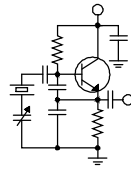


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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What We Have Learned

As May flowers bloom all across the northern hemisphere, we enter the third month of dealing with the COVID-19 mess, and in the broadcast industry, we have learned a lot in that time. In fact, people in just about every business have learned a great deal.

Here in our great company, we have learned that our people are very resilient and very capable. Of course we already knew that to some degree, but working through the difficulties presented by a lockdown has brought out the best in our people. I'm proud of them, every one, especially our engineers. It has been our engineers who have kept the trains on the tracks and provided our operations people the resources they needed to operate the radio stations from remote locations.

We have also learned what things are important or critical and what things are window dressing. When it comes down to determining what the bare minimum it will take to keep a station operating, the excesses tend to get tossed overboard in a hurry. That defines for us the things on which we need to focus. The rest can wait for better times.

Challenging times such as this cause us to take a hard look at the infrastructure in our facilities, looking for weak spots. I was recently asked by my friend, Paul McLane of *Radio World*, about this very thing. I spent a few days thinking about it before I sat down and drafted my answer, and it turned into a rather comprehensive treatise on the various elements of a broadcast station's infrastructure and what is good-better-best to keep the station operating in times of crisis, whether a lockdown resulting from a pandemic or area-wide storm damage. I'm pretty sure you're going to see that treatise in some form or another in an upcoming RW e-book, so you can be watching for that.

Putting that to paper was a good exercise, because it made me think through every facility we have and their strengths and weaknesses. It's always a tradeoff. If we had unlimited funds, we would have three levels of backup of every critical piece of equipment, with geographic diversity to guard against wide-area outages or destruction, but that's not where we live. We have to look at each facility and evaluate the mission and the economic realities and make specific decisions for each. Some merit a higher level of redundancy than others because of mission or the financial situation.

As I pondered all this, one question kept surfacing: Is there a penalty for employing this backup studio, processor, STL, transmitter or antenna? The answer is almost always yes. Is there a way to lessen that penalty? Sometimes, and I think that's a good thing for us to look at from time to time. Can we improve our auxiliary facilities so that the listener does not perceive that we are doing something different when we use them? If we can and it doesn't break the bank, it's something we should consider.

Detroit

We have a lot going on in our Detroit market right now. First and best is the hiring of Mike Kernen as chief engineer of our Detroit market. Mike comes to us following a 32-year stint as director of engineering at the Greater Media/Beasley Detroit cluster. He brings with him a wealth of knowledge and skills, and he has already jumped into the growing pile of technical issues in our facilities there. We are thrilled to have Mike aboard and very much look forward to working with him.

We took a lightning hit on the big tower at the studio/FM site the weekend of March 29. Thankfully the energy was shunted to ground and did not enter the building, but the H-field caused a bunch



We welcome Mike Kernen as the new market chief in Detroit!

of minor but irritating problems. A number of NICs were damaged. We lost a handful of analog I/O op-amps in the Wheatstone TDM system. The AES input to the Omnia VOLT processor feeding the 96.7 WCHB-FM transmitter died. One of our Wheatstone M4 mic processors took some damage, and all three Sage Digital ENDEC 3644 EAS units lost analog monitor inputs as a result of the induced voltage from the H-field. The biggest issue was the failure of the 48-volt DC UPS unit feeding the microwave equipment on top of the tower (which feeds the WMUZ-AM site).

The failed NICs were replaced so easy enough. The folks at Summit Technology Group took care of that and did the initial triage and made a few repairs to get things going. Mike has, with Steve Cuchetti's help, been working his way through the rest of the issues, replacing op-amps and getting the microwave link running again. The VOLT processor has been repaired by our friends at Telos/Omnia, and the great folks at Wheatstone took care of the M4 repair for us. Sage fixed the three ENDECs and they are on their way back. So we're mostly recovered from the lightning strike. Only the 48-volt SEI UPS remains to be fixed as far as we know, and it looks like we're going to have to send that back to the factory for repair so SEI won't send us a replacement control board that we can replace in the field. That's something I will definitely remember going forward. The Trango microwave radio, which we swapped out

just to be sure, appears to be working okay, but we will confirm shortly. Great job Mike, Steve and all the good folks at Summit!

We are still dealing with an antenna issue at WCHB. Something has happened on the big tower at that site, which is shared with Entercom's WOMC-FM. The impedance of the tower has gone from 11 ohms to up near 100 ohms. Almost certainly one or more of the shorting/grounding straps on a transmission line going up the tower has come loose, or an insulator has shorted somewhere. The folks at Summit flew the tower with their drone and were unable to see anything obvious. We had our friend and local consulting engineer Russ Harbaugh come out and measure the impedance, and he noted that it was varying, as if something was moving around or blowing in the wind.

