Radio Guide

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March-April 2012 – Vol. 20, No. 2

PSI Broadcast – Antennas Designed by Broadcasters

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Radio Waves

by Ernie Belanger – Editor

NAB Already?

Wow, it's already time for the annual trek to Vegas, to see all the new goodies manufacturers have to offer – and to hear a white paper or two that will help keep us updated on the latest technology.

This year things will be a bit different for us – we won't have an NAB booth. It was a logical choice, since we never spent that much time in it. We felt our time will be better spent walking the radio floor, giving us the chance to visit with more people.

In this issue, we're exploring behind the scenes at PSI Broadcast with our *Cover Story.* In *Safety and Security,* Jeff Johnson discusses backup plans for your station's signal security, while in *Operations Guide* Chris Tarr looks at backing up your servers. Robert D. Reite reports on a disaster plan in action, and lessons learned, that call for adjustments and improvement in *Disaster Preparedness*.

Peter Gutmann looks at the FCC's handling of time demands by politicians in *FCC Focus.* Steve Callahan looks at an extreme transmitter site build in *Xtreme Engineering.*

Mike Callaghan discusses EAS logs in *Practical Engineering,* and George Zahn gives us dynamic advice on better sound, when we check into *Studio Site.* In *Small Market Guide* Roger Paskvan explores a daunting question about AM Radio's salvation.

Leo Ashcraft reveals some predictions regarding the LPFM window about to open soon, while Tom Bosscher continues with his transmitter site tips for techies, in *Transmitter Site.*

Have a safe trip to Vegas, and we hope to meet you on the NAB show floor.

– Ernie Belanger, Editor

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

by Ernie Belanger

PSI Broadcast

Antennas Designed by Broadcasters for Broadcaster's

One of the advantages in being part of the old guard of the radio industry and a history buff, is my knowledge of how companies started and evolved. So it is with Doug Ross and Propagation Systems, Incorporated (PSI). I first met Doug, more years ago than I care to remember. He was working as the design engineer for an antenna manufacturer. He and I worked several projects together, including an antenna designed for the National Weather Service's Weather Radio Program. A man with a keen and innovative mind, and a caring heart, is how I would have described him then – and even more so now.

A dipole in final assembly.

Driven To Innovate

Doug wanted to grow and innovate, while at the same time having complete control of the production process, ensuring his design vision was carried out properly. He also wanted to control pricing, to keep antenna costs reasonable. He was driven to focus solely on antenna design and manufacturing, to provide the best possible products at affordable prices, giving broadcasters the best value for their dollar. To that end he, with the help of some long time broadcasters, founded PSI – a company dedicated to innovative antenna design for both FM Radio and Television. From the start he structured his company to meet the mission he held in his heart.

Early on, as with most start-up companies, it was rough going; but Doug stuck by his mantra, refusing to throw in the towel and instead building a team with manufacturing experience in antennas. Today, PSI's staff has nearly a century of combined experience in broadcast antenna manufacturing.

RF Focused

While other companies diversify into other areas, PSI continues to focus its expertise in RF radiation systems. Antennas for Television, antennas for FM, antennas for microwave, and also rigid transmission line are the hallmark of PSI. They have carefully selected and brought together experts in mechanical, electrical, electronic, and civil engineering to do what they do best – design and produce the very best antenna products.

This philosophy works well. Today, PSI's corporate home is a twenty thousand square foot facility, that is fully equipped. All antenna parts are fabricated in-house, with quality control intimately involved in each step of the process. The facility includes the highest quality welding equipment, a complete machine shop, and metal fabrication shop with equipment and quality processes all controlled by a seasoned staff.

The Process

Computer based antenna designs are verified using both near field and far field antenna measurement techniques. Each design is carefully tested to ensure it meets the stringent parameters of the design team, to meet the customer's needs.

Before the blueprints on a design are released to manufacturing, the engineering and production staff carefully review the design and project requirements, to ensure that there is a clear understanding of the antenna system to be built. Any questions or job specific issues are addressed, and the design is then released for production. When it comes to antenna testing, this is where PSI shines once again.

Brass fittings in the machine shop.

On directional or custom FM antenna projects, PSI works closely with each customer to ensure that their coverage goals are met through the use of accurate scale model antenna range testing. Doug personally reviews all testing of each system with the help of an expert staff. According to Doug, "Whether the antenna is high power for a major-market station group or for an independent low power broadcaster, I want every antenna we design and manufacture to excel in its performance for the customer."

Well Accepted

Over the years, PSI has racked up an impressive customer list including: Canadian Broadcasting Corporation, Entravision Communication, Barrington Broadcasting, MTV2/Viacom, CSN International and Shamrock Communications as well as numerous independent broadcasters.

The PSI team has also taken on more than its share of interesting and sometimes challenging projects.

WRVM in Wisconsin is a perfect example. PSI designed a 10-bay, high power FM antenna, PSIFHR-10C for this project, which presented a couple of twists and turns that took it off the path of a standard "off the shelf design." The customer was an experienced broadcaster and knew exactly what requirements he needed and how he wanted the antenna to perform.

The antenna specifications included mandatory requirements for the radiation between the main and minor lobes as it related to higher population centers. Mechanical design of the tower also played a key role in optimizing the pattern to achieve the desired result.

PSI worked closely with the customer, performing pattern studies to determine the effects of the tower on the antenna pattern. After reviewing the studies, it was clear that in order to achieve the desired radiation, beam tilt, with a special bay wave spacing of 0.844, in combination with custom brackets, had to be utilized.

Always willing to consider new ideas and suggestions, Doug makes his determination and recommendation based on the customer's needs. PSI always strives to find the most economical solution for the customer, while not sacrificing performance. WRVM's antenna also included radomes to withstand the harsh Wisconsin winters. WRVM appreciated the efforts and performance of PSI as well as the reasonable cost.

A panel antenna on the test range.

Yet Another Challenging Design

PSI's project for WHEY, Muskegon Community Radio, proved to be an interesting one, and included a midnight rendezvous – complete with a visit from the police. With tight directional parameters, and a tight budget as well, PSI designed a 3-bay low power directional FM, PSIFML-3-DA for the new station.

Working with the folks there was an enjoyable experience for the PSI team. When up against a tight deadline

(Continued on Page 8)

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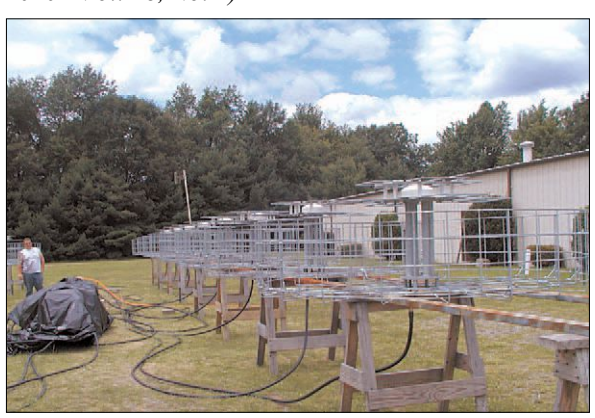
Cover Story

PSI Broadcast

– Continued From Page 6 –

for the station kickoff, Doug agreed to help out personally by driving the antenna part of the way to meet up with William Erickson, President of WHEY. Much to everyone's surprise, an interesting late night transfer (including the visit from law enforcement) – was made along Route 22 in PA. *(Full article in Radio Guide January-February 2010 - Vol. 18, No. 1)*



The CBC antenna in test.

The station installed their antenna without a problem and reflected power was barely noticeable. WHEY appreciated that, as Bill later wrote, "Doug and the rest of the staff at PSI were willing to go out of their way, even for a little radio station like ours."

International Expansion

Now lest you believe that PSI only focuses on domestic projects, Doug and his team have provided antenna systems in numerous countries including some major projects as well. The Canadian Broadcasting Corporation was building a station in Bon Accord, New Brunswick. The system had to be used for both Channel 6 Television and FM service in a heavy ice environment. The heavy icing conditions created a challenge from both a mechanical and electrical standpoint.

Special Requirements

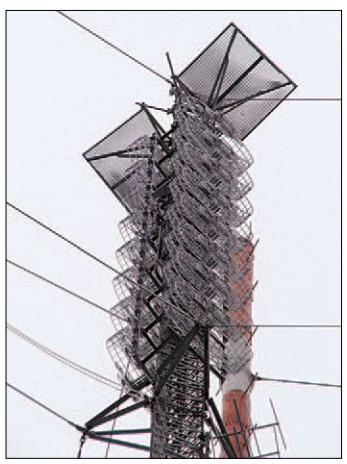
Mechanically, the antenna had to be designed using proper materials that would both withstand the severe weather and also maintain a low wind load to adhere to the tower restrictions. From an electrical standpoint, the antenna had to cover Channel 6 and the entire FM Band 88-108 MHz under extreme conditions.

After reviewing the requirements, and all factors were considered, it was decided that an 8-bay cavity backed antenna, PSIFMCB, would be the best choice for this application. The antenna was constructed mainly of heavy-duty galvanized steel. This ensured that the antenna would withstand the harsh Canadian environment.

A custom directional figure eight type pattern was designed to operate using horizontal polarization. As built, the system not only met the specifications but it was designed to be upgraded in the future to full circular polarization – no small feat. PSI also exhibits internationally and continues to grow its international base. With all this, if you think that Doug is letting PSI rest on its already impressive laurels, you'd be wrong.

More Innovation

Doug continues to lead his team to find new and more innovative designs and creative ways to help add life expectancy to their antenna systems. In addition, PSI also responds to customer demands for products that ease transitions in the ever changing broadcast climate. Currently, demand for off-the-shelf directional designs is pressing. Viable solutions for low power broadcasters with directional requirements is high on the list.



The CBC antenna mounted.

In response, PSI developed a line of off-the shelf directional antennas, the PSIFMT Series antennas. The development of this line was in direct response to market needs. The PSIFMT antenna model is a directional, circularly polarized antenna, intended specifically for FM translators. Rugged copper and brass construction make it suitable for any environment.

