio console or other studio gear on a computer or tablet. In fact, there might not even be a physical console surface, just a big touch screen with access to various console elements.

And it's not just a pie-in-the-sky concept. Studios are being virtualized now. Take, for example, BBC's Virtual Local Radio (ViLoR) project in which our Axia brand was heavily involved. BBC Technology, in collaboration with BBC Local Radio, recently completely virtualized several of its stations. The studios appear much like traditional ones but with the underlying equipment and infrastructure moved to a central, shared, location. Editorial teams have full control over the play-out system and mixing desks, but the actual audio files are stored, streamed, mixed and processed in a remote data center in real-time. Importantly, the system was designed to ensure that only the back-end equipment is centralized so that editorial and production teams can continue to present from the local community. According to the BBC, this innovative approach helps them solve an important challenge of how best to refresh the equipment and systems used across the BBC's 39 Local Radio stations as they reach the end of their natural technology life. Updating stations using traditional technology on this scale is both expensive and slow, taking between six to eight months per station. By sharing infrastructure and equipment across multiple sites, the BBC substantially reduced costs, and time to refresh a single station was minimized to only eight weeks!

The Benefits of Virtual Radio

The lure of a virtual radio station can't be denied, with the potential for loads of upside. As I mentioned with the ViLoR project, virtual radio is easier and less expensive to update than physical equipment. Imagine having four facilities: When a piece of hardware reaches end-of-life, all four sites have to be updated on site, one by one, studio by studio. AoIP equipment certainly makes this process much easier than the old TDM days. For one, it doesn't have to be done all in one fell swoop, but can implemented gradually, over time. It also dramatically minimizes the amount of wiring needed and is overall faster, cheaper, and better than analog or primitive digital. Virtual radio takes all this a step further because software can be updated remotely and/or all at once in a central data center, with software updates pushed out simultaneously to every facility. No physical equipment, no site visits.

Virtual radio also has the potential to be more reliable than physical equipment. AoIP is already light years ahead of old analog and primitive digital systems in terms of reliability. In an AoIP system, there is no single point of failure, making total system failure a thing of the past. Virtual radio can kick reliability up another notch by running multiple instances of software concurrently in physically diverse locations.

Just like AoIP dramatically reduced the amount of TDM cages and racks needed for a facility, virtual radio stands to reduce or eliminate equipment altogether, potentially making those vast equipment rooms – including power and cooling – a thing of the past. And with them, the cost of that associated real estate overhead.

By removing much of the physical equipment from the equation, on-site radio broadcasts via mobile radio stations also become that much easier, less expensive, with less equipment, shipping, and configuration time needed to get up and broadcasting live.

From a quality perspective, we all know that audio loses something in the translation from format to format. Virtual radio allows the audio packet to remain in its original format with no loss of integrity. Like in an AoIP system, the signal remains pure throughout the airchain resulting in better audio quality.

Perhaps one of the biggest benefits of a virtual software facility model is the ability to interact with products from outside of broadcast, like those from the world of computing – a tablet or Windows computer, for example. By using software, you aren't tied into to proprietary hardware and have more options when it comes to designing your system. Another big plus of software is that because functionality is not hard-coded to a specific button on a console, for example, it's highly customizable, allowing more flexibility as to functionality.

Today's Virtual Radio Studio

Of course, as with any new technology, change happens gradually. Indeed, many of our customers only recently made the move from analog to AoIP, and there are many facilities out there that still haven't made the switch. What we're seeing, more than completely virtualized studio operation, is a sort of hybrid setup that uses both physical and virtual gear.

For example, your console might be more than a traditional surface – like an Axia Fusion console with traditional inputs and outputs combined with Axia IP-Tablet Virtual Radio software that puts your most used functions on a touchscreen. Our Axia SoftSurface was a very early cut of this kind of hybrid back when no one ran their consoles on a touchscreen or computer. It was pretty revolutionary, allowing broadcasters to run on a virtual surface yet still have the full functionality of a console.

Axia Fusion Console With IP-Tablet

Our newly introduced Axia IP-Tablet includes virtual mixing software module for the Axia xNode that allows users to access the internal mixer inside an xNode; change sources and routes; and control the levels of each with virtual faders. When you combine this software with an xNode you get a fully customizable mini mixer. Just like a smartphone, you can add other IP-Tablet Virtual Radio "apps" to create even more virtual radio studio functionality, including those that control other Telos Alliance products like the Omnia.9 audio processor or VOCO 8 mic processor, Telos VX and VX Prime phone systems, Axia PowerStation and StudioEngine, and more. This software-based approach dramatically enhances the functionality and value of your console. Customized facilities are much more available to all broadcasters – not just the ones in larger markets.

Axia IP-Tablet Virtual Radio Software

While virtual radio may not look like something out of *Minority Report* just yet, one day it might. We are extremely excited about this studio of the future. A studio in which equipment is minimized, overhead is dramatically reduced, site visits are less necessary, updates are easy and simultaneous, redundancy is simple, and reliability is top-notch.

In the meantime, virtual radio is here and happening now, and the benefits are obvious. From the pure virtual model to the hybrid system, the concept is not absolute. And while you may have just transitioned to an AoIP studio, it's never too early to start thinking about virtual radio and what your studio will look like in the years to come. – *Radio Guide* –

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Studio Site

Sounds of Silence

Echoing Sentiments on Quiet Studios

by George Zahn

Are you happy with your air studio or recording studio's sound isolation? Have you heard people talking from your hallways on recorded announcements or live broadcasts? How many times has the producer in your extra studio cranked the volume to 11 on the other side of your air studio wall?

We all get it. Many of us have worked in a variety of locations that have paper thin walls, reminiscent of a cheap motel's acoustics, to some studios protected like Fort Knox.

At the same time, managers and engineers happy with sound isolation may be battling recording areas that are "too live" and fraught with reverberation or, to borrow from Game of Thrones, studios that are "dark and full of terrors," due to too much sound absorption.

The proper acoustic environment of the studio is fairly subjective. To many, a good studio should have decent sonic isolation from any outside sound, meaning windows and metal walls and studs can be a detriment. The studio should also fall somewhere between a tiled bathroom and an anechoic chamber. If your studios, like those at my current station, have been retro-fitted into an existing area, you may be fighting one or both of these issues.

Absorption Versus Diffusion

Most studios that are well sound-proofed have plenty of insulation, and generally well-sealed studio doors, or air locks, to help isolate sound. In studios where the room was obviously not designed with adequate insulation for sound or may contain extra windows (which are great for atmosphere and letting visitors see talent in action, for better or worse), the glass and other hard surfaces can contribute to more sound reflection than you may wish.

Absorption of sound is aided by adding soft or porous materials on the studio's walls. The goal is to prevent reverberation by literally allowing some of the sound air pressure to "soak" into the wall covering. An alternative to absorbing the sound is to diffuse or deflect the sound by creating irregular surfaces. This is one reason that specifically designed studios often have non-parallel walls.

In addition to keeping the sound in a studio from being too reverberant, absorption or diffusion of sound can help prevent standing acoustic waves. If your studio has occasional live music performances, standing waves can become a real issues. A standing wave can happen at sympathetic frequencies to the studio's dimensions. This can happen more frequently in the bass end of the spectrum, but basically any square or rectangular room without soundproofing can have dimensions that allow the bandwidth of a sound wave to bounce back and forth in complete wavelengths. Other frequencies will diffuse more naturally since their wavelengths aren't complete as they hit a surface. This can be disconcerting to announcers or musicians in a performance area.

A "Standing" Ovation

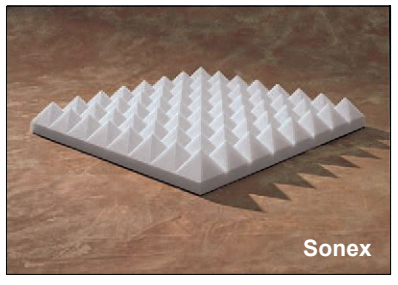
At one station I worked at, we had an "audience studio," with seating for about forty people, with a small flat stage area. Despite the stage area having slightly non-parallel side walls, there were still windows on each side which allowed the mixer in the adjacent control rooms to see what they were mixing for the air signal. Those windows created standing waves, especially in some bass frequencies. Adding some Soundtex, a non-woven acoustic absorption material to the walls in the area, definitely minimized the problem, although the necessary windows still allowed for some minimal standing waves.

There are some low cost ways to absorb or diffuse sound, and there are specific broadcast and acoustic treatments that can be added to walls, or movable baffles that are scientifically proven to solve reverberation problems. These include the aforementioned Soundtex, Sonex panels, and Auarlex panels, to name a few. Auralex even makes panels that can be quickly assembled for portable use which is great for setting up a "studio environment" at a trade show or convention, or even sprucing up a small personal studio.

The Auralex product was particularly interesting to me (as we'll discuss later – just a little absorption or diffusion can go a long way) because it's portable and has floor stands for different configurations. Their MaxWall product is about 4 inches thick and 4 feet wide by 20 inches tall, with panels in various colors. They even have a demo in which you can create an impromptu voice booth, although maybe a bit too dry for most tastes with eleven panels, and one with a window to allow for visual cueing.

Auralex

Sonex comes in similar sheets with textured patterns that help diffuse the sound that's not absorbed. Rumor has it that some of these sheets were also used on sci-fi TV sets to give a futuristic wall finish, more so than for acoustic control. Sonex also makes ceiling tiles and its materials have been used in large office and industrial settings.



Another interesting product is the Whisperwave acoustic ribbon sound baffle. It can be suspended from the ceiling with its mountings and the curvy four foot long panels are stylish and give you some control directly overhead in the middle of a room, as opposed to placing the treatments directly on the walls or ceiling. This would work far better in an area with high ceilings.

Insulation Isolation

Whether you're improving the acoustics in your home studio or your station's centerpiece, there are some relatively economical ways to start. For soundproofing, try some improved weather stripping around your studio doors or, space permitting, add a small "airlock" between the first door and the studio. This works on sound in a similar way that fast food restaurants use an airlock between their outside doors and the inside restaurant to prevent heat or cold from outside from directly hitting their customers. Most studios do not have the space to add an airlock, but if you're designing a new studio, it can be very helpful.

In the 1970s, it was extremely fashionable for some studios to have carpet remnants of various colors and thicknesses on studio walls. This was more than a psychedelic decoration. These carpet pieces aided in the absorption of sound and to some extent, even diffusion, due to the variety of thickness and textures. This is an inexpensive option even today, although not quite so stylish.

"Hanging" In There

Another fairly low-cost DIY project would be to borrow from some TV and old radio studio designs. From the days of Jack Benny and Fibber McGee and Molly, the performance was held in an audience studio to allow for interaction and laughter from the audience. To help deaden the large room, studios often had drapery along the walls – again offering absorption and a bit of diffusion. In large TV studios, drapes can be used to minimize reverberation as well.

The neat thing about drapes is that with a few tracks hung in a room, the drapes can be expanded over the whole wall, or pulled back to allow some or all reverberation. For a small investment of some extended drape tracks and soft window coverings, it could be "curtains" for unwanted sound reflection.

If diffusion is really what you need as opposed to overall absorption, adding anything irregular on the walls can help. It is a common sight in some theaters or concert halls to see what appear to be nice artful wall sconces that might just be nice wooden squares placed on the side walls or ceiling. A nice design? A way to help diffuse sound to prevent annoying standing waves? Probably both.

On a smaller scale, you can try something like this in your own studio. In fact, mounting a few small blocks of sound absorbing apparatus or any irregular material on pieces of wood or foam core you can hang, allows you to try moving those hangings around different places on the walls and/or ceiling to get the desired sound you want. This is similar to using portable sound proof baffles in a music recording studio to get the right isolation of instruments for the best control. Also, don't forget the floors. Sometimes carpeting or even a throw rug can help deaden unwanted sound artifacts.

How Dry I Am

Can we go too far in deadening sound? Absolutely, and that's why trying a little or spaced treatments first can save money and prevent us from going to far. At one station along my journey, we had a studio that was as close to an anechoic chamber as I've experienced (other than one at a science museum I visited). From personal experience, I can tell you that absolutely *no* liveness (or wetness) in a studio is more unnerving to an announcer or mixer than outside or reverberant issues. I, and many of my colleagues, found it disturbing and eventually, management pulled some of the full-wall sound proofing from the walls.

Even in my station, we use good absorbing materials on the upper half of the walls (due to an entire wall of windows in our air studio) and it works very well. For more soundproofing, I'd love to hear stories about the best soundproofing insulation which can be placed in existing walls, as well, since many of us are in studios that were never designed to be studios. I welcome any input or creative soundproofing stories you may wish to share to make us all have better studios moving forward!

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

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Chief Engineer

Blower Motor Replacement

by Scott Schmeling

Hi, everybody. I hope your summer is going well – mine has been more than interesting. I'll share some of it with you in the next issue. Today I'd like to talk about blower motor replacement.

The blower motor is an essential part of your transmitter. If the blower motor fails, the transmitter shuts down. We'd like to prevent that if at all possible!

