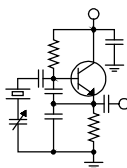


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Many loyal readers may recall that we held off purchasing new Part 101 microwave radios for our 6, 11 and 18 GHz links last year until we could confirm that our existing antennas could be adapted to fit the new radios.

Back in September, our vendor came by with an adaptor kit and we climbed up onto the roof at the Denver studio where we could easily reach one of the antennas. We pulled the radio off and tested the new bracket and indeed it did have the same hole pattern and fit the antenna nicely. With that equation solved, we ordered the new Cambium PTP820S radios for Denver, Chicago and Birmingham.

Those radios were a long time coming, and we did not, in fact, receive them until last month in Birmingham and Denver; Chicago received theirs in December. Amanda and I programmed up the new radios to get them ready for installation. We then brought in our climber/engineer, Derek Jackson, to begin the process of swapping the radios out on three of the Denver paths.

This would be the test bed for the other markets, both in terms of installation and overall infrastructure. The Cambium radios were much more capable than the 10-year-old Trango Apex radios they were replacing, with throughputs of close to double what the older radios could provide in the same bandwidth. They also feature an adaptive modulation scheme that reduces the modulation from 2048QAM all the way down to QPSK, depending on path conditions, which will in many cases keep the link up and running through fade conditions.

One other advantage of the Cambiums is true in-band management (IBM), which means that

we can do away with the small Ethernet switches we have at the top of the towers to provide for connection to both the management and data ports of the Trango radios with a single Ethernet connection from the ground. We will still employ the Ubiquiti Nanobridges or PowerBeams to get across the base

insulator, but those can be connected directly to the Cambium's data port without a top-of-tower switch, thus eliminating a likely point of failure. (That said, since Amanda found and had installed some "hardened" DIN-rail switches made to work in "hostile" environments, we have had very few switch issues.)

And yet another Cambium advantage is that they have a pair of GBIC ports into which we can plug the module of our choice, including SFP (fiber) ports. All we have to do is purchase a license upgrade from Cambium to activate the port(s). We plan to use fiber in Birmingham, so this will be a very handy.

So it was that we were eager to get the first of these new radios deployed so we could see how they would perform, but it was not to be. We found very quickly that while the adaptor brackets fit the antennas, the waveguide adaptors did not, at least not on the Denver 11 GHz antennas. The existing waveguide ports measure about 1-1/4" outside diameter, while the adaptors are looking for a 1-inch O.D. waveguide. So it is back to the drawing board, and we are presently looking at options. My guess is that we will have to replace the antennas altogether, which will be a real chore and expense, although most of that will be in tower work – replacing the antennas will require tower rigging, hardware and realignment of the paths.



My hope is that the issue is limited to the 11 GHz antennas and the 18 GHz links will be adaptable to the new radios. Job #1 in both Birmingham and Chicago is figuring this out.

Projects

We're ramping up several engineering projects around the company. First, we ordered a Nautel NX50 for WXJC in Birmingham, to replace the aging XL60 that was installed in 2000. As if to confirm our decision to replace the XL60, not long after we replaced the order, the XL60 blew the IGBT that is used in concert with a relay and several power resistors to discharge the B+ supply.

That has happened before, and the last time, which was in 2018 if I recall correctly, it also took out the relay, and we had some difficulty obtaining a replacement. At that time, also if I recall correctly, we added a time delay so that the discharge circuit would not come into play in the event of a power line "stutter," which we frequently get at that site. That mod seemed to help, as we got through a year or more without another failure, but here we are again.

The new NX50 will physically replace the ND2.5 night transmitter – and will almost fit within its footprint. Stephen and his crew will have to swap the main/aux inputs to the phasor, do some transmission line work and maybe a little finish carpentry as well to get the new transmitter into operation. The plan is to use SNMP with the Burk ARC Plus Touch for remote control and forego the fat piece of multi-conductor control cable. We expect delivery of the new transmitter toward the end of February.

