Radio Guide

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Digital Issue Now On-Line

May-June 2012 – Vol. 20, No. 3

Altronic Research – A True Arkansas Gem Stone

WHEN YOU NEED SOLUTIONS FOR BROADCAST AND PRO AUDIO, HENRY ENGINEERING MAKES ALL THE DIFFERENCE...

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A "failsafe" AC power controller, switches to "Back-up" equipment if "Main" equipment fails. Ideal for use with Arbitron PPM™ encoders, will switch to backup PPM™ encoder if main encoder fails.

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MIXING

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STEREOMIXER
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A 4-input, 2-output stereo mixer for line level signals. Micro-Assign switches permit routing any input to either Left, Right, or both outputs. Adjustable mix level for each input.

DISTRIBUTION, ANALOG & DIGITAL

DIGIMATCH 2X6
2-input, 6-output digital audio interface converts between AES/EBU and SPDIF signals. Also functions as a digital audio distribution amplifier, providing 3 AES/EBU and 3 SPDIF outputs from an AES/EBU and/or SPDIF input(s).

USDA 2X4
Utility Summing and Distribution Amplifier for line level signals has 2 inputs, 4 outputs (2 stereo pairs). Independent outputs can operate in stereo and/or mono. Adjustable output levels.

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AUDIO INTERFACE, ANALOG & DIGITAL

THE MATCHBOX HD
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USB MATCHBOX II
An ultra high performance USB-to-XLR digital interface for analog and digital audio systems.

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Dual-stereo (4 channel) level and impedance converter for 2 stereo "play only" sources. Converts -10 dBv outputs to professional +4 dBm balanced lines.

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MultiPort is a multi-format digital and analog interface panel that provides convenient access to studio inputs and outputs.

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MULTIPHONES II
The MultiPhones Distributed Headphones System provides headphone listening facilities for multiple users.

MULTIPHONES MINI POD
A compact stereo headphone amplifier that can be used with MultiPhones II Master unit, or by itself as a "stand alone" headphone listening station.

SWITCHING

AUTOSWITCH
AutoSwitch is a silence sensor and automatic stereo switcher. It switches to Backup audio if Main audio fails or loses a channel.

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NEW!

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SAM uses two Single Stereo Displays to show the levels, balance, and phase of stereo audio. Left and Right levels are displayed on a large arc of tri-color LEDs, with Sum and Difference components shown on a second tri-color display.

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Radio Guide

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Radio Waves

by Ray Topp – Publisher

Tips From the Field

A large part of our ***Radio Guide*** content has been devoted to the "nuts and bolts" of radio broadcasting. And, over the years, we have added additional long-form content, but always with a good dose of technology.

However, the request for tech tips from our readers has been a constant reminder to me of the necessity of publishing those simple hints that can save us all a tremendous amount of time and money.

As of this issue, we have begun offering tech tips once again. In every issue of ***Radio Guide*** we will include two pages of *"Tips From the Field,"* – directly from our readers.

On page 34 you'll find that the very simplest of tips can save your time – and your life. And on page 36 you'll learn how to improve the effectiveness of standard air filters, and also how to discourage a few critters from taking up permanent residence in the transmitter bldg.

If you have any tech tips you have used in the past, and found helpful, please take the time to share them with us all. We're looking for tips that can be applied to more general technical situations, rather than those equipment-specific problem solutions that may only be of interest to a few.

Send your tech tips (with photos if you have them) to radio@rconnect.com Try to keep them between 250 and 500 words.

– Ray Topp, Publisher

THIS CODEC HAS BEEN THROUGH TWO WARS, MULTIPLE ELECTIONS, FLOODS, FAMINE, EARTHQUAKES, HURRICANES, MARATHONS, CHAMPIONSHIP GAMES, REGATTAS, LOTS OF CONCERTS AND WAY TOO MANY CLUB EVENTS TO ADMIT.

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Cover Story

Altronic Research

A True Arkansas Gem Stone

by Ernie Belanger

You may have wondered how Altronic Research ended up in Yellville, Arkansas. Frankly, I did as well. But after hearing the Altronic story, the answer became as clear as the waters of the many rivers and streams that run through the Ozark Mountains of Arkansas.

Many of us know that Arkansas is known for its hot springs, as well as the home to several famous politicians. The massive retailer, Wal-Mart, has located their corporate headquarters there, and, oh yes, a surprising and well-kept secret is that Arkansas is also famous for diamonds, as in the actual gem stones. But this story is about a different type of diamond, and the quest for that crown jewel – an excellent quality of life – that began nearly forty years ago.

John Dyess

Nearly four decades ago, in 1975, when John Dyess moved his family from his native Texas to Arkansas, he was in search of that elusive gem – a slower pace and a better way of life for his young family. He felt that this was the place to where God was calling him to settle.

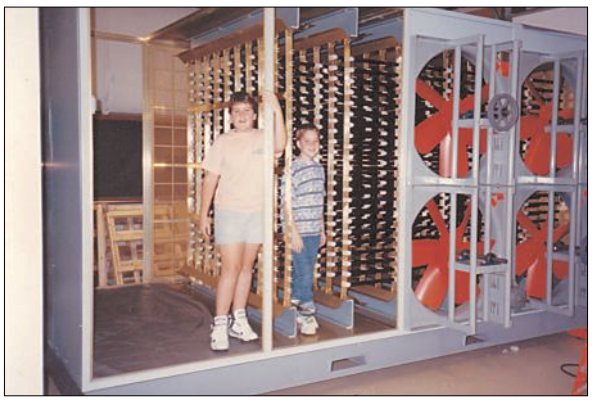
The quest for quality was in John's blood and it translated directly into the products manufactured by Altronic Research. Over the years, Altronic has developed a reputation for excellence and integrity that is supported by the numerous honors it has received. They've been awarded the Presidential E-Star Award for Excellence in Exporting, and annually, the company garners Quality awards from the State of Arkansas.

Texas Born and Raised

John was raised in the Dallas, Texas area, and studied electronics at the University of Texas in Arlington. John worked in the vacuum plating industry, automotive HVAC systems, and Navy high and low speed wind tunnels. He even operated a successful auto body shop.

Lest one think that John enjoyed only the successes in life and business, it is important to note that he was a part of two companies that eventually failed. Both of these companies were resistor manufacturers.

Like many other successful entrepreneurs before him, he was able to turn his stumbling blocks into stepping-stones for his future. Though bittersweet, his involvement in those companies gave him the foundation upon which to build his own successful resistor company in Arkansas.



Chris and Dave, John's two sons, in a 1.5 Mega Watt load being built in 1991.

Shortly after his move, John re-entered the resistor business in 1975 when a former customer contacted him to build resistors that were a key component of a national defense project. So John started Power Film System (PFS), and grew the business by selling non-reactive resistors to the military, and the broadcast industry for dummy loads. He would even beg for guest passes to the National Association of Broadcasters show to find new customers.

The Purchase of Altronic

When Bob Federico (inventor of the water-cooled high-power RF dummy load) decided he wanted to sell Altronic Research located in Cleveland, he contacted John and asked him if he wanted to be in the load business. John said "Yes," and then began to try to find out how to pay for it. Needless to say, the Lord provided – Altronic produced its first dummy load in Yellville, Arkansas in 1983.

Initially, Altronic had only produced water-cooled loads, and John continued in this tradition. Over time, John found that there were a surprising large number of technically talented people that had been drawn to this part of Arkansas for the same reason that he was – quality of life. As Altronic grew under John's stewardship, it added personnel that enabled it to begin major innovations in the load business. First added to the product line were air-cooled dummy and self-contained heat-exchanger loads.

Continued Growth and Advances

But that was just the beginning. Altronic designed and built the first 1.5 million Watt air-cooled dummy load for AM in 1991, and delivered it to Harris Broadcast. That load is still in operation today. As impressive as that was, Altronic's list of firsts includes designing and building the first calorimeter for air-cooled dummy loads, the first 250,000 Watt water-cooled dummy load, the first 1.5 million Watt air-cooled load for AM radio that required no tuning – and a 200,000 Watt air-cooled load for short wave as well as high power outdoor static air-cooled loads.

Altronic's quality has garnered it some major projects over the years. Included in the list are, high power dummy loads for Voice of America, the Pacific Missile Range in Hawaii, and components for the Air Force's F-111 fighter when it was in production.

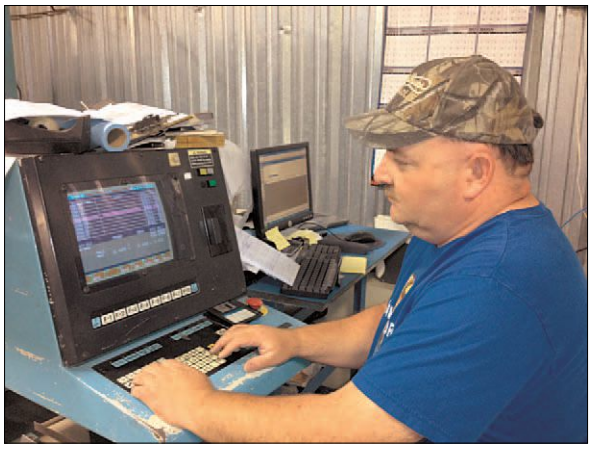
They have also provided braking resistors for test submarine motors, non-standard impedance loads for the Brookhaven National Laboratories particle collider, and products for scientific applications with several National Laboratories.

Altronic contracts grew in both size and scope, as did numerous projects with transmitter manufacturers in the United States and around the world.

Right Sized for Quality

Today, Altronic continues to maintain a track record that is to be envied by any manufacturer. That record is made possible by the quality of workmanship that can be found in each of Altronic's loads. All manufacturing is done in house. Its 28 employees, in the company's 15,000 square foot ISO 9001 compliant facility, manufacture products to exacting standards – John and his team wouldn't have it any other way. From raw material to finished loads, every step of the process is monitored to ensure that excellence of quality is maintained.

Painstaking adherence to its established quality standards has more than paid off. Altronic's unsurpassed reputation for quality, reliability and innovative cutting-edge designs keeps customers returning with their new projects that require even more innovation in design. As always, John and his team are ready to step up to meet new challenges that push the envelope of creativity.



Tony Ramey programming the CNC Machine.

Meeting Customer's Needs

Recent customer needs motivated Altronic to develop a line of digitally-controlled soda/water RF loads. This product line includes one load capable of handling 1.1 Megawatts. There is also a load designed to take 3 MegaWatts as a pulsed signal. The soda/water RF loads have opened the door into a new market, giving the company a strong position for future applications around the world.

One of the keys to Altronic's success is the attention it pays to its customers. Customers who need a load that is a standard product get the same attention as those who come to Altronic with special projects. The ability to listen to customer needs and translate their "wish list" into viable products is a key to the company's success.

From this unexpected location, a stone's throw from a National Park, who would have thought we'd find a company making some of the quietest and best performing air-cooled loads in the world. On second thought, perhaps you *might* expect that. After all, the last thing you would want is to have a noisy cooling fan that would interrupt the peaceful sounds of nature in an area with an excellent quality of life.

For more information on Altronic loads visit www.altronic.com or call Altronic at 870-449-4093.

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Studio Site

Is Time on Your Side?

