The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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"For to us a child is born, to us a son is given…"

As we enter this Advent season, we remember and celebrate the birth of that Child, that Son, a Savior who is Christ the Lord. By his coming, those that have walked in darkness have seen a Great Light, a thrill of hope, to borrow the lyrics to a familiar carol.

You won't get some watered-down, PC wish from me for pleasant holidays, although I do hope your season is bright. But you will get a sincere encouragement to meet and know that Great Light. Jesus didn't leave his throne in heaven and come to earth for the adventure. He came at immeasurable personal cost to save humanity from estrangement with God, and His invitation remains open today.

Do you know Him? If not, now is a good time to change that. If you don't know how, I'll be glad to tell you.

Year-End Projects

As we see the end of 2023 barreling down on us like a runaway train on a downhill slope, we're rushing to wrap up a few capital projects around the company. Why, you may ask, are we still dealing with such projects in December? The short answer is that everything takes much longer than it should in the post-COVID world.

The longer answer is that things have changed. Supply chain shortages and disruptions, particularly on big-ticket items, have made lead times that were once weeks into months or years. We ordered a new 30-ton rooftop HVAC unit for our Birmingham studios a few months ago and we don't expect delivery until sometime in 2025. Seriously. Even smaller, lower cost items take a long time due to materials and labor shortages.

No doubt the changes brought about by COVID have something to do with all that, but there is much more in play here, things that have their roots in events of 2020 and 2021. Every industry is having to adapt, and the broadcast industry is no exception.

In Detroit, we have a major FM control room renovation underway. That room hasn't seen much of anything except equipment replacement since I built it in 1991. Just for fun, I pulled the folder for that project and saw the mechanical drawings for the cabinets that were, until a couple of weeks ago, were still in place. I also saw the studio wiring diagrams that included cart machines – yes, cart machines! That really puts things in perspective.

That room is getting a complete interior remodel, complete with all new finishes and new studio cabinets. More on this from Mike Kernen in these pages. When all is complete, it will be a state-of-the-art control room that is ergonomically designed for the way it is used. It will complement the talk studio, which was renovated last year.

And we're still working on generator projects in a couple of markets. In Detroit, the new gas line is in, but the utility did not configure the feed as we asked, with a higher pressure feed to the generator and a lower pressure feed to the building. We're still waiting on them to get that corrected. The way it is now, the generator begins to starve for fuel (natural gas) at about 80 kW load.

We have a similar issue in Chicago at WPWX, where the fuel pressure drops to zero at about 88 kW. Apparently we need a different

regulator on the propane supply, and it's taking forever to get it.

At the FM transmitter site in Buffalo, the new 100 kW generator is in place but we're still waiting for delivery of the transfer switch. We still don't have word on when that will be shipped. We've been waiting a long time.

At that same site, after yet another very long wait, we got one of the HVAC units replaced last month. I'm glad to have that one checked off. Of course, it was installed in cool weather. Hopefully it will work right when we need it when warm weather returns this spring.

The Connected Car

Something I am working on is getting our stations, FM and AM, up and running with DTS Autostage and RadioDNS. These are two different "connected car" platforms that provide different display features, including station logo and metadata display, on connected cars. Between the two platforms, we will have quite a few auto brands covered, with more coming aboard with one or the other all the time.

What's in it for us? Essentially a bigger, more visible presence in the connected car dashboard. Many of you have connected cars and know that most stations, AM and FM, simply show up on the screen as a frequency. FM and HD stations transmitting RDS may have their callsign displayed, but that's it for the most part. These two platforms integrate over-the-air (OTA) and internet data to produce a much more prominent display, including as noted above the station logo. Metadata in some models will bring in album artwork, and some will even display song lyrics while the vehicle is in park or and on the rear seat screen.

These platforms also provide for a blend to the internet stream in weak-signal areas, but we won't be participating in that component because of unresolved data/royalty issues. To maintain time alignment between the OTA audio and stream, the platform maintains a full-time connection to the station stream, and of course that adds to our streaming data use and royalty tally. We pay for data by the gigabyte, and we pay royalties per "performance," and one connection x one song = one performance, so a connected car would add to our performance count even when the stream is not being used in the car. At some point, these platforms are going to have to find a workaround for that. Thousands or tens of thousands of connected cars running around pulling stream data and incrementing performance counts would cost our company a lot of money.