In California's Central Valley, we are upgrading the auxiliary transmitter, a 1990-vintage Nautel ND50. We don't plan to replace the ND50, since it runs and is reliable, but we are purchasing a new AM-IBOC exciter and Exporter Plus for it. It's not so important that the aux run in digital (although it does and will continue to do so), but it is critical that it operate with modulation dependent carrier level (MDCL).

On the main transmitter, a Nautel NX50, we employ the AMC MDCL mode with 3 dB of carrier reduction. The problem is, when we need to put the aux on the air, we either have to go to generator power or run the aux at half power to prevent running up the demand on the PG&E meter. Just a few minutes of non-MDCL operation on the aux will cost us over \$500 in demand charges. The AM-IBOC will provide for the same AMC 3dB compression that we get on the NX50, so with the new exciter and

exporter, we will be able to run full power on the aux using utility power.

In Chicago, we await a tower crew to do an antenna swap at the WSRB site. We are replacing the Shively 106.3 MHz auxiliary antenna with a broadband ERI antenna that will permit operation on either 92.3 or 106.3. The idea here is that if the worst were to happen and the WPWX tower, located just a short distance north of the Lansing site, were to collapse or some other catastrophe occur at the WPWX site, we would request an STA from the FCC and operate at reduced power and height from the Lansing site for a period of time. Rick has more on this project in his column in these pages.

I have filed an application to license this Lansing facility as an auxiliary for WPWX, which will, if granted, allow us to use it at will. But my guess is that we will seldom do that, since it will operate at less than 10% of the ERP and 100 feet lower than the 50 kW main facility, but any port in a storm, right?

Also in Chicago, we are making preparations for a big studio project in which we will retire the Wheatstone Bridge Router/G5 TDM system and convert totally to Wheatnet AOIP. The facility is currently a hybrid, with the control rooms on the older TDM system but the production rooms and Nexgen on Wheatnet-IP. Planning is currently underway so we can get the correct complement of equipment ordered.

As part of that project, we plan to enlarge the Power92 (WPWX) control room. That room often has six or more people in it, and it was designed for two or three people, max. We will take the adjacent talk studio, which is not used, and make it part of the Power92 air studio. This will include new studio cabinets for WPWX and all stations in the cluster, and we are looking at our options for a supplier of those cabinets.

So... 2020 is shaping up to be a busy year in our technical operations.

Website

If you haven't seen it yet, be sure to stop by and take a gander at our new website at <http://www.crawford.live>. We have a sharp-looking engineering page that features links to current and back issues of *The Local Oscillator* as well as descriptions of the technologies we employ. Thanks to Josh Myers for doing a great job with the new site.

All the folders that were on the old site are now under the new domain (such as Eng_Files), so if your links don't work, it's an easy fix.

Detroit Update

This month, we welcome Paul Stewart and Summit Technology Group aboard in Detroit. Summit is a professional broadcast engineering firm operating out of Oakland County, Michigan on the north side of metro Detroit, and they provide a wide range of technical services to radio and television clients around the area. They will be providing our Detroit cluster with contract engineering service as we continue to search for a full-time chief engineer, working with our own Steve Cuchetti to keep our facilities in tip-top condition.

This interim arrangement takes the pressure off in a number of ways. It provides us with a regular

amount of top-tier engineering attention in the market, it provides Steve with a critical local engineering resource, it relieves Brian Bonds of having to make regular and frequent trips to Detroit, and it provides me with the time I need to find and thoroughly vet the right person for the full-time position.

At this point, I have no idea how long this arrangement will be in place. It could be a few months or more than a year. Whatever the case, we are grateful to have this highly-recommended bunch of professional broadcast engineers looking after our technical plants in this very important market.

Welcome aboard, Paul and all the crew at Summit!

The New York Minutes

By

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

Hello to all from Western New York! Normally the winter months are relatively quiet with the exception of the occasional snowstorm to deal with, but this winter we have experienced minimal snowfall, about half of the nominal totals to date, and above normal temperatures. Winds, normally generated in the upper region of Canada, have been much stronger this winter, originating in the southern portion of the United States and barreling like a freight train up the Ohio Valley into Western New York.