For the past several weeks, we have been operating non-directionally from tower #2 in the two-tower array and have an STA to permit this while we sort out and fix the issue. The STA facilities provide for excellent coverage of full power at night and just a small reduction during the day, so listeners won't perceive there is an issue. Mike is working on getting Great Lakes Tower to come do a climb and inspect every inch of every line and conduit going up that tower to locate and fix the issue.

Finally, the main and aux transmitters at WMUZ-AM have issues. The main, a Nautel NX50, is showing an RF drive problem to the #10 power module. Nautel had initially diagnosed the issue as a faulty backplane, but I am not convinced, and neither is Mike. He is taking another look at the situation. Thankfully the transmitter has plenty of reserve horsepower and is operating at full power, even with the failed module. The aux is a Harris DX50, and it has several problems. Several power modules, which Summit tried to repair in the field, are still out and have since been returned to GatesAir for repair. Hopefully we will have those back soon.

And of course all of the above happened in the middle of a pandemic with the whole nation on lockdown!

The great news is that we lost little to no air time as a result of the lightning strike, antenna and transmitter issues. I credit the fast action of our friends at Summit, assisted by Steve Cuchetti. Great work, all!

Hopefully next month things will have settled down so that we can hear from Mike in these pages. Stay tuned!

The New York Minutes
By
Brian Cunningham, CBRE
Chief Engineer, CBC – Western New York

Hello to all from Western New York! The COVID-19 pandemic has certainly changed the way we do radio! Many stations had contingency plans in place in case of flood, fires and other disasters, but this one certainly caught everyone by surprise. As most of you know, New York State was hit hardest, with tens of thousands of cases reported and thousands of lives lost. Here in Buffalo, at the time of this writing, over 3000 cases of the corona-virus have been reported and more than 200 deaths have been directly attributed to the virus in Western New York.

Our stations are working with skeleton crews as the Governor still has stay home orders in place, with only essential personnel allowed to travel, and non-essential businesses closed until the number of cases are at an acceptable level.

As far as engineering goes for the CBC Western New York market, it's been business as usual. The only upside of all this is in the fact that I am able to get many of the studio issues resolved as I am not having to work around a live, in-studio person. Transmitter maintenance has been unaffected, and luckily, we have not had any major issues (failures) since the pandemic started in mid-March.

All of our stations already had VNC capabilities in place, so there was not a rush to get internet VNC connections configured so that board operators/announcers could work remotely from home.

In Rochester, at WLGZ-FM they are operating at 100 percent voice tracking from each announcer's home. I was pleased with the sound quality and the overall consistency. It sounds as if there is a live person in the studio.

At WDCX-FM, we only have a live board operator in studio during key hours of the day, and other departments are reporting in as needed.

At WDCX(AM) in Rochester, Earl and Peter are holding down the morning and afternoon drive times, with the rest of the dayparts being automated, including the live satellite shows received

over the XDS receiver.

To the listener, the stations sound as they always have, so I guess we should be proud that we are able to broadcast without interruption or detour from our normal operations. Hats off to our entire programming staff, who saw to it that everything was covered, and no programming has been lost thus-far.

As far as engineering goes, as I stated earlier, we have not had any equipment failures since early March. I did get the quarterly tower inspections done for our two facilities in Buffalo, and all lighting is in good order. I will have some chain-link fencing issues to deal with as soon as the weather turns.

At the WDCX-FM tower site, the frost heave has pushed some fence posts upward, causing a big gap between the bottom of the chain-link and the ground, big enough for a person to crawl under the fencing and gain access to the tower anchor points. How

much post is left in the ground will determine how I will proceed with the repair. I am hoping that all I will have to do is remove the fastening clips and slide the chain-link back down to the original position and then re-fasten. Worst case will involve driving the vertical posts back down into the ground to their original heights. If they were encased in concrete, this will turn out to be a much bigger project to rectify.

Signage at the WDCZ five-tower array will need to be replaced soon. All of the RF radiation warning signs have weathered to the point that they can hardly be seen. I am hoping that I can purchase plastic signs instead of the metal versions we have been using for years. I would think that the plastic signs would last longer and be more fade-resistant than their predecessors. The only concern in using plastic is what effect the cold would have on them (they may get brittle or crack).

