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November-December 2015 – Vol. 23, No. 6

High Powered History



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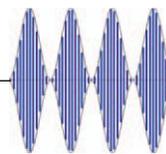


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The cover photo of Willis Tower courtesy of:
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Broadcasters' Desktop Resource – (page 43)
 Coming in early 2016, watch for a new, growing collaboration between Radio Guide and The Broadcaster's Desktop Resource (the BDR: www.theBDR.net) which will make both publications stronger and more valuable to you.

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Cover Story

High Powered History

Building the Sears (Willis) Tower Site

by Warren Shulz

Finding the best places for antennas has been important since the beginning of broadcasting. Perhaps as important is getting all the players to work together harmoniously. How do they do it? In Chicago that is the story of the Sears Tower (now Willis).

As they say, from the top of the building you can see for miles – over parts of Illinois, Wisconsin, Indiana, even over Lake Michigan to the state of Michigan itself.

Sound like a great place for an FM or TV antenna? Well, then, how about a dozen or two?

Big by Design

Until the new One World Trade Center topped out last year, the tallest building in the USA was in Chicago. The new Number Two is the Willis Tower – known for most of its life as the Sears Tower.

Back in 1969, Sears, Roebuck & Company was the largest retailer in the world, with approximately 350,000 employees. Sears executives decided to consolidate the thousands of those employees who were in offices distributed throughout the Chicago area into one building on the western edge of Chicago's Loop.

With immediate space demands of three million square feet (the total building is some 4,477,800 square feet), and predictions for future growth necessitating more space, Sears commissioned architects Skidmore, Owings and Merrill (SOM) to produce a structure to be one of the largest office buildings in the world.

The Sears Tower was financed by Sears Roebuck & Co. at approximately US \$150 million.

Building It High

Sears and the City of Chicago approved the design, and the first steel was put in place in April 1971.

The building structure was completed in May 1973. The Sears Tower observation deck, called the Skydeck, opened on June 22, 1974.

It is interesting to note that the original build-out height was right up to the FAA limit obtained, and Sears had no intention of adding any television broadcast antennas. However, pressure from retailers whose sales of TV receivers were suffering due to ghosting issues caused by the Sears Tower ended up being the motivation to provide a location for future television broadcast antenna development.

To accomplish that, two cylinder bases, 90-feet tall and 12-feet in diameter, were added to the initial design to permit such future development by the local television broadcasters.

An interesting fact: Sears took fire safety to a new level by constructing a fully-sprinklered building. Even though regulations of the time did not require a fire sprinkler system, the Sears Tower building was equipped with one from the initial build-out; there are about 40,000 sprinkler heads in the building.

TV's Modest Beginning

During the first two years, just WLS-TV-7 and WTTW-TV-11 were in operation from the Sears Tower site.

The stations used a side-mounted tower section added next to the west base cylinder so they could cover land

mass (as opposed to the relatively unpopulated Lake Michigan) with directional VHF high band TV antennas. The stations operated from these "temporary" antennas from 1972, which remained useful until the DTV conversion.



TV tower section on the roof in 1972.

The Original Four FM Tenants

While the TV folks could not decide what to do for more than 11 years, it was the persistence of RKO General Radio, licensee of WFYR-103.5, that opened the door to a temporary FM antenna mast development in just two years.

Among the four original FM broadcasters which moved onto to the Sears Tower, RKO's WFYR and Robert Victor's WXFM had the worst antenna sites. Hence, George Capalbo, Vice-President of RKO Radio, took the lead in pushing Eric Pavel, the Sears Tower roof czar, to seal a deal.

Unfortunately, there still was no one who wanted to bankroll the vertical real estate development above the cylinders.

Finally, after two years of meetings Sears gave in, during January 1974, and allowed for FM radio antennas because none of the television operators had joined to develop towers above the two base cylinders. The four FM leases were short term and the mounting was understood to be a temporary location.

Nevertheless, this finally opened the door for the original four FM broadcasters. They were: WLAK 93.9 (Sudbrink), WCLR 101.9 (Bonneville), WFYR 103.5 (RKO General), and WXFM 105.9 (Robert Victor). Staffing was John Bortkowski, Gary Schroeder, Warren Shulz, and Don Coleman (part-time contractor).

Mounting It Up

It was just two months later, in April of 1974, those four FM original stations started broadcasting from Sears Tower.

The nominal 12-inch mast was made up of four 10-foot flange sections stacked and mounted on two I-beams welded to the inside walls of the West cylinder.

We then stacked the four antennas – from top to bottom – 93.9, 105.9, 101.9, and 103.5, using a temporary single Harris (ERI) circular-polarized ring per station, to reduce cross-coupling and require as few notch filters as possible.

Sherwin Asrow designed the pole and attachment beams. The contractor was the late Don Hudella (dba

Lightning Deterrent). However, the Local One of the Iron Workers' Union controlled the job, so progress was intermittent.

It definitely was a slow go with erratic progress. Hudella had labor difficulties in working with the crew and actually spent all his time in the Sears lobby because the Iron Workers did not want him on the job site. They wanted to be seen as doing all the high work.

Furthermore, although this work was done at a time before RFI exposure regulation issues, I do recall that the price of the job changed along the way and more funds were needed. I also recall the discussion of a cash payment to move things along, but so far as I know, that never occurred. Finally, after weeks of delay, the 40-foot pole was completed and antennas mounted.



Looking up from the 110th floor roof level at the temporary FM mast atop the west base. This shows some ice buildup on the antenna radome.

The city of Chicago required all antennas at the Sears Tower site be in a radome enclosure to control the buildup of ice. As I recall, this was a condition of permit for antennas to be installed atop the Sears Tower.

All of the stations were running full Class B ND antennas except 105.9 which used orientation and reduced power to fit a tight spacing against WLNR 106.3 in Lansing IL. As best that I can remember, WLNR held WXFM to a 30 kW ERP limit to the south.

Coping With Nature

As one can well imagine, lightning was a problem for the FM antennas at the top of a structure 1,530 feet above ground.

As noted above, the mast was in four segments and was shop painted with many coats, the top coat being an acrylic paint. At first, the bolted flanges did not make positive electrical contact and lightning was making its way down the 3-inch feed lines.

Damage Control

Later we tack-welded each flange and added a purposeful ground conductor from the rod to the building steel. These actions help to reduce any lightning damage.

Nevertheless, over time, we had to deal with various puncture holes in the feed line (along tower section run), radome destruction, and more.

In fact, severe lightning resulted in a fire, causing some severe transmission line fire damage sometime in 1979. The Chicago Fire Department even had to be called out to manage the event.

There is a lot more to tell about the Sears Tower and the progression of broadcast facilities over the years. So, stay tuned, a second part of this history will be posted to theBDR.net soon to continue the story.

Warren Shulz is enjoying the retired life now, after being Chief Engineer at WLS AM-FM for 22 years after 15 years at WFYR-RKO. Now, he is out RVing and riding his eBike. When he is in, you can contact him at: wshulz@cs.com

This article originally appeared on The Broadcasters' Desktop Resource – www.theBDR.net

Parts 2 through 4 of this article are now available on the BDR, check it out at: www.theBDR.net/articles/prof/history/index.html

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“Focusing” On the Faces Made for Radio

Has the time for studio webcam come and gone?

by George Zahn

OK, so you're looking forward to 2016 and you're creating a list of resolutions for the New Year. Perhaps you're happy with your on-air sound and studio performance. Realizing budgets are tight, you still want to do something to engage listeners and have some fun. Perhaps you're the manager or engineer of one of the many stations that have never added a webcam to your studio. A webcam can be a fun, and fairly inexpensive addition to the studio. But is it right for your station?

As a manager, I can immediately think of all the reasons *not* to add a webcam. Some of you may have seen YouTube videos of DJs mooning listeners or various other unsavory acts on webcam just to “have fun” with those eavesdropping via the Internet eye. Even though my staff is “tame,” and our format is not “renegade” fare, I could still imagine listeners' reaction on the day that one of my hosts valiantly came in while under the weather only to find the need to retch into the studio garbage can during breaks. Is that really what we want listeners to see when they hear?

Even though the webcam may be fraught with downsides, many stations consider them a staple, and use them (sometimes only on select shows) on a regular basis. Website gurus will tell us that having some form of video on our website is a key to engagement with our web visitors. Look at the number of radio shows simulcast with video on cable TV channels and streaming podcasts, and we can see some of the benefits.

Outlook May Be Hazy

It's a neat concept: the webcam allows the listener to see who they're listening to, although one station listener sadly reports on a webcam opinion blog that one host at their favorite station always turns the webcam toward the station's logo on the wall when on the air. Some listeners have had other disparaging remarks, and some love them, so there's no consensus. Also, a webcam active during an automation shift is a real negative image, showing a static studio with nothing happening.

Whether it's the fear of inappropriate behavior or the rogue or shy host who chooses to disconnect or re-aim the camera, it's important that stations who implement a webcam have some basic policies for staff. However, some flexibility likely should be part of that code, especially in the case that someone is ill or may have a legitimate reason not to be seen.

Despite the negatives listed so far, some brave station personnel might want to venture onto the webcam ledge and experiment. What do you need and how do you do it? I turned to Dave Schram, a station operations manager and Apple certified computer technician who is also a co-host of a computer talk program in the Midwest. Those of us with more limited experience in streaming and web presence may be surprised to learn that you just don't hook up the \$19.99 webcam, that might be found on special on-line or at the local big box store.

“To do this right, you need a web camera that is also a web server,” says Schram, “wired cameras are faster and more reliable than Wi-Fi cameras. The web server camera has its own IP (Internet Protocol) address.”

Schram indicates that a web server camera can be had for about \$200. Setting up the camera is fairly easy and the station simply adds the camera's IP address to the station website. Schram cites a couple of drawbacks: one non-technical and one that could affect your financial bottom line.

“It definitely takes away the ‘theater of the mind’ mystery behind listening to radio,” he adds, “but the bigger concern is how much bandwidth you're budgeting for your website. Stations can limit the number of video connections they allow at any one time.” A video stream, even just video with no audio, can add plenty of data pass-through to whatever web data you're pushing through the pipe. Limited “viewer” access can be a turn off to those listeners turned away from the webcam due to hitting a streaming threshold.

Sync or Swim?

Among some other concerns, including lack of control over what hosts or guests do on camera, is the potential synchronization issue between streaming audio and video. It may be best to sync the camera audio with a separate video feed that's part of the camera stream to avoid confusion of those listeners who wish to “eye-vesdrop” on their favorite personalities.

While I am not an attorney or wish to dispense legal advice, I think it's prudent for any station wanting to add a web cam to a studio to do some professional legal diligence and perhaps have an agreement that governs talent and guests and their permission to stream their images on-line. Audio for radio is a given for those on air, but broadcasting images is not. The agreement could also delineate what limitations there may be on staff behavior and consequences of such behavior.

OK, so all this sounds like a headache for what could be a fun addition to make your station more accessible to listeners. There may be stations who claim that any publicity is good publicity and throw caution to the wind – or “air” in this case. For those looking to carefully add these visuals, it seems that some prudent planning and some foundation work at the beginning could prevent potential issues in the future.

If a webcam seems daunting after all these pros and cons, there are some other ways to create video content. If you want a more limited webcam experience, perhaps just on a show or two as warranted (as we have at my station), you can use a smartphone app called Periscope (www.periscope.tv) which uses the phone's camera and microphone to stream short term video of a show. The angle of the camera can be very limited and the audio not ideal, but it has been a fun experiment on our computer show.



Web Server Camera

A nice feature on Periscope is that the video can be replayed for 24 hours before becoming unavailable. This way a listener still has time after a missed show to experience it. The listener (viewer) must be a subscriber (free) to Periscope to view it. Periscope says that, despite the 24-hour viewing limit, the videos are kept on their servers and can even be edited. It is always important to understand data charges and reception of the smartphone within the studio. It's advisable to do a test run before publicizing a high profile event on any social media.

Hi-Def Jam

While Periscope or other smartphone apps won't drive people directly to your website, there are other ways to infuse video into your web presence. “Many organizations create edited content for YouTube – possibly a studio video tour, meet our staff, or even a seminar on speakers, microphones, or other equipment – then add a link of the YouTube video back to their webpage,” explains Dave Schram. “Having the video on YouTube allows you to capitalize on using video to help promote your station without cluttering up the website itself.”