I'm sure most of you have changed a transmitter blower motor or two. But, in the hope there are readers who are new to broadcast engineering, I'd like to go over the process. It's usually a fairly easy job that takes about a half-hour or so. While that may be true for most transmitters, but I have one model that has always been a challenge. In fact, changing the blower motor on this model transmitter has actually taken me three-and-a-half hours! But I think I just discovered I've been doing it wrong – more about that later.

I mentioned preventing transmitter shut-downs caused by blower failure. In the "old days" the motors had oil ports at the front and rear bearings. Normal procedure called for a couple drops of oil every six months or so. But today's motors have sealed bearings that require (or permit) no lubrication. We can't oil the motor bearings anymore, so we can't prevent the motor failure. But we *can anticipate* a pending motor failure and replace the motor before it fails.

It can be said that every piece of equipment has a sound of its own. The next time you're at one of your transmitter sites, take a couple minutes to listen. Listen closely. Listen to the sound the blower makes – and remember it. As the bearings begin to dry out, the sound will start to change. It might be a slight shift in the frequency of the sound or it might actually start to squeal a little. When you notice a difference in the sound, you can be reasonably sure the blower motor is going to fail in the not-too-distant future. In that case, now is the time to get ready to replace that motor – on *your* schedule.

You will need wrenches, allen wrenches, possibly a screwdriver, and of course, your replacement motor. You do have one, don't you? Check right now. Go through your spare parts. If you don't have a spare motor, *get one!* Because when that blower fails (and it *will*), it very possibly could fail at night and you'll be waiting, at the very least, until your neighborhood electric motor store opens in the morning. That is, of course, unless the motor is not in stock and has to be ordered. Now your off-air time just got longer.

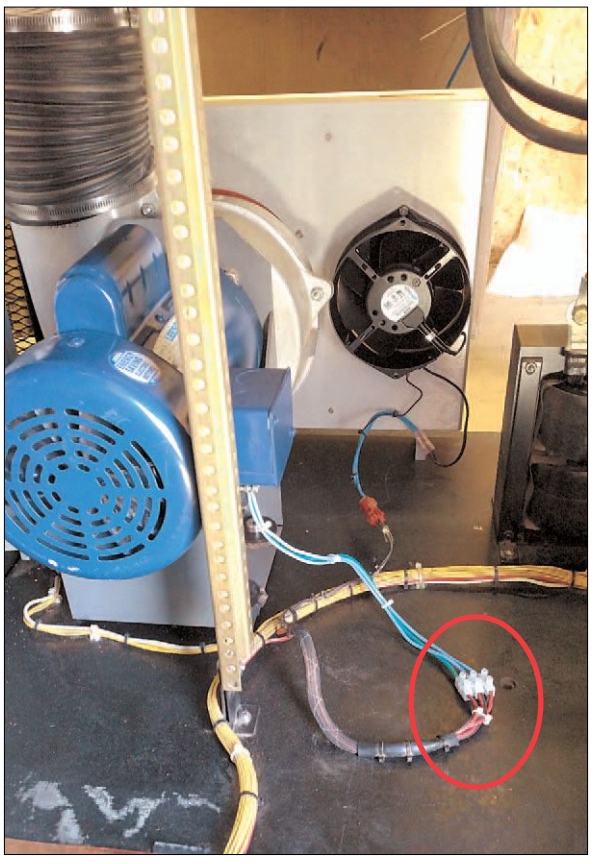
If you need to get a spare motor, check the manual for the specs. If you can't find them there, check with tech support or look at the motor itself. There's a plate on the motor that tells you everything you need to know. Most transmitter manufacturers will have the motor you need in stock. If you prefer to buy locally, the data from the plate on your motor will give you all the necessary information to guide you to getting the right motor.

Let me say this one more time – check your parts inventory – if you don't have a replacement blower motor, *get one as soon as you can.*

OK, now to the motor that I was replacing incorrectly for oh ... so many years.

This motor is in a Broadcast Electronics FM 10B transmitter. At first glance, there's nothing unusual looking about it. The blower assembly is on a small riser and the wiring goes into the motor. On the air intake side, there's a rubber gasket of sorts, that goes through a large hole in an aluminum assembly that bolts on stand-off's to the floor of the transmitter and fits up to the air filter on the back door.

The first thing I do is remove the back door of the transmitter to improve accessibility. Next, I remove that aluminum assembly on stand-offs. It also includes a cabinet flushing fan, but that can stay mounted since the wiring has connectors installed. Keep in mind, though, that flushing fan also has a sound of its own and it *can* fail. In fact, I am replacing it as well.



Completed Installation
Note pigtail and terminal strip.

Next, I remove the power wiring to the motor – that has to be done from the other end of the motor, so the lower front panel of the transmitter also has to be removed. Once the wiring has been disconnected, I want to pull the motor out. *This* is where I started to go wrong ...

My plan was to unbolt the motor from the riser it sits on. In just about every other transmitter, this would be correct, and easy. So I removed the nuts from the two mounting bolts I could see ... then I realized that because of its position, when the two cabinets of the transmitter (power supply and transmitter itself) are bolted together, it is impossible to see the mounting bolts on the opposite side (right side when facing the back). No problem – I'll just go by feel. It was more than a little awkward but I got the nuts off and the bolts out and the motor removed.

I didn't know yet, what "fun" was in store!

After removing the blower portion (squirrel cage blades and housing) from the old motor and mounting it on the new one I was ready for re-assembly.

I set the replacement motor in position and put the first two bolts in place (the ones I could *see!*). But I still couldn't see the back two – and it took forever to feel my way and get the last two bolts in place. But that was *easy* compared to trying to get the washer, lock washer, and nut *onto* the bolts that I *couldn't* see! (I was getting a little more than frustrated.) But after dropping nuts and washers a number of times, I finally got the nuts on the bolts and was able to get things tightened up – this was *three hours* after I'd started!

Use a little Anti-Seize when you put the fan blades on the motor shaft.

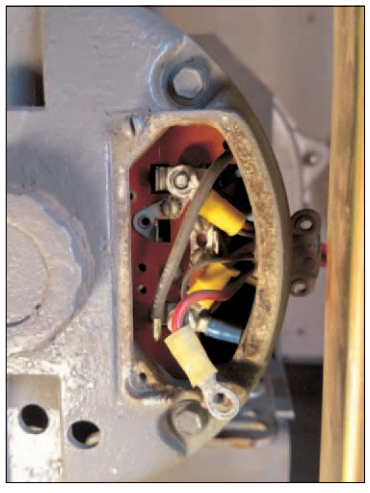
But I finally discovered what I was doing wrong. Rather than unbolting the motor from the riser, I should have been unbolting the *riser* from the floor. Using this method, it's much easier to properly mount the new motor in place. Yes, it's true that I still cannot see the bolts on the "far inside" side, but unlike the bolt/washer/lock-washer/nut arrangement for mounting the motor, the riser only has a *bolt* at each of the four positions. It's a great big stainless steel allen-head bolt – no washers or lock-washers or nuts.

I will admit, I discovered this "proper procedure" partway through the most recent motor change, so I can't tell you for sure how much time will be saved, but it will be substantial. But I *can* add a few helpful hints that are valid for any transmitter blower change.

Helpful Hints:

Be sure to have some penetrating lubricant (ie: Liquid Wrench) with you. It will help loosen bolts that may have rusted a bit. A light spraying will also help prevent rust in the future, to help make the job easier.

When you put the fan blades on the replacement motor shaft, apply a little Anti-Seize first. This product is primarily for spark plugs, but it is also effective here – again, making the next change easier.



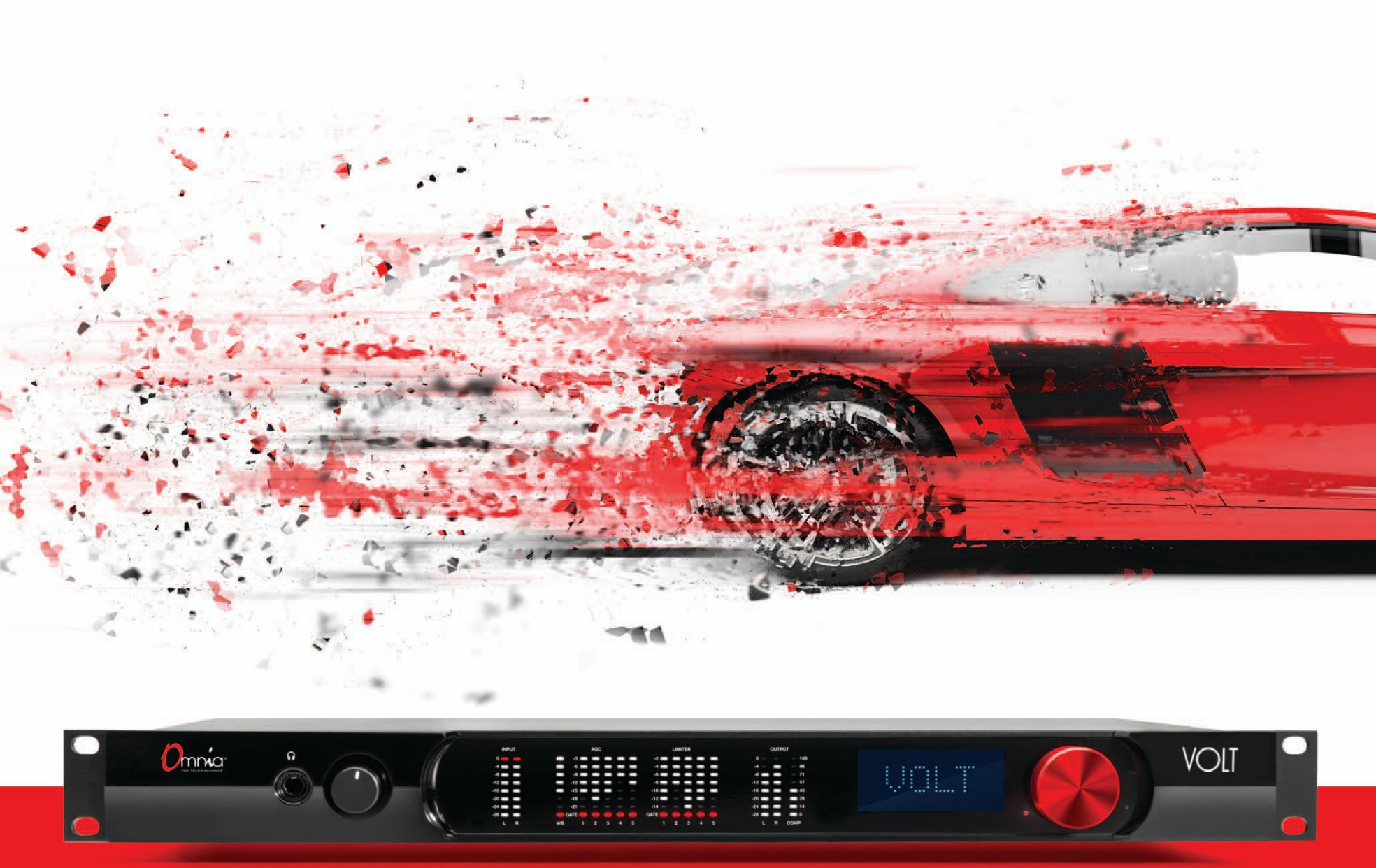
Motor Wiring Access

And the final hint: if the wiring connects directly to the motor, add a little pig-tail and a terminal strip so you don't have to disconnect anything from inside the motor next time. It's all about working smarter.

And did I mention, be sure you have a replacement motor on the shelf!

Until next time – 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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FCC Focus

AM Revitalization

The 800 Pound Gorilla is Still in the Closet

by Gregg P. Skall – Womble Carlyle Sandridge & Rice, LLP

For the all of the rhetoric about AM Revitalization, the most impactful proposal adopted by the Commission to date does not really affect the AM band at all. So far, the "saving grace" for AM has really been to move its listeners to the FM band by the adoption of rules allowing AM stations to retransmit over FM translators. First, by adoption of the cross-service rules allowing AM stations to use FM translators and then by the adoption of two waiver windows, allowing an AM licensee to move a translator up to 250 miles, bringing it to their own community to retransmit their programming. Reportedly, over 900 AM stations took advantage of those filing windows. It is expected that soon the Commission will open two more windows for AM stations to apply for new FM translators if they did not utilize the two waiver windows.

However, it has been observed that the FCC has yet to make a major effort to improve the AM band itself. It did make some needed technical rules changes, the most important being elimination of the ratchet rule, which ironically prevented AM improvement. Another was a reduction in AM antenna efficiency standards. These changes enable AM stations to design simpler antennae systems and provide relief when seeking to relocate an existing facility made more difficult by constraints of site availability and local land use restrictions.

While important, those changes are really small potatoes. The 800 pound gorilla left in the room was the proposal to modify AM protection standards by revising the protected service contour definitions to recognize modern-day noise and interference. In the daytime, new, higher field strength contour values have been proposed along with correspondingly higher interfering contour definitions. It has also been proposed to change the nighttime and critical hours protection of Class A AM stations – which could allow some 200 Class B and Class D stations, currently required to reduce power, directionalize or "shut-down at sundown," to better serve their own local communities at night. Despite agreement from many respected engineering consulting firms, the Commission has yet to act on this gorilla.