There is a lot of competition in car dashboards now. We're up against streaming platforms like Spotify and Pandora plus a host of others, plus satellite radio and a whole lot more. We need to stand out if we can and at least be on equal footing in terms of visual impact in the dashboard. That's what DTS Autostage and RadioDNS will help achieve. Stay tuned for more information on this as we ease into it.

Streaming Update

It took me a few weeks of off-and-on experimentation, but in early November I finally figured out both the correct installation process and the metadata export process for the new Rocket Broadcaster streaming encoder that we will use, at least initially, with SoundStack, our new streaming service provider. Once I figured it out, using Denver as the test bed, it took just a few hours to get Rocket up and running for all other stations in the company. We have for several weeks now been encoding and sending both AAC and MP3 streams to the SoundStack ingest.

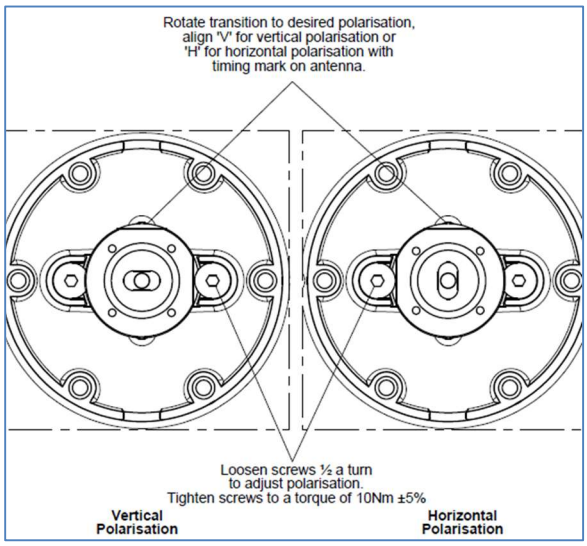
The thing I discovered about the metadata export is that it has to be a UDP transmission of the XML data, and Nexgen only added a UDP export in the last two updates. That means that several of our markets had to update Nexgen to the latest version before the export would work. That's been going on in the weeks since we got all this figured out.

So, what happens next? Our service with Triton ends when the ball drops at the end of the year, so probably on New Year's Eve, our engineers will all need to change their stream exports to UDP and restart their audio servers. They can check the metadata on the Rocket encoder main screen for each stream. Then it will be up to our webmasters to change the "Listen Live" links on the station websites and apps to the new URLs. I've already handed this off to the Alexa skills folks at Intertech, so that will be taken care of.

Since we're already streaming on the new platform (just nobody is listening yet), the transition should be seamless, plus or minus app and website update timing. People that have our stream players bookmarked will need to replace those bookmarks with new ones. My guess is that the phones may be ringing early in the new year in many of our markets.

23 GHz Link

Readers may recall that the new 23 GHz Part 101 link between our new Buffalo studio and the



state-owned relay tower a half mile away worked but the RSSI was some 25 dB below what it should have been. Other pressing tasks have kept us from delving into that issue in more than a cursory way until last month.

Last month, I asked Brian Cunningham to go up on the roof and take some photos of the make/model tags on the Commscope antenna. With that information, I was able to first look up the specs on the antenna, and those showed it to be a "single polarization" antenna, which was a clue. We had, in prior troubleshooting steps, changed the polarization on the output of the Cambium radio and seen no change in RSSI when we would expect to see a 20 dB change one way or the other.

I took all that to our Cambium rep, who was able to find an installation manual on the antenna (with which we were apparently not provided with the antennas). It showed that unlike the 6 GHz antennas for the rest of the system, the 23 GHz antenna is indeed a single polarization antenna, and in addition to the output slot on the radio, the input waveguide on the antenna must be properly oriented. Our license calls for vertical polarization.

Brian rotated the input waveguide on the rooftop antenna and immediately got a 25 dB improvement in RSSI. That tells us that the input waveguide of the antenna on the relay tower is improperly positioned. We have a tower crew coming to fix the issue very shortly.

Looking at the depiction (left), the likely source of the error is apparent. For vertical polarization, the input waveguide slot must be horizontal. My guess is the installing tower crew thought otherwise.

