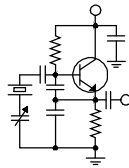


# The Local Oscillator



## *The Newsletter of Crawford Broadcasting Company Corporate Engineering*

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### **Granted!**

It took all of fourteen working days for the FCC to grant the five translator applications we filed on opening day of the second AM translator window (July 29)! We got grants on all our applications on August 18.

Starting on Monday, August 1, I began closely watching the FCC's CDBS database for any mutually exclusive (MX) filings. I have a crawler program that does this for me, and I was watching its output every day for the next five, but nothing showed up. No one filed any application that were MX to our five. That was great news!

Then I began anticipating grants, and I watched the grants progressing through the sequential file numbers. All the filings that day had the file number 20160729 followed by a sequential three-letter suffix. The first application filed that day had the suffix AAA. Our five applications were, in sequence, ABU-ABY, so we were presumably numbers 47-51 in the processing line. It was fairly easy to watch as applications higher in the queue were granted or dismissed, so I was anticipating the grants on the day they were made.

We are still waiting on the FCC to grant the transfer applications on two of the five translators. We can't build out the CPs until we actually own the translators. At press time we have received transfer consent and closed on three, including K261EO, which will become K266BP when we put it on the air for KLVZ; K266BP, which will become K236CQ for KLTT; and K260CK, which will become K234CV for KCBC. The other two translator purchases are in the queue and we should close on all of them this month.

There is still one translator application that has not been granted, the one for KNSN in San Diego, filed in the first window. That one got hung up on international coordination with Mexico. Last

month, we agreed to accept a conditional grant on that one, and we anticipate a grant any day now.

Equipment has been ordered for all the five new translators, and indeed it has already started arriving. The antennas, transmission lines and equipment cabinets will take the longest (antennas won't ship until the end of this month). We hope to get all five translators on the air in October and November, certainly before winter weather sets in. Some of these FM signals figure heavily into our programming and marketing plans and we will prioritize accordingly.

### **Network Challenges**

I remember, somewhat fondly, the days of yore when Studio-Transmitter Links (STLs) were simple. When you needed a link between studio and transmitter site (or vice-versa), you would pick up the phone (no email in those days), call the local volunteer frequency coordinator and get a frequency to use from him or her. Then you'd put up a couple of grid dishes or paraflectors, fire up the transmitter and tweak everything in. For a mono audio link, you could get by with a couple of hundred microvolts, so even if you were skimming terrain or shooting through trees, such a link would often work. You could operate for 720 hours without FCC authority on a non-interference basis while awaiting grant of your application.

Those days are long gone. All links, even (relatively) narrowband 950 MHz STLs and ICRs, require Part 101 PCN coordination, which takes a while and costs some money.

Also gone for the most part are the days when a narrowband 950 MHz link was adequate for a remote transmitter site link. Today we need a significant amount of data bandwidth and throughput. Audio is transported using codecs, remote control of transmitters and other equipment uses web engines

and Ethernet connections. And of course we're also transporting RDS, PSD and other data to our sites & even translators often transmit RDS (all of ours do).

Most of our new translators are collocated with existing CBC transmitter facilities & all but one, Lookout Mountain in Denver. It is that site where we have had the greatest challenges in terms of getting a reliable Ethernet path, one that will sustain dropout-free audio and provide for all the R/C, RDS and other functions.

We started out at the site with a simple 30 MBPS cable internet feed from Comcast. That worked okay, but would on occasion drop packets. The Worldcast IP Codecs we were using on that path (so that we could do a multi-unicast from our existing studio codecs) do not have forward error correction, so dropped packets equated to audio dropouts. Sometimes there were sufficient dropped packets that the audio was hard to listen to, and sometimes the feed was lost altogether.

To deal with the dropout and audio loss issue, we installed an internet T1 with QOS at the site and used the SureStream feature of the Worldcast codecs to provide separate, disparate-path internet feeds to the two Ethernet jacks on each codec. That worked as advertised, as long as both Comcast cable internet circuits at the studio were behaving themselves, but that T1 is pricey, some \$500+ per month. Obviously I would like that expense to go away.

Which brings us back to the idea of an STL of some sort. Our Denver facility uses licensed 11 GHz Part 101 links to three of the AM sites, and we have access to the rooftop on our studio high-rise, so that's a natural direction for us to look for a link to Lookout Mountain.

Last month, I did a frequency search and found an 11 GHz pair that will work. We have since started the PCN coordination process, and that will wrap up early this month. I will then file the FCC application for the link.

That link will get us 47 MBPS of data bandwidth to the site, which will be plenty. I would plan to keep the Comcast service as a backup (it's relatively cheap). The microwave link will allow us to put everything at the site on the studio network. We plan to use a Trango Apex Lynx for this link.

In the meantime, our good friend and telco vendor Steve Solton (Convergence Solutions) helped us get a VPN tunnel working over the Comcast ISP, putting everything of ours at the site behind our firewall and on our network. Stephen Poole and Todd Dixon were also instrumental in helping us get this working.

