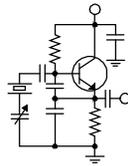


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

NOVEMBER 2016 • VOLUME 26 • ISSUE 11 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

A Crazy Month

October was one of the busiest months that I can recall in my 32 years with this company. We had multiple projects with deadlines running simultaneously. It's certainly not the first time that's happened, but this time it seemed like everything was fighting us.

For example, we had two translators to get on the air in Denver. Amanda had no experience with this kind of FM work, so I had to be hands-on to both get the work done and teach her how to put an FM antenna on an AM tower. There were two sites, two antennas (well, three really & there were two log-periodics in an array at one of the sites), two transmission lines, two isocouplers. Piece of cake.

But then the shipment arrived by motor freight with the KLVZ isocoupler, equipment cabinet and stand. We saw right away that someone had run the fork of a forklift through the side of the crate, and looking inside, we found one of the legs of the stand bent and the bottom welds broken. We called Kintronics and got a replacement stand started while we went on with the rest of the project.

We mounted up the isocoupler at the KLVZ site without incident, using lengths of strut u-bolted to the tower legs to support it. The tower crew came a few days later, unboxed the antenna & an ERI 100A-2HW, and hauled it up the tower. The next day, they hung the transmission line, 7/8-inch Commscope AVA5-50A, putting the 7/16 & DIN male connector on the top end of the line before hauling it up.

Toward the end of that day, with the line connected to the input of the power divider at the top and with an N-male connector on the bottom end, I shot it with the network analyzer, expecting to see pretty much the same thing as the factory sweep showed. What I saw instead was a return loss of about 2 dB from 88 to 108 MHz, pretty much a flat line. Something was seriously wrong.

We first focused on the line, thinking that it had to be shorted or open to see that kind of return loss. The connectors looked fine. Next, I used a DVM and measured the DC resistance of the line, inner to outer & 0.3 ohms. A call to ERI revealed that the bays present a DC short to the power divider, so that would be normal. It was late in the

day, so we buttoned everything down and called it quits.

The next day, we shot the line with our TDR and saw a clean line all the way to the end with a short at the far end. The tower crew disconnected the line from the power divider and we saw the line go open on the TDR trace. The line sure looked normal.

Our friends at ERI called and said they were shipping a replacement power divider, just in case. There's not much to go wrong with the bays on the 100A, so if it was an antenna and not a line problem, the trouble was likely in the power divider. They even speculated that the slugs on the center conductor of the power divider might have come loose and slid all the way to the bottom. There is a lot of slug in that power divider, so if the slug moved, it would result in a 2 dB return loss across the whole band.





Figure 1 - The KLTT translator H&V antennas sit atop tower #4 in the directional array.

We didn't get back out to that site for a few days. The tower crew, which we kept busy for a solid two weeks, was installing a microwave link for us to Lookout Mountain and installing the KLTT translator antenna and line (the KLTT translator antenna installation went just fine). When we did get back out there, the new power divider had arrived. The plan was to run a few more tests before even opening the crate (if we didn't have to use it, we would return the replacement PD unopened).

A pair of climbers was sent up with a short and a 50-ohm load plus some 7/16" DIN adaptors (double-female, double-male, female tee, etc.). First thing, they used the 50-ohm load to terminate the line at the top and I shot it with the network analyzer. Perfect. >40 dB return loss all the way across.

Then we reconfigured each of the two bays as single bay antennas and one at a time, connected them with a 10-foot jumper directly to the transmission line. The first bay showed a 2 dB return loss across the whole band. Uh-oh. There's a problem. To eliminate the 10-foot 7/16" DIN jumper, we put the 50-ohm load on the end of it instead of the bay and shot it with the analyzer. No joy, 2 dB of RL. We had the tower crew send the jumper down on

the load line and I shot it terminated on the ground. Perfect. What the heck?? Back up it went.

This time, when we connected it to one of the bays, the sweep looked like a bay. We connected it to the other bay and did another sweep. It also looked like a bay. So we concluded that the bays were okay and the power divider was bad.

What happened with the jumper?

Apparently, the tower crew used a DIN tee to connect to the bay that first time and they had the calibration short screwed onto the open port. The foreman had sent it up that way (so they wouldn't have loose stuff rattling around in their bolt bags during the climb) and the climbers, who were not RF guys, never thought to remove it. Anyway, that was just one more confusing, contradictory thing I had to deal with in the project.

The power divider was brought down on the load line and we gave it a look. As I rocked it from end to end, clank-clank. The slugs were definitely sliding on the inner. There was no damage on the outside, no dings or other issues. Evidently the slugs had come loose in shipping and we didn't notice.

