Radio Guide

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September-October 2014 – Vol. 22, No. 5

Small Companies – Unique Solutions

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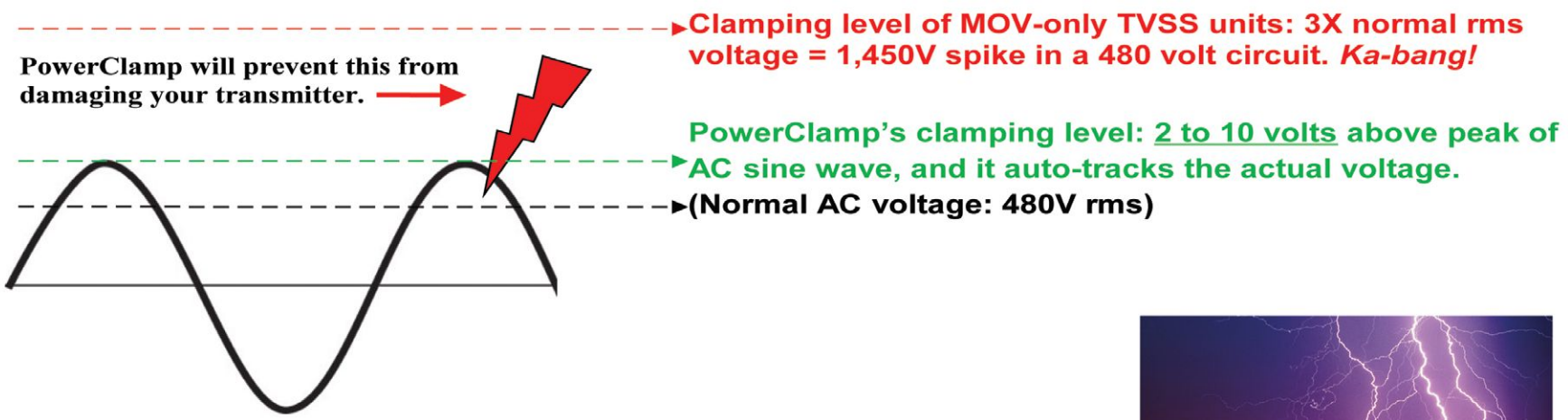

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Contents

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In This Issue

Critical Content for Radio

Cover Story – *by Elaine Jones (page 6)*

Small Companies: *"In this issue, we continue our conversation with small manufacturing companies who have been serving the Radio industry for decades. As with the companies featured in the July/August-2014 issue, these companies got their start by identifying a gap in existing product offerings and filling that gap with a unique solution. In this issue, we talk with Hank Landsburg of* ***Henry Engineering*** *(founded in 1982) and Kyle Magrill of* ***Circuitwerkes*** *(founded in 1989)."*

Radio War Stories – *by Mike Callaghan (page 18)*

Winning a Contest the Hard Way: *"At the end of a specified song, we'd award the car and the cash to caller number 102 to our request lines. Simple enough, right?*

It was months after the car had been won that we found someone had tapped into the request lines, and intercepted the 102nd call. Then they'd inserted their own telephone handset into the phone circuit and they became the winning caller. And they'd done it right inside our own building – and even from our own floor."

Transmission Topics – *by Jim Turvaville (page 34)*

Antenna Matters: *"There are as many opinions on FM antennas as there are manufacturers of the antennas, and just about as many different opinions on how they should be installed. Because most every FM antenna installation is unique, I'll not attempt to make any generalizations on what is the right or wrong type of antenna design for your station. Instead, I want to outline some of the reasons behind different antenna designs so you can ask the right questions for your specific station needs."*

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Cover Story

Small Companies – Unique Solutions

Innovating over the Years

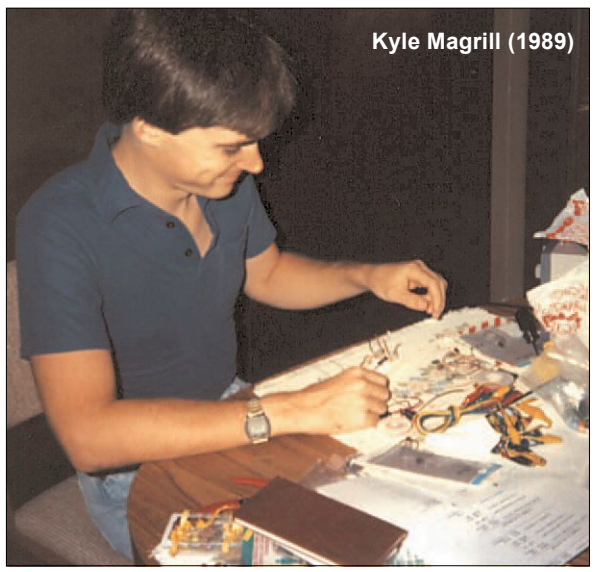
by Elaine Jones, owner, Elaine Jones Associates

In this issue, we continue our conversation with small manufacturing companies who have been serving the Radio industry for decades. As with the companies featured in the July/August issue, these companies got their start by identifying a gap in existing product offerings and filling that gap with a unique solution. In this issue, we talk with Hank Landsburg of **Henry Engineering** (founded in 1982) and Kyle Magrill of **Circuitwerkes** (founded in 1989).

Radio Guide: What events led you to the creation of your company?


Hank Landsburg

Hank Landsburg, Henry Engineering (HE): I was working as Director of Engineering for Drake-Chenault, a programming syndicator in Canoga Park, CA. Much of their original studio gear was actually consumer equipment, with unbalanced audio circuits at -10 dBv levels. I was constantly having to build "booster amplifiers" to interface this gear with the consoles, which required balanced lines at +4 dBm. I thought to myself, "I'll bet a few other engineers are 'in the same boat' – having to connect consumer cassette decks, turntable preamps, tape decks etc. to their professional consoles." Since there wasn't any high quality product on the market to solve that problem, I decided to design one and try to sell a few of them ... and that's where the original Matchbox came from.


Kyle Magrill (1989)

Kyle Magrill, Circuitwerkes (CW): We got started around a couple of kitchen tables. A friend of mine, who was a CE with Entercom, asked me about building a project that Entercom wanted. The idea was for a telephone dial-up, remote controlled listen line. The twist was that the radio needed to be controlled by touch-tones. I turned to another engineer that I knew and liked, named Mike Hagans. In early 1990, CircuitWerkes was officially formed with $2,000 of seed money from the two partners and working out of Mike's garage in Arizona – and my spare bedroom in Florida.

Radio Guide: What was your first product, and what did it do?

HE: It was The Matchbox, a level-and-impedance converter that provided proper interface between consumer and professional audio gear. It's still our most popular product. To date, we've sold about 95,000 units.

CW: The project I originally discussed with Mike was divided up, with Mike designing the telephone interface and DTMF decoder, while I worked on the telephone hybrid and radio interface. After breadboarding dozens of ideas, a rough design emerged and was supplied to Entercom. They liked it and we decided to call the product a TeleRadio. We realized that the telephone coupler and DTMF decoders could each be their own product and could be combined to form a simple dial-up remote control.

Back in the day, Mike and I used to run a host program on one computer and, using another terminal program, would dial long distance to each other to transfer PCB files over a 2400b modem connection. Sometimes, we would fax drawings back and forth. We worked that way for several years until the Internet finally became available.

Radio Guide: What has been your biggest challenge as a small company?

HE: Originally, it was "getting noticed" and establishing credibility. We overcame this challenge by introducing our first products through reputable dealers, e.g., Allied Broadcast Equipment, BSW, Audio General Store (now BGS), David Green Assoc. and others. I figured if we had the backing of well-known dealers, we'd be accepted as a reputable equipment supplier.

CW: A small company has to learn to live within its means. When we want to do anything, the costs have to be controlled so we can't just throw unlimited people and resources into product development. Some projects that we would like to build get shelved for later dates. Today's equipment is far more complex and also a lot more powerful than things we made 20 years ago. Only a select few can really master the complex programming necessary to make a product work well.

Radio Guide: How do your current products/services differ from your original offerings?

HE: We still produce The Matchbox, but now it (and all of our products) is in a rack-mountable chassis. We're still the only company that offers products in a 1/3 rack width, with a built-in AC power supply (no "wall-warts"). Our motto has always been "We Build Solutions," because all of our products are "problem-solvers." We've always developed products that solve problems for radio and audio engineers. That's still our focus, and what we're known for – well-performing products that are reliable and affordable. Our original products are still in production, but of course we've added many new products since 1982 – some digital and some analog. Many of our offerings are unique in the industry because they're "niche products" with a very limited market. That's OK with me!

CW: We still make a few of our original designs. The TeleRadio was discontinued in 2000, but we still make telephone couplers and DTMF decoders as well as subaudible tone decoders and encoders which remain fairly strong sellers. Today, most of our equipment is designed to interface to the Internet or a LAN.

Radio Guide: What has been your biggest surprise as a small business in the broadcast industry?

HE: I'm always amazed at how well-known we've become, and the tremendous support we get from the engineering community. I hope the engineers know how much we appreciate it.

CW: Well, the shift to all digital systems with heavy reliance on networking was not a blip on our radar in 1989. It didn't happen overnight, so surprise might not really describe that phenomenon, but I certainly didn't foresee the impact that digital would have on our industry as a whole. Fortunately, the transition was slow enough that we were able to ride along.

Radio Guide: What's next for your company? What do you envision for the future?

HE: More of the same! More digital products to augment the analog units that have been our mainstay. As long as there's a demand, we'll keep creating the products that solve problems and hopefully make life easier for broadcasters and audio professionals.

CW: Companies, even small ones, must evolve or die. Our industry changes fairly rapidly. Instead of predicting changes, I look at trends and what equipment is being offered to fill the needs. When a need is unfilled, we may step in to fill that role. We try not to build things already being offered, unless there is an uncorrected flaw. Because even simple equipment can be complex compared to yesterday's gear, we are blessed to have some really talented people here that can help us keep up with the demands of our ever-changing industry.

Elaine Jones, runs a small business – providing marketing and PR services to equipment manufacturers in the broadcast and AV industries. Her company, Elaine Jones Associates, was founded in 1997. She can be reached at elaine@ejonespr.com

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Studio Site

Think Out of the (Gift) Box

Low-Cost Creative Ideas for 2015

by George Zahn

In this era of August Halloween store displays and Christmas sections opening before the ghosts and goblins have visited our doors, it's never too early to start looking at some creative, and more importantly, economical additions to our radio stations for 2015.

Since we have readers ranging from managers to engineers and all points between, whoever reads this article first can claim the idea. For managers, it's a chance to reward staff for a good year, or for staff, it's a chance to start requesting and justifying some new tools as we look to the new year. The bad news is that most stations are on razor thin budgets with little budget room for something new. The good news is that some of the ideas here are imminently affordable and may just be a tool to retain, inspire, and invigorate your staff.

Here are some fairly low-cost additions to your studio, news team, and on-air sound for the new year:

1. Get Socially Active

Most managers have "bought in" to the need for better social media presence, be it Facebook, Twitter, Instagram, or any variety of the hottest, latest, and greatest way to reach folks. Quite often in the radio world, we forget about the visual. Two ideas here involve ways to add a visual element to your radio station social media (insert "face for radio" joke here).

One of the least expensive ways to add more visuals to your on-line presence is to add more graphics to your webpage, Facebook page, or other social media. Some stations send out simple digital cameras with their news reporters to get a photo from the scene or of the person they interview. Keep in mind that even the most rudimentary phone camera today is plenty for an Internet picture posting. An image that is 150 dpi still looks dandy on a computer monitor screen.

Most phones now are overkill and will yield ample quality photos for on-line content. If you can't afford to buy a cheap digital camera, encourage your staff/interviewers to snap a picture on their phone and use that. Despite what many think, the use of even simple photos do add to a web presence. People like to see the "voices" they hear. Do make sure that you use the photos on-line with permission of the person in the shot.

The Zoom Q2 HD Recorder

If you want to really get visually fancy for under $150, you can now shoot video, in addition to, or while field recording. Again, most phones shoot more than adequate video, but another device is the next level digital audio (and now video) recorder from Zoom. The Q2 HD lists for about $125 and is designed to record (or even stream) live uncompressed stereo audio and 1080p resolution video, on a device with stereo microphones and a camera that includes basic video zoom and even some lighting condition adjustments for the video. It's a music junkie bootlegger's dream, but it could be used to record an interview in the field or a studio, and then also shoot complementary video to go with the story. No bad for the roughly $100 retail. Again, always make sure you have the permission to post what you're shooting!

2. Make Your Staff "All Ears"

The start of a coming new year might be time to discard all those "Cyclops" headphones. I know, I know, the Cyclops has *one eye*, but how many of the stereo cans in our studios only have *one ear* working? Over the span of a year, most of the headphones in most studios meet untimely deaths by getting wrapped in chairs and curled in feet and hurled to the ground. Some will crank them until the elements in the earpieces rattle.

Again, there are a range of ways to tackle this issue. On the "uber" cheap, you can invest in some new low-cost headphones to replace the busted mono-headphones, but, before installing them, ensure that excess cable is wound or eliminated. Many newer cans have short cables, which is nice to a point. But if you need to reach for something in a studio, you don't want to have the headphones pull off your head, taking parts of your ears with them.

If you don't want the short-cable headphones designed to wear with personal media players, get some with the longer cord, but with a simple way to gather the cord and secure it and prevent tangling. An excellent example of such a "spool" comes with the Sennheiser HD 202. The 202 (often available in 5 pack bundles for about $100 total) has a cord that's about 10 feet long. They don't handle the drops very well, but Sennheiser includes a type of oval spool with notches on either end that allows you to wind the excess cord up and lock it in place, a nice feature. Of course, you can create your own spool tools to use with any headphones.