One such windstorm on January 12th produced near 80 mph winds with sustained wind speeds near 50 mph. We experienced widespread power outages throughout the region and substantial property damage from the downed trees. Most of our sites noted little to no damage, but power was down at both WDCX-FM and WDCZ transmitter sites for most of the day.

Our generators kept us on the air without interruption, with the exception of the WDCZ transmitter. The Burk remote control called me at 5:10 am with an off-air alarm. I attempted to bring the transmitter up via remote, but it would not respond. I checked our tenant's signal, and they were

on, so I knew it had to be a transmitter issue. Upon arriving at the site, I found the standby generator

running, but the Gates DAX-5 would not come up. Some quick troubleshooting revealed that the ± 12 -volt and 5-volt supplies were down. It only took about 15 minutes to replace the power supply module, and we were up and running.

The only issue at the WDCX-FM transmitter site was the importer had to be restarted after the power failure. Later in the day, the temperatures were forecast

to drop with freezing rain and sleet moving into the area with accumulations up to $\frac{1}{2}$ inch. Fortunately, the winds kept this weather system further south of Buffalo, so we were spared a potentially severe problem.

I reported in last month's column that we had a failure with the WDCX(AM) exporter, a Nautel Exporter Plus. The problem manifested with the transmitter folding back with SWR faults continuously until it would go into shutback and shut down completely.

Tracking this issue down was difficult. I first suspected a change in the common point impedance of the day/night networks. After checking and finding both near perfect, I then looked at the digital signal



with a spectrum analyzer and found that the settings were out, although the digital modulation monitor was locked on the digital signal. Minor adjustments on the sidebands produced noticeable improvements for about two weeks, but then the VSWR faults began again. A hard re-boot of the Exporter Plus usually took care of the problem, but it would resurface weeks later.

Finally, on December 30, the exporter failed completely, so it was boxed up and sent to Nautel for repair. I suspected that the electrolytic capacitors were the culprit. Nautel would shotgun the caps and all would be well. I was shocked to hear that the problem was caused by two bad cables inside the unit! I re-installed the exporter on January 29 and it appears to be working fine now. I guess the next couple of weeks will tell if this issue is finally fixed.

Another failure I had reported on last month was the Telos 2x12 phone hybrid. The unit was totally dead, so I initially planned on ordering a replacement power supply, swapping it out and we would be back in business. After thinking about it, we were right in the middle of the holidays, and we along with many of our programmers rely heavily on phone calls for many of our shows, so I opted to send it in to Telos for repair and rent a loaner until our unit was repaired. That was a good plan as it turns out. Telos found that not only had the power supply

failed, it took out the motherboard also, so had I acted on my initial plan, we would have been up the creek with no hybrid!

As part of my monthly maintenance schedule, I exercise our backup transmitters to ensure that they will operate when called upon. In January, the WDCX-FM Continental 816R-4 came up with no problem, but soon thereafter began arcing in the RF cavity around the front door. I shut the transmitter down and looked to see what was causing the arcing and found that there was corrosion around the finger-stock between the front panel and the cavity. The corrosion is a white-colored chalky substance, which is extremely hard. I have seen this before in this transmitter, and the only way to remove it is with a Dremel tool with a very fine abrasive disk. I suspect that this is caused by the exhaust stack, which is connected directly to the top of the transmitter and vented to the outside, with no air gap between the transmitter and ducting. This is the only transmitter I have that is exhausted this way, and the only one that has this type of corrosion. After a thorough cleaning, I will re-design the exhaust ducting, hopefully this will alleviate this from happening again.

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!

News from the South

by

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

There are few things that you can depend on this life. The love of God, taxes, gravity ... and the fact that, when you're in a hurry, Windows will *invariably* decide to update something at the worst possible time. You'll be staring blankly for a while as the screen says, "Windows is installing updates ... don't turn off your computer."

As the saying goes, it is what it is, though, so we just have to deal with it. But folks, there's a reason why I use Linux as much as possible in my work. OpenSUSE (which I use), Fedora, RedHat, Ubuntu and other good distributions know how to install updates and patches in the background. You won't even need to reboot unless

the kernel itself has been upgraded. The worst you'll experience is perhaps a little slowdown or an occasional "sticky" mouse while the new files are being installed.