The replacement power divider, which did not go clank-clank when rocking it from end to end, was hoisted and installed, and the sweep looked just like the one from the factory. Mission accomplished. But what should have been a two-day project took more than four days.

Another three-day project was the KLVZ Nautel ND2.5 transmitter. That station had been dark since April, and there was an FCC deadline of October 24 to bring it back on the air. A couple of weeks prior, we brought the station up for a shakedown. Amanda had brought it up with a dead carrier once a month or so since April, but this time she brought it up with program modulation and it kept tripping off with high RF current alarms. It took three days and a lot of digging to come up with the explanation that somehow the amplitude of the RF current sample had increased by quite a bit, probably as a result of a changed resistor value in a divider network. Maybe a lightning hit did this, or maybe it was just age (the transmitter dated back to 1994).

Those are just a few examples of the kind of stuff we were dealing with last month. Everything took longer than it should, some stuff didn't work, and we ran into unexpected problems. But as I write this at the end of October, we have two more translators on the air in Denver, one more on the air in Birmingham and another in Portland (I didn't mention the audio processor in Portland that failed after a few days). And yes, KLVZ did make it on the

air on October 24 along with its 250-watt 94.3 MHz FM signal.

Lookout Mountain Microwave

I mentioned last month that we were working on an 11 GHz microwave link from our Denver studio to the Lookout Mountain FM site. That was one thing that we got done without issue last month, but it was a lot of work.

The hardest part was pulling several new cables from the 12th floor engineering room to the roof. The new cables included a 12-2 rubber-jacketed UF cable for -48 VDC, two shielded and UV-jacketed CAT5 cables, and a run of RG-6. You'd think that we wouldn't have trouble pulling this bundle into a 4-inch conduit that had nothing more than a few CAT5 and a couple of small coaxial cables in it, but it kicked our backsides. The new cables kept getting twisted up in the existing bundle and hanging up. We finally pulled them in one cable at a time, but even that was a struggle.



Figure 2 - The "old man" works 160 feet in the air, relocating the stiff-arm on the new 11 GHz dish to Lookout Mountain.

The new 3-foot dish was installed by the tower crew on the rooftop mast without incident. They had to fabricate a bracket to clamp a 4-inch pipe to the mast, but that all went fine. They eyeballed the dish onto the right azimuth (the Lookout Mountain towers are fairly easy to see from up there) and called it a day.

The next morning, I put on my harness and went up the mast. Amanda was my ground crew and we got the radio mounted on the back of the dish but not without incident. The tower crew had mounted the stiff-arm in such a way that it blocked the area where the radio mounts. I had to take all that



Figure 3 - This is sort of like a "Where's Waldo?" picture. The new Crawford 11 GHz antenna on Lookout Mountain is the one that says "Trango." The KLZ 100.7 antenna is visible above and to the left of the microwave antenna.

apart and reconfigure/relocate it. We powered up the radio and headed up to Lookout.

We had some trouble finding a suitable mounting location up at the Lookout site. The preferred mounting spot had a big pinon pine tree right in the aperture, so we had to find a different spot. Thankfully there was a location with a clear view of the studio.

The next trouble came when we couldn't use the DVM we had with us to monitor RSSI as we aligned the antenna. There is so much RF up there ó several megawatt UHF TVs plus a whole bunch of FMs ó that the DVM showed 100 volts or more DC when not even connected. The Trango Apex Lynx radio puts out a couple of volts DC for RSSI monitoring. You see the problem I'm sure. So we used the GUI and did the best we could, but there was so much lag that it was really just about impossible. We went to the other end and peaked the RSSI with that antenna, then grabbed a different DVM and a bypass capacitor. That did the trick. Back up at Lookout we were able to monitor the RSSI and get everything peaked up to be right on the path budget. We have -47 dBm at both locations now and a solid 47 mbps link. That cleared all the dropped packet issues we had been experiencing.

Portland Translator

The KKPZ translator went on the air on Friday the 21st without issue. The issue came a week later, when as I mentioned above, the audio processor's composite output died. Thankfully, the BW Broadcast transmitter has an internal audio

processor and we were able to get the FM back on the air in a hurry by feeding audio directly to the transmitter. The manufacturer is replacing the processor and we should be back to normal in a hurry.

Early indications are that the coverage is quite good to the southeast, which is the direction the translator beams, into the Gresham-Oregon City area.

And Then There Were Two

That leaves just two more translators to go: KCBC and KNSN.

The KCBC translator antenna was scheduled to be installed the week of the 24th of October, but that was postponed by a power divider issue there. After the issue we had with the same antenna in Denver, I asked Steve Minshall to take a close look at the KCBC 100A-2HW power divider. He found that the slugs were not sliding around on the inner, but the inner was definitely moving around some inside the

extrusion. He could see the center cups of the DIN female connectors for the antenna input and both bays moving as he rocked the PD from end to end. To quote the Apostle James, "My brothers, this should not be." ERI has shipped a replacement power divider and we should get that installed early this month.

