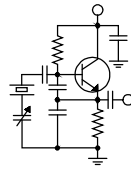


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

JUNE 2019 • VOLUME 29 • ISSUE 6 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

Seasons

It's always interesting to observe the seasons through which we go in our part of the company. I'm not talking about winter, spring, summer and fall, although those can certainly play a part. Instead, what I mean is that we find ourselves dealing with one particular type of issue or doing one kind of project, often company-wide, in a certain season.

Such seasons are often driven by technology. For example, back in 2006, we were in a season of converting our big hubs to Wheatstone TDM technology. A decade later, we were converting to AOIP (and still are).

Sometimes our seasons are driven by regulation. Just ask anyone involved in repack, on either the TV or FM sides of the issue (the FM side being "collateral damage" of sorts). I can think of any number of seasons of regulation-driven change over my 43-year career.

And sometimes our seasons are enabled, rather than driven, by changes in regulation (or deregulation, as the case may be). One example of this is the FCC's waiver (and later revision) of the 90-105% power rule to permit AM stations to operate using MDCL. When the agency began allowing that, I spent a good bit of time getting waivers and then equipping our stations. We're still enjoying the fruit borne in that season, a gift that keeps on giving month after month.

Another example is underway right now, and that is the recent change in FAA Advisory Circular 70/7460-1L that permits dual medium-intensity white/red tower lighting on structures from 200 feet up to 700 feet in height ("Change 2"). With a good number of towers in our company in that

height range, all of which would require repainting to remain in compliance with FAA color and reflectivity standards, this represents a way to cut our tower maintenance expenses over the long term.



Right now, we are in a season of tower marking and lighting change in several markets, including Chicago, Rockford and Denver. Late last fall, we changed over the 500-foot WYCA tower to one of the new systems. We learned a lot in that project, probably more than we wanted – the top "beacon" and flash head experienced a failure almost right out of the box, and we had to wait on weather and climber availability to get it swapped out. The manufacturer made it good, but it did

take a while. We were able to diagnose the problem with one of our drones. Professional UAS pilot Rick Sewell was able to fly the tower, video the head and observe that quite a few of the LEDs in the head were not firing. That tower is now in good shape and we're moving on to several of our other towers in the market.

In Denver, we have just replaced the 1962-vintage Huey & Phillips red tower lighting system on the two 450-foot KLZ towers with a dual medium-intensity white/red system from Slatercom, which uses Dialight flash heads. Slatercom provided the beacon mounting brackets, cables and control boxes.

The photo on page 2 below shows the innards of one of the control boxes. Consider that these boxes are NEMA-4 enclosures that are 30 inches wide; these were mounted on 32-inch tower faces some 15 feet above the ground. It was tons of fun to work in the boxes way up in the air like that (see the photo above). We'll probably use an

extension ladder for troubleshooting and maintenance operations.

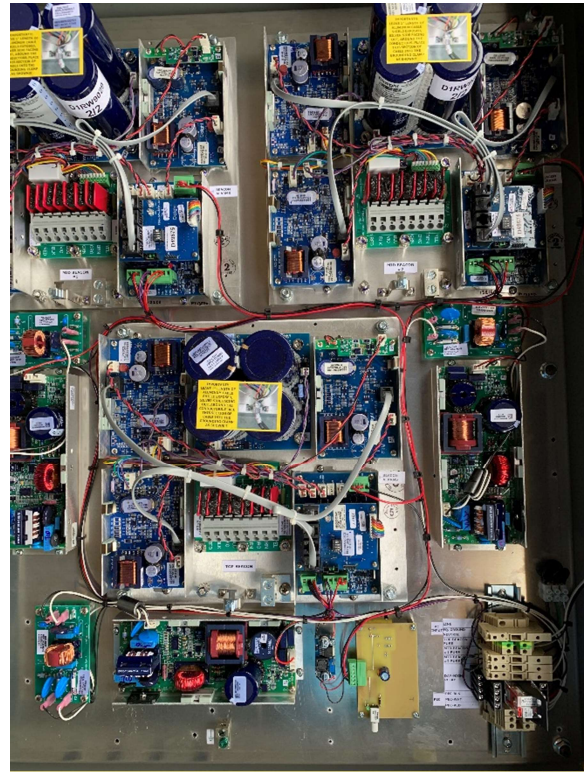
The boxes contain drivers for the flash heads, switching power supplies, surge suppressors and alarm modules. The alarms are, per FAA regulations, wired in series and to open on fail – if there is a failure anywhere in the system, including a power supply, the alarm loop will open just like an old-style interlock. We'll set up our remote control systems to alarm on open (invert the status).