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

Hello to all from Western New York! November was a busy month at CBC's Buffalo/Rochester facilities with several big projects getting underway that had been delayed due to manufacturer's production woes.

In October of last year, we solicited bids for the replacement of one of our two Bard 6-ton A/C units at the WDCX-FM transmitter site. In 2021, we replaced the first unit of this lead-lag A/C system, a unit that presented numerous failures in the past several years. The original system came with the Thermo-Bond prefab building, which we installed in 2007, making the A/C in service for 14 years.

In the last two years, we replaced the compressor, fan, condensing coils and the controller board in the "A" unit, and we figured that the "B" unit was operating on borrowed time, therefore replacement was inevitable. Being proactive, we decided to replace the now 15-year-old A/C unit before it also begins systematically breaking down.

Tri-R Mechanical came in with the best proposal for replacement, almost $2,500 under the closest competitor. Cris signed the proposal, then it was hurry up and wait… and wait.

We were beginning to believe that we would have to push this cap-ex purchase into next year's budget, but as luck would have it, we were able to

obtain a unit that was manufactured for another work order that had been cancelled due to the lengthy wait.

The Tri-R Mechanical crew wraps up the A/C unit replacement at the WDCX-FM site.

On Thursday the 9th, the project foreman came out to the transmitter site to survey what would be needed to remove the old and install the new A/C. We scheduled Wednesday the 15th as the installation date, with fingers crossed that the weather would be suitable for outdoor work. After a chilly start, the sun came out with temperatures near 50 degrees and the crew effortlessly got the job done!

Another cap-ex project on our plate was the replacement of the failed 50 kW Gillette generator also located at the WDCX-FM transmitter site. In early June, I noticed that the cabinet housing the generator was covered with oil. I immediately phoned our service contractor, R.B.U'Ren to set up a service call to determine what happened to the Perkins diesel engine. They discovered that the piston in cylinder #1 had failed, and after intensive searching, our service technician reluctantly reported that there were no parts available to repair the engine.

After reviewing several competing bids, we accepted the bid from R.B. U'Ren on a 100 kW Gillette diesel generator with a John Deere engine. WDCX Manager Brett Larson and I spoke with several diesel mechanics about engines, which ones were good, and which ones to stay away from, and in each conversation, John Deere emerged as one of the best for serviceability and parts accessibility.

The order was placed, with an expected delivery time frame of 8 to 12 weeks. I (and Cris) were a little suspect of this information, as CBC waited nearly a year on delivery of other generators ordered for other markets during the COVID-recovery era. Surprisingly, the generator showed up the first week of November. However, the transfer switch did not! Gillette is anticipating shipment of the 300-amp transfer switch around the first week of December.

All dressed up with no place to go, the new generator is sitting pretty sans transfer switch at the WDCX-FM site.

Not to waste any time, R.B. U'Ren pumped out the nearly full old fuel tank into a holding tank, removed the failed generator and set the new one in place along with the new fuel tank. As soon as the transfer switch shows up, the electricians from Ferguson Electric will remove the old wiring and install new wiring capable of handling the increased wattage of the new generator. We are fortunate that the existing conduit is large enough to accommodate the increased wire size. That will save additional install time. Hopefully, in next month's report, we will have a working generator in place!

Cambium Update

You may recall the issues we were having in our Cambium Part 101 23 GHz link from our studios to the SUNY tower just a half mile east of the studio site in Amherst, NY. Since installation in early summer, the 23 GHz RSSI (signal level) was considerably lower than expected. At best, receive levels were -57dBm when they should have been in the mid-30s. Although adequate to pass data, at this level we were unsure how the system would perform once the snow started flying.

You may recall that I changed the polarity on the radio located on the roof of our studio location, without any change in signal level. We should have noticed at least a 20 dBm change either way, but no change was noted.

To spare you with all the boring details, come to find out the dish was not transparent with the Cambium radio; each had a polarization adjustment! I switched to the backup STL and removed the radio from the dish on the studio rooftop and found that it was set to vertical polarization, meaning that the dish

mounted on the SUNY tower is set wrong. I changed the rooftop dish to horizontal, and signal levels increased to -37dBm! We will get the crew from Patriot Tower to come and readjust the polarization on the tower dish ASAP.