KNSN in San Diego uses a four-antenna log-periodic array. We have the antenna, line and all the equipment. The week of the 24th of October, the local tower crew did a survey climb to figure out what they would have to fabricate to support this and where it would have to go. I'm still waiting on word of when the installation will take place, but we're hoping for this month sometime. In addition to hanging the LDF4 transmission line on the tower, the crew will also have to fish it through 180 feet of underground conduit to the transmitter building (it runs under a road).

The New York Minutes

By

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

Hello to all from Western New York!

With the snowflakes flying the last week of September in the Buffalo area, it marks the official start of the winter season. As of this writing, I do not have all my sites fully prepared winter. We have experienced a lengthy period of rain recently which has set me back several weeks in getting everything winterized.

Some of the most important items that need attention are the tuning houses located at each tower base at both my AMs. Insuring that everything is in proper working order before the snow arrives will save you a lot of work later on! There is nothing worse than walking out to a tuning house to address a problem when there are several feet of snow on the ground.

There are numerous items that need to be addressed each year, and if these are overlooked, could be potential problems at the worst times. First and foremost, I insure that each tuning house is clean

and free of any debris. You do not want any materials lying around that rodents can utilize to make nests in and around your networks.



After performing a thorough cleaning, I check each potential entry point that mice could enter, and seal it. Conduits that carry wiring into and out of the enclosures are stuffed with steel wool; mice cannot or won't eat through this material. I also strategically place moth balls around areas that mice would want to nest in.

More importantly, I check all of the network RF switches to insure that they are in good working order. I first insure that all electrical connections are tight, and that no wires are frayed or damaged. Next, I check all of the switch contacts to make sure that there is no evidence of arcing when the switch changes the network day/night modes.

Another item to attend to is the lubrication of the mechanical switching apparatus in the switch. You should be able to switch by hand between

day/night modes without feeling any binding, or needing any additional pressure for the armatures to switch and engage the finger-stock. If you feel a drag or hesitation, you need to look further to see what is causing the problem. In most cases, a good cleaning and lubrication of the mechanical portion of the switch will take care of the problem. I use a silicon-based lubricant that will not dry out or become tacky over time. The best I have found is the silicon lubricant sold at most Radio Shacks. It comes in an 8-ounce tube, and can be easily applied using a swab or small brush.

Another area I check on the switches is the solenoids that pull the armature up/down. I check to see that there is no heavy discoloration around the winding, as this could indicate heat build-up and an impending failure of the coil. I check the wire connections on top of the coil to insure a good solder connection between the supply wire and the coil terminal.

Finally, I check to insure all limit switches are working properly. This is very important in aiding you to determine where a problem may exist. If you see that one of the indicator lights is not working on the phasor controller, that can save you a lot of time in diagnosing a problem in the array, most likely that one of the switches may not have switched into the proper position.

Another item that needs a thorough inspection is the standby generator. I look at all connections to insure tightness, make sure that the fuel tank is full and all fluid levels are good. I generally like to have our generator service company perform a full maintenance service on the generators before winter sets in. If there are several feet of snow on the ground, you will have a hard time getting the service company (or fuel company) to the site to repair a problem that should have been addressed earlier. There is nothing worse than losing electrical service at the transmitter site and finding the generator will not start or continue running for an extended period of time.

I exercise our generators weekly to insure proper operation, that is, I manually start and run the generator while I am there, not a programmed run cycle. You cannot safely insure that all is well with the generator's operation if it is running while you are not there. I listen carefully to the engine's performance, listening for any knocks or sounds that are not normal. I check to make sure the exhaust stack is clean and clear of debris. I listen for any whining from the generator as it turns.

Most generators have openings in the case to allow air to circulate within the armature of the

generator to help keep it cool. These openings provide ideal access for mice to enter and set up housekeeping. If you have, or had an issue such as this, you can purchase magnetic screen to place over the openings that will keep mice and insects out of your unit and still provide enough opening to allow air to circulate to keep it cool.

Like an automobile, if you maintain and service your generator at recommended intervals, it will last a long, long time. It is not worth cutting corners where maintenance is concerned, follow the manufacturer's recommended service schedule, and the generator will not let you down when you need it most!

This fall, while performing my quarterly tower inspection, I found that a couple of secondary (side) markers were not operating at the top level of the WDCX-FM tower. These are Dialight LED lamps, and have been working for about four years or so. I had Don Boye of Western Antenna & Tower climb up and see what was causing the outage.