That about wraps up another month here in the great Northeast, and until we meet again here in the pages of *The Local Oscillator*, stay safe, practice social distancing, and happy engineering!



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

Hah! I promised some pictures last time; believe me, we have them ... but not as I originally intended it.

April 12th, Easter Sunday, we had several nasty storms come through, with embedded tornadoes and strong straight-line winds. You probably saw mention of this in the news. While Alabama wasn't hit as badly as some other states (notably Mississippi and Georgia), what we had was bad enough.

850 AM (Tarrant, AL)

This was arguably the biggie, and could have been a really, really bad thing. It's hard to know precisely what happened, but here's my best guess. Lightning hit the obstruction lights on tower #5 in WXJC's



Figure 1 - This is what was left of the fiberglass rod on tower #5.

array. This burned several things, including the SO cable up to the top beacon. What's worse is that the lightning apparently burned the fiberglass standoff/insulator on the top guy wire to the Northeast and set it on fire.

The strong winds also caused an old rotten pine tree, well off in the woods to the north of the site, to fall across the western guy anchor. Either the guy had already let go, or this popped the already-burned-through fiberglass. At any rate, that top guy came loose and tangled into the trees at the site. The tower was obviously leaning

at the top and we had more storms coming. We treated it as the emergency that it was.

Fortunately, Southern Tower, a company with whom we've worked in the past, immediately came over from Talladega to look at the tower after Todd sent them a picture showing how it was



Figure 2 - Some nicely-roasted guy wire.

leaning. They were able to loosen the other two guys to the top level, allowing the tower to straighten up a

bit. But with more storms coming, we really needed that third guy in place. That's a tough old tower, but we didn't want to push things.



Figure 3 - We rented a man lift to get the guy untangled from the trees.

Incidentally, you always learn something, and it ain't always good news. I've been here over 20 years now, and never noticed that the guy wire for tower #5 was a different size from that used on the other four, much older, towers. This has caused some confusion in the past, by the way - including me ordering some 3/8" guy wire that wasn't needed for the other four towers. (It's still on hand, by the way. If any of our other engineers need some of this, let me know.)

Southern Tower managed to get a temporary fix in place. Since the fiberglass rod was gone, we wanted to put some extra "johnny ball" insulators in place to help protect against corona and arc-over. Unfortunately, what we and the tower crew had on hand just wasn't quite right for the task, so we opted for strength. The crew managed to put in one insulator a few feet from the tower, with a preform on the guy wire looped around a tower leg. It's holding like a winner as I write this, and its effect on tuning was minimal, I'm glad to say.

Cris was all over this as soon as I informed



Figure 4 - The clevis on the replacement rod was a wee bit too big.

him. He and I were talking and texting frequently, with pictures flying between Denver and Birmingham. He ordered the needed parts and we had the tower crew return to make a permanent repair. We were able to determine that the top beacon had been damaged, as well as one of the side lights, but we were unable to get the replacement fiberglass rod in place. Tower #5 has a smaller, single eye up on the tower, and we couldn't figure out a (reliable) way to get the new standoff mounted to it.



Figure 5 - Before (left) and after (right).

We're crafting a bracket as you read this; for now, thank the Lord that the tower didn't fall, and we at least have a good, strong guy wire to hold #5 against the additional storms that are always coming.

On Generator: 101.1 in Cullman

WXJC-FM didn't escape without worry, either. When the storms came through, they destroyed a bunch of power lines in the Smith Lake area. The power was out over a good bit of Cullman County, so 101.1 went on generator during the storms. I received a (belated, but welcome) notification from the monitor that I have in place at that site.



Figure 6 - Todd refueling WDJC's generator.

We needed to refuel it. We had a 55-gallon drum that was almost full at the WDJC-FM site on Red Mountain; Todd hosed and dragged that 350-pound drum out of the old building at WDJC-FM and helped me get onto our trailer. I said, "Go back to the studios, I got this!" and pulled it up to Cullman.

Heh. Well, no, I didn't. The ground in Cullman was still soggy and that trailer was being very ornery, even with a wheeled jack on the front to make it roll more easily. There's not much room inside the fence at either of our sites with generators. They're just not in a convenient location for refueling. (More on the WDJC-FM refueling in a moment.)

Fortunately, Todd and Jack were able to head up to Cullman the next morning and get that fuel into the generator, along with some additive to help keep the diesel from going stale. I've got the two best assistants in the company and my hat is off to them. Cullman EMC also gets a nod for restoring our power within a couple of days. Given the widespread damage, I wasn't sure when we'd have juice again.