In fact, it might be nice to have a page on your station's website for links to your own YouTube videos. A web marketing expert explained to me that for any business, showing expertise in your area can be a nice addition for your site. Most of our stations have staff that are well versed in audio editing, and a small investment in simple video editing software (possible programs such as Sony Vegas) can help transform basic smartphone or standard video camera footage into a usable demonstration for your station studio or a special feature. These software options are fairly low cost (under \$200) and intuitive, if the user has ever used standard audio editing software, and might be a better spending option for some stations than a server web cam. You may also be able to produce higher definition content than a streaming web cam server, which may need to be scaled back to throttle data through-put.



Sony “Vegas” Video Editing Program

Despite its millions of listings, YouTube can be a nice free repository for your video options if you don't want to keep it on the website as on-demand content. A YouTube link on your webpage takes very little room and you might eventually create a library of links that can keep your listeners coming back to your website.

If your station is using a webcam or smartphone web streaming app, let me know what works for you and how you use it (possible for specific shows). Do you have agreements for web streaming of hosts or guests? Have resources such as YouTube helped you reach new listeners? Let me know and we might share part of your story in a future article.

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

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Rules & Regs

The FCC's AM Revitalization R&O, Further NPRM and NOI

by Ron Rackley

As everyone continues to pick apart what the FCC did and what they seem to intend in the AM Revitalization Report and Order, we seem to have a fair amount of agreement on what are the high points and what is missing. The well-respected Consultant Ron Rackley offers his thoughts as we look ahead.

It was good to see the high level of participation in the comment process of this rulemaking by broadcasters, broadcast industry professionals, and other interested parties.

Overall I believe the FCC has done an excellent job considering the various opinions expressed by the commenters, within the public service framework mandated for them by the Communications Act, to arrive at decisions that will be good for AM radio going into the future.

A Different Time

For those who, like myself, have our thinking rooted in the way things used to be – when licensed stations, whose owners had been selected to provide service in a very

We are on a new paradigm, you might say, when it comes to the use of FM spectrum by less than fully licensed stations.

The Best Deal Possible

Clearly, AM stations are arriving late to this FM spectrum party.

However, given the FCC's priorities and objectives for its use today, I think the provisions that have been adopted for allowing AM stations to use FM spectrum by obtaining and moving FM translators may be the best deal AM broadcasters could hope to get.

The FCC plans Windows to allow AM owners the ability to acquire an FM translator. The first Windows will permit translators up to 250 miles away to move, to operate within the AM station's 2 mV/25 mile contour.

A quick, easy tool to see what might be available for your station is the new tool from Cavell-Mertz. Just go to www.fccinfo.com and after searching for an AM station, click on the link at the bottom of the page. All translators within 250 miles will be listed.

Status	Calls (Click for Details)	Mode	Freq (kHz)	Power (kW)	City	ST	Facility ID	File Number
Lic	KFYI/AM	ND1 U	550	5 kW Day	Phoenix	AZ	63918	BL-
Lic	KFYI/AM	ND1 U	550	1 kW Night	Phoenix	AZ	63918	BL-

AM Translator Search Tool - Commercial FM Band Translators within 250 Miles of the KFYI Daytime Facility

formal application process, were considered primary, and translators were secondary services subject to being displaced – it is difficult to accept the new FM translator provisions.

If the decision had been made to have AM stations provide service in the FM band back then, say in the 1970s or 1980s, I believe the FCC could have just ordered those secondary users (translators) off the air to make their use by licensed broadcasters (AM stations) possible. That is far from the case today.

Although FM translators still operate on a secondary basis, the FCC has shown no inclination to consider them expendable insofar as the interests of licensed AM broadcasters are concerned.

A New Paradigm

About a dozen years ago, thousands of FM translator applications were accepted by the FCC in a filing window. A great number of them were granted.

The FCC Rules have changed to see FM translators in an entirely different light than when they were very limited in power and only available for fill-in use by licensed FM stations. Furthermore, the relatively new LPFM service is seen as an important way to promote localism and diversity of ownership in broadcasting.

I have no studies to back this up, but I believe that more AM stations might be able to have FM translators in highly populated parts of the country this way than by applying for new frequencies. (The time for that would have been before the 2003 filing window when the applications for most of the translators that are authorized today were filed.)

We can wish that the FCC had had the foresight to allow AM stations to apply for FM translators back then, but we cannot unwind the clock.

Necessary Technical Changes

The technical provisions that were adopted and set out in the Report and Order¹ will certainly help stations that must change transmitter sites deal with site location issues.

There was widespread support in the comments for the changes.

Some few people do not understand how relaxing antenna performance and city of license coverage requirements can be a step in the right direction while AM stations need stronger signals to overcome noise and interference.

Consulting engineers such as myself, who do the allocation studies and try to design antennas that meet their requirements and have a chance of gaining local

approval, see the necessity for these changes clearly. Many AM stations need flexibility in order to continue to operate at all from new sites as licensed facilities.

Power Not The Simple Answer

The idea of a unilateral power increase for all AM stations to overcome noise and man-made interference has been mentioned in the industry from time to time and some people have found it attractive. But it is not workable for several reasons.

We do now have workable options on the table. How AM signals may be improved is addressed well by the proposals in the Further Notice of Proposed Rulemaking.

The rule changes to revise the protected and interfering contour levels, if enacted, will result in AM stations in general being able to increase power and/or make antenna system changes to improve their daytime coverage in a controlled way so that other stations are protected from excessive station-to-station interference.

They will also make signal improvement possible when stations relocate their transmitter sites, whether voluntarily or out of necessity. Elimination of the “ratchet clause” and returning the nighttime skywave protection requirements between Class B stations to what they were before 1991 will go a long way to make nighttime coverage improvement for many stations possible, as well.

Although it is a controversial idea, especially for certain Class A station owners, the proposed changes in their protection requirements that many commenters favored will open a discussion in the rulemaking comments about how their wide area coverage and local stations' local area coverage objectives should be balanced.

It is time to have that discussion.

Directional And X-Band Stations

The proposed rule changes having to do with details of how stations with directional antennas conduct Method of Moments computer modeled proofs, and maintain their facilities afterward, mostly have to do with “house-keeping” matters brought to light by seven years of experience with the methodology. They are not expected to be controversial.

The end result will be significant reductions in cost and operating schedule interruptions.

The FCC is also asking for comments about how to take care of unfinished business dating from when the first expanded band stations were authorized.

Decisions about what kind of service is appropriate for additional stations in the expanded band and what technical requirements they should meet for interference protection are long overdue.

Looking Forward

We now have the most comprehensive look at the FCC Rules as they impact AM radio in the last quarter century underway. We may never have an opportunity for “AM improvement” like this again.

The viability of AM radio as a broadcasting service can be significantly improved in the process. The industry should be interested in all the technical rule proposals and not just how FM translators will be regulated.

Ronald D. Rackley, P.E. is a principal in the engineering firm du Treil, Lundin & Rackley, Inc. in Sarasota, FL. Contact information is at: <http://www.dlr.com/contact.html>

¹ The AM R&O Found at: <https://www.fcc.gov/document/fcc-releases-am-revitalization-first-report-and-order-fnprm-noi>

This article originally appeared on the Broadcasters' Desktop Resource – www.theBDR.net



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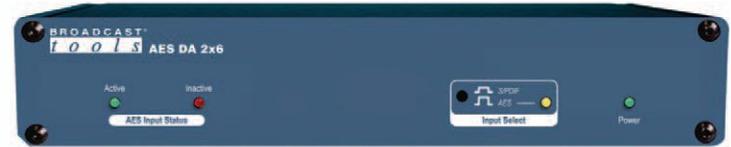


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LINEAR ACOUSTIC
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Mobile and Equipped

by Jim Tuvaville

Having just returned from a 31 day road trip (a lot of which was not actually work) I have noticed that a great deal of comfort which I enjoyed in that length of a trek revolved around my truck and what I carried. I may often get a few odd looks from other non-engineering friends, but it has really been reinforced on me lately how important it can be to be well prepared in your mobile work vehicle. I'd like to share some of my own techniques, in the hope that it can be informative and possibly enlightening to someone along the way.

When I was on staff with a Group owner, it was early in the more modern times and before they furnished vehicles to the Engineering Department. As such, I had to be equipped in and of myself to travel as needed for the job; something that has now changed with them and many other owners. I also kept several clients on the side during those years, which only added to my need for a quality mobile workshop. Now that I'm only handling a few clients, I find my attention again focusing on how to be most effective in what I carry with me on a day to day basis.

I have had a myriad of vehicles in the years, and each had their own advantages. My first true dedicated work vehicle, back in the early 90's, was just a converted full size van. I took out the back seats and built a work bench and storage in it. I have had a couple of pickup trucks, and certainly am biased toward the "crew cab" style, where one can organize things behind the driver's seat in safety and security. After having locked tool boxes stolen from the back of a regular pickup truck, I made the conscious choice to downsize to the smaller SUV type I use today. I chose the one I have now because the back seats laid down flat to maximize the cargo room (and it is usually pretty full) and still permit me to have another seat if needed.

I found out quickly that having 4WD is a necessity – even in locations where terrain is not always consistent with the need; never forget how nice it is in rain and mud to have those extra gears available. There is certainly not a one-size-fits-all when it comes to work vehicle utilization – we are all different and have varying tastes and needs. When choosing or designing a work vehicle, I encourage you to be really open minded and think a bit outside the box as to how you may end up needing to use it. It's much better to do a little over-thinking from the beginning than run in to a "gotcha" later down the road.

Equipping

For the past 8 or 10 years, I have made sure my work vehicle is equipped with the one thing rarely planned for – and always needed without warning – electrical power. I cannot count the number of times I've found myself at a remote site and needed a quick soldering job done, a 4" hand grinder to cut stubborn tower hardware, or have been tracking down an anomalous signal problem and need to take the Service Monitor or Spectrum Analyzer out in the field on short notice. The only real way to handle these, and many other similar needs, is to have portable power, and making it a permanent part of your vehicle is the true solution.

Fortunately with the popularity of alternative energy these days, good quality DC to AC power inverters have dramatically reduced in price. I have a 2 kW Pure Sine

Wave unit mounted under the front seat of my truck which was under \$400, and models less than that are now available. It is connected with #2 AWG wire directly to the engine compartment battery for minimal voltage drop and safety. While I have used a solenoid to activate an inverter in the past, my current one has a power disconnect handle switch (from a Marine supplier, under \$10) so I only have to pop the hood and power it up when needed.



It can provide me enough power for that hand grinder, circular saw, small air compressor, portable electronic gear – including my Crown FM500T transmitter. I've used that transmitter on more than one occasion to get a translator signal back on quickly from my truck. Don't forget to carry a few properly sized and rated electrical cords – I have short and long extension cords, as well as a few multiple outlet cords to make working from the vehicle less restrictive. There's nothing like the feeling of having that power with you – and being able to park close enough to use it.

I also utilize the heavy duty ABS plastic totes made by a number of manufacturers: Rubbermaid, Sterilite and Durabilt are just a few of them, and they come in a variety of sizes so one will certainly nest conveniently in your vehicle and maximize your space utilization. I have three different sizes, each with different purposes which are marked for ease of access. In a small one I have a myriad of wiring needs – electrical, audio, coaxial, computer, CAT5 – and associated pre-made jumper cables and adaptor cables. When I find extra cables lying around, they go in this tote for a future need. In another I carry one with my bigger tools – propane torch and accessories, hand grinder, hack saws, larger hammers, an assortment of hand saws and tools and a selection of several sizes of tarpaulins.

There is also half a dozen of the generic zip tool bags in two different sizes. My local discount tool supplier usually had them on sale for under \$10 and it certainly allows for convenient organization of smaller items. While they are all black, I have color coded the handles with tape to allow me to easily grab the one needed. I keep my 18 Volt cordless gear in one (with extra battery packs and plug in charging system), small test gear (Bird Dog Satellite meter, Rig Expert antenna analyzer, etc) in another, and safety gear (ratchet straps, rope, gloves, climbing harness, etc) in another. One small bag has various audio connectors, CAT5 connectors, and some of the variety boxes of resistors and basic components; and a small bag contains socket sets in SAE and Metric – in 1/4, 3/8 and 1/2 inch drives with extensions.

Equipment

Of course, each of us has our favorite set of tools with which we work; I have mine separated into different levels of use and carry each of them at all times.

1. My "Tool Bag" which is all of the hand tools, screwdrivers, pliers, basic wrenches (allen, torx, etc) as well as the small version of common SAE and Metric open end wrenches. I also have CAT5 crimp, 110 and 66 punch tools, soldering pencil, basic DMM and test meters and Fox & Hound gear. It is in a totally zip close type case and I keep it under 50 pounds, so I can check it and keep TSA happy on a flying trip. In the outer flap zipper pouch, I keep the shoulder strap that came with it, in case I find it more convenient to snap on and carry it that way instead of the handle. Whatever the job, this is the bag I grab when I walk in the door.