Don found that two of the lamps' wiring had shorted (melted) together due to high RF from the antenna. The side lamps are located approximately 30 feet below the bottom bay of our 10-bay ERI antenna. He noted that the rubberized pigtail from the junction box to the lamps wiring showed no sign of RF damage, so he decided to add additional protection by adding a rubber sleeve on each wiring harness to the LED lighting.

Time will tell if this helps protect the wiring from RF burning. Don also noted that moisture had entered all three of the LED fixtures. He could not determine if the water was just from condensation or if the seals had failed where the lens connects to the base of the fixture. A check of the bottom three lamps showed no signs of water at all.

At the WDCX studios in Buffalo, we recently lost our video surveillance system. The cameras started failing one by one, and a check with the manufacturer showed that this system was obsolete and no replacement parts were available. It was a four-camera system with a 14-inch CRT monitor with no video recorder.

I found a very nice replacement system on the Home Depot website. For about \$350, we got a four-camera wired system, complete with an HDD recorder, that will record 24/7 for four years. All we had to add was a 22-inch LED monitor and we were up and running! The good thing was that the wiring for the original system was identical to the new system, so I did not have to re-wire the cameras. We did have an issue with one of the cameras, but the manufacturer is working with us to get a replacement

shipped pronto. In all, I was very pleased with the quality and ease of operation with the new surveillance system.

That about wraps up another month here in the great Northeast. 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

It's great to be back, but given the circumstances, it's bittersweet. I want to take this time and let everyone know how dedicated that Joe Huk was. Joe was a great engineer and friend. He will be missed.

A few weeks back, Joe had several issues that he was working through. I had just flown back to Detroit, and Joe sent me a text and asked for help. After working two nights prior until almost 2 AM at a client site, I was tired and did not feel like going in to work, but I am glad I returned his call. I went in on that Wednesday night to help him. He had been working over a straight 24-hour period, and even slept in his car at the station.

We worked through restoring the connections and STL audio that were lost due to network issues. We also diagnosed a control surface that went down. I had previously made a few cables up for the blades to be used in a situation like this that came in handy. I had several RJ45 to XLR cables of both genders.



The staff tribute to Joe Huk.

We worked until 12:30 AM on Thursday morning, and spent time in the engineering trenches

that I will never forget. It was only a few hours later that Joe passed away.

Over the years I had an opportunity to get to know him. At NAB, we spent time exploring downtown Las Vegas. Good times. You never know in life how much time you have. This was an eye opener for me in reflecting on what is most important in life. My relationship with God and my family. I am going to miss Joe, and so is the staff at Crawford Broadcasting.

The staff all pitched and made a tribute for him at the station, which included a tree planted in his honor.

I have been helping to keep the operation running, and have rejoined Crawford Broadcasting full time. It's good to be back. I worked on putting budget items together for 2017, and followed up on projects that need to be completed by year end. The WMUZ NV40 needed a little attention. I repaired one of the RF modules, and restored it back to full operation. In addition to that, I have been checking systems out for the upcoming winter season. The line pressure, the furnaces, and generator. We will be installing a new furnace at the WRDT Monroe site in early November. And we have ordered new Cisco managed switches to replace the older unmanaged units that are used currently. I am looking forward to getting those installed.

Finally, I will be working to finish the new Burk remote control systems for all three stations. This includes bringing up new IP connectivity at WRDT at the Motower site, something we have never had but is sorely needed.

Until next month, God bless and 731 W8FP

News from the South
by
Stephen Poole, CBRE, AMD
Chief Engineer, CBC–Alabama

Thanks to everyone who has been praying for my wife Sandy. She's doing better; the doctors have changed her medicine again and she's currently going to physical therapy. We're trusting God for some answers.

As I write this, of course, the election is coming up and all I can say is, VOTE. Don't stay home, vote! Don't worry about the polls, don't worry about the weather, just go to the polls and ... VOTE.

People complain about choosing the lesser of two evils. Folks, until Jesus returns and sets up His kingdom, that's going to be the case more often than not. I grew up and resigned myself to that fact many years ago.

Truthfully? I've never really expected my presidential candidate to be a model Christian. I'm pleased when I hear that our leader is a devout Believer; of course I'd prefer that. But in real life, I rarely get the candidate I'd really prefer, so I ask myself this question: which one is more likely to support the conditions (including the Supreme Court!) that will permit me to do what God has called me to do, without interference?

If you prayerfully consider that question, you will know what to do this time as well. It's really that simple.

One other thing I'd ask you to consider is giving some money to the Salvation Army to help with hurricane recovery in the Carolinas. What with the election, the news media are far more worried about what Trump Said Today and Hillary's Latest WikiLeaks Embarrassment, but believe me, those folks need our help. And while I'm on that subject, will you permit me to rant for a moment?