The future is bright for PSI. The company is driven by Doug's philosophy of exceptional quality and reasonable prices, not to mention exceptional customer service. ***– RG –***

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Xtreme Engineering

By Steve Callahan

The Little Station With a Big Bite

In every market, there is a unique radio station with a fascinating history. It's not always the most famous, or the oldest station in the market, but the twists and turns of it's on-air history makes it an interesting radio station with a story that has to be told.

The WNSH Story

I was recently called to WNSH in Beverly, Massachusetts to do a quick technical analysis and to act as its contract chief operator; it's one of those radio stations with a very interesting past. WNSH operates on a Mexican Clear frequency, 1570 kHz. At one time, it was one of three stations operating in Massachusetts on 1570 so it had to be directional and operated from a two tower array across the street from a busy shopping mall for many years. In those days the call letters of the station were WBVD. Yes, it caused a chuckle or two in the local broadcasting community but WBVD really stood for Beverly and Danvers, Massachusetts, which were two of the communities it served.

Extremely rocky ground at the site.

As often happens, the station had to leave it's two-tower site. Finding a new site was going to be tough. The new owner of 1570 operated the station with minimal power from a counterpoise tower on the roof of a local building. I had the opportunity of seeing the system in those days, and it was remarkably innovative and an excellent way to preserve service to the community of license while looking for a long-term solution.

It consisted of a short tower and a ground system laid on top of the building's flat roof. It was a temporary fix, as the search was on for a site large enough to fit a three tower array within a community amenable to housing it. In that area of Massachusetts, the population is dense, which is good for covering a lot of potential listeners, but bad because no one wanted three new towers in their backyard.

A Solution With Xtreme Written All Over It

The owner of the station finally came upon a novel location for the site, sufficient to return 1570 to the air with a respectable power level. A local college had some unused property in the rear of their campus. That property was unused because of the huge rocks which made any kind of construction there next to impossible. However, that negative turned out to be a positive for 1570.

The local college saw the public relations benefit of housing the station, and the financial benefit of finally using previously unusable land, so a deal was struck. But the build out of the site was far from usual. To say the lease it was "Xtreme."

Oh My Aching Back

The towers had to be short and invisible – that was the easy part. The only access at the time was through protected wetlands. That meant no vehicles could be used to haul in rigging gear or equipment, tower parts or even the transmitter building. Oh, and airlifting it in was not in the budget and out of the question.

The tower crew had to spend a whole summer hand-carrying everything – yes everything – *one mile* into the site that was needed to build and erect three 100 foot towers. They were a little creative when it came to the transmitter building. They decided to mount rubber wheels on the prefabricated transmitter building and "wheel" in onto the site - literally using man power to push and pull it into place. No small feat.

One other thing . Did I mention that there was no power to the site and a generator had to be employed to initially operate? The tower crew also had to hand carry diesel fuel to the site twice a week to keep the generator operating to keep the transmitter on the air until permission was received to run a power line into the site.

A Lucky Break

While all of this very ambitious construction was going on, the owner of the Beverly 1570 had also become the owner of the nearest co-channel 1570 about 70 miles away in Taunton, Massachusetts. He then sold the Taunton 1570 station with the provision that it could eventually go off the air for the benefit of the Beverly 1570.

In 2006 and 2007, the owner of WNSH proposed a daytime power increase for the station from 500 Watts to 50,000 Watts, using the same three tower array. However, a co-channel 1570 in Riverhead , Long Island (New York), objected to the power increase proposal because of what is referred to as the "Cape Cod Effect."

What is That?

A lot of directional AM stations on the East coast locate their tower sites to the west of their intended communities of license or population centers. This is done to minimize their signal westward to protect other stations inland and to maximize signal eastward to their intended market. However the AM signal continues out into the Atlantic Ocean. When AM signals hit the much more conductive ocean salt water, their proposed coverage is enhanced. Usually it's a waivable problem when any overlap of two AM signals occurs over open water.

However, when it occurs on even a tiny portion of inhabited land, like Cape Cod, you have to make allowances. Thus the name, "The Cape Cod Effect." When the proposed power level of WNSH was dropped from 50 kW to 30kW, the Cape Cod Effect went away, and the Riverhead station agreed to the lower WNSH power increase.

Things were looking up for little WNSH. With the agreement, it could increase from 500 Watts to 30,000 Watts, and when the owner of the Taunton 1570 agreed to turn the license for that facility back to the FCC, WNSH could then operate with 30,000 Watts from a single tower.

The tower crew came back and reversed most of the work it had done just a few years before. They had to remove two of the three towers, and you guessed it, they had to hand carry everything back out, that they had to hand-carry in just a few years before. (And you thought you had it bad during your last build.)

The WNSH transmitter shelter.

More Xtreme to come

WNSH now operates from a single 90-foot Rohn 25 tower with 10 degrees of top loading, instead of a 157-foot quarter wave tower. The top loading makes the short tower appear to be, electrically, a bit taller. Now, top loading is commonly achieved with a "Top Hat" or by bonding a portion of the upper guy lines to the top of the tower. Because of the extreme rockiness of the site, the ground radials are not buried between the rocks but are laid across the rock faces.

A tower this short, at this operating frequency, needs some extra considerations. The antenna tuning unit is quite large and of high capacity; because in addition to the high base current, it's trying to match the operating frequency to a short tower and the losses in the ATU will throw off heat.

The guy wires are also nonconductive material because of the possibility of re-radiation. If an AM station operates into a short tower, it will have quite a lot of circulating currents at the base. I once was repairing some breaks in a ground system on a similar short AM tower and I was surprised to see whisps of smoke coming from the grass close to the intersection of the ground system with the copper strap at the base of the short tower.

Never Easy in New England

We'd all like to build a simple single quarter wave AM tower on flat terrain in highly conductive soil. However, in low conductivity New England, and with a site that has immoveable automobile-sized rocks in the ground field, you have to do the best you can with what you have.

WNSH is a station that could have disappeared several times, but thanks to a persistent former owner, including a willingness to undertake an extreme build, and several lucky breaks, the station is now a proud member of the Costa Eagle Broadcasting Group which serves the growing Hispanic radio audience in the Greater Boston Area.

Thanks to Pat Costa of Costa Eagle and Chris Loycano of Broadcast Tower Service for their assistance in the preparation of this article.

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

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Transmitter Site

More Transmitter Site Tips for Techies

By Tom Bosscher

We've come a long way from the RCA stepper remote control for transmitter site monitoring. As I stated in my last article, I have decided to have Internet access at each transmitter site. This will allow me to use Logmein or its equivalents to look around the remote transmitter site. But just what all should we monitor?

Keeping Cool

In the early days, all we cared about was the plate voltage and current, and percent power or antenna current. Today's remote controls allow us to monitor much more. One parameter that I have found, to save me the 3:00 a.m. trips to the transmitter site, is temperature.

Temperature Probe Installed

Adding a probe to monitor temperature is easy and cheap. You can make your own with an LM34CZ, or you can buy premade probes from many of the remote control manufacturers. Some might think I am going overboard, but I like to monitor outside, inside, transmitter stack, and HVAC outlet temperatures. At many of my sites, I have the typical dual air conditioners. Monitoring each unit gives you a feel for how things are going at the site – whether a hot August day, or a cold January night.

Make sure you place the HVAC sensor probe directly into the outbound grill, as shown in the photo above. And make sure to save some gift wrapping ribbon to tie it to the grill, for a very easy visual verification of blower operation.

One more item that I have added is a 24 VAC relay to go across the outbound wires from the HVAC controller. I then tie those into the status of the remote control. This allows you to see if the thermostat is calling for cooling or heating, and you can then watch the result on the outbound temperature probe.

Over the years, I have had problems with various thermostats. One problem is that many units have a hysteresis of only one or two degrees. A transmitter site doesn't need to be kept at 74 degrees, plus or minus one degree. There is a very properly priced T-stat, about $80 at Grainger. Their part number is # 3ZP79, which is a Ranco Model # ETC-112000-000.

Reduced HVAC Cycling

This version runs on 24 VAC (you can get a 120 VAC model). Most HVAC units have the other side of the 24 VAC control transformer on the barrier strip, which you need to power this controller. What is nice about this unit is that it has a programmable differential setting. I have the air come on when it gets to 79 degrees, and shut off when it gets to 74, a five degree differential. My HVAC person is very happy about this and told me it reduces the cycling of your HVAC units.

Ranco Model ETC-112000-000 Temperature Control

Do you have a UPS at the transmitter site? Does it help protect your sensitive electronic equipment? Well, after forty years in this business, I have found out that there are just two types of UPS's out there – those that have failed and those that will. Now that we have determined that your UPS will fail, what to do? Pulizzi, a division of Eaton Power, makes some really nice rack mounted auto transfer relay panels that will switch your equipment over to another source of AC if the UPS output goes dead.

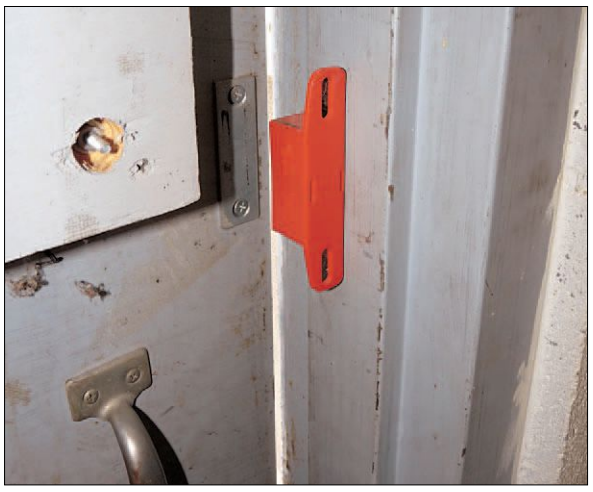
However, you can easily build one with a NEMA box, two extension cords to cut up, and a three pole 120 VAC relay. Use the two poles of the relay to switch the hot and neutral of your outbound power, and the third set of contacts will go to your remote control to a spare status port to let you know that your UPS is now a DPS (dead power supply!).

I would recommend that the backup pigtail (a male 120 VAC plug), goes to a separately breakered outlet, but on the same phase leg as the UPS feed. This will help when the relay has to switch between the two sources.