2. My "Tool Box" which is actually a zip close type large case on wheels that can be rolled along with the Tool Bag on its handle if needed. It holds the next bigger size of needs – 140 W soldering gun, hammer, larger hand tools and wrenches, larger bags of Zip ties, duct tape, glue, etc – and rarely has to be taken in on a job.

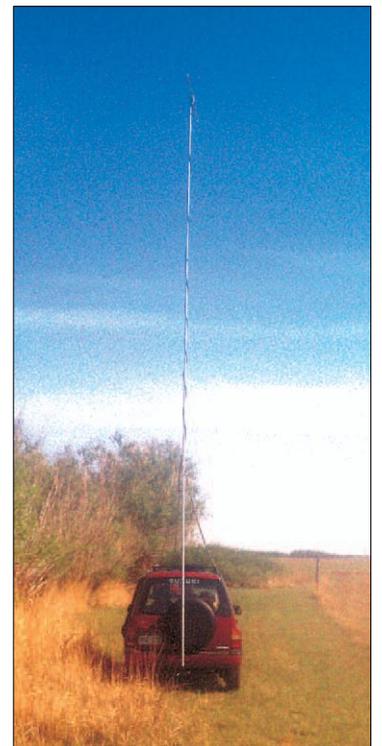
3. The various totes and zip bags noted above with specialized work equipment and needs.

Above and Beyond:

Depending on your specific work needs, some other items I have may be worth your consideration. These might include a portable mast to hold an antenna – mine is 26 feet and mounts on the receiver hitch and has support arms from the roof rack.

Maybe you need a bumper mounted winch; attachments for towing or utilizing a trailer with your vehicle; external DC ports on the fender for hooking up booster cables; or some other specialized need. My travel van has much of these same abilities, but also a mini-fridge for the ultimate creature comfort. Whatever your situation, think ahead and equip your vehicle for the most unforeseen circumstance and you can be the hero of the day. Just don't get used to that feeling – we are engineers, after all.

Jim "Turbo" Turvaville is semi-retired from 36 years in full-time Radio Engineering and maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.



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Bubba – A Lesson Learned

Sensitize Your Staff to Avoid Ratings Impact

by Peter Gutmann

For better or worse, just as it seemed that the good old days of outrageous DJ stunts were long gone, Bubba the Love Sponge comes around to prove us wrong. This time, though, it had nothing to do with wild promotions, far-fetched contests or disruptive hoaxes. Rather, it involved something far more mundane – a blatant attempt to distort ratings.

The purpose of this column isn't to gloat that the scheme ultimately was thwarted, justice prevailed, etc., but rather to review this situation and then to provide some reminders of licensee responsibility to guard against similar problems, which can be quite costly in terms of losing the benefit of ratings, not to mention reputation.

The following outline of the matter is taken from the allegations in an October 15 complaint filed by Nielsen Audio, Inc. against Bubba Clem, whose show was being broadcast over WBRN-FM, Tampa. Beasley had acquired the station from CBS in late 2014 and changed its call sign from WHFS-FM, presumably to cement its identification with Bubba's syndication company, Bubba Radio Network, Inc.

On July 29, 2015, Bubba learned from an avid fan that four Portable People Meters were being placed in the household of a listener in the Tampa market whom the fan knew. Bubba met with the panelist and promised him \$300 per month upon an improvement in his ratings, and a bonus of up to \$400 per month if targets were achieved.

Phone texts followed, in which Bubba warned: "U have to PROMISE NOT TO SAY A WORD ... This could ruin me." Bubba further instructed the panelist to listen to WBRN-FM, as well as a few other stations to avoid suspicion, but that: "you CAN NOT LISTEN TO EVER 102.5," which broadcast one of Bubba's main rivals. He further described how to circumvent the PPM's motion-sensing technology (which lapses into inactive mode in order to minimize the detection of audio signals when a participant is not present to hear the broadcast signals).

Alas, Bubba's numbers dropped in August. He then urged the panelist to try harder: ("Please buddy. Please. I'm paying u!!!"). He purchased and sent the panelist radios (presumably to maximize exposure of the meters to the coded WBRN-FM signal). He also learned that a similar scheme had been thwarted: "I had a guy who had just 1 of them. And they took it from him Friday. Cause he wasn't smart about it. ... So I need your 4 more than ever buddy."

Although just how is unclear, but Nielsen discovered the fraud and the cooperating panelist disclosed Bubba's arrangement. On September 21 Nielsen confronted Bubba with the evidence. On October 6, Bubba held a press conference in which he admitted the scheme, offered no excuses and accepted full responsibility. Indeed, given the documentation of his blatantly illegal activities, he seemingly was left with no alternative for a plausible denial or innocent explanation. Truly, one has to wonder how anyone – much less someone who's been in the communication business for 30 years, whose controversial acts have run afoul of the law before, and who surely was aware of the erosion of privacy – could be so naïve

nowadays to think even for a moment that texts or other communications evidencing a crooked deal would never come to light.

Nielsen asserted that by delisting WBRN-FM from its September reports it had avoided impairment of its ratings. Nonetheless it contended that the integrity of its audience estimates and the viability of its business had been called into question and that its reputation had been irreparably damaged. Its lawsuit sought one million dollars plus punitive damages and an injunction to enjoin Bubba and his associates from committing any further acts intended to distort ratings. Clearly the magnitude of the relief being sought was intended to send a warning signal to the entire industry, although hopefully, even without such a warning, few instances as blatant as this would be apt to arise in the future.

Tom Taylor's excellent NOW newsletter raised and answered an intriguing question – can a mere four corrupt PPM meters really make a significant difference in a market the size of Tampa (# 11)? Tom cited an estimate that there are about 1,250 in-tab meters on a typical day for the four dozen stations there. Yet he also cited an expert who contends that the average meter count at any one time for a competitive station in that market would be only in the high single digits. On that basis, even a single suspect meter could significantly skew the station's ratings. The impact of four could be drastic.

Notably, Nielsen only sued Bubba personally and his syndication company. The unnamed panelist (as well as the fan who had facilitated all this) would seem equally culpable, but presumably anyone willing to sell his soul for \$300 per month isn't in a position to pay seven-figure damages and would make an impractical defendant.

Yet what about the licensee of the station that carried Bubba's show and that stood to gain a nice boost in ad revenues from the inflated ratings? The day before Bubba's public admissions, Beasley issued a press release in which its president stated that it had been unaware of Bubba's actions, had quickly cooperated with Nielsen once it learned of the allegations and strongly condemned Bubba's actions. Beasley further distanced itself from the controversy by emphasizing that Bubba was not its employee but merely an independent contractor who provides programming.

So far, Bubba seems to have emerged relatively unscathed from all this – other than the pending lawsuit, of course – and for hardly the first time in a career checkered with controversy. Beasley suspended his show for a mere week, and only on a single station. Nielsen subsequently stated that it had uncovered further suspect activity and proceeded to delist WBRN-FM for a second month. In the meantime Bubba's show continues to air.

Beasley further noted that it was taking appropriate steps to ensure that such conduct does not occur in the future, including training for Bubba (I'd like to be the proverbial fly on the wall during that session!) and distributing guidelines to all of its employees. In fact, Nielsen publishes a "PPM Rating Distortion & Rating Bias Handbook" that provides some helpful, if mostly obvious, direction. In light of the Bubba debacle, it seems opportune to review Nielsen's guidance.

Nielsen emphasizes at the outset that its requirements pertain not only to the broadcast of promotional activities but to all means of communication, including social media. It further cautions that its guidance is not intended as an exhaustive list of considerations and that any activity that has the potential to bias survey participants or distort survey results must be avoided.

Among the activities that Nielsen cites as prohibited are:

- Any attempt to solicit listeners to become panelists.
- Any announcement or activity that prompts survey participants to identify themselves, surrender control of a meter to another person or provide false demographic or household information to Nielsen.
- A station learning the identity of a PPM panel participant and that does not immediately notify Nielsen.
- Allowing anyone associated with a station or even a member of their household to serve as a panelist.
- Any attempt to influence the listening behavior of a panelist or having a meter's exposure differ from a panelist's exposure to encoded media.
- Double encoding of a broadcast signal so as to falsely trigger a meter.

Even beyond these direct attempts to skew ratings, Nielsen considers to be improper seemingly neutral activities such as merely announcing that PPM research is in progress, emphasizing the importance of any radio ratings research or encouraging panelists to unlock and carry their meters. Of course, none of this is intended to prevent authorized subscribers from citing the results of prior surveys in their marketing.

Nielsen further notes that it has a range of options to redress violations, including placing a special notice of suspect station activities in applicable reports, flagging audience estimates with a symbol and footnote, listing a station only "below the line" rather than in alphabetical sequence, and delisting (omitting a station's ratings altogether in one or more reports).

Nielsen's lawsuit against Bubba and his syndication company is unprecedented and perhaps intended to signal more aggressive future enforcement. Indeed, the lawsuit contained numerous counts, alleging fraud, wrongfully interfering with Nielsen's contractual relationships with both Beasley and the panelists, and violations of the Florida Deceptive and Unfair Trade Practices Act, which prohibits "[u]nfair methods of competition, unconscionable acts or practices, and unfair or deceptive acts or practices in the conduct of any trade or commerce."

As of this writing (early November), Bubba has not answered the complaint. Rather, he had requested an extension of time to file his response, presumably to avoid having to assert any substantive defenses (although, since he publicly admitted the wrongdoing, it's hard to imagine just what or how persuasive those defenses might be). He also raised the possibility of a settlement, although it remains to be seen if and to what extent Nielsen is willing to compromise on a matter that strikes at the very heart of its integrity and business.

Regardless of the outcome of the lawsuit, the lesson is clear – do all you can to sensitize your staff and even independent programmers to dissuade them from activities that, even if innocently intended, could be construed as having an impact upon audience ratings. And if you do become aware of suspected activity, report it promptly, cooperate fully, and hope for the best.

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

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Transmitter Site

Total Transmitter Rebuild

by Mike Hendrickson

One of the hazards of living in the northern part of the country is the winter storms that can coat a thick layer of ice on all outside objects, including towers. In this case the tower was coated with several inches of ice from ground level up to several hundred feet. As the temperature warmed up, the ice came loose and fell from the tower. The ice that fell weighed tens, if not hundreds, of pounds. When a heavy object falls from a few hundred feet, the roof below will be damaged. The roof at this site was punctured in several locations, including one hole about a foot in diameter directly over a transmitter. This provided a drain on the roof and the melting ice and water drained into the transmitter

bringing dirt, sand, rocks, and other debris from the roof.



The assessment, after the transmitter was inspected, was that the transmitter was totally destroyed. A replacement transmitter was ordered and, until the replacement arrived, the station operated on the backup transmitter.

While we waited for the replacement transmitter we did an assessment of the destroyed transmitter. Since the transmitter was only twenty years old I felt we could attempt to rebuild it.

Before I decide to rebuild a transmitter there are several criteria that must be met:

- First of all, is the transmitter model still supported by the manufacturer? In this case, the transmitter was a Harris HT25 and GatesAir still supports this product.

- What appears to be the extent of the damage – is it mechanical damage, electrical damage, or both? In this case there was no electrical damage because the transmitter was off when the roof was punctured.

- Take a look at the wiring harnesses. Is the wire insulation brittle? If so, will the wiring harness need to be replaced because of the potential for shorts? This transmitter had only two wires that needed replacement. They were located at the back top of the transmitter, close to the hot exhaust of the PA.

- Consider the age of the transmitter and whether or not it would have been replaced in the next few years if there had been no damage? In this case the transmitter would have continued in service for at least another 10 years before replacement would have been considered.

- How much time will you be willing to dedicate to the rebuild? Your time has value and this must be considered as part of the cost of rebuilding it. In the case of this transmitter, I estimate that it took about 50 hours of labor to complete the rebuild.

After the decision to rebuild the HT25 had been made, it was moved to its future site. This gave us a secure location with adequate lighting and power for testing. We also obtained all of the GatesAir product bulletins for the transmitter. This would also be the perfect time to install all of the product updates that have been done to the product line.

Finally the rebuilding could begin. This was not my first rebuild of a damaged transmitter, but it was one of the more interesting rebuilds because of the amount of dirt and debris in the PA cabinet. Before any component was removed from

the transmitter a complete set of high quality pictures were taken of transmitter. The back door, front access panels, and PA cavity access panel were removed to permit pictures to be taken of the inside of the transmitter.