The Broadcaster's Magic Little Secret

by George Zahn

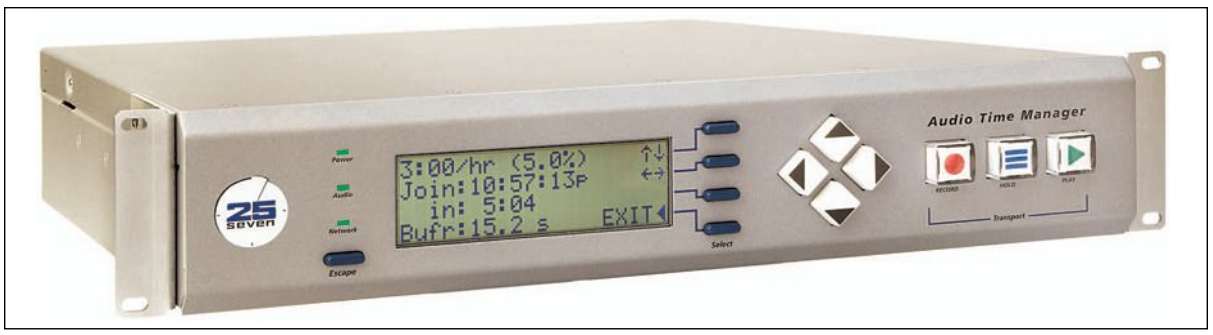
I have to admit that when I first heard about a time shifting device for live radio production, I was flummoxed. How do I squeeze more time into an hour, and do it on the fly? Then I was amazed to learn that the box that lets broadcasters do this "magic" has been on the market since roughly 2005. The "box" is the ATM (Audio Time Manager) from the company 25-Seven.

"We're a secret weapon to a lot of users," says Geoff Steadman, President of the company that has been doing the time warp for some seven years, "I have some users that say 'I don't want you talking about us using this,' but it's been a real trade secret."

The box that has been very, very slowly revolutionizing how local stations interact with networks is a basic stereo in/stereo out unit, that provides delay of up to an hour, allowing an operator to pause incoming programming, then restart it anywhere within the one hour of stored material – and even command the box to use the built in logarithm to catch up to real time (within reason).

It's been likened to TiVo for audio, or an endless one-hour tape loop with a movable play head. In the words of Steadman, "We keep hearing 'Content is King!' Why then are we beholden to the clock?"

Steadman says of the ATM, still very much misunderstood because it doesn't fit in an easily identifiable broadcast niche, "The ATM's mission in life was to try to help stations fix a problem they had stopped looking for, time conflicts."



"Shift" Into Gear

So you're expecting the beginning of a press conference you want to carry live, but you have a spot set to squeeze in. In mid spot, the press conference starts. With the ATM recording the press conference feed, you simply finish the spot set, then start the press conference audio from the ATM output. There's even a dashboard display feature that will allow you make up the audio delay using a sophisticated internal program.

According to Steadman, one of the first uses for the ATM was at WTKK in Boston, a city in which Steadman has public radio roots. WTKK was apparently having difficulty with some of the unpredictable lengths of the network holes in the Don Imus show, so they used the ATM to "pause" Imus until the full stop set was played, then restarted the next segment. The ATM offers pausing, buffer play, and live cueing. If your audience expects breaks at certain intervals, you can time compress the network segment that may have started late to re-meet your clock if you wish.

The time compression is very stealthy. "It doesn't play with pitch," reminds Steadman, "a pitch change would affect PPM if the ATM processing were on the wrong side of the encoder." This is different from the time compression experiments years ago that used frame rate editing. According to Steadman, "what we're doing is thousands of micro edits at a very rapid rate, checking periodicity, density, spectral content, and pattern recognition that doesn't treat silence any differently than speech, because there is content in silence. You can fool the eye, but you can't always fool the ear."

More Than Seeing Spots

How this comes into play in our studios is far more than cramming extra spots into a network break. It literally allows us, as local broadcasters, to turn the network on its ear. From commercial stations, who need to run an extended traffic report on a messy morning and still "join the network post" (albeit delayed on the ATM), to public stations who can now "pause" programs such as *A Prairie Home Companion* in order to do a vital pledge break without the listeners missing any of the show, there may be a future for this box which has "stormed" on the scene more like sap in winter.

Imagine not being beholden to the network clock – not for the purpose of having sloppy local hosting, but to do the local programming that our listeners can't get elsewhere. The goal of the ATM was to make things sound tighter and better, not to be a crutch for talent who can't hit posts.

There are some other creative uses. C-SPAN Radio can momentarily pause a session dozens of times during the broadcast for a very quick identifier of who is speaking – in effect doing a "radio crawl" that could have only been done before by fading the speaker under the radio announcer. The recorder just keeps recording a "radio continuum," bringing the last hour of content in tow. Imagine a severe storm warning happening during the final goal line stand of the high school championship on your station. Pause the game, run the alert, and recue to the key point of the game. Then let the box catch up back to real time.

Reportedly, some stations are even time-shifting some segments of network news programs so that the national news stories better follow the local or regional stories on the station. Even if you think it sounds complex, or are having a hard time wrapping your head around the concept, the sheer nerve of restoring program content control to the affiliates *during network shows* is fascinating. How often have we as engineers or managers felt angst as we heard our talent race through our revenue generating local information simply because the network says we have sixty local seconds.

Other uses do include inserting more spots by being able to pause content, newscasts or other local programs. According to Steadman, some stations, including WTOP in Washington, are time-shifting top or bottom of hour national newscasts to fit logical breaks in programming, giving their talent the choice to hit the hard post or finish a key thought without truncating content.

For being asked to keep his product "hushed" by clients, Steadman has a cornucopia of success stories. "We just put the tool out there, and stations have found incredible uses for it." ESPN Radio is now using the ATM functions to take audio feeds from their cable College Game Day program, pause and recue segments, and use them on their ESPN Radio network programming. Some stations are using the capabilities to "pre-screen" syndicated shows that "waste" time with thirty or forty seconds of music before the host pops in. The board operator can simply cue past the fluff music and use the time more effectively, if that's what the station needs.

ATM Rear Panel View

News to the Networks?

It remains to be seen how networks react to all of this wiggle room being created their affiliates, but it may be a slow revolution that allows local stations to truly tailor network breaks to local content.

While we're talking about time compression, the 25-Seven line also includes the PLM, or Program Length Manager, that features less controls such as cueing, but can delay incoming material, and time compress up to three minutes in an hour. It is often used in automation settings to create extra spot inventory. They even have taken on the big boys at Eventide with their own broadcast profanity delay, ranging up to 90 seconds. Among the features of the delay unit is the "PD-Alert." Every time someone hits the DUMP button, a clip of the material deleted is sent directly to the stations program director via e-mail.

25-Seven may be as little known as some of its products, including the category-defying ATM, but the "little" guy in this case is growing, and has some interesting ideas. The analogy is that the little company is also returning some clout to the other little guys – us, on the receiving end of the networks!

You can sound off and let us know what you think! Let us know your take on time compression. Do you use it? What are the pros and cons? Network comments also welcome!

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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And that audio packs the clean, clear competition-crushing punch Omnia is famous for. Each stream is sweetened with its own adjustable wide-band AGC with three-band compressor/limiter, EQ and low-pass filter, and precision look-ahead final limiter. The result: clean, clear streams with more presence and character than you ever thought possible.

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Replacing a Tower Base Insulator

by William Bordeaux

The late Ronald Regan was eating jellybeans in the Oval Office when I took over the engineering at a three tower directional array. An inspection tour of the studio and transmitter sites with the engineer, just before he left the area, brought me face to face with what seemed like a critical problem.

While at the transmitter site, he brought my attention to the base insulator on one of the towers. The insulator had a visible crack in it as well as several small chunks missing from the metal casting that was sandwiched between it and the tower base. He warned me that it had been like that for several years and was in danger of complete failure at any moment. It was essential that I put pressure on the station owner to get it replaced without delay.

Seeking Repair Funds

I did explain the problem to the best of my ability, but the owner would not or could not spend the money required to get it replaced. As the years went by, the cracks became bigger and more pieces fell off of the insulator. I kept pestering the owner about the insulator, but could never get the "go ahead" to replace it.

Finally the station was sold to new owners and at last I thought the chance had come to properly repair the tower. Alas, the insulator repair never made it to the top of the list. In fact, Bill Clinton was winding down his Presidency when the station was finally put out of its misery and decommissioned. At that point, I went from Chief Engineer of the site to Caretaker.

For several years the County planners, The Sierra Club, the Coastal Commission, and other groups too numerous to name, debated our plans to pull the towers down and remove the transmitter building from the site. Days turned to weeks, weeks to years and finally, almost 20 years after the engineer had warned me about the dangerously cracked base insulator, the demolition plan was approved; guy wires were cut and the towers came crashing down. I went to the tower base once the dust had settled, and sure enough the base insulator had shattered when the tower hit the ground.

Even though the tower held on all those years, I was intrigued by the thought of replacing a base insulator. I could not imagine what it would take to lift up many tons of steel and install a new insulator.

The Project Turns Real

Sometime later, at a client's transmitter site, we received a report of high VSWR. Upon arrival, we found a failed insulator. There were deep carbon tracks running the length of the insulator and black deposits of carbon on the metal caps from the prolonged arcing.

This is an ex-insulator.

This insulator was clearly beyond repair and needed to be replaced. After several calls we found a tower company that had the time and expertise to do the job.

We made careful measurements of the failed insulator's dimensions and sent them off to the tower company so they could find a replacement that would be sure to fit with little extra work. Fortunately, they were able to find an insulator that was within an inch in height of the old one. This would mean that there would be little if any adjusting needed in the guy wire lengths. Had this not been the case, a change in guy wire length and the associated work could have easily added many hundreds (or thousands) of dollars to the cost of the project.

Within a few days, the crew arrived and began work. For several reasons, there was no way the station could stay on the air while the insulator was being replaced, so careful planning found a time for the tower crew when the off-air work would be least disruptive to the operation of the station.

Measure Twice, Cut Once

Once the power was shut down the tower crew went to work. The first order of business was to confirm that the new insulator would be able to fit properly. Once that was established, the crew went to work building a unique steel structure within the framework of the tower. This structure would allow two bottle jacks to lift the entire tower just high enough to slide out the old insulator and slide in the new one. Sounds simple, no?

Not so fast. Calculating the weight of the tower is a complex equation. Not only is there the mass of the steel stacked up into the sky, but there is also an ever-changing weight exerted by the downward component of the guy wires.

With no wind, the tension in the guy wires can be resolved into two force components. One force is in the horizontal direction starting at the guy attachment point and the other is a force in the downward direction beginning at the guy attachment point and going down the leg of the tower. The magnitude of these forces will be equal if the guy wire comes off the tower at a 45-degree angle. As the angle between the tower and the guy wires decreases, the downward component of the force becomes greater than the outward component.

When the wind blows and exerts force on the side of the tower, the force again gets resolved into two components by the guy wires. Some of the force of the wind will cause an outward force from the tower in the opposite direction from the wind and another component will cause a downward force, effectively increasing the "weight" of the tower.

Having an understanding of the forces acting on a tower gives you a greater appreciation for the unique skills a tower crew brings to the party. Jacking up a tower and replacing an insulator is a carefully orchestrated balance of forces, lots of planning and a little bravado.

Getting Ready

The tower crew placed large, thick steel plates on the concrete tower bases. These were used to place the bottle jacks on. In this way the load of the tower is translated though the bottle jacks and spread out over the area of the steel plates.

The name of the game here is pounds per square inch management. By spreading the loads out, they made sure not to over stress any one component of the jacking assembly. Keeping with the plan, steel plates and more bottle jacks were used to create a jacking point that spread its load out among several cross members of the tower.

Once the jacking assembly was in place, it was time to begin the jacking. Because the tower only needed to be raised an inch or so, it was determined that the guy wires had enough slack to allow movement of the tower without having to loosen them up any futher.

Remember, when raising the tower not only are you lifting the dead weight of the steel tower but you also are pushing against the downward component of the tension on the guy wires. As you raise the tower that component increases, and in effect the higher you jack the tower the more it weighs.

Careful ...

The tower crew used a level and transit to insure that as the jacking progressed, the tower remained plumb. The jacking has to be synchronized between the two jacks to insure that the tower rises straight up from its resting-place. If the tower leans while jacking, forces become even more complex with some of them acting in directions that are not conducive to the safety of the crew or health of the tower!

Slowly jacking the tower.