Hush, Matt Drudge

I grew up in a little town named Raeford,

NC, roughly equidistant between the Fayetteville/Ft. Bragg area and the golf courses of Pinehurst. I've been through many hurricanes, including Hugo back in the 80s and Fran in the 90s (not to mention Ivan and Katrina here in Alabama). I've related that story here before; when Fran came through, our home was without power for a week.

But honestly, I was shocked at the level of damage caused by Hurricane Matthew. I stay in touch with my friends and family in the Carolinas via Facebook, and they were posting images that were just heartbreaking. One picture that comes to mind (which,

unfortunately, I can't use here because of copyright) is that of the generator at Southeastern General Hospital in Lumberton, NC, on fire because it had run continuously for days. They had to evacuate that facility through flooded streets.

Same as with Hurricane Sandy a few years ago, some folks (in particular, Matt Drudge) claim that the National Hurricane Center (NHC) overstated the danger that Matthew presented. A quick Google search on "matthew flooding NC" should serve to dispel that notion. Look at Figure 1 (courtesy of the NCDOT): it looks kind of idyllic, doesn't it? But that's actually US Hwy 74 near Lumberton or at least, it used to be.

Lumberton was essentially destroyed by Matthew. My home county of Hoke still has many roads that have been completely washed out (see Figure 3). Large parts of Eastern NC, including the Fayetteville area, are still digging out and cleaning up. Repairs have begun, but will take many months, or even years in some cases.

Someone needs to explain how hurricanes actually work to Mr. Drudge. As I've related in these pages before, tropical storm systems are huge. They





Figure 1 - Highway 74 near Lumberton, NC

also tend to be slow-moving. If you've never been through one, they seem to go on forever. You don't want to be anywhere near the eye (as Sandy and I were for Fran). But even well away from the center, it can be like a really severe thunderstorm that just drags on for hours and hours.



Figure 2 - The NC National Guard helping flood victims in Fayetteville, NC.

Basically, Drudge needs to learn more about these storms before he criticizes the NHC. In particular,

1. Look at the radar or satellite image of a

storm, then imagine a clock face with 12 o'clock pointing in the storm's direction of travel. The worst winds will typically be between 12 o'clock and 3 o'clock. The Hurricane Hunters measured winds of 75 MPH or more, so by definition, Matthew was a hurricane.

2. Also, the strongest winds are near the core of the storm. The NHC will (correctly) call it a "hurricane" even if the 75 MPH winds are concentrated in a relatively small band near the center. Matthew's strongest winds were to the east, mostly over the Atlantic. Drudge's criticism that land-based wind measurements weren't that impressive is nonsense.

3. Because a large portion of Matthew stayed off the coast, it sucked up megatons of moisture from the Atlantic and poured it inland. A different track, say, over land through Georgia and South Carolina, might ironically have resulted in less overall flooding, but more wind damage.



Figure 3 - Sandy and I used to drive this all the time: Rockfish Road in Hoke County.

4. The gusty winds are nothing to joke about, but the real danger from a tropical storm is the flooding. This was the killer with Hurricane Sandy a few years ago, and it's what made Matthew a killer. A slow-moving storm can easily drop dozens of inches of rain in one spot. Southeastern NC had already experienced heavy rains the week before, and Matthew then added to the misery.

Look: I won't argue that the Global Warming nuts try to use any severe weather to frighten us into supporting them. That much is true. But facts are facts, and the fact is, Drudge just needs to hush. Matthew was a major storm event (the NHC has already said that the name will be retired) that killed many people and caused damage estimated in the billions. My word, how much worse does Drudge want it to be?

Inbound and Outbound Spam Filtering

In early October, another employee email

account was compromised and our mail server was put on a couple of blacklists. Fortunately, we caught it right away, and the two blacklists in question aren't used by most ISPs. But after chatting about it with Cris, I figured we needed to do something.

Back when we were using the Scalix mail system, all outbound mail was scanned by our Barracuda spam firewall. I had tried to get this to work with our new server, Zimbra, but kept running into all sorts of strange problems. We have many more accounts now (over 350), and Barracuda support said that our server was so busy, our model 300 might not be big enough. I was prepared to put a larger filter in our budget requests for 2017.

But then I decided to tinker with it. I searched the online forums and Googled for tips. It turns out that there are some settings that will improve performance that we hadn't been using (we never needed them before), and that, combined with a few really geeky tweaks that I won't get into, allowed Barracuda to scan our outgoing mail.

This still needs more work; one weakness is that mail sent entirely within Zimbra (for example, between two users in Webmail) might bypass the Barracuda. But I'm happy to report that it has made a big difference and is another big step in keeping us from sending out spam.