Sennheiser HD 202 Headphone w/ Cord Spool

One station I worked for actually started out the staff with one really nice pair of headphones (Sony MDR 7506 at about a hundred bucks per pair) to each regular on-air person. They became the personal headphones for that person and if they damaged them, the onus was on the headphone owner to replace or repair his/her own gear. Guest headphones were just anything run-of-the-mill – "whatever was on sale" that week headphones. The hosts generally took great care of their own headphones and it was a nice perk.

As a sidebar, let me know what headphones you find the best sounding and most durable. If you, like me, remember the old Koss Pro 99 4A model which sounded great but had very delicate wiring, you can relate to the search for headphones that hold up, yet have a nice frequency response.

3. Step Up Your Mic

This one can be more costly, depending on what extent you want carry out a plan. Years ago, I wrote about how your microphones help to determine your sound almost as much as your sounders, format, and personalities. Proper microphones and mic technique can make a decent change in the quality of your station's image.

On the extra-inexpensive side, a simple primer with your announcers, to ensure that they're using good microphone technique, is a solid move. Most stations are using unidirectional microphones and if your announcers need a bit more meat to their voice, they can work that mic closer to take advantage of proximity effect – the exaggeration of bass tones when you work very tight on a cardioid mic. Likewise, someone with James Earl Jones-level bass, might actually want to back off a bit. You may have excellent microphones in your studios, but are they being used properly? That's a cheap improvement for 2015.

If budget allows, maybe you'll want to change microphones. If you're pretty much a two-studio, single microphone in each, station, that's not too expensive (depending ion the choice of microphone). If you're doing only occasional interviews on secondary mics, you may be able to just change out the main announce mic and live with lesser mics for guests.

If you have even more budget, you may choose to homogenize your on-air mics for consistency, making sure that announce and guest mics in all studios are of the same make and model. Each station has its own needs, but a real morale booster can be the mic (or possibly processing) that makes your on-air people sound even better.

Case in point: after one NAB a number of years ago, the GM I worked for at the time brought back a Neumann TLM 102, a large diaphragm condenser mic, for a studio that we used for specialty production. Most of us loved that mic so much for its extra bass response and smooth sound that we all wanted to record in the same room. I hadn't seen such staff excitement for an investment of about $700.

Be careful, because mic choices are very subjective. Just as one mic could invigorate a staff, I also worked at a station that tried switching to a pair of RE20 mics, a real broadcast staple, in our main studios. Most of the staff heartily requested a return to another staple, the Sennheiser MD 421. A wonderful way to see how mics might work is through lending and borrowing before buying. Stations with strong bonds between engineers can save each other money by letting the other "try before you buy." And some broadcast equipment suppliers might allow a station to try a mic if they do regular business.

On a similar sidebar, let us know what mics you're using as your workhorses and why. In future articles we'll talk about the different families of microphones to help you make better decisions if new mics are in your future.

To sum up these points, one thing that excites our human nature is something that screams *"NEW,"* and hopefully these are some technical ideas to help invigorate a staff that may be starting to suffer from fall and winter cabin fever or a stagnant on-air or web presence. Sometimes just sprucing up technique can do the job, and that costs virtually nothing other than a little time. There are some really fun, inexpensive "toys" that can liven up staff and improve your sound and/or social media presence if used well.

As always, if you have other ideas for economical studio or field recording improvements, feel free to share them and one might just show up 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*

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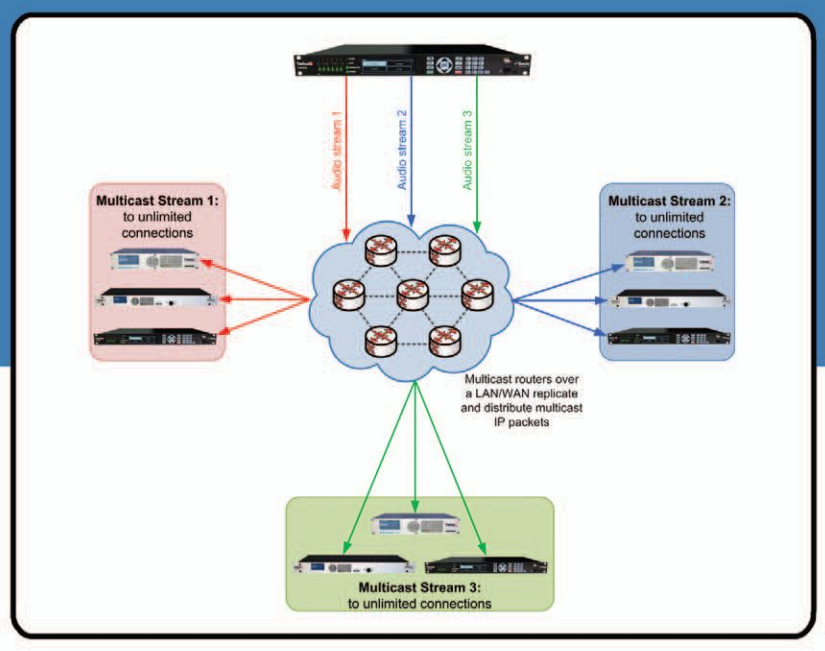

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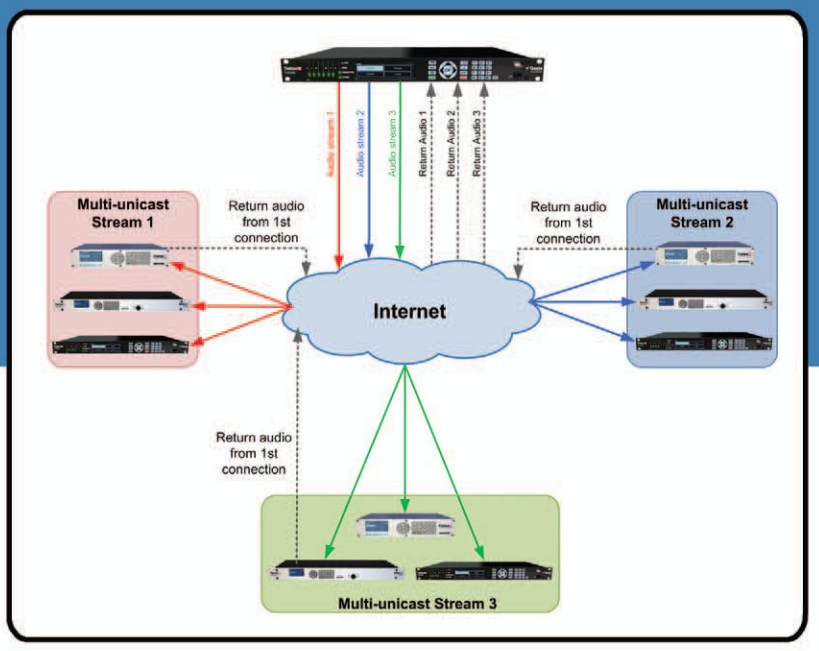

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Maintenance Guide

Tools of The Trade

In this article, we will discuss various levels of stocking for tools and equipment to have at your transmitter site, so that you never arrive to do an emergency repair, only to discover that the item you need is back in the shop.

What Do You Need?

Before you start stocking the tool box, it is important to have a goal in mind. What level of maintenance do you need to be able to perform?

For example, if all you are interested in is a kit to make sure you have the necessary items for emergency repairs, you probably will not need the equipment to do bench level work. Site conditions also have an effect on your choices; if you have running water or air conditioning on site, you will require tools that are unnecessary at sites without water or air conditioning.

Keep in mind that the following is only a series of suggestions and that it will be necessary to take a look around your plant to see what other specific items may be needed that are not mentioned.

Play Safe!

Before we start with hand tools, there are two items that should be present at every transmitter site – or any other location where you may be working.

Item number one is a properly stocked First Aid kit. If your site work is primarily limited to inside the building, this would include Band-Aids, gauze, cleaning wipes, sterile dressings, adhesive tape, and scissors as an absolute minimum. Burn dressings are also recommended. A good idea is to consider the nature of injuries that would typically be possible, based on the type of work you do.

If you are in a remote area with snakes, an anti-venom kit is also a good idea. If the site is not equipped with potable running water, then a couple of bottles of water will help clean any wounds prior to dressing – not to mention providing prevention against dehydration.

And here is an important point: with all First Aid kits, if you use something, *replace it immediately!*

The Bare Minimum

There is a short list of items which should make up a travel kit, pretty much anywhere you go – regardless of the job. These tools will do the trick for many basic repairs and could be called the "bare essentials" as far as site tools go.

To start, this would include a multi-bit screwdriver. Make sure you have two or three bit sets, as these little fellows tend to strip or fall into inaccessible areas at the least convenient times. A nice screwdriver might even have an LED light to shine on the work area.

In addition, you cannot go wrong with a couple of adjustable wrenches – this will make sure you have something to get off most nuts or bolts, even if you do not have the proper standard wrench. A socket set (metric and English sockets) with a couple of extender bars will get the things you cannot reach with a wrench. Finally, linesman pliers, a pair of needle nose pliers, and side cutters will round off the set to cover pretty much any mechanical disassembly and reassembly requirement.

Remember also, that a lot of electrical connections are made with hex socket screws and may require an Allen wrench. In a pinch, a matching sized bolt with double locked nuts on it, in conjunction with your adjustable wrench, will make a suitable substitute.

Can't Touch That

If you are doing any electrical work whatsoever, carry a voltage probe (not a multimeter, but an actual one-hand Volt Alert). This will tell you if you are about to grab onto something that is energized – an experience you may never have the opportunity to repeat.

A multimeter is also a requirement for most work at this level. A low end unit with Volt and Ohm functions will get you started. For basic level repairs, it is a good idea to have a 25 or 75 Watt soldering iron, depending upon your preference, extra tips, and some solder.

To complete the bare essentials, an auxiliary light source is one of the most necessary things at almost every transmitter site I have visited. A headband flashlight, with ultra-bright LEDs, will provide sufficient illumination to get the job done, is always pointed where you are looking, and does not need an extra hand to hold it.

All of the tools mentioned here can be purchased on a very modest budget. Perhaps you might need to buy them over a couple of months, but do get them all, along with an inexpensive carrying case.

Adding to The Kit

Once you have acquired the basic tools for each site you work at, you can start to augment the kit depending upon your specific needs.

For instance, if any of your equipment uses edge connectors or Cinch Jones type plugs and sockets, it is frequently possible to solve many problems with a can of DeOxit™ and a toothbrush. A squirt of contact cleaner and scrubbing with a toothbrush will resolve several intermittent issues.

DeOxit™

However, *do not* use a wire brush, sandpaper or other abrasive on these contacts, as this will cause wear, remove any protective plating and degrade operation over the long term. At the same time, a sheet of mild abrasive such as emery cloth will often come in handy for cleaning copper strap before soldering, or for cleaning solenoid contacts in high voltage contactors.

Other Consumables

As you fill out your toolbox, it should contain some basic parts. The first thing that comes to mind is fuses – at least one of every fuse used in every piece of equipment at the site should be available and identified individually, rather than all being tossed into a single drawer.

Similarly, if there is anything that uses batteries for memory backup or any other function, a set of these is recommended. Remember that many types of batteries have a shelf life, and the ones in the toolbox should be replaced as necessary to ensure that a fresh complement is always available.

That covers the basics. An acceptable basic tool kit can be put together for less than $50.00 in one quick trip to the hardware store. While it will not be the highest quality, and may not last more than a few uses for some tools, it will, if properly stocked, get you out of a pinch.

Building to the Next Level

If you do any plumbing or work with copper strap, a propane torch, igniter, and solder – as well as a can of solder flux – are useful. A pair of Vise Grips™ or clamping pliers is good for heat sinking the work or holding two pieces together while they are being joined. Do not forget to include a pair of suitable work gloves.

Getting into the more detailed levels of disassembly and repair will frequently be made easier if you have a nut driver set (again, both English and metric), as well as a proper set of combination wrenches suitable for the equipment at the site.

At this level, we would also increase the quality of the voltmeter, to ensure we have one that includes a diode test function, and replace the multi-bit screwdriver with a full screwdriver set – ensuring that we have the necessary drivers for any oddball screws that may be contained in the equipment (covering Torx™, slotted, and Phillips head screws in all common sizes would be the initial priority).

Filters and Belts Too

Although this is more in the realm of parts than tools, a full set of replacement air filters for everything in the site (transmitter, air handling system, air conditioner, etc.) and a set of belts for everything that has a belt (generator, cooling system, and the like) will frequently let you take care of an emergency without a trip to the hardware or auto supply store. As you use them, replenish the supplies.

Likewise, if you have a generator, replacement fuel filters, oil filters and hoses should be kept on hand. In most cases, the first time you need these items they will have paid for the cost of having them on site, as opposed to having to leave, go get them and come back.

Going All the Way

Now, assuming price is not an issue, but making sure we have everything necessary to do any level of repair at the site is a priority, we can stock the "dream toolbox." For this, we will need all of the tools mentioned in the previous sections, as well as a few others.

First, you will want to consider the possibility of bench repair of equipment. For this we need to add a few more sizes of wire cutters and needle nose pliers, as well as a set of smaller wrenches and nut drivers, possibly going down to 5/32", or 4 mm.

The screwdriver set could be augmented by a set of jeweler's screwdrivers, for detailed work. A proper grounded-tip soldering iron (about 40W or so) is recommended. A groundable static mat for use with static sensitive assemblies will prevent introducing problems during repairs. Portable versions of these items are available at many electronic supply stores.

Depending upon the work you intend, some other specialized tools may be required. Power supply diodes are torqued to specific levels, so a torque wrench would be needed. MOSFETs and many other devices are also torqued, requiring a torque nutdriver. Consult your equipment manuals, as many will list any special tools required, frequently including manufacturer and model numbers.

Scoping It Out

It is almost guaranteed that, at some point, some technical support person will want to have you look at something on an oscilloscope.