Once the tower was jacked up, leaving enough room to slide the old insulator out, the real work began. The flanges that held the old insulator on were different in dimensions from the one new one that was to replace it. New boltholes had to be drilled into the base of the tower as well as the concrete base to accept the new flanges.

One of the most interesting tools the tower crew used was an electric drill fitted with a huge electromagnet. When the drill is positioned properly on the work piece, the electromagnet is energized and the drill becomes a portable mini-drill press. This is surely a great invention! Anyone that has tried to drill though plate steel by hand can really appreciate this tool.

A new insulator supports the tower.

Finally the holes were drilled and the new insulator was carefully slid into place. The pressure was carefully, slowly and evenly bled out of the bottle jacks and the tower came to rest on its new insulator. The flanges were bolted into place and the lighting gap was sized.

Finishing the Job

The job was not complete until the tower crew checked the guy tension and plumb on the tower. After that, we had them check the tower plumbness, guy tensions and the base insulator condition on the two other towers in the directional array (as long as they were in the neighborhood). The site got a clean bill of health and should be good for many years of trouble free service.

So what exactly caused the failure of the insulator in the first place? The tower crew and manufacturer of the base insulator could not say for sure.

There had been some changes in operating conditions within the last several years. The station power had been increased from 5 kW to 10 kW, and there was a new 5 kW station sharing the tower. The old insulator was rated well beyond the calculated base voltage, but perhaps the increase in power, along with the years of weathering had taken their toll. At this point we have more questions than answers.

In any case, we expect good service from our new insulator. Maintenance will be simple. An occasional cleaning of the outer surface of the insulator with a soft cloth and alcohol, maintaining proper lightning gaps, and periodic guy wire inspection and tensioning should go a long way to preventing future failures.

Bill Bordeaux's email is: bill@stationengineer.com

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Xtreme Engineering

By Steve Callahan

The Part of Your AM Antenna That You Can't See

Something as low-tech as a defective AM ground system can have an "Xtreme" effect on your high-tech signal. Now is the time to check those systems out – editor

In my 40 years of broadcasting engineering, I've seen quite a few AM tower sites. Some were good, some were bad – and many were just plain neglected.

An important part of your AM transmission system is where you can't see it – underground. Your ground system is a valuable asset, so do you know what condition it's in? The cheapest and easiest power increase your AM station can ever get is by restoring your ground system to its original specifications. There were many AM stations which were built in the late 40's and their ground systems are now questionable due to wear and tear, theft and vandalism, and simple neglect.

A gradual decrease in coverage could point to an old, deteriorating ground system. A sudden decrease in your coverage could be the result of the theft of some ground system copper – a problem which has been on the increase nationwide. Is your solid state transmitter tripping off with unexplained VSWR alarms? You just might have less of a ground system that you think.

If you find that your AM ground system has been damaged or has deteriorated, then there is a solution. Kevin Kidd of AM Ground Systems Co. specializes in the repair and reconstruction of AM ground systems and he's got some interesting stories of stations he's helped across the country. I met Kevin at the first NAB AM Workshop in Orlando several years ago. He keeps an eye on the technical needs of about 30 stations in his area and recently I had a chance to chat with him about the most challenging ground system projects he's ever done.

Kevin and his crew specialize in the evaluation, construction and repair of AM ground systems. They've traveled throughout the country, restoring ground systems that have been vandalized or damaged, or installing new systems if a station moves its tower site. Whether it's at a new station, or at one in need of ground system repairs, having someone who specializes in the proper configuration and installation of a ground system can save you time and money.

Too Much Concrete

I asked Kevin which of the 100-plus projects he's worked on was the most challenging. He told me the story of a station in the Cincinnati area that had sold its tower site, but had found another location for its multi-tower AM array. The tell-tale hints of an overly budget-conscious owner were obvious, when Kevin spied some used coax that had already been installed underground. Another sign was that the new tower site had a lot of concrete waste which would make installing a ground system very challenging.

However, the problems at this particular site just kept on coming. The person who had installed the concrete piers for the tower base insulators had poured the concrete too low and the tower insulators ended up being below grade.

When the consulting engineer on the project arrived on the site, he took a quick look at the tower bases with his compass and discovered that the array, which had been laid out by the local surveyor, was referenced to magnetic north and not *true* north. This is actually a very common problem that I have run into at several other tower locations. The fix at this site was to spin the array (all but the center non-directional tower) five degrees, to align the array with true north. This was a costly mistake, but it had to get fixed.

Concrete waste provided challenges.

The time on this station's construction permit was running out fast and the local backhoe operator was leaving the site because he hadn't been paid. Kevin stepped up and hired him for the time it took to get the necessary work done. The weather turned cold, so what might have been a problem became a lucky break. A week of freezing temperatures caused the surface of the marshy part of the site to freeze and it was easier for Kevin and his crew to get the ground radials plowed into that area. Having Kevin and his crew involved was the smartest decision the station owner made at that site.

The station eventually did sign on in time, but a year later Kevin was called because copper thieves had hit the site.

Floating Tower Site

Another interesting tower site brought Kevin and his crew to Wisconsin. An AM station had moved its tower site and was in need of a ground system. When he arrived at the new tower site, Kevin found that the tower had been built on what the local folks called "a floating bog." Jumping up and down at ground level could be felt by someone standing at ground level a short distance away, very similar to a trampoline. The tower base and anchors had been installed using well casings sunk down into bedrock, because the below-grade soil composition at the site consisted of layers of water and earth. This situation required that Kevin not use any heavy equipment to install the ground radials.

Heavy equipment was needed here.

Enough is Enough

We've all got interesting stories that are just too crazy not to be true. Twenty years ago, I built a small AM station and installed the specified copper ground system. One day, a local fireman called me and said he had just passed the tower site and saw someone at the tower site looking very suspicious. I immediately got there and saw the very unsettling sight of a majority of the ground system missing. Fortunately for me, the thief was leaving and didn't see me. When confronted, he dropped a large rucksack full of copper and ran like a deer into the woods. The police followed his trail into the woods but couldn't find him.

I rebuilt that ground system with $4,000 worth of copper, but a couple of years later the ground system at this particular station was stolen again. This time I had to do something a little more creative. I had heard that another AM station that had suffered repeated copper ground system thefts had replaced their ground system with barbed wire.

This sounded pretty creative to me so I replaced the entire ground system with galvanized barbed wire and the FCC's license-to-cover actually specified the ground system as rebuilt with galvanized barbed wire. The replacement cost was a fraction of what it would have been with copper and the station got out just as well. Most importantly, the ground system thievery stopped immediately. A decade later, I replaced the barbed wire ground system with copper as part of a power increase at that station.

Cover It Up

Another little trick to cut down on the theft of copper ground radials is to drop a shovel full of concrete into the trench on top of the radial every twenty feet. This makes it harder for the copper thief to just pull the entire radial out of the ground. Always make sure that the visible portion of your your newly-installed copper strap is dulled by a coating of sticky roofing tar. The sight of bright, shiny copper attracts copper thieves like moths to a flame.

The moral of these stories is that you should visit your AM site regularly and look for any copper theft. You should actually get out in the field and walk the antenna array and look for any missing copper strap. If your base current or common point current deviates a lot under different weather conditions, look for missing copper. Have your neighbors watch your tower site for any suspicious activity. A station T-Shirt will be much appreciated by them and they'll be your eyes and ears when you aren't there.

You can contact Kevin Kidd at AM Ground Systems Co at 888-476-8630 or www.amgroundsystems.com

Steve Callahan is the owner of WVBF, 1530 AM, Middleboro, Mass. and may be reached at wvbf1530@yahoo.com

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Accepting "Super PAC" Political Ads

by Peter Gutmann

As all broadcasters surely are aware, the bulk of political ad spending has shifted from traditional candidate committees to so-called "Super Political Action Committees" or "Super PACs." Yet, many broadcasters remain unclear as to their obligations to accept and air Super PAC ads.

First some background. Super PACs are a new breed of animal in the political zoo that essentially was created by the Supreme Court's controversial 2010 *Citizens United* decision. The central holding of that case struck down as unconstitutional a provision of federal law that had barred independently-funded "electioneering communications" within 30 days of a primary or 60 days of a general election. The slim majority reasoned that independent political expenditures were an essential component of free speech protected by the First Amendment and should not be restricted.

Attracting Criticism

However, from the very outset the decision attracted criticism, sparked by a dissenting opinion from four of the nine justices who expressed concern that unlimited spending would lead to corruption of the political system and disproportionate influence by the wealthy. Even so, despite the difference of views, all nine justices upheld the sponsorship disclosure provisions of the underlying law. Nor did the case disturb the severe limits on direct contributions to candidates or their authorized committees.

Super PACs arose as a way to circumvent those limits. Although ostensibly not connected to candidates themselves or their authorized committees, many Super PACs are devoted to the support or defeat of specific candidates. That, in turn, enables candidates to let Super PACs do their dirty work while distancing themselves from the negative publicity that attack ads often cause. It also enables Super PACs to accept from wealthy backers large contributions far in excess of those permitted to the candidates themselves. Indeed, so far in the 2012 election cycle, contributions to Super PACs far exceed those to candidates themselves, and all indications are that the trend is likely to continue, if not accelerate.

Where Does That Leave Broadcasters?

First and foremost, broadcasters are under no legal obligation to accept Super PAC ads. The mandatory access provisions of political broadcasting law only apply to federal candidates themselves and to equal opportunities. Since by law any PAC, super or otherwise, cannot be officially connected with a candidate, it cannot claim either a right to air time in the first instance or a right to respond to a message by a candidate or another PAC.

Many broadcasters choose to accept PAC ads, whether out of a sense of civic duty to promote political discussion, or to advance their own political views, or simply to reap the financial benefit in a tight economy. Once PAC ads are accepted, is there a legal obligation to accept others, especially from an opposing point of view? No. Without any of the prior Fairness Doctrine obligations to require a balance of views, broadcasters are free to accept or reject any opinion ads they wish. Indeed, the so-called "Zapple Doctrine," a corollary of the Fairness Doctrine that once required air time for supporters of candidates, is gone as well.

Just as with commercial advertisers, stations can select the PAC ads they choose to air. So, for example, can a broadcaster accept only PAC ads attacking an incumbent? Or reject negative PAC ads altogether and only accept those advancing a candidacy? Yes – unlike with equal opportunities or federal candidate access, licensees can select and reject ads based on content or viewpoint. Yet issue ads carry a risk – unlike candidate "uses," broadcasters may be held liable for the contents.

PAC ads also are not subject to the special rates (comparable or lowest unit) that candidate uses enjoy. If a broadcaster chooses to charge a premium for PAC ads, it may do so, although at the cost of diverting business to competitors.

Weighing the Risks

Of course, we've only been considering legal obligations. Broadcasters have always carefully weighed the risk of offending listeners and advertisers through their programming, including the ads they accept. There comes a point where the potential long-term damage to a station's reputation outweighs the temptation to accept lucrative PAC ads that are apt to offend. Nothing in *Citizens United* changes that balance or relieves stations of such responsibility.

Even so, once a PAC ad is accepted, stations incur certain obligations. The first is to accurately identify the sponsor in a clearly audible tag. That obligation is undisturbed by *Citizens United*. Since a PAC ad cannot be authorized by any candidate, the tag would need to state: "_____ is responsible for the content of this advertising," with the blank filled in with the name of the sponsor.

So far, at least, broadcasters have no special obligation to ensure the legitimacy of that disclosure. Unless a broadcaster has actual knowledge or a reasonable suspicion that the claimed sponsor is false, licensees may rely upon the nominal sponsor's representation, even if it sounds misleading. It's sad but true that some advocacy groups hide behind an innocuous or even deceptive name, such as an industry-funded entity that sounds like a public interest advocate. But as long as a PAC provides its actual name, a station fulfills its obligation by announcing it.