This allowed us to put a pair of Barix Exstreamers at the Lookout Mountain site. Using the MP3 coder, we get dropout free audio to the analog inputs of the Omnia ONE-FM processors that we can switch to if we get too many dropouts on the internet feeds to the site.

The VPN tunnel also allowed us to put an Avaya phone set up at the site. Mobile service is terrible up there, the result of all the RF from FM, TV, wireless and no telling what else plus the location of the site outside (above) the coverage lobes of any LTE sites. You can make a mobile call if you stand in just the right place, hold the phone just right and *don't move*. Of course no one else at the site can move, either, once you've found the one spot where you can make a call.

The Avaya phone gives us clear, reliable (as reliable as the Comcast IP service, anyway) phone service at the site. A login is required to use the phone for anything but 911, so we don't have to worry about other site users running up a big phone bill (we have unlimited nationwide LD, anyway, but still). That 911 service is important. One local engineer had a heart attack while working alone at that site last spring and had to drag himself down the hill to a nearby house to get help. He made it and is doing okay now, but it could have been a very different outcome.

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

Hello to all from Western New York! Where did the time go? Labor Day is almost here, and in the Northeast, Labor Day signifies an end to summer and the beginning of preparing for the long winter months. Winter can start as early as mid-October, so that means that we have only six weeks or so to get everything ready for the long, cold winter season.

Our cap-ex projects are nearing completion. The only item remaining is the painting of the WDCX-FM 425-foot broadcast tower. Don Boye of Western Antenna & Tower has begun treating the tower members with rust preventative and performing a thorough inspection prior to painting.

We had an old 7/8-inch Heliac cable on this tower for a number of years that was not being used, so Don removed it while he was preparing the steel to accept paint. This old feedline was installed by a previous engineer for some two-way communication antennas, and when he left, he simply cut the line and removed the antenna, leaving the line on the tower.

By the time this issue reaches the virtual presses, Don will have begun painting, and hopefully the weather will hold out so he can get this project done in a few more days.

The other projects we had been working on the past few months have been completed. Regency Fence Company of Rochester was contracted to replace all of our tower fencing at the WDCX(AM) tower site in Clarkson, New York. The old fencing was installed in 2002, made of wood, and was deteriorating badly. It was hard to keep up with the maintenance to keep the enclosures secured; there was always something in need of repair or replacing. The new fences are chain-link, with galvanized posts and heavy duty gates, so they should last 20 years or so.

Murray Roofing did a stand-up job in replacing the decaying, leaky roof at the WDCZ transmitter site in Hamburg, New York. We knew

when we purchased this station several years ago that at some point the roof was in need of replacement. I had patched several areas that were leaking last year,

but those patches were beginning to leak again, so replacement was inevitable. The new, rubber membrane roof looks great, and comes with a 20-year warranty, so I guess I will not have to worry about roof replacement at this site again!

During the winter months, I can begin to take care of the water damage to the ceiling at WDCZ due to the leaky roof. Many of the

ceiling tiles are water-soaked and unsightly. There are a number of florescent light fixtures that no longer work due to water damage, so I plan on fixing/replacing those as needed. We were indeed fortunate that all of the areas that were leaking were no where near any of the broadcast equipment. It's no fun trying to keep transmitters and rack equipment dry from leaky ceilings.

As in much of the country this year, we here in Buffalo and Rochester have seen unseasonably high temperatures, with little or no rain. These conditions have been hard on the local farming communities; the lack of rain has caused many crops to die or significantly reduced crop yields. Many folks don't realize the amount of farming that occurs in Western New York. Most hear "New York" and think of endless miles of concrete, asphalt and tall buildings.

The majority of the farms in this area grow corn, wheat and soybeans, but even larger portions are grape farmers, producing grapes for wine making and preserves. I'm told that some of the best red wines come from grapes harvested from Western New York. Driving down the New York State thruway towards Ohio, you will pass miles and miles of grape farms alongside the highway, stretching as far as the eye can see. Here you will find some of the plumpest, juiciest grapes you will ever taste. Harvesting is still done by hand in most of the farms,



and I'm sure that picking the grapes in the hot sun is definitely not pleasant work.

I got a little off-track talking about the grape harvesting; I intended to comment on the lack of rain and high temperatures causing our transmitter fields to basically dry up! Most of the growth has turned to straw, and once cut, it is not growing back very fast at all. This is good in the fact that I have not had to spend a lot of time mowing this year. At each AM transmitter site, only one cut has been needed. As we head into the fall season, depending on how much rain we receive, I believe only one more cut will be needed to keep the fields at a manageable level.

Performing my quarterly tower inspection recently at the WDCZ transmitter site, I noticed that the beacons were flashing at a very slow rate on towers 3 and 4. There would be approximately six to eight seconds between flashes, so I called in my tower guy to investigate the cause. Some of the towers in this 5-tower array were still using the old motorized flashers, while others were replaced with solid-state flashers.