My main transmitter site is for WCSG, and its Continental 816 shares a 10 x 14 foot room with WGRD's 816HD – two big transmitters. It is a noisy, very noisy room. Mike Maciejewski, the chief engineer of WGRD, bought a set of 3M earmuffs to leave at this site. These are 3M Tekk part # 90561. They are comfortable, and they really cut down those headaches after spending a few hours in that small room.

3M Tekk 90561 Ear Muffs

One last item. At most transmitter sites, you need to unlock the door, and many times it is a dead bolt. Now the door will swing back and forth. Go to your local hardware store and install a large magnet with a keeper bar, and mount those as shown in the picture. Now you can close the door, and it stays shut till you push it open. Add a large pull grip, and you will save scraping your knuckles on the door jamb.



A magnet keeps the door from swinging open.

Last note for this month. In the last 10 years, I have visited over 500 transmitter sites in Michigan. The obsessive truth is at www.michiganbroadcasttowers.com

What is disappointing is that it seems that less than half of these tower sites have the tower ASR number by the locked gate at the road. It only takes twenty dollars at the local hardware store to solve this very common FCC citation problem. Twenty dollars is easy to explain compared to the $5,000 fine.

Tom Bosscher is the Chief Engineer at Cornerstone University Radio. Email him at: tom@bosscher.org

Drops jaws. Not audio.

Broadband Internet is everywhere. Which makes it ideal for live remotes.

Unfortunately, the internet is also notoriously erratic. Even if you're lucky enough to get a good connection, it might deteriorate during your show. So you dial back the bitrate, sacrificing sound quality to play it safe.

There is a better way.

Meet the amazing new Z/IP ONE codec.

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Studio Site

Dynamic Advice on Better Sound

by George Zahn

They are quite possibly the audio devices we take most for granted. For most of us, they were at the station when we arrived, and frankly, they're in sight, but often out of mind.

The Subject is Microphones

While you can try to control your station's sound with all the EQ tweaks and on-air processing at your command, the bottom line is that if your microphone is giving you garbage, no amount of processing magic will be able to transform it into something usable.

We often run into a different interpretation of the same problem. The Program Director says he or she wants a specific microphone with a specific "sound" for the station's staff. The engineer might concur that it will make a change, but that the current microphone is not broken. The manager, trying to hold the bottom line, responds that, "if it ain't broke, don't fix it." The microphone change-over gets put on hold, and the station sounds the same.

The last I checked, we're all in the communications business, yet sometimes we listen, but don't hear. As a manager myself, I'm not saying that every time someone on staff wants new equipment you should hurry up and buy it. The real message here is that there should be a solid "give and take" on something as rudimentary yet vital to our sound as microphones. And for those of us who have asked, "Is there really a difference?" – there is.

All Ears

Let's first examine how the microphone works. I was giving a tour to a group of Tiger Scouts at my station recently, when I was reminded of the best analogy for a microphone. The microphone is basically our station's "ear." Sound waves strike the mic's diaphragm and causes it to move back and forth – the way our ear drum vibrates to sound. The higher the frequency, the faster that little diaphragm has to move. On a cheaper microphone, if the diaphragm can't keep up, the microphone sounds muddy, not crisp, and the intelligibility of your station's sound suffers.

Most microphones, such as the large diaphragm broadcast models, are great at reproducing bass frequencies, and the closer our talent works that microphone (if it's a unidirectional mic), the more bass will be enhanced. This "proximity effect" is a boon to many announcers who weren't blessed with the natural bass of many of our colleagues. When it comes to a majority of microphones, bass reproduction is generally not a problem. But what about the crispness of your station's voices?

The Basics

Let's revisit the elementary physics of microphones: the heavier the diaphragm and anything attached to it, the more its inertia. That mic really has to work to reproduce the high frequencies it "hears." Manufacturers have worked hard to find the best balance of bass response and the ability for the microphone to pick up the sibilance in the 3500-4500 Hertz frequency range. For the uninitiated, that frequency range is where most of our "S" and "T" sounds take place.

That means the diaphragm has to vibrate 3500 to 4500 times per second. For instrumental overtone on pianos, microphones are taxed to the point of more than 10,000-15,000 vibrations per second. So inertia can be a problem.

A Weighty Issue

By sheer cost factor and durability, most stations use an array of dynamic, or moving coil, microphones. By their nature, dynamic mics have the heaviest diaphragm assemblies (elements) because a post with a metal coil is attached to the rear of the diaphragm, adding weight to the moving portion of the microphone. Condenser microphones, as a family, have lighter elements that move more freely. But as a group of microphones, the price point is higher and the need for phantom power or an external power supply can add a challenge to some older consoles.

There is no direct corollary that a large diaphragm microphone is a great microphone. Yes, we want smooth and rich bass response that may come with the larger diaphragm, but if you have an "off" brand, large diaphragm mic that doesn't replicate the crucial sibilance in speech, we might as well have everyone at home listening only on a woofer, with no tweeters in the speakers (some modern pulse thumping car stereo systems we've all been next to at traffic lights, notwithstanding).

So how do we make something sound better when we just don't have the budget to change out microphones en masse? Every station should strive for consistency in their microphone performance. Most all professional cardioids (unidirectional) microphones have the aforementioned proximity effect – an exaggeration of bass frequencies when an announcer works very close to the microphone. Since that is a benefit (or a problem if you're James Earl Jones), those professional mics are equipped with a bass roll off switch.

The bass roll off switch on the MD421U.

Thin Is *Not* In

If you have more than one mic in your studio, hopefully they're the same brand and model. If that's the case, and you're hearing dramatically different quality from the microphones in your studio, the bass roll off switch might be the culprit. Sometimes what sounds like a damaged microphone might just be a bass roll off switch that has been turned on, thinning out the voice of the announcer.

There are some microphones, such as the Sennheiser MD 421 that have as many as five bass roll off positions, which range from flat frequency response to attenuating so much bass that your manliest announcer will sound like a eunuch. If your mics are the same, the roll off switches consistently set, and you're still hearing differences, it might be time to check your microphone cables.

A Cable Problem

Keep in mind that mic cables, especially the areas near the connectors can become a weak link in your system. Mics which are swiveled a lot on booms or mic stands can really wreak havoc with the cable's dependability, as it can put plenty of strain on the soldered connection in the connector.

When checking cables, your engineer should have a simple tester that allows you hook up both ends of the same cable and check for all three connections. It's also important to check that the wiring in each cable is of consistent polarity. In other words, are pins 1, 2 and 3 wired the same on each end of the cable? Cables wired out of polarity can create even more problems than just the tinny sound of a shorted cable. The sound carried by an "out of phase" microphone cable can disappear in the mix. Another very good visual check for proper polarity can be found on many analog consoles. If your console has a reliable mono meter, you would find an out of phase microphone output will result in little or no movement of the mono meter, when mixed with the output of an in-phase microphone.

Up Close and Personal

If everything technically meets spec, how about the performance of the people on the microphone? How often do you peak in the window to see how announcers are using that coveted microphone? If one announcer is working two inches away and the next shift jock is working two feet away on the same mic, the mic will sound dramatically different.

Also be sure to use decent wind screens to minimize "plosives." Diffusing screens, often seen in music videos, can allow an announcer to work close to the screen for their comfort, yet the microphone can be moved a few inches away. These screens can be used if wind screens don't get the job done.

There is always a possibility that a microphone has been damaged or succumbed to a lifetime of wear, but as a rule, pro mics can last for decades, especially the superbly durable family of dynamic microphones. When you weigh the variables we've discussed here, finding the right microphone for your staff can be a challenge. Yet, as discussed in this column over the years, you may be able to "try before you buy."

This is an area in which the kinship of engineers is often helpful. Many seasoned engineers have likely worked together with other stations tech staff at one point or another. Some engineers also have connections to local studios. If a station can borrow a few different microphones under consideration, and try them before making a purchase, it's a great way to "narrow the field." Developing relationships with equipment vendors is another very good way to access demo models for short term trials.

Consider The Source

Remember that at least 90 percent of everything you hear on a recorded song started by being picked up by a microphone. The right microphone at the beginning of the process will result in the best overall recording or broadcast. I will use the same argument right now. Think about what percentage of your station's technical "sound" you can actually control. Where does that "sound" originate? Microphones do indeed make a difference!

What are some of your best microphone stories or nightmares? What microphones have you found to provide consistently strong quality among announcers of different ability, gender, and tonal quality? Share your ideas with us!

George Zahn is the Station Director/General Manager for WMKV Radio in Cincinnati he may be reached via email at: gzahn@mkcommunities.org

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Disaster Preparedness

A Disaster Plan That Worked

by Robert D. Reite, CBT

The WHLM stations are located in the Susquehanna River valley in Columbia County Pennsylvania, an area subject to flooding. In 2001, Joe Reilly put a dark 930 AM Bloomsburg PA station back on the air as a full service station – his emphasis on community service. I was hired as the contract engineer for the station, as I knew transmitters, AM antenna systems, audio equipment, EAS, and radio automation systems. Three years later, Joe bought the 103.5 MHz Class A FM in Berwick, PA about 20 miles away.

Back-Up Power

We have a propane powered backup generator at the AM transmitter site, as well as main and backup transmitters at both the AM and FM sites. At the studio it is possible to switch either studio to either transmitter. There is no clear line of sight to either transmitter site from the studio, so the AM station is fed over a ISDN circuit, and the FM on a point to point T-1 circuit. The T-1 had experienced enough problems that we put in a Rivendell automation system at the FM site. This is connected to the silence sensor so that when we lose the T-1, at least we will have programming similar to the normal classic rock format on the air.

There is no permanently installed backup generator at the main studio; however the owner had made arrangements with the Bloomsburg, PA fire department for the loan of a portable generator in case of an emergency.

The WHIM studios powered by the Fire Department's emergency generator, per the station's disaster plan.

Photo by Dr. Richard Ganahl

More Disaster Planning

A project was in the works for the AM transmitter site. We were building an emergency studio there, just in case the main studio becomes uninhabitable, which would also cover loss of the AM STL.

We had just made room for a desk and small mixing board, by selling off our old back-up transmitter. (We had purchased a new main transmitter and the former main transmitter now served as backup.) But as it turned out, mother nature did not give us time to finish this project.