As the transmitter was dismantled, each major component was labeled. All of the minor components and mounting hardware were placed in storage baggies and labeled. Pictures were taken every time before something was removed from the transmitter. By the time transmitter dismantling was completed I had taken several hundred pictures. I also took copious notes of the dismantling process.

This transmitter was dismantled down the bare cabinet walls. Everything, except for a few items on one of the cabinet walls, was removed. At any time during the dismantling, if additional damage was uncovered, a decision could be made as to the value of continuing the rebuild. Until the transmitter was completely dismantled I did not order replacement parts.

After the transmitter was dismantled I made an assessment of the replacement parts that would be needed and desirable for the reassembly. Obviously, any component that had been damaged needed to be replaced. But, less obviously, there are many components that should be replaced just due to age. For example, the bearings in the PA blower motor should be replaced. The blower motor had run continuously for over 20 years, so now was the time to replace the them. Several of the circuit breakers were replaced, and any resistor that showed signs of overheating was also replaced.

The RF gaskets around the PA compartment could and would be replaced. As a side note, be absolutely sure that you reinstall all of the RF shielding gaskets and braid. Even the slightest crack may permit emissions from the cabinet that may cause interference to licensed users in other bands, such as the 700 to 800 MHz band. If there are emissions from the cabinet that cause interference you will be required to fix the problem.

The next step in the process was a complete cleaning of the transmitter. For this I used soap, water, cleaners, vinegar, and silver polish. I washed out the cabinet, the PA compartment walls, and other major components using a power washer and soap. The vinegar was used to clean the brass and copper hardware. The silver polish was used to clean the tube socket components. After the silver polish and vinegar were used, I used water to rinse everything.

After everything was cleaned, the transmitter was reassembled. I used all of the pictures that had been taken during the dismantling of the transmitter, in reverse order, to guide me on the reassembly of the transmitter.



During the reassembly, I also took the opportunity for a “product improvements.” The original design of this transmitter had the exciter RF output driving a driver stage, followed by an IPA that drove the PA tube. The driver stage was necessary at the time of the design of the transmitter, as many exciters that were in use did not have more than about 15 Watts of output. The driver amplified the 15 Watts to a level that would adequately drive the IPA. More modern exciters have RF outputs that can directly drive the IPA stage without the need for the driver. Because we would be using an exciter with 50 Watts of output I decided to eliminate the driver stage. The driver was left in place to plug the hole in the PA blower duct work but the power cables were disconnected.

The other product improvement was to remove the Flex Patch assembly. This was done because the RF cables appeared to be brittle and we thought if they were bent, the cables would probably short. The other consideration that I had with the removal of the Flex Patch assembly was that it was a failure point because of the multiple connections.

I ordered double shielded cables from a vendor and connected the exciter directly to the IPA input. The IPA output was connected to the IPA low pass filter and directional coupler with a new cable. The output of the directional coupler was connected to the PA grid input with another new cable.

After the transmitter had been reassembled, the “fun” could begin. I connected the transmitter to an AC power, fused disconnect switch. The output of the transmitter was connected to a Wattmeter and dummy load. I left some access panels open, but put shields in place to prevent any accidental contact with high voltages. This initial turn on was done exactly the way transmitter manual instructs a purchaser of the transmitter to conduct an initial start up of a new transmitter.

I fully expected that there would be some problems and I was not disappointed. The screen power adjustment motor was defective and the screen voltage circuit breaker was intermittent. This was due to age and not water damage.

Another problem that was discovered was the mechanical failure of a piston tuning capacitor in the IPA low pass filter. The replacement for this capacitor was several hundred dollars. Fortunately, we had another transmitter that was in the process of being parted out. This transmitter used the same assembly and we were able to salvage a capacitor. There did not seem to be any other problems.

After a couple of hours of gradually making adjustments, the transmitter was operating at full power. The final step was to check for harmonic and spurious emissions. The transmitter passed with flying colors, but the exciter failed. This resulted in a replacement exciter being installed until the failed exciter could be repaired.

This transmitter is now on the air operating full time.

There are a few items that I would like to point out. GatesAir has a document that explains how to change frequencies on the HT 25 transmitter. This is a great document that is very useful for rebuilding a transmitter even if there is no frequency change. Other transmitter manufacturers also have documents and product bulletins that are very useful if you are doing a transmitter rebuild.

Be sure you have adequate test equipment available for the final testing and adjustment of the transmitter. At a minimum you need dummy load, a calibrated wattmeter, voltmeter, and a spectrum analyzer. You will need to verify that the transmitter meets the FCC rules regarding harmonics and emissions. Depending upon the specific requirements of the transmitter rebuild, you may need other test equipment as well.

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

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Considerations for LPFM

by Steve Callahan

I had the pleasure of working for a very wise man that owned radio stations in three states, and also had several low power television licenses across the country. He once told me that LPTV didn't really mean "low power TV" but actually meant "low profit TV," because he couldn't make enough money with them to justify their existence. He ran some very profitable radio stations, but never had an acceptable return on investment in the LPTV facilities.

Let me say right up front that I believe in low power FM stations (LPFM) and there are many low power FM stations across the country which do an excellent job of providing a unique and localized programming source to their listeners. However, there are many entities that have applied for an LPFM construction permit that didn't have a clue of what they were getting into.

I've had the pleasure of building several LPFM stations for knowledgeable and dedicated licensees, and I'm happy to report that they all are still on the air. However, I always get calls or emails from LPFM permittees who are in desperate need of technical assistance and have a construction permit that is going to run out soon.

I've noticed that there seems to be common problems with those LPFM permittees who find themselves in trouble. It starts with the decision to actually apply for an LPFM license. Many prospective licensees go it alone with the actual application. The LPFM application is not as difficult as some of the other FCC applications, but it is definitely a good idea to recruit the services of a competent consultant. If you decide that your most burning passion is to own a radio station with a small, but important (to you!) coverage area, by all means proceed. However, proceed with your eyes wide open.

Ask another successful LPFM licensee for help with the application. Chances are good he or she used a competent consultant and advisor to guide them around the potholes in the FCC application. For example, many LPFM applications were rejected because the proper waiver wasn't asked for or the applicant didn't realize that they had to protect an existing adjacent station which was operating a subcarrier with programming for the blind and print handicapped.

I'll emphasize "competent" consultant because all consultants are not created equal. Some unscrupulous individuals take your call (and your check!) and then use their software to generate an application which might or might not be granted. Again, ask around in the LPFM community for the track record of that consultant. Good consultants have a good reputation in the business – and satisfied clients.

One pitfall that I see all the time is the tower site specified in an LPFM application. Again, an unscrupulous consultant merely turns to the Antenna Site Registration (ASR) website, looks for a tall structure in the area that will work to squeeze in the frequency, and then specifies it as the future home of the LPFM station. I have seen applications which specify an existing directional AM station's towers as a potential site, many existing cellular towers, and even a tower – which were proposed but never built. Even though it is technically possible to

locate an LPFM antenna on a series-fed AM tower, it's more work and expense than an LPFM should undertake. On a tall tower, stay away from the "cellular zone" which is roughly from 120 to 160 feet above ground level. That's prime real estate for the tower owner to locate cellular panel array antennas. It's actually easier to get permission for an antenna on the top of a cell tower. However, beware that being on a cell tower will be expensive because the tower owner is used to the high monthly rents they are getting from the cellular companies.

Back in the previous century, if you specified a tower in an FCC application, you needed to certify that you had "reasonable assurance" to locate on that tower. It helped if you even had a

contingent lease or, at a very minimum, lease terms that were verbally discussed and agreed upon, between the lessor and lessee.

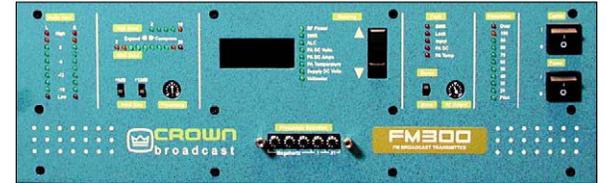
Today, the first thing you should do when you get that coveted construction permit, is to contact the tower owner if you haven't already. If you specified a tower owned by one of the big national tower companies, get on the phone as soon as possible. It can be tough to get through to the right person who leases tower space in your region. Get ready to be knocked over by the monthly tower rent. Don't even think of asking for free tower space because you are a nonprofit group. If you run into a roadblock or the rent is out of your budget, it's better to look for a new site and modify your construction permit sooner rather than later.

If you specified an existing broadcast tower, make sure it isn't an AM tower. If it's an FM tower, contact the owner as soon as possible and ask politely if you can



Jampro LPFM Antenna

rent some space to locate your antenna. One FM station owner I talked with said an LPFM permittee marched into his station one day, construction permit in hand, and announced that he was ready to put his LPFM antenna on the FM tower and was there to accept any equipment the FM owner was going to donate to the LPFM. The overzealous LPFM fellow was promptly shown the door. If the tower you have specified has other rental antennas on it, chances are good that you can rent some space too. However, unless you know the tower owner personally and he or she is extremely civic minded, don't ask for free tower space.



Crown LPFM Transmitter

Let's say you have your LPFM construction permit, and have a valid, and acceptably priced tower lease; it's time for a business plan. If you didn't use the time you spent waiting for the construction permit to do one, you need to do a budgetary plan as soon as possible. Almost every potential LPFM broadcaster I have talked with didn't prepare a business or budgetary plan. Just like any other business, you'll have fixed and variable costs. The tower lease needs to get paid each and every month, the studio rent needs to get paid, and the monthly telephone and Internet bills need to get paid. Unless you plan to spend 24 hours a day single-handedly running the station, maintaining the equipment and fund-raising, you will need some help. Hopefully you will find some volunteers as dedicated as you to help out, but they are not that easy to find these days. Finding and retaining good employees is a big job and comes at a cost and a pile of regulatory paperwork.

Finally, you need to seek the services of a well-recommended local radio engineer to make a list of needed equipment to make your dream radio station a reality. The local SBE (Society of Broadcast Engineers) can assist you in finding that person. Your local engineer can assist you in finding equipment that will fit your budget but will also make the most of your potential coverage area.

As you have seen, there is a lot of spending that has to take place, both anticipated and unanticipated, before you can share your CD collection with the world.

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

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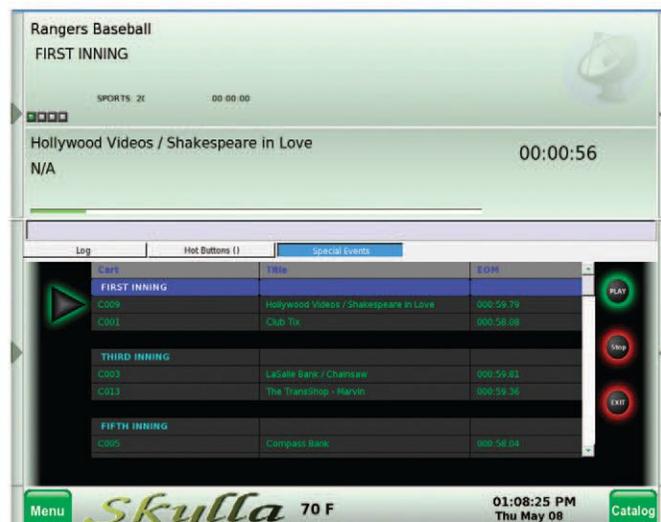
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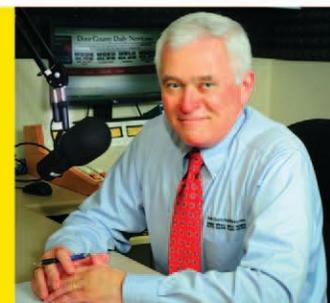
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Chief Engineer

Staying in Control

by Scott Schmeling

The Continental Electronics website (contelec.com) has a good over-view of transmitter maintenance and troubleshooting. After the opening section on safety, it mentions:

Transmitter RF sections are ever more reliable; most problems that will keep you off the air are control-circuit problems. The time to learn the control circuit is before you have a problem.

It just so happens I've had some "issues" that confirm that statement.

Case #1 - A Collins 831G-1 would not turn plates on. Blower and filaments came up but then ... nothing. Normally, after a 120 second delay (as I recall) the plates would turn on. The delay is accomplished with a time delay relay instead of external circuitry (capacitors and resistors) delaying the energizing of the relay. I located the time delay relay and took some voltage measurements. 24 Volts DC was being applied to the input, but the coil never energized. Since I had no replacement, I temporarily installed a standard relay in its place.