Don checked out the flashers in question and found that RF was getting into the solid state flashers, retarding the flash rate. If we turned the power to the towers down to about 2 kW or so, the flash rate would increase to normal rate. I ordered several non-polarized capacitors to bypass the RF, and Don installed them on the input and output of each relay. That did the trick -- now all are flashing at an acceptable rate.

Recently, while performing my weekly maintenance at the WDCX-FM transmitter site, I attempted to turn on my auxiliary transmitter for testing, as I do each and every month to insure that it is working properly, and found that the tube had gone bad. There were no indications last month when I exercised the transmitter that a tube failure was impending. Everything looked normal, so I ran it for about 20 minutes into the dummy load and shut it down until needed.

In the past couple of years, I have had some bad experiences with rebuilt tubes from Econco, and decided to purchase a new National tube from Richardson Electronics. Last year, after receiving three bad rebuilds from Econco for the Continental transmitter in Rochester, I tried a National tube, and it has been performing great! It was easy to tune up, and readings were nearly identical to those noted at the factory. So it was no hard choice to decide that National was the way to go for the Buffalo Continental back-up transmitter.

After receiving the tube, I installed it, and

like the Rochester installation, it tuned up very nicely, although I had to re-tap the screen transformer to get the screen voltage up to make 100% power. After the transmitter was up and running for about 10 minutes, the screen voltage and current began to jump up and down, and the reflected power from the PA grid was increasing rapidly. I shut the transmitter down, did a thorough inspection for any loose connections, tube socket damage and such, and after finding nothing, tried to bring the transmitter back up. Again, I got same symptoms as before! A replacement tube has been ordered, and next month I'll fill you in on how that installation played out.

At about 8:30 PM on Saturday, August 20th, I received a call from the board operator at WDCX(AM) in Rochester that the readings on the night array were way off. The pattern change occurs at precisely 8:30, so the board operator was right on top of the issue, realizing that something was wrong and calling me immediately. I dialed into the remote control and found that the antenna array was in night mode, however the readings were those you would find with the system in day mode! I shut down the transmitter and headed out to investigate the issue.

Upon arriving at the transmitter site, I immediately noticed that the A/C was down, and the temperature inside the building was about 95 degrees. I kept the door open to help circulate some of the heat out while I investigated the network issue. The only thing I could find was that the day/night contactor had switched at 8:30, but the transmitter did not switch into low power mode. We had several big thunderstorms roll through the area hours earlier, so I assumed that lightning had played a role in this occurrence.

I got everything synchronized and turned my attention towards the non-working air conditioning unit. I recycled the power on the unit, but it would not come up. A quick look into the relay controller box inside the building revealed nothing, so I headed outside to the rear of the building where the main A/C unit is located. I opened up the electrical panel and immediately smelled something burning, but could not see from where the smell was coming. I phoned our HVAC guy, and he had me check a few things, but the air conditioner was not coming up tonight. I scheduled a service call for Monday, as the weather reports were calling for somewhat cooler temperatures on Sunday. Weekend rates are too high, and as we do not have any high power equipment at this location that puts out enormous amounts of heat, I felt that the repair visit could wait until Monday.

After the repairman arrived, he found that the low voltage transformer took a hit. He suspects

lightning due to the way in which it was burned. After replacing the defective transformer and checking out the remainder of the system, the A/C was back up and cooling properly. We use Bard self-contained A/C units in all of our transmitter buildings except for WDCZ, and have found them to be very reliable. The only issue with them is you have to keep the condensing coils clean and clog-free, and depending on whether you keep the air intake filters

changed on a regular basis, aside from the occasional lightning hit or during cottonwood season, they sit there and do their thing, keeping everything cool and happy!

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

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**The Motown Update**  
by  
**Joseph M. Huk, Jr.**  
**P.E., CPBE, CBNT**  
**Chief Engineer, CBC – Detroit**

**Revival Detroit WMUZ Summer Picnic and Remote**

In August, we gave back to the community. The Crawford Broadcasting Company's Detroit cluster's studio facilities reside in the city of Detroit. The neighborhood around the facility is going through a renaissance. Our company is involved in purchasing land and properties in our neighborhood for the purposes of revitalization. Houses beyond repair are being taken down, and parks are taking their place. Homes that are in need of repair are being refurbished and rented out or sold to families in need. Communities are being brought together with a renewed spirit of hope. Tim Creran, our community liaison and construction manager, is in charge of this initiative. He continues to bring the community together and strengthen ties between the businesses and the neighborhood.

One focal point of this movement is the annual WMUZ Detroit Revival Picnic. This year was the second anniversary of this annual event. Neighbors, friends, church members, and pastors are all invited to enjoy music, food, drink, and fellowship.

This year there were a couple of additional activities that were included at the event. Our gospel station, WEXL-AM, broadcast live from our park in front of the station. Pastor Damon Mosley presided over the broadcast activities. Normally, he does his show in our studio on Saturday mornings, but he enjoyed the food, fun, and interviews with dignitaries that attended the picnic, under the tent. We also were

joined by Be-Moor Radio ([www.bemoorradio.com](http://www.bemoorradio.com)), an all internet radio station, appealing to the youth within the community. Its format is hip-hop and prides itself on a clean variety of music. They used a laptop computer with their stream encoder/automation play-out software to conduct their broadcast live under the tent with WEXL-AM.