Disaster Strikes

In early September, the remnants of Tropical Storm Lee, dumped torrents of rain for days into the Susquehanna River watershed. The river was expected to crest above flood stage and preparation for "all flood, all the time" coverage began on Monday. By Tuesday the prediction was for the worst flooding since 1972. I stopped by the AM transmitter site Tuesday afternoon to test the generator, even though I had done a load test just a few months before. I then had to go home before the small creek near my house rose to the point where I would not be able to return.

Although it was tempting to stay at the station, family responsibilities come first, and having an excess of non residents in an emergency area makes things more difficult for emergency responders. Continuous flood coverage began during the morning show on Wednesday.

Bloomsburg Police Chief Leo Sokoloski, Pennsylvania State Senator John Gordnerand Bloomsburg, and Mayor Dan Knorron (L to R) during the disaster coverage.

Photo by Mark Williams

The Plan in Action

All day Wednesday, and for most of Thursday, everything went according to plan, even with the owner out of town – as our plan called our sales manager to be next in command if the owner is not available. Late Thursday high winds took out power at the AM transmitter site, but the propane fueled generator started promptly.

The station staff that was in town had worked out a rotation schedule, and the sales manager went out in the field and did cell phone reports from critical areas. The WHLM stations gave out important emergency information, such as where residents could find fresh water, since the flooding forced the shutdown of the water treatment plant for the town. The location of emergency evacuation centers for residents forced out of their homes was also broadcast.

Be Prepared To Adjust The Plan As Needed

At 3:00 a.m. Friday morning, the normally reliable downtown Bloomsburg, PA power failed, leaving dead air on both the AM and FM stations. By this time I was trapped at home by small creek flooding, but I have backup power at home and a good old fashioned POTS line on copper which stayed up, so that I could receive and make phone calls to the station staff.

I talked the sales manager through disconnecting the audio from the ISDN codec and connecting the line level audio output from the sports remote kit to the Optimod processor so that he could get on the air directly from the transmitter site. The task was easy since all the audio connectors are XLR plugs and jacks. Broadcasting on AM 930 resumed at 4:00 a.m. from the AM transmitter site.

Studio Power Plan Worked

As planned, the sales manager retrieved the portable generator from the porch of fire chief's home shortly after daybreak, moments before that area flooded. The generator was set up in front of the main studio building. We did not have to worry about theft of the generator, since our AM control room is a "showcase studio" on the ground floor with a view of the sidewalk.

I talked the staff through the process of unplugging the studio equipment power strips from the wall outlets and connecting them to the heavy gauge extension cords coming from the generator – adding up the load as we went, with the most critical items first. First priority was for the AM station air chain, including the EAS equipment. Broadcasting from the studio on 930 AM resumed at 9:00 a.m. Friday morning. The Internet connection was the next item to be restored, so that the staff could get additional reports of other areas being flooded. But when we attempted to get the FM studio back on the air, there was not enough generator capacity left, so we set up to simulcast the AM audio on the FM station for the duration of the emergency.

Fortunately there was a gas station not too far away that still had power, so we had no problem getting additional fuel for the generator. Power was restored to downtown Bloomsburg by 9:00 o'clock Friday night, but we decided to continue the simulcast on the FM station until the emergency was over.

Staff Fatigue

By now the staff was getting pretty haggard, and the river was so high that staffers thought to be in a worry-free area had to go home and secure their property. The owner was still trying to get back into town, and I was able to gain access to local road closing information and give him the best route home, as Interstate 80 was closed. The owner arrived in time to give the weary staff some relief. We stayed in disaster mode over the weekend – normal programming did not resume until Monday.

WHLM remained on the air, giving listeners vital information, even through a flood caused power outage. All thanks to a well designed and executed Disaster Plan and a dedicated staff.

What We Learned From The Experience

First, the station staff may have their own personal issues to handle in an emergency, so you need twice as many people as one might think. Not only should you consider staff becoming trapped at the station, and having emergency supplies there, we needed to make adjustments to our disaster plan for staff that may be trapped at home, and unable to report for work in person, as I was.

Although the arrangement with the Bloomsburg Fire Department for the loan of a generator worked according to plan, ideally a generator should be permanently installed at the studio site, fueled by natural gas so that it will never run out. Since the area is not prone to earthquakes, natural gas is the most reliable fuel at the studio location.

Bob Reite is WHLM's Chief engineer contact him at 570-784-1200

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FCC Focus

Of Politics and Broadcasting

by Peter Gutmann

As a general matter, broadcasters have full discretion to chose their programming. One of the very few exceptions mandates that stations provide access to federal political candidates. But even that has limits, and a recent case helped to clarify just where stations can draw the line.

Background

By way of background, the Communications Act mandates that candidates for federal office (President, Vice President, U.S. Senate or U.S. House of Representatives) are entitled to reasonable access to commercial broadcast stations. Spots that qualify as a "use" (in which the candidate appears in an identifiable way, even if only to voice the required sponsorship tag) can be censored for only two reasons – obscenity (a tough standard to meet in politics, as it requires a complete absence of social value) or direct incitement to immediate lawless action (as opposed to standard negative campaign ad claims).

Slander, indecency, strident rhetoric, falsified "facts" and fear-mongering are all beyond a broadcaster's control in the context of a use (and, in exchange, the broadcaster is immune from liability). But what if someone claims to be a genuine presidential candidate in order to insist upon his right to present a message that a licensee feels is repugnant and shockingly inappropriate for its audience?

A Recent Test

In early February such a situation arose. While it concerned demands made upon television stations, the principles would apply just as well to radio.

Randall Terry, an anti-abortion activist, declared that he was a Democratic candidate for President and demanded that broadcasters run his extremely graphic anti-abortion ads during the Super Bowl game and pre-game programming. When a Chicago TV station refused his ads, Terry filed a complaint with the FCC.

It is well beyond the scope of this column to assess whether Terry is a visionary leader or a shameless charlatan. On the one hand, religious history is full of heroes, from Abraham to Martin Luther King, Jr., who defied the laws of their time to pave the way toward a greater social good. Others, though, might question whether traumatizing young viewers is truly consistent with Terry's professed goal of protecting innocent children.

The FCC Decision

In any event, the FCC staff denied the complaint on two grounds. First, it found that Terry had not met his burden of establishing his status as a legally qualified candidate. To reach that conclusion, it relied in part upon a letter from the Democratic National Committee stating that it did not consider Terry to be a genuine Democratic candidate due to the positions he espoused and his public concession that he was only hoping to exploit the political access rules. Since the Democratic primary was looming in Illinois, the FCC upheld the right of Terry's purported political party to determine whom they would qualify as their potential nominees.

In addition, although Terry claimed write-in status in Illinois, the FCC faulted him for having failed to document a substantial showing of activities commonly associated with political campaigning, which is one of the criteria needed to demonstrate status as a bona fide write-in candidate and thus entitlement to access.

Specifically, the FCC found that his campaign stops had been limited to a small geographic section of Illinois, that he had distributed only small amounts of generic literature, and that he had presented no evidence of having made campaign speeches, issuing press releases, maintaining a campaign committee, establishing headquarters or engaging in other political activities throughout the state.

Thus the FCC staff found that he had not met his burden of demonstrating that he was a bona fide candidate for purposes of the access rules.

No Guarantee of Placement

The primary ground for denying Terry's complaint was that, even if he was a legally qualified candidate, his right to reasonable access would not guarantee him ad placement in a specific program, and particularly not one like the Super Bowl. While it is generally true that broadcasters are expected to accommodate reasonable candidate requests, the FCC also recognizes that specific placements

(Continued on Page 20)

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FCC Focus

by Peter Gutmann

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can be refused if a program is sufficiently distinctive that all legally-qualified opponents could not obtain equal opportunities. Given its extraordinary ratings, limited inventory and single occurrence, the Super Bowl was found to be unique, with no equivalent broadcasts available to accommodate equal opportunity requests.

Guidance for Broadcasters

While the Terry decision was fact-specific, it does provide a certain degree of guidance to broadcasters concerned over excessive demands for access by purported federal candidates. (The same standards would apply to equal opportunities by purported legally-qualified opponents of any candidate, federal or not.) The burden falls upon a candidate to demonstrate that he or she is legally qualified. While fringe candidates may not be excluded for mere lack of support, write-in candidates who have not qualified for the ballot may be called upon to show that they have engaged in a substantial variety and amount of campaign activities within the area of the intended broadcast.

While there are no reliable standards to assess this factor, often a ruling can be obtained from a state attorney general or election official. For candidates for nomination, stations can defer to the party holding a primary election or caucus. (Note, though, that while qualification is required on a state-by-state basis, once a presidential or vice presidential candidate qualifies in ten states (including the District of Columbia) then he or she is presumed to be qualified throughout the entire country.)

Unique Program

While the Super Bowl is genuinely unique, it is possible that similar arguments could be raised with respect to other programming for which there are insufficient slots should all legally-qualified opponents demand their equal opportunities and where other programming would not be comparable in their overall audience and demographic appeal.

Rethinking the Basic Rules

Perhaps the ultimate impact of this, and possibly other comparable situations, will be to compel some sorely-needed rethinking of the most basic political broadcast rules, including federal politicians' mandatory access. One of the major premises for that rule is the scarcity argument – that broadcast spectrum is a uniquely desirable medium of mass communication, yet is insufficient to accommodate all who seek to use it, and so those who hold a license and enjoy this privilege owe the public something in return.

Although it may be painful to admit it, the modern reality is that politicians now have many other viable options to communicate their views to the public than even a decade ago. While broadcasting remains important, it has become a component in an increasingly diverse – and largely unregulated – media mix, including social media. On that basis, is there really any reason to compel stations to accommodate politicians when their competitors, ranging from newspapers to websites, have no comparable obligation?

Put another way, has the time come when broadcasters at last should be able to operate on the same free-market basis as their increasingly potent competitors?