This has been a baffling problem, who would have thought that the dish and the radio had polarization adjustments! This one has truly been a learning experience.

The studio rooftop end of the 23 GHz link. Naturally the polarization of this one that doesn't require a tower climb was perfect.

November has been clean-up month at our Hamburg and Boston transmitter sites. In Hamburg, we rented a 20 cubic yard dumpster and filled it with a little over 2,600 pounds of trash. A portion of this was trash that the previous owner left us as a parting gift, stuff that we did not want or need. Anything in the building that has not been touched within the past year was thrown out, with exception of any electronic equipment.

In New York State, it is illegal to dispose of electronic equipment in the city dump; all electronics have to be disposed of by a licensed, state approved electronics recycler. On Friday morning the 3rd, Frankie's Recycling picked up a trailer load of old computers, monitors, and other electronic equipment that was never to be used again and hauled it away for recycling. The cost was a little over $400, but well worth it to get this old equipment out of the building and out of sight!

In Boston, the clean-up was a lot easier, just some contractor bags to haul off with cardboard, packing materials, etc. All older, unused electronic equipment in Boston was removed months ago, stored at the Hamburg transmitter site, and disposed of when Frankie's hauled everything away. With all the junk removed, it should be much easier to keep the transmitter sites cleaner.

As of this writing, winter has begun to move into Western New York. On Monday the 27th, we received a little over 18 inches of snow at the Boston transmitter site and 14 inches in Hamburg, very manageable depths of snow as far as Buffalo is concerned. I am hoping that we have a little milder winter than what we experienced last year. If I recall correctly, the official total for last year's snowfall was 189.6 inches – that's almost 16 feet of snow! I'm too old to deal with that much snow!

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, have a merry Christmas and happy engineering!

The Motown Update
by
Mike Kernen, CSRE
Chief Engineer, CBC–Detroit

Thanks!

Thanksgiving is of course about gratitude, and it seems a perfect time to reflect on how and why I got into radio. It certainly has been a great place to spend every day for nearly 40 years now.

At about 12 years old, my Uncle Dick Kernen started taking his son Bob and me to his Sunday morning talk show, "The Sunday Times." Why he wanted my cousin and me there is still a mystery, but he did for several years.

Those many early mornings at the radio station spent screening phone calls and making coffee (Dick ran on coffee) sparked a desire to spend the rest of my life working in broadcasting.

Uncle Dick's day job was as vice president of Specs Howard, a Detroit area broadcasting school from which I ultimately graduated (twice), and he helped me, as he did thousands of others, find my first real job in radio. It was a part time engineering assistant gig at HOT HITS WHYT 96.3FM, which was the sister station to Detroit superstation 760 WJR. It wasn't two weeks before I started working there, too.

Bolstering my part-time hours, I had the great pleasure of running master control for the Detroit Tigers and running the late Paul Harvey segments. I also worked the wee hours of the weekends where I ran American Top 40 broadcasts from Prod A on WHYT.

I mentioned graduating twice above because 'Specs' had two programs. One was Radio and Television Broadcasting, and the second was Broadcast Electronics. I had taken six semesters of electronics in high school and found I had an aptitude for it. I aced just about everything in electronics and always found music and technology at the top of my list of interests, along with my greasy automotive pursuits. Broadcast Electronics was where I wanted to be, and Don Stoker, the program's instructor, made sure I could cross the bridge from the basics and theory to what I needed to know to work as a broadcast engineer.

My three bosses at WJR and WHYT all fired me on the same day because the company was sold, and they cut all part-timers. I started almost immediately with Comcast, then at a recording studio, but within a couple of years, Dick recommended me for a broadcast engineering position at my favorite radio station, the legendary 101WRIF, that lasted for the next 32 years until the pandemic.

Now, of course, I'm at Crawford with four great radio stations to care for and nothing short of excellent resources with which to do so.

Certainly, the common thread in this story is the people that helped me along the way. Without making this sound like an Oscars speech, there have certainly been several people who've given me opportunities, taught me, and even taken a chance on me. To those, especially my late Uncle Dick, my supportive parents, my wonderful wife Charlene, and Cris Alexander, I am infinitely grateful!