The Merriam-Webster Dictionary actually defines an "800-pound Gorilla," as something of great size or power that dominates; exactly what the Class A nighttime rule revision is to AM Revitalization. And, it is most significant where it is needed most: in rural or suburban communities. Not only must those community oriented stations reduce their local service at night, but those that can continue to stay on frequently must employ complex and costly directional antennae to protect one of the 73 Class A stations. And as the Commission itself noted, even for those Class B stations that are protected from interference by other AM stations at night, the protection afforded Class A stations often results in sub-standard nighttime coverage in deference to the secondary service of a larger station often many miles or many states away.

Decades ago, skywave clear channel radio served the purposes of the Communications Act of 1934 which requires the FCC "... to make available, so far as possible, to all the people of the United States, a rapid, efficient, nationwide radio communication service." In the early days of radio, it made sense to quickly expand service to small and remote rural communities through sky-wave service. Many will remember *The Walton's* television series of the 1970s that portrayed the life and trials of a 1930s Virginia mountain family through the era of the financial depression, occasionally seen listening to their favorite radio shows such as Edgar Bergen and Charlie McCarthy. World War II produced a plethora of radio operators, many of whom returned home to build local radio stations. But by then, they were mostly limited to classes of stations that must protect the large city nighttime skywave signals.

Clearly the radio scarcity of the 1930's is no longer. Docket 80-90 greatly expanded the availability radio, then came Internet streaming, and today we live in a world with a plethora of entertainment and information resources literally available on demand. Yet many local communities have but one "community oriented" resource: their AM station that must still protect a distant city Class A AM station. And the truth is that many of those Class A stations can no longer fulfill their assumed purpose.

Submissions from highly respected communications engineering consulting firms strongly make the case that the assumptions underlying Class A skywave service are a myth today and actually result in unfruitful restrictions on local service AM stations. In March 2016 comments, du Treil, Lundin and Rackley ("DLR") concluded that the "presumed" 0.5 mV/m 50% skywave service is a myth that results in unjustified restrictions on other stations wishing to provide service to their local areas. In their view, this myth has been perpetuated because of the way Class A stations have existed in a regulatory allocations "bubble" for the last eighty years, with no consideration given to *actual* interference due to protection calculated on an assumed contour level.

Many other engineering firm comments were consistent with du Treil, Lundin and Rackley's conclusion that Class A, 0.5 mV/m 50% of the time, skywave interference-free coverage simply does not exist.

The DLR comments cite a 30-year old NAB-sponsored study that concluded the top six out of eight categories cited by AM radio listeners for reception difficulty had to do with noise generated by the environment and not interference caused by another AM station. *(B. Angell & Associates, Inc, AM radio interference study June, 1988).* Buttressing that survey was the Canadian Dept. of Communications "comments" submitted to the International Radio Consultant Committee ("CCIR") of the International Telecommunications Union ("ITU"). The Canadians also concluded that higher EM levels are the big problem for AM radio reception in both urban and rural areas. As a result, today 30 mV/m is considered the bare minimum value to cover densely populated metropolitan areas with noise-free reception.

It appears that DLR was correct in concluding that twenty-five years ago a wrong turn was taken in AM band policy by focusing on strategies to reduce "on paper" inter-station interference rather than improving AM's ability to overcome noise and interference with better transmitted signals. DLR's calculations show that, in fact, Class A stations in the United States actually have nighttime interference-free levels, on average, of 1.5 mV/m. Therefore, they propose nighttime Class A groundwave service protection at the 0.5 mV/m threshold as fair for stations that have interference-free coverage near that level. H&D Consulting Engineers, LLC ("H&D") also conclude that, in general terms, skywave service is ephemeral and no longer a public interest. Moreover, as shown by H&D, studies defending Class A skywave service are misleading, in that they presumptively characterize overlap as interference.

Real AM revitalization requires that we stop focusing on interference caused between stations and aggressively address how stations can overcome noise and other types of interference. Notably, comments of the National Association of Black Owned Broadcasters Inc., and another group of 58 AM radio station owners, called the "AM Broadcast Licensees," supported this change. Illustrating potential service gains for other stations at night, if Class A stations protection was based on actual interference levels versus current no-interference assumptions in the present rules, Univision Local Media, Inc. ("Univision") showed that their three Class B Chicago, Los Angeles and Miami stations could increase primary, local service to a combined population of 1.1 million people.

Others agree. In his July 2016 blog, Lawrence Behr argued AM reception was highly dependent on the desired program signal being typically some 25 dB above the ambient noise level: "The AM band today is subject to AM coverage distortion, increasing noise threats and interference from the proliferation of wireless systems, electronic devices and low frequency radiators that distort AM signals more now than as recently as 10 years ago, agreeing with others that interference to AM is really dependent upon ambient noise and not contour protection and that many fear that AM listenership may die soon if the band is not managed by the FCC in cooperation with licensees, utility companies and electronic device manufacturers."

Most recently, former Chairman Mark Fowler stated in a *Radio World* article that, "the antiquated standards we live with today still define AM signal levels for service contours and the levels of undesired signal interference. These standards were designed in the 1920's and 30's. Rural families like the fictional Waltons gathered around family tube radio sets to listen to Jack Benny and "The Grand Old Opry." Electronic external interference did not exist. Chairman Fowler concludes that the real-world standard would replace the 80 plus year old, single signal overlap avoidance method that wrongfully assumes that a Class A receives no interference at all within its 0.5 mV/m 50% of time skywave contours. Agreeing with the consulting engineers who filed comments in the revitalization proceeding, Chairman Fowler urged the FCC to adopt rules based on the actual nighttime *interference levels* which in *reality* is the desired/undesired signal ratios calculated for Class A stations.

The bottom line appears to be that change in interference criteria, suggested by most commenting consulting engineers, will allow AM station signal improvement in consideration of modern-day noise and interference conditions across the board, including both expanded coverage in the daytime for most stations and expanded groundwave coverage by Class B and Class A stations that operate with directional antennas at night – without real harm to any actual Class A station listeners. A failure to make nighttime changes along the lines that have been proposed by several expert consulting engineering firms and Univision, will continue to prevent real local service to millions of people. The Class A group opposed to any change call themselves the "Alliance Engineers: First Do No Harm." The ironic point here is that, to do no continuing harm, Class A nighttime protection must be changed to reflect real life interference situations. The presupposed contour protection environment of the 1930's may have worked for our grandparents, but it no longer exists and is no longer relevant for their millennial grandchildren. It's past time to exit from the Alliance's 1920's time machine and get back to the future.

It is indeed time to adopt a real word standard that will provide actual protection to those who actually listen to Class A stations day and night, and allow AM to "revitalize itself" by adoption of real world nighttime interference level protection, based, as Chairman Fowler urges, on actual nighttime interference levels calculated on desired to undesired signal ratios.

Gregg Skall is a partner of the law firm Womble Carlyle Sandridge & Rice, LLC. He frequently lectures on FCC rules and regulations, represents several state broadcaster associations and individual broadcasters and other parties before the Federal Communications Commission in their commercial business dealings. Prior to private practice, Mr. Skall served as the Chief Counsel for the National Telecommunications and Information Administration and General Counsel to the White House Office of Telecommunications Policy.

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Monitoring Your FM Stations

Wiely Boswell

Equipment to test your on air signals has never been so small, so accurate, and at the same time affordable. Pira, a company from the Czech Republic, has been building RDS equipment for quite some time. RDS in Europe has been quite advanced and has features not used by U.S. broadcasters – it is quite involved when you look at RDS data. Pira has designed and built the P175 and P275 which are small units that will read RDS parameters as well as modulation, pilot, and phase. The web site is **www.Pira.cz** It is a very informative web page which also contains useful free software.

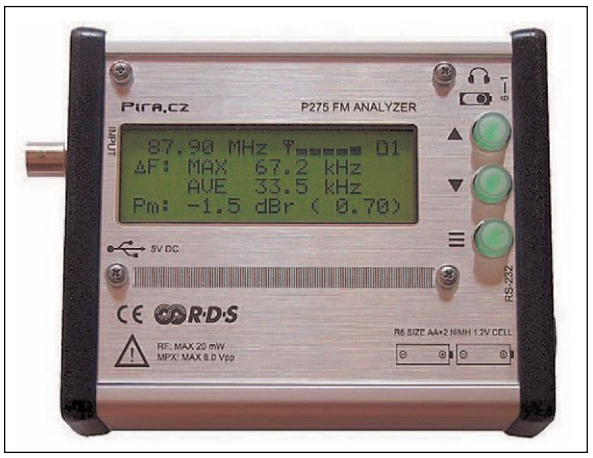

Figure 1: The Pira P275 FM Analyzer

The unit is a USB powered software defined radio (SDR) capable of displaying a vast array of measurements beyond RDS. A lot of cost is defrayed by using a laptop but the unit has a front LCD display so will allow it to be used stand alone for basic measurements. The unit will operate on batteries also. **Figure 1** shows the P275 display , several others can be scrolled up.

Figure 2: The Pira P175 FM Analyzer

A USB power measurement was made using a handy USB V/A meter. The P175 consumes 180-250 milliamps, allowing it operate on any USB port. You can purchase it without the case if you want to do a custom build into your plant. There has just been a new hardware version released that I want to go thru eventually. This is specific experience with version I hardware (Version II has an Ethernet port).

P175 FM Analyzer w/o Case

However, from their documentation, can I connect the P275 to the Internet? "The P275 device does not support an Ethernet Internet connection directly. The software supplied however supports remote control which can be realized via remote PC or using any commercially available Ethernet-to-RS232 converter. The software also integrates a simple web server and its scripting engine includes MySQL client, FTP upload etc." My current unit supports RS 232 and USB.

To get up and going, you download the software which will include a USB driver (unless using RS232) and the main program. Connect the equipment and set the correct com port.

I use COM5, for the USB. There is a CONNECT box to start connection. There are two Tx/Rx boxes to show active communication between PC and unit. There is also a RUN box to begin continuous graphing functions as well as a one time sweep. The PC need not be high powered by today's standards, but the more things running at the same time will require some horse power. It's Windows system only, but I run it on both XP and Windows 7

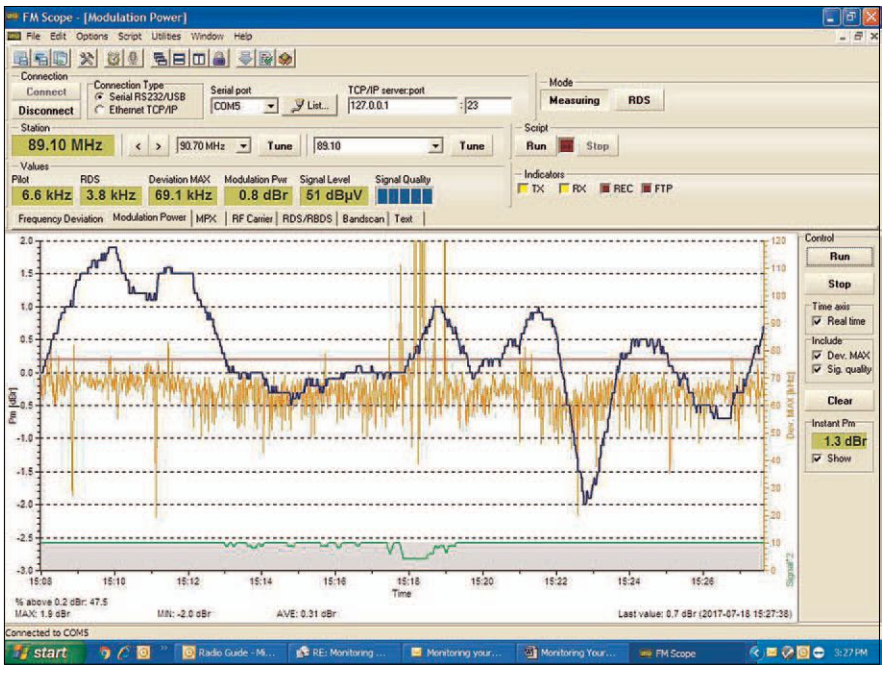

Figure 3: Main Software Screen

Measurements include several type displays of deviation, left/right audio levels, receive signal level, pilot injection level, RDS level, RDS vs pilot phase, and a FM band scan with relative signal strength levels. A strong enough signal will be identified with station frequency. In this scan a box called ACQUIRE envokes a single sweep. **Figure 3** shows the main software screen with the modulation power tab selected. Signal strength is indicated by green trace near bottom.