Depending on budget and application, this could be as simple as a low end, single-trace 10 MHz unit or all the way up to the portable multimeter/oscilloscopes available from several test equipment manufacturers. Be sure to include a proper set of scope probes as well – nothing is more frustrating than measuring something you know must be 5 V peak-to-peak, and having the scope insist that it is only 1 V.

Do not forget that scope probes can fail as well – so always have at least one spare on hand.

Adding It Up

At this level, the price depends purely on the test equipment used. An entry level "advanced" toolkit could be put together for less than a thousand dollars; a fully-stocked, singing and dancing toolbox will run in the range of about $4,000 to $5,000.

Either way, that covers the basics of the toolbox. Hopefully this will make sure that you are never caught short during a 3:00 a.m. visit to a transmitter or studio site, when the hardware store is closed. *– Radio Guide –*

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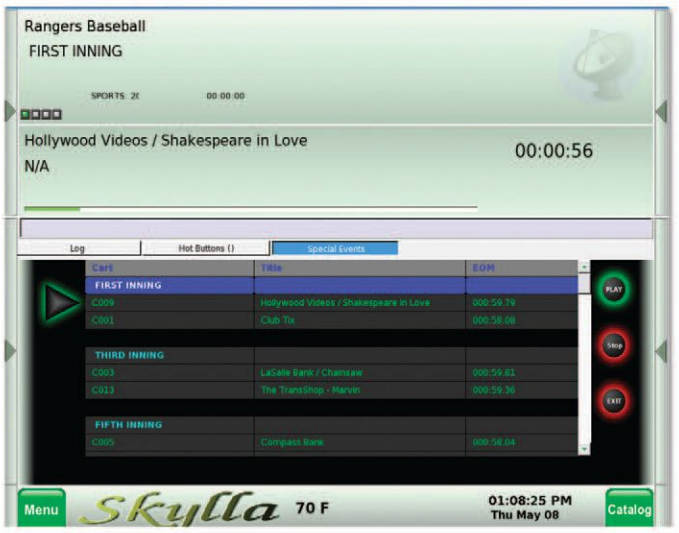

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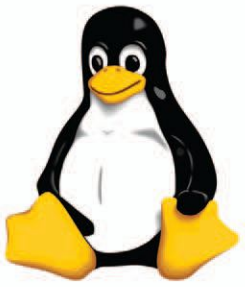

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Tower Topics

A Tale of Two Towers

by Steve Callahan

I've been working pretty hard on a little project for the past two years that I thought you'd like to hear about. It's a project that's just full of ironies and coincidences.

Back in the 1980's, I was the contract engineer for WPEP in Taunton, Massachusetts on 1570 kHz. It was a little station with a modest downtown studio and a rural tower site. It was a well-equipped station for its size and it's where I met my first and only Gates Vanguard AM transmitter. (That alone is a story for a future article.)

In the late 1970's, the owners of WPEP were fighting an upstart group who wanted to build a new station on 1530 kHz in the adjacent community of Middleboro, Massachusetts. The WPEP folks filed a lot of paperwork with the FCC trying to squash the Middleboro application, but they were unsuccessful and the FCC granted the new 1530 construction permit.

Tower Base Rebar

I ultimately acquired the construction permit and built the 1530 station and operated it while the folks at WPEP went through five absentee owners who did nothing for the long-term benefit of the Taunton station. Finally, the last ownership group turned in the 1570 license so another 1570 could go up in power. All that was left was a tower and a transmitter site with nothing to broadcast.

Seven years ago, I stepped in and bought the old WPEP tower site. It brought back many memories of working at the station almost 30 years before. It really showed its age and it suffered the neglect of ambivalent owners and managers. However, it had a 180 foot tower which was going to be very useful to me.

I removed three dumpsters of trash and accumulated junk from the site and set about fixing the building, the tower and the 300 foot wooden walkway from the transmitter building to the tower, across the existing swamp. After many months, the site started to look like a radio station again.

I rang up my favorite consultant, Charles Hecht and Associates, and set him on the case of what was going to be necessary to operate the 1530 from the old 1570 site. I imagined the 1570 owners, who tried to squash the 1530 application, would spin in their graves over this turn of events!

I spent one full month with an experimental authorization, performing field strength allocation measurements from the site and its existing tower. Charley determined that I could more than double my daytime power, double my night-time power, and eliminate my present critical hours requirement, if I could add one more tower to the site. I would also more than double the population count of the potential listeners the station now covered. It seemed like a no-brainer to me!

New Access "Boardwalk"

I have been involved with siting new AM towers several times in the past, and I have learned what you do, and not do. One thing I learned is that you make an effort to personally meet and talk with all of the abutters before work begins. Fortunately, it had been a radio tower site since 1949, but the area had also grown up since then. What used to be rural now had apartment buildings and commercial businesses. If you wait for your neighbors to get the legal notices or read about it in the newspaper, it's too late. All of the neighbors were quite happy to meet and relate some of the stories of shows they used to listen to on the old 1570. One woman said she lived next to the tower for 40 years but had never noticed it.

I had an experienced local surveyor draw up the plot plans, and then I started the long trek through local permitting. Fortunately, 1530 is well listened to in Taunton, and we have a lot of friends in local town government. My first stop was at the Conservation Commission's office. Fortunately for me, the former vice chairman of the Conservation Commission does a weekly show on conservation and the environment on 1530. He was more than happy to assist us at the public hearing which took about a half hour, and we left with our first approval. One month later we were at the Zoning Board of Appeals to ask for a variance. The zoning bylaw had the requirement that a tower had to be set-back from the property line by an amount equal to the height of the tower. As someone who has had to drop old towers over the years, I know from personal experience that a guyed tower very rarely falls like a tree in the forest. With multiple point of attachment via the guy wires, it folds onto itself. Fortunately, the members of the Zoning Board were also avid 1530 listeners, and they agreed – we walked out with our second approval in a little more than a half hour. One month later, we were back at City Hall for a hearing with the Planning Board. Even though the zoned use of the site permitted a radio tower, and it had been a radio tower site continuously since 1949, the board wanted to put its stamp of approval on the project, which they did, and it took them just ten minutes.

Guy wire anchors ready for concrete.

Our next, and last local permit, was from the Taunton Municipal Council. We had a public hearing with them just one week before local elections. I saw that all of the municipal council members at the hearing had been in the station recording their political commercials for next week's elections. Approval from the municipal council took about 15 minutes.

Now it was time to get to work. A local tree crew cleared the back of the property where the new tower was going to be located. Christopher Loycano of Broadcast Tower Service, my favorite tower crew, extended the wooden access boardwalk from the existing tower to where we had to get to the new tower base. Chris also found a fellow who had a lot of experience in building foundations for cellular towers and had just recently left to start his own concrete business, specializing in tower foundations. Vincent Mofford of Vinco proved to be the perfect man for the job of pouring the concrete for the tower base and the three anchors. He poured the three anchors above ground and then hauled the anchor blocks, or "deadmen" out to the three anchor points. This made it very easy to have the rebar and concrete inspected before they were buried and he took just one week to get all the concrete-related work done.

The sections of my new 180 foot tower were delivered to the site and it was then that I learned that my tower crew had bought the new, unused sections from a local fellow who had gotten them back in the 1990's from the former owners of the 1570 station! Seems my new tower had been intended for this site all along and now it had finally arrived!

The lessons to be learned from this project, up to this point, are to first have your abutters on your side so they don't have to learn about the project at the public hearing. Take time to show them your plans. Additionally, have your radio station be the soapbox for local government, who in turn will trust you and assist you as you build your radio station's local community voice.

Steve Callahan, CBRE, AMD, is the owner of WVBF, Middleboro, Mass.

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FCC Focus

Canada, Regulation, and Quickhitz

by Peter Gutmann

As an attorney whose clients tend to rail against regulatory burdens (and often with good reason), I was intrigued by a recent report of a Canadian license renewal that had been in jeopardy for failing to meet a single content-based commitment. That seemed so alien to our own regulatory scheme that just I had to check it out. Here's what I found. If you're feeling oppressed by the FCC, this column should make you feel much better.

The specific issues weighed by the Canadian Radio-television and Telecommunications Commission (the "CRTC" – the Canadian equivalent to our FCC) were whether a Vancouver station had failed to make timely contributions to various cultural development funds and whether its broadcast of "category 3" (special interest) music during only 14.1% of a single week fell short of its commitment to devote at least 15%.

To put this in perspective, let's back up and consider the grounds weighed by the CRTC in granting the initial license in 2008.

The Canadian application form is far more complex than ours, and inquires into many areas foreign to FCC concern, as it includes: the proposed musical format, the demographic group that the station will target, information demonstrating market demand, costs and sources of financing (including balance sheets of individuals and signed letters and/or audited financial statements from institutions), predicted ratings, revenues and expenses for the first seven years, and the amount the applicant pledges to contribute annually to a Canadian content development fund.

Perhaps most remarkable to us First Amendment fans is the programming section that requires commitments to specific amounts of "local programming," defined as originating from or produced exclusively for the station (i.e., no networking or syndication) and must incorporate "spoken word material of direct and particular relevance to the community served; this must include local news, weather, sports coverage and the promotion of local events and activities." Other required commitments: specific amounts of local and regional news, national news, international news, music by emerging artists (and means beyond airplay to promote them) and, in certain instances, breakouts of programming for ethnic or specialty formats.

If some of this sounds vaguely familiar, let's recall that prior to deregulation in 1981 the FCC imposed similar "promise v. performance" requirements on license renewals.

Before awarding the new Vancouver license in a comparative evaluation, the CRTC first analyzed the market's economy, growth potential, advertising revenues and the profitability of its existing commercial stations. Only then did it conclude that the market could support additional stations.

Two applicants were favored based on their proposed Triple A formats, which the CRTC found would have several desirable features – a broad mix of flexible musical genres, a lower repeat factor, and greater emphasis on new music. The winner (with the name of "6851916 Canada, Inc." – quite a mouthful!) prevailed on the basis of its commitment to a weekly playlist of 700 songs of which 15% would be by emerging artists. Its license was expressly conditioned upon fulfilling its pledges to air 126 hours of weekly local programming, 14 hours 31 minutes of spoken word programming and 50% of its pop music from Canadian artists – and contribute an extra $1 million annually toward Canadian content development above the mandated contribution amount of 0.5% of revenue.

A dissenting opinion cited a rival applicant's proposal to broadcast substantially greater amounts of spoken word and news programming, its lack of other stations that would foster ownership diversity, and its Adult Urban format that would provide greater programming diversity than Triple A. At the same time, she noted "the oft-repeated refrain that we do not regulate format, and yet the majority decision hinges on this very issue."

Another interesting wrinkle – in March 2014 the CRTC approved an ownership change for five stations including our renewal applicant, but subject to a "benefits package" of $7,558,236, representing 6% of the overall value of the transaction, to be paid to various radio development funds over seven years. (And note that calculation of the "value" went beyond the purchase price to also include the value of assumed leases and even working capital.) FCC application and regulatory fees seem like quite a bargain in comparison.

And where, you may ask, does all that money go? Half is earmarked for the Radio Starmaker Fund, a non-profit corporation that provides marketing and promotional support (including radio ads) to advance the careers of emerging English and French language Canadian artists. Mere dreamers are not eligible; rather, funding is available only to artists who already have achieved a minimum level of prior sales and who make a significant monetary investment of their own. Another quarter goes to the Foundation Assisting Canadian Talent on Recordings that supports activities from demos to workshops to touring. The rest can be allocated by the licensee to specialized radio support groups, such as Aboriginal Voices Radio, Inc.

And that brings us back to the renewal. It turns out that prior owners of our applicant, now named the equally creative 8384860 Canada, Inc., had missed out on $250,000 of their promised payments in two prior years, but subsequently made up the deficit and had put in place "stringent procedures to ensure compliance with these obligations going forward." As a condition of renewal, the CRTC required proof of timely payment of the remainder of 8384860's "contributions."

As for the programming lapse, the licensee blamed a software error and committed itself to a weekly review to ensure that future selections qualify within "category 3." Even so, the licensee sought relief from the content requirement altogether, citing a need for flexibility in order to compete in the Vancouver market.

The CRTC was unmoved. It cited the voluntary commitment that had formed the basis for its licensing decision in a highly competitive case and concluded that granting relief would undermine the integrity of its licensing process. The CRTC went on to characterize the shortfall (14.1% v. 15%) as "severe" and granted only a short-term renewal to permit earlier review of future compliance with the conditions of license.

So what's the lesson here? Hopefully, as you read this you've been comparing the programming and financial burdens with our own system, which perhaps isn't that burdensome after all.

And speaking of Canada, it seems notable that our neighbor to the North was quick to embrace – and then reject – QuickHitz, a format that's sounds like the radio equivalent of tapas dining. According to the website, it's a "game-changing mass appeal music format built especially for the needs and lifestyle of today's multitasking, attention challenged listeners" that plays two-minute excerpts from 24 songs per hour. (Their slogan "twice the music in half the time" is catchy but untrue – it's either one or the other but not both.

Also, not to quibble, but my decidedly unscientific survey – listening to one continuous hour [4-5 p.m. on September 3] – logged only 22½ songs [good thing the CRTC wasn't involved!], lots of raucous bumpers, two artist/title IDs, one community event announcement, one six-second weather report, zero news and 13 spots (2 :60s, the rest :30s and :15s). Admittedly, it's a breathlessly-paced high-octane experience with fairly short and infrequent commercial breaks – a juke-box on steroids.

QuickHitz is controversial, to say the least. The more frequent exposure benefits rights holders who are paid for each play, as well as those emerging artists who manage to get on their playlist. Others, though, decry the butchery of their creativity (as in: "If I wanted to write only one verse with no intro or break I would have done it.")

Anyway, following launch on a single U.S. station last year (where, as of this writing, it still can be heard, directly or streamed), a Calgary station became the first Canadian outlet to sign on in early August, only to drop it three weeks later, citing threats of artist boycotts and lawsuits (but only after the owners reportedly purged the protest leader from all 100 of its co-owned stations' playlists). Perhaps the more serious reason for the reversal was that same nettlesome content provision of Canadian radio law that caused fits for good old 8384860, our hapless license renewal applicant – it mandates that the required Canadian selections be broadcast in their entirety.