OK: having gotten that off my now 64-year-old chest, we move on to January in general. After a nice, quiet December, things took off running after the first of the year. We have a new NX50 coming for WXJC AM, we have new obstruction lighting on the way for 101.1, and there are Cambium links to be installed. The latter will get us away from the CAT5/POE arrangement and go with fiber. This will allow us

to eliminate the Nanobeams that we're using to send

signals between the tower and ground at both the WDJC site on Red Mountain and the 850 AM site in Tarrant.

On top of that, we continue to have one round of storms after another. The phone line at 92.5 FM in Pumpkin Center has died a couple of times, we lost the modulators on a module at 1260 AM, and 850 AM in Tarrant suffered a failed RF contactor on tower #5, the highest-powered on the day pattern. Fun, fun ...

Sharkin' Them Wires

I did a Webinar for the SBE on Wireshark back in January. This is a free, open-source network packet analyzer that lets you actually examine the data that is being sent and received between two computers. Wireshark even understands most common protocols (including many that no one has ever heard of!) and will lay everything out neatly for you.

It was humbling for me that it received so many good reviews afterwards. I was a bit distracted, even though I'd locked myself into my office for the event. My phone kept pingling, text messages would appear on the screen that I wasn't expecting, and – the crowning moment – Todd unlocked the door and came in to tell me that the panic alarm on my Jeep was honking madly in the parking lot.

My life, there you go. My only disappointment was the format of the Webinar. I don't know why, but I assumed there would be some live video so that I could actually walk the viewers/attendees through several common scenarios. But no, it was just my dulcet voice (with my deep Alabama southern accent, of course!) and some slides. Glad I didn't rent that tuxedo and propeller beanie for the show ...

Contactors

I'll start with this one, since it's the most recent (Figure 1). Let me say this in Kintronic Labs' defense: to start with, they're the best. No denying that. There's plenty of brainpower at their facility up in the hills of Tennessee, and I thoroughly enjoy working with them. I'm on a first-name basis with some of the folks. Great people.

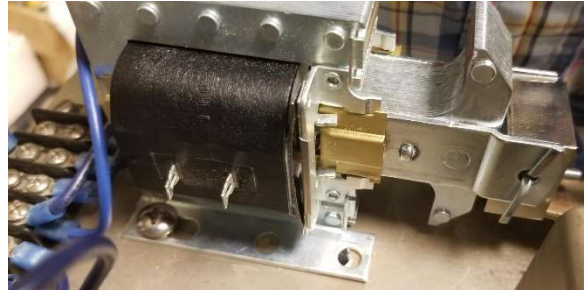


Figure 1 - My install didn't quite go like the Kintronics illustrations.

Also in their defense, it has become common nowadays for parts to become obsolete and unavailable. That happened back in the tube era, of course, but not nearly as often. As late as the 1980s, you could still get parts for an old Gates transmitter, for example (though you might have to pay an arm and a leg). Also, these are 20-year-old contactors, and I suspect some of the dimensions have changed over time.

Kintronics was apparently forced to change vendor on the solenoids used on their RFC series of high powered contactors. I'm not blaming them, and I give them a lot of credit for coming up with a retrofit and instructions to put these new units on old contactors. But ... it is also obvious that they're used to having a fully-equipped machine shop at hand, with all sorts of handy tools (and experienced techs to use them).

The instructions were quite detailed, complete with a template for re-drilling and tapping the mounting holes. Drill bits and taps were provided. But the first problem was that the solenoids didn't precisely fit the two existing holes that I was supposed to use, and the solenoid was about 1/2" too far forward. (See above my disclaimer that these *are* 20-year old contactors, though.)

The roll pins are a special pain; I'd rather see them use clevis-type pins with C-clips or something like that. For now, I've inserted some big cotter pins on the blocks that they provided to match the old hardware. I'll have to improve that later. It won't last.



Figure 3 - NOT what you want to see during drive time.