Monitoring off air is not considered accurate because of multipath and low signal concerns. The manufacturer seems to say off air is better, but I suppose it depends on the RF environment. There is warning about not exceeding 20 mW (13 dBm) for the P275 or 5 mW (7 dBm) for the P75/P175. Most modulation meters typically are fed with direct sample and sensitivity is low. However, this unit has good sensitivity, and the P275 also allows input of RF or MPX signal. The main information bar will show signal quality as well as concurrently tracking signal quality on a modulation power real time graph. This is helpful to evaluate if a signal change has thrown off a reading. Make a note here, that HD stations that read high on an analog modulation monitor also read high on this unit. (Perhaps a new feature one day?) The upper left of the screen displays quite a bit.

There are two tune sections that allow you to go back and forth (like two VFOs) and presets available. Pilot, RDS injection, Max deviation, Modulation power, signal level in dB and bar graph are always viewable no matter which tab is selected at bottom.

The connection here is shown as Connected on COM5. You can use the "List" button and determine available com ports via the device manager on your PC. Then there is a host of options in the upper tool bar.

It is a learning experience all on its own. Different displays can be simultaneously tiled – this is where CPU horsepower heats up.

There is a 1/8" audio out jack which allows audio monitoring. On the P175 it is mono audio and the P275 has 2 channel audio, but allows you to force it to mono.

This is stated in the manual: "Note: The headphones output is not suitable for rebroadcast or streaming purposes." I am not sure exactly why it is considered not suitable. A lot of translators on the air today have a hard time receiving a "perfect" signal to rebroadcast.

RDS is quite a complex system. There are so many differences in the way receivers display data it is hard to program RDS injection. I have seen RDS work fine in one car and not work at all in another. So the P175 and P275 can show you what is going out and, if you are an RDS guru, they even have RDS SPY software to go further. To get an updated readout you select "AQUIRE" to run and bserve the data on a scope. There is a text window that makes some sense and then there is the raw data.

There is a lot you can learn from their web site. They help you understand RDS operation and how to test with the P275 . I am still trying to understand how it displays so differently on receivers – the U.S. has not even begun to tap its features. In the U.S., we also have program PAD data delivered on an HD stream, which has quite a few features as well. However, this unit does not do HD analysis.

One last feature not to miss is alarm outputs. There are pins available with outputs for silence sense, overmodulation, signal loss, and Pilot or RDS level error.

This is a system ready for both the serious "get into the software" developer and the appliance operator. I have barely scratched the surface so take a look into this interesting product documentation.

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

Tower Topics

What's Holding Up Your Tower?

by Steve Callahan

I'm sure you do the same thing I do when I get to a tower site. I take a look toward the top of the tower or towers to make sure the lights are on and flashing at the right rate. I then make sure that everything that's supposed to be on the tower is *still* on the tower.

Are all of the FM antenna bays still there? Don't laugh – on a tower in Florida I once visited, there was a two bay antenna where there was supposed to be a three bay antenna. Aside from a little bit of increased reflected power and some diminished fringe coverage, the station owner couldn't pinpoint exactly when lightning had removed the now missing top antenna bay.

After you've scanned the above ground portion of your transmission system, do you take the time to look at the concrete foundation which supports this magnificent monument to Marconi?

If you have ever supervised the construction of a broadcast tower, you know what physically goes into keeping that tower up and relatively plumb, through all sorts of weather conditions. I won't even try to explain all of the physics and stress calculations needed to properly design the loading characteristics of even a simple tower, but now it's up to you to maintain the work that someone else invested in your tower.

Think of it this way. There is a lot of downward compression on your tower's foundation. Every tower section, every antenna, transmission line and mounting bracket, contributes its weight to that downward stress on your tower base. The guy wires are arranged to contribute to that downward force, but in a good way. If you take a close look at your AM base insulator, you'll see that, in most cases, the entire tower rests on a nub, sometimes the size of a quarter. The tower is designed to slightly "give" with prevailing winds and if it didn't, the guy wires would pull their anchors right out of the ground over time.

Recently Repaired Tower Base

I keep a copy of the ROHN Commercial Products catalog from July of 1988 in my library. It's a wealth of tower information that I've used more times than I can remember. Even though the stress calculations in the 1988 catalog are far surpassed by today's newer more stringent figures, the pictures and diagrams in the catalog give you a clear and graphic description of what it takes to build a tower. The rebar detail in the base concrete, the guy wire placement on various height towers, tower light wiring diagrams, even the detail of installing the climbing pegs is all in that very old but very informative catalog.

I'll assume that you still personally do the quarterly checks of your tower lights on-site and then you take the time to walk around your tower or array and make sure that all is well. However, if you don't, or haven't for a long time, take the time to visit all of the guy wire anchors. If you can't get to them because the brush is too heavy, that's the first step you need to take to maintain them.

When you get to the anchors, look for any heavy rust on the guy wires or the attachment hardware. The turnbuckles which maintain the guy wires tension should have figure-eight shaped pieces of guy wire called "safeties" twisted through them and then securely fastened together to keep the turnbuckles from intentionally or unintentionally unwinding. Are there stainless cotter pins in all of the clevis pins? One missing cotter pin could cost you a lot of time and money.

New Tower Base

While you're standing out in the field at the guy wire anchors, consider for a minute the part of that anchor that you can't see that's buried under your feet. From the fan-out plate, there is a rod that goes down to a large block of concrete and rebar which is affectionately known as a "deadman." Tower construction plans specify the size and weight of the "deadman" and the horizontal and vertical slope of the anchor rod. Take a moment to make sure the anchor rods are not deviated left or right in relation to the tower. If the rod is not straight, it's receiving lateral stress that it wasn't designed for. Someone carelessly mowing your tower field in a hurry can do a lot of damage by running into a guy anchor.

If your tower is getting along in years, and many of them are, and especially if you're in an area where the soil is corrosive, consider having your buried anchor rods tested for corrosion. Just because you can't see them is no reason to think that they are still up to the task of keeping your tower straight. Cumulative corrosion can take its toll by reducing the diameter of the rod, and it's a lot cheaper to repair them on *your* schedule.

When you visit your tower base, take a long look at all sides of the concrete structure. The concrete base could be round, square or triangular, but whatever the shape, it's there to support tons of tower under tons of compression. Are the corners or edges flaking off? Can you see any rebar sticking out of the concrete? Is the tower base pier level or is it leaning? All of these symptoms are danger signals that you could be seeing. The power of frozen water in a crack in concrete is amazing and can eventually destroy the concrete tower base.

Tower Base to be Repaired

One area of tower maintenance that is very often forgotten is to clear the weep holes at the base of the tower. Towers with hollow legs have weep holes to allow moisture in the tower legs to drain away from the tower. I have personally seen split tower legs that were caused by painted-over weep holes that were never opened back up, and the water built up inside and then froze, splitting the tower legs. Yes, that damage can be repaired but it didn't have to happen in the first place.

Don't think that if you have a self-supported tower without guy wires that you've escaped the responsibility of regular tower maintenance. You have four concrete bases per tower to keep an eye on. Any time that your tower crew is on the tower for tower light replacement, ask them to take a look, and take pictures, of rusty or loose bolts, broken or bent diagonal braces or other potential problems.

On AM towers, turn the transmitter off and feel around the base insulator for hair-line cracks or chips. If you use a torroid transformer to feed the tower light power up the tower, you have to maintain that also. If your transformer's rings are getting ragged, you can get re-wrapping kits from the manufacturer to keep them weather-tight. It's an easy and fast repair and it will save you a lot of time, trouble and money. I once had to drag a big pair of new, and very heavy, transformer rings across a six tower array to replace one that had been destroyed by water intrusion.

There are towers out there in radio-land that have been up in the air, and doing what they were designed to do, for 75 years or more. With the right attention and maintenance they can continue to do their job day in and day out for as long as they are needed.

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

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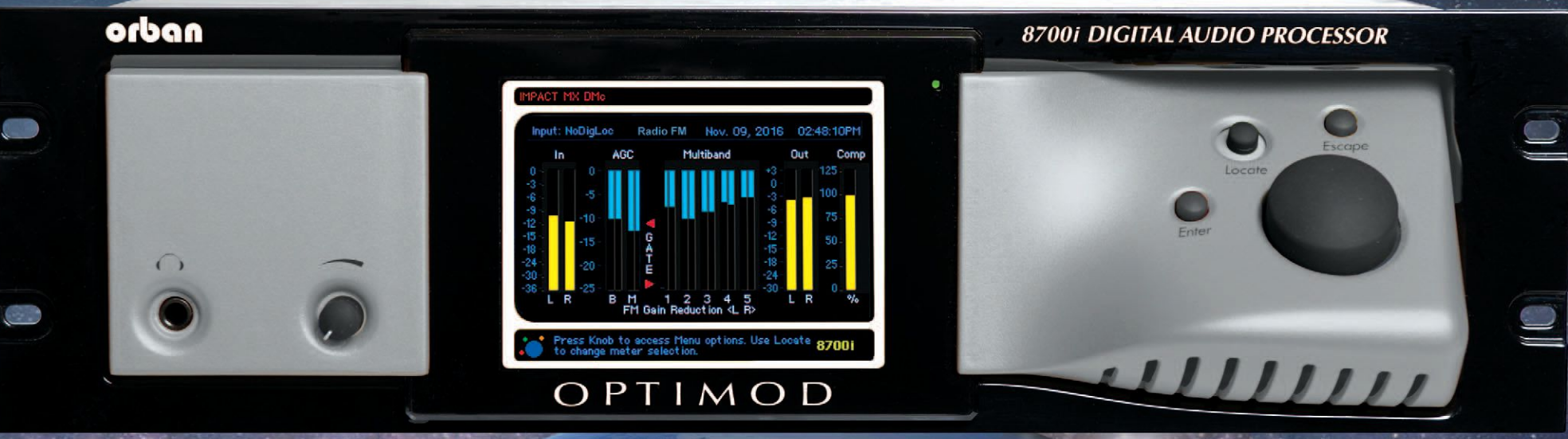

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Transmitter Site

Breaker, Breaker

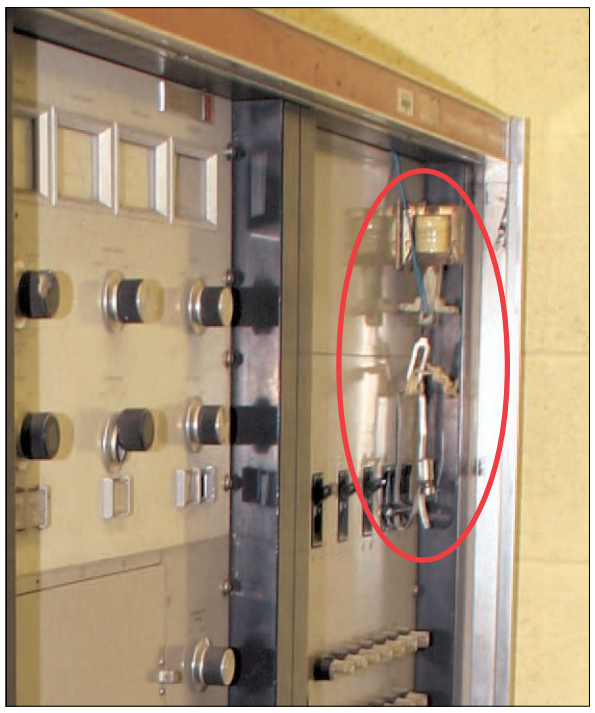
by Mike Henrickson

Several of *Radio Guide's* readers responded to the last issue's article on tower leasing. One comment I received was a request for the name of a consultant that could quote current tower leasing rates in an area. If you do an Internet search for tower leasing consultants, there are several consulting companies that show up. I cannot recommend any specific company.

Another response concerned having a damage deposit made by the tenant. This deposit would be returned to the tenant if they remove all of their equipment from the tower and building when they vacate the site.

I thought that this month I would write about some of the unusual and strange problems I've encountered over the years. Perhaps you have run into some of these as well.

At one site we had a Rockwell 831G-1 FM transmitter as a backup. This transmitter caused us a couple problems. When we acquired the site we were warned that the plate breaker would, on occasion, trip *without* the plates or filaments being on. In fact, this occurred often enough that the station had installed a solenoid that could be used to remotely turn the plate breaker back on.



Solenoid to Reset Plate Breaker

We spent a lot of time trouble shooting the problem before we finally found it. The Collins and Rockwell transmitters, as well as their successor, Continental, use SCRs to control the power of the transmitter. The transmitter is designed so that the primary voltage is constantly applied to the SCRs. When the transmitter is off, the SCRs are not triggered, and there is no current through the SCR to the plate transformer. In this transmitter one of the three SCR banks had a very slight amount of leakage current through it, when the transmitter filaments and plates were off. There should have been no leakage current, so we replaced the SCR bank with the leakage. After the replacement there were no further plate breaker trips.

Also, at the same site, we discovered another strange problem that was again traced to the Rockwell transmitter. One night when we were operating on the emergency generator as a test, we decided to turn on the Rockwell transmitter into a dummy load as well as continue to keep the main transmitter on the air. The purpose was to do a full load test of the generator. We turned on the transmitter and both the transmitter and the generator were operating just fine. Then we noticed that all of the UPSs at the site were alarming that they had switched to battery operation. At first we thought that the generator had developed a problem and could not handle the extra load with both transmitters operating. We turned off the Rockwell transmitter and everything was fine.