Vacation is Over

I spent the last few days of my long-awaited vacation with an upper respiratory infection, which I'm sure delighted my wife and friends to no end and made the flight home miserable for anyone within earshot. It held on for what seemed like forever, let up for a week or so, and as I write this, I'm off because of COVID. Fortunately, it has been a cakewalk compared to the URI.

FM Control Room

During my brief time back at work this November, I did manage to get a major project started. 2023 called for the complete remodel of the WMUZ FM Control Room, which didn't really need it, but hey, it's been since the mid-90s, so why not? Seriously, the room had at least 100 rather large holes from a time when cart racks dominated the walls. The 30-year-old cabinets were dingy, as was the carpet (yes, it was on the walls too), and layers of abandoned wiring was a rat's nest.

I must admit to dreading this project a bit, so I kind of let it go until late in the year. There was plenty else to do, and the studio was working – you know how one rationalizes... Anyhow, the time came, and we had to move the control room. I decided to displace Prod 5, since it was the only studio without a permanent resident writer-producer. Its duties would shift to the conference room.

Figure 1 - Prod 5 is serving as the FM control room during the renovation project.

Moving the control room, which is in use endlessly, would require some recorded programming. Management graciously allowed for two consecutive shows to be prerecorded to give us time to move the entire operating FM control room to Prod 5. With Wheatstone, everything should just pick up, move, plop down boot-up and run. Hook up some speakers, a headphone amp, move the phone system, mics, computers and monitors, door release button, delay system, wait… this is starting to sound like a lot! Yeah.

Figure 2 - Work is underway in the old FM control room!

Well, we got it done, but we had some problems. The console booted up with black characters against a black field on the lower displays, so you couldn't tell what any of the faders did. The old 10/100 network switch decided to become intermittent. The UPS wouldn't plug into the 15-amp wall outlet. The VoxPro computer decided 4GB RAM was no longer going to be enough, and for some weird reason the console settings for the phones changed themselves (this has happened before).

Most of this waited until the next morning to manifest and blow the fuses of the morning show person – naturally! Even the FM talk studio wouldn't cooperate, since its source of Wheatnet had been from the switch in the FM control room and the only switch I had on hand that would work with multicast evidently wasn't programmed for it.

Console Upgrade

The Wheatstone LXE console we use in the FM control room has been running on the firmware and OS it shipped with 3+ years ago. We have three of these, and they work like a hose… except this one recently. For some reason, it's developed a propensity to shut off its AUX send busses, which prevents the recording of phone calls and messes with the head of the morning guy. I've created save states he can recall, but those also get altered. Now the black-on-black text, which wouldn't relent no matter what I tried meant I needed to upgrade.

Wheatstone sent me everything I'd need along with complete instructions on how to perform this upgrade. I have a personal rule never to upgrade anything on a Friday, but in this case, I really needed to get this fixed. Especially because the morning guy was about to mutiny.

I checked with HQ, and the report was that these LXE updates go fast and without issue, so I waited until we had a block of time and did the procedure, only to end up with every fader showing three large yellow triangles. At least the black-on-black text issue was resolved.

I contacted Wheatstone, who said they'd seen that only once on a university's console. I love having the odd one. A quick back-rev to a prior version made the three triangles into one small one. So far, it's been stable.

Phase Shift

WCHB 1340 AM is a 1 kW station on a local "graveyard" channel which, as do most Crawford radio stations, broadcasts in HD Radio.

Since joining the Crawford team nearly four years ago, the transmission system there has presented me with some formidable challenges. The first was a poor and intermittent connection at the quarter-wave point on tower one that no one could seem to root out and was keeping us stuck using only

tower two. Then there were the multiple issues in the phasor, the building itself, the HVAC, the STLs, and the transmitter. Now that all that is corrected, there's this ATU looking cabinet on the wall in the transmitter room which has been bypassed and unplugged. What is that?

This cabinet contains a circuit to rotate the phase of the load to the main transmitter so that the antenna system is optimized for the HD Radio signal.

When HD Radio sidebands are added to an AM radio station, they occupy spectrum space just above and below the station's AM carrier and analog sidebands. This means that a given antenna system needs to pass energy ±15 kHz from the center frequency. Because any antenna system (other than a purely resistive dummy load) will have a slope to both the real (resistive) and imaginary (reactive) components of the complex impedance, it will have an impedance other than the desired 50 j0 Ω at frequencies used by the HD Radio sidebands. The proper orientation of the load as plotted on a Smith chart is critical to proper HD operation.