Odds and Ends

I mentioned last time that we had just finished installing the equipment for WXJC's new

translator. In early October, we received the go-ahead from the FCC, so we brought it live.

One thing that we're doing differently with this one is, we're using the processor that is built in to the BW transmitter. While it ain't an Omnia or a Vorsis, it seems to do the job well enough for now.

One issue that we ran across, though, was audio dropouts with our APT Worldcast codecs. We've run across this before, and have had mixed success with fixing it. In fact, a couple of years ago, we finally opted for some Tielines, because they seemed to be much more forgiving of momentary glitches in a data link.

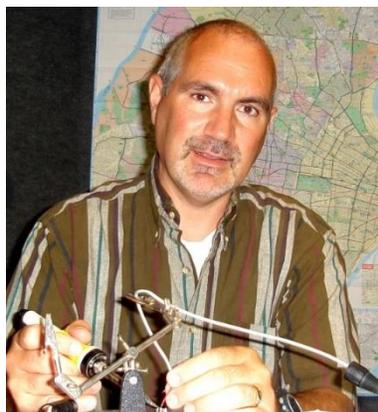
But score another one for Todd, whom we have nicknamed The Bulldog. He just doesn't give up. Once again, we've proven to ourselves that the 'Auto' setting in most network config is just evil. (OK, I'm exaggerating ... but not by much.) If you set your network switches to 'Auto' instead of specifying speed and duplex, you'll have problems. Same for your network cards.

It turns out that a similar thing is true of the APT codecs: there's a setting in there that defaults to 'Auto' for packet size(s) and buffering. We had already made the buffer as big as possible, but were still getting dropouts. But when Todd changed that 'Auto' setting to a manual config, our dropouts (and the apparent cause, which the logs called a 'sync failure') mostly went away. We're still tinkering and I hope to have a full report next time.

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

One of the things I have been wanting to do since we installed the Wheatnet system last year is to take advantage of the logic that is built into the system. Currently, some of the logic function between the rooms is done through the Wheatstone Bridge Router system, but actually most of it still travels over the legacy 25-pair cables.

While there is something to be said for the good old-fashioned copper for these functions, it certainly doesn't give you the kind of control



you can have with the logic functions built into the Wheatnet system.

In moving to the Wheatnet logic system, one of the obstacles that we faced was being able to light several different lamps in the studios that ran on higher voltages than the 5 volts provided on the LIO circuits of the Wheatnet Blade. Of course this meant some sort of external relay that would switch on with 5 volts and handle higher currents and voltages on its external circuits. In this case we have off-air lights and 'Profanity

Delay Safeø lights.

My first thought was to go find some Bud boxes and the soldering iron and try to make the neatest project possible. I donø hate the idea, but I really wanted something that would be easy to attach wires or even change wires quickly. I also wanted it to be easily expandable without having to take your existing circuits down to add other circuits and functions down the road. I am a fan of the RDL Logic Control Relays, but the cost would be quite a bit more than Bud boxes.

I guess you could sum it up with the statement that I wanted something better than the standard Bud box project but wouldnø cost too much more than buying the individual parts of the typical Bud box project.

After scouring the websites of Digikey, Mouser, etc., I decided to go with the Grayhill relay racks and the associated modules. They have racks that will handle either 4, 16 or 24 modules. I went with the four-module rack in each control room and chose the solid state digital relays.

We had already terminated the LIO wiring from the Wheatnet Blades in the control rooms on Krone punch blocks. We had a bit of cabinet space open next to each of the control room punch blocks, so that would be the logical (no pun intended) place to mount the Grayhill four-module rack.

We began using this system as part of a project to move the profanity delays from the control rooms to the rack room. I really wanted to do this a long time ago. I was tired of the issues with looping the audio back through the control rooms with all the associated ramp-to-zero sessions that come with

having to service the air chain. I had many other reasons that I wonø belabor here.

The on-air staff was very nervous about this move. They had a decade of the profanity delays next to them in the rack with their comforting yellow light saying it was ready to ødump.ø So, I wanted to give them a really big button with a feedback lamp that showed the delay was ready to dump. The profanity delays have relays that give closure when the unit has enough delay built up to be used in case objectionable material needs to ødumpedø before it airs. We just used the Wheatnet blades in the rack room to terminate the relay into Wheatnet system and then cross-pointed it to an output on the blade in the control room.

The first relay we installed was the lamp on the giant new dump button in each control room. When we received the first rack and module, it didnø come with any wiring diagrams. No problem. I donø need instructions to figure out relays. Well, after about 20 minutes of frustration in not getting the relay to close and light the lamp, I admitted defeat and went to the Grayhill website and downloaded the instructions. Thatø when the proverbial and literal light went on.