You might note the lighter colored small circuit board at the bottom right. This is the fiber-optic transmitter board that I had manufactured (thank you ExpressPCB.com!). There is an almost identical fiber-optic receiver board that we installed inside the ATU cabinet at each tower base, and they were connected together with a 1 mm fiber encased in a run of ½-inch 100% PVC conduit. That receiver provides an opto-isolated closure that connects to a 600-foot run of single-pair AWG #18 wire that runs back to the transmitter building and remote control.

Why the fiber-optic connection, you ask? It's because the towers are insulated and RF "hot." We need to cross the base insulator with the alarm conductors without impacting the impedance of the tower at the AM frequency. We've already done this at the new KBRT tower site in Southern California to good effect. The fiber solution works like a hose.

It was a real challenge shoving the fish tape through almost 50 feet of ½-inch PVC liquid-tight conduit. Unlike the metal-lined version, the all-PVC stuff is "sticky" inside and fights the fish tape all the way. Pulling the fiber-optic cable back through was almost as much fun as shoving the tape through.

The system is now operational on both towers and the white LED strobes can be seen for miles and miles. The fiber-optic monitoring system is working great, and that 600+ feet of 18-gauge wire



Interior of the 30-inch wide Slatercom NEMA-4 tower light control box. Note the fiber-optic transmitter at the bottom center right and the small DC-DC voltage converter to the left of it.

doesn't have too much voltage drop for the Burk status to read accurately. In fact, I measured the voltage right on the IP-8 and it showed 0.00 volts, which surprised me. I figured we'd have a residual volt or more with that long run tied to an opto-isolator output, but the pull-up resistor in the Burk must have a much higher resistance than I thought.

The New York Minutes

By

**Brian Cunningham, CBRE
Chief Engineer, CBC – Western New York**

Hello to all from Western New York! Spring has finally made its way into the northeast portion of the country! The weather has been gray and cold, without sunshine seemingly forever. But along with the warmer temperatures come spring thunderstorms, complimented by winds, lightning and localized flooding along the Lake Erie and Lake Ontario shorelines.

The country's mid-section has been belted by tornados in the month of May, over five hundred confirmed twisters documented since May 1st! Normally, we in Western New York do not have to worry about tornado damage, as it is indeed a rarity for one to occur this far north. We do, however, from time to time, experience waterspouts over Lake Erie, but I cannot recall one of these ever making landfall and causing property damage.

Thus far, we have received quite a bit of rainfall which is hindering our ability to get the tower fields cut, especially around the transmitter buildings. Hopefully, we will get a break from the rain and thunderstorms soon so I can begin to get my outdoor activities underway.

The first item that will be done when the weather clears is the tower lighting for WDCX(AM) in Rochester. Don Boye of Western Tower has been trying for weeks now to get a break in the weather to get the beacons and side-markers replaced on towers five and six. If it's not the weather delaying getting this work done, its other emergencies that Don has to address, pushing our work back until the next weather window appears.

While waiting for clearer weather, I did get the opportunity to service our air conditioner units at both transmitter sites in Buffalo. It is amazing how much dirt accumulates in the condensing coils over the winter months! A thorough cleaning of the coils, along with filter changes and inspection of all electrical connections, round out what maintenance I can perform on the A/C units.

The blower motors have sealed bearings. Therefore, no lubrication is necessary. I also replaced the building's air intake filter, which works in conjunction with the temperature-controlled exhaust fan, which is energized in the event of an A/C failure.

The Bard five-ton units we have at the FM transmitter site are easily maintained, as all of the components are within arm's reach. At the WDCZ(AM) site, the condenser is on the rooftop, making servicing a little harder as you have to carry everything needed to

perform the maintenance up a ladder. It never fails – there are always two or three trips up/down the ladder for items I forgot or found I needed after I began the maintenance procedures.

While up on the roof, I took the opportunity to inspect the fairly new roof we had installed several years ago. Aside from some gravel shifting, the roofs' rubber membrane appears to be in excellent condition. We have not noticed any leaking or wet spots in the interior ceiling since the roof was replaced in August of 2016. I will have to make another trip up on the roof when the weather improves to clean out the gutters, which have accumulated a lot of needles from the large pine trees surrounding the building on the east and west sides.