The U.S., of course, has no comparable communications law. Yet the legal status of the QuickHitz format is less certain under our copyright law, where its two-minute fragments could be challenged as unauthorized derivative works. That, in turn, puts the QuickHitz folks in a quandary.

To qualify as derivative, a work must not only incorporate substantial portions of an existing work but must significantly alter it with original creative elements. So, on the one hand QuickHitz can claim that its format is sufficiently original to qualify as a derivative work and thus warrant protection of its own. But that would require authorization, which the owners of the original hit songs are unlikely to give.

On the other hand, if QuickHitz claims that its abridgements fall within broadcasters' blanket licenses for which no further authority is required, then its format would not be considered eligible for protection and anyone could easily replicate it. In other words, the ultimate irony here is that the purveyors of QuickHitz claim copyright protection for their edited product while at the same time asserting their ability to freely use others' copyrighted originals without permission.

Legality aside, QuickHitz raises an intriguing question – is its approach the answer to capturing kids' elusive attention or a misdirected attempt to flout radio's traditional strengths? I'll gladly leave that verdict to others.

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

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Science of Sound

Acoustics and Radio – *Part 6*

"Sounds of Inner Space"

by Jeff Johnson, CPBE, and Alex Kosiorek

Acoustics determine the nature of the source of our radio signal – our sound. An established professional recording engineer, Alex Kosiorek, advises us:

It is the ultimate goal of an audio recording engineer to produce a recording that is highly pleasing to listen to. When capturing sound in a desirable acoustic, we often utilize the sound and tonality of the space as part of the recording process. However, in some cases, the acoustic may have challenges that need to be overcome, and exclusion of certain aspects of the space is needed to achieve a desirable result. There is obviously no one "be all" solution for recording in every acoustic – as no two spaces or sound sources are alike, whether they are a chamber group, large orchestra, jazz quintet with amplification, etc.

With the ultimate goal in mind, evaluating an acoustic to determine how it is best to capture sound in the environment can be one of the most fascinating aspects of being a recording engineer. It truly can be a discovery to determine how to work in an acoustic. I like to think of it a little bit like being Sherlock Holmes. A knowledgeable recording engineer will factor in a variety of variables, both scientific and measurable, with those that are more subjective to produce a recording.

There are numerous challenges when evaluating a space, and the following is just a short list that we, as recording engineers and/or producers, may survey. However, before looking at the acoustic environment, it is equally as important to look at the space, to see how it functions from an electrical engineering perspective. Among the questions we try and answer are:

• Where may I be able to establish a control room?

• How far away is the control room from the performance space?

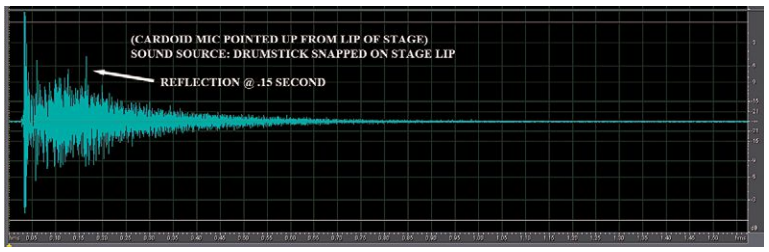
• Is there sufficient, clean power available and is it properly grounded (often something to consider in older establishments)?

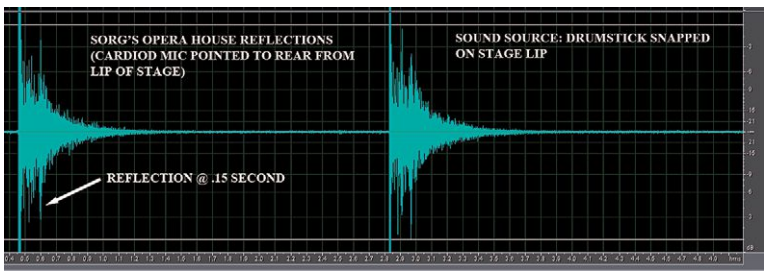
• What types of electrical interference may be encountered, including lighting dimmers, transformers, as well as proximity to transmitter sites, security systems and other devices?

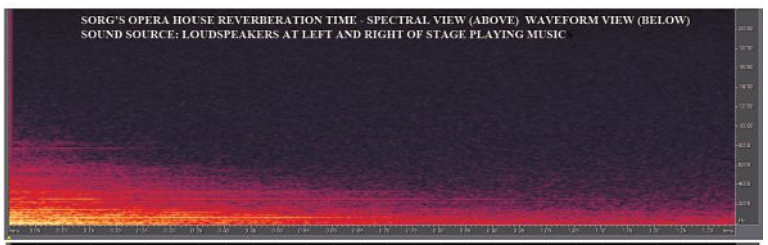
A site survey should always evaluate these and similar variables, as they can influence how we approach the equipment used to capture the sound. Even with modern facilities, making an assumption that power and/or even pre-installed audio lines will be appropriate can lead to complications later on. An engineer should have sufficient tools to investigate and negate those issues, in tandem with assessing the acoustic itself.

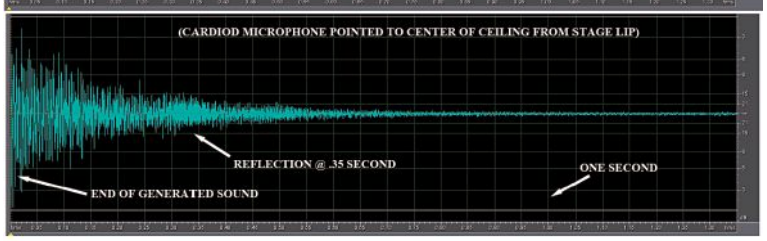
While performance spaces come in all shapes and sizes, there are a variety of practices one can employ when looking at an acoustic to see how it influences the sound to be captured. This is influenced by what is being recorded, as well as where the musicians (or sound source) are situated. From there, we look at what parts of the acoustic will enhance the recording and which ones may cause "acoustic" inference. There is a laundry list of things to look for, and be aware of, in these regards. Awareness of the materials used in the space is a vital part of the equation. Two spaces may have similar RT60 times, however, one made primarily of wood and plaster will sound and react considerably different than one built with glass and cement. Noticing where the absorptive and reflective surfaces are, and how they may function for a particular performance, should be considered.

Investigating what cannot be seen visually is equally significant. Discovering where room nodes or standing waves occur is important, as well as slap-back that may occur from any of a number of surfaces (in any direction). These can influence the selection and positioning of microphones.









Another example of something that is often not seen but can be heard, is the HVAC system. Noticing how it behaves while cooling vs. heating, as well as the velocity of air, are all important. Sounds from HVAC or other structural (or exterior) noises occurring from a particular direction or from all around can impact how sound is captured. Lastly, taking time to be aware of spaces below the stage, audience and/or other areas of the performance space should be considered. For example, the cavity below a stage can often enhance the warmth of a space and a recording, or become something that is a challenge to deal with – especially if the program is amplified. A classic example of this is Carnegie Hall, a world-renowned acoustic, which had been deadened by a layer of concrete placed underneath the stage when it was renovated in 1986. After it was discovered and the concrete removed, the floor acted as a pleasant resonator once again.

Amplification systems often play a role in the acoustic of a space as well. They can enhance or exacerbate issues, especially depending if they were properly installed/tuned for that space or not. Much more can be said about the choices made for a sound reinforcement system. Careful attention to both the aesthetic and the type of system employed, impact how the system and the room react with one another. Also, the choice of what is the intention of the system is a key factor as well. If a space is used for both recording and amplification, it is imperative that recording engineers, sound reinforcement specialists and/or system designers work collaboratively to ensure the systems can work in tandem with one another, instead of interfering with one another.

All these variables play a role in the selection of microphones and mixing techniques to achieve what recording engineers believe is the "Holy Grail" – a sound recording that truly represents the acoustic in which a performance was held. However, sometimes the acoustic does not play in our favor or other areas of concern influence our decisions. Enjoying a performance in a lovely acoustic can be an exhilarating experience. For those of us who have the pleasure of working in these spaces, it truly can be one of the most challenging, yet most exciting experiences to capture these moments to be heard again. Careful planning, evaluation and implementation of audio systems can lead to an enjoyable experience for all. – ***Alex Kosiorek***

What do we mean by "Inner Space?" The author performed a study of the acoustic character of the auditorium of the 1891 Sorg's Opera House in Middletown, Ohio, an Inner Space known for its excellent acoustics. What was found?

The sound source was a modest stereo system consisting of a Dyna 17 Watt/ch tube amp and AR4 speakers placed at the stage lip left and right. (In the Sorg, this venerable system sounded very fine and filled the space adequately. After all, in 1891 there was no electronic amplification, and none was needed!) Also, a drumstick was snapped on the wooden stage lip.

The three waveform and spectral illustrations shown on the left were recorded into Adobe Audition using a cardioid mic pointed as labeled.

The drumstick snap waveform (two samples) with the mic pointed to the rear of the auditorium shows a definitive first echo at .15 second. It is rewarding to see that there is no multiple echo.

The drumstick snap waveform with the mic pointed to the ceiling shows the more complex waveform resulting from the more involved acoustic path.

The combination illustration is of the echo of music played via the loudspeakers with the mic pointing up to the center of the ceiling. In this configuration, the music was stopped abruptly and the resulting longer delay of the first echo is pointed out. At the Sorg, there is an upper gallery partially separated by a false ceiling. The more complex waveform of the music echo made a longer trip to the gallery and back.

*The RT60 (Reverberation Time decaying to -60 dB) unoccupied appears to be approximately 1.5 seconds. This is short for orchestral music, but near optimum for voice clarity. The Sorg is 64' x 64' x 46' high. The RT60 resulting from the formula presented in the previous article was much longer. In this case, practice trumps theory – **Jeff Johnson***

Alex Kosiorek is Senior Audio Engineer and Media Technology Specialist, and Manager of Central Sound at EIGHT, Arizona PBS, Arizona State University.

Jeff Johnson can be reached at: jeff@rfproof.com or jeff@sorgopera.org

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Radio War Stories

"Winning" a Contest the Hard Way

Mike Callaghan - KIIS, Los Angeles (retired)

Contests have always been an important part of "buying listeners," and they were certainly important to KIIS in the '80's and '90's. Probably no other Los Angeles station ran contests with the "flair" and downright expansiveness that KIIS did.

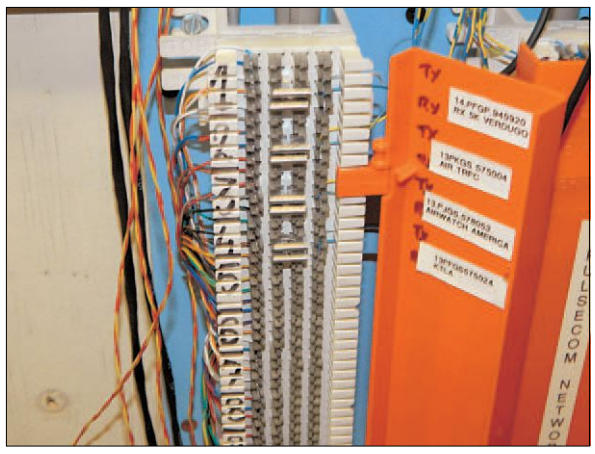
From the "Million Dollar Dash for Cash" to the car giveaways, we just flat out bought ratings. The air product was (and is) excellent, but whether it was "Paying Your Bills" or putting listeners in the driver's seat of new cars, we tried to make ourselves irresistible.

Then came the day when greed took over, and one of our listeners turned the tables on us, and took the station for a prize worth well over $100,000. We were giving away a Porsche Turbo Carrera with $50,000 in cash stuffed in the glove box.

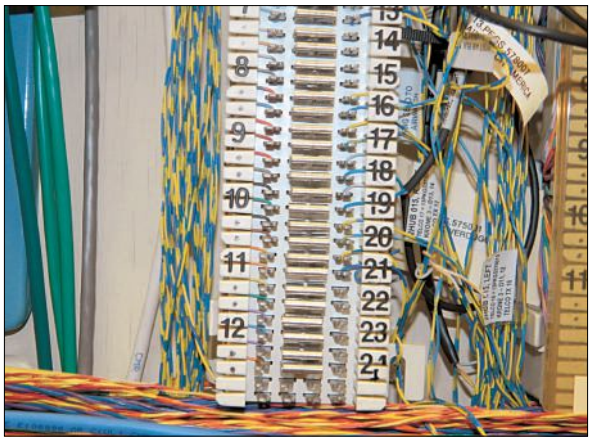
At the end of a specified song, we'd award the car and the cash to caller number 102 to our request lines. Simple enough, right?

It was months after the car had been won that we found someone had tapped into the request lines, and intercepted the 102nd call. Then they'd inserted their own telephone handset into the phone circuit and they became the winning caller. And they'd done it right inside our own building – and even from our own floor.

The discovery worked like this: Some time after the contest, the request line operators began to complain of intermittent connections and dropped calls into their phones. We started checking out the lines, and we found something new. The "bridge clips" on the "66 blocks" were missing. These are jumpers that separate the phone company's equipment from ours in the telephone closet. If you need to isolate telco's gear from yours, you remove these jumpers so you can test the equipment separately. After you've finished the testing, you put the clips back, restoring the connection, and you're back in business. In our case, the bridge clips had been replaced with multi-conductor cables that led off into another part of our floor.