Last, in addition to the broadcast activities, we enjoyed gospel music, gospel rap and poetry from a variety of local artists. Many thanks go out to our station coordinator, Alison Anolick, for a fine job in organizing the many components that make up this complex event. A special thanks goes out to Vito Faletti, Brandon Woods, and Steve Cuchetti, for helping me with the setup and security of the broadcast and public address equipment.



**Arc Touch Plus Burk Remote Control Finishing Touches**

This year, as part of our system improvements, we are replacing our old GSC 3000 and ARC-16 legacy remote controls with the new ARC Plus Touch systems. We took the option of keeping our status, command, and metering peripherals and using their IP Plus GSC or IP8 X adaptors. The only issue that I have noticed is with a situation where we are retrofitting a legacy ARC-16. If you desire a continuously latching closure to control something in your plant, you are limited by the feature set of the legacy product. The ARC-16 did not have that functionality. This is easily corrected by adding your own latching relay and

programming a momentary contact on the Burk ARC Touch Plus. You would not have this limitation with retrofitting the GSC3000, since you already have the functionality with this product.

I have retrofitted our WMUZ-FM and WRDT(AM) sites with the new ARC Touch Plus systems. The last facility is our nighttime only WRDT-AM facility, at the Motower transmitter site we rent from Greater Media. Our audio, telemetry, and control is connected via a T1. A QEI CAT-Link provides the encoding and decoding from and to the T1. A set of modems provide a very small data pipe for the remote control.

With the GSC 3000 and its web interface, we had no issues with acquiring telemetry and

control from the Motower site. What we found was that the GSC3000 web interface is not compatible with the new ARC Plus Touch system. I spoke with Miguel at Burk in regards to the issue. He advised me to obtain two Burk SL-1 devices. These devices extend your LAN over a serial RS232 connection. With those, you could communicate with any IP device at that location, provided it does not require much bandwidth. Right now I am working on fine tuning the SL-1 link. Next month I will let you know the outcome.

Until next time, be safe, and if all goes well, we'll be reporting to you from the pages of *The Local Oscillator* next month. Best regards.

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

Ah, another month, another heat wave with storms. Fortunately, they haven't been too bad (and thank the Lord, as I write this, it looks like tropical depression 9 is going to stay away from us), but we've been busy nonetheless.

Poor Sandy has one medical issue after another, and I appreciate your prayers. As for me, my only big complaint is that my vision gets worse all the time. I'm going to end up getting tri-hextra-mega-focals so that I don't have to take my glasses on and off just to do my job!

**Generator Control**

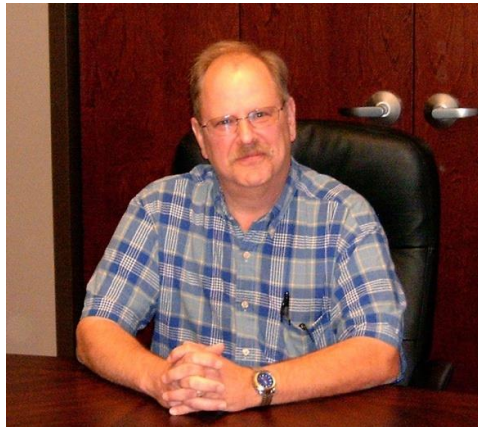
After the meltdown with the studio power failure several weeks ago, I spent quite some time looking over our generator at the studios. The fact that it failed to start when we lost two phases plainly spooked me. That shouldn't have happened.

We hired Taylor Power Systems to come service the generator set and to look at the controller. The tech changed the oil, checked the fluids and did the usual static tests, then looked at controller in engineering. "Ah. The problem with these types is they only check two phases out of three, and as long as they see a voltage, they're going to be happy."

Ah, indeed. That explained our problem. We lost two phases, but a phantom voltage through another phase was enough to confuse the controller, so the generator never cranked. To help address this, we did two things: placed a manual must crank switch in reach of our staff, and added a better phase-loss detector.

We first did the manual switch so that our staff could force the generator to run if all else failed. This should be a simple matter; most generators have an input to force a start and switchover. There's even a name for this on ours: "peak shed," i.e., the idea that you can actually save money during peak demand hours by moving some of your load from the utility to the generator. The manual said that there was a "peak shed" input provided, but it didn't work. This is a programmable function and apparently, our generator wasn't programmed. Yay.

The simplest solution was to simply break one leg of the three utility phases ourselves with a relay. I rigged it up with a 24V supply and even included an indicator light so that the staff could tell when the generator was running (see figure 1). Worked like a champ. Now, if all else fails, they can





run into the front room of the engineering area and flip the switch up.