As I recall, the price of the replacement relay was much higher than I wanted to pay. So I pried the sides of the case and slid the relay out. Inside was a small circuit board with two capacitors, a resistor or two and a transistor. I replaced the capacitors with values as close as I could find and

tested it – *it worked!* It wasn't quite a 120 second delay, but it was close enough. I had a photo of the relay's insides, but it was on my previous phone – which died rather abruptly last August so I can't show it to you (sad face!).

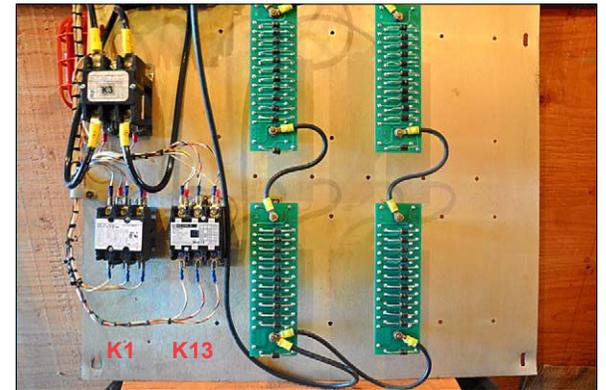
Case #2 - A CCA operating properly would, for no apparent reason, shut down. At the site everything looked fine but pushing the ON button would do nothing. We discovered that if we flipped the wall breaker a few times, the transmitter would eventually come back on.

We were thinking the wall breaker may have been bad, but observing the Input Voltage meter showed proper service voltage. We had even replaced the *blower*, thinking *that* was the solution – but the problem continued.

We measured the voltage feeding the blower motor, and found the voltage across the two terminals was only 120 Volts, where it should have been 240 Volts. We had a bad contact on the blower contactor (K13). The contactor *was* energizing, but because of a bad contact the blower was not blowing, no air was flowing, and the transmitter was not transmitting!

Our theory is that flipping the wall breaker would cause the contactor to energize, and every now and then, we would get a good contact and the blower motor would run. We needed to replace the contactor. This is where the *real fun* started!

K13 is mounted at the very bottom of the rectifier panel. The original contactor is made by Arrow-Hart. I matched specs and bought a Square-D from a local electrical supplier. Unfortunately, the mounting is slightly different. So we pulled the rectifier panel – again! (You may recall seeing this panel in an article earlier this year when the wiring harness had to be replaced. I wish the contactor had been acting up then!) We decided to mount the new contactor beside filament contactor K1 just above its original position. I'm happy to say that after replacing the blower contactor, the transmitter has been running great.



K13 was moved to a new location.

Case #3 - In another CCA, the transmitter shut down and would not come back up. When I arrived on site, I found the wall breaker had tripped. I reset the breaker and the blower started right up. This transmitter is configured to automatically come up on low power after a power outage, so I waited for the plate voltage to turn on. I waited ... and waited ... you get the idea. The plates never turned on!

(Continued on Page 22)



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Staying in Control

– Continued from Page 20 –

I opened the schematic and started tracing. Those of you with CCA transmitters know that, for low power, the low power contactor (K3) applies ground to one side of the high voltage transformer, while the high power contactor (K2) applies each side of the 240 Volt line voltage to the transformer primary. The 240 Volts AC applied to the coils of each of those contactors goes through an auxiliary contact on the *other* contactor. In other words, one side of the line voltage feeding K3 goes through the aux contact on K2, and vice versa. This is an interlock so *both* contactors can not be energized at the same time – remember, K3 applies a *ground* to one side of the high voltage primary.

Well, it appeared the aux contact on K2 was open, therefore not allowing K3 to energize. (Here's my first mistake.) I unplugged the wires from the aux contact and slipped them on a small coupling adaptor. Then I reset the breaker. My blower started and filament voltage was present. After the delay, K3 energized and ... *BAMMM!* The breaker tripped *instantly*. (And I'm sure my heart was racing a bit.)

I took a closer look at K2 by removing the cover so I could see the contacts inside. The two outside poles (this is a 3-pole breaker but only two are used) showed signs of overheating. At least one pole had sort of fused itself together holding the contactor in the energized position. *That's* why the Aux contact was open preventing K3 from energizing – and that's why, when I bypassed the Aux contact and K3 energized, the breaker tripped. Since K2

was fused into conducting, when K3 energized it placed a ground on one side of my 240 line voltage. The breaker did exactly what it was supposed to do.



Overheated Contacts on K2



K3 Disintegrated Contact

Several years ago, the hot contact of K3 had overheated to the point of disintegrating, so we had moved that wire to the center contact. When that happened I got a replacement

contactor and had it on site. So I replaced K3 and filed the pitted contacts of K2 and we were back in business.

One month later, almost to the day, the wall breaker tripped again! This time when I reset it, the transmitter came up just fine and all the readings were exactly what they should be. So you can imagine my surprise when the breaker tripped again a half hour later. The breaker felt very warm. Running at full power, I measured 72 Amps on each leg of the 100 Amp breaker. You would think that would have been fine. I let it run for a while, watching the current, and feeling the breaker. Current didn't change but the breaker was getting progressively warmer so I ran it back down to low power.

I checked with Van at V&J Electronics and he said the breaker was too small. It should have been a 150 Amp. (I didn't install this transmitter.) The interesting thing is, the transmitter has been in place since 1996. The breaker failed two years ago and we replaced it with the same value. Unfortunately, a 150 Amp breaker will not fit in this panel but a 125 Amp will. It will be here Monday!

Not one of these problems was in the RF section – they were all control-related. That's why it's important to be familiar with the control circuitry of your transmitters. Take a look at your manuals. Find the description of the control circuits. Read through it. You might even want to jot down notes and type up a condensed version. Then put it in the front of the manual and/or in your log binder so it's easy to refer to. I did.

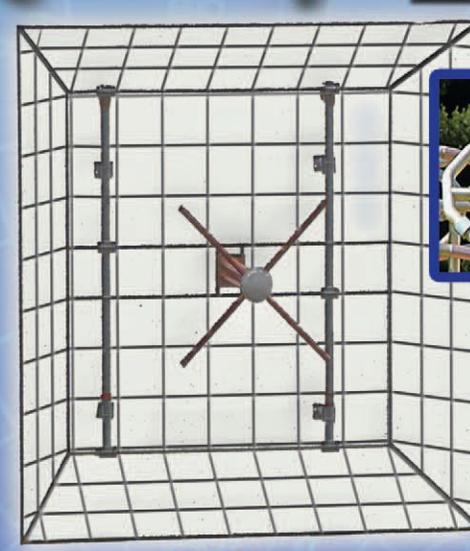
That's it for now. Christmas is almost here. I wish all of you a very Merry Christmas and a safe and fabulous New Year! Until next time ... keep it between 90 and 105!

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

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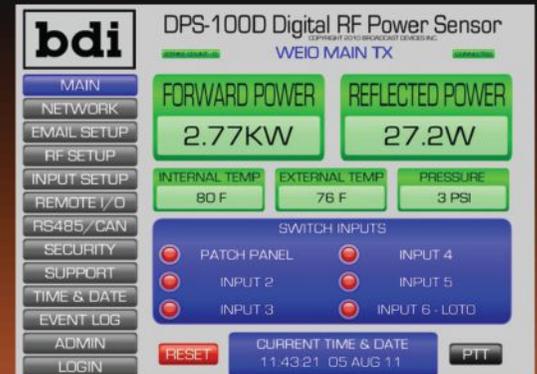
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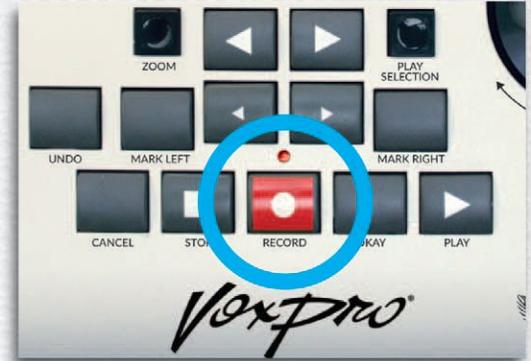
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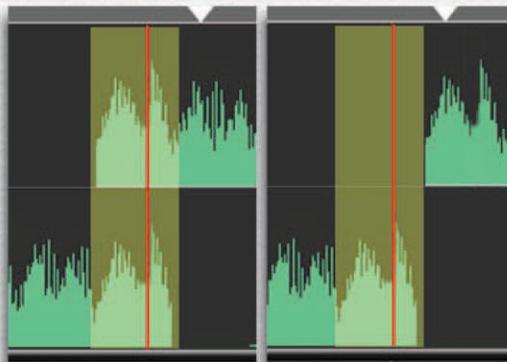
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Studio networks have a way of expanding, and those so-called islands of reliability could now be one large landmass the size of Australia. If one studio goes down, they all will...

For the entire story... INN29.wheatstone.com

Standing Beneath the Big Tower

90 Years of WSM

By Scott Johnson
From three miles north on I-65, I see it, rising from the trees like a steeple. And for radio engineers and country music fans alike, it does mark a place of great reverence. It is the 808-foot tower of radio station WSM-AM, and this day marks an important date in that station's storied history. 90 years ago on this date, WSM first signed on.

As I drive up and am directed to parking in a corner of the vast field, along with a hundred or more other guests, both the scale of the place and the weight of the experience sink in. I'm here for WSM's 90th anniversary celebration, an open-house at one of the nation's most famous transmitter sites.

For the entire story... INN29.wheatstone.com



Kim Komando's New Studios @ Corner of IT and Radio

Oh, the irony.

Kim Komando's talk show about gadgets and computer technology was turned down by two broadcast networks in 1994 because they said computers and the Internet were a passing fad.

Of course we now know that IP is here to stay. And the irony? The Kim Komando Show, produced by WestStar, is now viewed on her television network streamed over the Internet, and it's being distributed to 450 radio stations from a new studio facility that is — you guessed it — IP based.

For the entire story... INN29.wheatstone.com



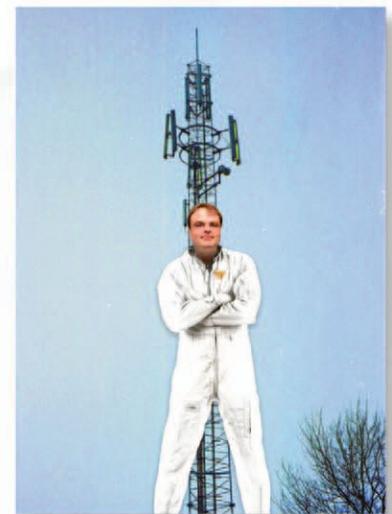
Processing Tip From the Field

Mike Erickson reports in with this audio processing tip:

Clip restoration processors can make great additions to the production studio but we don't recommend them for the air chain, where they can play tricks on otherwise great sounding audio.

These algorithms seem to work on overly clipped audio but can be unpredictable on audio that doesn't need to be restored.

For the entire story... INN29.wheatstone.com



Emergency Prep

Site Preps You Can Do

by Rolin Lintag

Are there things you can do now to save yourself from those frequent drives to the remote sites during inclement

weather? You may not be able to stop the snow from falling but you can possibly prevent avoidable trips to the remote sites. Even when you have to, you can be ready for it.

Let's take a look at the few things you can do to prepare for winter, for example. For those of you who are too busy to even read this whole article, a checklist at the end can be printed out for immediate action.

Electrical Disturbances

Winter can cause disruption of electrical services to a remote site. This is usually due to tree branches falling on utility power lines, strong winds causing single-phasing anomalies and just plain Murphy's Law in action.

One sure thing that comes to your mind is that the generator system should be ready. Perhaps it is not too late to get that

mechanic out to the site and verify proper operation of the battery/charger, block heater, starter motor, coolant and air intake/exhaust. Think of the generator as a system and its "function."

The mechanic will look for the generator as an engine, but you need to make sure that the air vents of the genset room will open when it is in operation. The

genset engine will choke if it runs with a restricted intake air. Those room air vents, air filters and the exhaust muffler are part of the genset cooling system that need to function properly for the genset system to achieve its mission. Still on the function side, are you sure that the ATS (Automatic Transfer Switch) will switch to the genset source when the Mains fail? Will your remote monitoring system tell you of that fact?