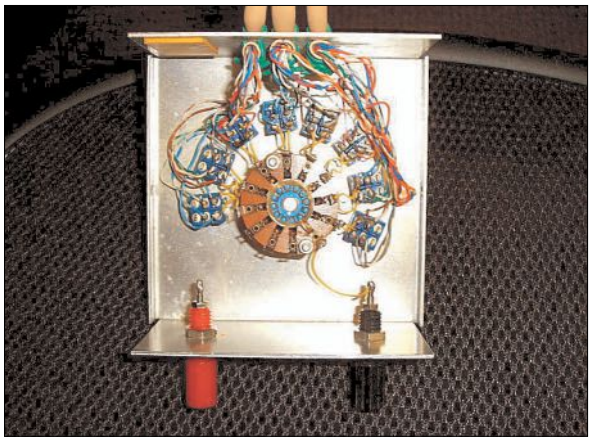
We traced them along the wall and into the "seismograph room." In Los Angeles, high-rise buildings have seismographs located in tiny closets on various floors. They measure the shaking the building undergoes during an earthquake so the authorities can tell if it's still safe to occupy afterwards. The rooms are small, and isolated to keep out unauthorized people.



The new cables went into the room on our floor, and into a 6" x 6" x 2" metal "project" box that was screwed to the wall. On the box was a rotary knob with a series of toggle switches around it. The parts all looked as if they came from Radio Shack. There were 8 switches – one for each of our request lines. By flipping the toggle switches, you could intercept and take over any of the request lines. The rotary switch in the center was used to select which of the lines you could listen to, without being noticed by the operators or the callers trying to request songs or win a contest. A holder with 4 "AA" cells supplied the local operating voltage.

So, when a contest started, the person using the box would plug in a telco headset, and use the rotary switch to follow the request line operator as they counted up the lines, looking for the winning caller. When they reached the right caller, the thief would flip the toggle switch for that line, disconnecting the legitimate caller and then they'd become the caller and they'd win the contest.

When we discovered this home-made box hanging on the wall, I felt as if I'd been kicked in the stomach. It was hard to imagine the nerve of whoever had taken the time and effort to install such a nefarious device. Further, they had to have help from someone inside the building – someone that had access to the seismograph room and the telco closet where our equipment was.



The box must have been installed on a weekend, or else one of the engineers would likely have noticed activity in the space and interrupted the plan. And the cables would have had to be run and connected at the box before the bridge clips were removed. It must have taken at least an hour or two for the installation. There were a lot of things that could have gone wrong and allowed the plan to be discovered. But apparently the plan had worked well enough, and long enough, for us to be hoodwinked. We had no idea which of our "high-ticket" contests the box had been used for; for all we knew it could have been used for a number of them. But the Turbo Carrera with the cash was the focus of attention.

Because of the value of the contest, The Los Angeles Police Bunco squad became involved; they conducted an investigation and dusted the box for fingerprints but it was clean, as were the cables going to it. Apparently the perpetrator had been careful. The police finally decided to put an alarm on the seismograph room to alert them to further entry. They were a little late. In reality, the damage had already been done and we weren't planning any major contests that would have made it worthwhile for the villain to return to the scene. And, whoever it was that had rigged the contest, had to stay close enough to get into the seismograph room after the contest had launched. From starting to play the designated song to the awarding of the car and cash, barely 7 or 10 minutes at most elapsed. So they had to be in the building and not anywhere else or they'd miss their chance.

It had been too long since the car and cash were won for us to go back and confront the winner. The building staff had turned over and the people that might have been accomplices to the crime were long gone. And despite the entry alarm, no one tried to get into the seismograph room again. Finally, a year later, we removed the "project" box and kept it for a souvenir.

Most modern phone systems are different than the "1A2" key system we used then. They don't have a "tip" and "ring" connection that are easily intercepted to allow something like this to happen. Whoever wired our suite to fraudulently win the contest knew what they were doing, and they did it well. Chances are excellent that more than one person was involved. Only the loose connections that started revealing themselves months after the fact led to their discovery.

If the connections had stayed intact we could easily have abandoned the suite, moved away, and never have known about the "rigged contest."

Mike Callaghan was formerly the Chief Engineer at KIIS-FM in Los Angeles, CA. His email is: rg@mike.fm

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Tech Topics

Ferrites and the Broadcaster

More Than Lumps On a Cord

Modern ferrites bring great value and promise to today's broadcasters, whether in detuning, filtering, or eliminating stray RF problems anywhere from towers to computer keyboards, from microphone audio circuits to cleaning up power lines.

A great deal of information is available about the use of ferrite material, but it is so versatile that new applications keep popping up. There are several different kinds of materials for different specific frequency ranges and applications. To utilize them properly, their characteristics must be understood. A good source of available information is from the various manufacturers.

The RF Connection

One fundamental use of ferrites is to provide impedance to RF current flowing on a conductor. However, there is more to the concept – it is not quite as simple as it first seems.

We must be careful to realize that the impedance provided by ferrites is a complex impedance (R + j X), *[See box on page 22]* not just simply resistance or inductive reactance alone. Radio engineers should be familiar with this from tuning networks and such.

At low power level applications, such as placing ferrites on audio lines to keep RF out of them, complex impedances are not really significant. However, at higher power levels they must be considered. Also bear in mind that the values of R and +j X vary in different ferrite materials and with different frequencies, so this must be taken into account for a specific application.

Dealing With Heat

Because part of the impedance is resistance, it will convert some of the RF energy to heat, which must be dissipated into the air. The increased permeability of the ferrite material causes an increase in the inductance of the conductor on which the ferrite is installed. So RF current traveling on conductors is impeded by both factors, real (resistance) and imaginary (reactance).

A very common application is to place ferrite beads on certain leads around a computer. You may notice a lump of some sort in the cable between the monitor and the computer.

Computer and camera cables often have ferrites to keep signals clean.

This is ferrite material in the form of beads to block RF energy in the form of sync pulses and/or digital data. The energy dissipated as heat in this application is so small that it is insignificant.

Broadcast engineers sometimes place ferrite beads on telephone and audio wires to keep RF energy from flowing on them. Again, the energy dissipated in the resistive component of the ferrite is insignificant.

Dealing With Significant Heat

However, we want to look at a few applications in which the power dissipated may generate significant heat. If ferrite beads get hot enough, they may crack and become useless. If cracking occurs, the RF impedance ability becomes greatly diminished.

As an example: when it is necessary to place a VHF or UHF antenna on a series fed AM broadcast antenna, the transmission line must cross the base insulator without affecting the AM antenna.

Several means have been developed for this purpose. An isocoupler is a device that will couple the higher frequency signal through it to get to its antenna, but has little effect on the AM antenna. Another method is called the bazooka feed, and a third is to convert the AM antenna to a folded unipole. However, all of these take some doing and are relatively expensive.

A Cost-Effective Solution?

Ferrites may provide a simple and inexpensive way of doing this for antennas that use a small transmission line such as RG8 coax, 1/2-inch Heliax or something similar.

You simply fabricate a jumper that is two feet or so in length and place ferrite beads of the proper material over the jumper, using a weatherproof sleeve when necessary.

The top end of the jumper shield is connected to the tower metal and the bottom end is connected to ground near the tower base. This allows the VHF or UHF energy to travel through the coaxial cable while the AM RF energy is prevented from flowing on the outer surface of the cable.

While this should work, now we must address a caveat about the AM energy that will try to flow on the outside of the coaxial cable shield. Recall that the impedance of the ferrite material is

(Continued on Page 22)

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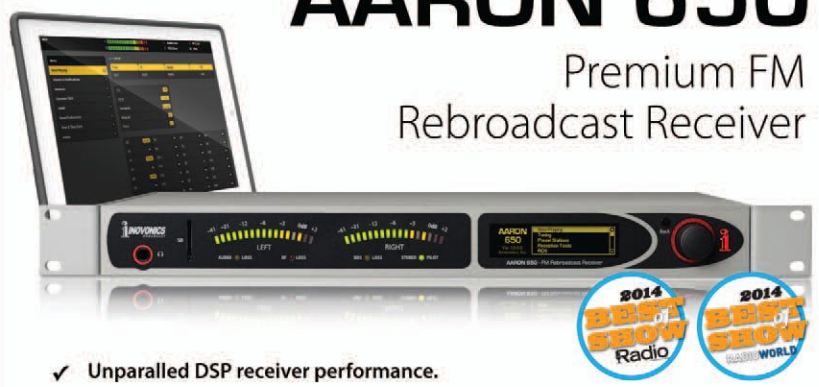

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Ferrites and the Broadcaster

– Continued from Page 20 –

complex, meaning that part of the energy will be dissipated as heat. Will it be enough to damage the ferrite material? Will it even work at all? At the moment, we do not know.

Someone could fabricate a test jumper as described and place it across the base insulator of an AM antenna. Will it affect the input impedance of the AM antenna? The test should be conducted while observing an RF impedance bridge.

This method may work on AM antennas of lower power, but may or may not be workable on higher-powered stations. We could even call it an "iso-jumper." If someone decides to test this, please let us know the results.

Detuning

Ferrite material also has the ability to make an electrical conductor appear to be an open circuit. Coincidentally, this is the end purpose of detuning: to eliminate the flow of RF energy on a conductor.

How would it work for detuning a tall structure? Suppose that a new cell phone tower has been erected in the near field of an AM station. FCC Rules require that the owner of the new structure install detuning apparatus so that the pattern of the AM station will return to its proper shape.

If we could install enough ferrite material on the tower legs at a low height, the AM RF current should be impeded to the point where it would not re-radiate the AM signal. Discovering how much ferrite material would be needed to make it work well again requires experimentation, but theoretically it is possible.

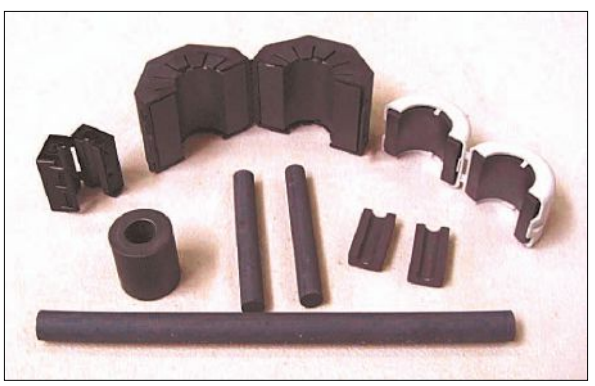
It is sometimes desirable to place an FM or TV antenna onto the side or leg of a tower with large cross section. However, the tower members may re-radiate some of the energy, causing distortion of the radiation pattern. Sometimes detuning stubs are welded in various locations in an attempt to get the proper pattern shape.

Once again, in theory, placing ferrite materials on the vertical and horizontal tower members near the high frequency antenna could make the tower steel disappear, allowing the desired pattern to be radiated. It would not be necessary to cover the members entirely, just enough to break the members into segments that would not re-radiate.

Ferrite Paint?

It would be great if ferrite paint was available. We could just paint all conductors in which we do not want RF current. Shades of stealth technology!

Of course, it would probably have to be pretty thick to be effective. There is a ferrite powder that can be mixed into paint, in order to make a refrigerator magnet stick to a wall with which it is painted. It's unknown if that woud have any value for RF absorption. Any experimenters out there? Let us know.



A variety of ferrite materials.

The most common shape of ferrite material to stop RF current flow is in the form of a bead or donut. They are available split into two halves, but the two halves must be very close to each other when installed on a conductor.

It might be possible to use powdered ferrite material and place it in a cylinder surrounding a tower leg, for example. It would have to be very tightly packed for good performance. The cylinder material should be non-conductive, capable of standing the compressive force needed to pack the material inside and then provide long term weather proofing. A plastic such as Teflon might be suitable.

This method might be used to detune a monopole. A band of ferrite material (maybe powder) would surround the monopole some distance above the base with a non-conductive compression band holding it in place.

Some Uses – Some Possibilities

We have reviewed a few old standard applications for ferrite materials and introduced some possible new ones.

We also pointed out that ferrite material has not a simple, but a complex impedance, which consists of increased inductance of a conductor by surrounding it with material of high relative permeability (r), which also has resistive loss. The ratio of R and +j X will vary depending on frequency and the material used, so it must be taken into account when planning an application.

Another way of looking at a complex impedance is to calculate:

$$Z = \sqrt{R^2 + X^2}$$

Ferrite materials are great stuff with many useful applications, but their limitations, as well as their advantages, must be understood to obtain the best results. An excellent book on the subject is the *Ferromagnetic Core Design & Application Handbook* by Doug DeMaw. It is published by MFJ Enterprises and available on their website. The stock number is MFJ-3506 and price is $19.95. If you get a copy, be sure to read the section on the B-H curve and saturation.

If you have any interesting or useful tech-tips or tech topics, please email them to ***Radio Guide*** *for publication in future issues. Please email to: editor@radio-guide.com*

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Talent Stations take their place among the, well... talent!

Marc Lehmuth sent us these recent photos of Impact Partnership's new 10-studio installation in Kennesaw, Georgia. Shown is Studio A with several mic positions and Wheatstone TS-4 Talent Stations (with mic on/off/cough, talkback, and headphone source) mounted into the desktop, all networked through the WheatNet-IP audio system. The new recording studio was built for Impact Partnership's radio "dream team," which develops talk programming for financial advisors as well as related spots for radio.
This isn't Marc's first experience with Wheatstone. Marc was previously the engineering director for Cumulus Media in Atlanta, where he started out with Wheatstone's TDM routing technology and added WheatNet-IP audio networking and control surfaces using a MADI interface. When Marc became the director of engineering for Impact Partnership earlier this year, he brought along some Wheat. See more photos...

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Look what we showed off at IBC this year! This split frame LX-24 control surface arrived in Amsterdam in two pods, six modules on each side. With all the console action off to the side, announcers can work the show from their keyboard, monitor and mouse in the middle. There's no need for a backplane for the modules, and the motherboard is conveniently mounted under the table. (Look closely - you'll see two TS-4 Talent Stations, table-mounted, as well).

If you missed us at IBC, come see us at NATEXPO in Moscow. Russia, November 19-21; we'll be in booth A69.