Then we decided to put the Rockwell transmitter on the air and turn off the main transmitter. Again the UPSs switched to battery operation. We discovered that the problem was that the Rockwell transmitter was putting hash on the power line when operated on the generator. The hash was generated by the SCRs that control the power. The transmitter had been set up so 100% power was achieved with the SCRs gating at about a level of 80%. This hash indicated to the "smart" UPSs that the power was bad. The fix? We retapped the plate and screen transformers in the Collins transmitter so we would have to operate the SCRs at close to 100%. This cleaned up the power and everything operated okay.

Original Harris FM25K air duct on the left and replacement air duct on the right.

A few years ago, I needed to replace the blower motor on a Harris FM25K transmitter. The blower output is connected to the PA compartment by means of a fabric duct. The duct is held in place by a set of rectangular clamps. I removed the clamps and started to remove the duct, when it started crumbling into dust. After over 30 years of operation the fabric had dried out and was very brittle. The bad news was that Harris no longer supported the FM25K and did not have the replacement duct available. The good news is that I'm married to a woman who is an expert on fabric.

We stopped at a JoAnn Fabric store and purchased some canvas material and Velcro straps, from which she constructed an adjustable duct. I was able to install the new duct, adjust the size, and replace the clamps. The new duct worked as well as the old duct and the transmitter continued to operate for several more years.

One of the more challenging problems I encountered involved a satellite receive system at a transmitter site. We were getting three audio feeds using three separate carriers and receivers. All three receivers were receiving signals from the same transponder on the same satellite. Two of the receivers continued to operate while the third receiver had audio drop outs. The received signal on all three receivers appeared to be normal. We replaced the LNB at the satellite dish – no change in the drop outs. We changed out the receiver – no change. We changed out the coax and all splitters between the LNB and the receivers. We installed a band pass filter on the satellite dish because we suspected the cell tower about a quarter mile behind the dish might be causing interference. No change in the problems. Finally, as an act of desperation, we installed a transportable dish at the site. The problem went away, but why? The received signal level from the transportable dish was lower than the installed dish.

This site had two FM transmitters and two HD transmitters. We finally tried turning off each transmitter, one at a time, when we were operating on the installed dish. When we turned off the music FM transmitter the problem cleared up. We then turned all of the other transmitters off and turned the music transmitter back on. The problem was present. What was going on? We had operated at this site with the same configuration for many years.

A check of the records revealed that a few weeks before, the PA tube in the music transmitter had been changed and the tuning adjusted to accommodate the new tube. We re-adjusted the tuning and the problem cleared up. Apparently the transmitter, a Harris HT25, was generating spurs that were getting into the 1000 MHz output of the LNB. Even though we had used a spectrum analyzer to check the satellite signal we had not detected the spurs because they were super imposed on the satellite carriers. When we monitored the spectrum analyzer while tuning the transmitter we could see the spurs move around with the tuning.

A few days later, I was at the spring NAB show and went to the Harris booth. I mentioned the problem to one of the customer service people present at the show. His response was that it was a known problem and there was a fix available. Harris, now GatesAir, has a bulletin available about this problem – the solution and a parts kit. The solution is to install some ferrite blocks in the PA compartment of the transmitter.

I had another interference problem with a satellite system I never did resolve. We had a back up satellite receiver set up in the event of the failure of the main receiver. This back up receiver was tuned to a different frequency, but on the same transponder and satellite. The backup worked fine for a while, but then started giving low signal alarms. This started about 3:00 p.m. in the afternoon and continued for about an hour. It happened the next day, but stopped for a couple of days and then started up again. It was as regular as a clock – on every business day at 3:00 p.m. the satellite signal would be blocked by another signal for one hour. It did not occur on holidays or weekends, however it did occur occasionally at 3:00 a.m. Monday morning. The frustrating part was that we thought it was from some type of business that would be uploading data to a central location. But, there were no businesses nearby with any type of uplinking system. The "solution" came about when we sold the station.

Until next time happy engineering!

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. He may be reached at: mikehlakeville@gmail.com

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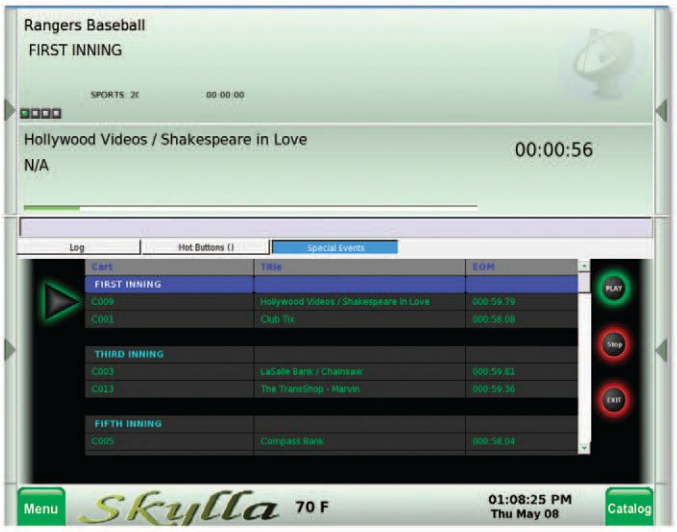

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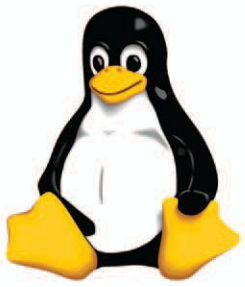

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IT Guide

Can Complex Security Be Made More Simple?

by Jim Turvaville

My wife says I only write articles about the things which are currently irritating me… and she might be right. At least this time she might be right, since I've had more than one recent rant about having to constantly change, and subsequently remember, new passwords for a variety of things. I've also had at least a few rants about trouble remembering combinations to locks at tower sites; all of which may just mean that I'm having trouble remembering things these days and not that there's any real security problems in my life. But let's not get personal ... <g>.

It's a different world these days than when I got into Radio back in the late 1970's. It's not just the technology we use and take advantage of every day to make our industry function; it is also the need to have more levels of security and protection for our possession's, property and our privacy. I may have been drug kicking and screaming into every one of the newest iterations of PC operating systems for the past 18 years, but I am not unaware of the danger of having insecure passwords for our on-line activities, nor for the need to have proper safety and protection at our facilities from those who would damage, destroy or steal our property.

Passwords

As irritating as it is to be constantly reminded to change my password, and then struggle to remember it the next time, it is a fact that we have be smart and creative in creating passwords which will still offer a high level of security and minimize the likelihood of it being hacked. As a customer, I was recently reminded by AT&T Business of some basic "Don'ts" of password selection which merit being repeated:

1. Never use the system default password. We all heard about the recent issues of doing this in our EAS unit or Barix stream boxes. All of the modern remote control systems and similar network devices including routers and modems come with a default password. Simple rule – change it first out of the box.

2. Don't use "Password" or "1234" or even "qwertyuiop" for a password. These are tops of the list of chosen passwords which hackers always try first.

3. Avoid using your name as, or as a part of, the password. This is not the issue it used to be for any large network structure, as they tend to disallow this anyway. But for devices where that safeguard is not in place, this little advice should be heeded as well.

4. Avoid passwords based on personal information. Particularly personal information which may be available through public searches or by acquaintances and coworkers who overhear you conversing on a daily basis – or might appear on Social Media. This would be names of spouses, children, pets, schools attended, places lived, etc.

5. Avoid short passwords. This might seem obvious, and prohibited by some systems, but unless you have some really unique combination, short passwords can be more easily hacked by computer software made to do just that.

The best passwords include uppercase and lowercase letters, numbers, punctuation marks, and special characters like #, %, or &. If your password is easy for you to remember, it's easy for others to remember too – and for hackers to crack.

Now with that in mind, let me toss out a few suggestions to make complex passwords easier to handle.

Try a sentence password which you can remember. For example, if my password was "NitT4aGm2C2taotP!" you'd think that might be tough to crack, as well as tough to remember. But I'll show my age when I tell you that is simply a sentence used in typing class, and was first uttered by our patriot hero Patrick Henry. It's actually, "Now is the Time for all Good men to Come to the aid of the Party," with some easy word-number substitution and an exclamation mark at the end (much as my typing instructor usually said it). I know many who use their favorite Bible verse as the sentence, and even add the reference at the end to toss in some numbers and a colon.

The first time I saw this in use was literally over 30 years ago, when a station manager had a toddler who always wanted something with "DaddysMoney" – which was his chosen password. Little did he know how ahead of the times he really was back then. Whatever your chosen sentence, keep it one that you can easily repeat mentally and preferably one on the obscure side. The first few times you use a sentence password you might stumble, but I promise you that soon you will be muttering it in your head and your fingers will naturally respond.

(Continued on Page 22)

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Can Complex Security Be Made More Simple?

– Continued from Page 20 –

Use bizarre obscure facts about yourself that are not readily available. It's easy to see how your first car or even childhood pet names could be more common knowledge than you think, because I promise there will soon be some on-line "challenge" game which will require that you to disclose things like that along the way. But for 30 years I used an old high school girl crush's name as my most obscure password – not only did she never know I had a huge crush on her, none of my own friends did either. But as we all know, there *are* some things which we just never seem to forget – and given the requirement to cough up a quick obscure password, she quite often came to mind.

Be Geeky. No, really, that's pretty much who we all are, so let your inner Geek be unleashed and create a password based on it. Maybe you know the NAD83 Lat/Long of your house – can you say "Iam@37.125By99.892" Isn't that a pretty good password? Or maybe you're a musician and know "G3is@196Hz" to be true. Say you're a video lover and can recall that "1080pHD=2.073Mp." All you need is something that interests you, and then create the password from information you already know – just place it in a format which makes it harder to hack.

Combinations

This is actually much less about security as it is simplicity. We all know that locks only keep the honest thieves from breaking into your property, and while there are some really good combo locks out there, any of them are just a small deterrent to anyone truly wanting to do your property harm. So let's try to make those 4-number locks a bit more manageable.

Correlate the numbers to the letters on your phone dial pad. While the days are hopefully going away into obscurity when radio and TV ads gave out complicated strings or words to dial on your phone, those letters are still on your smart phone key pad and can come in handy when you need to choose a combo number. Many years ago I used the call letters of the primary station to set combo locks for translator sites (so KABC's translator tower lock would be 5222); but that is pretty insecure to anyone who looks up that info on-line now. Still, using similar guidelines as on-line passwords, you can pick 4 letter words or 4 word sentences and use the first letter of each word – correlating that to your dial pad for a number equivalent. If you're really clever, you have that combination and reverse it, so even if the word or phrase is suspected, the number sequence will be backward.

Numbers unique to you or your station (not the frequency) can be used and more easily remembered. While you would not want the last 4 digits of your call-in line or business line to be used, that private line or fax number are much more likely to be suspected and tried. And again, if you're really clever, you have that combination and reverse it – so even if the source is suspected, the number sequence will be backward.

Relevant dates which are not necessarily public knowledge can be used. For example using "2986" might represent the date you installed that new 10 kW transmitter (February 9, 1986) which only you (sadly) remember with any fondness.

Whatever your need, complex security can be made a bit easier if we let our brains do the hard work and we think a bit out of the box.

There remains the issue of retaining this myriad of passwords and combinations in a manner which is also secure. While the most secure method is to have a Password Manager software, which is ironically also secured by a complex password, that allows you to keep a secure record of all of the various on-line and real-world locations where you have passwords and codes. My only issue with that system is that the master password has to be written somewhere and shared with someone for the "HBAB Principle" – in case you are *Hit By A Bus* – or all of those systems will be forever hidden and locked. Although keeping the company's passwords on a Post-It Note on the bottom of the keyboard is the other extreme, I have an unencrypted file hidden in an obscure directory, with an equally obscure name, which contains my login and password info.

At least if I end up being HBAB then someone of my same technical abilities can find it and keep life rolling along for the most part in those areas. In the same way, a physical note pad secured in a locked drawer or safe would have equal value in that scenario – as long as someone you trust knows how to find the key.

Jim "Turbo" Turvaville is semi- retired from 38 years in full-time Radio Engineering and lives in Rural Wheeler County Texas in a "tiny house" where he maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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Testing On a Budget

by Tommy Gray – CPBE CBNE

When you get a few days of downtime (Downtime? What's that?), you might have a little time to relieve some stress. Now stress is something we have plenty of, right? On one of those short periods when I was between major projects, and had a day to spend in the office, I started thinking about ways to make life easier. I was wanting some kind of spectrum viewer to take in the car with me when I just wanted to take a quick look at what was in the air near where I was working – and not have to drag out my old trusty Tektronix boat anchor. My test equipment is tried and true, but unfortunately weighs a ton! When you get to be my age, dragging a 100 pound piece of equipment in and out of the car is not the easiest thing anymore.

Keep in mind that I was not concerned, in this particular application, with lab quality accuracy but simply wanted an easy way to look at a spectrum plot, and listen to a station for identification and comparison purposes. Were I to need accuracy, of course I would go back to "Old Reliable." Don't try to use this hardware and software for important engineering applications, as it is just not accurate enough, and certainly not certified nor calibrated, for the purpose.