Licensees also are obligated to maintain a public file containing information for all broadcasts concerning any "political matter of national importance." Unfortunately, there has been no reliable guidance as to the precise scope of that "national importance" standard. It's probably best to err on the side of caution and consider any PAC ad to qualify, unless it clearly is directed only to local matters having no possible national relevance.

The information to be placed in the public file must include:

- Whether the request to purchase broadcast time is accepted or rejected by the licensee;
- The rate charged for the broadcast time;
- The date and time on which the communication is aired;
- The class of time that is purchased;
- The issue(s) to which the communication refers;
- The name of the entity purchasing the time; the name, address, and phone number of a contact person for such entity; and a list of its chief executive officers *or* members of its executive committee *or* its board of directors.

Note that the last category is required by the FCC's rules for all political matter, whether national or not. Also, note that the required disclosure of officers, executive committee or board members is phrased in the alternative, so that only one category need be covered. Finally, to the chagrin of many campaign reformers, there is no requirement to ascertain or disclose a list of the donors or the source of funds to the sponsor, even if it is a Super PAC with a generic name.

And what does the future hold? That's hard to say. Public opinion polls suggest that *Citizens United* has proved hugely unpopular, with a large majority of the populace opposed to its result. While some contend that the Supreme Court severely underestimated the consequence of its decision in unleashing Super PACs, the Court is unlikely to reverse itself so soon.

More Stringent Disclosure

In the meantime, indirect efforts to limit its impact are already underway. These largely are focused on enhanced disclosure obligations. One proposal working its way through the Senate would require announcement of all donors who contribute $10,000 or more to fund a sponsor. At the same time, several states are considering supplementing the federal standard with more stringent disclosure requirements of their own. Generally these are legal so long as they expand, rather than defeat, federal requirements. Depending on your view, they will either enhance the transparency of political ads or needlessly clutter them with potentially lengthy mandatory tags.

Two matters are absolutely clear – Super PACs will continue to play a major role in the current election cycle, and stations will be faced with various pressures to deal with them.

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

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Disaster Preparedness

Post-Mortem of An Excellent Plan

by Ernie Belanger

In the last two issues, this column has had reports of two station engineers who had the opportunities to work their disaster plans during actual disaster situations. Both found shortfalls that needed to be fixed moving forward.

One thing about disaster planning that can drive engineers and managers crazy is the perception of trying to hit a moving target. No matter how in depth you plan, there is always something that wasn't anticipated. That's because, as predictable as disasters can be, they are equally unpredictable. (FYI – professional Emergency Mangers have the same frustrations.)

The best you can do is exactly what the pros do – take an historical look at how specific disasters, common to your area, behave and make up the best plan possible to cope with those behaviors. You must also leave yourself enough latitude to adjust your plan as unexpected behaviors present themselves.

When the disaster is over there is nothing more gratifying than knowing the information your station put on the air helped your listeners survive.

Now this might sound more difficult than it really is. As engineers, we pretty much have instinctively evolved the ability to adapt and make adjustments, as the situation we are facing changes. This same skill set we use as engineers is exactly what is needed when our disaster plan must be adapted to changing situations within the context of a disaster.

Bob Reite did just that. If you look at the November/December 2011 issue of ***Radio Guide*** in the *Disaster Preparedness* column you'll read how an excellent plan executes in real time, and how it allows for adjustments – even though it sometimes takes heroic efforts, as it did with Bob's plan.

So lets take Bob's plan for WHLM, point by point. Pull out your own Disaster Plan to see how your plan measures up to what Bob had put together.

Backup Studio Power

The station had an agreement in place with the local fire department to borrow a generator. You'll note that as soon as it became evident there could be a power outage, that part of the plan was immediately put into action and the unit was brought to the station and readied for hook up.

This demonstrates a well thought out plan. The station didn't have it's own generator so it reached out to the fire department and had an agreement in place to cover a potential power outage, long before the disaster struck. The ability to keep your station on the air (hopefully to provide vital information) is one of the fundamental building blocks for your station to be disaster-ready.

Color-Code Your Outlets

Plan for back-up power at both the studio and your transmitter site(s). If your station doesn't have the budget for a full back up then designate what is essential equipment for the station to remain on the air, and install an emergency electrical grid within your facility. You may have observed orange or red electric outlets at medical facilities. These circuits are the ones that are on the emergency power grid.

The color of the outlets allows the staff to quickly and easily identify emergency power so life saving equipment such as ventilators can be plugged into outlets that will be continuously powered up – even in a disaster. Don't reinvent the wheel. If the best your station can afford is partial emergency power, then design an emergency power grid based on the example of these medical facilities. Use colored outlets for quick recognition – and make sure essential equipment is plugged into them.

Emergency Programming

WHLM's plan very wisely had an emergency-programming format that was pre-planned. This plan smoothly transitioning the station from its regular programming to special emergency programming. The emergency programming gave its listeners and new listeners (those listeners from other stations that weren't prepared) vital information at a crucial time.

With that switch, the station became an invaluable part of the county's emergency management plan, keeping residents up to date moment-by-moment, as the disaster and it's aftermath unfolded. It also solidified the station as a vital part of the listener's lives. This is something your station – every station – should strive for.

How Does Your Plan Size Up

Now take a look at your disaster plan. Have you a plan in place that will position your station as an integral part of the City, Town and or County's disaster plan? Do you have an Emergency Programming plan similar to WHLM's? You should. You should want to position your station to become a key player in disseminating potentially life saving information before, during, and after a disaster.

While this might not translate into immediate revenue for the station, the station will reap the harvest of its investment time and time again moving forward. The bond that it will forge between the station and the communities your signal reaches is priceless.

Assignment of Specific Tasks

Bob noted that his station's plan did have specific tasks assigned to specific members of the staff, and things went smoothly. He also noted that he would rework that part of the plan to ensure necessary tasks are handled even when assigned personnel are not in the area. This is a very important part of any disaster plan.

As you do your planning, it may be necessary to have staff members assigned primary tasks and also to have them serve as a secondary or tertiary backup on other tasks. In this way, even if a staffer is stranded outside of the disaster zone and can't return, the tasks they would have handled will be taken care of by an alternate.

Bob also wisely advised that you have to be sure to plan for staffers having to take some time to secure their own property, should the disaster throw you one of those unexpected curve balls that wasn't expected, and "safe" areas suddenly are potentially in harms way.

Personnel and Families

Prior to the arrival of and during the event, your staff members will be distracted, having to take time to ensure their families are or of harm's way. Early on in this series I advocated having an evacuation plan for the family members of your staff. While I did get some push back at that suggestion, this is something which seriously should be considered and a plan put in place.

From a management perspective relieving the worry about family safety will help keep your staff focused on the task at hand. The last thing you want, when your station is in such a high profile position, is a staff that is distracted because they are worried about loved ones.

To prevent this, plan for evacuation long before a disaster strikes, if possible. Obviously with tornados and flash flooding it's hard to do that. But with hurricanes, blizzards, ice storms and other predicted natural disasters it is better to have a plan in place that can be executed at the drop of a hat.

MRE's can be purchased on-line and at some sporting goods stores.

Emergency Supplies

One of the fundamentals that you need to plan for is basic staff comfort. By that I mean an ample supply of food, water, blankets, cots, pillows etc. You need to be sure to look at your emergency staffing matrix and plan for at least one gallon of bottled drinking water per staffer per day. Remember too, depending upon the disaster predicted you might need to plan food and water for an extended period of time.

Plan meals as well for the staff and dare I say they should probably be meals ready to eat (MREs). If you have no power, you have no refrigeration, and keeping standard food preserved could be a problem.

Ernie may be reached at: editorial@radio-guide.com

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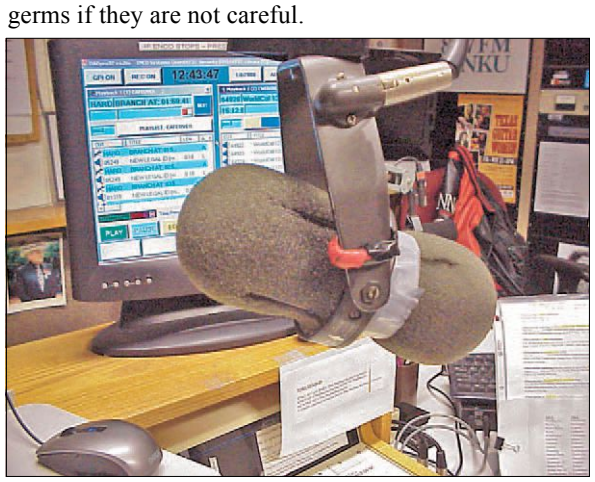
Safety and Security

A regular column on protecting property and persons – with a technical slant.

Ah ... Ahhh ... Choo!
And You're Not On the Air Today

by Jeff Johnson,CPBE

Threats to our ability to broadcast can come from lightning, insurrection, power outage – or unseen, microscopic pathogens. A broadcast studio is a place where many people get their hands on everything – and also their germs if they are not careful.



A Playground for Germs?

We read discussions regularly of concern over sanitation in the studio. When all cooperate, we can minimize those banes of broadcasters – the sniffles – and worse!

The author's sister-in-law, Chris Johnson is a Nurse Practitioner. She has written and recommends the following:

– Handwashing is for Everyone! –

"Go wash your hands" mom used to say to us as children. It's just as true now as it was then. Handwashing has been proven to be the most important first line in defending yourself from the spread of many types of illnesses and infections. Whether you are at home, in the workplace, or any setting that you find yourself in, handwashing will keep the microbes causing infections at bay!

Think about it, when you borrow a pencil, use a keyboard or mouse, touch a doorknob, pick up the telephone or shake hands with someone in the work setting ... did that person who touched those items before you have clean hands? When you think about it, did you? Did you do a good job washing your hands? Have you washed every time you sneezed, coughed, went to the bathroom – before and after you ate lunch or a snack?

Have you washed your hands today? Every time you handle garbage, touch a pet, come in contact with someone who is ill, rub your nose, touch your face, or put a band aid on a cut or sore, did you think to wash your hands?

A Quick Quiz to Check Your Handwashing IQ:

1. Just rinsing your hands with water will do the job. T F

2. Using hot water will clean your hands best. T F

3. I should wash for at least 15-20 seconds. T F

4. I can wash only my palms and fingers and be okay. T F

5. It's best to dry my hands on my jeans. T F

Answers: 1) F, 2) F, 3) T, 4) F, 5) F

Now you know when it's time to wash your hands, let's talk about how to do so the right way!

• Wet your hands with clean running water (warm or cold) and apply soap.

• Rub your hands together to make a lather and scrub them well; be sure to scrub the backs of your hands, between your fingers, and under your nails.

• Continue rubbing your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from the beginning to end twice.

• Rinse hands well in running water.

• Dry your hands using a clean towel or air dry.

Washing with soap and water is the best way to reduce the number of germs on your hands. When it is not available, an alcohol-based skin sanitizer is an alternative, as long as your hands are not visibly dirty (because then it will not work), and it must be at least 60% alcohol. This is an alternative when soap and water is not handy, but be aware it does not eliminate all types of germs!

Chris Johnson, ARNP

References: 1. CDC.gov/features/Handwashing 2. American Society for Microbiology: Clean Hands Campaign Flyer.

(Continued on Page 20)

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Safety and Security

– Continued from Page 18 –

The following essay is by Dr. Charles Grossman, PhD, a biologist and friend of the author:

– Three Primary Types of Pathogens –

Transmission of infectious diseases can take place in any location where people congregate. In the closed environment of a radio station, or sound studio, transmission would be facilitated by contact with surfaces containing the infective agents or by direct contact between individuals, one of whom is shedding the infective agent. Additionally, infective agents can be dispersed through air inhalation resulting from aerosolization of droplets generated by sneezing or coughing.

For a pathogen to be successful it not only has to be capable of infecting its host but also be transmittable between infected and non-infected individuals. It must also not kill off 100% of its potential hosts or it will itself not survive.