On Generator: WDJC-FM on Red Mountain

On April 15th, WDJC-FM's monitor sent me a notification that it was on generator. I asked Todd to run by to check it and he did so on his way to work. Sure enough, the generator was running and we had a downed power line at the site. We called Alabama Power and put in a trouble ticket. Todd also checked the fuel in the generator; it had just over half of a tank. Given that (once again and as usual) we had no way of knowing how long we'd be without utility power, we refilled that 55-gallon drum and pulled it up Red Mountain.

Cris had us buy an electric fuel pump last year. It's a beautiful thing. The only drawback is that (as mentioned above) you can't get very close to the generator at either this site or WXJC FM in Cullman. Todd and Jack had managed to unhitch and push the trailer close enough to get the job done in Cullman, but we'd have to remove the fence fabric to get it into the compound at WDJC. Therefore, I stopped by Tractor Supply and purchased an extension hose for our pump. With a new length of 24' we had just enough to reach the generator. Todd did the refueling while the generator was running, so we communicated with hand signals.

Not long after we refueled it, the power came back on. Both of our generators are now close to full and given that more storms are coming as I write this, thank the Lord, indeed!

WYDE-FM in Pumpkin Center

WYDE(AM) in downtown Birmingham chugged right along through all of this, but its sister station, 92.5 FM whose transmitter site is located in Pumpkin Center, Alabama, wasn't so fortunate. A tornado went very close by the site, chewing up power lines over quite some distance along Alabama Highway 269. We don't have a generator at 92.5, so we were basically at Alabama Power's mercy on this one. They restored power after a couple of days, but then, we still had no phone line. A call to AT&T got that fixed.

Driving around in that area right after the storm, I wasn't surprised at either failure. I saw snapped power poles and lines all over the place including phone lines, great big multi-wire cables that had been ripped apart and left hanging. Frankly, I'm surprised that AT&T was able to get the phone restored within a few days, but I thank the Lord that they did!

Odds and Ends

You will notice that I haven't even



Figure 7 - Me wearing the latest fashion.

mentioned the COVID-19 stuff that's going on. But amongst the storms, remembering to take the masks with us, and staying six feet away from fellow customers in the stores, we also had some server issues. Right when I was running to Cullman to check on the generator, I received notice that we were getting "certificate errors" on the web server. I had to stop by my home computer to fix that, between running to sites.

Also on the server front, we're about to retire the old (ancient) (it's the IT equivalent of Achmed the Dead Terrorist) engineering mail server. We had started on that, but were obviously knocked off track by the aforementioned storm damage. Amanda Hopp did some good preliminary work, so my hat's off to her as well.

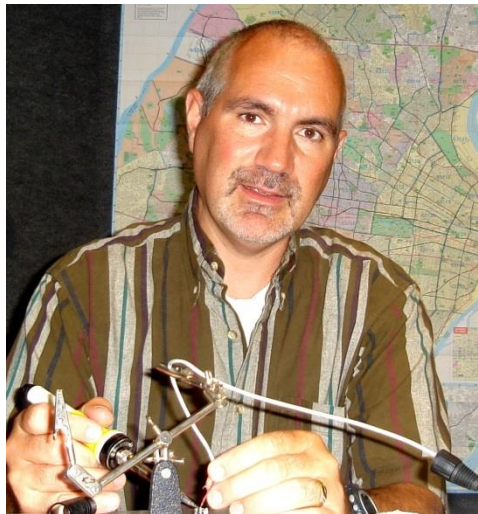
And finally, an additional indicator that Alabama needs to repent: the new air conditioner for the studios at 120 Summit has arrived. The repair crew was trucking it over to our location ... and was in an accident. Fortunately, it looks like it wasn't a serious wreck and the new 35-ton unit appears to be okay. We'll see. But if the above didn't convince you, maybe that'll give you some idea of how things went here in April.

That's it for this time. Keep praying for this nation and stay safe!

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

While I consider myself to be the kind of guy that likes to relax, sit on the couch and take things easy, the last month has very much challenged that notion. While that is certainly not how I am spending my work days, the pattern of working on my feet and using my hands has certainly changed with the quarantine restrictions.

Since we have a team of engineers in the Crawford Chicago operation, I had to be concerned with how closely we work together. The engineering staff deployment during this time period became my top concern as



their safety, the safety of the staff and doing our part as good citizens were the top concerns.

Obviously, keeping the stations on the air and what billing we could still generate during the lockdown was a high priority as well. The next priority was then making sure we could keep the staff that was working remotely, working.