Seemingly, reform can arise in either of two ways, each of which is fraught with difficulty. First, since the requirement is statutory, Congress would have to modify the Communications Act, which authorizes the FCC to revoke the license of a station "for willful or repeated failure to allow reasonable access to or to permit purchase of reasonable amounts of time for the use of a broadcasting station by a legally qualified candidate for Federal elective office on behalf of his candidacy." But since incumbents seeking reelection are major beneficiaries of cheap, plentiful broadcast time, they are unlikely to abolish this benefit.

Possible Court Challenge

Second, the constitutionality of the political access provision could be challenged in court. However, that would require an actual case – a broadcaster with the courage to violate the law (and to face the consequences – including license revocation – if its appeals were to fail). While it remains to be seen whether the FCC actually would pull a license if it felt that a station had acted in good faith, few broadcasters are apt to risk their livelihood to find out.

But we digress ... for now, the Terry case may provide some limited relief for stations faced with demands for access by issue advocates claiming status as genuine federal candidates in order to convey their messages.

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

Is there a legal question that you would like answered or a situation that you would like Peter to discuss in detail in a future column?

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Safety and Security

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

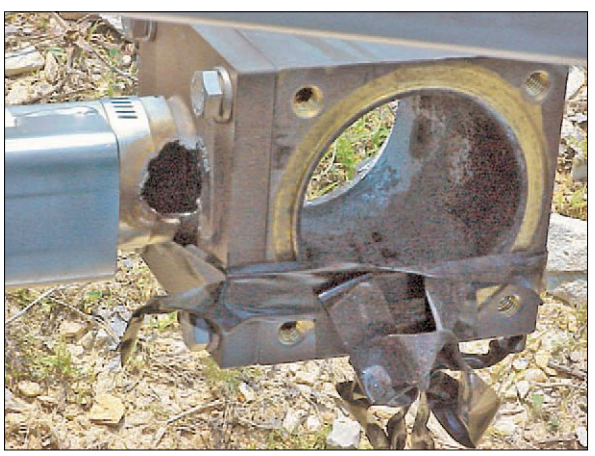
Plan "B" Security

by Jeff Johnson,CPBE

Security of our broadcast plant is important. So also is the security of our listeners when they rely on us for information – when they need us most. We as broadcasters need a Plan "B," – a backup – when a natural disaster strikes and we are "down," and when a station emergency strikes that take us off the air.

When down literally *means* down and off the air.

These photos show the situation with a 12 bay ERI antenna mounted at 1200 feet. Three burnout holes were found. The crew worked wonders rebuilding and remounting the antenna in seven working days.



One of three burn points that knocked the antenna off the air. Luckily there was an auxiliary site to use.

This situation clearly demonstrates why we should have a back up or auxiliary transmitter site and antenna that can be keep us on the air at a moment's notice.

Auxiliary sites, auxiliary antennas and auxiliary transmitters are an important component of backup security. Auxiliary antennas may be mounted on the same tower as the main antenna, or they may be on another tower.

According to FCC Rule 73.1675(a)(1) The auxiliary antenna must be authorized (licensed) with a service designation of 'FS.' It must be also permanently mounted.

Coverage

The FCC Rules also constrain coverage of an auxiliary site and licensing of an auxiliary transmitter. In every instance, the service contour of the auxiliary antenna may not extend beyond the corresponding contour of the main facility. For FM stations, that is the 1.0 mV/m (60 dBu) field strength contour. For AM stations that is the 0.5 mV/m field strength contour – 73.1675(a)(1)

An auxiliary transmitter for use with the main antenna does not require authorization, according to FCC Part 73.1670(a). However an auxiliary transmitter for use with an auxiliary antenna must be authorized per 73.1670(b).

At first this might be confusing for some who read it but the FCC's intent is clear. A backup transmitter at your main site is covered under the station's license. A backup transmitter at your auxiliary transmitter site must be licensed for that site.

Auxiliary is *Not* Emergency

The FCC is very specific regarding auxiliary sites and their equipment being authorized. They do however grant a lot of leeway when it comes to an emergency situation. An emergency antenna, not requiring prior authorization, must not be mounted "ready-to-go."

(Continued on Page 24)

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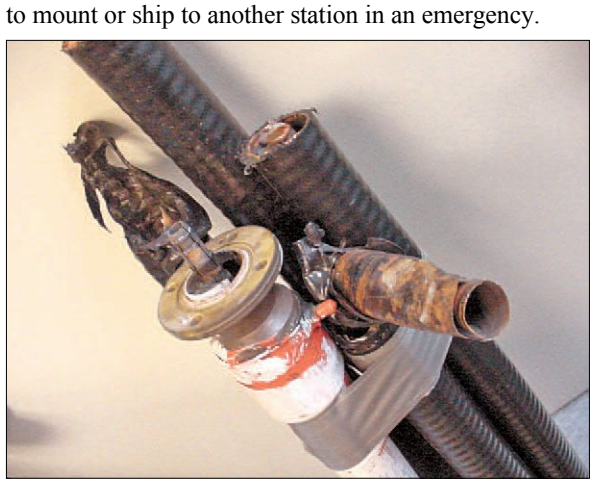
Safety and Security

by Jeff Johnson, CPBE

– Continued from Page 22 –

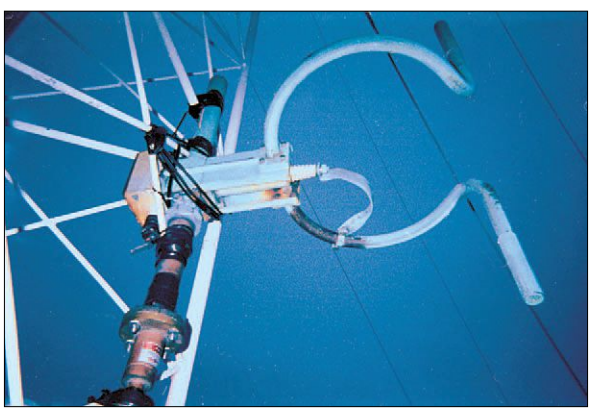
FCC Rules part 73.1680 is very specific about this, *"(a) An emergency antenna is one that is erected for temporary use after the authorized main and auxiliary antennas are damaged and cannot be used."* A perfect example of this would be the portable emergency low power transmitters in military spec. shock mount transport cases, and antennas with crank up portable masts, sold by some transmitter manufacturers. You or someone in your station group might even have a broadband antenna ready to mount or ship to another station in an emergency.



Burned transmission line – a real emergency.

For FM, the operator according to FCC Rules part 73.1680 (b)(2), *"... may erect any suitable radiator, or use operable sections of the authorized antenna(s) as an emergency antenna."* It is not clear if having a usable antenna "just laying around" in case it is needed is legal.

Most of us have unused hardware. It seems prudent to have in mind what might be used in an emergency among the "junque." The author once used a single bay ring-stub radiator mounted with Tie-Wraps and a pieced-together transmission line as an emergency antenna.



A true emergency antenna lashed into place.

The antenna pictured above is a true emergency antenna. It was temporally rigged at about 250 feet. Surprisingly it performed almost as well as the main two bay ERI "rototiller" mounted on a Lambda section at 500 feet.

Need to Notify

Although the FCC doesn't require advance notification, remember that the FCC must be notified promptly if you have an emergency that warrants the use of previously unlicensed gear as emergency back-up equipment.

FCC Part 73.1680: *"(b) Prior authority from the FCC is not required by licensees and permittees to erect and commence operations using an emergency antenna to restore program service to the public. However, an informal letter request to continue operation with the emergency antenna must be made within 24 hours to the FCC in Washington, DC, Attention: Audio Division (radio) or Video Division (television), Media Bureau, within 24 hours after commencement of its use.*

The request is to include a description of the damage to the authorized antenna, a description of the emergency antenna, and the station operating power with the emergency antenna."

Serious Forward Thinking is Needed

If your station doesn't yet have an auxiliary site and antenna, you may want to seriously consider installing one. This will ensure your station is ready to provide security to its listeners in the event of an emergency.

Should management not want to make the investment in a back-up site, perhaps you can at least convenience them to purchase an inexpensive single bay emergency antenna and a few hundred feet of coax. This minimum investment will allow you to keep a signal on the air in an emergency. Be sure to have your emergency kit ready with everything you need (tie-wraps, etc.) to mount the antenna when it is needed, so you will be within the FCC guidelines for an emergency antenna.

FM service contour information is available at:
http://transition.fcc.gov/ftp/Bureaus/MB/Databases/fm_service_contour_data/readme.html

Auxiliary antenna and transmitter regulations are in CFR Title 47 Part 73.1675 and 73.1670 respectively, and emergency antenna regulations in CRF Title 47 Part 17.1680.

Jeff Johnson can be contacted at jeff@rfproof.com

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Operations Guide

Back It Up, or Risk Loosing It

by Chris Tarr

I will admit it. I'm a "backup junkie."

How It All Began

It goes back to an event many, many years ago when I had taken over the job as the administrator for a commercial traffic and billing system serving several radio stations. How did I come to take the position? The previous administrator had been relieved of his duties after failing to maintain the backups. One fateful day, the hard-drive failed fatally and all of the traffic and billing information between the last successful backup and that day was lost. We're talking about months of logs, schedules and billing information.

From that day forward, I have been a stickler for backups. In some instances I have two or three different ways to restore data in the case of a failure. So, what's your plan?

Making A Back-Up Plan

Backing up important data is major responsibility – especially if you're a publicly held company. Even if you're not, your financial and operational health is dependent on having your data available

Something as simple as restoring a document that an Account Executive accidentally erased is vitally important. The dirty secret? Making this happen isn't difficult at all!

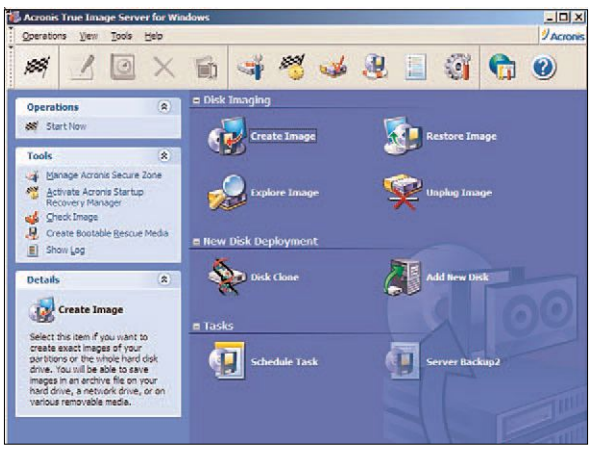
The Basics

At the very least, you should be backing up your critical files and directories. The easiest, cheapest way is with a USB hard drive. Windows servers (and workstations) all have a built in backup program that is pretty simple to use. Fire it up, select the data you want backed up, set the schedule, and you're done. My advice is to buy as large a drive as possible, and create "rotating backups."