In Rochester, we had budgeted this year to have repairs made to each of the cinder block doghouses which house the day-night networks for the six-tower array. Over the years, erosion has caused the foundations to shift, and in many cases, has caused the cinder blocks to break into several pieces. There are spots in some of the doghouses where you can actually stick your fist into the building from the outside where the blocks have collapsed and broken.

Our contractor is scheduled to revisit the site the first week of June and update the quote we received last year to ensure that all the damage is taken care of along with any additional items that



have arisen since the last inspection.

Aside from this work, the only other outdoor maintenance I had planned for this site is to paint and seal around the entrance doors of each doghouse. There is considerable rust and discoloration on each steel door, along with a bullet hole or two from idiots who don't respect private property. I will have to wait until the weather clears before I spray weed killer in and around the tower fences. The weed killer I use recommends application of the chemical at least 24 hours before the next rainfall for maximum kill. Generally, one spraying in the spring and another in the early fall keep the unwanted growth at bay, except for those summers where we have a lot of rain.

On Tuesday, May 21, I made another trip over to WDCD in Albany, this time to remove an Audioarts D-75 audio console from the production room. This console will replace a 20-year old Mackie 24.8 board located in the WLJZ-FM production room in Rochester. The D-75 console will greatly

improve operations in this studio, especially when it is utilized as a backup air studio. Additionally, voice tracking in Nexgen will be much easier and quicker due to the additional output busses the Audioarts has.

My original plan was to remove the console without disturbing the integrity of the original wiring, which would make re-installation much quicker. However, after inspecting the wiring, there was no way I would reinstall this board with the original wiring. I don't know who installed it, but I would not with much confidence reuse the wiring harnesses that were there. I have been rewiring the DB-25 connectors each night at home to ensure that the reinstallation is clean and problem-free. I plan on installing the board in its new location sometime in the next few weeks.

That about wraps up another month here in the great northeast, and until we meet again here in the pages of *The Local Oscillator*, be well, and happy engineering!

The Motown Update

by

Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC – Detroit

Greetings from Motown! Spring is here, and we started out the month of May out with our Flower Day remote at Eastern Market located in downtown Detroit. We used our Tieline Via and a hotspot completely off battery power for four hours. I am really impressed with the flexibility and quality of the remotes we have done from the Via. I like the built-in microphone processing and headphone mixer. It is nice to have one piece of equipment that will serve our needs.

Hamvention in Xenia, Ohio (near Dayton) was great this year. My assistant and I took my Winnebago Lesharo and went camping and attended the hamfest. John Bryan State Park is close to Xenia and made the daily trip over to the fairgrounds easy. I used my homemade SDR transceiver at the camp site. We had a primitive campsite, so I had a chance to use it in 12-volt mode using a solar panel.

The last year that hamvention was at Hara

Arena, I had come across one of those Sunday "I don't want to take it back home with me" deals.

Where the vendor practically gives things away. I ended up with a box full of mini-computers that were used in cabs with display screens. I ended up with six computers and small LCD screens for \$5. I didn't really know what I was going to do with them until several weeks later when I opened them up. When I pulled the cover off, I discovered a DC to DC converter board. It takes 12 volts and supplies power to the motherboard. When I looked these boards up, I found that they were still sold for \$129 apiece. To my surprise, the power supplied by this board was very, very clean and filtered. I used this board to supply power to my SDR. I built it with a 12-volt power supply having the option to run natively off a battery.

I had purchased a Silver Bullet antenna in Florida and set it up in the campsite. I worked a slow-scan television (SSTV) contact from North Carolina





The Lesharo at the Air Force Museum.

and made several other SSB contacts.

The hamfest was fun. We saw a lot of broadcast equipment. There was a table of Marti equipment for \$200. We attended a cool forum on propagation and what is going on with the sun. We also visited the Air and Space Museum in Dayton. It was my first time there and was an incredible experience. Planes from the start of flight to the X-planes. There are missiles, a satellite, and Apollo capsules. I couldn't believe admission was free.



Some of the exhibits at the Air and Space Museum in Dayton.

When we returned to Detroit, we finished the Windows 10 upgrade of all our Nexgen machines. All went well, and the users reported better performance. We also checked the air conditioners out at each of our transmitter sites to make sure all of them were working properly.