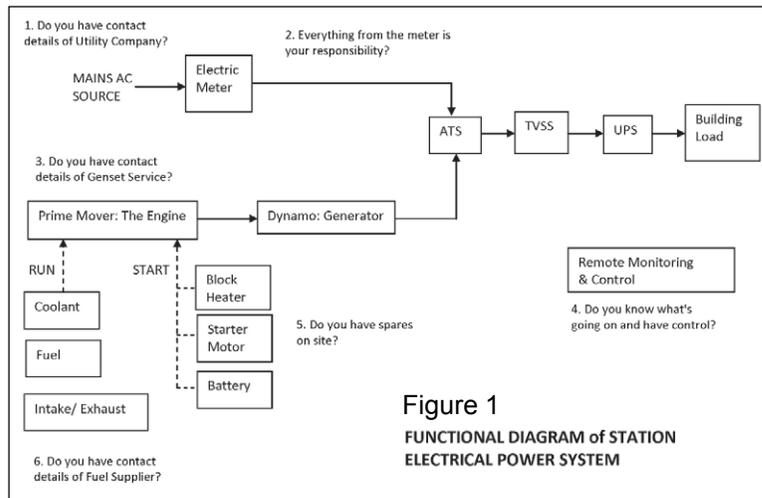


Figure 1
FUNCTIONAL DIAGRAM of STATION
ELECTRICAL POWER SYSTEM

Since preparation of your genset may be the single best proactive step you can do to harden the site from the weather, take a look at **Figure 1** to see my functional diagram of how the electrical system looks like from the maintenance point of view.

Question 1 deals with how to get the Utility Company to respond to problems involving everything up to the electric meter. Read the Service Contract so you know for sure if the Utility Company is the one to act on the problem, or if it is you. It is possible that the Utility company will trim the tree branches hanging over your power lines at their expense. It is good to take the proactive step of verifying this ahead of time.

That leads to **Question 2** which clarifies if the tree cutting service is your concern *after* the meter. If everything after the meter is your responsibility, then have all tree branches hanging over the power lines trimmed on your dime. If the lines are buried, are the conduits plugged well enough to prevent reptiles and rodents from making them as their hiding place?

Question 3 deals with the possibility of needing genset service during inclement weather. Do you have a maintenance contract to get preferred action/response from the service company? Chances are, you are not the only one asking for help when Snowmageddon hits. Verify this with the service company during their visit and get all contact details you can count on when you need service.

Question 4 is about taking charge of the remote site when you are physically not there. Is your station off the air because the genset stopped working after an hour? How do you know if the place gets flooded and you need to turn off all electrical power to prevent irreversible damage to the facility?

Question 5 is about having the part needed when it gets hard to get them during inclement weather. Having a spare starter motor for example is cheap insurance versus dealing with a replacement that needs to be flown in from another state (when all flights are cancelled).

(Continued on Page 28)


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Simian Gateway runs alongside Simian 2.2 **PRO** to manage TCP/IP communications between Simian Remote clients & Simian 2.2 **PRO**.

– Continued from Page 26 –

Question 6 is about getting the fuel you need when you need it. With frequent brownouts and extended snow storms, will your fuel vendor make deliveries on time? It is not a bad idea to arrange with back-up vendors just in case.

Low-power relay/gap-filler sites can get better protection from electrical disturbances by beefing up the UPS capacity. Get UPS brands with expandable capacities. One relay site I worked on had a transmitter/receiver load of only 140 Watts so extending the UPS capacity from 24 hours to 4 days was a big leap in reliability. Most electrical service disruptions can be restored within 3 days after a snow storm, so having that 4-day capacity ensures continuous on-air operation. If the UPS can be remotely monitored via IP, much better so you know the status of the unit and can plan/act accordingly.

Internet service to the site can also be interrupted due to power disruptions. When that happens, a reboot of the PC or a router is all you need to restore connectivity. There are web controlled power strips that can enable you to do that remotely, saving you from a road trip. It helps to use a surge suppressor ahead of the power strip (or UPS) to give better transient voltage protection to your equipment. There are units available that you can just plug onto the socket and can individually protect equipment.

Snow/Ice Protection

Making sure that the ice shield holds up to the weight of snow is best done before winter comes. Antenna dishes need protection from ice falling off the tower – add to that HVAC outdoor units, fuel tanks and shelter roofings. Also be aware that when the ice starts falling, your vehicle may get damaged and you need to wear helmet if exposed. Best safety precaution is just to stay within the building as much as possible.

Make sure that all water plumbing and faucets exposed to freezing temperatures are protected. Water expands when it turns to ice and you can expect to see how destructive that process is if you don't take the necessary precaution.

Check to see that outdoor connectors to Yagi antennas (EAS and other Receive antennas) and LNBS for dishes are weather-proofed. There are gel-filled connectors you can use for outdoor applications and with the use of rubber tape to seal the connection, you can be sure that moisture and water will be kept out. If your antenna dishes are not heated, prevent them from becoming catch basins for snow with proper orientation when not in use. Be ready to have a ladder, snow brush (used on your vehicle), non-slip boots and ice melt in case you have to go out and clean the parabolic dishes of snow deposits.

Road Safety

Make sure you have the proper tire chains on your vehicle. A pair of gloves will help you put on the tire chains as needed so expect to use them when you have to go out during winter. A small spade in the vehicle can help you get your vehicle out of getting stuck. If that does not work, then you should be ready to call a tow service – contact numbers should not only be on your cellphone, but also on a print-out kept inside the vehicle. Make enough provision for your safety and comfort in case you get stuck on the road. I usually carry a bag with warm clothing, hand warmers, blanket, weather radio/flashlight, energy bars and bottled water in the vehicle just in case. It is a given that you will have a first aid kit on your vehicle to start with.

One important item I carry in the vehicle is a butane torch. There are times that an ice melt for padlocks is useless so the torch is the way to go to open up a gate lock. A bolt cutter may work too, but you need to carry around extra chains and padlocks in your vehicle if that is your modus operandi.

Checklist

• Generator System:

- 1) Checked that batteries are strong? Good terminal connections? Remotely monitored?

- 2) Battery charger actually charging the batteries? Remotely monitored?
- 3) Good starter motor? Spare on site?
- 4) ATS and remote indicators actually working?
- 5) Fuel system checked, with no leaks or exposed parts to ice damage?
- 6) Block heater working?
- 7) Air vents actually opening during operation?
- 8) Air filter not clogged? Protected from insect clogging? (Yes, wasps/moths/bugs can clog air filters!)

• Electrical Service:

- 1) Tree branches over power lines are trimmed?
- 2) Plugged all conduit openings that may invite rodents and reptiles?

• UPS (Uninterruptible Power System):

- 1) Will the batteries last through the winter?
- 2) Do you have spares in case you need them?

• Vehicle:

- 1) Personal bag – warm clothing, gloves, hand warmers, power bars/water, flashlight, weather radio?
- 2) Tire chains and hand gloves?
- 3) Fuel tank at least half full at all times?
- 4) Contact list for towing company, Police, Fire Dept., First Aid, genset service and fuel vendors?
- 5) Spade and ice melt?
- 6) Extra gate chains, padlock and bolt-cutter as needed?
- 7) Butane torch (check local regulations for carrying this inside vehicle)?
- 8) Spare tire OK?
- 9) Safety gear like helmet, rain coat and non-slip steel-toe boots? Life-jacket if roads can get flooded? First-aid?
- 10) Two-way radio if applicable?

Rolin Lintag is Asst. Chief Engineer for KRON 4 in San Francisco, CA. You can reach him through rlintag@kron4.com

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Funny Things Happen On the Way to Making Radio

by Tommy Gray CPBE CBNE

This month, I think I will deviate from the “Techie” a bit and share a bits of humor from days gone by. We are approaching the holiday season once again and our thoughts tend to drift toward family, friends and the good memories of the past. All of us have some “good ones” I am sure, that bring a smile to our face when we think about them. We probably also have a few that bring out a “snicker” when they cross our “memory paths.” This month I want share a little story or two that may somehow brighten your day and bring an upward curve to the “smile line.” I have no doubt that you probably have some real “side splitters” that we all would laugh about as well. This is not very technical, but maybe memorable in its content.

The Air Conditioner Powered Transmitter

For many years I was working my regular route as a contract engineer, servicing the 40 or so Radio and TV stations I had under contract. I thought it would be just another week of making rounds, doing inspections, and a little preventive maintenance. About 3:00 in the afternoon my phone rang. On the other end was a GM from a small station in a nearby small town that I did not work for, who was sounding very frantic. It seems that his station was off the air and had been for a few days. By now he was pulling out his hair. It seems that his engineer (who was also a

contract engineer) had decided to take a vacation and leave him without a backup that was familiar with his plant. Now frankly, I did not know the manager but his reputation had preceded him and I was not very excited to get involved with him in any way.

Out of courtesy, I listened to his story and really started feeling sorry for him, as it seems that he was GM of a corporate owned station and being a young guy, he had to report to some very strict owners. The owners had basically told him to get the thing back on the air and start making money again or look for another job! He told me that his engineer had told him that if he got into a pinch he could call me and I would help him out. Now keep in mind I knew nothing about it at all. The Engineer had just hoped that everything would stay working and he could get some time off without incident. Well as you know, that rarely happens because the “Absence Detector” in most broadcast equipment knows when you are trying to get a day off and chooses those days to die! This was the case for this old antique transmitter.

Feeling a little sorry for the guy in his frantic condition, I agreed to take a look at it with the understanding that when I walked out the door it would be with check in hand. He agreed, readily promising to pay me when I had it back up. I drove the 30 minutes down to the site to meet him and

found what was probably one of the worst transmitter sites I had seen in some time. Now it was not because the engineer had not done his job. It was just that the equipment was antiquated junk that should have been sold for scrap 20 years earlier. To his credit, the engineer had made the best of a bad situation.

Now keep in mind that not only had I *never* seen one of these old boxes except in a picture, but it was also seriously worn out. I started inquiring about a schematic, and much to my dismay there was none that we could find. The manager was in a major panic thinking that I could walk in, flip a switch or something, and get it back up. I spent about 15 minutes trying to figure out the layout of the control circuits as something was keeping the plates from turning on. I was getting a little frustrated with him and his constant talking (he never shut up the whole time I was there). I could see nothing burned or loose, and with a meter finally figured out that the plate breaker was not getting voltage to turn on. The old Gates transmitter was one of the ones with the “telephone relays” across the front and without a schematic, it was going to be a rough go to work through it. I had the time, but frankly did not have the “inclination” as this guy was driving me crazy by this time. Finally, I looked at him and said there is obviously a bad relay, or something along those lines and there are no parts or a schematic here.

His countenance fell as he concluded that I was telling him that he was out of luck. I was looking at the wall and spied a breaker panel and a window A/C unit. Now it was winter and the A/C was not being used, so this was the only other 220 Volt source in the building. I told him, “I can get it on the air, but it will not be something that I’m happy doing this way.” He said, “I don’t care what you do! If you can get it on the air, I will be very happy for you to do it and I will give you a bonus!” I

(Continued on Page 32)

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Curious Engineering

– Continued from Page 30 –

explained that I could take the A/C breaker and wire it to the 220 Volt plate contactor and it would come on when I turned the breaker on. I also warned him that if it were to overload, it would fry itself in its own grease and might even burn the building down since it could not turn off!

He didn't care and so I wired the plate contactor to the A/C breaker and "Voila!" It came on the air and everything looked really good, believe it or not. He started jumping up and down so hard that the little portable building was shaking, and you would have thought he was a kid on Christmas morning who had just gotten exactly what he wanted! I kept telling him over and over again that I was not happy with the situation and would not be responsible if everything went up in smoke and that he would have to sign a release freeing me from responsibility. He did not care and had a smile as big as Texas on his face as he signed the hurriedly drafted document. He said his engineer would be back the next day and he could fix it then. I gave him a bill, he threw in an extra hundred bucks, and gave me a big hearty handshake and a smile.

I drove away, feeling apprehensive knowing that I probably should not have used the A/C breaker, but knowing that the guy would get to keep his job and would be the hero with the owners for getting it back on the air with the engineer on vacation. I got a call from the engineer a few days later laughing about the whole situation and telling me that, yes, the problem was as I suspected, a relay, and that all was well and the site did not burn down. We both got a chuckle out of it, and I breathed a sigh of relief and hoped I never heard from those folks again.

Billy Goat Lawn Mowers

There is a misconception out there that goats will eat a lot of grass. Now having a place in the country, I can tell you that they will eat the leaves off the trees, and eat the thorns off everything but they don't eat much in the way of grass. At least the ones I have seen don't.

Back in the early 70's I was Chief of an AM, FM, & TV in a fairly large city in Arkansas. As a side job, I did a little contracting in the area. One of my clients was a "mom and pop" AM in a neighboring small town. One day I arrived at the transmitter site to be greeted with a fence that never existed before. I called the GM and asked him what was up. He told me that keeping the grass cut out there was costing him way too much so he had a friend build a fence around the property and he was going to get a herd of goats to eat the grass. For weeks, I had to make my way around the goats to get into the building.