**Figure 1 - Manual switch to force generator operation.**

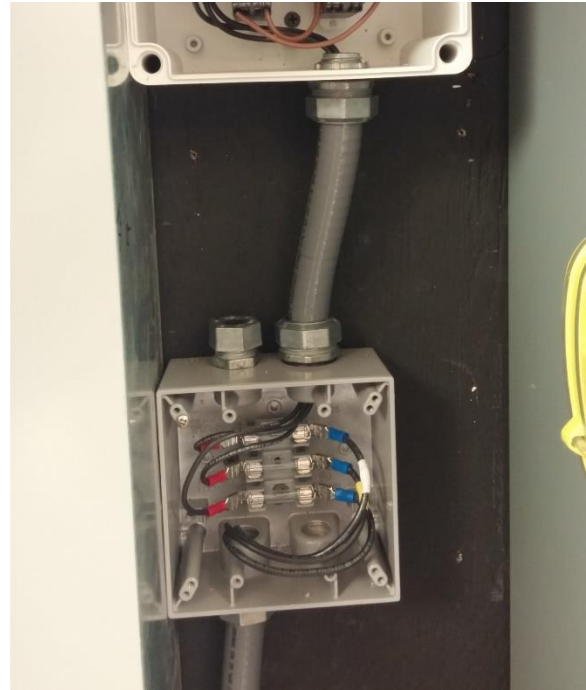
Then done, I turned to building a more accurate phase-loss detector. Simply looking at levels wasn't good enough; I wanted something more sophisticated. Poring through the available units at Digikey and Mouser, I finally settled on the Omron K8DT series. These don't just watch levels; they also check *phase rotation*.

You're probably already familiar with this if you've ever wired up a large 3-phase blower. If you get the phases out of order, it will run *backwards*. The K8DT that we purchased watches for this, too. If I should lose a phase, even if we have a "phantom" voltage ghosting back in on one of the lines, it wouldn't be in the correct phase relationship, causing the relay to trip. ó

I've mentioned this before, too many times to count: our utility is notorious for giving us repeated, rapid power glitches ó off, on, off, on, several times in the space of a few seconds. The existing controller waits about .5 seconds before cranking the generator; I want it to take over anytime the power is flickering. The K8DT will respond in about .1 seconds. To "stretch" this out, I added an Omron H3DT-type "on-delay" relay, set for 15 seconds of delay. This way, the first glitch will start the generator, and the extra 15 seconds of timeout will help prevent our simple-minded, one-eyed generator controller from becoming confused.

We want things to look nice, of course, so I

put the fuses for the phase detector in a small metal box, then mounted the relays above it in a plastic box with a clear cover (figures 2 and 3). This protects against fingers poking into voltages and meets code. We can see the indicators on the relays and adjusting them as needed will be easy.



**Figure 2 - Fuses for the phase detector.**



**Figure 3 - The finished phase detector in operation.**

I've had people ask why I'd use relays for this type of thing. After all, there are other options, from a simple 555 timer circuit to a microcontroller. Hey, I've built quite a few 555 circuits in my day (there are several doing their jobs here in Alabama as you read this). But there are several reasons I'd go with relays. First, I'm dealing with high voltages (this

is a 480V circuit), and I feel better with an old-fashioned relay. Second, by the time you add in the cost of the power supply, the relays aren't much more expensive. Third and finally, they're simple, more resistant to power surges and very easy to set up.

As for the microcontroller, that may indeed be the preferred option in the years to come. Prices continue to crash on them, and industrial-quality controllers can be had now for less than \$100. You'd have to program it, but that has been very much simplified on the newer units as well.

But at the end of the day, it was my choice, and I decided to go with nice, reliable relays if at least for now. Call me a dinosaur, but hey, it works.

### Translators!

We've already installed one translator here in Birmingham, 95.3 for WYDE(AM). It's up and running, though we may want to increase the antenna height to help clear the trees in its service area. We're looking at that for the future.

Cris has managed to secure another translator, this one for WXJC(AM). The antenna for this one will be mounted on WYDE's tower in downtown Birmingham, and will do a fabulous job for us, especially at night. We deliberately chose a pattern that would complement WXJC-FM, which already simulcasts WXJC but is located 20-30 miles northwest of Birmingham. It's another win-win: we have WXJC-FM, WXJC(AM) (50kW), and now this translator to fill in the holes.

Our big problem, as usual, is finding a good tower crew. Tower Maintenance Corporation, which does decent work at a rational price, is tied up now through November. I mentioned Grandpa and his grandson/stepson/[insert guess here] in the previous issue of the *Oscillator*; needless to say, they're out as well. I sent a request to a crew in Oklahoma and have yet to hear back from them.

At the end of the day, we may end up using Wireless Infrastructure from California again. That invariably costs more, because we have to pay their travel expenses. But they do such good work, it might be worth it in the long run. After how badly we've been burned by shoddy tower work over the years, we tend to be a bit skittish.