In mid-March, it was decided that operations here would go to skeletal staff until the quarantine was over. Thankfully, this approach appears to be working as we don't have a case of the COVID-

19 among the staff. That could change, but at least it appears we have made the right decisions.

In regards to my staff, I chose to schedule them in a staggered fashion at the studios to support our on-air operations and the remote workers. Further, I decided to try our best to not have two engineers working on anything together if at all possible. That hasn't worked out totally, as we have had a few high priority issues that made working together necessary.

We have now moved into the second month of quarantine, and I am wondering when the end will be in sight. I find myself trying to balance the need for safety and the need to move beyond just supporting ongoing operations in the studio and remotely. We have two large projects looming that will require both significant amounts of engineering hours but have elements to them that will require more than one engineer working together.

At the time of this writing, we are just beginning to receive shipments of equipment and components for these two projects. First on the list is that we are receiving a Nautel GV20 transmitter that will be used as part of an upgrade to our off-site auxiliary for WPWX, at the Lansing transmitter site.

We currently have the ability to put WPWX on that site at a relatively low power of about 5 kW. The idea is that if something major were to happen, at least we would have something still on the air. It would also serve as a go-to site for any kind of major maintenance at the main site, such as tower work in the vicinity of the antennas.

After getting this working and seeing that we had a new antenna that could handle 30 kW of

power, Cris got the inspiration that we could have an even greater insurance policy for this important station by replacing the transmission line with a higher capacity line and then replacing the backup transmitter at the site with a 20 kW frequency-agile transmitter.

Getting rid of the problematic BE FMi703 backup transmitter at the site was certainly fine with me. The new transmitter would now be a full-capability backup for the two stations. So, this is really a major undertaking as we will have to replace everything from the antenna backwards. This means larger, higher capacity transmission line inside the transmitter room and even how the electrical service is fed to the new transmitter.

It is hard to picture much of this work done with only one engineer present at a time. Yet the goal I have in mind is to do as much as possible with as few engineers in the room as possible. Certainly, when we have to have more than one engineer present, we will take precautions with masks and gloves.

The other large project that is just getting ready to get underway is the rebuild of all four control rooms. This will be significant work as we will not only be replacing the control surfaces, but the studio racks and cabinets as well. Again, there are parts of this that it is hard to imagine getting done with only one engineer in the room.

So, these are the challenges that we face as we move ahead in times that are not familiar to any of us. We're not the only industry that has these issues and have to face how to make what we do work but stay safe at the same time.

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

Hello from California! It was interesting to participate in the first Crawford engineering video conference last month. As I recall, the introduction into video calls was done at the world's fair in Seattle sometime in the 1960s. It never really materialized as a form of communication until decades later, and alas, we are doing it now for real. Setting up Zoom on my laptop in preparation for the videoconference turned out to be useful in an

unexpected way.



A few weeks ago, while watching the news, they showed a shot of a convalescent center in Southern California. This got my full attention because my father-in-law was living there. The news was that this was a new center of coronavirus infections. We soon learned that my wife's dad had tested positive for the virus. About a week later, he was rushed to a hospital where heroic efforts were made

to save his life. Unfortunately, he did not make it.

My wife was deeply grieved that she could not be there for him. The nurses that were taking care of him said that she could have a video call with him using Zoom. Time was critical, but it was a blessing that I had already installed Zoom and it was ready to go. She was able to say her goodbyes and he passed away an hour later.

At the convalescent center, 50 patients tested positive for the virus. Of those, 18 died. That is a mortality rate of 36%. I am sure that most, or probably all, of these patients had underlying medical conditions, as did my father-in-law. This virus is serious. While many can get over it without difficulty, it can be quite insidious if it takes hold. It wreaks havoc in the lungs, but it also strips oxygen molecules from the red blood cells. Without sufficient oxygen, the body shuts down organ by organ.

At KCBC, we are, of course, taking precautions against spreading the virus. This is actually quite easy since there is only one full-time employee at the station. I normally work independently, often in a different part of the building, and often work hours when no one is there.

Tower Light Monitoring

As you may recall, I mentioned previously that I was having difficulty with monitoring the tower lights on tower number three of our antenna system. I had replaced the SSAC tower light sensor and that did clear the problem up, at least until a thunderstorm rolled through. As soon as the thunderstorm hit the area, I received a tower three lighting alarm.

Thinking it must be that SSAC controller issue again, I went out and checked it. It turned out that the SSAC controller was working just fine, so now we had a new problem.