For the purposes of this discussion, potentially pathogenic organisms can be classified into three groups; bacteria, viruses and fungi. Of these three groups, fungal infections are probably of least concern in the environment of a radio station. Fungi are generally transmittable through spore formation and it is unlikely that one would find the moist conditions required to allow mold growth. This being said, obviously mold growth could be encountered in storage facilities, sheds, etc., and thus when shifting or cleaning out such environments it is always advisable to utilize respiratory protection.

In such storage facilities, inhalation of dust generated from dried urine and feces of deer mice may contain Hantavirus which is a life threatening disease in humans, causing Hantavirus pulmonary syndrome, or Hantavirus hemorrhagic fever; thus the use of respiratory protection is warranted

Bacterial infections can also be transmitted in closed spaces by direct or surface contact or aerosolization. Examples of such infections would include (but are not limited to) those produced by Staphylococci and Streptococci (which can cause very serious throat, skin and life threatening systemic infections), Tuberculosis, and Pertussis (or whooping cough).

With respect to Tuberculosis, this ancient and successful disease has been infecting humans for 7,000 years. At least one-third of all humans alive today have been infected, and 200 million have active disease. Thus it is at least potentially possible that staff at a radio station could be exposed to this infection. However, the organism cannot be transmitted by surface contact and thus can only pass between hosts through aerosolization where the uninfected individual must inhale the organism in suspended droplets.

Regarding Pertussis, it is highly contagious through droplet transmission but is generally not life threatening in adults. However, it can be fatal in infants. The majority of the population is immunized against Pertussis, but immunization must be re-administered every 10 years for it to remain effective.

Many bacteria can live on soft surfaces for days, or even weeks, especially if the surface remains moist. Clothing and skin are especially good environments where bacteria can survive and must be cleaned with soap and water or other anti bacterial agents. Hard surfaces can be sanitized with such agents as diluted Clorox solution.

In a radio station viruses have the highest probability of being transmitted between individuals, mainly due to the fact that individuals are frequently placed in close proximity such as in announcers booths, and because of the ease of transmission both by contact and aerosolization.

Strictly speaking, viruses are not truly alive, and can only be considered as alive when they are actually infecting a cellular host. Depending on the type of virus, it may remain viable (i.e. capable of causing infection) on surfaces for days, weeks or even years, but some are so fragile that they are only viable for minutes outside of the body.

For example the Hepatitis virus is viable on surfaces for a week if undisturbed, while the HIV (AIDS) virus can survive outside the host for only a few hours. Rhinoviruses (causing the common cold) can survive on hard surfaces for about one day. Influenza viruses can survive in the environment about two days and is therefore more easily transmitted than cold viruses.

Interestingly, flu viruses are adversely affected by high humidity and elevated temperature, which may be one reason that there is less flu present in the summer months. Also flu viruses can remain viable longer on hard surfaces such as stainless steel, or plastic, than on soft fabrics. In the environment of the radio station viruses can be transmitted when a person first touches a hard surface and then touches their eyes, nose or mouth. To break this route of transmission, surfaces should be sanitized with diluted Clorox, alcohol, hydrogen peroxide, soap or iodine-based cleaners, or with short wave ultraviolet.

Additionally, personnel should wash their hands frequently with soap and water or with hand sanitizers containing alcohol. However, such hand sanitizers do not actually have a great effect on neutralizing the viruses, but instead do remove them so that they cannot actually cause infection. Old fashioned soap and water is probably the best way to neutralize viruses and bacteria.

Finally, in considering how to sanitize microphone screens or control switches and mixers, the best method would probably be to use an aerosol based anti microbial product that could get into the nooks and crannies of the surfaces. While wiping the surface with a Clorox wipe might not be 100% effective, it would certainly be useful.

Finally remember to cover your coughs and sneezes, wash your hands frequency and do not touch your eyes, nose or mouth with your hands during flu season.

Charles J. Grossman, PhD and Prof of Biology; Xavier University; grossman@xavier.edu; 513-745-3623

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Operations Guide

Safe Audio File Import

by Chris Tarr

For music stations, getting songs on the air used to be a simple matter: record companies would drop off a pile of 45's with the Program Director. The singles would make their way into the studio, where the DJ would play them on a record player. Easy, but there were drawbacks like scratches and cue burns.

Then came the love-hate relationship with the tape cartridge. The station would still receive those 45's, but then the staff would record them once onto a cart. That worked pretty well as long as the Engineer kept the playback heads clean and aligned.

Even later came the Compact Disc. Read by a beam of light, the CD faithfully reproduced audio, though the promise of "faithfully" didn't always hold true. Scratches and dirt caused the audio to drop-out, jitter, or skip. CD players were also maintenance-heavy, requiring optics cleaning and alignment.

Rip and Toss – What a Waste

Fortunately, technology has caught up with us and now we have hard drives. While still not perfect, hard drives hold a lot of audio relatively inexpensively, are pretty reliable, and can be set up to be redundant. However, it did require us to go back to "dubbing" CD's into the automation system, a process that not only took a lot of time to do, but required the record companies to create and mail CD's to radio stations all over the country – stations that would "rip" the CD into the system, then toss the CD out. What a waste!

No More Burning

Nowadays, the record companies are doing the smart thing and making their singles available as digital downloads for the radio stations. No more burning CD's, no more shipping fees, and stations can often simply "ingest" the audio into their automation systems with a few clicks.

But wait! If you can download something from the Internet and place it into your automation system, doesn't that mean that the possibility exists to download a virus or worm to your automation system? Quite possibly, yes.

Let's talk about some strategies here. In a perfect world, someone would download the audio, put in on a USB drive and run it over to the automation server right? No! It's easy to load something bad onto a USB drive, and with Windows "auto-run" feature the virus could launch as soon as you plug that drive in.

OK, then let's burn the audio to a CD, then run it over and rip it into the system like the old days. Sure, you could do that, but do you really want to waste the time and money involved in going that route? Probably not.

I'm going to talk about one way to accomplish this task, but I want to disclose something up front. This is not a 100% safe way to do this, however I feel it's a good balance between security and usability. There is still an infection risk involved, but it's fairly minimized.

Here's the theory. We put our studio and production machines on their own physical network that doesn't ever touch the Internet. These machines will have their own non-routable IP block separate from the rest of your business network.

Heavy Lifting

On this network you have your server. This server has two network cards, one on the automation system network, and one on the business network, and has virus protection installed as well as all of the current OS patches. This machine will do all of the heavy lifting for you. It is the only device on the planet that can see both your business network and your automation network. However, due to the fact that each network is on a different physical network adapter, and the server acts as a firewall between the two, each

(Continued on Page 24)

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Operations Guide

by Chris Tarr

Safe Audio File Import

– Continued from Page 22–

network is invisible to the other. Just make sure to set up Windows *not* to route between the two networks, which is the default configuration.

On this server is a transfer directory. This directory is where all the action happens. This is also the place where an infection is going to happen if you aren't careful.

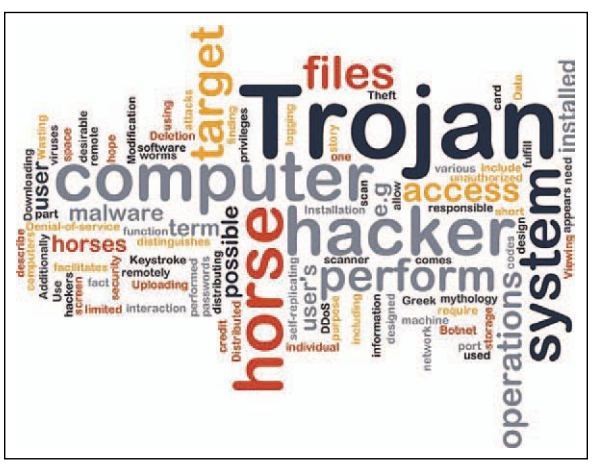
Now, if your automation system has server software that imports audio files from a directory, and automatically imports it to the playback machines, you're in great shape. Simply configure the workstation that is downloading the audio files, to save them to that shared folder on the server. Then configure the antivirus software on the server to scan that directory in real-time (so that it scans any file that shows up in there) and make sure your definitions get updated frequently. This should be enough to keep you pretty safe. The worst case (hopefully) is that anything bad is contained to the server and not the workstations.

File Server Resource Manager

Now, what if your playback systems have to ingest audio from that directory? You really want to be safe, and make sure that nothing gets in that directory other than what you need. How do we do that?

Well, aside from what's mentioned above with anti-virus software, Windows Server has a little-known feature called "File Server Resource Manager" or FSRM. FSRM is a fantastic tool that allows you to, not only manage quotas in directories, but – get this – restricts the types of files that users can write into the directory. So, with the controls properly set, you can have that directory set up on the server so that both the playback machines and the download computer can see only .MP3 or .WAV files.

How do we set this up? It's pretty easy. Instead of diving in depth here, this link will take you to an excellent "how to" article with step-by-step instructions on how to set it up: http://bit.ly/Kz8B4T



First Line of Defense

Now these are obviously not completely secure ways to transfer files. A well crafted worm or virus could still make it's way through your system and into your automation playback network, but we've made it pretty difficult. First, the only way that an executable could get moved around is by getting dropped into the transfer folder.

With FSRM as our first line of defense, if it's not a valid file type, it won't be allowed to be placed there. Then, your virus scanner will scan the files as they're dropped there to make sure they're clean. While there's still a possibility that there will be a problem, it's extremely slim at this point.

Honestly, even without all of these protections, you can be relatively safe, if you follow some basic safety tips:

1. *Only share the transfer folder on one or two computers on the business network.*

2. *Make sure those computers have up-to-date anti-virus software.*

3. *Educate the users that they should download music ONLY from the music service's website, never from peer-to-peer or file sharing sites. Consider installing web-blocking software on those systems, so that the "bad" sites can't be reached. If they're ingesting audio from email (such as commercials) make sure that your anti-virus system is configured to scan email attachments.*

When you combine all of these tips, the end result is a fairly quick, easy, and convenient way to get audio from the Internet to your automation system with very little risk.

Chris Tarr CSRE, CBNT, DRB is the Director of Engineering and IT for Entercom's radio stations in Milwaukee and Madison, WI he can be reached via email chris@geekjedi.com

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Chief Engineer

Improvise and Adapt

by Scott Schmeling

Usually when we fix something, the repair job involves replacing parts. Sometimes, though, when we don't have the parts we have to test our ingenuity and improvise with what we have on hand.

I had an offset Ku-Band satellite dish that collected water in the feedhorn when it rained. While I can't say for sure that the water caused it, I had two LNB's fail within a week of each other on this dish. There is usually a plastic cover over the end of the feedhorn, but this one was gone. I didn't have a replacement, so I looked in the van to see what I could "Macgyver" together.

I found a few things I could use to construct a makeshift cover. I cut the corner from a blue tarp and I fastened it to the feedhorn with a good, heavy-duty black cable tie. I covered the edges of the tarp fragment with a strip of 1-inch linerless rubber splicing tape to keep it from being frayed by the wind. The piece of tarp made a great feedhorn cover, and the LNB hasn't failed since.

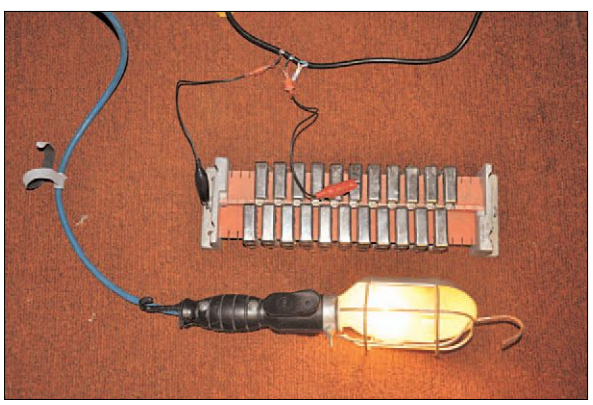
Illuminating the Problem

Here's another situation. You have a transmitter that is tripping its circuit breaker (or blowing fuses). Troubleshooting takes you to the high voltage rectifier stacks. It has a three-phase power supply, and there are three stacks. One of them is bad, but which one?