With the tornados that hit Dayton, I have been thinking through disaster recovery scenarios, like what if the roof blew off. After seeing what happened in Dayton with the Hara roof blowing off, it is worth having several large tarps on hand. If something like that happened, at least we could try and save what is left inside. I plan on stocking a few.

For Memorial Day I took my first trip to Northern Michigan. I took the Lesharo again, I figured, why not get my \$650 dollars out of it? We arrived safely, but the engine developed a miss on the

way there. When I tried to start it on Saturday, all I got was cranking, no ignition. Well I was in an interesting position. The nearest auto parts store was 45 miles away. I had no vehicle and Uber and Lyft don't operate there. So... I started to diagnose the problem.



One of the great views on Mackinaw Island.

I looked at spark first. I had spark from the coil. I then checked the distributor cap and rotor. They were a little dirty. I cleaned them and attempted to reinstall them. When I screwed the distributor cap back on, I heard a "crack!" Oh boy, the center of the cap cracked right off!

Well, now I really had an issue. No stores open until after Memorial Day, 400 miles away from home and a rare Renault engine with an imported distributor cap that wasn't in stock anywhere. I had to be resourceful. I started to look for epoxy. The camp store did not have any, but the owner of the camp said he might have something in his shed. In an hour he stopped by the campsite with a tray of assorted dusty odds and ends. There was a tube of two-part epoxy. I thought I had my solution. Well, when I opened it the tube was dried out. It was getting late and I gave up for the day.

On Sunday, I took my family to Mackinaw Island. They had a shuttle from the camp to the Ferry. What a beautiful place. No motor vehicles, just bikes and horses. We took a carriage ride around the Island and had a fantastic lunch at the Grand Hotel. If you haven't ever been there, it's a great place to go.

As the day came to an end we returned to camp and reality set back in, what to do with this motor home, and how do we get back home? I looked around the camper for anything that would help. My wife said, "What about this Gorilla Glue? Will it help?"

I couldn't believe it, a possible fix! I glued the cap back together and let it set up overnight. When I woke up on Memorial Day, the first thing I checked was the cap. It felt solid. I carefully put the plug wires back on and reinstalled it. Now was my

opportunity to test it. I cranked it over and still no ignition. I thought I was done, until I thought the issue through.

With the symptoms, it could have been too much fuel flooding the intake. I figured I would try an experiment. I decided to open the intake after the air flow sensor. I figured if I provided more air that it might balance the air fuel ratio enough to get the engine started.

I disconnected the intake boot and cranked it over. What do you know, it started! What a moment!!

After looking into it further, I discovered that the fuel pressure regulator had a burst diaphragm

that would flood the engine.

I ended up driving back home over 400 miles with a glued together distributor cap and a fuel line that was restricted by vice grips to restrict the flow. Nothing like adjusting an engine's performance with vice grips! On the way back, another fun challenge occurred. In stopped traffic, the engine was getting hot. I found that the temperature switch to the cooling fans quit working. I had to bypass the switch to keep the fans on.

We arrived safely, and it definitely was a weekend to remember!

Until next month, '73 from Brian W8FP.

News from the South

by

Stephen Poole, CBRE, AMD
Chief Engineer, CBC-Alabama

We all enjoy sharing the Big Projects™ that we've done, or have planned, in these pages. The truth is, most of May flew right past us here in Birmingham. Aside from a big firewall failure (more on that in a moment), we mostly fixed things after severe storms, nursed our Nexgen system and dealt with STL fades. I won't bore you with those details.

I will share a few pictures. The first that proves that I'm an engineer (Figure 1). I've had these rack screws in my pocket for a couple of weeks now. These are short but shiny; most of the ones we use here are the standard black. I can't

remember where these came from, but I figure I'll eventually go to a transmitter site, see a piece of equipment that's not screwed into the rack and say to myself, "Aha, self!"

The second (Figure 2) is from the muffler repair to the generator at 101.1 FM in Cullman. That generator is very old, so the muffler basically had to be custom fitted to the existing exhaust system. This wasn't cheap. While I was cropping the photo for this article, I noticed that the flap apparently doesn't want to close. I guess I need to get at it with some WD40 before the next round of severe storms come through.