We use a fiber-optic cable to interface the tower mounted SSAC controller to the grounded side

of the world. This is done with a pair of circuit boards that Cris built. It is a very simple system, and there is very little to go wrong with it. Checking the tuning house and of the fiber-optic system, I found light being emitted from the fiber-optic cable, so I knew the sending LED was functioning. The problem had to be in the circuit board receiving the light provided by the fiber-optic cable.

Troubleshooting the circuit board should be a super easy job to do; there are only two active components on the board anyway. As it turns out, using a multimeter in the presence of high RF energy is problematic. Nevertheless, I was able to determine with a high degree of certainty that it was the fiber-optic receiver that had failed. Cris had a few fiber-optic receiver modules drop-shipped to me and upon replacement, the system is back to working perfectly.

AM IBOC

We are in the process of replacing the NE ó IBOC HD exciter on our auxiliary transmitter, an ND650. With the arrival of the AM IBOC unit and an Exporter Plus, I thought it would be easy to make the change. I was wrong.

Not being familiar with an AM IBOC exciter, I did spin my wheels for a while trying to figure out how to make it work. I assumed that I had to be doing something stupid, and that once I found the right combination of setup parameters it would function. Again, I was wrong. Finally, I came to the conclusion that it probably wasn't me, or at least if it was me, I had exhausted all hope and needed some assistance.

A couple of emails back and forth with Nautel support determined that the unit was indeed not working. As I write this, Nautel is preparing to ship me a replacement. I look forward to telling you next month that it is all working fine and dandy.

Take care and stay healthy!

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

A new phrase floating around the industry these days is “Low PIM.” No, PIM doesn’t stand for some form of Product Information Management.

Driven by increasing numbers of RF sources concentrated in small physical facilities, any source of spurious signals becomes a concern.

The DTV repack, the concentration of broadcast FM combined on shared antennas, the co-location of land mobile services and broadcast, all driven by local planners that require higher and higher facility density, geometrically increase spectrum congestion and the potential sources of spurious interference.

Passive Inter-Modulation mixing can occur with any metal to metal partial contact which forms what amounts to a diode junction. Those junctions can be formed in coax cables and connectors as well as coax and antenna contact with supporting towers. Some types of coax, LMR in particular, have a bad reputation for generating lots of spurious interference. The focus of low PIM products is to reduce or eliminate these sources of Passive Inter-Modulation problems.

What does all this have to do with KKPZ, tower work near KKPZ and COVID19? Lots actually.

KKPZ is collocated with our tenant on 1640 kHz, a 10 kW day/1 kW night facility that shares tower #3 of the KKPZ directional array. As part of

our annual occupied bandwidth measurement, we need to check harmonic and intermodulation mix products between 1330 and 1640.



Over the last few years harmonic and intermodulation products have been slowly increasing. To complicate matters greatly, the harmonics and intermodulation products have high levels of 60 Hz modulation. Additionally, when making measurements, the insurgent antenna does not point at the transmitter and often is looking at the water district facility, which is loaded with land

mobile towers. Very suspicious.

The implication of course is that the harmonics and intermodulation products are generated off site by passive intermodulation, quite likely generated by towers at the water district facility.

And COVID19 enters the picture. Tower and antenna work at the water district facility on a replacement tower, chronicled previously in these pages, has ground to a halt.

By the way, have you noticed that with the current COVID lockdowns, we can’t do work normally? It seems that now it takes twice as much effort to get half the work done.

With a moving target, or in this case a halted and incomplete target, isolating the PIM mixes is difficult at best.

**Rocky Mountain Ramblings
The Denver Report**

by
Amanda Hopp, CBRE
Chief Engineer, CBC - Denver

Has anyone else been crazy busy since working from home? I don't know why, but I have. It's not emergencies and things like that. I think I am just trying to find things to do so I don't have to work from home.

Don't get me wrong. I feel more productive working from my home office. I don't have people constantly coming to me with minor issues that they could fix themselves. In fact, the calls have stopped and no discrepancy reports have been submitted. It's amazing when I am gone what others can accomplish on their own. I do my best to be sure all the equipment at the studio is in good shape. It helps prevent issues. I know not all issues can be prevented with maintenance, but most can.

I have found myself going to the various transmitter sites for different reasons. I have had some things on the to-do list for well over a year, and I decided this was the right time to get those done.

Working at the office for whatever reason, keeps me at the office. I have no desire, unless I need to, to go to the transmitter sites, and because of this, I don't go. Now the work that was on the list wasn't critical, but it still needed to get done. I have had some critical things come up and dealt with those issues as well. I really could get used to working from home on a more permanent basis if need be. I doubt that will happen but I can hope right?