I was working on a 20 kW, 3-phase transmitter some time ago, and I knew that one of the rectifiers was bad. I remembered hearing about testing them with a light bulb. Basically, you feed 120 VAC to the center (of a half-wave stack), and connect the other end to a standard light bulb. Then look at the light. If the light is off, that part of the rectifier is open, and if the light is normal brightness, it's shorted. However, if the light is slightly dimmer than normal, the rectifier (or *that half*) is OK.

A good rectifier is only going to conduct for half of the full AC cycle – giving you half (or so) of the normal peak-to-peak voltage. That accounts for the dimmer light. Obviously, an open will not conduct, and a short is going to conduct the full cycle – hence, full bulb brightness.

I had a cheap light I could sacrifice for the cause, so I cut the hot lead and connected it to the rectifier as mentioned above. With this test it was very easy to find the bad rectifier stack and replace it. This "bulb test" works for both dual (half-wave) or single rectifiers.



I was so happy with the way it worked I built a cord specifically for this purpose. I took a standard power cord, cut the "equipment" end off, then cut the outer jacket so I could pull some of the black wire out. I cut the black wire and put alligator clips on the two ends. Then I installed a regular 3-prong receptacle connector on the very end. When needed, I plug a trouble light into the receptacle end and clip the clips to the rectifier.

(Continued on Page 28)

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Chief Engineer

by Scott Schmeling

Improvise and Adapt

– Continued from Page 26 –

I have since modified the cord making it useful for another type of test. I put quarter-inch flat quick-connect female terminals on the two ends of the hot wire *and* I cut the neutral and put both ends into another female quick connect. Then I put mating male quick-connects on two black wires (with alligator clips). Now I can remove the alligator clip jumpers and use the quick connects on standard tower light flashers. Unfortunately, I didn't have a bad rectifier stack around, so I couldn't show you both good and shorted, but the lamp in the photo is lower than normal brightness indicating a good rectifier.

Open Filament Circuit

I'll share one more troubleshooting tale. A few weeks ago we had a CCA transmitter with no output. Operations Manager Keith Wright replaced the PA tube, a YU-148, but still we had no RF out. We decided he should put the exciter on-line until I could get there with another tube. We have a 1-5/8" flange to N-connector adaptor, and a chunk of RG-214 coax just for that purpose, and it's really come in handy. The exciter is a 100 Watt unit, so it makes a pretty decent backup.

When I arrived with the new tube, we did a thorough visual inspection and found nothing obvious. We pulled the old tube and installed the new one, applied filament voltage, and let it warm up for a while. When we hit the plate button we got plate voltage, but no current and no output. We gave everything another once-over and tried again ... still nothing out. With filaments on, I checked the meter – 13.5 Volts – just where it should be. I gave the Filament Voltage knob a crank left and right and noticed the voltage was *not* changing. According to a CCA Trouble Shooting guide that I ran across, *that* was an indication of an open filament circuit.

The YU-148 PA Tube

But this was the *third* tube that exhibited no output. I'm sorry, but there's *no way* all three tubes would be bad. The problem *must* be in the transmitter. So we started taking resistance measurements from the transformer to the socket. Everything looked fine – except measuring across the filament rings in the socket didn't show the near short that we measured on the tube. I'm not going to tell you how long we went in circles because the Filament Voltage switch was in the PA position and we were reading the resistance of the *meter*!

We took the center filament ring out of the socket to clean it. That's when we discovered the contacts would slide way too easily on and off the tube. It appeared the center filament tube contact was not making contact with the ring of the socket. We cleaned it up with emery cloth and bent the fingers in until there was solid contact with the tube. That was it! Problem solved and the transmitter was back on!

By the way, I would be happy to share that CCA Trouble Shooting Guide with anyone who wants a copy. Just e-mail me. It contains some very good information regarding CCA transmitters. Until next time, I hope all your troubles are easily shot!

Scott Schmeling is the Chief Engineer for Minnesota Valley Broadcasting. Email him scottschmeling@radiomankato.com

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Practical Engineering

Cure Yourself of Wall Warts!

by Mike Callaghan

Radio Stations collect Wall-Warts the way camels collect fleas. It's rare to unpack a new piece of equipment without finding the little white box with the "wall-wart" inside. Now, more than ever before, the ubiquitous little plastic power supplies clog up our power strips, 'Y' adapters, and seemingly every other electric outlet we have. And even though each one of them uses just a tiny amount of power, most are critical to what we do.

"Wall Warts" can clog up your power strips.

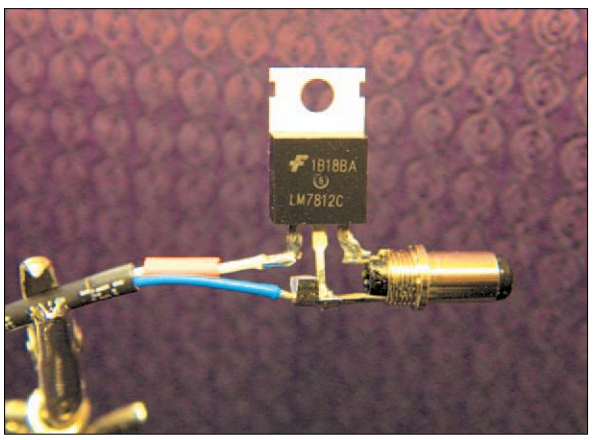
Power strip makers have risen to the challenge; they now supply three-sided strips with outlets on all three sides; allowing the wall-warts to plug in without blocking access to adjacent sockets. In tight spaces, these are a real blessing.

Nonetheless, there is an easier answer to these ever-multiplying power blocks. Remember that most of these supply just a few Watts of DC to run a small circuit or device. Manufacturers use them because by providing an external UL-approved power supply, they avoid the cost of having the entire piece of equipment approved. It makes sense, but the supplies really can take over the inside of a rack!

Substitue a Larger Power Supply

Instead of dozens of tiny supplies, why not replace them with one large, hefty, super-reliable power source – and then use minimal-gauge cabling to distribute the power throughout the racks and the rest of the facility? Put that supply on a rack-mount UPS and you'll have DC power forever!

A local three-terminal regulator can drop the main supply to match each load. Many small loads include a regulator themselves, and these can usually take the distributed power directly. Or a local regulator can be a part of the coaxial plug on the rear of the device, or wired into the cable close to the plug. A heat sink is usually not needed, depending on the voltage drop of the regulator and how much power the load consumes. If the regulator does get hot and the load is in a rack, you can fasten the regulator's metal tab to the rack frame as a heat sink. (The tab is connected to ground in the regulator.)



A regulator connected to a power plug and the power source. (before the shrink tubing is applied.)

These regulators are made in multiple output voltages. The whole family includes 7805 (5 Volt), 7806 (6 Volt), 7808 (8 Volt), 7809 (9 Volt), 7810 (10 Volt), 7812 (12 Volt), 7815 (15 Volt), 7818 (18 Volt), and 7824 (24 Volt)

This series is made in convenient TO-220, three terminal packages, and they're all good for 1 Amp. of current; try to take more than that and they'll shut down. The maximum DC input voltage should be less than 35 Volts.

On very rare occasions, a load will have a large capacitor across the input. This may push the regulator into over-current shutdown when the device is energized. A small-value resistor (10 Ohms or so) in series with the load will cure this.

(Continued on Page 32)

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Practical Engineering

by Mike Callaghan

Wall Warts

– Continued from Page 30 –

For multiple loads in a rack, it's easiest to "daisy-chain" the regulators with the cabling from each one leading to the next. This allows neat wiring, and it's easy to pull out the feed to a particular load and not disturb the others.

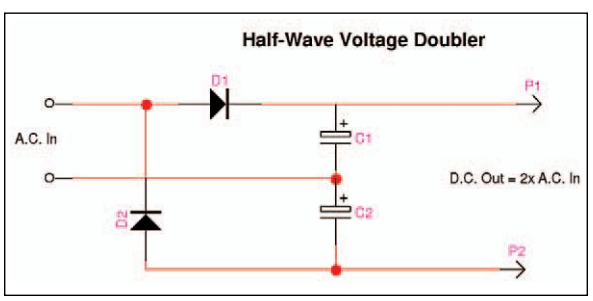
Loads that are fed directly from the master supply without a regulator should have a way to limit the current draw if they fail; an automotive in-line fuse is simple and easy to check when something stops working.

This can be very important; a station I built in Pasadena used a master 24 Volt supply for everything from the 24 VDC On-the-Air lights to the relays that ran the turntables. Accidentally shorting the DC feed under a production console would stop the turntables playing in the air studio.

Some of the "ice cubes" shipped with equipment produce AC. This is a whole different situation – I haven't seen any three-terminal regulators for AC yet! In this case, it may be better to go ahead and use the wall-wart. There are specific applications, though, when a large number of the same loads can use a common source. We have 8 stations in the cluster, and they all have silence sensors feeding from the air monitors. If a station goes silent, alarms go off at our corporate monitor hub in another city. Each silence sensor came with an 15 Volt AC wall wart. Since all units were mounted adjacent to each other in the same rack space, it just made sense to get a single 15 Volt AC transformer to feed the lot of them. The panel with the transformer includes an LED to verify it's working. (An LED works fine on AC, albeit a little dimmer than usual; it's only on one-half the time.)

Don't mistakenly feed a AC load with an DC source, or vice versa. In some cases you'll note the schematic shows a rectifier and regulator after the power input, but some AC devices do need the AC's sine wave for timing or some other purpose.

If you need a small source of DC, and haven't the right voltage supply on hand, remember you can take an AC transformer and build a voltage doubler to get what you need. This simple circuit uses just two diodes and two good-sized capacitors.



In a pinch, remember that silicon diodes in series can be used to drop DC voltages when they're too high – figure 0.7 Volts for each one. The regulation suffers, though, so the scheme is best with either a constant current load or one that's insensitive to supply changes.

Extra overall reliability can result from using dual supplies. Wired through steering diodes, this insures DC availability even when a supply fails. If the current draw is substantial, the steering diodes may need to be on heat sinks. Remember the diode voltage drop? If you pull 10 Amps through a diode dropping 0.7 Volts, that's 7 Watts of heat that has to go somewhere.

A stud-mounted silicon diode in a moderately sized heat sink should be fine. Use LEDs on each of the two supplies to verify they're both working.

The size of the cable to tie all the DC loads to the source will depend on the distance it covers, and the loads themselves. Most wall-wart-powered devices use less than 100 mA.

Take the total number of loads and multiply by 0.1 Amps – that's the approximate current draw. Multiply that by 2 for the safety factor, and you'll have the current you need to provide. If the current is under 5 Amps, you'll be OK with 16 gauge cable. Between 5 and 10, use 14 ga., and between 10 and 20 Amps, use 12 ga. Above 20, use multiple power sources and split the loads between them. This amperage is also what to look for when you shop for the supplies.

Larger versions of the Euro-type barrier strips can mount in each rack to carry the DC between them, with feeders running vertically up or down to where the loads are.

There are numerous choices for the main power supplies. Reliability is critical, and surplus military grade units are a good choice. Analog supplies are heavier and less efficient than switching ones, but are easier to fix if they stop working. Be sure to put fuses in the output wiring; while most supplies will fold back if they see a short, you don't want to find you have the exception.

Once the master supplies are in and running, you'll be free of worrying about the wall-warts failing, falling out, or being bumped loose in the back of a rack. Thomas Edison was greatly in favor using DC distribution system rather than AC, and this is one time he was right!