### The Magic Yagi!

I mentioned above that WXJC(AM) (850) and WXJC-FM (92.5) normally simulcast. This would make 92.5 a perfect backup  $\delta$ STL feed to 850 if something happened. To that end, I purchased a 4-element Stellar Labs FM Yagi antenna from MCM Electronics a few weeks ago. They're ridiculously

cheap, less than \$30. We already use one here at the studios for our off-air receivers, including the new GoldenEagle.

It's not perfect. You get precisely \$25 worth of antenna; keep that in mind. For really critical applications, we would no doubt go with something like a  $\delta$ pro yagi from Scala (such as we did for 101.1 in Cullman a few years ago). With the Stellar Labs, the front to back ratio isn't very good and the gain in the forward direction is only modest. On the other hand, the side rejection is excellent.

All in all, for the price, if you need a quick and dirty FM antenna to pick up an off-air signal, it's hard to beat. The MCM stock number is 30-2460. They have some other inexpensive antennas that look interesting, too.

Well, over this past weekend, we had another one of those low probability scenarios (I seem to attract them like a dumpster draws flies). 850's main STL has been down for a while waiting for a tower crew. The backup 950 MHz STL became noisy, probably because of the horrible humidity.



**Figure 4 - Temporary mount using hose clamps and tape, but it works!**

Our procedure in that case is to use WDJC's HD2 as an emergency feed. The problem was, 101's main STL was also down, so it was already using



WDJC's HD2. We have leased the HD3, as mentioned in the previous issue, so that's no longer an option. Therefore, I figured it was time to get the Stellar Labs into the wind, so to speak.

By that time, it was getting dark and I didn't feel like winning a Darwin award by trying to mount the antenna on the roof of the transmitter building. I pulled a 10-foot length of stiff PVC pipe from the building, along with some hose clamps (and of

course!) electrical tape (can't run a transmitter site without that!). The hose clamps let me secure the pipe to the big pad-mounted transformer out front and the tape kept the coax from flopping around in the wind.

That's engineering, ain't it? Of course, we're going to move it to a more secure mount on the roof of the transmitter building, but for now, you can admire the work (Figure 4).

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

It's been a little over a month since we had that lightning strike at our studio that caused so much damage. For the most part, we are back to business as usual, having replaced and or repaired the affected systems.

One of the things I found to be a challenge during this time was actually knowing everything that was damaged. Often times we found that we repaired or replaced one piece of equipment only to find that another piece of equipment downstream was not working. Unfortunately, you wouldn't know that until you replace the equipment upstream. So, just when you think you're getting somewhere, you still have another piece of the puzzle missing.

One example of this was the system we used to monitor the AM stations that we are assigned for EAS purposes. We have three stations that are either LP-1 one or LP-2 assignments. After the lightning strike, we found that all three tuners were ready for scrap. They were older, off-the-shelf variety tuners, so they weren't worth investing money and effort to repair.

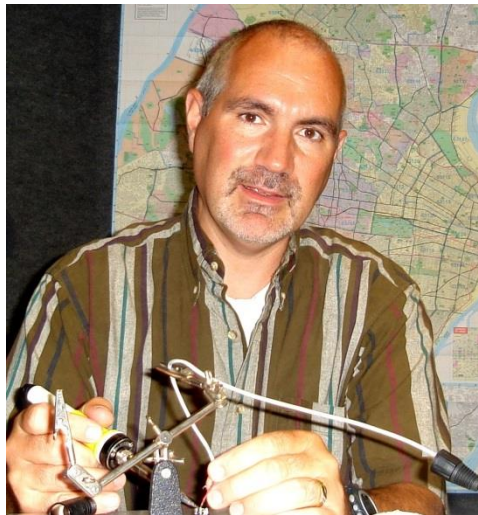
We purchased new Inovonics AM monitors to replace them, and once they were installed and attached to our AM active antenna, we mainly received static. Obviously, the antenna system also had an issue. This made sense, because the antenna is mounted to the STL tower that was hit by the lightning strike. I was worried that this might be the case.

The AM antenna is an approximately 20-year old, Belar AM loop antenna with the amplifier. I checked the cables and power supply and they were good, so it really only left the amplifier board in the actual antenna. I ordered a replacement board and that got us up and running again. It was just one example of finding another culprit hiding behind other damaged components.

We have had a few other experiences like this with other systems. For one of our Trango Apex microwave radios, located on the same tower, I found the power supply was bad. When that was replaced, I immediately learned that the power-over-ethernet inserter (PoE) attached to the power supply was bad. After replacing the PoE if you guessed it the radio on the tower was also bad. So we chased our tails on that for a while on that one.

For the most part, we are through with replacing the affected equipment. We do have a few lower priority items that still need attention, like video distribution equipment and monitors for security cameras. I am turning my attention to improving the prevention of such a strike happening again.

I was on vacation the day that the lightning strike occurred, so I can only go by what the witnesses told me. Most of them are convinced it was a strike on the actual tower, and I have been told that were actually as many as three or four hits in succession, which probably means the facility was hit



in several spots.