Schedule three "full" backup jobs: Job A and Job B rotate every other day, while Job C runs weekly. That gives you three separate restore points to work with. Even better, take your weekly backups and copy those onto another drive once a month.

Level Two

The next level deals with using Enterprise level software and storage media. The most common small business software is Symantec's Backup Exec, found on http://www.symantec.com/backup-exec which is an extremely powerful backup solution that will handle many different types of backup plans, as well as notify you of success or failure in any number of ways. Using Enterprise level software affords you the ability to use more reliable backup media such as tape libraries and network-based storage. While tapes do eventually wear out, tape rotation increases the tape's life, and again allows many restore points.



The Acronis True Image screenshot.

Why Not Use The Cloud

An emerging technology is in the area of cloud backups. Companies such as Carbonite, Barracuda, Acronis, and even AT&T are starting to offer on-line backup storage. Generally you pay for the amount of space you need, then you load some software on your server that runs in the background, backing up your files.

The upside is that your backups are not stored on-site so if there's ever a major disaster, you can recover data from anywhere. The downside is that if you have a large amount of data, the initial backup can take days, using your upstream Internet bandwidth. Once the initial backup is made, smaller incremental backups happen much faster.

(Continued on Page 28)

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Operations Guide

by Chris Tarr

– Continued from Page 26–

Keep Back-Ups Off Site

That brings us to an important point: Keeping your backups off-site. Having multiple backups of your data is great, but what happens if your building burns down? Will your backups go with it? That's why it's so important to keep a backup off-site.

This doesn't need to be done daily, but a weekly or monthly copy could be the difference between inconvenience and disaster! In my case we have a transmitter building across the parking lot that doubled as a cold war bomb shelter – a perfect place to keep backups! In fact, I'm going to be putting in a network storage device in that building so that files can be mirrored there without having to transfer physical media.

Mirror, Mirror In The Rack

Speaking of mirrors, another fairly inexpensive way to protect your data is to build a RAID array. With the proliferation of inexpensive hard drives, there's no reason not to set up a mirrored RAID system in your servers. Windows Server software has the facility built-in! Simply install two identical drives, and set up the mirror. If one drive fails, you'll automatically be switched to the mirror.

Using the above methods, let's look at how cheaply and easily we can protect our data. Let's start with our server. Let's install a new drive and build a RAID mirror. Western Digital's WD10EARS 1 terabyte SATA drive is selling for $106. Pick up two of those. Let's also get a Seagate 2 terabyte USB drive while we're at it for $125.

Now, we install our two hard drives and set up Windows server to mirror the drives. Then using Windows Backup we do a rotating scheduled backup into the USB drive. That's a pretty solid data security plan for under $350. I'm betting that having that backup is worth substantially more than that!

Of course, this is not a perfect solution, and there are many other, better ways to backup data. However, this shows that you can at least have something put together inexpensively that is much better than no protection at all!

Hardened Portable Back-Up Drives

If you don't have the time to design a fancy back up system in a bomb shelter and you aren't getting any cooperation from the management team regarding off site storage – there is still hope. In the past few years several manufacturers have made hardened portable hard drives available – they are USB connected and come as large as 2 terabyte.

They are all rated differently, some claiming to withstand temperatures up to 1500 degrees, and they are waterproof too. The prices can get up there: a 2 terabyte model by one manufacturer checking in at about $400.

Test, Test, Test!

Of course, all the backups in the world won't do you any good if they're incomplete or corrupt. You should never "set and forget" a backup. You should, at minimum, check your backups monthly. Besides checking the logs, and running a verify, you should pick a random, non-time-sensitive and non-critical set of files and do a restore. This restore will verify that you are indeed able to restore files in the case of an emergency.

In the story at the beginning of this article, the administrator would have been just fine if he'd had just bothered to check his backups. He would have seen that they had stopped months ago due to an error.

There are some other ways you can handle data management using things like SANs (storage area networks) however these are beyond the scope of this article, and for most facilities akin to buying a sports car and driving it at 15 MPH.

A hardened hard drive.

You Need To Back Up

As I've outlined, there are several ways to backup the critical data in your facility. Most people are doing ,at the very least, some form of data backups. However, with our busy lives trying to keep computers running and radio stations on the air, it's easy to forget this critical component in our infrastructure. A minimal investment in money and time has the potential of paying back handsomely down the road, as well as enhance your status as a Superhero.

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

Transmitter Surprises – *Part 2*

by Scott Schmeling

Last time I related an experience during a station transfer, specifically the surprises we found when we opened up the transmitter. But I guess *anytime* you take over a transmitter whose history is unknown to you there can be unexpected surprises.

Case In Point

A few years ago we acquired a station with a Continental 816R-3 transmitter. I was told the rig had a few "issues." For one, the RF output metering was not working. In addition, the automatic power control and the manual power control were inoperative. That Raise/Lower switch controls a bi-directional motor, which is coupled to a 5K 10-turn pot. The motor turns the pot and the pot adjusts the power. (Simplified, but you get the idea.) When the motor stopped working, they (the previous owner's engineer) drilled a hole in the front panel and literally flipped the pot around with the shaft protruding from the front. This did give manual power control.

As far as the Forward/Reflected meter was concerned, the needle was below scale in both metering switch positions. That wasn't a big concern, though, because there was a rack-mounted Coaxial Dynamics RF Meter panel that indicated both forward and reflected output. It also provided VSWR protection to the transmitter. It was wired through the remote interlock terminals, so the transmitter would shut down if VSWR got too high. Apparently, if the *manual* power control was working, they weren't too concerned about the automatic control. But no motor drive on the manual pot meant somebody (usually *me*) had to go to the site and reduce power output to keep the station on the air during icy conditions.

Metering First

The first thing I dug into was the RF metering. RF metering and automatic power control are both functions of the A3 card. Going way back in the logs, I actually found an entry indicating the +12 regulator on the A3 card was "not working." The parts list indicates the +12 Volt regulator is an LM340T-12. This crosses to a 7812 – $2.00 at the "Shack." The A3 card also has three LM741 op amps ($1.19 each) I went to the Shack and picked up a couple 7812's and some LM741's. Just in case the op amps on the card had been damaged, I wanted to replace them all.

Armed with parts in hand, I headed out to the site one night and began work. When I pulled the A3 card out I found the +12 volt regulator was not only "not working," it was *gone*. My assumption is that the regulator had been removed but no replacement found in the spare parts box. I replaced the regulator and checked voltage, but the +12 was still not correct. I checked the supply voltage to both regulators and something was pulling my plus supply way low.

Problem Solved

On the input leg to the regulator there are two 100 uF tantalum capacitors in parallel to ground. One of them was shorted. I didn't have a spare cap with me, but just removing the shorted one gave me my +12 Volts. I did replace it later.

I replaced the LM741's and went through the calibration procedure in the manual for both the forward and reflected readings. I also set the Power Control Adjust trimmer for the proper forward power. Everything looked good, but just in case, I left the transmitter in manual control. I wanted to "watch" the metering and the auto power circuits for a while before I switched them back on. The card was fixed for well under $10.

I did verify that B5, the motor that drives the power control pot, was bad and ordered a replacement from Continental. Things were really busy when the motor arrived, so I decided to wait and install it later. Well, "later" kept getting delayed – until a few weeks ago.

Not So Fast

We have had an incredibly mild winter here in Minnesota, but toward the end of February the forecast called for freezing rain followed by snow. As a precaution I went to the site late in the afternoon and decreased power to 70 percent. This is usually enough to keep the VSWR below the Coaxial Dynamics trip point and keep the station on the air – or so I thought.

At about 6:30 I got a call that the transmitter was off so I drove out (roads were getting slick) and lowered power to 50 percent. That should certainly be enough, I thought.

Sometime after 9:00, you guessed it, the transmitter went down again! By the time I arrived, it was late enough, and I decided to keep it off and take the time to replace B5. Maybe I could salvage the remainder of a night's sleep.

(Continued on Page 32)

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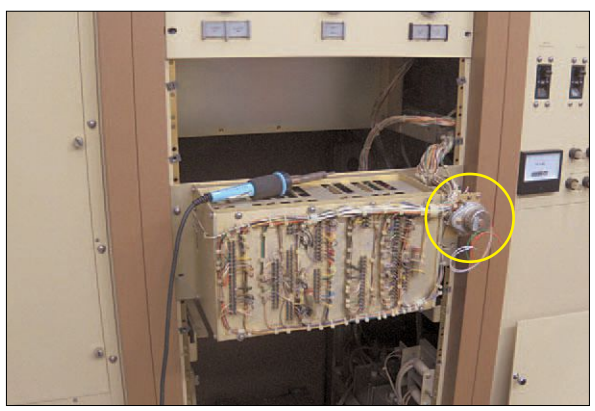
Chief Engineer

by Scott Schmeling

– Continued from Page 30 –

The motor is mounted on the back of the card cage assembly, A20. There is no practical way to remove A20 from the transmitter because of all the wiring that is soldered to the card edge connectors. Since our exciter is mounted in a rack and *not* in the transmitter, I was able to pull the A20 out toward me, rotate it down 90 degrees and screw it to the rack rails where the exciter would have been fastened. If your exciter is still mounted in the transmitter, you could pull it out a ways and use it for a shelf.



The A20 assembly, ready to be worked on.

After the motor was replaced, and while the A20 was still mounted for "maintenance," I checked the operation of the raise and lower function and all worked well. At this point, I put the A20 back in its proper place and returned the transmitter to air.