Finally, in engineering-related news, Todd thinks he may be on to something with our occasional, random, unexplained Nexgen issues. To briefly recap, from time to time, the audio server for WDJC-FM (and less frequently, WYDE) will hang

and/or come up with a blank log. We've had RCS support all over this; Todd, Jack and I have tried everything except for a new coat of paint and fresh

light bulbs in the ceiling. We've improved things and we'll operate reliably for a while, but eventually, we have to reboot or restart to get Nexgen back. Again, this seems to be totally random and RCS is just as stumped as we've been.

Todd, being a bulldog, refuses to give up. He was poring through the advanced network settings for the millionth time and found a couple of other things that were different from those audio servers that haven't

had problems. In other words, we think this is Yet Still Another Windows 10 Issue. Assuming his little tweaks make a difference, I'll have Todd write it up for next time. You have to love Windows.

The Great Firewall Meltdown

In mid-May, our mail server suddenly stopped sending and receiving email. I can normally go in remotely to see what's going on, but this time, I had no access. I couldn't get into the firewall, into the email server, or the backup email server. This told me that it was the firewall itself, which was bad news. That's the kind of thing that requires that someone put hands onto the physical server. Furthermore, it is the primary access into our entire mail system, from Barracuda to the backup Zimbra server. Everything was down until we could make it happy.





Figure 1 -- Proof that I'm an engineer. Rack screws!

Jack beat me in to the studios and announced that the firewall machine was refusing to boot. "No boot device." This was double ungood; I had been hoping that it was just a glitch or random hang. Nope, Todd later determined that the hard drive itself had gone west. We pulled out another machine and tried to install the PFSense firewall on it, but it just wouldn't work. We tried everything we could think of, but no good. It just would not pass or forward packets to the Barracuda, Zimbra, anything. In other words, this was no firewall, this was simply a wall. Certainly secure from hacking, but useless for what we needed. (Heh.)

We have a small DLink router here for emergencies, and after trying repeatedly to get the PFSense firewall to work, we put the DLink in line just so that our users could send and receive mail. We could then take our time on the "real" PFSense firewall. Little routers like the DLink might work, but they're not exactly robust, and they're certainly not designed to handle thousands of packets per second. We had email, but it was slow and aggravating. Plus, they're not good at blacklisting blocks of IP addresses, which is one of the tools that I use to help reduce our spam load.

To make a long story short, at length, we had to give up on PFSense. The latest version had some problems and we didn't have the time to run them down. I turned to another firewall, based on the same original code, called OPNsense. We had fun trying to get it to install, but at length, Jack had it running on our spare machine, and we put it in line.



Figure 2 -- The new muffler and custom pipe work at WXJC-FM.

Back to full speed, yay!

Cris ordered a replacement firewall from Dell; it arrived yesterday as I type this. Todd installed OPNsense on it, put it in line and it worked like a hose. We have the older OPNsense firewall still mounted in the rack, ready to go, if anything like this should happen in the future. In Figure 3, the new mail server is not shown. It's right above the Barracuda Spam Firewall at the top of this picture. Next down is the old (now backup) OPNsense firewall, the backup Zimbra mail server, and the new OPNsense firewall. Lotsa blinkies.

For the rest of this column, you shall be treated to random thoughts and odds and ends.

The Surveillance State

That title sounds like something from Art Bell or Alex Jones, doesn't it? Don't start up the theme from Twilight Zone just yet. I shall explain. To get you started, try this experiment: if you have a smart phone, talk about a new refrigerator or a vacation trip. Better yet, post something about it on social media. Passing references won't do; talk about it several times over the course of a few hours. The next time you log in to your social network, don't be surprised if you see ads for refrigerators and trips to Tahiti.



Figure 3 -- The new Dell firewall is at the bottom.

Yes, your phone “spies” on you (in quotes because I’m not the aforementioned Bell or Jones). The same is true of any email or text messages that you send on your phone, or social media posts made on Facebook, Instagram, Twitter, et. al., ad nauseum. This is why various apps will try hard to get themselves installed as your default messaging or social networking system. “Don’t you want to make me your default Picture-Widget???” That way, they get to scan and look for keywords and phrases, then sell that info to the highest bidder.

This isn’t going away. As for what this has to do with work, it’s simple: the idea that your communications – ANY communications – are secure is a fantasy nowadays. Obviously, if you’re planning insurrection against the local government in Ploonk County, RI, you probably ought not to start a new Facebook group, or text or email your fellow insurrectionists. But there are other, less obvious things to consider nowadays.