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Sound Off

Our friends south of the border sure know how to do radio. When we sent our audio processing specialist Mike Erickson packing to Radio Grupo in the Mexican city of Aguascalientes last month, we expected him to come back with tales of AM flamethrowers and hot tamales.

Instead, he wound up doing something he rarely gets to do at a Top 40 station: setting the sound for clarity first and loudness second. "They were going for long term listening and clean sound, which is a welcome change for guys like me who appreciate some dynamic range," says Mike. "When processing for CHR, it's usually loud and exaggerated. But they wanted open, clear and engaging!"

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Chief Engineer

Tower Light Puzzler

by Scott Schmeling

As Engineers, we all share a few characteristics, like "problem solver." Whether it's a transmitter issue, an IT issue, for some of us, even a *plumbing* issue! If it's not working, we analyze, troubleshoot, often talk through it, and then fix it. Some of the issues are fairly common and easily solved, but recently I had quite a "head scratcher."

We have a tower site on the far west edge of Minnesota near Lake Benton, and it's my most favorite site. Unfortunately, it's also farthest from home and visited the least. There's an 850-foot tower on top of a 200-foot hill near the north end of the second largest wind generator farm in the country (I'm told). It's also my favorite site for photography ... but I digress. A few weeks ago we had a problem with the tower lights that really had me puzzled.

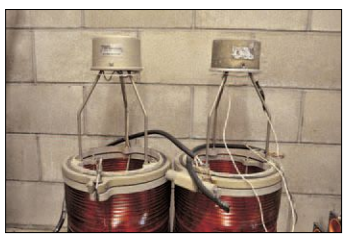
As I said, it's an 850-foot tower, constructed in 1988. At that time, regulations called for three beacons evenly spaced. However, *none* of the beacons were lighting. In fact, *nothing* was lighting! I started troubleshooting by measuring the voltage going to each of the bulbs. My meter indicated a steady 120 Volts going out to all but beacon one, and each level of side markers. The fuse for beacon one had blown, but after replacing the fuse I still had steady voltage everywhere. Using alligator clip leads, I connected a trouble light to each line and got a steady light. This verified what my meter had shown.

A side note here. Most current tower light controllers use an SSAC FS155-30T (or FS155-30RF) as a master controller to flash the top beacon and supply a control voltage to either an FA155-2 or FA155 auxiliary flasher for each of the middle beacons. As noted earlier, this tower has three evenly spaced beacons. *This* controller uses a CS-306-30 timer module that sends the control voltage to each of the three FA155-3 Auxiliary Flashers. The three beacons flash *sequentially*.

OK, back to the troubleshooting – I had no flashing beacons. Since the fuse for the top beacon had blown, I decided to replace that flasher. I thought there might be a *chance* that replacing it would restore the beacons to normal – no such luck!

There are two troubleshooting techniques I use (that is, *after* I've used my contactless voltage tester to see if voltage is going out or not). I clamp a current meter around each of the wires going out to see how much, if any, current is being drawn. Normally, a beacon fixture with two good 620 Watt bulbs will draw about 10 Amps. I also like to check resistance between the conductor and neutral (with the system turned off and the fuses pulled, of course). An open would indicate most likely burned out bulbs. A low resistance should mean at least *one* bulb is intact.

The resistance of the filament of one beacon bulb is 3 Ohms. That means two bulbs in parallel should read about 1.5 Ohms. There would also be *some* resistance in the wires up to the beacons. When I measured here, I got NINE OHMS between *each* of the beacon lines to neutral! It was obvious something was wrong up on the tower! (Yes, I have a knack for stating the obvious!)



One more thing – I still had that trouble light clipped to a beacon line. I discovered something "interesting." If it was clipped *after* the fuse for *any* of the lights, I would get a steady, *almost* full intensity steady light. If I removed the fuse and clipped to the output of the flasher my light would flash just like a beacon should. I reported the outage to Lockheed Martin and contacted a tower crew.

The following week, the crew and I arrived at the site armed with a full compliment of bulbs. I told Kevin what I had found earlier and we both agreed it didn't make sense. Neither of us had ever seen anything like it. The first step was to relamp the tower and see if that would take care of it.

To make a long, full-day story short, relamping the tower did *not* solve the issue! The climbers did notice, however, that the top beacon was in pretty bad shape.

(Continued on Page 28)

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Chief Engineer

Tower Light Puzzler

– Continued from Page 26 –

They saw *lots* of spots of damage on the cap from lightning hits. And the screws holding the upper lamp socket in place had vibrated loose and it was just hanging there and the wires going to that socket had become brittle (and of course, the bulbs were broken!). We had run out of daylight and were going to need some parts to get the lights back on.

Perhaps another characteristic we all share is that we understand the value in "holding on to things," just in case. The two lower beacons had been replaced the previous year because of severe ice damage. (The top beacon had not been replaced because no ice fell on it!) I still had the two old beacon fixtures in the building. We could take parts from them to repair the top one. Kevin would bring some "SO" cord to replace the jumper from the top junction box to the fixture, just in case.

Because the wind almost *always* blows on Buffalo Ridge, we were not able to return to finish until the following week. Armed with a socket assembly (socket mounted inside top cap and high temperature wire) and some new SO cord, the climbers headed up. Meanwhile, Kevin and I crossed our fingers. By the way, I looked it up – the crossing of fingers *is* an accepted engineering practice.

When the climbers got to the top they went to work rebuilding the beacon. In addition to replacing the top socket, they had mentioned how bad the wiring looked. After replacing the socket, the SO cord jumper, and installing new bulbs, we turned the system on. The report from the top? "Lights are flashing!" They looked down the tower and reported seeing the other two beacons flashing like they should! A quick check of current showed 10 Amps on each beacon line – just like it should be. Things were finally back working again!

A third characteristic we share: we like to learn new things. We will take an experience like this and learn from it. As far as this tower light issue is concerned, we don't know for sure, but our best guess is that the insulation on the HOT line and the NEUTRAL line to the top beacon had broken down, allowing at least a partial short between the two. Again, my guess is that possibly the hot and neutral were shorted at the top of the tower. But with 850 feet wire up and down the tower (1,700 feet total) there was enough resistance in the wire to not appear as a total short.

I mentioned the jumper from the junction box to the beacon was "SO cord." I've heard the term before, but didn't know what it meant, so I "Googled it." Here is what I learned from the Portable Cord Wikipedia page: Letters are used to describe various types of portable cords. The following are the descriptions for each letter:

S = Severe Service Cord – 600 volts (also 277/480 or 480). May be utilized in place of SJ in extra-severe service.

SJ = Junior Severe Service – 300 volts (also 120 or 120/208 or 120/240 or 240 or 277, but *not* 277/480).

T = Thermoplastic

H = Heat Resistant or High Heat (HH) Resistant

N = Nylon Outer Jacket Material

E = Elastomer – thermoplastic that looks and feels like rubber.

O = Oil Resistant Outer Jacket Material

OO = Oil Resistant Outer Jacket AND Oil Resistant Insulation

W = CSA Weather and Water Resistant (approved for indoor and outdoor use).

Based on the above listing and the fact these particular jumpers are subjected to extreme heat, cold, wind, and ice, it seems to be that SO cord really isn't the best for this application. I picked up some SOOW 14/3 cord.

One last thought: winter is coming. Now is the time to check your transmitter sites. Get any vegetation around the building knocked down and plug up any holes to keep critters, cold, and snow *outside*. It might be a good idea to get a shovel out there, too. And if you're due for a tower relamping, your tower crew would much rather do it now that when it's 20-below!

That's it for now. 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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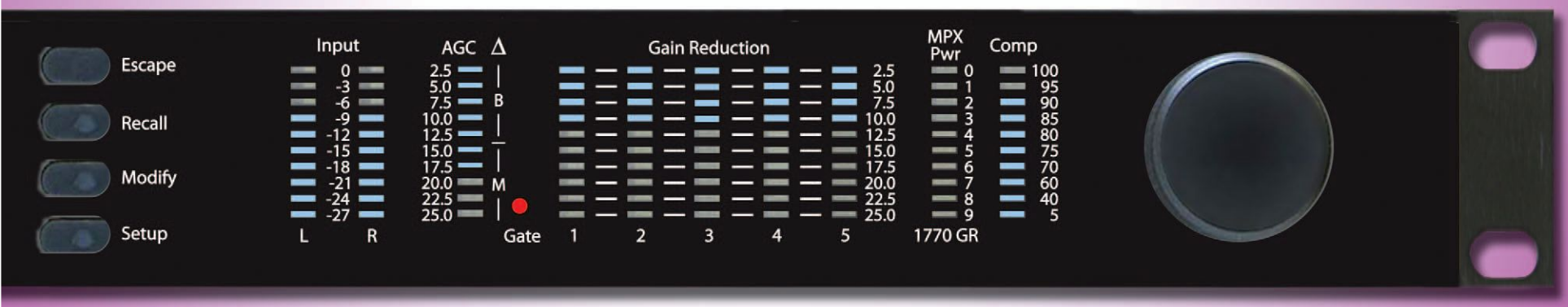

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Practical Engineering

Do the Math

Old School Electronics Math for the Busy Engineer

by Tommy Gray

One thing that I learned in school that has stuck with me is a simple way of remembering electronics formulas. Most of you have probably heard of "Pie" (not pi) formulas at one time or another. The simple Pie formula helps one to remember whether to divide or multiply when doing a calculation.

Allow me to give you an example that all of us know quite well, the basic E = I x R calculation. This formula contains three elements: "E" for voltage, "I" for current, and "R" for resistance. Using this formula, we can perform numerous simple electronics calculations. All we need to know is two of the variables and we can quickly, with basic algebra, easily calculate the unknown. The problem arises when your brain is tired, and you cannot remember whether to divide, or multiply, etc.

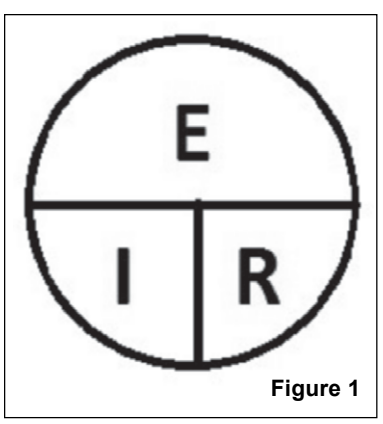

Figure 1

Step into the picture the "Pie." The Pie (Figure 1) is a circle (hence the name pie), with a vertical line across the center horizontally, and one or more vertical lines dividing a section of the circle. I will give you an example of a Pie for the above formula.

The variable to the left of the equal sign goes above the horizontal line, and the others go below. To execute the formula you multiply items on either side of the vertical line then divide the result into the value above the horizontal line. For example if I want to know the voltage, and I have a current of 2 amps, and a resistance of 5 ohms, I would multiply 2 X 5 and get the answer of 10 volts. If I have voltage and resistance, I can calculate current by simply dividing the resistance into the voltage (divide the variable(s) below the horizontal line into the variable above the line).

Again using the same values, I would divide the resistance of 5 ohms into the voltage of 10 volts and get a current of 2 amps. The same would hold true if I wanted to find the resistance and knew the current and voltage.

This is a very basic and simple way to do basic electronics math. But what if the formula was a bit more complex? No problem, our trusty Pie comes to the rescue once again. Let's use a more complex formula such as for example, capacitive reactance. Now this one will get a little hairy but it still works the same way – divide up multiply across. The formula for capacitive reactance is: 1/(2*pi*f*c) Let's plug that one into the Pie (Figure 2).

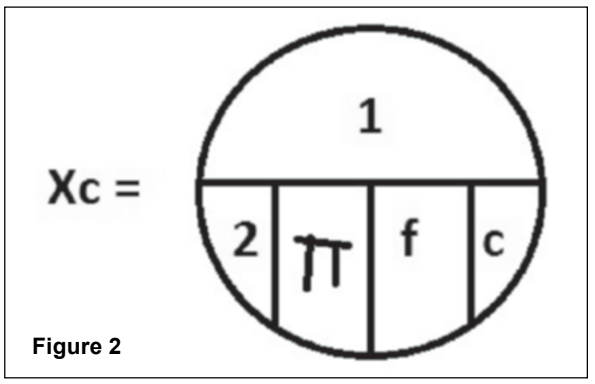

Figure 2

In this case, we can find the Capacitive Reactance (Xc) by dividing the product of the 4 variables below into 1. Or, 1/(2*pi*f*c). As you can probably see by now, this will work for just about any formula you might want or need to use in the business.

Picture the pie formula to calculate Indirect power for an FM transmitter. We know that the formula is P = I x E x eff (Where eff is the Efficiency factor). You can simply plug in the values into a Pie and visually see the procedure. I like the Pie formulas because once I "see" them I have a mental picture that stays with me. When I was in school, I took a 50 cent piece and drew circles over the back of my main notebook, and put every formula I could think of in those circles. For years, I would refer to those "pies" when I needed a formula. I ran across that old notebook the other day and remembered how valuable it had been to me during my time as an engineer. Now back to the indirect power application.

(Continued on Page 32)

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Practical Engineering

– Continued from Page 30 –

Plug in your values, and you can find your power (Figure 3). Before we do that, allow me to inject something here regarding efficiency factors. First of all, most manufacturers of transmitters will give you a rated efficiency. Keep in mind however that there are a lot of factors that can have an effect on efficiency, and just because your transmitter manufacturer may tell you that your transmitter is capable of an efficiency of say 83%, that does not mean you will get it. (Try that with a solid state box! Ha!) You may get less and in some cases you may even get more!

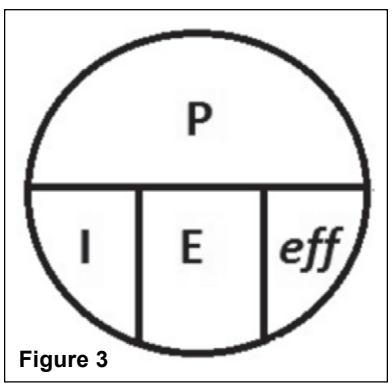


Figure 3

Calibrate your Meters!