A Change In Configuration

Let me mention here, that the remote raise and lower functions were not wired to the remote control unit, but all of the transmitter's remote control wiring had been extended to a punch block, so it would be a simple matter to run a couple pair from the raise & lower terminals to the proper command relays in the remote control. Just a few more minutes and there should be no more need to drive out here any more tonight. Yes , I actually thought that. I may have even said it out loud (you *do* talk to yourself at the transmitter site, don't you?).

After punching the wires down and connecting to the relays, I tested them. The raise worked just like it should, but the lower did nothing. At this point, the transmitter had been on for a while and I really didn't want to take it down again, so I lowered the output to 30 percent and I headed back home for a few hours of sleep.

Up Again

You'll never guess what happened? Sometime around 4:15 a.m. the transmitter went down again. While driving out to the site, I was thinking about that raise/lower circuit. The local control worked fine, so I was sure the wiring to the motor was correct. The remote control relays are on the A2A3 card – actually two cards that are fastened together. I didn't have a way to extend both relay cards at once, so I decided to flip the A20 panel back to its maintenance position and trace voltages.

I verified the DC was getting to the relay coil and the relay was energizing. But, the 120 volts that drives the motor was not coming out of the relay. I concluded that it must be a bad relay. We were getting way too close to morning drive to even think about keeping the transmitter down any longer. I ran it up as far as I could before the Coaxial Dynamics panel shut it down. I hit lower a bit and brought it back up again. Would you believe at 12 percent. I really didn't think it was that icy, but checking with a couple other transmitters (with VSWR foldback) verified that I should leave it there. I also decided to just stay at the site and watch the VSWR meter so I could lower the output even more if necessary, but it wasn't.

Yet Another Trip and Surprise

I ordered a replacement relay and when I opened up the transmitter to replace it I discovered yet another surprise. The problem was not the relay itself. The solder runs on the circuit board had blown out. The runs had actually been repaired previously, but the repair job on the wiper run showed open. The problem was probably under the relay socket. Rather than desolder the socket I decided to drill a hole near the socket and run a piece of wire through the board and solder it to the wiper terminal then solder the other end to the edge connector. Done – tested – and working like it should, at last.

Let me mention one more thing. This transmitter was built before automatic VSWR foldback was common. Continental does have a modification kit for the A3 card that adds VSWR foldback functionality. The part number is 643-7576-001. It's a small card that piggy backs on the A3 card. There are also a few component changes on the A3 and the A8 cards. I ordered one and will be installing it soon. I'll let you know how it goes.

Finally Done

All-in-all, doing the repairs to my 816R-3 really didn't take all that long and were not at all difficult. Yeah, I should take the rest of the day off. But I just have a few more things to take care of first.

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

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Aarlon also has a voice modem to allow POTS callers (via a password) to gain access to the same IP based graphic information and commands via DTMF tones – complete with voice responses from Aarlon, as the user seeks information or enacts commands. These are standard items within Aarlon.

Aarlon boasts two on-board computers that process all of the command relays, meter readings, and status levels; as well as handling video and audio services at the site (the composite video camera is not included in the standard Aarlon package).

Aarlon has 16 Voltage inputs, -10/+10 Volts DC, with 16-bit resolution, but may be easily be configured to 1-5 VDC or 4-20 ma inputs.

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

BW Broadcast - RBRX1

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BW Broadcast has released another software update for their award winning RBRX1 and RX1 FM receivers.

One new feature introduced by version 0.92 is the ability to perform an A-B comparison of a stored preset to the current configuration – much like that found on audio processors. Instant comparisons, after making adjustments to any of the 50+ parameters, gives the user even more control when searching for the perfect sound.

Another new introduction, which also helps with installation, is an RDS test feature for TP and TA flags, saving time upon set-up. The introduction of an asterisk (*) before the active preset name, as requested by users, also boosts the user interface of the RBRX1 when managing multiple alarms.

Also introduced is the added support for RBDS, adding to the already extensive control over RDS. A simple user change, either on-site or remotely, using the HTML5 remote control, will ensure the user's data is set up for their respective code. Significant improvement to the unit's Alternate Frequency (AF) control make it perfect for larger networks with multiple frequencies. This update improves the RBRX1's ability to encode and decode RDS AF.

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

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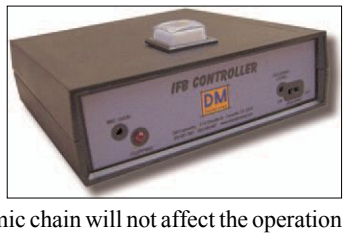
Simplify your remotes and sporting events by adding the IFB Controller.

Installation is simple: just loop your control room microphone and mix-minus buss audio through the XLR connectors on the rear of the IFB Controller. The output of the IFB Controller can be connected directly to your codec, be it Telos, Comrex, Tieline, or whatever codec you are using. The insertion of the IFB Controller in the mic chain will not affect the operation or sound of the control room mic in any way, and use of phantom power is not altered by the IFB Controller.



The IFB Controller can also be used at a remote site or sporting event when you need to talk to the talent on the field without going into the play-by-play or color person's earphones. Simply install it in-line with the program audio going to the IFB transmitter for the field talent.

The IFB Controller has a recessed front panel "mic gain" control that can be pre-set for any type of microphone input or even line-level inputs. There is a front panel "ducking" switch for including or not including the mix-minus program material in the output to the codec, including a "ducking level" control to adjust the amount of "ducking" of the mix-minus material under the talk back mic audio. A rear panel "remote control" jack is provided for remote operation of the IFB Controller.

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Small Market Guide

Can AM Radio Be Saved?

by Roger Paskvan

In this issue, let's take a breather from technical radio and focus on small market AM.

Lack of Revenue

For a majority of small markets, the AM broadcast stations are still providing some income but have definitely taken a back seat to their FM cousins. The folkways of a small town provide an atmosphere that makes old habits hard to break. This plays a part in establishing small market AM's, still hanging on, but the current younger generation is sold on FM.

So what is the real issue here? Is the AM radio band dead? More and more stations are going dark or migrating to FM. What "Big Miracle" can be done to save our ancient modulation whales?

Lack of Fidelity

In addition to the lack of fidelity and dial congestion, AM has been plagued by static since its inception. In the mid 30's Howard Armstrong was hired by RCA to eliminate static on their AM radios – his solution was FM. In today's radio market, the static is still with us, but only affecting AM.

Many of AM problems mirror those of the overall band: a crowded slice of spectrum that's prone to interference and coping with ever-increasing sources of man-made noise. Many AM stations have added FM translators just to overcome these new interference issues.

Compact Florescents – More Noise

In weak areas, those new coiled up fluorescent light bulbs (and the new LED bulbs, too) create bad interference on AM radio. This interference will only get worse, as more and more homes are forced to convert to the new lighting sources.

This resultant dim future of the AM band has become a major concern for many existing broadcasters as consumers migrate more to their cell phones, tablets and crowded dashboards for crystal clear sound. Broadcasters are moving away from the static sound of the AM band, by simulcasting news and sport games on the FM dial where they can pick up younger listeners and the sound quality is outstanding.

How Can AM Compete

HD Radio might be an answe.r The system transmits audio in the form of data via a digital signal in conjunction with the regular analog signals. While it does work better on FM, because of the wider bandwidth, AM stations can at least sound like the analog FM (a marked improvement). While this sounds great, in reality there are still problems with HD AM. The first problem was the acceptance of reduced power for the digital carrier.

Listeners complain of erratic reception and difficuly tuning in the HD AM signal, due to the interference, especially at night.. There are also problems with lack of sufficient antenna bandwidth in AM arrays, usually required for directional operation at night.

There Is A Potential Upside

On the positive side, IBOC radio signals offer some hope for small market AM radio stations and saving the AM dial in general. With HD Radio, AM stations will sound just as good as FM analog stations do now. Plus an HD radio receiver can also zero in directly on the digital transmission, eliminating interference and signal "reflections" off of buildings. The result is clear sound without any static, pop or hisses that conventional AM analog transmission has to offer.

Some say that the improvement in IBOC AM signal to noise is a real benefit to AM stations. To the HD listener, there is the significant reduction in background noise. So what can be done?

It is the opinion of this author that HD radio would be a significant improvement to the existing AM radio dial. Full band HD AM radio would potentially save the AM broadcast band, giving current AM broadcasters the ability to sound like an FM station on the AM dial. However the FCC doesn't seem inclined to sunset analog AM anytime soon even though a total HD transformation would give a breath of life into an old geezer, and provide a means for small market AM stations to compete with larger FMs.

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

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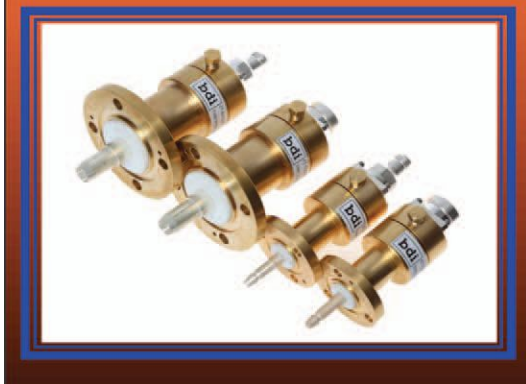

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Practical Engineering

Getting Real With EAS

by Mike Callaghan

Have you noticed how so many of the FCC Notices of Violation these days relate to EAS issues?

Equipment doesn't work, tests get missed. It makes you wonder just how seriously radio stations take the EAS system and the task it has. It's as if everything else is more important. But avoiding the EAS responsibilities is a surefire way to gamble with your boss's money – or if you are an owner your own.

Recipe For Disaster

Starting in January, our traffic system changed the way EAS tests show on the log. They started appearing as PSA's on the left side of the log, and only on the right side did it show they were actually EAS tests that needed to be transmitted. And, they often were listed as the very last event in the hour.

This arrangement is an invitation to disaster. If the hour is running long, and the jock sees that PSA listing, it may be treated with the same care, dedication and reverence that jocks give all PSA's. It could be the first thing to get blown off, and the test would be missed. We have learned, and now the EAS tests are at the front of the hour, and they are logged into stop-sets, the same as a commercial.

Training New Board Operators

We (and probably you) have new board operators all the time. Depending on where they came from, EAS issues may not ring any bells as being important, And because sending an EAS test involves something more than just pushing a button, green board operators are inclined to enter vapor-lock when the test shows up on the log. If this happens at 4:00 a.m., where a lot of EAS tests get buried, they're also very unlikely to call for help. So, the test could be missed – again!