For example, if you send and receive email on your smart phone (and most of us do), that mail is stored by your ISP, Google, Apple, and/or anyone else who touches it on the way to your fancy, OLED display screen. Most people never even consider that. What prevents me from becoming an outright Bell/Jones is this: most of these big corporations couldn’t care less that you’re thinking about a different hair style or might have cheated on your taxes. But they will look for keywords and phrases, then target advertising to you.

But back to that insurrection against the redoubtable folks who run County Ploonk. What you may not realize is that if you compose a letter, even if sent by fax, there’s a good chance that a third party might see it. If you store it in the “Cloud” (in quotes

for a reason; a “cloud” is just a computer somewhere else on the Internet), others could view it. I’m not just talking about the well-publicized hacking attempts and compromises that you’ll see in the news from time to time. The host who maintains that server, no matter how loud he/she protesteth, will find it very difficult to resist at least doing a keyword scan from time to time. Hey, he/she already has your email address, right? Didn’t you have to sign up for the service?

The bottom line is that if it can be done, someone will try to do it. Like I said, you can’t escape it, but be aware of it, especially with everything moving into “The Cloud” and smart devices.

SiriusXM

Our new Jeep came with SiriusXM installed (of course), and we received the usual free one-year subscription. We bought the vehicle last June, so our anniversary is coming up. SiriusXM is getting very nervous, judging from the letters that I’ve recently received, because I haven’t jumped all over their \$12.99-per-month offer to do a paid subscription. My wife Sandy likes it, but I find it even more stale than terrestrial radio. If you think iHeart and Cumulus play the same 40 songs over and over, try SiriusXM some time. They even play the same songs on different channels.

The entertainment system in my Jeep is pretty nice, but it appears that SiriusXM had a finger in its design and features. One huge irritation is that if you switch from regular FM to SiriusXM (even if only by accident), it’s very much louder than terrestrial radio. This is an old, old sales trick: if you’re selling stereos, the ones that you want to move are set up to sound louder. Most people, at least at first listen, will think the louder unit is better. It’s human nature, but personally, I find it terribly annoying.

Second, the display for FM RDS is very plain-jane, with dull off-white text on a black background. SiriusXM, on the other hand, has the artist’s face or album cover over to the left in full color. Bright, clear multi-colored fonts are used for various parts of the display. I realize that the latest HD receivers have some nice stuff like this, but again, looking at it from the point of view of the average listener to this particular receiver, they’re going to say, “Wow!”

Finally, my radio apparently has a large buffer in it for SiriusXM. There’s a “Replay” button that will allow me to “rewind” back to a song that I heard a few minutes ago. But SiriusXM itself likes to

play games with this: when you're switching channels, it will try to start at the very beginning of a song. The only time I hit the middle of a song is after I've just cranked the Jeep. That radio is obviously buffering and storing data the entire time that it's on.

If you're flipping through your presets, this can be quite aggressive. For example, say you switch to the "Classic Rock" preset; the Beatles start singing "Revolution." You decide you don't want to hear that, so you keep advancing through your presets. It

finally wraps back to "Classic Rock." My unit has 12 presets, so wrapping through all of them takes less than 30 seconds. But once I get back to "Classic Rock," "Revolution" is ending and the next song is starting.

Hmmmm. Maybe HD Radio receivers need to borrow a few ideas from them. Just sayin'.

That's about it for this time; until next month, keep praying for this nation!

The Chicago Chronicles
by
Rick Sewell, CSRE, CBNT, AMD
Engineering Manager, CBC-Chicago

Just Another Day in the Life of an Engineer

*A little sleep, a little slumber,
a little folding of the hands to rest—
and poverty will come on you like
a thief
and scarcity like an armed man.*
(Prov. 24:33-34)

I have to keep that verse in mind when it comes to keeping the creatures out of critical places at transmitter sites. Not just the buildings, but generators and outdoor compressors as well. It is a constant battle, and if you "sleep" on it just a little, you'll soon be losing that battle.

I was at our Beecher transmitter site recently, and when I got there, I found two birds in the transmitter building. This site is very difficult because it is an older building and right in the middle of farm fields, which usually requires constant vigilance against rodents. In this case, I didn't have to look too hard to figure out how the birds got in the building.