Also, having to drill the holes in the little “linkage hookup pins” (their term) was a royal pain. One could wish they had pre-drilled those on their fancy machines at the factory (or better yet, drilled a series of small holes, to account for different thicknesses in the old linkage bars – another unpleasant roadblock that took more time than I wanted).



Figure 2 - Birmingham would be to the upper left, 45 miles away.

The bottom line, much to my embarrassment, is that it took me a couple of days to finally get the contactor finished and ready to go, between other stuff going on. I had planned on a single afternoon. Shows what I know. Again: not criticizing Kintronics, but ... call it a friendly suggestion. Assume that your parts will be installed by a kludger (like me), possibly in the dark of night, and with nothing available but basic hand tools and

maybe a cordless drill. T’would be greatly appreciated.

The Dead Rack

Todd and I had already left for the day; Jack was still hanging around, when all of a sudden, just about everything popped off air. He went around front and immediately noted that one entire equipment rack – the one with all of our Wheatstone blades – was mostly dark (Figure 2). Fortunately, he also spotted the problem: an older APC UPS that had lost its mind for some reason. With a little persuasion and restarting, he got the APC to come back on line. The blades booted up, restored their own configs from memory, and we were back on air within a few minutes. Jack gets a cookie for that one.

101 Tower Lights

The company that will be installing the new LED “strobes” on the tower at WXJC-FM in Cullman sent me a detailed questionnaire and wants a bunch of pictures. This does not annoy me. Part of the problem that we’ve had with those lights in the past is that the crews treated it as Just Another Job. That tower is over 1,300’ tall, and by the time they reach the top, they’re tired and are already thinking about gotten’er done and gotten’d down. Things aren’t always taped, tied, or routed 100% correctly. I think this company will be more careful.

Todd gets the cookie for this one: he’s our FAA-licensed drone driver, and he took the drone up to Cullman to get all sorts of shots. There are 61 sections on that tower, and the flanges are kind of large, so the installers will have to add some extra length to the cables to compensate. We also wanted some shots of the existing xenon flash heads, the wiring, and the general condition and appearance of the upper portions of that tower. Todd skillfully piloted the drone up and down that tower; one picture is included here (Figure 3).

Modulators

As mentioned above, we lost one of the modules on 1260’s almost-new NX5 the first part of January. Cris says that he’s had these MOSFETs fail frequently elsewhere; I believe it. By no means am I criticizing Nautel, either, but ... marginally inadequate heatsinking is also becoming common nowadays. I am not a Nautel engineer, and I had nothing to do with the design of that transmitter, but my gut and experience both tell me that the heatsinks on that module should be rearranged or made a bit larger. Maybe that’s just me.

Fortunately, we always order a new transmitter with a spares kit, and there were replacements ready to go. Getting the old FETs unsoldered took a bit of work, but it wasn't as hard as I feared. The heatsinks on my modules will actually pop off with a bit of encouragement (Figure 4). This allowed me to more easily install the new transistors, with just the right amount of heatsink grease. Stick the finished assembly back onto the board and solder, and you're done.

Now, that particular job, all told, only took a few easy hours. Wish they were all like that!

That's about it for this time. Until next month, keep praying for this nation!

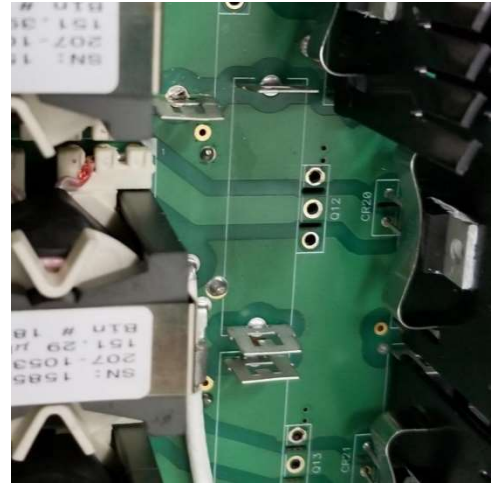


Figure 4 - Thank you, Nautel, for making the heatsinks removable!