Once I'd found out what this cabinet was for, I connected it but was quickly shown why it was left unused. The station's night pattern and alternate non-directional modes of operation didn't make the transmitter happy with this cabinet inline.

Clearly what happened is that when my predecessor installed the new Nautel J1000 transmitter, its surge suppressor and coaxial cable, which the installation instructions clearly and emphatically say not to cut or change the length of, changed the rotation of the load presented by the antenna system to something the transmitter did not like at all, so he bypassed the phase rotation network.

I decided to enlist the services of our consultant, Munn-Reese of Coldwater, Michigan, to bring in their network analyzer and experts Ed and Rick. They found that there were some component changes required in the phase shift network, and using some spare parts I had, they were able to get it working.

The Smith Chart confirms we've corrected the load to the proper orientation, and I can confirm that HD Radio coverage on 1340 is much improved, which is huge for this little 1 kW station! There's still some work to be done on tower 2, as its self-impedance isn't where it used to be (we only use tower 2 ND during emergencies or maintenance on tower 1), but progress is progress!

News from the South
by
Todd Dixon, CBRE
Chief Engineer, CBC–Alabama

Medicat USB to the Rescue

Several months ago, I wrote in these pages about a "live boot" USB stick Swiss army knife called Medicat USB. I've used it here and there for some of its tools, but I got chance to use it earlier this month when I went to our Cullman site to investigate why our HD2 signal wasn't broadcasting, and our HD importer had rebooted and couldn't find a bootable device.

We put our Nautel GV40 and its importer online in 2016. The hard drive in this importer was a 60 GB Kingston solid state hard drive.

While the drive was obviously a more industrial version as it had a metal case, it was still a hard drive, and it almost goes without saying that hard drives that last more than five years are a blessing from above, but they're still made by man and will fail. So, what do you do in a situation like that?

You only have a couple options. I'm sure Nautel would be happy to send us a new drive, but then we're stuck with having to input all of your previous settings into the importer, that is unless you created a backup of the settings. It's also likely an expensive proposition as well, as it would be a new copy of Windows and all of the HD related software that is installed on these importer systems.

The other choice is to try to do something with the drive you have. In my case, I brought the HD importer back to the studio to see what I could do with the failed drive. I had a spare SSD drive on the shelf waiting for just such an occasion.

So, I got out a USB SATA drive dock we have here and inserted the spare drive in it. Then, I plugged it into the importer along with all the necessary peripherals and the Medicat USB stick and then turned the computer on. I forced the importer to boot from the Medicat USB stick, and

It is an industrial grade hard drive, but it's still a hard drive.

then I was in business.

Medicat has several backup and recovery solutions on it, but among them probably the easiest and best is Acronis True Image. I chose that solution, and within 15 minutes, had imaged the old hard drive onto the new one and made the new one bootable. I replaced the old hard drive with the new one and the importer came back to life instantly. It already had all the previous settings in place and was ready to be reinstalled up at our Cullman site.

This was a reminder to me that among all the technology that we have and use on a daily basis, hard drives are really a lynchpin for everything to work right. We back up our Nexgen file servers, but what about creating images of our normal workstations or other important machines we have?

Cris is really good about making sure we have replacements for our radio critical machines every five years or so in our budget cycle so that we hopefully don't have to deal with drive failures. Case in point, we've been blessed this past month to substitute five new Nexgen workstations into our operation here in Birmingham to replace older machines that were due to be replaced on that schedule.

It is a really quick operation to image a drive, and storage (USB or hard drive) is currently so inexpensive that we ought to be making sure that we have full hard drive images of these machines so that we can get back on our feet quickly in the event of a drive failure. Even with newer machines, it's never a matter of "if it will happen" but "when it will happen" that a newer hard drive will fail.

We'll visit again next month, where I'll share more bright and shiny tech tips that remedy problems that tend to scare the life out of most of us. Until then, I'm praying for a blessed Christmas season for all of you and that the work of your hands is prosperous.