SDR Hardware

A few years ago, some Engineer/Ham Operator friends and I played with SDR (Software Defined Radio) a little. We each purchased a cheap receiver off the Internet and had various degrees of success with them. At the time, and being a tad "frugal," I did not want to invest a lot of money into something I might not use except for amusement. I looked at what everyone else had bought and compared them with what was available. Many of the pieces of hardware were simply circuit boards without a case and I was not too hot on something like that. After all, I was not wanting to "build" something as much as I was wanting to experiment. Finally I found a unit that had a machined aluminum case that looked nice, and did not require any fabrication. It used the same very familiar RTL-SDR type hardware, so it was basically the same as what everyone else was using. The one neat thing about it was that it already had an HF antenna jack on it and was capable of working in both the AM (HF) and FM bands. I ended up spending a little more on it than some of the others were costing at the time but if I recall correctly, I got everything for around $60. Several of the others required installing hardware or connectors, but this thing had them already built-in. It also came with a nice antenna for the UV side with a decent coax and connector. Now mind you, I am not plugging anyone's hardware. I am just sharing what I found in my search for something "Cheap and Dirty," as the saying goes. I will share pictures of my rig later on.

Now Comes Software ...

Next began my search for a software package. Again, I was *not* going to spend any more money on this project, so paid software was out. Only free packages were considered. I did a great deal of research, and consulted with a lot of my Ham operator friends, who were using these things to monitor 2 meter bands, etc. I finally settled on two packages that seemed to be, at the time, the most versatile, easiest to install, and also user friendly. Some of the packages I looked at had a really cheesy GUI, and I was wanting something that not only performed well, but looked good (Hey, get all you can for free, right?).

After testing quite a few, two seemed to rise to the top – at least for me. Now I might mention in passing that some of the packages out there, I never got to work – or if I did, their performance was not acceptable. These two had great installation instructions and even a little user support through forums, etc. The first one I decided on was called "SDR#," which worked quite well for me, and was the least buggy of those I tested. It installed fast and worked the first time. (Well, actually the *second* time, as I did not read all the instructions completely and missed a step – so be

(Continued on Page 28)

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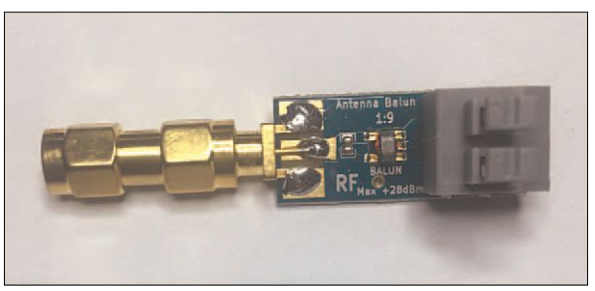
– Continued from Page 26 –

thorough!). I used it for quite a while to monitor nets and repeaters, etc., and left it running in the office on a Windows™ computer for some time. It proved to be pretty reliable. The one thing I did not like, being a programmer, was the lack of a really modern GUI with sculptured buttons, etc. It was very functional but lack luster and rudimentary. For me to really like it, it has to not only work well, but look good too!

RTL-SDR Receiver Hardware

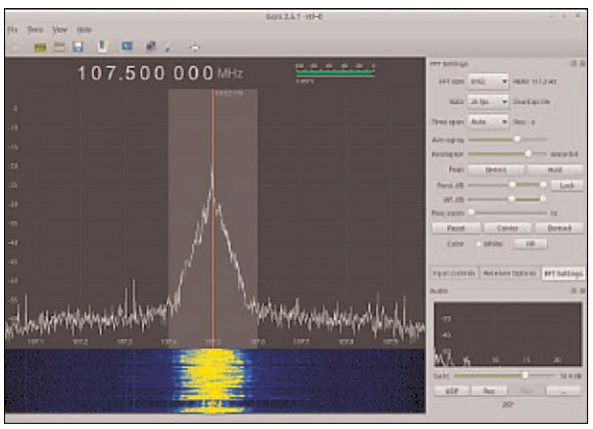
The next one I had tested was a nice looking package named "HD-SDR." The name serves it well as it looked the best of everything I tested, and I ended up using it more often, even though it was not quite as easy to use as SDR# in a few respects. HD-SDR is a very professional looking package that you will not be ashamed to show to your friends. These are all Windows™ packages and will work well for simple and cheap signal inspection. They are customizable in a lot of ways, so you can make them perform like you want them to, for the most part. One note here is that the Windows versions require a little faster and more powerful computer to give the same performance I achieved on a slower and less powerful Linux box. I might also mention that my Linux boxes are older XP machines that could not run Windows 10, and since installing Linux on them, I don't even need Windows (and Linux is free!).



Balun for HF Use

Linux is Not Left Out

Having switched all the desktops in my office over to Linux Mint Cinnamon over a year ago, I wanted to be able to use the SDR hardware with one of them. This meant abandoning my current software and finding something that would work on Linux. The Internet to the rescue! There is a very functional package for Linux out there available through the Software Manager, called GQRX. I found a great set of installation instructions in a forum on the web, and was able to install and configure it the first time. It was in some respects easier than the Windows setup on the other packages. Now it is not as great looking as HD-SDR, but is very similar to SDR# in appearance and functionality. You can bet that as Linux continues to grow in popularity, even better packages will be out there soon.



GQRX Screen Shot

For now, I will continue to run my Windows packages on my Laptops and GQRX on my desktops as they can share the same hardware by simply plugging in the USB cable. Below are pictures of my current hardware and a quick screen capture of a "not so nearby" station I captured while the announcer was talking. It is a little out of my good signal range, but I can still listen clearly and do routine signal inspection.

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

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Engineering Perspective

I Was Wrong

by Sam Wallington

My entire team came into the conference room and sat down. I could tell they were nervous – they could sense something was wrong. I said some introductory words, then proceeded to berate them for some performance issues. As my *coup de grâce,* I shared that I, and the rest of the organization, had lost confidence in their ability to carry out the work. Hurt, some argued half-heartedly, but I verbally jousted and they soon gave up and slogged back to their desks.

With that stroke of genius, I fully implemented my stupidest leadership trick. It took years to recover from the damage I did in that one meeting. Instead of digging into the reasons for the problems, I made a series of misdirected assumptions and blamed a group of competent, passionate, and skilled people for results that were actually the fault of broken policies, practices, and leadership – including mine.

Blaming others is easy, since mistakes and stupidity only happen to "others," right? The sad truth is we all do dumb things. Sometimes, mistakes are relatively benign, like when my mom accidentally freshened her breath with perfume instead of breath spray. Other times, our errors, even if well-intentioned, create big problems like the disastrous meeting I had with my team.

Believing we are generally right is probably normal. I wonder if it is culture or genetics that make it so hard to admit when we are wrong. Whatever the source, telling someone else that we blew it is difficult, especially if we must tell someone we admire or need to look good in front of (like our team, boss, or spouse)!

Yet there are good reasons to be forthright about our failings, especially in leadership roles. Besides the benefits of basic honesty, if we are unwilling to admit we missed the mark, we will shut down our willingness to try anything new. In addition, being open and vulnerable about errors builds up trusting relationships and makes it easier to live with being human. There is safety in St. Augustine's approach: "I err, therefore I am."

I am trying to teach myself to seek failure, to try something new, to make mistakes – on the way to a potential breakthrough. My team has heard me say, "I love failures!" so often it has probably begun to annoy them. However, I find I have to keep repeating it, as much to remind myself, as to remind them. Failures mean that something has been tried, and, as long as it was not stupid ("I wondered what would happen if I drove my car into the studio.") and as long as something was learned, the failure was valuable. Like Thomas Edison's famous line, "I have not failed, I've just found 10,000 ways that won't work."

One of my biggest fears, when I began my broadcasting career, was breaking an FCC rule. It started small – what if I forget to play the top-of-the-hour ID? – and grew to encompass Public File maintenance, transmitter operating tolerances, and so on. The fear had value, as it helped me when I entered a correction on a station log; but most mistakes are not likely to be caught by the FCC. So why comply with the rules? Besides being the right thing to do, and avoiding the embarrassment and penalties of being caught, it allows me to sleep at night.

What about the "mistakes" that are really rather intentional (or maybe we just avoided looking)? How many FM stations run their modulation at (ahem) 120 or 130%? Or maybe the operating power is just a bit high? Might it be reasonable to ask if the STL coordinates and elevations are accurate?

Perhaps it is because of my original fears, but I made the decision early on that "my" stations would only operate within the rules (scary to put that in print, because, of course, mistakes happen). Though I have had a lot of agreement and cooperation over my career, I recognize that keeping modulation in line could mean an argument (or worse) with the Program Director. Despite that, I do not believe it is okay for a station under my watch to stay out of parameters once discovered.

Taking the stance that I will obey the rules – and admit my mistakes – has definite costs. There is the cost of filing a correction with the FCC. There is the cost of "reminding" station management that protecting the license by staying legal is one of the most fundamental requirements

(Continued on Page 32)

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Engineering Perspective

– Continued from Page 30 –

of staying on the air. But harder than either of those, for me anyway, is the embarrassment of admitting that I just made or uncovered a mistake. Even if the boss is gracious, it is still personally costly to say to them, "I just learned that the transmitter site coordinates I calculated 10 years ago are wrong – and as part of fixing it, we will have to lower power permanently."

One of the worst things broadcasters can do is to lie to the FCC, no matter how tempting. Despite the cost(s), the best approach when discovering an error with a station is to be completely forthright. Yes, it takes courage to stand up and say, "Hey, everyone! I made a mistake!" Doing so, however, has the potential for a future without expensive "willful and repeated" fines and restrictions, especially if that honesty comes immediately after discovering a problem.

As painful as admitting mistakes can be, things rarely turn out as badly as I imagine. By way of example, let me tell you another story (since I seem to be sharing embarrassing moments). Once upon a time, we had a construction permit. Ready to build it, we showed up at the landlord's office and asked for the site keys and directions, drove to the site, installed the equipment, turned the station on, filed for the license, and went home happy. Much later, during a routine inspection, an observant engineer noticed that the GPS coordinates of the tower didn't match the coordinates on the license. In fact, the station was operating *miles* from the licensed coordinates!

We immediately admitted our error, and quickly moved to correct the problem, ultimately resulting in the FCC granting a corrected license. We have been happily broadcasting from the correct site ever since. (Since you are probably curious: The landlord owned two sites. They gave the keys and directions to the wrong one, and we failed to double-check during construction. You can be sure we check now!)

The point is that the FCC did not fine us, or even "yell" at us. Perhaps that was the luck of having our applications reviewed by a gracious person (and I certainly am not encouraging people to build at the wrong site in the hopes of receiving grace!) But when an honest mistake happens, I have found the FCC to be fair in their responses. That has been true for me with a number of mistakes found over many years (fortunately, most mistakes have been less egregious than broadcasting from the wrong site).

Maybe you've seen the Engineer T-shirts that say something like, "Trust me, I'm an Engineer" or "I'm an Engineer. To save some time, let's assume I'm never wrong." Though most Broadcast Engineers are hard-working, smart, and capable, there are a few who are those things, plus arrogant. Those few seem to be convinced that they can do no wrong (or that they should never admit it). In reality, we all do truly awesome things – and we all make occasional mistakes. Most mistakes are relatively harmless (dropping that nut into the least accessible part of the transmitter or getting the phase backwards on the third guest mic), but occasionally, we make some big blunders. Regardless, we need to make them right.

A friend and mentor of mine once told me about installing a console. The station had scrimped and saved for years to be able to buy this new, awesome board, and he was excited to be the one to install it. When he hooked up the power supply, he connected the wires based on their color code, and confidently turned on the power. Unfortunately, the very first thing out of the beautiful new console was smoke. It was painful to admit his mistake, and he had to spend hours repairing the damage he'd done by assuming that the company had used normal colors on the power wires. But that became a valuable lesson for him. Any time someone made a mistake around him, he was able to have sympathy and help them find courage despite their error (which was the case when he shared the story with me).

After I threw a hand grenade into my team's morale and motivation by harshly telling them they were not doing well, I had to admit I was wrong. Though my goal was reasonably appropriate, and the team did need direction, my delivery was hurtful, unkind, and not helpful to their growth or development. After one person had the courage to talk to me about how I came across, I apologized to each person, and started the long process of rebuilding the bridges I had blown up.

Today, I have an amazing and awesome team. And do you know what? They make wonderful, glorious, and sometimes embarrassing mistakes! But they tell me or others about them, and we all learn from them. Even better, they tell me about my mistakes, and I get to grow as well.

Bottom line? Let us agree that when we make human mistakes, we will admit our error and share what we learned as we make things right.

Sam Wallington is VP of Engineering for Educational Media Foundation, and has 34 years of experience in broadcast engineering. He can be reached at swallington@kloveair1.com

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Survival Guide

Seeking Out the Soul of a Station

by Rolin Lintag

Seldom do we discuss those things that are not obvious in the station. It is just natural for us to talk about what we do see. We see the equipment that is being used, the way the equipment performs, the way the rooms are arranged or maintained.