Relaying a Monthly test has it's own set of issues. If a weekly test is daunting, the Monthly test, with the voices, and all those tones is far more challenging – it's a genuine relief when it gets on the air without something going wrong.

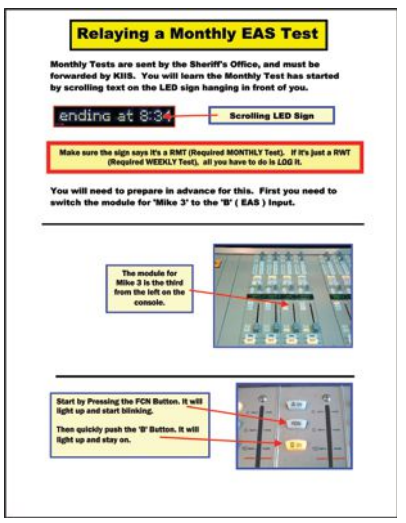
We Create Our Own Problems

While most stations are supposed to loop the audio through the EAS system, so a Presidential alert can stop the show, many engineers just don't trust the equipment that well. So, instead, the EAS bleats and burps go to a console input, and have to be potted up to get on the air.

The EAS pot is a very rarely used input. It is also another "land mind" that is an opportunity for the system to not work as designed, and for tests being missed – if it's not potted up. In this situation, more often than not, dead air takes the place of the test.

If the operator does get it potted up, but pulls the pot down too quickly at the end, the three end tones get missed, and stations taking the relay from your station don't know the test is over. So they may merrily keep relaying the sending station's programming until someone catches on and pulls the plug.

You may not be aware of other stations using your signal as their primary alert (LP-1). In some cases, the primary station has equipment problems, or can't be reliably heard. If this does happen, you may unknowingly be tapped to fill in as an alternate. So those final ending tones can be critical.



A page from the KISS EAS manual cleary showing directions for running the monthly test.

All these factors combine to make EAS tests a huge responsibility, and an even larger stumbling block, if not a major inconvenience. And not to mention that some stations actually record legitimate alerts only to play them when the alert won't interfere with their programming flow – be it a network talk show or their music format.

This delay can cause vitally important information not to reach listeners in time. For example, notifying listeners of a Tornado in the area after it has touched down, killed someone, and then moved on does them no good.

(Continued on Page 40)

Practical Engineering

by Mike Callaghan

Geting Real With EAS

– Continued from Page 38 –

Save Yourself Some Grief

There are ways to reduce the anguish behind all this. When new operators get hired, they should have to spend some time with the engineering department – after the handshake, and before they fill out their W-2. This insures they get the basic training about how EAS is handled at their new job. There are some board operators that just don't have a clue.

Unbelievable But True

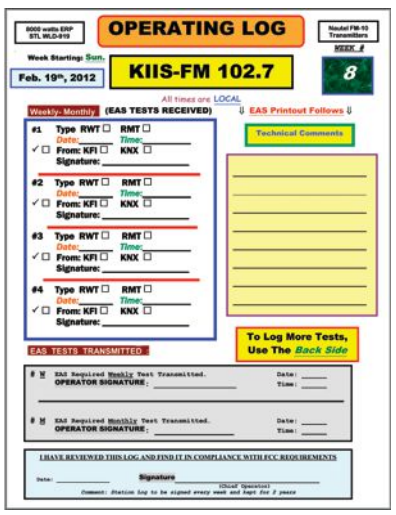
I did some tower work for a station one day and stopped by the studio to make notes in the station log. I asked the on-duty operator where the log was and he said the station didn't have one.

So I asked this operator where he wrote down that he'd sent or received an EAS test. His response, *"Oh, we don't have anything to do with EAS. We're exempt!"* If I'd been from the Commission, I'd still be there writing them up!

Create An EAS Test Manual

An EAS policy manual and instruction sheets should stay in the studio for reference. And everyone in the station should be familiar with them. These sheets should include photographs of the buttons being pushed, and the pot being up – unsure operators should have a place to go for help without making phone calls. The manual can also have a sample log sheet with arrows and diagrams about where both the weekly and monthly tests get logged, dated, and signed. Don't forget to include the remote control legend and emergency phone numbers.

To make it easy, our logs have plenty of prompts and spaces. Each EAS test received has places for the type of test it was, who sent it, and separate areas for the date, the time, and the operator's signature. (If you leave just a single space for the date and the time, one or the other seems to get missed on a regular basis.)



The KISS Operating Log. Easy reading to avoid errors.

Tools In Hand

Most likely you already have the tools in hand to create sheets like I have made, quickly and easily. Microsoft Word is a great tool for crafting the manual. With a digital camera, you can take photos of the console, and use Word to add the text, draw the lines and arrows, and produce a easy-to-follow "how-to" sheet for just about any console operation – including sending and logging EAS tests.

Microsoft Word is also an excellent tool for drawing up the logs themselves. Using color in the logs makes them more interesting and easier for board-operators to follow.

Log Review Schedule

With eight stations in our cluster, we review the EAS. logs late Friday, when an engineer takes the next week's logs into the studio. By that far into the week, every station should have its Required Weekly Test out of the way. If not, then the operator gets to "squeeze" it into the next commercial break while the engineer watches it run and watches it get logged. You might think this is overkill, but it is definitive insurance.

There Is No Reason For Violations

It's surprising how many stations get dinged for broken or uninstalled EAS equipment. How does this happen?

Granted, configuring a EAS system to the local standards can be daunting – none of them are simple. All EAS Equipment Manufacturers have numbers you can call and trained support staff that are willing to help you through the process. If possible, once the systems are set up, be sure to do a configuration backup so the data is stored somewhere outside of the unit itself. This insures the data will be safe if the internal battery dies. To make your life even easier, check with the manufacturer to find out historically how long the battery life has been. Then you can schedule a reminder to replace it.

The EAS logs and equipment are at the top of the list of things an FCC inspector will ask to see when they visit. Yet it still amazes me how many stations put little or no priority into ensuring everything is up to standards. Yes, for some it can be an irritant but, if the gear is operating correctly, the logs are in order, and the operators know how to send a test when asked, the inspector is unlikely to dig much deeper into the technical operation. Keeping it all together means you won't be gambling with your boss's money!

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

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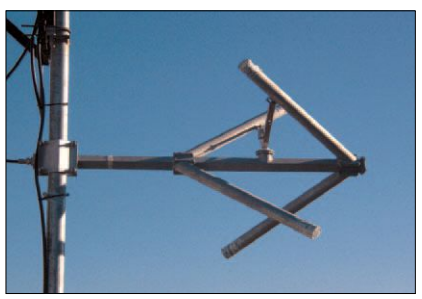

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FCC LPFM Window to Open "Before Presidential Election"

by Leo Ashcraft

Much Internet chatter indicates we should expect to hear from the FCC on two major policy issues that are the result of years of work by Nexus Broadcast and supporters like you. The FCC will be releasing its final rules to preserve channels for community radio in urban areas, as well as new proposed rules that will shape the future of the Low Power FM (LPFM) radio service. Those new LPFM rules should be codified later this year, at which time the FCC will be announce an application filing window, when groups can apply for new LPFM radio stations.

Austin Airwaves Predicts 10,000 Applicants

The Audio Division of the Federal Communications Commission confirmed to Austin Airwaves on January 20th that the Commission is "shooting for the Fall" for the opening of the highly-anticipated "window" for applications for new Low Power FM (LPFM) educational radio stations. The previously-reliable government source asked not to be named. Another source outside the Commission, long familiar with the LPFM issue, stated she thought that the FCC wanted to get "the process rolling before the presidential election."

Austin Airwaves predicts there will be as many as 10,000 applications for the new LPFM licenses, nationwide.

When asked if he felt this number was a good guesstimate, the FCC source said, "We never know what a particular demand will be until we open a window. We have stopped conjecturing about how many applications there may be. It depends in part on supply and demand, and availability of spectrum in major markets. There are mysterious, serendipitous aspects to it. The new 'second adjacent rules' contained within the Local Community Radio Act (LCRA) certainly has opened up more channels."

Noting past incidences, when the FCC's servers have crashed under the load of hundreds of applications, Austin Airwaves asked the FCC if their servers are up for the job." They responded, "Absolutely! But, nobody should be filing in the last 15 minutes of the very last night of the application process. But will some people do that? Oh yeah, absolutely!"

I'm not sure of the capacity of the FCC servers. They have had problems in the past. We support having multiple windows for different regions of the country because of the limited number of engineers and lawyers who are qualified to help organizations apply. Breaking up the windows makes it easier for everyone to have access to them. Regardless of whether or not the FCC will have multiple windows, groups should waste no time in preparing to apply for a construction permit.

Many engineering firms and LPFM advocacies, such as Nexus Broadcast, are gearing up for an application window before the presidential election this year. We are helping groups prepare to apply during a potential five day window, most likely in September or October."

Clear the Way For LPFM ... Here we Come!

I could see anywhere from five to ten thousand applications submitted nationally. The FCC's Proposed Rule Making (PRM) regarding translators is expected later this month. It will finally resolve the questions as to what to do with thousands of translator applications remaining from the 2003 application window. Translators are low power FM stations that carry an existing station's signal into other areas. They operate on the same frequencies as LPFMs. Community radio groups have been advocating protecting these frequencies for local, community and minority applicants, especially in larger markets. Depending on the number of frequencies made available after the PRM, a significant number of frequencies could be made available, especially in major markets.

After a decade of effort by community radio advocates, the Local Community Radio Act (LCRA) was passed by Congress on December 20th, 2010 and signed into law by President Obama on January 5th, 2011. With only days to go before the end of the session, Austin Airwaves played a key role in the lifting of the so-called "secret hold" in the Senate. Once the hold was lifted, the full Senate voted on the LCRA, passing it by a wide margin. Advocates for the LCRA fought years of strident opposition from National Public Radio and the National Association of Broadcasters.

At the National Conference for Media Reform, in Boston, Congressman Mike Doyle (D-PA) praised the years of work by LPFM advocates.

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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