I learned quickly that I had better leave the truck *outside* the fence to keep the goats from eating anything that stuck out on it. I had caught one goat trying to eat the radio antenna, and ran another one off the roof where they seemed to like to go – chewing on the cab lights! I had not seen much progress toward getting the grass eaten down as it was getting higher all the time, and about a month or so after they arrived, I came out to find that the goats were gone. At first I thought maybe someone had stolen them, as it was a very rural site, or maybe at the very least they had somehow escaped.

I called GM again and asked what was up. He said that the goats had not eaten any of the grass, and that his lawn guy was going to charge him extra for letting the grass get so high. It was going to take a bush hog to cut it before he could ever mow again! The goats were history.

Moral, don't leave the grass cutting at your transmitter site to the animals.

Please Tell the Audience We Are Off the Air

One final chuckle for the day. Though it is not from a radio station it was still funny to me. One day at a TV station where I was Chief, the transmitter went down due to a power failure at the transmitter site. There was no generator there because the owners were too cheap to buy one. As a result, it was down until the power company restored service. It was on a Sunday afternoon and of course the ball game was on. The GM called me frantically, wanting to know what was up and what I was doing to get back on the air. I explained the situation to him, and told him that we were still on at the local cable company due to a microwave link there, but that the air signal was down until the electricity came back on.

His reply to me was, "Well, can you at least put up a slide to tell the folks watching by air, what is going on?"
Happy Holidays!

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

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It is Time to Retire Hybrid AM HD Radio?

by Edward A. (Ted) Schober, PE

Back in the early 1990s Gannett, CBS and Westinghouse formed USA Digital Radio to design In-Band-On-Channel broadcasting. They later merged with Lucent Digital Radio to acquire the additional technology and skills to become HD Radio. The plan was that each and every radio station would have its cake (analog broadcasting) and eat it too (a companion digital stream). It was planned as a transitional technology which allowed every existing broadcaster to transition to a digital platform. Every AM and FM station would start transmitting in both analog and digital, and when there were enough digital receivers, the analog would be shut off allowing an improved digital signal.

The FM HD Radio hybrid system worked fairly well with near CD quality out to approximately 75% of the analog signal range. On the other hand, the original AM hybrid HD radio system was absolutely terrible, with a codec (coder and decoder of the analog signal to bits and back again) that had worse subjective quality than the analog signal and coverage that extended to only a tiny fraction of the analog range.

Many of the initial problems with FM Hybrid HD Radio were solved in short order by the bright folks at iBiquity. They figured out how to send some extra channels and data to boot. They recently got the FCC to permit higher FM HD power levels to improve coverage and building penetration. The FM Hybrid system does

most of what was promised, and the FM pure digital system does much more.

AM Hybrid was no easy fix. The terrible AM HD codec was improved from “really nasty” to “not nearly so bad.” It still transmitted an obviously poorer quality signal than analog FM and arguably worse than the AM signal. AM HD Radio is hampered by the negligible amount of “information space” left over after the analog AM signal is transmitted.

As time went on, the AM Hybrid digital coverage problem only got worse because the amount of radio frequency noise in the AM band increased from CFL and LED lighting, computers, automotive electronics and the “Internet of Things.” The AM signal leaves a paucity of information space to squeeze in data to carry digital audio along with the AM analog signal, and noise makes even less space.

Early on, the mantra of the broadcaster-owners of iBiquity was that digital radio had to be for AM also. AM radio was still a place where money could be made. The AM Hybrid HD Radio system was designed to be the best possible compromise, squeezing both AM and digital into a tiny, noisy sliver of spectrum. It was a fool’s errand; never accomplished despite prodigious effort.

I was involved with an iBiquity medium wave experimental station in Frederick, MD. It showed outstanding

digital-only HD radio performance, when the AM signal was shut off, and the data used the space the AM signal formerly occupied. This station, transmitting daytime at 10 kW in the expanded band in Frederick, MD, provided dropout-free mobile service past Harrisburg, PA a distance of over 100 km. That is a range unheard of in the low conductivity North East.

I have been a booster of digital-only broadcasting in the Medium Wave band (if it is digital, then the band is no longer AM) as it has the potential to provide CD quality over a large area in spite of all the noise. The HD Radio codec can produce decent audio at the higher data rates available in digital-only HD Radio modes, and the royalty free Opus codec of DRM 30 provides the possibility of two programs on an AM channel or full CD quality.

Since the late ’90s when Hybrid AM HD Radio was introduced, the quality of the AM band has declined. Noise sources from bad and overstressed power lines, thousands of noncompliant switching power supplies, light dimmers, home computers and RF noise from automotive computers and equipment, means that the already pitiful range of AM HD Radio is now even worse. When I read David Layer’s recent reports of iBiquity medium wave HD Radio, I was seriously disappointed and reported my observations.

While FM Hybrid HD Radio is a qualified technical success, the consumer and retailer acceptance has been anything but.

AM Hybrid HD Radio is neither a technical nor consumer success. There are many AMHD exciter still sitting in racks, unpowered. A number are still in operation, mostly at major stations whose licensees held ownership in iBiquity. People don’t listen to Hybrid HD AM Radio because the AM signal of a well engineered AM station often sounds better on a decent radio than the Hybrid AM HD signal does. *(Continued on Page 36)*

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– Continued from Page 34 –

In the early days of HD Radio deployment, there were hundreds of complaints filed with the FCC about received adjacent channel interference from stations operating with Hybrid AM HD Radio. The FCC, as far as I know, never responded to these complaints. As a result, some of the stations receiving interference have done unlawful things to stay alive. I am aware of a Top 10 market, independently owned directional AM station, that reverted to its omnidirectional backup antenna, at full power, to gain back areas lost due to interference from two 50 kW second adjacent stations in the same market broadcasting AM HD Radio. I have an Atlantic coastal client with 1.9 kW in the middle of the band who lost 20 miles of coastal coverage when a first adjacent channel station began broadcasting in AM Hybrid HD radio.

AM Hybrid HD Radio has many negatives:

1. Serious first adjacent channel interference to stations in adjacent markets.
2. Second adjacent channel interference to stations in the same market.
3. First adjacent channel interference to distant stations at night.
4. Degradation of the AM signal quality of the host station.
5. HD Coverage is greatly reduced from the AM analog signal
6. HD Radio receivers are optimized for hybrid AM HD Radio, not digital only.

None of these problems are present in either medium wave digital only HD Radio (when the receivers are optimized for digital only modes) or for DRM 30 digital radio.

Medium Wave Digital Only (DRM 30 or HD Radio) has many positives:

1. Digital only HD Radio interferes with first adjacent channel stations similarly to Analog AM and DRM 30 can share service areas with first adjacent stations. Existing stations will receive no interference.
2. Both digital-only systems (when properly adjusted) have negligible second adjacent interference potential.
3. First adjacent channel interference would return to Analog levels with Digital only HD Radio, and be eliminated with DRM 30.
4. There would be no host AM station to degrade.
5. Digital only HD Radio coverage would be slightly less than AM Analog coverage with existing receivers, and DRM 30 would have superior coverage to AM Analog. Digital-only optimized HD Radio Receivers would have coverage comparable with DRM 30.
6. New HD Radio receivers would be optimized for Digital-only because there would be no Hybrid mode stations.
7. Digital-only stations would have audio quality as good or better than FM, and DRM30 has the possibility of additional program channels.

AM Hybrid HD Radio has not influenced the overall acceptance of HD Radio. The FM HD Radio system has struggled for the past ten years on its own merits, with AM Hybrid HD Radio less than a footnote in the mind of listeners. My car radio receives HD Radio. I turned off the AM HD function because the switching and back and forth from Analog to HD was so distracting that I could not listen to it. (At the time I gave up on it, most of the stations were reasonably timed, but the difference in sound from noisy and dull to gritchy and harsh was too annoying.)

Now that many AM stations have FM translators, some with strong FM translator signals now have nearly all their

listeners on FM. I have a good FM Translator for my Virginia AM station. Virtually all our listeners listen to the translator or the stream. I would operate the Medium Wave station in digital-only mode if it was permitted on a permanent basis. I believe that a reasonable number of other station operators would do likewise.

Many AM licensees are losing money on their AM operations, holding on to them in hopes of an FM translator, relocation with a digital signal to TV Channel 5 and 6, or the hope that the FCC might revise regulation so that the medium could survive by technical improvements. I believe that if conditions were right, many licensees with a cluster of AM stations would convert their weaker station(s) to become digital Medium Wave translator(s), to repeat their stronger AM Station(s).

Now that DTS purchased iBiquity, taking ownership from the big broadcasters, they no longer have vested interest in continuing Hybrid HD AM. The Hybrid AM HD system is fatally flawed, and now it is acceptable to recognize the elephant in the room. Since AM Hybrid operation causes serious interference, generates no income for the broadcaster and has no effect on sales of HD radio receivers, it is time to shut the operations down. The FCC should modify section 73.404 to delete the word hybrid in its reference to digital broadcasting on Medium Wave stations, and authorize digital-only operations.

In the interim, while waiting for the FCC to act, I challenge all broadcasters to turn off their AM Hybrid HD Radio equipment, and inform the FCC. No one is listening to hybrid AM HD Radio, nor will anyone ever listen to that signal in the future. Lets let it die peacefully

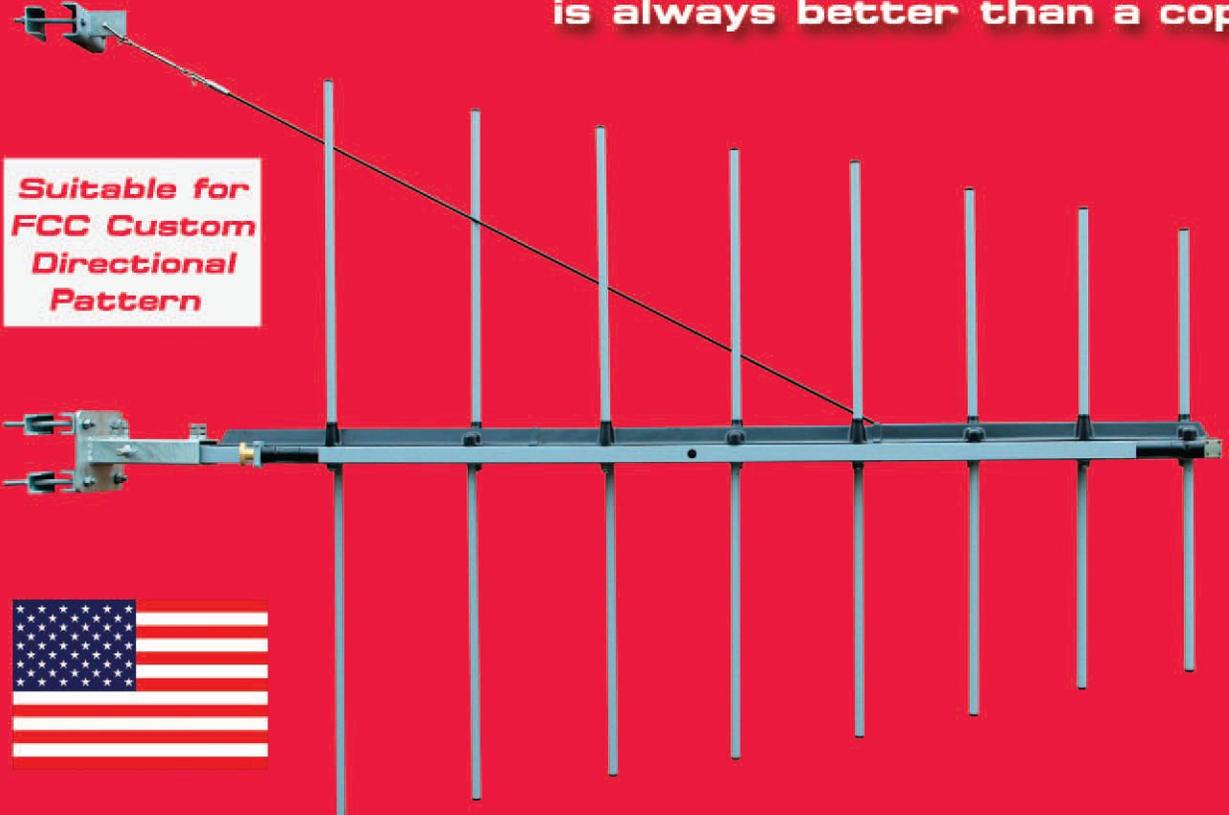
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Continuing Education

Adapt or Get Passed By

by Chris Tarr

As Engineers, we're often an "island" of information. After all, there really is no school for Broadcast Engineering anymore. At first glance, there's not a whole lot going on as far as continuing education.