The only way in the field to be completely sure of your efficiency and your power meter calibration is to do the following. You will need a calibrated thru-line wattmeter. You will also need a dummy load of sufficient capability to run your transmitter at 100% power for your application (i.e. licensed power).

Start up the transmitter, run it at your licensed power level into the load according to the watt meter, not your transmitter power meter. Once you have reached your authorized power, calibrate your transmitter power meter to match the calibrated meter. (This is not necessary to measure efficiency but *is* necessary to make sure your power meter is accurate.)

Note: Transmitter meters are usually logarithmic and are not accurate except in a range a little above and below the 100% reading. Now some may argue this, but this is my personal observation based on working with most transmitter brands down through the years. Calibrate the meter to be accurate at full power for your licensed power.

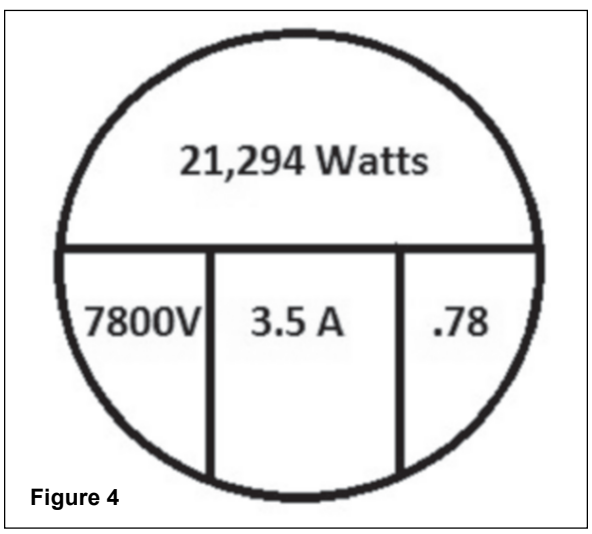


Figure 4

Once you have the meter calibrated, then read the Plate Voltage and Plate Current meters, while operating at 100% licensed power. Plug your Power, Voltage, and Current into the formula and you will get your actual transmitter efficiency. Write this number down and keep it for future reference.

For example if your Plate Voltage reading was 7,800 Volts, your current read 3.5 Amps, and the efficiency read 78% (Efficiency factor .78) here is what you would get for your current operating power (Figure 4).

Keep in mind that due to a slight mismatch between the purely resistive dummy load, and the antenna itself, your readings are going to vary a little. Use the efficiency factor you calculated, as it is accurate. You will also notice that the power meter will read a little differently on the antenna than it does on the load, due to the mismatch.

I like the Pie formulas as they are easy for me to remember. I always know when to multiply and when to divide. and can figure out my calculations with ease. Now I realize this is a little "Old School" as most of you probably have a self-calculating spreadsheet in your tablet or smartphone, as do I. But in case you are a little lean on technology at the moment they always work – and the batteries never run down!

I would suggest possibly putting your frequently used formulas on a card, laminating them and putting them on the wall in the shop or transmitter building where you can have them handy when they are needed. There may be one day when the cell access is a little flaky at the site and you cannot get into your Dropbox to pull one up, and *voila*, you have it right in front of you.

While I was researching for this article I ran across a new version of the Pie that is good for some things. It is called the "Pie Wheel." You can find numerous references to this tool in a quick Internet search, but then we *were* talking about Old School methodology that is still relevant weren't we? Enjoy!

Tommy Gray is the Director of Broadcast Engineering/Technology/Facilities at KSBJ/NGEN Radio Networks. He may be reached at: tgray@ksbj.org

Transmission Topics

Antenna Matters

by Jim Turvaville

There are as many opinions on FM antennas as there are manufacturers of the antennas, and just about as many different opinions on how they should be installed. Because most every FM antenna installation is unique, I'll not attempt to make any generalizations on what is the right or wrong type of antenna design for your station. Instead, I want to outline some of the reasons behind different antenna designs so you can ask the right questions for your specific station needs.

Height

In the FM world, signal propagation generally follows line of site from the tower to the listener, so height is always desired for best coverage. There are two specific situations, however, where one can actually have too much height and troubles will be possible.

The first can happen when a station is in the unfortunate geographic location where temperature inversions can happen from nearby oceans and large bodies of water. While there is little that can be done to prevent this phenomenon, one can plan and accommodate their interference. I have experienced these first hand in coastal areas of the Carolinas as well as both the Atlantic and Gulf coasts of Florida, and am aware it can happen in other similar locations. While each location is different, the general consensus among the engineers with whom I have discussed this phenomenon is that an antenna located more than about 500 ft above ground is where one can experience these inversions most dramatically. I know of several stations which operate at licensed heights of 800 ft to 1,500 ft above ground, which have auxiliary antennas at the 500 ft level for this purpose. On those days when temperature inversions are at their worst, a simple switch to the auxiliary antenna usually makes the signal listenable again. If your station is, or will be, in an area where this can be a problem, then some advance planning of antenna placement can be of great benefit.

The second situation where height can be a problem is typically found where the desired coverage area is very close to the tower location, whereby the signal tends to over-shoot much of the desired listeners. This can happen on high power stations as well as lower power signals, or even translators – I have installed a 250 Watt translator on a mountain top at 3,000 ft above town; and there are places where I can physically see the antenna but have poor signal because of the close proximity to the tower.

Obviously, we want enough height to reach your audience, but being tall just for the sake of being tall may require some added engineering forethought and design. Fortunately. in the case of the translator mentioned, the great majority of the desired city coverage is farther from the tower and this is not a serious impediment to the station reception. Additionally, a bit of mechanical beam tilt has subsequently been employed on this particular installation. Mechanical beam tilt is a process whereby the vertical radiating plane of the antenna is lowered below the horizontal radiating plane of the antenna. This allows a bit of downward radiation, greater than the vertical radiation pattern of the antenna or antenna array would naturally permit. This is useful on both low and high power stations and is a lead-in to the next subject of consideration on antenna system design.

Number of Bays

When building an FM station, more often than not, the size of the antenna is chosen as the product of the mathematical calculation of ERP versus TPO. For example, I have a CP for 50 kW and want to buy no more than a 10 kW transmitter – so I install a 10-bay antenna and use 9.9 kW TPO to make maximum efficiency at my plant. This lets me have 50 kW ERP and only have to pay the electric bill each month for a 10 kW transmitter, when a 6-bay antenna would require a 17 kW TPO from a 20 kW box. The 10 kW/10-bay combination makes sense to the accountants and to the station owners – but it may not always the right answer for necessary pattern coverage.

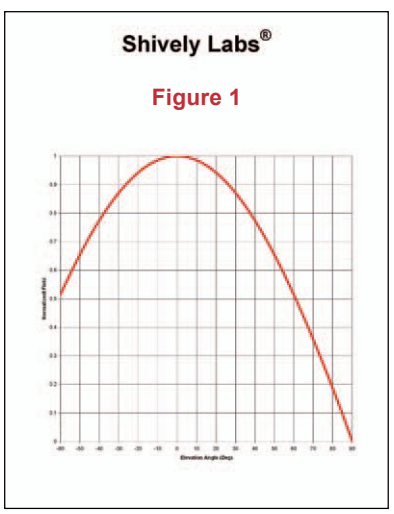
All FM antennas have both a horizontal and a vertical radiation pattern, by the sheer physics of how the radiating elements are built, and these characteristics vary somewhat between basic designs of antennas by different manufacturers. In a generalization, most FM antennas are of the "rototiller," "slant-V," or "ring-stub" design – each of which has slightly different horizontal and vertical radiation patterns.

(Continued on Page 36)

Antenna Matters

– Continued from Page 34 –

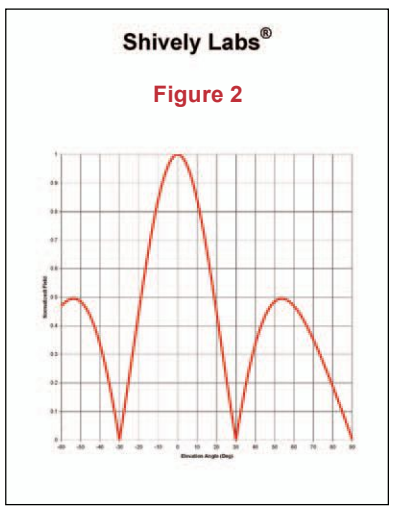
Obviously, all FM antennas strive to have the horizontal radiating pattern as omni-directional as possible; after all, this is the plane where the signal propagates outward from the tower to cover your service area. With little variation, all of the types of FM antenna design perform well in the horizontal plane, making any of the manufacturers able to provide good service and coverage. It is the vertical radiation plane where antenna design, and specifically multiple bay antenna arrays, can have a real effect on signal penetration in both the near field and the distant regions.



This pattern from Shively is typical of a ring-stub type antenna.

A single FM bay has a relatively broad vertical radiation pattern, sending a good deal of the RF from the aperture of the antenna both upward and **d**ownward.

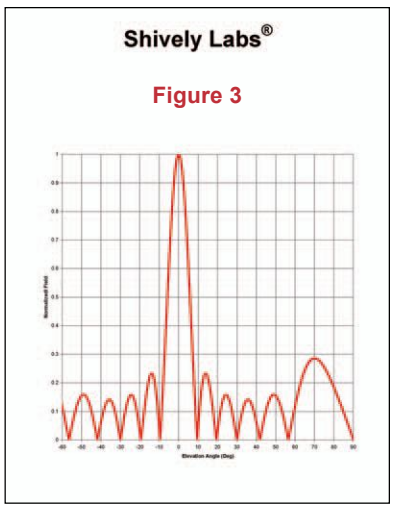
Figure 1 is a measurement of the power from the antenna at various angles from the direction of the antenna, both upward and downward for a full 180 degrees. To visualize this in a real-life installation, imagine the graph turned sideways where the lobe of the antenna points outward; this more clearly shows how much of the signal goes up into the sky and down toward the ground close to the tower. Herein is an example where a 1-bay antenna can greatly improve close-in signal penetration from a tall tower; if your tower is centrally located inside the area of the desired audience you will have good local coverage. When two bays are used, the pattern appears as in **Figure 2.**



When just 2 bays are used, the pattern looks like this.

Where you can see as much as half of the power is now being taken from the vertical plane and being concentrated into the primary lobe. This still provides really good near field signal for the station while putting less straight up to the sky.

The graph in **Figure 3** shows clearly a reduction of almost 90% of the signal in the close proximity of the tower, while focusing the majority of the radiated signal outward toward the horizon. Herein is an example where a multi-bay antenna will improve the fringe signal reception for a station located a greater distance from the desired audience, at the cost of less near field signal penetration. As one adds more bays to the antenna array, the primary lobe becomes narrower with less vertical radiation, and mechanical beam tilt may be required to be sure that lobe reaches a point near ground level at the distance from the tower to the desired listening area. Changing the spacing between the antenna bays to 3/4 or 1/2 wave alters this as well, and is often desired to meet radiofrequency radiation exposure limits at the tower location.



By converse, visualize the same antenna design in a 6-bay model:

There is no universal right or wrong design for an FM antenna array, but these factors should be carefully considered in light of the desired area of service for the station. While the cost factor will change, designing the antenna to provide good signal penetration in the desired service areas and then choosing a transmitter to match it will provide a more consistent sounding signal that can translate into added revenues.

Jim "Turbo" Turvaville is the retired Director of Engineering and I.T. for WAY Media (www.wayfm.com) and now maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

Tech Management

Are You a COG?

Sure, we are asked to fix everything from the phone system to the front door. Sometimes it sounds like there are a whole lot of Crabby Old Guys (COGs) out there, with no hope for the future of the industry. "There is no respect." Maybe there is no respect because you give no respect?

True, with the increased workloads at many stations, more than a few engineers today really are stressed out as they search for some holy grail of engineering satisfaction. You know, that feeling of accomplishment when something gets fixed, brought back from the dead, or just plain works the first time you turn it on?

That really is what it is all about. Yes, we are all busy, and often cannot seem to accomplish more than just "putting out the fires." However, instead of moaning and groaning, "I'm an old engineer and the world of IT is swarming all around me," why not pick up a book and read, or make friends with the IT guy?

When the announcer comes into the shop and says: "Hey, Mr. Engineer, the CD player in the production room will not play CDs," how do you respond? Do you (a) roll your eyes and moan, "I'll get to it when I can," or (b) follow the jock into the production room and act like you care. If you normally respond with (a), it is no wonder you whine about getting no respect. You may be a COG!

After all, the announcer is just letting the guy, whose job it is to make sure this stuff works, know that it is not working. By responding positively, not only are you making him feel better, he will feel less apt to get testy with you. Remember, he needs the CD player to get his job done. If he thinks you do not care, then he may think you are a roadblock to getting the job done.

Are You An Invisible Engineer?

If you are a full-time CE for a group, do you show up during normal business hours? Or are you the mysterious engineer who is only seen in the shadows of the night? Do you attempt to show up at any of the company functions? Or do you scoff at the event because you have transmitter maintenance scheduled for that night?

Yes, there is a lot going on at the transmitter site. And no one is asking you to become drinking buddies, or even work 8-5 every Monday to Friday – just show your face and act like you care. Perception becomes realty! We always talk about the average listener; well there *is* such a thing as an average jock. You do not have to tell lies to the jocks or management, just make them feel like they have been heard and you can begin to correct the situation.

Are you an engineer who only shows his face when for an emergency. And when you do, do you complain the entire time because you were called away from something else. An emergency directly affects the station employees' ability to do perform their best in a difficult situation. Many employees have trained to handle these emergencies well, and if you fail to do your part, then they may resent your lack of a good team attitude.