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

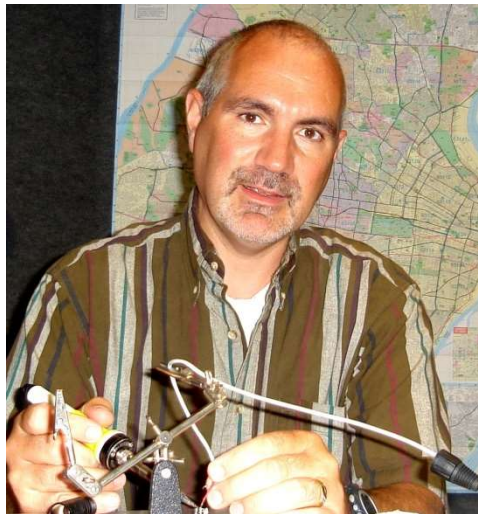
It's been some time now since I was convinced that we needed an auxiliary site for our number one billing station, WPWX. We're in a highly competitive PPM market. There is no acceptable time for the station to go off the air. Even for much needed maintenance.

Due to the programming and demographics of the station, late night and even overnights are highly listened to and have plenty of billing, so even those times are not convenient. Now factor in any kind of event that could take us totally off air at the transmitter plant and not having another place to put the station on air is rising to the level of necessary.

Of course, the proposition of a lot of equipment purchased and monthly costs made this seem more of a wish than a necessity. I knew we were not likely to enter into any long-term agreement with high monthly lease payments to be on someone else's tower.

This meant that we really only had one choice that was to construct some kind of facility on

our Lansing tower. Now in all likelihood, we would not be able to add any additional antennas to the tower due to the wind load already near capacity.



So, we had to find a solution that would not increase the wind load on the tower but would allow us to put a second frequency on air there without too much interruption to the current facility. I really didn't see a clear direction for this until two years ago when we installed a Nautel GV5 for the station housed in that facility. It was the new main transmitter for WSRB, 106.3 FM.

As I got more familiar with the transmitter's capabilities, I realized that it was frequency agile. And with the presets that you could program, you could move it quickly to another frequency if you had an antenna that could handle the multiple frequencies.

Further, since we were using the AES composite connection for audio for WSRB, this would leave open the analog composite connection for WPWX. So, if we had the right antenna, we

would have a preset on the transmitter that would be programmed for a frequency of 92.3 with the analog composite audio. In mere moments, we could be on the air at an auxiliary site.

All we needed was to have this transmitter attached to an antenna that was tuned to 106.3 and 92.3 MHz. Under the current configuration, the main transmitter was attached to the main antenna and the aux transmitter to the aux antenna, with no switching capability between them.

The simple solution would be to purchase a new antenna to replace the main antenna with a new multi-tuned antenna. However, the issue here was that the main antenna was directional, so that more of the signal covered the densely populated areas of Chicago's south side neighborhoods while protecting a short-spaced station in Indiana. While in theory you might be able to engineer a directional antenna on two different frequencies, in the real world that would not be practical.

We decided that the better approach would be to install a coax/antenna switching network for the two transmitters and antennas, then install a multi-frequency antenna in place of the aux antenna, thus

allowing us to swap the main and aux transmitters from their subsequent destinations to be used to run two stations from this tower at the same time.

Currently, we are nearing the finish line of this project. We have installed two ERI coax switches in place of the less versatile coaxial patch panel that was in place. To operate this, we have installed a Tunwall controller that is designed for a two-antenna, two-transmitter operation.

The switching network is in place, it has been tested, and we are awaiting the final step in the project, the actual installation of the two-frequency antenna in place of the aux antenna. We already have the antenna on location. We are awaiting favorable weather for scheduling a tower crew to get this accomplished. This installation will also involve having an ERI consulting engineer on hand during the installation to ensure that the antenna is properly tuned on both frequencies after it is physically installed.

My hope is that we will have this finished by the end of next month and we'll have tested it fully by then as well.

Valley News
By
Steve Minshall
Chief Engineer, KCBC -- Modesto

January has been pretty uneventful at KCBC. One problem raised its head again, however: tower light monitoring issues. The Burk remote control system has been sending tower alarms on occasions. It is annoying when a monitoring system is more unreliable than the system it is monitoring.