Of course I still have many of the board operators, the ones that have trouble embracing change, complain about not being able to see the digital number display on the profanity delays. I am playing with the idea of purchasing a cheapie webcam, mounted in the rack room and pointed at the delays so they can login to the camera and see the numbers. Anything to help them sleep at night.

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

Itø translator season in Oregon after Cris filed the applications as another window opened at the Commission in July. The application was processed and approved with lightning speed, proving that the Commission can act quickly. In this case, the paperwork was completed more quickly than the actual installation.

Our translator would be mounted on the 170-foot



communications tower just to the south of the KKPZ transmitter building. That tower has a 10-foot pylon at the top, which originally was used to mount a single-bay øroto-tillerø FM auxiliary antenna.

Initially, the size of the translator antennas was a challenge to fit into the space available at the top of the tower. A pair of vertically and horizontally polarized Kathrein

log-periodic antennas was larger than the accessible real estate. An antenna mounted at the bottom of the pylon would have had the tower structure blocking the antenna elements.

When the antennas were delivered, it became clear just how large these antennas really were. The booms are two large aluminum square box tubes. Mounting these antennas would require care and thought. After several revisions of plans, an existing unused antenna was removed from the 5-inch pylon and those clamps were used to mount a smaller mast parallel to the pylon. The other antenna was mounted off the face of the tower structure using an H-frame bracket. All this had to be done while avoiding having the antenna become entangled with the detuning skirt brackets and drape wires.

We wanted to move quickly as the difficult weather season for tower work was fast approaching. Fitting the antenna work into the schedule of the tower crew was a challenge as we were required to work around a major promotional open house at the station and deteriorating weather.

Weather became a major issue as we approached our installation window. Rain appeared as forecast, with cloud to cloud and cloud to ground lightning. Needless to say we didn't climb that day. The following day cleared, early allowing installation of the mounting mast and H-frame. The following day remained clear and the mounting of the antennas went fairly quickly.

Installing the feed line was another matter. The communication tower is close to a quarter wave at one of the AM frequencies, and with the feed line pulled up and ready to install, was very RF-hot at the top. Fortunately, the upper connector had been installed prior to lifting the cable, which allowed using jumper cables to ground the cable to the tower. We could then install the ground kit and the cable.

Because the communications tower is detuned, there tends to be RF on feedlines attached to the tower. That can sometimes generate crosstalk in audio circuits. So far that hasn't been a problem.

The translator equipment is located in the communications suite in an oversized rack. The KKPZ transmitter/studio building is a concrete structure that is structurally solid. With an eye to the potential for a major earthquake, I lashed the rack to the concrete wall.

After the initial turn-on, the quality was superb and we began the process of checking out the

coverage of our new translator. Twenty-four hours later, that was interrupted when the audio processor failed. The composite output disappeared and was replaced with +10 V DC. This of course had to happen on a weekend. That figures.

A quick call to the manufacturer on Monday provided a diagnosis of a component infant failure. A replacement arrived by Wednesday and the translator returned to service.

Overall, we are pleased with the results and are now scoping out the coverage, which is looking good. Stay tuned.



The KKPZ translator antenna at the top of the detuned communications tower on Mt. Scott.

**Rocky Mountain Ramblings
The Denver Report**

by
Amanda Hopp, CBRE
Chief Engineer, CBC - Denver

What a crazy, busy, hectic month October was! I don't think I've worked this hard ever, and that includes when we moved to our new studio and office space in 2010. It was a month filled with problems and successes. We now have two new FM translators on the air, a microwave link from the studios up to our FM site on Lookout Mountain and a new format on KLVZ 810.

We started the month off with the KLVZ-FM translator. We found the stand for the cabinet was damaged in shipment, but we made temporary repairs and put it in place with a few modifications to get us through until a replacement arrived.

The tower crew came and began their work. It started out as a nice day. They worked to get the antenna and power divider mounted up on the tower. Then the wind went crazy! One of the guys said he saw a tumbleweed fly by at 280 feet in the air! They were also getting pelted by water being blown off of one of the local quarry ponds. It was not pleasant for them. They headed down the tower to continue the work the next day.

It was a little breezy then, but not bad. They got the transmission line up the tower and secured to the tower. We, of course, tested things at that point and found something horribly wrong. We spent the next several days, on and off, trying to find the issue. After discussing it with ERI, they sent us out a new power divider, thinking maybe the slug inside came loose in shipping. After doing a few more tests, we decided that indeed there was a power divider issue and it was time to replace it. Sure enough, once on the ground, it sounded like a rain stick when rocked end to end. Okay, not quite, but you could hear the slug fall each time you flipped it. Once the new one

was up, things began looking good on the network analyzer.