KLTT Work

In April, at the KLTT site, I have wanted to redo the weatherstripping on the ATUs for a while. I also needed to replace the 25-year-old ATU locks so that all of our ATUs in Denver use the good ole RHO24 key.

I went to the site and began with tower 4. It was probably the most difficult tower to deal with. The weatherstripping was probably original to the unit (1995). I was able to scrape it off, then use some Goo Gone to really clean it up and then used Formula 409 to get the slime off.

Replacing the locks wasn't any big deal. I

made my way to each tower and what I found was that tower 4 was the one that needed all the weatherstripping replaced. The other three towers

had minor work that needed to be done. A piece here and there that was falling off got replaced. That helped save the amount of weatherstripping we used, which was a good thing I found out.

I also cleaned up the ATUs some. Did some checks around each tower to make sure all looked good. The only issue we found was at tower 1. The ground strap at the tower base was cut, two braids from the

Austin ring transformer were off, and the strap that goes from the tower to the ATU had been arcing to the ATU stand, causing damage to the strap.

We had to work with station staff to find a time we could take the station off air to do the repair work. Tower #1 is the high-power tower in the array, with over 27 kW present, so there was no way we could work around the tower with the station on at full power. They gave us a window of about thirty minutes to do the work.

We arrived early and did whatever work we could, safely, before having to turn it off, then once it was off, we got to the other stuff. It took some work, but we were finally able to get strap replaced/patched and braids tacked back on. I was very pleased this was the only tower with an issue.

Updates

I decided this would be the perfect time to update firmware on various pieces of equipment. My first attempt was on our WorldCast Horizon NextGen CODECs. Of course, it didn't go as planned. I honestly don't know why I tried those. It seems I almost always have an issue when updating them. In the process of trying to update, I found out our backup audio to one of the transmitter sites wasn't working. More on that later.

The KLTT Nautel NX50 was due for an update, and for this particular update, we needed a new CF card. Well, not necessarily a new one, but in order to be sure we could go back to the old version





This strap originally crossed over the top of the angle-iron ATU stand frame member, but over time, it had been arcing and nearly severed the strap. We cut out the damaged section and routed it beneath the stand.

if things went wrong, I had actually kept three spare cards from past upgrades.

On the evening I went out to the site to do the update, I found it just wouldn't work. One card wouldn't even boot up. The next one I tried did it did the update and then it gave me a 0404 Page Not Found error.



This strap was damaged by the weed whacker, which has a blade on it. We cut out the damage and patched it.

I went home and re-downloaded the image file, which you should do before burning any of Nautel's images, and put it on all three cards. Back out at the site the next day, one card failed to do anything. Thankfully the second card worked. The update didn't take long at all and we were up and running in about fifteen minutes.

We have been working with Nautel a bit,

and they have some reasons why the others weren't working. I am fairly certain one of our cards was corrupt. I remember that happening last time we tried an update. The other card I am not sure about, but I decided, in order to avoid any confusion in the future, to throw those two cards away. I kept the old version we updated from and the next time we do an update, I will burn that card or I will just go buy another one.

I also made sure all of our networked Inovonics mod monitors were up to date. Those are fairly easy to update. These included the 531N and 525N. I have one up at our Lookout Mountain site but haven't gone up there yet to do it.

I do wish, with one of these updates, they would make it so you can do future updates from a web browser. I get that things happen during updates, but for us, these aren't critical to what's on air. Yes, I want to be able to log in and look at things, but if it were to fail for whatever reason, we'd survive it for a time. There's just a lot to be said about not having to drive 25 miles to the unit itself and put it into a firmware update mode.

I have also found that the Omnia 9 audio processors can be updated, but we aren't sure if we will do those. Those are critical to our operation. I would also like to still get the Horizons updated, but I tried the update on two different units and both times the update crashed. Something wrong there.

Backup Audio

As mentioned earlier, when I went to do the Horizon update at the Ruby Hill site, I didn't even think to manually switch the audio over to our backup. I figured it should be working and would automatically switch. Boy, was I wrong! Instead I took the station down for a bit because after the initial update try, the Horizon wouldn't come back up (grrr).

This got me to looking at all our backup links, all of which are Barix Extreamer 1000s on IP circuits. One unit needed a reboot before it started working again. And this particular one that I found during the Horizon update attempt was just weird. I still don't know exactly what happened. We have the audio going over one port, it had been working. We think when we got our internet upgraded to a better speed at the office that somehow it blocked that port. After messing around with it for a while and getting nowhere, I decided to try a different port. As soon as I made that change, it came back up!