Plus, we're our own worst enemies sometimes. We believe that, after all, transmitters are transmitters and consoles are consoles. We can figure it out, no problem!

Sometimes, you need to teach an old dog new tricks.

Now, people have told me stories about Engineers they knew that had all those certification letters after their name, yet still didn't seem to know what they were doing. On the flip side, we all know someone who has never stepped foot in an SBE meeting who seems to be able to fix everything. The reality is that most of us are somewhere in-between.

Let's face it – being able to change out a 4CX20000A is a skill that is slowly becoming irrelevant. Solid state transmitters are becoming the norm, and knowing how combiners and low-voltage switching supplies operate is quickly becoming "must-know" information.

Where am I going with this? I'm trying to stress the importance of continuing education.

These days, you can't just rest on knowing how old analog gear works. The industry is changing quickly, and it's becoming a case of adapt or get passed by. There are

HD transmitters, IP consoles, and streaming video. If you can't get your head around these types of things, you'll quickly find yourself on the same path as the buggy whip maker! I can say that more than once I've been called to help out an Engineer that was trying to set up a piece of IP gear or an audio codec. I love teaching, and I enjoyed the opportunity to help someone learn something new.



Changing this out is becoming an irrelevant skill.

Having said that, you need to take it upon yourself to get a good assessment of what you know, and what you

need to know, and then get to work. There are plenty of learning opportunities, if you know where to look. Fortunately I've found that most people are naturally curious, and when presented with the chance to learn something new, they'll usually jump right in.

So where do you start? Obviously there are some great sessions at NAB and the NAB Radio shows, but have you looked to see if there are any regional gatherings? We're fortunate here in Wisconsin – twice a year the Wisconsin Broadcaster's Association puts on Engineering clinics. There's a one-day clinic in the summer, and a huge three day clinic in the fall, attended by folks from all over the U.S. I know that there are several others like it around the country. These are typically very affordable and have a lot of great educational sessions and vendor demonstrations.

Speaking of vendors, often vendors will host webinars and post the videos on-line. Additionally, many vendors hold classes at their factories to not only go over their gear in particular, but also the technology behind it. These also can be either free, or very affordable.

Of course the SBE's site, SBE.org, is a great resource. Their site contains several training videos, and they also hold many webinars through the year that cover some of the latest technologies and trends. Speaking of SBE, often local chapters will host programs during their meetings that cover the latest Broadcast gadgets and trends. It's also a great place to ask questions and find out what your peers are up to.

Sometimes a "deeper dive" is required. I grew up around computers and IT, so I've always been very comfortable with it. Not much rattles me with this stuff. That's good, since a lot of what we do these days revolves around computers. I'm not joking when I tell people there is often

(Continued on Page 40)

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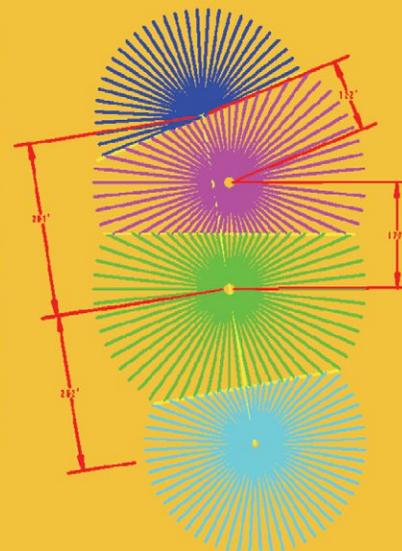
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Adapt or Get Passed By

– Continued from Page 38 –

more copper from networking cable in a transmitter building than there is from RF plumbing! However, computers can be intimidating if you haven't spent a lot of time with them. If you're not comfortable with computers, then perhaps a call to the local technical school is in order. They usually offer everything from a full, complete "introduction to computers" course, to specific courses such as using Microsoft Office or basic repair. Again, many of these courses are low cost or even free for adults.

Another trend is on-line learning, either through accredited schools, or simple YouTube channels. You can study at home, at your own pace, and take on your education in easily manageable chunks. There are several Facebook pages and on-line message boards that are also great resources for the latest industry information. Even simply doing an on-line search of something new will yield some results.

The point is to think outside of the box a little and realize that continuing education doesn't necessarily mean turning your life upside down, taking a second mortgage out on the house, and going back to school. I look at continuing education as a lifetime of learning, and try to always be learning something new – whether through an actual class, or simply reading a technical article. Often times we get intimidated by the thought of the learning process, when really it's not difficult at all. All it takes is a little effort and some creativity to make happen.

It can be difficult to admit that you don't know what you don't know, and in reality many people can do their day-to-day jobs without ever needing to work on their skills. If you're working for a station that has older gear, that is unlikely to be replaced before you're ready to retire, then there's probably no "professional" incentive to learn something new. However, as I've mentioned on these pages before, we tend to have an image problem with management.

My feeling is that if we want to be considered technology professionals, that absolutely means continuing to learn and honing our skills. After all, we're proving that we take our skills and knowledge seriously when we put forth the effort to attend learning sessions or take certification tests. I believe that any good manager will appreciate a person that invests in their career and self in this manner. Not to mention, it certainly increases your value as an employee and can certainly help in negotiating that raise!

There always seems to be reasons to not do these things – time, money, whatever. The key is that you need to put a premium on knowledge and make it happen. A lot of these resources are free or low-cost, and many employers will pay or reimburse you for the costs to attend classes and seminars. Even if they don't, it's important for you to understand that you're making an investment in yourself. No matter what you do the reality is that any time, effort, or money spent on education will pay you back several-fold.

On a slight side note, I encourage you to take some time and investigate the SBE's certification program. Whether or not you believe in what they do, the SBE does an excellent job of not only offering continuing education courses online, but requiring continuing education credits in order to renew your certifications every five years. I think that's an excellent idea. Not only will you need to

study up and take a test for certification, but they require that you earn recertification credits by doing things like attending meetings, programs, and educational events. It's an excellent way to track your progress.

These are just some tips on what is available out there and some of the steps you can take to keep on learning. Keeping your mind and your skills sharp is a process that lasts a lifetime. Never forget that we work in a rapidly changing industry and live in a fast paced world. If we stop learning, there's a very good chance that we risk getting passed by.

Christopher Tarr holds the CSRE, CBNE, and DRB certifications from the Society of Broadcast Engineers, and is the Director of Engineering for Entercom's Wisconsin stations. He can be reached at chris@tarr.cc

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www.sbe.org/sections/documents/EducationPrograms_0613.pdf – provides a high-level overview of all the courses on SBE University.

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Risky Radio

Enabling the Gambler

by Jim Bender

Happy is the engineer whose employer seeks his opinion for the strategic plan, the business plan, the operating plan, the operating budget, and safeguarding his licenses – and then acts accordingly.

Unfortunately radio owners seldom consider the engineering department to be part of the team that brings success to the operation. Most often, radio engineering is viewed merely as a service, insurance, or an expense – perhaps like contracting for pool cleaning services.

If so, you probably have heard this sort of truism: “The transmitter is brand new. It doesn’t need any preventive maintenance.” Or this one: “We’re all computers and satellites. The tech from *4Best Buy* can take care of them.”

The Risk Taker

Free Tip Number One: Do not waste your time and energy trying to explain the value of good engineering to this sort of manager.

A GM who sees the technical department only as an expense is “The Gambler.” When everything is working, The Gambler sees spending money on engineering as a carefully-calculated insurance payment – and not spending money on preventive maintenance essentially a carefully-calculated risk.

The Gambler will look at the age of the equipment, the overall health of the facility, the anticipated cost of something

going down, the weather outlook, the phase of the moon, and the price of tea in China. Some seem to have even less basis for their gamble. They appear to be basing financial decisions on whether their wife or mistress yelled at them this morning.

The hallmark of The Gambler: Rather than invest in preventive maintenance, he will pinch every penny in the operating budget. Say you have a tube transmitter. Do you have a new spare or is it the weak one that came out of the transmitter last year? The Gambler will not let you order a new tube until the current tube will no longer make power or fails altogether.

The GM Who “Saves” the Day

Another of The Gambler’s tricks: There is no money set aside for capital improvements, but when catastrophe strikes, the checkbook suddenly is wide open.

Remember when you installed the new computer-based automation for the cluster? You told the GM the room with the computers needed its own air conditioner, but since it was getting toward winter, he blew you off.

Now, it is May and you could fry an egg on top of the server case. The Gambler tells you the *Farmer’s Almanac* calls for a cool, mild summer and you should not worry. That you have to prop the back door open and rig up a half-dozen box fans to keep the room bearable is not relevant. In June, when the computers lock up and all the stations go down at once, he suddenly will direct you to get that air conditioner installed “right now.”

The Gambler delayed that capital expense to the last possible moment, proving that he was prudent and you were an alarmist. Free Tip Number Two: Do not waste your time and energy saying, “I told you so.” No one is listening.

Compliance Is For The Other Guy

In recent years, the FCC resources are stretched pretty thin. From the time your current GM was just a young AE to

the day he took the big office, there has never been an FCC Inspector at your stations.

So when you bring up compliance issues, The Gambler scoffs. Without real consequences, the risk of FCC action is deemed negligible. You may show him the Checklist, but it is soon buried by mounds of more important papers and completely forgotten. Show him real examples of real fines assessed against similar violators in the here and now, and The Gambler counters by telling you he has signed up for the Alternative Broadcast Inspection Program, which will keep the FCC Inspector away for years.

The ABIP inspectors try hard, but because they have so many inspections to conduct in a limited span of time, they frequently rely upon representations made by the staff. More than one certificate has been issued on the basis of management’s promise to “fix it right away.” The Gambler wins another one.

The Miracle Worker

Maybe you recall the last time you miraculously repaired a dead transmitter by remembering a trick you learned over the years? You may think you are just doing your job. Actually, The Gambler thinks you have proven him right and justified his management style.

Free Tip Number Three: Do not try to explain that Gambler’s Luck will eventually run out. The Gambler believes in Luck and will not hear anything else.

If you work for a Gambler, the first step toward recovery is to recognize the truth and admit you are powerless to change him. When you see the GM or owner as a gambling addict, you need to decide whether you are comfortable in helping him to manage risk, or you are tired of being a miracle worker. If you choose to stay, you will be less frustrated if you see the situation honestly.

Jim Bender is an experienced contract engineer based in Townsend, Montana. He can be reached at jim@bender2.com

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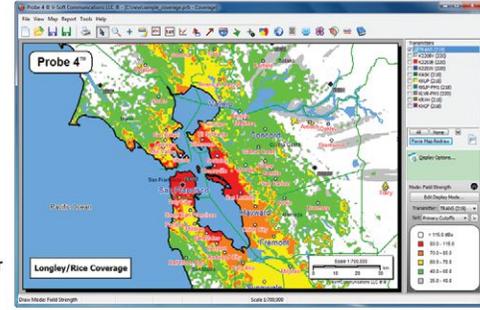
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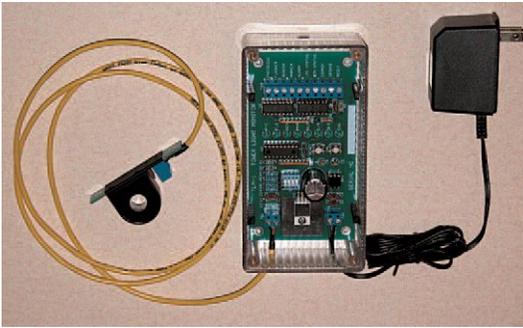
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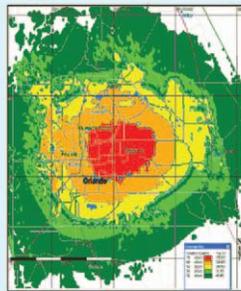
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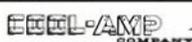
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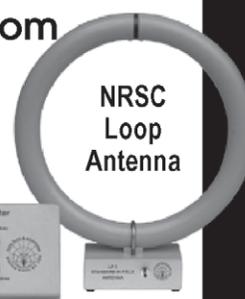
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www.nrbconvention.org

NAB 2016 Spring Convention

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

NATE Unite 2016

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

Texas Association of Broadcasters (TAB)

August 10-11, 2016
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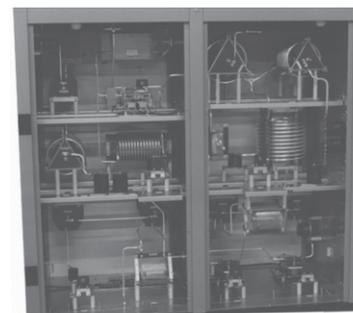
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