Since we had some down days here and there at KLVZ due to weather and the crew working at the KLTT transmitter site, we were allowed the time to replace the stand for the equipment cabinet at KLVZ and then rack all of the equipment. That went great until we figured out the transmitter was too deep to have the line connected at the back. We had to order a right angle N adaptor.

Once that was in, we were able to connect the transmitter and test it fully.

While waiting on the tower crew to finish up, we decided to fire up the AM transmitter. It had been off since April, and while we had tested it periodically during the off time, we decided to try it with modulation. What we found was disturbing. Even at low power, the transmitter kept tripping off. We could not figure out what the problem was, though. It worked fine before we took the station down, so what changed? We installed our new Inovonics 531N modulation monitor and saw the modulation levels were very low. But the transmitter was still acting like it was tripping because of over modulation (it would work fine with carrier only).

We began troubleshooting the issue. Since we didn't know where it was, we began testing everything. We found one capacitor in the output network wasn't quite what it should be any more, so we replaced it. That didn't help. After brainstorming with Nautel for a while, we finally found the issue. There is a resistor that had evidently changed value. We figure we had a lightning strike while the site was off and it affected it just enough, probably got that output blocking cap, too. Rather than messing with the resistive divider network in the RF current sensor, we simply added a resistor in the sensor circuit (to



lower the sample voltage to the circuit) and all is right with the world now.

Thankfully, after all this trouble, after making a two-day project extend to a week, we were able to work on the KLTT-FM translator. We arrived before the tower crew one day to install the stand and cabinet and equipment. Our goal was to have the majority of our work done before they got on the tower. That we did. I was able to get the equipment installed, plugged in and powered up, and get network cables made for each piece. This made things much easier.

The tower crew was able to get the antenna up on the tower, and the next day they got the transmission line up. Then a massive windstorm hit. It was so bad that the crew was getting zapped by static electricity each time they tried to put a ground on the transmission line. They called it quits for the day and came out the next day and finished up. This installation went a million times better than the KLVZ-FM install.



Amanda just finished installation of the KLTT translator equipment in the weatherproof, temperature-controlled cabinet at the base of tower #4.

In between the two FM installs, we were able to get a microwave link established at the Lookout Mountain site. This is a huge blessing. While we had been able to finally get two mostly reliable connections to the site using both a T1 and Comcast, we wanted to be able to have everything behind our firewall on a 10.X.X.X IP address like the other sites. Plus, a microwave does tend to be more reliable. It is amazing how easy it can be in Denver

to establish these connections. Find a location that is visible by both sites. We have a newly-renovated building not too far from the office. It went from being a red brick building to being white. That should be easy to find from Lookout Mountain. And looking at Lookout Mountain from the studio building there are plenty of places to see. With those two landmarks, we were able to visually do the initial path alignment. We were then able to tweak things in to get the RSSI on the path budget. So far, the link has been solid!

The Legends format has returned to a Crawford station in Denver. I remember when KLZ was Legends. I was a young kid then. I had all the shirts for it, though. We brought KLVZ up the 24th of October with the new format. The first week was a test run of sorts. There are lots of moving parts for this to work. First, and most important, is learning MusicMaster. Jorge Carballo has been working hard trying to get it to work with our Nexgen system. There are still bugs as certain songs do repeat in a short period of time. I think with some time and help from KAAM in Dallas, we will be able to get it working the way we want. The station in Dallas belongs to Don Crawford Jr. and he has successfully been running this format there.

From Dallas, they will be doing voice tracking to give the station a live feel, as well as doing a daily live show and a sock hop on Saturday



evenings. We also have Tron Simpson returning to us to help with the voice tracking. He lives in Colorado Springs and has a studio to work from. We set up a Nexgen Remote Studio computer for him to grab our logs and insert his work product. We still have work to do but soon we will have the station running at its full potential.

I must say, driving around with my dad has been fun. We've been listening to the station nonstop, and his knowledge of the music is crazy. He will say who the artist is and wait for the PSD to verify. Even when he doesn't know, just give it time and he figures it out. Pretty useless information, but

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then again, isn't all information useless until you need it?

I am praying for a slower November. I need time to recuperate, and time to get caught up with the other stations. It seems we have been under attack constantly since starting these projects. Some of the attacks have happened with the translator and KLVZ

projects, other issues are popping up just when we think we can relax. I want to be able to get to each site and give it some TLC. Maybe then we can relax.

That about covers it for this month so until next time! that's all folks!!!

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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, 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/91.1 MHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz/94.3 MHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz, 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

WEXL • 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 • Detroit, MI
103.5 MHz, 50 kW/150m AAT
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
WYDE-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
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT



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