Mike Callaghan is the Chief Engineer at KIIS-FM in Los Angeles, CA. his email is: mc@amandfm.com

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Tips From the Field

– More Tips on Page 36

Tech-Tips from Radio Guide Readers

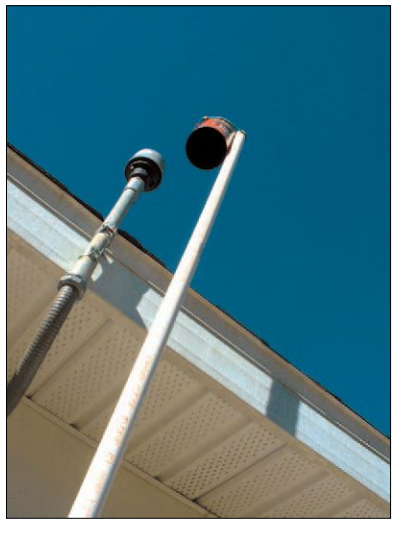
#1 Home Made Tools Save Time – Save Life

by John Stortz

When doing a tower lighting inspection, how can an engineer know if the photocell will work properly without waiting around until dusk or dawn? Here is my solution to the problem: a tool made from one of those 18 or 48 ounce oatmeal (or similar style) round boxes and attached to an appropriate length of 1/2 or 3/4 inch PVC pipe.

All it takes to mount the box to the PVC handle is a bungee cord or some duct tape. By using a dry oatmeal cardboard box, rather than one of metal, the project results in a lightweight and easy to use tool. Painting the box flat black on the inside helps absorbs light.

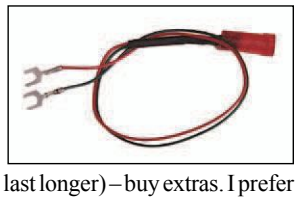
The PVC provides a handle long enough for the engineer to place the can safely over the photocell without needing a ladder. Covering the photocell simulates dusk, and the tower lights should switch to the night mode within about a minute. Remove the tester and the tower lights should return to day mode. What about those horizontal sensors on the side of tower or building? The use of the bungee cord makes it easy to adapt the tool to whatever angle makes it easiest to cover the photocell.



And while checking those tower lights, take a moment to be very sure they *all* turn off when removing the tool. This is especially important on taller towers. We've had several sidelights burn out because lightning had caused one of the solid-state relays to lock "on." The small 110 Watt lights were simply not bright enough to be noticed from the ground in the daytime, so the lamps just burned day and night, until they failed. Eventually, I realized this would be another good application for one of those cheap neon indicator lamps.

I first discovered those little neon indicator lamps while still fairly new to broadcast engineering. I used to short out everything with the shorting stick – not only the HV capacitors, inductors & transformers, but also the incoming power terminals. One time, I had forgotten to turn the 150 Amp main breaker off before shorting the incoming power. The resulting sparks, smoke and sound nearly scared me out of my socks and shoes! That event got me wondering what might help prevent another pyrotechnic display, yet provide good safety.

These lamps use about 1/4 Watt and will last for years. Any normally closed cabinet, with power controlled only by an external circuit breaker or fuse, would be a good candidate for an internal neon light. The purpose of the light is just an extra warning to whoever opens the cabinet, reminding them the power is still on. The best place to put them is somewhere near the line inputs. It becomes a nice safety warning when you open the transmitter if you should forget to turn the power off.



When purchasing neon lamps (the 240 Volt version will last longer) – buy extras. I prefer indicators which can slip into a panel hole, and have an internal resistor and insulated wire leads; these can be picked up for $3 to $5 each. Another good place to hang one of these neon indicator lights is across the main power feed(s) of any equipment, or the output of any breaker where danger could be present.

I still short out the incoming power feed, as well as the other stuff, before sticking my hand into a transmitter. While neon indicator lamps have a predicted life of at least 100,000 hours, a power surge might have shortened that life to zero. I would much rather have another sparks and sound event with a shorting stick, than having that energy passing thru part of me. Remember: The life you save might be your own!

John Stortz, is Chief Engineer of WKES in Lakeland, FL. You can contact him at jlstortz@moody.edu

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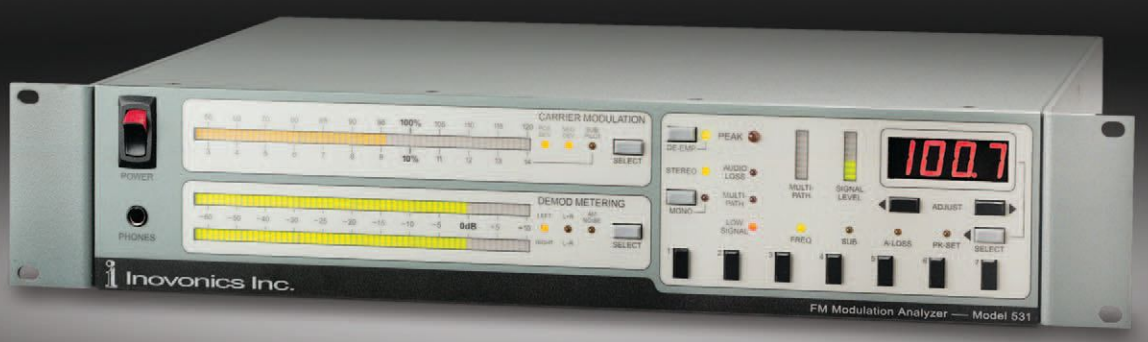

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Tips From the Field

– More Tips on Page 34

Tech-Tips from Radio Guide Readers

#2 Keeping Stuff Out of Your Transmitters

by Gary Peterson

I hate cleaning transmitters. There are so many other things I can do with time otherwise spent removing dust and critters from the transmitter cabinets. So, you can understand that I am always on the lookout for tricks to keep stuff out of the transmitters in the first place.

If you dislike spending your maintenance time cleaning dirt and dead bugs out of transmitters, the following tips may help make your life more pleasurable.

Your first line of defense should always be properly sealing the doors and other openings in the transmitter building. (Although most transmitters have some sort of air filtering, there is no law that says you cannot do as much as possible to trap dust and dirt before they reach the transmitter.)

Of course, the more stuff that your air filters catch, the less you will have to deal with inside the transmitter cabinet. I use disposable fiberglass filters and change them frequently. It is possible to greatly increase the efficiency of your air filters. The trick is to use a good filter spray.

A good spray to use is RP brand "Filter Coat." It is available from ElectronicAirCleaners.com in Attleboro, MA. You can email Dave@ElectronicAircleaners.com or phone 508-226-7220.

Filter Coat is also available at some hardware stores, and heating/ventilating and air conditioning shops may carry it. I would suggest you avoid the kind that smells like wintergreen. While it will make your transmitter shack smell like Life Savers, I have found that it does not catch dirt very well.

Application is easy: take the new air filter outside and lean it up against the perimeter fence. Shake the bottle well, and apply a light coat to both sides of the filter before installing. You will be amazed at how quickly the filter gets dirty. When I began doing this, I tried spraying the filter on only one of the two transmitters at our site. Within a few weeks the difference was obvious.

The filter on the left is shown after three weeks in typical dry, dusty "Plains" service. It is compared with a new filter on the right.

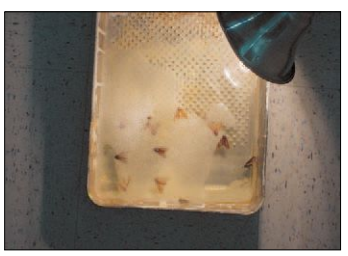
You will have to change filters more often, but as you can see from the picture, that dirt does not end up inside the unit, where it adheres to all manner of irregular surfaces and, therefore, is much more difficult to remove. If you try a filter spray, the next time you open up the equipment for maintenance, you *will* notice the difference.

Of course, use of a good insecticide around the walls and openings will go a long way to reducing the number of critters in the building. I also like to use naphthalene mothballs to discourage both little and some not so little "tenants" from taking up residence.

For whatever reason, certain years and/or seasons seem to result in huge infestations of various insect species. In a bad year up here in South Dakota, "Miller" moths can quickly clog a transmitter air filter. They even seem to be able to easily get into what is, for all practical purposes, a tight building.

When the Millers get real bad, I leave a pan of water on the floor with a bit of liquid dishwashing detergent added. The only other thing needed is a trouble lamp to clamp to the pan.

Later, when the transmitter room is dark, the moths will be attracted to the light attached to the pan. Eventually each of the critters will hit the water and the detergent will wet their wings.



On my next trip, all I have to do is dump the water-detergent mix, with all the drowned moths, and refill it with a fresh mixture. None of those critters made it to clog the air filter on the transmitter. Make sure that you use enough mixture to last until your next visit.

These are a couple of easily implemented ideas. Perhaps you have some other tricks that have worked at your site. If so, please let us know. After all, a clean transmitter is a happy transmitter!

Gary Peterson is the Chief Engineer for New Rushmore Radio, Rapid City, South Dakota. He can be reached at kzerocx@rap.midco.net

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LPFM Guide

FCC LPFM Window Shelved Until Fall of 2013

by Leo Ashcraft

In a previous article we reported the LPFM window was slated to open before the Presidential election. This came from several sources at the FCC at the time. Everyone one was on board for a filing in 2012. The FCC even fast tracked the proceeding and achieved much progress in a very short period of time. Recently, that expected time period has been shelved due to several items being proposed to amend the LPFM rules. Some of these include possibly dropping the LP10 class and replacing it with a new 250 Watt class.

In addition, our FCC source informed us that some LPFM advocacy groups have requested the Commission to delay the window by as much as six months following the codification of the new LPFM rules. Their reason being, so they could more effectively advertise the opportunity to the general public.

Amherst Alliance: "Don't Forget About 10 Watt LPFMs"

While an upgrade may seem to be a positive change for LPFM, some LPFM advocates such as the Amherst Alliance don't think so, not at the cost of losing the LP10 service.

The Connecticut-based group has responded to a posting on a Nexus LPFM Listserv that indicated what Media Burau Chief Peter Doyle reportedly said at the recent National Religious Broadcasters convention in Nashville, regarding low-power advocates generally being more interested in higher wattage, not less.

According to a report circulated on the Nexus LPFM ListServ (LPFMForum.com), Mr. Doyle reportedly replied: "LPFM groups are not satisfied with 100 Watts, they want 250, not 10 Watts."

Amherst president Don Schellhardt responded in a letter to the Commission: "Mr. Doyle's depiction of the views of LPFM advocates is absolutely, unequivocally untrue. We are, frankly, stunned to discover that Mr. Doyle has such a mistaken impression of what LPFM advocates have actually said, on the public record, on repeated occasions."

Amherst Alliance President Don Schellhardt said that the alliance does support 250 Watt LPFMs, for example, "... but only when and if they are licensed in rural areas, where lower population density justifies longer transmission ranges and enough spectrum is available to accommodate multiple LP250 stations in many communities. At the same time, our record of prioritizing LP10 stations in urban areas, where the spectrum used by a single LP100 station could block the licensing of two or more LP10 stations, goes back to 1999."

The Amherst Alliance is a special interest group which was an early promoter of the concept of LPFM service. It has since been a "key player" in the debates that have shaped LPFM.

Other LPFM advocacies such as Conexus.fm also support both the new 250 Watt class as well as the existing 10 Watt service. Conexus assisted in the recent proceeding by enabling a simple comment form, and publicized the proceeding heavily. Such grass root efforts have enabled hundreds of additional comments in the proceeding that might never have been heard. Conexus is better known as The National Association of Low Power broadcasters, with a recent name change to Conexus. The advocacy is also an original supporter of LPFM since 1999.

The father of LPFM radio, Nicholas Leggett, also continues to fight for LPFM and has filed extensive comments in the current proceeding. His comments tend to echo those of Amherst and Conexus.