My belief is that the worst damage came through our ISP's cable. Their modem was completely fried, and we have several pieces of equipment attached to it that were destroyed. On examining the cable entry, there is no ground block like you would expect to see on your typical installation. We asked them to come out and put a ground block in place. We were told that it is grounded at the utility pole and that's all they need to do. So, the next step is to do it ourselves. But there are some challenges to this as the entry point to the building for the cable is well away from any other of the station grounding. Having separate grounds is not usually good practice.

I am also looking at the parking lot entrance gate. We know this has been struck in the past, and I have reason to believe it might have happened again during this last strike. You would think having metal poles in the ground would be enough to protect this gate structure from sending a lightning charge into the building through the wiring, but we know it has

happened in the past. We probably need to add some copper ground rods to help keep it from being a lightning conductor to the building.

I'm sure that we will discover more areas where we can improve the facility protection as we keep trying to find the vulnerabilities. One of the immediate finds that I made when I had a chance to catch my breath was a broken ground cable on the STL tower. We had this addressed as quickly as we could get someone with a cad welding kit here. The other two legs were grounded properly when the lightning strike hit that day. However, they were each attached to their own grounding rod. This meant that without the attachment to the one leg, the tower was not really grounded to the station ground. I am no expert on lightning, but I know that the lightning current was essentially finding the station ground through the antenna cabling rather than through the thick AWG #0 copper wire like it should have been through the broken connection. This probably was a contributor to the damage that occurred.

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

**Broadcast Engineer Credentials Program**

As Oregon local broadcasters near an agreement to keep local broadcast stations operating during an emergency, I would like to take a few minutes to review where we are. Someone once said a good place to start is at the beginning.

The events that underscored the need for broadcasters to do something in this regard were hurricanes Katrina and Sandy. Critical fuel supplies were confiscated or withdrawn, forcing broadcasters to leave the air, eliminating the vital link between responders and the public. Broadcast engineers were not able to keep broadcast stations on the air serving the public.

Across the nation, broadcasters set in motion legislation promoting protections for local broadcasters during a disaster. Oregon broadcasters were active early on to promote the needs of local broadcasters. In Portland, work began on local planning while in eastern and southern Oregon

broadcasters dealt with wildfire planning.

As interest grew and the Oregon legislative session neared, the Oregon Association of Broadcasters (OAB) stepped up with proposed

legislation to enable local broadcasters to serve our communities. We approached the state legislature because we needed a uniform, statewide program that would operate across local county boundaries. We also wanted a number of protections including a state-issued broadcaster credential.

Almost immediately, it was clear that any program which impacted state Office of Emergency Management (OEM) budgets would not fly. In the process, we didn't get everything we wanted, although we got much of what we need with legislation which mandated a credentials program. Ultimately, the legislature provided broadcasters with state legislation which enables a state-approved and recognized broadcast engineer credentials program.



It needs to be clear up front that neither the OAB nor the local SBE chapters have the resources to fund paid staff to operate the program. If engineers want the credential program to succeed, then we will need engineers across the state to step up and support the program as volunteers.

It should be mentioned that legislation supporting Oregon broadcasters is part of the state law governing the state's responsibility to prepare for and respond to disasters. While the program is founded upon the governor's disaster authority, OEM has been careful to involve local emergency managers in the process.

The program is not limited to the state level, and the success of the program depends upon local emergency managers playing a role in the program. Early on, we spoke at the Local Emergency Managers Update meeting, so local managers are aware of our efforts, and local managers have also attended our discussion meetings with OEM.

In initial discussions with the OEM, several items were identified as priorities. Branding and accountability were high on the list. We needed to clearly indicate how the committee was created, who was responsible, and what tasks were expected of the committee. The Memorandums of Understanding (MOUs) between the OAB and local SBE chapters provide that needed structure.

Bottom line, what does an engineer need to do: First, you need to demonstrate that you are a broadcast engineer. There are several ways to do this, ranging from professional certification to a designation by a local broadcast station. You will also need state issued ID and a recommendation which can be from your employer or another locally recognized engineer.

Emergency managers want to know that you

are familiar with emergency management procedures. Initially that is accomplished by taking and passing three courses that are free and available on line. Biannually, you need to report ongoing emergency and safety training that you have taken. It's worthwhile noting that you can double dip on training. For example, an IPWS training class is applicable to both ongoing SBE certification and credentials ongoing training.

Emergency managers are very concerned about individuals working inside an emergency or disaster area. For that reason, safety training is recognized as an ongoing training. Each engineer is expected to possess a minimum level of personal protective equipment.

Most importantly, because of the safety issues surrounding a disaster area, you will be expected to be on your best behavior. The expectations are outlined in a code of conduct.

One critical feature of the Oregon broadcast engineer credentialing program is that the program was developed as a collaborative process with both local and state emergency managers. Local broadcast engineers will be more effective when we work with incident commanders and emergency managers.

#### **Mt. Scott Tower Work**

This summer has been one with more distractions from nearby tower work. Most recent is upgrade work being done at the PGE tower just to the south of KKPZ. The work was done in an unusual manner by using a crane to hold the tower while sections of the tower were replaced.