Doing What is Needed

Quit being a COG, and remember why you chose engineering as a profession. Nobody forced you to become one. There was no dictator pointing his finger of evil power at you saying, "You *will* be a broadcast engineer – and like it!" The choice was yours. If you do not enjoy it, then keep it to yourself because there are young, impressionable people out there who really do look up to you. Have you ever been disappointed in your dad, mom, grandparent or mentor? It certainly does not feel very good.

When we got started in this business, we were probably told, "Radio is not a job kid, it's a lifestyle!" Do you still believe in that statement? Do you pass it on to others?

Failure to Communicate

In the Beginning

In the earliest days, Engineers roamed the earth with impunity. It literally took dozens of them to keep the equipment running – we had no choice.

Without warning, raptors appeared in the form of General Managers, Program Directors and, worst of all, "Personalities." Engineers found themselves nipped at the heels from every direction. And it gets worse; every year as more equipment takes care of itself, folks get downsized or puppetized by headquarters.

(Continued on Page 40)

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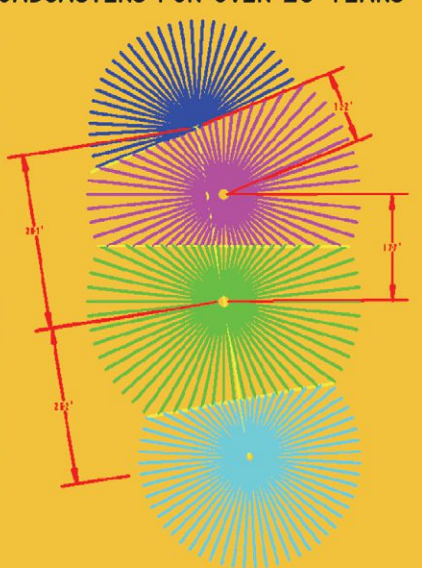

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Tech Management

– Continued from Page 38 –

In such an environment, "turf" becomes more important than ever. Merely justifying one's existence in 21st Century Broadcasting can become a full-time job.

Which Department is More Important?

Every department in a radio station is critical to its success. The question "Can't we all just get along?" can become more critical, the more the bottom line becomes the foundation for your station's existence

Sadly, some of the most serious conflicts are between Engineers and Program Directors. Neither can do their jobs without the other, yet an uneasy, often-broken truce can exist from day to day.

Picking on Program Directors as major engineering irritants is probably unfair. There are so many contributors in other departments that we would need several articles (or a book) to cover all the possibilities. In the old days, Program Directors actually made decisions, so we will tackle them first.

Understanding The Cultures

No department can honestly argue that entertainment is not our prime directive. Without compelling programming, there is no reason for any of us to exist.

Compelling programming brings with it huge egos which must be buffered by the Program Director. No Engineer wants to be faced with angry "talent on loan" from any higher power. However, neither Personality nor Engineer is known for U.N.-style diplomacy.

Yet, the Engineer sees the PD as a badly dressed creature with hair (or intentional lack of it), configured to match the programming.

The PD sees the Engineer as someone dressed in something flannel, and with jeans that were torn at work rather than at the factory.

Failure to Communicate

Another culture war escalates when the Program Director, under orders from the Sales Manager, sets up a remote for early that *same* afternoon.

Something got lost along the way. The Engineer had told the Program Director about the critical equipment lead-time, and the PD passed it along to the Sales Manager – who forgot to tell the Account Executive. The General Manager now gets into the act and wants to know who screwed it up.

Well ... it must have been the Engineer! Engineers are known to work miracles, so another one was expected. (Go easy with miracles or you will end up always being expected to them pull off).

This is a communications industry. That's probably why we rarely communicate well. There is nothing more frustrating for someone who deals in things ephemeral – like formats, or a "personality" making $100 million needing a ride to work – than to be confronted by an Engineer supported by the laws of physics. There is no wriggle room.

Engineers have to use that awesome power for good (preferably their own good). Engineers with great people skills usually have fewer problems. Nearly every other department requires people skills in one way or another – they need cooperation. It may seem like they are fooling each other, though it is really the social lubricant that makes a complex system work.

The most well-liked and effective Engineers are the ones who have been willing to take the time to carefully explain the process.

Even the best employees will need help, now that analog has gone digital, and much of the staff has been downsized. Most people understand simple explanations, especially when backed up by detailed memos, directions and training. The PD who gets the blame when the local Ranchero station beats you – in a market where no one knows what that is – needs someone on whom to lay it off. You *do* have time for all that – right? *– Radio Guide –*

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Small Market Guide

An Appeal to Fellow Small Market Broadcasters

by Roger Paskvan

In the last issue of ***Radio Guide***, we talked about the Good, the Bad and the Ugly future for AM radio. From the feedback emails, this topic seems to be at the forefront of many broadcasters' minds. Yes, what are we going to do? The end is coming.

Look at the current direction of audio technology. It is heading into the realm of quality of sound, availability on mobile devices and instant access for those on the go. The listener now has more options than ever before to listen to quality music. Internet access on mobile devices has brought a programming world to your finger tips. FM can still compete with stereo and reasonably high quality sound. Present AM radio, because of sound quality, can't!

Now if we look at the dismal pathetic state of AM radio, nothing has really changed since the 1930's. The modulation process is still the same although Class D modulation has improved efficiency. It's the same idea of changing the amplitude of the carrier. The bandwidth is narrow (10 kHz) and AM sounds almost like music through the telephone. The static is still there and to quote the late RCA's chairman, David Sarnoff, "static, like the poor, will always be with AM radio."

In this brief article, I wanted to focus on getting some ones attention to take action. Talk is great, but we, as small market broadcasters, need to save the AM dial from failure. It is headed down the path of destruction and as the incomes go negative and the loyal listeners finally die off, the end picture becomes real. If no one is listening to you, why stay on the air? If you can't break even, why keep trying when you know there is no future for you or your AM clients that could get positive results on FM?

Utilizing the FCC's recent television re-model plan as a proven vision to save the AM band could just accomplish this task. What needs to be done is to get the Commission to formulate a plan for re-farming the entire AM dial to digital modulation, with a carefully planned phase-out of current analog AM technology. This could be a five year process to force each and every AM broadcaster to convert to digital by a set date, just like analog TV did. Yes, I know it will cost some new transmitters and there are yet to be resolved bandwidth issues with antennas as well as the skip problems, but these issues can be resolved. If your AM station is like ours, we are still using an MW-5 from 1975, every day. That's only 39 years of service, probably about time to upgrade anyway for a lot of stations.

This mass method of re-farming the AM dial would save AM as a transmission mode and give a breath of fresh air to the AM broadcasters. The fact is that full 10 kHz digital stereo AM will rival the quality of current FM broadcasting. Superior sound quality could justify the added expense of a new digital transmitter. Your AM station will have all the new capabilities of any current FM station. Yes, time would have to be given for AM digital radios to be manufactured and car companies to implement the new format into their models. In the end, all those AM stations (about 4,700) would be saved and small market radio would now thrive in the world of quality digital audio AM broadcasting.

Letting the marketplace decide, like the FCC did for AM stereo will not work. A carefully thought out several-year plan to phase out current AM technology is needed to pave the path for a new single format digital AM transmission system. This plan will provide an opportunity window for AM broadcasters to make the necessary engineering changes and financial plans to get the task done efficiently. Like the television transition, at a specific FCC date, all analog broadcasting would cease and the digital world would emerge from 540-1700 kHz.

As broadcasters, we need to talk to our congress people – take steps to make this an NAB agenda item. Send letters to the FCC encouraging them to start the process of saving our AM resource. The time is *now*, we can't wait any longer. FCC Commissioner Ajit Pai is already looking into AM improvements. Chairman Tom Wheeler we need your leadership to save "ancient modulation" from extinction.

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

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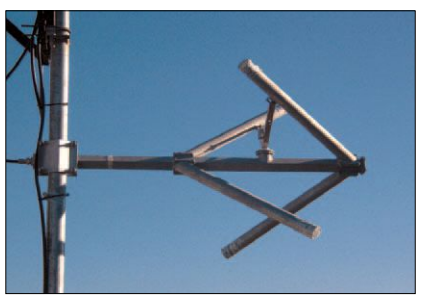

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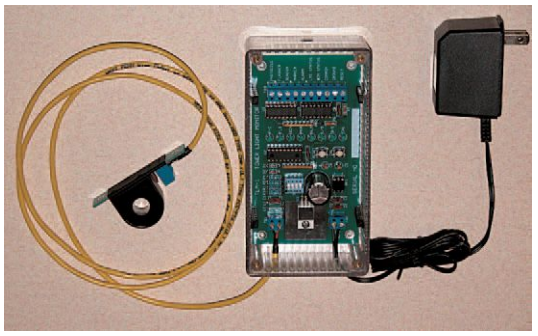

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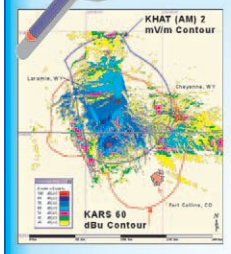

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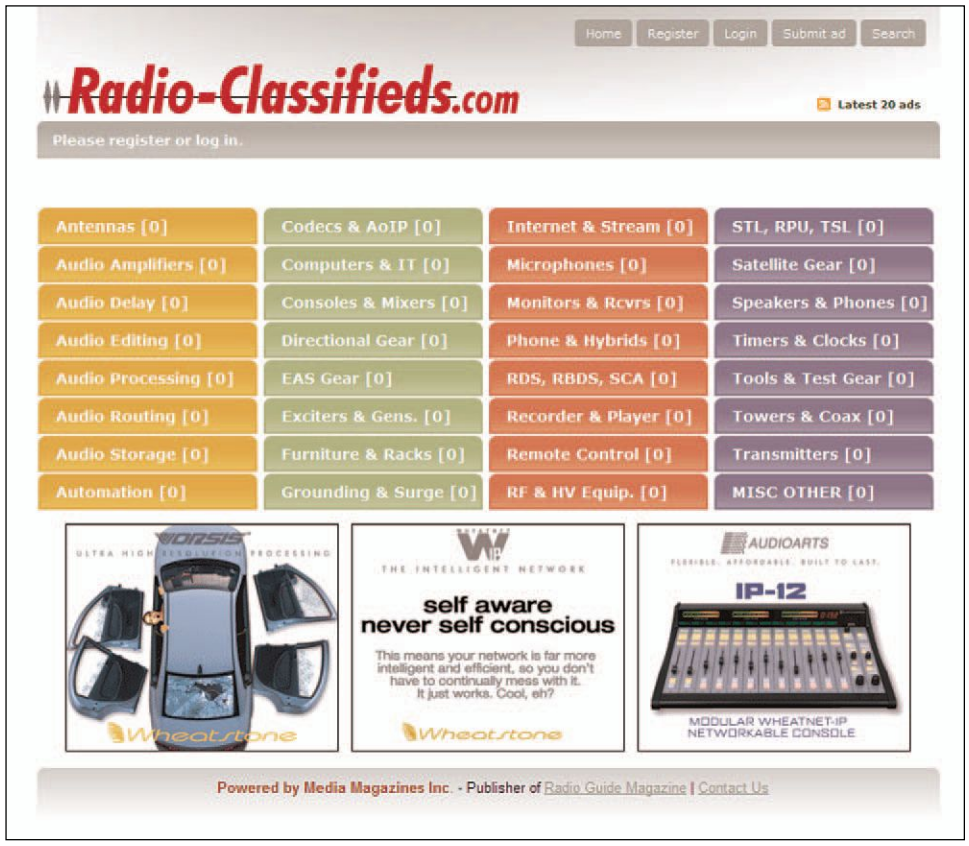

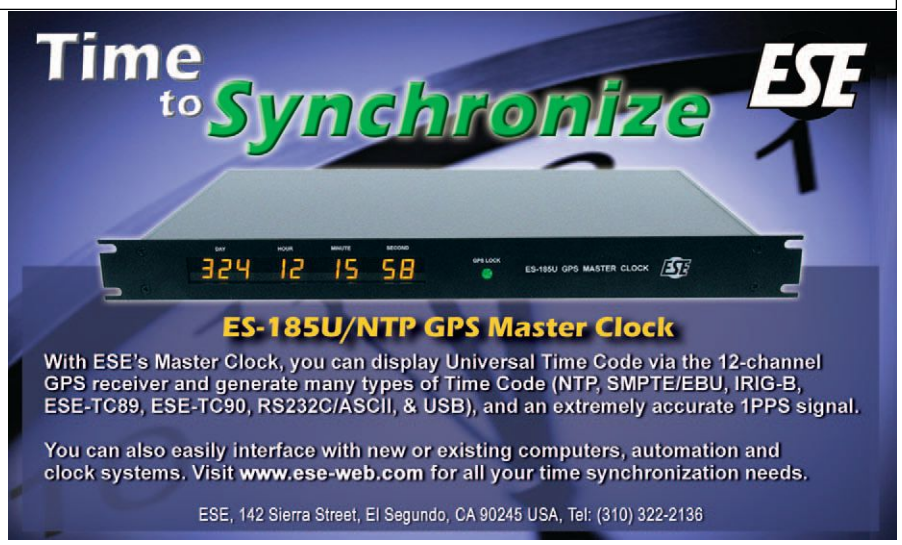

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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October 8, 2014
Tuning Stone Resort and Casino, Verona, New York
www.sbe22expo.org

WBA Broadcasters Clinic
October 21-23, 2014
Madison Marriott West, Middleton, Wisconsin
www.wi-broadcasters.org/events/broadcasters-clinic/

Ohio Association of Broadcasters (OAB)
October 29-30, 2014
Columbus, Ohio
www.oab.org

2015 CES Conference
January 6-9, 2015
Las Vegas Convention Center, Nevada
www.cesweb.org

2015 NRB Convention
February 23-26, 2015
Nashville, Tennessee
www.nrbconvention.org

NAB 2015 Spring Convention - Las Vegas, Nevada
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