In December, a tower crew had installed a new tower light system and they had cleared out the foam insulation around the entrances for transmission lines to bring in the tower light cables. I allowed my hands to be folded and forgot to redo the insulation in these holes. I kicked myself a bit, chased the birds out of the building and headed to the hardware store for a fresh can of spray foam insulation.

When I got back, I was "perched" on a step ladder and started spraying the foam in one

transmission line hole when out of the other hole comes an angry bird who takes a swipe at me with his beak. I shoo him away and start spraying again. This time two birds come out at the same time and try the same thing. I get rid of them and start now spraying into the hole out of which the birds had just come.

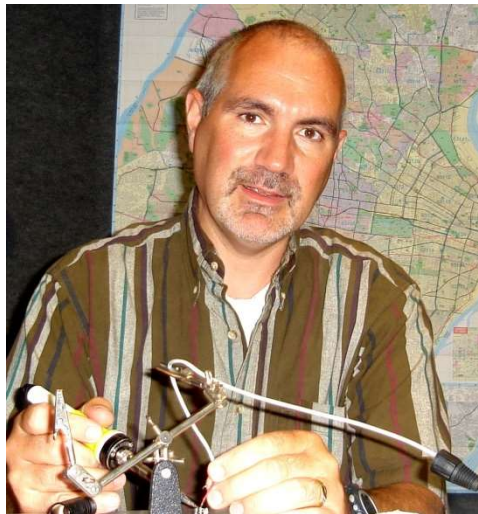
You guessed it, one more bird comes out and he is seriously bent on getting revenge. I am not sure how I didn't fall off the ladder, but I survived the ordeal and got the two holes covered on the outside. I decide to take the operation inside and cover the holes from in there.

As I was finishing this up, I realized that there was still another bird in the transmitter room. I began my pursuit with a broom and box in hand, only to have him go into our crowded main rack. He got tangled in all the runs of wire in that rack.

You might think this would make it easier to apprehend him, but it did not. I was trying to sort him out while all the time thinking I am going to end up pulling a wire that will take the station off air. I can see how that off-air discrepancy report would go over.

It took me about a half-hour to get him loose, without taking us off air. I think he was eventually tired, and I was able to catch him in the box and get him outside.

No animals were harmed in the telling of this story, but much harm was done to an engineer's



button-downed shirt.

I suddenly realized that I had bird poop all over my shirt. I looked like the homeless pigeon lady on the movie, “Home Alone 2: Lost in New York.” I ran to the gas station to try to clean off the crap, but it

was too late as it was already dried and hardened into the shirt.

So, lesson learned once again, “a little sleep” and “poverty will come on you like a thief,” or in this case, a flock of birds.

The Portland Report
by
John White, CBRE
Chief Engineer, CBC–Portland

For local radio stations, following the proper local idioms and pronunciations is critical for the local listening audience to take a stations programming seriously. A master control located in far city and another state can torpedo local programming.

There is no better example than a local cluster which uses remote news production for multiple cities. Here in Portland, a remotely produced “local” newscast often refers to a local place name as the Williemet. Locals, of course, know the Willamette River as the “Will-am-it.”

Weather terminology is similarly unique. A couple of inches of rain is an Oregon mist. What is three months of snow, rain, and sleet? Answer: winter. What is four months of snow, rain, sleet, and hail? Spring. Two days of rain followed by clouds is a weekend, and two days of sun followed by rain is summer. And, of course, three days of rain is Memorial Day which is what normally marks the change in Oregon weather from cold and wet to warm and wet.

Last month, I touched on environmental Passive Intermodulation (PIM) problems at Mt. Scott. In its classic form, PIM shows as an unexpected mix of two or more signals to produce the sum and difference products of the signals, and in some cases, third and fourth order products. The result can produce elevated levels of harmonic or mix product signals in the spectrum.

At Mt. Scott, the large number of high-level signals is an invitation for PIM problems. In the last few years, several land mobile users have begun taking steps to reduce or eliminate PIM interference. In one case, a local VHF land mobile transmitter suffered from a second-order mix, which produced a spurious signal on the input of another VHF system.

A dual circulator was replaced with high-

rejection dual circulator and 80 dB notch filters at both the mix and second transmitter frequencies was added. While this greatly improved the interference, it did not totally eliminate the problem. Every metallic contact which is not bonded can, and often does, produce PIM interference.