What all this has taught me is I should look on a weekly basis at all our links to be sure all are okay. The last thing I want is to need that backup

audio in the middle of a storm or something and have to be digging into it.

New Light at KLTT

Last year, my husband built a new awning for the front door at the KLTT site. The one that had been there was old, and in a storm, finally gave out and was damaged beyond repair. The new awning



The new 3,000 lumen LED security light at KLTT.

was done in such a wonderful way, covering a good area right over the door, that it also blocked the light from the security light that was above it a bit. That light still does a good job lighting up the area in front of the building, just not the door itself. I decided to purchase a 3,000 lumen LED security light and mount it under the awning.

It took some time to install it, with a serpentine conduit run and some holes in the concrete block for the conduit and mounting the unit. I logged into our security camera that night and found it was working great, giving us a great view of our door. It will make it so much nicer when I have to make those nighttime trips to the site. I'll be able to see to get my key in the deadbolt! And I hope it will be a significant deterrent to thieves. Wouldn't want someone to spot you trying to pry a door open.

Occupied Bandwidth

Another thing I had forgotten about in all the COVID-hoopla was the occupied bandwidth measurements for two of our stations. The KLDC one was actually due in March and KLZ was due in April. Of course, March got away from me. It wasn't until Todd Stickler asked about getting the analyzer shipped to him that I remembered. So I immediately went to the office to pick it up so I could get my measurements done before sending it off.

I am now up to date on everything and I have been working to stay caught up. Again, working from home is actually making this all easier.

KLZV-FM Interference

I'm not sure if I wrote about this last year or not. Back when my dad was in the hospital, I got a call from an FAA contract engineer. The guy was

truly a piece of work, but I won't focus on that. We found that the FM transmitter was putting out spurious emissions onto one of the Denver approach control frequencies. Not a good thing at all.

I went out and tried to find the issue. At times I thought I did find the issue. I had the spectrum analyzer out and could see it happening. I'd unplug this cable and it'd go away. I thought it was one piece of equipment. While I was on the phone with my dad letting him know what I found (more than ten minutes later), the issue came back. Okay, so it wasn't that piece of equipment.



The front door is now well lit at night.

Not being able to find a definite cause, I started lowering power. I went down in increments and found a power that would work, about 85% of normal. We did an STA on it and, once again, time got away from us. We turned it back to full power to see if the problem was still there, and it ran okay for some time before the FAA called my dad. Thankfully this time it was actually someone from the FAA, not some jerk contractor working on behalf of them.

We were able to go out and look into things again and concluded that the issue is with the transmitter. We pulled it out and took it over to KLTT (because we have a big air compressor and it's not far) to clean it out really well. We checked all the hardware and found a screw securing a MOSFET to the heat sink loose. Our guess is that this maybe even came from the factory loose and over time, not having a good heat sink was damaged.

We have a trouble ticket open with BW Broadcast, but their factory and repair facility are

closed until the pandemic is over. For now, we will operate under a new STA at lower power until we can get this fixed.

Coming Up

I think this year will become even busier as I hear the Wheatstone upgrades that we had scheduled for next year will now take place this year. Whether we do it this year or next, I do look forward to having an up-to-date fully-integrated system with AoIP throughout. I look forward to cleaning up the wiring and just making things look great, not that they don't already look great. There's just something about all this new Wheatnet stuff that gets me excited.

Spring is here, and our sites are beginning to grow up with weeds. I am thinking about spending more time at the sites helping with the maintenance by mowing when needed. We need and have ordered a new fuel pump for our John Deere riding mower, but it has been delayed due to COVID-19. I do have

our Kubota I can ride around in and mow with. I plan on using the bucket on the front to flatten as many prairie dog mounds as I can. At some of the sites, those little jerks build the mounds high. It does make it difficult when you are going to the towers having to avoid them. Sometimes, when they build them right in the middle of the road, I'm unable to. But flattening them will at least keep the inactive holes flat with only the active ones coming back up. Plus it's fun to do.

Only time will tell what May will bring. As of right now, we are still on lockdown until May 8. I don't know if Tri-County Health will lift that for us or not. Governor Polis has already unlocked the state with a "Safer at Home" order. It essentially opens the state back up in phases. But many counties have decided to extend their stay-at-home orders. I am fine with whatever, as I will just continue working from the sites and from home.

I pray you all stay safe and stay well!

The Local Oscillator
May 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, 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

KLVZ • Denver, CO
810 kHz/94.3/95.3 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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