Months ago, I had a serious problem with false alarms and, as a shot in the dark, I put 0.01 uF bypass capacitors across the status inputs of the Burk remote control system. This greatly reduced the false alarms, but did not eliminate them completely.

I decided to delve a little further into this issue and see what was actually going on. Checking the voltage across the terminals of the status inputs, I found negative voltages for each tower, up (or rather down) to almost -5 V on one tower. There is no place

for a negative voltage to be generated except possibly by rectification of RF energy.

As an experiment, I doubled up on the

bypass capacitors and the negative voltage was greatly reduced. I found that tripling the number of capacitors reduced the voltage to zero on two towers and 0.5 V on the other tower. This puts a total of 0.03 uF capacitance across each status input. If I had in the beginning just used a 0.05 uF capacitor, I would have saved myself a lot of grief. Lesson learned!

Not long after I added the capacitors, I received another false tower light alarm. I put my voltmeter across the terminals of the status input and found that it indeed had a positive voltage of almost 5 V. It turns out that this was not a false alarm but an actual failure. However, the failure was not of the



tower lighting but a failure of the SSAC tower light sensor module.

The tower light sensor modules need to be calibrated upon installation, and that should be good indefinitely. However, I have found that they do not stay calibrated indefinitely, and they periodically they

need to be recalibrated. Thinking this was the problem, I recalibrated the tower light sensor module, but that lasted only about 10 minutes. A new module is on the way and that should take care of my tower light monitoring issues.

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

In the past, I have used the old Herman's Hermits song, "Henry the Eighth" to illustrate things that are yet again even more and further still a repeat of more of the same. That song is uncomplicated (to say the least), and at one point the vocal states, "Second verse same as the first." So ... this verse is "tower modification near our station." To be honest, I have lost track of the current iteration. Best guess ... 84th verse, same as the 83rd.

In the past, I have mentioned the subduction zone earthquake that is expected in the Northwest. Most local governments are strengthening the communications infrastructure. Rumors abound about extending generator run times and other steps to improve reliability.

It came as a surprise one day when I saw a parade of cement trucks making their way in the direction of the Mt. Scott water facility and home of the Mt Scott tower farm. "Hmm," says I, "I wonder what that is about." I had received no notice of any construction, although some of the brambles have been cleared opposite of the water facility. New housing? January isn't exactly prime construction weather in Portland, Time to investigate further.

What I found was massive construction of a foundation for a replacement tower. A few inquiries found that the existing 150-foot Clackamas co tower is being upgraded to 180 feet. Some years ago, the current 150-footer was installed in the dead of winter with no notice. Both the pattern of KKPZ and our tenant KDZR were impacted. After some extended discussions, that tower was finally detuned for both frequencies.

It's worth noting that the water district facility is a few hundred feet from KKPZ and the home of a forest of towers, all of which interact with each other. The 150-foot tower had a significant impact on the KKPZ pattern, and I saw a significant change in base impedance for our tenant at 1640.

The only verbal data I have at the moment indicates a height increase to 180 feet – a 15% change to 88 degrees at 1330 kHz and an 18% change to 108 degrees at 1640. Without cross section information, a more detailed investigation isn't possible. However, the latest standards would suggest a significant increase in cross section. The photo of the tower foundation and shelter pad below indicates extensive structure.



So at the moment, I still have not received formal notice, detail scope of work, or timeline for this project. All of which makes dealing with this new construction difficult. Without notification, our ability to determine the likely pattern deviation is limited at best.

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

At long last, we were able to get our barn cleaned up at KLZ last month! It's not really a "barn" as such but a big metal building, what some call a "pole barn," with a galvanized metal skin on it, where we store our trailer and other items. We had a friend, a local consulting engineer, who had been using it for storage of old transmitters for several years. He was kind enough to come get them and take them away. That allowed us to use our trailer to start tossing unwanted things on it, much of which was left over from the prior owner(s) of the station and going back who knows how long.



One of the transmitters long stored in the KLZ barn is on its way out.