Meanwhile, construction of the new KKPZ translator begins. Stay tuned as that project progresses!

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

Where Has the Time Gone??? That is always the question. Time just flies by, and for me it's even worse in August. I'm sure it's because we go on a weeklong vacation every year and summer is winding down. It was a fairly slow month work-wise because of that vacation and well, thankfully, there hasn't been much to do other than the routine.



**Antenna Installation**

The month did start with us receiving our brand new antenna for 100.7 FM. The antenna we had gave us some issues. Our signal didn't quite match up with what it was supposed to be. So we got a new one and had Derek Jackson from Today Works install it. It was quite an experience. This was all located on top of a section that was above the building at our Lookout Mountain site. It wasn't hundreds of feet in the air (unless you count the fact that the site is over 7,000 feet above sea level). We rigged the tower, and while Derek was up there, my dad and I were on the ground waiting. We would help lower the old antenna to the ground and then send up the new antenna along with some other needed items when Derek was ready for it. I have seen tower crews do this over the years, but I, of course, have never been able to help. Derek was able to get the antenna installed and now our signal matches up with the map. Because of interference, it's not as good as we would like, but unfortunately, we don't have much choice in the matter.

**New FMs**

I am excited that in Denver, we are getting two more FM translators. One is for 810 KLVZ and the other is for 670 KLTT. I think having all four of our stations on the FM dial will be great! It is good

to get the Good Word out there, and with younger generations staying on the FM side more often than not, perhaps some of them will tune to our stations and hear the Gospel and maybe even turn their life over to Christ. I just see endless possibilities with having four FM translators along with four AM stations.

Getting this all done will be a project, as we are installing these last two on the towers at the AM stations they belong to. It's going to take planning and work to get this going, but once it's done, I have no doubt it will all look and work great!



**One member of the "ground crew" for the KLZ-FM antenna installation on Lookout Mountain.**

**RDS and HD Radio**

Now that we have FM translators that transmit RDS, I needed a way to monitor the RDS data out in the real world. I know I can go into engineering at any time and look at it, but I am not there every day, and unless I'm going to spend hours and hours monitoring it, it becomes pointless. I've had an HD radio in my car for years for use with the



AMs. It allows me to flip over daily between our stations and make sure that what is airing is what is showing up in the title info. Because of this radio, I have found out easily and probably a lot sooner that the HD wasn't working, or even that the PSD wasn't going out at all in some cases.



**Tower worker and engineer Derek Jackson puts the finishing touches on the new KLZ-FM antenna installation.**

I had begun looking online for HD radios with RDS, and was finding very little. In fact, my searches turned up empty. I kept checking back week after week until I finally found something. I don't know if my searches weren't good enough or if maybe the products are just that new and some places hadn't received them yet. I found a Pioneer DEH-X8800BHS that had built-in HD and RDS. I ordered one for my car and one for my husband's car. We were both growing unhappy with the radios we had, so why not upgrade?

My car is always a pain as it came with a nice JBL sound system and steering wheel controls. I had to buy several different adaptors in order to get the radio to work with all that. With all those wires and adaptors, how I ever got the radio into the little hole where it belongs is beyond me. There are so many pieces and wires I just have to push the radio to where it goes, and while holding it in place put the screws in so it never moves again.

The radio itself is rather nice. There are some issues I have with it, but it's not necessarily Pioneer's fault. I am now able to monitor our four HD signals (currently three until we bring 810 AM back on air) as well as our two FM signals.

### Inventory

It's that time yet again. I don't mind doing inventory, as it refreshes my memory with where everything is. It gives me an updated list to look at when I do try to find things. The thing I'm not looking forward to this year is that I have some big projects I'm working on. As mentioned earlier, two more FM translators are coming and I also have servers coming in for replacement. While I can work on all that and do inventory, the hard part is keeping track of the new items while looking for all the old stuff. I have a few weeks to get this done and don't intend on it taking nearly that long.

### What's Next

We have a new server coming in from Dell that should be here soon. We are due to replace most if not all, of our servers this year. That includes the NexGen Firewall, NexGen file server, office and streaming firewalls, office file server, FTP server and who knows what else I'm missing, but as you can see, it's a lot!

The first one will be the most difficult as it is the NexGen file server. I am currently having our employees go through NexGen and clean house. Let's face it: it's easy to create show files, put the end/erase date to some ridiculous date in 2021 and just forget about it. Everyone will have to go through each file and make sure we need it. With one station having gone through a format change and the other one going to be changing formats soon before we bring it back on air, that's a lot of stuff we can delete.

We've had some other changes to one of our other stations and can also delete some of that library. We have a 2 TB hard drive that is over half full. When we had all four stations on air, two of those stations were music and we didn't even have it that full. I have no doubt that if people really look through files and everything else, we can get under the 1 TB mark, at least for now, in order to help with the transfer of everything to the new file server. We will see how soon we can get this server in place and operational.

That about does it for now, so until next time! that's all folks!!!



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The Local Oscillator  
September 2016

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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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