Of course, we do see the technicians and the production personnel, but oftentimes they become just "faces" that work in the station each day. Management styles often get so caught up with the daily rote and the urgent that we fail to see the not so obvious – yet more important "things" in the station.

With your indulgence, allow me to show you the world beyond transmitters and circuit boards. There is more for us to see than just repairing equipment or producing that spot. Let us dig deeper to understand the true soul of the broadcast station.

Man Before the Machine

When you buy the equipment, you get the technology that makes the hardware tick. In short, the machine will perform as it was designed. However, the best equipment in the station will never put out the best signals on the air all by itself.

Of greater concern should be the people who will use and get the best out of those machines – people who may not necessarily behave the way you want them to, especially when you send mixed signals. In this mixed-up world, we tend to love machines and use people. This is easy to deny but our actions and decisions give us away.

For example, how much of your budget do you allocate to train your people? How do you value your employees compared with how you take care of your equipment? How do you view working relationships?

Maintenance Free?

If we are going to have a balanced view, we need to look at man and machine as two sides of a single coin. After all, a coin has no value unless it has both sides.

Some managers view employees the same as those sealed batteries that have the "maintenance-free" label – they just keep on working, without putting any electrolyte in. But you and I know that people are more complex than that.

So before slashing that part of the budget that will build camaraderie, teamwork, and self-respect among the staff, think again as to how much you will *really* lose or gain. If you want more golden eggs to come, do not kill the hen that lays it!

Culture Makes (or Breaks) the Station

Here are some questions to put the issue in perspective: Just how does your station staff respond to daily correspondence or spare parts requisitions? How do they view management actions?

Do your technical and programming departments coordinate well enough with each other? How does each department view each other? How is your staff turnover rate?

The grandeur that was Rome did not fall due to any outsider's strength. The decay within itself destroyed it. Just because your station is now number one, does not guarantee you will forever be on that pedestal. Getting the crown is one thing – defending your title is quite another.

Bottom line: if your station operates in an atmosphere of coercion, in an ambiance of fear of failing or losing one's job when the ratings are not on your side, who knows how soon your empire will fall?

The Secret of Champions

Gone are the days of hierarchical top-down military rule within business organizations. Employees of the 21st century are just too info-smart to work wholeheartedly for a tyrant.

The more relevant business paradigm nowadays is that of motivating, coaching, training, leading and, yes, empowering. Doing so from the heart can motivate others to reach for greater heights each day. When that happens, for example, a technician will not only repair equipment, he will also be appreciative of how creatively the production folks use it. Working for such a station, no one needs "Friday Nights Are For Fun" because every day will be fun.

In other words, if your technical people think that maintaining the equipment is a boring chore, then they are not being motivated enough. Do we care enough to see that our people go the extra mile in improving themselves professionally and personally? Or are we merely content when they man their shifts with no foul ups?

When all is said, but nothing gets done, we are suffering from management vertigo. What we see is a mirage that does not exist and therefore does not do any of us any good.

Improve on your focus and see beyond the obvious – to the soul that drives success at your station.

Rolin Lintag is Asst. Chief Engineer for KRON 4 in San Francisco, CA. Reactions welcome when sent to: rlintag@kron4.com

Practical Engineering

Handy Hints From An Old Timer

by Mike Langner

Whether you care for one station or a dozen, it is always good when you can benefit from another engineer's experience. By not reinventing the wheel, we can "work smarter, not harder." Mike Langner offers some pointers from his many years in the business.

Safety While Troubleshooting

Personal safety has to be a first concern of any engineer who wants to live long enough to cash his next paycheck. A few simple rules will go a long way to keep you safe. A few tricks will make you even safer.

The First Rule of Safety is to make sure the power is off wherever you plan to stick your hands inside of something. Make sure the equipment is off inside any gear where you plan to stick your hands. That is: breakers down, disconnect down, and shorting stick employed anywhere high voltage might be found.

The Second Rule is, whether you have a studio-transmitter site or a remote-controlled site, a second person should be *on site* – instructed and ready to assist should trouble happen.

Avoiding the RF Bite

Everyone tasked with maintenance should know that, when it is time to service an antenna system, the power must be turned off or you are likely to get a nasty surprise when you touch a "hot component."

This is especially important when you find yourself working alone out at the base of an AM tower. In most cases, the prudent action would be to lock the disconnect box in the de-energized position to prevent some "auto-restart" circuit – or some person arriving at the site and discovering the disconnect was off – from actually turning the transmitter on while you are out in the field.

Of course, there are times when you need to have the transmitter turn on and off, in order to use a bridge or observe something in the ATU while under power. Trudging back and forth from the tower to the transmitter building for each iteration may take too long, especially if something is trying to burn. But, if you can activate the remote control, *someone else can, too!*

So here is a trick you can use: Just stick a big screwdriver in the lightning ball or horn gap. That will short out the tower. Or – and perhaps even better – use an automobile battery jumper cable to short the tower to ground. But before trying it, please read the next paragraphs.

Warning!

A very important note: AM series-fed towers can accumulate a DC charge of several thousand Volts from wind-driven dust and give you a nasty burn from the arc. Similarly, your AM tower is a great receive antenna, picking up lots and lots of signals from other nearby AM stations.

Therefore, when grounding a tower for safety, connect to the *ground side first*, *then to the tower.* This safety move can keep you from getting a DC arc burn – or a nasty RF burn – from what seems to be a "dead tower" but is in fact "hot" with a static electricity charge or induced RF.

Step-Start Resistors

While doing maintenance, where you need to turn the transmitter on and off, be sure to observe the condition of any step-start resistors. These are the resistors many transmitter manufacturers have incorporated in series with the AC mains that feed the transmitter.

Because step-start resistors only conduct electricity in the brief fraction of a second between pushing "Start" or "On," and the length of time it takes the main primary contactor to start, step-start resistors in a typical 5 kW transmitter may be as small as 50 Watts.

If you start the transmitter once every 30 minutes or less, you are generally safe. But restarting the transmitter a dozen or more times in as many minutes while trouble-shooting can cause the step-start resistors to get very hot and open up. Then your transmitter is subject to excessive surge currents on startup, and the stress those excessive surge currents place on the transmitter. Through the years, they can – and do – fail, and you will not know until something does fail, stressed by "across-the-line" starting.

Checking the step-start resistors when performing periodic maintenance (like cleaning the transmitter and its filters) is a good start. And, for just a few dollars, you can place much higher wattage resistors as replacements into the transmitter. It is something the transmitter manufacturer should have done in the first place – and is a very good investment in keeping your transmitter running at top form.

Mike Langner was the Albuquerque market Chief Engineer for Citadel until his retirement. A lifelong Ham and former station owner, he continues to be active in the industry. Contact Mike at mlangner@swcp.com

Automation Guide

New System Installation

Pre-Installation Preparation

by Mike Henrickson

Over the past couple of weeks I've been working for an automation company installing a play-to-air system. It's been a few years since I've been involved with the installation of automation equipment and I thought you would like know a few things I've learned. I've been working with Jim Broadwater who is a great engineer. He has more information available in his head about various systems than anyone I've encountered.

When you install a new play-to-air or automation system, there are a few things that you need to have completed before the factory support team comes to town to do the installation. There are the program issues and the technical issues.

This is a major project for the station. This means that, before you start, you need to have a plan of *what* is going to happen. You will also need to have a schedule or timeline of *when* things are supposed to happen. This is not like the installation of normal studio or transmitter equipment. This is the installation of equipment that will affect everything at the station, except perhaps the cleaning of the floor.

Every automation company has some type of checklist they will send you, and this list is a good starting point for the installation of the new equipment.

You need to have a list of station contacts and their phone numbers available for the installation team. A typical list would be the station manager, operations or program manager, and the person responsible for studio changes and modifications. During the installation these people will need to be available.

You should also obtain the contact information for the support personnel at the automation company. This is *not* the sales person that you worked with, but the people who will help you with the installation and the support of the system.

You will need to supply the company with some basic information as part of the planning. They will need to know things about the physical structure of the location. Items such as: "What is the address?" "Is all the equipment on the same floor?" "If not, is there a cabling access between the floors?" "Will an electrician be needed to supply power outlets?" "Is the site climate controlled?" Computer equipment will quickly fail if subjected to high temperatures.

Working conditions are also important. There needs to be a working bathroom available. It's not funny to get on site and find out the nearest working bathroom is at the gas station blocks away. Also engineers will not work on electrical equipment of any type when their feet are in water. Be sure that the floor where the equipment is located is not subject to flooding when it rains. Remember that in some parts of the country it rains every afternoon during the summer.

You need to give some thought as to what it is that is being accomplished. Are you "merely" replacing an existing automation system or are you changing formats, and going live – or going to a satellite delivered format or to music on hard drive, or some other change?

If you are changing programming in any way, be sure to have the program content delivered before the installation is scheduled to begin. You will need things such as liners, jingles, and other program content to match the format. These need to be on hand *before* the installation of the system so the automation supplier can possibly load them into the equipment, saving time during the installation. You do not want the installation coming to a stop because you don't have the imaging for the station. Remember, you are paying for the installation team whether they are working on installing equipment or standing around waiting for the arrival of program content so they can complete the project.

Music on hard drive requires that you receive the music well in advance of the installation. Give the company supplying the music a *firm* deadline, well in advance of the scheduled installation date. Recently released music can easily be loaded as updates. As part of the music on hard drive, you need the music, the music metadata, the music scheduling log software, or logs of the music schedule, such as logs from Music Master. Again, you should have this *before* the installation.

The automation people will want to receive the electronic version of the music logs so they can be sure that the system will import the logs properly. This is not something you want to worry about during the installation. Also, if you have the music on hand before the installation, along with a few logs, you will be able to audition an actual play list.

(Continued on Page 40)

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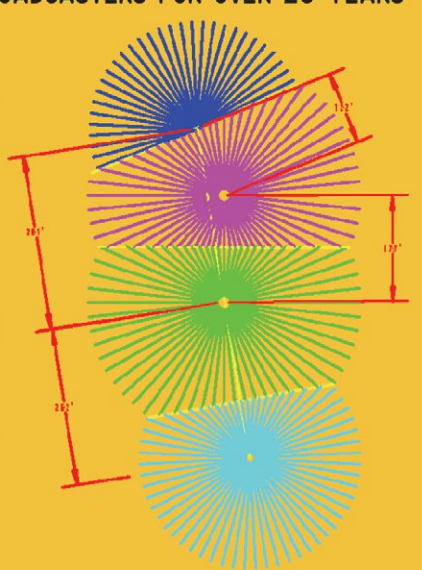

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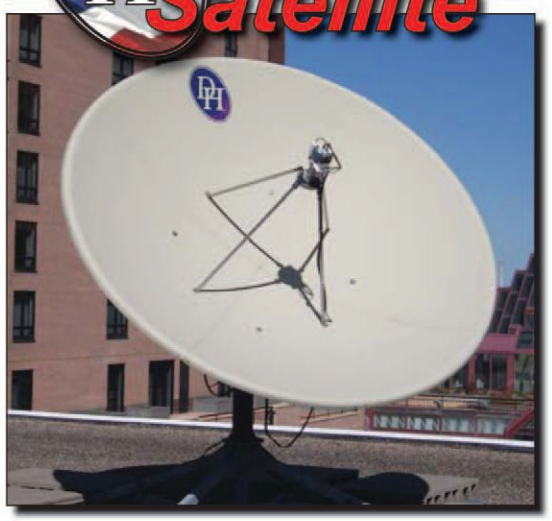

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New System Installation

– Continued from Page 38 –

The commercial content of the station will need to be transferred to the new system. This can and should be done before the arrival of the installers. This usually just requires that the new audio server be placed on the station's network so the audio can be transferred.

Are you changing the traffic system? Again, you need to coordinate the changes with the automation company. They need to know what system you either are using or are changing to. Again, an electronic copy of the traffic logs is absolutely necessary.

Stations that are planning on using satellite delivered programs, including newscasts, have a different set of issues. Be sure the automation supplier has all of the information necessary to properly program the system. This includes the manufacturer and model of the receiver, the satellite delivery company, and the specific programs. You also need to supply the automation company with all of the format clocks for the programs that will be used, including all information on contact closures that are used. Again, it is very helpful to have this supplied to the automation company before the equipment is shipped to the station. It would also be a good idea to have technical support numbers available for the program supplier.

You will need to think about what is on the air at your station. You may consider your station as a music station and it is all music on hard drive, but what about special programs such as local sports play-by-play? Is there a church service that is on the air on Sunday morning? Do you record network spots for later airing? All of these things need to be considered and taken into account.

Now, on to the technical side of things. First of all, you have either retired or upgraded all of your Windows XP computers, haven't you? If not, why not? With all of the computer hackers and viruses out there, you do not want a new system placed on the network with computers that are vulnerable.

You will need to supply the name and contact information for the person that handles the Local Area Network administration (LAN). This person will need to be available during the installation.