To date, nearly 13 years have passed and an LP10 window has never been opened. The FCC felt there was little interest in this very low power service. At the time of this writing, the LPFM comments have been pouring into Proceeding 99-25 with support for both the 250 Watt and 10 Watt class.

By the time this article hits the press, the comment period and reply comment period will have closed. The Commission will then make a decision based on the waves of comments the proceeding produced. There will likely be additional comment periods, but as a result, the LPFM window has been shelved until the Fall of 2013 according to an FCC source. We'll keep you updated on the status of LPFM through future ***Radio-Guide*** articles

What is LPFM?

For those not aware of this broadcasting service, LPFM stands for Low Power FM radio broadcasting.

(Continued on Page 40)

LPFM Guide

– Continued from Page 38 –

In the United States, the lowest minimum wattage a licensed FM radio station may have is 100 Watts. Under the LP10 class rules, that would drop to 10 Watts.

LPFM is the common term used to define an FM broadcast station that originates its own programming, but only has the power of a translator – with some key differences. While a translator can be authorized with as much as 250 Watts at 328 feet, LPFM stations are currently limited to 100 Watts ERP, at 100 feet HAAT. Currently translators may not originate programming, but there is a proceeding underway which, if approved, would allow origination of programming.

LPFM Was Once Legal – AKA Class D

The FCC began issuing licenses for LPFM stations in 2000; however, the idea is not exactly a new concept.

LPFM existed for more than thirty years in the United States, known as a "Class D" station. The first Class D license was issued by the FCC in 1948. Class D stations were originally licensed at 10 Watts on the FM band, within the region of 88 to 92 MHz (known as the "educational band").

Class D stations were the FCC's first attempt to bring more schools and colleges on the air – a way to give potential broadcasters an outlet for hands-on training at a much lower cost compared to say a 3,000 Watt station.

As time passed, Class D FM stations were granted higher power levels and ranged between 1 to 100 Watts. They were strictly non-commercial, and were only licensed to educational institutions. As a result of the educational institution requirement, there wasn't a major demand for Class D stations.

Enter the Public Broadcasting Act of 1967

It all began when President Lyndon B. Johnson signed the Act into law. This led the way to federal funding becoming available for non-commercial educational radio stations. It fundamentally changed the idea of what non-commercial educational stations should be.

The first goal of the Act was to establish a national "public radio" network. Shortly after, National Public Radio was born, providing programming far above the level Class D stations were able to deliver on their own.

This basically created what we know as public radio today. The designers thought public radio should provide a nationally-accessible educational service – basically a "school on the radio." Although many Class D stations were licensed to educational institutions, because of their small coverage they were generally used as on-air radio laboratories. It was a way for students to experiment with radio. As a result, the quality of the programming didn't measure up to the standards of National Public Radio.

Program Origination on Translators

There seems to be a bit of a loophole currently, with program origination on translators. Currently, when a daytime-only AM station receives FCC permission to utilize a translator, they may continue to operate throughout the night. When the main AM signal is shut off, the FM translator continues, thereby originating programming. Situations like this may open the door for future translator program origination.

One company intends to change the rules preventing programming origination on boosters however. And Amherst Alliance would like origination on translators as well and is being considered in the 99-25 proceeding.

Geo Broadcasting Solutions wants to use FM boosters as program originators that are separate from the main channel operation. Boosters are a bit different than translators. They operate on the same frequency as the main channel. They are used to help broadcasters "boost" their signal within their coverage area.

Geo Broadcasting says it holds patents on technology that would enable the booster to avoid causing interference both to the main channel and to other boosters; the technology also allows licensees to insert different, hyper-local programming on each booster. This is generally an issue since both stations operate on the same frequency. It is difficult to null the interference to each other as a result.

According to Geo, testing in Florida and Utah has been successful. Geo is requesting the Commission to authorize program origination on FM boosters as a routine matter in RM-11659.

Leo Ashcraft is CEO of Nexus Broadcast "Broadcast Outside The Box!" He is a broadcast consultant with over 28 years engineering experience and an avid LPFM advocate for over 15 years. More information at NexusBroadcast.com or 888-732-3599

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Small Market Guide

The Day Our Station Went Dark

by Roger Paskvan

It was a typical Monday in Bemidji, MN, home to Paul Bunyan and Babe the Blue Ox. It was March, and another day in smallmarketville was just beginning. At exactly 7:06 a.m., during our local morning news, the whole building went black! My program director got me out of bed with the words, "we are sitting in the dark, the whole transmitter blew up and I'm too scared to turn anything back on – come quickly." An engineer's worst nightmare was here. What a way to wake up.

Yes, our transmitter had a really big short, and the current rush was so big that it took out the 250 Amp building mains. As an experienced engineer, I felt the only thing that could do that much damage was a shorted high voltage power supply. A closer inspection revealed high voltage diodes that tested bad. To make matters worse, not only was one diode shorted, but six out of eight were shorted. These big diodes are over a hundred dollars each and you really want to make sure the diode is bad before you toss it out. This brings us to the subject of this article: an economical method for testing high voltage diodes.

In smallmaketville, economy is the key to survival. We needed an inexpensive way to check high voltage diodes. For those of you that are thinking, just use a VOM – well, that will not work on high voltage diodes. All regular diodes measure a constant 0.7 Volt drop in the forward direction, utilizing the diode test of a standard VOM. In the reverse direction, it measures open. This is a good standard indication that the diode is okay.

If you measure your *high voltage* diode stacks using a VOM diode tester, all the diodes will measure open circuit. This is because the diodes are manufactured by stacking many smaller diodes in series to get the high voltage rating up. As a consequence, all the 0.7 Volt forward drops add up to 15 or more Volts in order to get the diode stack to conduct. This is why the 0.7 Volt diode tester function of the VOM shows high voltage diodes as all open circuits. The internal voltage of the VOM is not high enough to get the diodes to turn-on and conduct.

To overcome this dilemma, some sort of jig is needed to put enough voltage across the high voltage diode stack to make them conduct, and then they can be tested. This usually requires a circuit that will place 25 or more Volts across the diode stacks. Remember, they are rated at several thousand Volts breakdown so don't worry about hurting them with your circuit.

Here is a poor mans way of checking these expensive high voltage diode stacks, that will provide concrete repeatable results. I came up with this circuit and mounted it on a wooden plank. A 60 Watt bulb, small diode (1N4001 or equal), porcelain lamp socket, lamp cord, and a 120 V plug, is all that is needed to get the job done. *(See figure 1)*

Diode Condition Test:

1. Diode stack good – forward diode direction, bulb at half brightness, reverse diode direction bulb is out.

2. Diode stack shorted – bulb at half brightness in both forward and reverse directions.

3. Diode stack open – bulb does not light in either direction

The testing concept is simple. 120 volts AC is changed to DC by diode D1. The test high voltage diode is placed between points C and D. If all is well, the diode is good and your 60 Watt, 120 Volt, lamp indicator will burn at one-half brightness with the test diode in the forward direction. Reversing the diode polarity will cause the lamp to go out. This is a good diode stack.

If the test diode is shorted, the bulb will burn at one-half brightness in both the forward and reverse directions. If the diode is open, the light will not come on at all in either forward or reverse directions. For those of you that prefer a meter reading, put a DC voltmeter across points A and B. You will then have a base line of measurements to evaluate high voltage diodes. Using a known good high voltage diode for testing, you can note the DC bulb voltage for normal diode conduction. This voltmeter reading will also provide a means for finding partially shorted diodes.

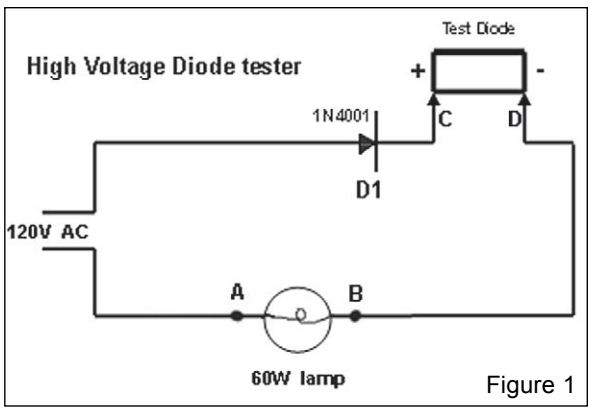


Figure 1

I have only seen partially shorted diodes on rare occasions. What happens is that some of the diodes in the stack are shorted with the rest testing okay. This rare condition gives a greater than normal light in the forward direction. Normally, the high voltage diodes are either working or shorted. When they short in the transmitter, all that primary current puts a super strain on your main power breakers and can blows the big one with a big bang!

This circuit is simple to build and provides a means of testing high voltage diodes. We always have one of these circuits at each transmitter site, since you never know when the big bad day is going to come. Just another way to come out ahead in small market radio.

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

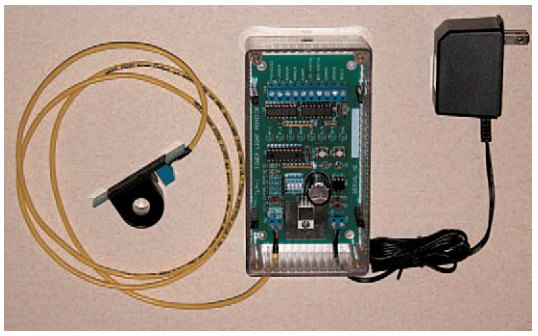
Service Guide

Radio Equipment Products and Services

Service Guide Radio Equipment Products and Services

TLM-1 TOWER LIGHT MONITOR

Total Monitoring for Older Lighting Systems



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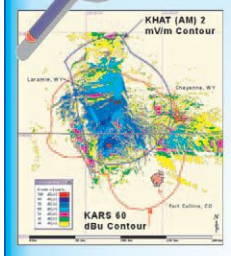

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Wheatstone – LX-24 Radio Console

Wheatstone's LX-24 radio console marries traditional modular design with a modern networkable control surface.

Each of the console's 24 inputs has a **Source** display, four **Stereo Bus Assigns**, four **Sends**, four **Mix-Minuses**, **Mode** select, **A/B** source select, and two **Programmable** soft buttons.

Integrated with the WheatNet-IP Intelligent Network, the LX-24 allows channel access to any network source. Four LED meters monitor signal levels, and circular LED indicators show SEND levels. A **Pan** indicator, digital **Timer**, and **Stereo Cue** speakers complete the console's meterbridge.

The LX-24 monitor section has powerful but easy-to-use features: Control Room and Headphone levels are handled by long throw faders. A CR/HDPN source display shows the selected signal, and five preset buttons call up the four output busses and an **External** source. Two studio outputs are supported, and an **Event Snapshot** function permits instant console configuration for different dayparts and formats. The LX-24 comes with 12 programmable **Soft** buttons; an optional 16-switch programmable accessory panel is available.

With a table-top, no cut-out design, the LX-24 connects to a rackmount Wheatnet-IP console BLADE via a single RJ-45 connector to access audio mix functionality, I/O, and share output mixes with other devices on the network. Multiple BLADEs can be added for additional I/O in a variety of digital and analog formats.

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 Broadcasters (TAB)
August 8-9, 2012
Renaissance Austin Hotel, Austin, Texas
www.tab.org/convention-and-trade-show/

NAB 2012 Radio Show
September 19-21, 2012
Hilton Anitole, Dallas, Texas
www.radioshowweb.com

Broadcasters Clinic & National SBE Meeting
October 9-11, 2012
Madison Marriot West, Middleton, Wisconsin
www.wi-broadcasters.org

SBE 22 Broadcast and Technology Expo
October 11, 2012
Tuning Stone Resort and Casino, Verona, New York
www.sbe22expo.org

College Broadcasters Inc, (CBI) Convention
October 25-27, 2012
Sheraton Altanta Hotel, Atlanta, Georgia
www.askcbi.org/?page_id=1500

2013 CES Conference
January 8-11, 2013
Las Vegas COnvention Center, Nevada
www.cesweb.org

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