Environmental PIM problems also affect MW broadcast frequencies, particularly when two or more AM transmitters are collocated at a common facility. At MW frequencies, PIM problems show as a mix of two AM signals. The mix of signal A+B, A-B, 2A±B, and 2B±A can produce a proliferation of mix product signals.

Ultimately, a low-PIM strategy is required at all RF facilities at Mt. Scott. This includes using low-PIM connectors, coax, bonding, and a fastener strategy. Low-PIM-rated connectors are becoming more available and are typically silver plated. firm, high quality bonding eliminates dissimilar diode junctions. Low-PIM fasteners either prevent dissimilar metal-to-metal contact or use non-conductive fasteners.

Coaxial cable is an unexpected source of PIM problems. Some cables use a foil shield structure, which will fracture and flake over time. The result is the cable foil shield becomes a thousand little diodes producing PIM interference. Solid copper outer conductor or high-quality braid is a must for low-PIM coax. Additionally, a nonconductive jacket, preferably flame resistant, is also required to prevent metal-to-metal contact with tower structures.

With weather changes from cold and wet to warm and intermittent wet, we are seeing increased PIM mixes at Mt. Scott. Usually, more RF is predictable over time as users increase. More PIM mixes with the increasing spurious RF signals is not at all welcome.

Rocky Mountain Ramblings
The Denver Report
by
Amanda Hopp, CBRE
Chief Engineer, CBC - Denver

KLZ Projects

We were supposed to have the tower lights done at KLZ before Memorial Day, but Colorado weather has been its usual bipolar self and we had to delay the project by a week. When you read this, we'll be done with this project. Unfortunately, we are having to play it all by ear. Watch the weather, keep an eye on the field and decide each day if we can drive to the tower bases to get the work done. As of right now, it looks like one more day of rain before it starts to warm back up for several days. I look forward to getting this work done.

You know how they say when it rains it pours? That is someone true literally as well as figuratively right now, project-wise. Not only do we have this tower light project going on, but we also have an arborist company out at the site taking care of the tree line for us at long last. On top of that we also have several smaller, but equally important projects to deal with all at the same time. It makes for a very busy time but at least it makes it fly by.

Internet

We are in the process of getting internet service installed at the four AM transmitter sites in Denver so we can do away with our ISDNs as well as have a more reliable, automatic backup when the

main microwave link goes down. We got KLDC done pretty easily, and we now have a Barix Exstreamer 500 connected up as an audio backup.

The nice thing about the internet at this site is that we have no ISDN there. We did at one time, but we could never keep it working, so this site has had no backup for years. This will allow a good backup.

We also got KLZ done, but it was more difficult as CenturyLink could not figure out where the pairs go once they leave our building. Finally, they got some cable guru in there that

figured out they go to a manhole down the street... where they convert to fiber! So we now have a solid broadband connection at KLZ which is all fiber except for the last few hundred feet.

Coming Up

By next edition, I should have some pictures also showing the tree work that was done at the KLZ site. Let's just say I expect to have that and a lot of other projects finished so that I can move on to the next thing, whatever that is at the time. With spring here, it means storms, which can cause a bunch of issues for us engineers.

I pray that everyone stays safe and that the springtime storms don't bring you chaos. Until next time...that's all folks!!!



The Local Oscillator
June 2019

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1

KNSN • San Diego, CA
1240 kHz/103.3 MHz, 550W-U

KCBC • Manteca - San Francisco, CA
770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2

KKPZ • Portland, OR
1330 kHz/97.5 MHz, 5 kW-U, DA-1

KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1

KLDC • Brighton - Denver, CO
1220 kHz/95.3 MHz, 660 W-D/11 W-N, ND

KLTT • Commerce City - Denver, CO
670 kHz/95.1 MHz, 50 kW-D/1.4 kW-N, DA-2

KLZV • Denver, CO
810 kHz/94.3 MHz, 2.2 kW-D/430 W-N, DA-2

WDCX • Rochester, NY
990 kHz/107.1 MHz, 5 kW-D/2.5 kW-N, DA-2

WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT

WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1

WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT

WCHB • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D

WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D

WMUZ-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT

WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2

WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT

WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT

WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT

WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT

WYDE • Birmingham, AL
1260 kHz/95.3 MHz, 5 kW-D/41W-N, ND

WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2

WYDE-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT



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