There are some other LAN items that need to be checked. Does the facility have administrator access to the Internet router? Does the site have a static IP? Are the on-air and office LANs separate? If the LANs are not separate, you may want to give serious consideration to separating them for security. I suggest that you use a program such as NetworkView to map your existing network. The map that is obtained can be supplied to the automation company. This will enable them to preset the static IP addresses of the equipment to avoid conflicts with other equipment using static addresses.

The installation team will need access to the network switch because they will need to install network wiring from the new computers to the switch. You will need to make sure there is a route for the wire to follow so the wiring can be installed. A wireless LAN is unacceptable for automation use.

You will be receiving at least one rack mounted computer. Depending upon the installation, you may receive many more computers. Do you have rack space for these computers? If you do not have the space, do you have space for another rack?

Is there a UPS and surge protector for the computer system? You cannot expect an automation system to be reliable unless you have the system on a UPS. Even a momentary flicker of the power can disrupt the operation of the system. My suggestion is to obtain a UPS large enough to power the entire equipment rack. In my opinion, there is no excuse for not having a commercial or industrial grade UPS.

During the installation your technical person needs to be available. There will be questions regarding the existing audio and control wiring – you will need to identify the audio and control wiring from the existing satellite receivers and other equipment. Any documentation of the existing installation will be very helpful.

How do you want the audio of the new system to be made available? Will there be faders on the audio console assigned to the system? Or, will the system be designed to go directly to air, with the audio console an input to the system. Please give some thought as to how this will be used. The station on-air staff should be consulted as to how they see the use of the system. A simple diagram of the audio flow is very helpful.

Do not expect the installation team to work on making any repairs to problems at your station that are unrelated to the installation of the new system. These people are there to install a new system, not fix the broken fader on the console or repair the transmitter.

My thanks to Johnny Schad at Smarts Broadcast for providing a copy of the Smarts installation checklist.

Until next time, Happy Engineering!

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. He may be reached at: mikehlakeville@gmail.com

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Small Market Guide

Even the FCC Watches Over Smallmarketville

by Roger Paskvan

We may think that your little town is so small and located out in the boonies, that no one will ever care. The FCC is not going to drive way up here to inspect your little ma and pa radio station. Think again, this just happened in our small town. The FCC showed up and checked my competitor's FM – unannounced, but left us alone. My phone rang and my competitor gave a frantic courtesy call, "The FCC is in town, you're probably next on their list." Well, we scrambled to get the logs signed and checked readings but no one showed up.

It was about a week later that my accountant informed me that paying for the Mock Inspection program is pretty good insurance. It occurred to me that this was a pretty good business idea.

The purpose of this article is to bring attention to the FCC Mock Inspection program, in which almost all 50 states participate, in some form. The service is not free; but each state's broadcast association provides some form of inspection program. I believe the idea was first conceived in Minnesota.

Basically, the broadcast association employs a number of retired broadcast engineers that set up AM and FM radio station inspections. The service is around $400 per station and well worth the added cost. Consider this is like buying fire insurance and it will all make sense. You're purchasing a three year protection plan – protection from that unannounced FCC walk-in. We all know that if the FCC wants to find something wrong, they will – or keep looking until they do. With all the newer added items to the public file, EEO compliance, political, LMA and dated EAS logs, everyone is vulnerable. The FCC rules have become three inches thick. The good old days, when the FCC checked your meter readings and left, are over. The transmitter seems to be only a minor part of their inspection today.

The upcoming Mock Inspection date forces you to "get your act together" – checking everything from the transmitters to the public file. The FCC publishes a "Self-inspection check list," free for the download, that provides the recipe to get ready for the Mock Inspection ahead of time. If you find things are missing from your public file or you've got technical problems, you have time to fix it before they can hurt you. Source: (https://www.fcc.gov/general/broadcast-self-inspection-checklists)

On your day of inspection, the broadcast association inspector arrives usually early. After greetings, they take out a big check list and start on top. The public file will usually take several hours, as they ask to see specific documents. Once that is completed, the inspector turns to your station(s). AM transmitters take a long time, especially if you have directional antennas.

The inspector will go out to your field strength monitoring points and verify the licensed readings – religiously. They check your tower fences and even bring a chip chart to compare the paint fading on your towers. If your fences are in bad shape, replace them to the FCC specs in the rules. Next they verify your licenses, and auxiliary licenses, such as STL, for expiration dates and the chief operator designations, etc.

After your legal paper work, now they start on EAS and other transmitter logs. Yes, they want to see two years' worth, signed by the chief operator. They spot check the monthly and weekly EAS origination alerts to keep you on your toes. Also, don't forget CAP compliance.

After lunch, the inspector returns and wants to be shown the FM tower site(s).

Hope your remote control is working and calibrated to within 5%. They verify each meter and remote control functions, checking for accuracy. Make sure the licenses are posted at the transmitter site and the ASR numbers are in large posted signs. They even request an NAB "Caution RF Radiation" sign to be posted on the transmitter building.

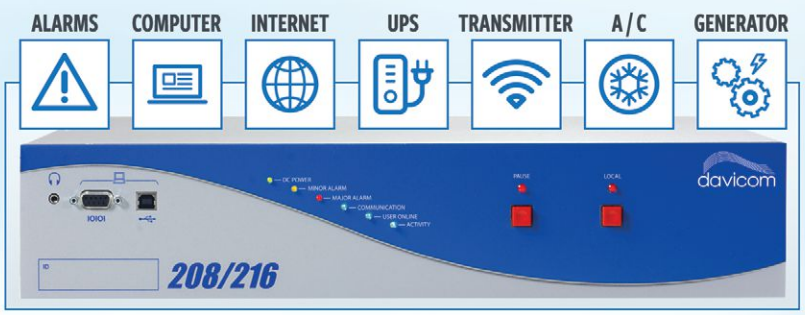
Well, at the end of the day, you will have a meeting and the inspector presents the findings. If anything is out of tolerance or missing, you have 30 days to correct the situation and still pass the inspection. If you pass, you know immediately. Within a few days some really nice plaques arrive in the mail to be posted on the station wall.

We have been in this program for the past ten years and it is well worth the peace of mind, knowing that the FCC is not coming through the front door tomorrow. You have passed a simulated FCC inspection and the Commission respects that for the next three years. It also, keeps everyone on their toes in a nice way. The broadcast inspection program is a good thing and a welcome addition to radio in smallmarketville.

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

davicom

Your Transmission Site
General Manager



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	60 kW	*2007*	*Nautel XL60*
	Please see our current listings on our website.		
FM	55 W	2000	Harris DIGIT™ CD
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	1.3-3 kW	2006	Harris Z6HD-HD Tri-Mode, *Single Phase*
	5.0 kW	1988	BE FM5A
	5.0 kW	1992	BE FM5B
	5.0 kW	1995	Harris HT5CD
	10.0 kW	1988	BE FM10A - Dual 5 kW
	10.0 kW	1988	Nautel FM10 - *Solid State*
	10.0 kW	2004	Harris Z10CD - *Solid State*
	20.0 kW	2002	Harris ZD20CD - *Solid State*
	25.0 kW	1982	Harris FM25K with DIGIT
	35.0 kW	1991	BE FM35B
	35.0 kW	1993	Continental 816R5B
	Please see our current listings on our website.		

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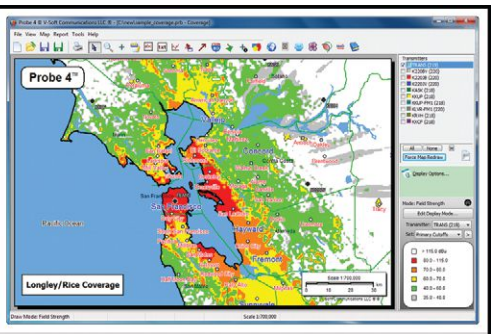

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Comrex – Inovonics – Wheatstone

Comrex – Opal IP Audio Gateway

Expert guests (like entertainers, political pundits, athletes, and others) don't always have access to engineers. They need something as simple and familiar as a phone call. But that doesn't mean a radio program should be settling for phone quality audio.

Opal is an IP audio gateway – a hardware device that you connect to the Internet at your studio, and it takes "calls" from the web. It has an audio encoder/decoder compatible with the encoder/decoder built into most browsers. Unlike Skype, the remote guest doesn't install a thing – they just click a link and go live.

To set up a connection, you just send your guest a link, which they open in either Chrome or Firefox. Once the web page is loaded, they'll see a button – once they click it, they'll be connected, and transmitting high-fidelity low-delay audio.

Other fun facts about Opal: it can support two discrete connections at once. It occupies 1/2U of rack space, and two can fit side-by-side in a 19" rack shelf. Connections to Opal can only be made from Chrome and Firefox at this time.

Have more questions? Email: info@comrex.com.

For more information: **www.comrex.com**

Inovonics – AARON 655 Receiver

The new Inovonics AARON 655 FM/HD Radio Rebroadcast Translator Receiver has been awarded the HD Radio Certificate of Compliance from iBiquity Test Center and is now fulfilling orders from stock. Recently introduced at the annual NAB show in Las Vegas, the 655 is a new addition to the AARON Family of Rebroadcast Translator Receivers.

The new AARON 655 is the first of its kind, combining an FM/HD Radio Receiver with an Audio Processor, Dynamic RDS Encoder, and IP-Streaming. Combining these premium features, with unparalleled performance , the AARON 655 excels in the most challenging reception conditions.

Some of the notable features of the 655 include: Uncompromising DSP-base (SDR) receiver; wide selection of program sources including HD 1-8, IP-streaming, Analog/AES Line Inputs; RDS Encoder that converts HD Pad Data, IP-stream Meta Data or Telnet Data; powerful 3-band audio processor with factory presets for easy set-up; assignable failover audio backup; dynamic web interface for remote control and monitoring; alarms & notifications via email/SMS/SNMP.

The AARON 655 is available now with a list price of $2,600. Orders for the 655 are being processed and shipping from stock through Inovonics' Dealer Network. For more information, contact Inovonics' Sales & Marketing Department. Email: sales@inovonicsbroadcast.com

For more information: **www.inovonics.com**

Wheatstone – PR&E DMX Console

Following its acquisition of PR&E in February, Wheatstone Corporation now introduces its new PR&E DMX console line that is a complete, stand-alone studio system with console surface and IP audio networking.

The new AoIP console line carries forward the rugged quality and practical functionality of the PR&E brand, but includes IP audio routing as an easy studio add-on. The DMX AoIP is all-inclusive, without the need for an external Ethernet switch. It provides 1GB connectivity for robust routing of sources and destinations between studios and integrates easily into most existing radio automaton systems using proven WheatNet-IP automation drivers.

The new DMX control surface is a fully integrated stand-alone console for on-air and production applications. It is available in an 8-fader (DMX-8) or 16-fader (DMX-16) frame with four program busses and bus-minus on every fader as well as convenient control knob on each channel for adjusting pan, mode, and input sources. The console has talkback and cue functions, EQ/dynamics, and control room, studio and headphone monitors, plus LED metering, built-in timer, and four-event recall.

This console surface is available with a 1RU DMX mix engine and 1RU Razor I/O module, which include 1GB Ethernet ports and RJ-45 interfaces for quick setup and easy audio routing between studios.

For more information: **www.wheatstone.com**

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

Texas Association of Broadcsters (TAB)
August 9-10, 2017
Renaissance Austin Hotel
www.tab.org/convention-and-trade-show

2017 Nebraska Broadcasters Assn. Convention
August 15-16, 2017
Embassy Suites, LaVista, NE
http://ne-ba.org/news_and_events-convention.asp

NAB Radio Show
September 6-8, 2017
Austin, Texas
www.radioshowweb.com

Ohio Broadcast Engineering Conference
September 19, 2017
Columbus, Ohio
http://oab.org/engineering/obec/

2017 IEEE Broadcast Symposium
October 10-12, 2017
Key Bridge Marriot, Arlington, VA
http://bts.ieee.org/broadcastsymposium/

WBA Broadcasters Clinic
October 10-12, 2017
Madison Marriot West, Madison, Wisconsin
www.wi-broadcasters.org

Radio Guide Advertiser Info – July-August 2017

Advertiser - Page	Website
Aldena - 37	www.aldena.it
Altronic - 36	www.altronic.com
AM Ground Systems - 39	www.amgroundsystems.com
Arrakis - 21	www.arrakis-systems.com
Axia - 41	www.telosalliance.com
Bay Country - 43	www.baycountry.com
BDR - 4	www.thebdr.net
BEXT - 42	www.bext.com
Bohn/Marti Repair.com - 46	www.martirepair.com
Broadcasters General Store - 33	www.bgs.cc
Broadcast Electronics - 22	www.bdcast.com
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Coaxial Dynamics - 32	www.coaxial.com
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Graham Studios - 46	www.graham-studios.com
Henry Engineering - 2	www.henryeng.com
Inovonics - 1, 29	www.inovon.com
Kintronic Labs - 26	www.kintronic.com
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Mega Industries/MCI - 34	www.mcibroadcast.com
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