"project," but once it's done, we will work to clean up the dirt floor inside the barn. We want to add some recycled asphalt in the building and then compact it down to give us a much better surface to walk and drive on too.

I am looking forward to getting the barn looking good. Getting rid of hornet nests that have collected over the years. Organizing the business

records that are stored in there. Straightening out other items that are stored, and figuring out a way to keep the brush hog, backhoe and tractor in there, all the while allowing us to be able to drive all the way through with our trailer (so we don't have to back it in). That'll make it easier for people like me who absolutely cannot back up a trailer to save their life.



Cambium Radios

We finally got our shipment of eight cambium radios. I unboxed each one and put them all on the workbench so we could begin inventorying them. Then the setup began. For the most part it was fairly simple. Cambium support was great in helping us with the issues we did have.

One thing I did learn was about a "back door" into the units. In trying to troubleshoot the first radio, Cambium had me go into a menu and turn off the various ports on the radio. I wasn't paying close enough attention and turned off the management port, which is the one I was using to configure it. Oops! I lost all contact. The back door is a way to go in on a different IP address that is preset, and it requires a special cable. Once we made the cable, I was able to log in and turn the management port back on. It was



The barn at the KLZ transmitter site.

weird in that the port I had to use with the cable was the same port I turned off, but somehow, with that special cable, the unit “knows.” I’ll take it.

Once we programmed up all the radios, I decided to test this back door on all the radios and found that on one unit, it did not work. It is now back at Cambium for repair. I know we will probably never need it, but I also know that if it isn’t working, we will need it because that’s the way things seem to work.

We got tower climber/engineer Derek Jackson to come to the office so that we could swap the radios out on the first link, the one to KLZ. The studio end of that link is the easiest one to get to. You stand on a platform and do the work. No need to be hanging there climbing, and it was a perfect one to start with to be sure it would all work. We quickly realized that the antenna adapter will not work with our dishes. We actually just found out we will have to get to replacement antennas, so this project is on hold until we do.



My dad figuring out the programming on the new Cambium PTP820S 11 GHz radios.

This being on hold has put another small project on hold. Last year while checking passwords to all our equipment for documentation purposes, I found the Ubiquiti NanoBridge on the KLZ west tower was inaccessible. I had been on there many times before, but at this point, no username/password combo seems to work. Unfortunately, this means we have to reset the unit. We actually programmed up another NanoBridge so that Derek could take it up the tower on his next climb. With the new tower

lights, I doubt we’ll need him to climb otherwise anytime soon, so this project is on hold as well. If I ever need to reboot the unit, I can easily do it using the breaker for the tower or the remote control power interrupt relay we installed last year. It doesn’t happen very often, but every once in a while, we have to use it to get things talking again.

Canal Work

We had the same company who cleaned up the tree line at the KLZ transmitter site go out to the KLTT site and do work along the agricultural irrigation canal that bisects the property. We are required to keep it cleaned up, and have done that in the past, cutting out the willow trees that grow out of the canal banks and impede the flow of water. The issue is, the trees that grow tend to have long thorns. They hurt... a lot! We decided to have a contractor come out and clean the place up so that we can more easily maintain it. There’s still some growth in the canal, but the only way to clean it up is to burn it, and we can’t burn it because there is always water in the canal, making it wet and unable to burn. Those reeds wick up the water and they just won’t burn. We’ll see if we get a love letter from the canal people this spring.

Upcoming

As of right now I don’t know what February will bring. One thing I know for sure is that we plan on installing better lighting in the barn. Currently there is one small 100-watt light at the tippy top that barely lights anything up. It makes doing any work inside hard. It might be daylight outside, but since there are no windows, just two doors and some bullet holes, it doesn’t allow for much light. We plan on renting a lift and buying six LED light fixtures, similar to a 4-foot fluorescent fixture, to hang in there to make it nice and bright for all future work. I actually just got the purchase order back approved, so I can go ahead and order what’s needed and most likely do the work the first or second week in February.

Other than that, I will be working on minor things here and there and we’ll see what else might pop up. After all, an engineer’s job is never done.

The Local Oscillator
February 2020

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

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

WDCX • Rochester, NY
970 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
970 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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