Tales From Cousin IT
by
Stephen Poole, CBRE, AMD
CBC Corporate IT Specialist

Back when I was a much younger man – this would have been only a few years after Joshua and the Sanctified Brass did that little gig outside of Jericho – computers were huge, clunky machines that were hideously expensive. But in fact, broadcasting was one of the first industries to embrace them, primarily for automation, and later, for transmitter control.

Some of you are old enough to remember the old mechanical automation systems with reels of tape, Instacart and Carousel machines loaded with cartridges and all that other stuff. The first ones had mechanical step programmers; later, actual "computer-controlled" systems from Schaeffer and SMC became the standard. They had strictly-limited memory: as I recall, the SMC that I worked with at WEEB AM, Southern Pines, NC, had 2048 "steps" that executed, one after another, in sequence.

It also had a current time module. I could press a button on the remote in the control room and a flat-sounding computer voice would say, "The correct time is xx:xx AM/PM." I think the manufacturer expected the staff to record more natural time slugs; WEEB didn't bother. We did do live time announcements twice a day for a local jewelry store. But if no one was paying for the correct time, our listeners got to hear Mr. Roboto. Niiiice.

There was one Revox reel-to-reel that was connected to the automation system in the control room. This being the mid-70s, of course WEEB was

in mono, but this was a two-track stereo player – with only one channel connected. I was on duty when the Doobie's Black Water came up one day: "... by the hand ... [ghostly gap] ... by the hand [ghostly 'pretty mama,' almost inaudible]" ... ah, good times.

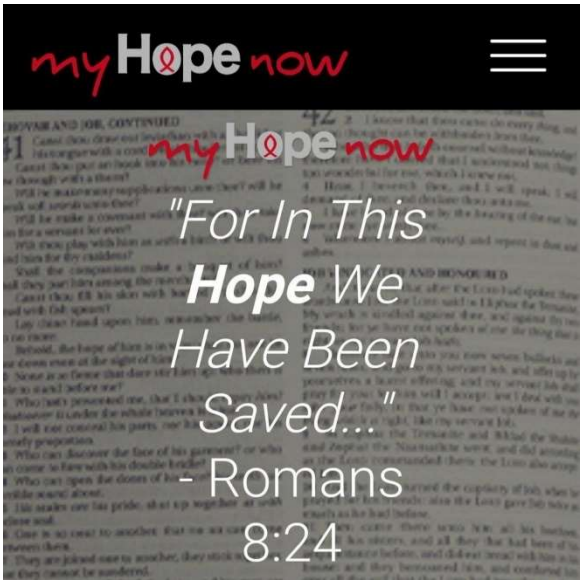


Figure 1 - The My Hope Now website on my Android.

I suspect that particular Revox was there so that we could eventually automate the Sunday preaching shows. Fortunately, they never tried that (what could possibly go wrong?). They couldn't; several ministries brought in hour-long tapes and wanted us to just play 15 or 30 minutes worth of distorted, noisy audio. So, the board operators had to manually cue up the reels of tape on ancient tube-type machines, then turn the big transport chicken knob to "play" at the appropriate time. Fade up in the middle of the service, fade down when the paid time had run out.

We also had a couple of turntables and some very old, very weird single-sized 33 RPM music discs from the late 1940s and early 50s. One day, the thoroughly-inebriated station owner called and demanded that I play some Dixieland from those ancient records. "Nobody wants to hear that pathetic 'my heart is broken' mess!" (Except he didn't say "mess.") The look on the Program Director's face when he burst into the control room a few minutes later was priceless. Those old records were scratchy and honky-sounding, but it was, indisputably, Dixieland. "La-da-da-DEET DEET dee-dah ..."

Nowadays, of course, everything is Internet or satellite delivered, digital audio files, and computers that are orders of magnitude more complicated than the little brain-dead chips inside those old automation systems. None of our control rooms have turntables or tape machines (though we may have a couple of the latter in production). Progress!

Dem Scammers ...

Ah, they're relentless. We still receive thousands of brute-force attacks every day; I have to stay on top of that. As I write this, we had over 5,000 attempts to break into our email system just today. Someone was trying to get into various employee email accounts, too. I've had to change the configuration to lock an account for a time if someone is trying to guess passwords. If one of your co-workers wonders why Zimbra is giving an authentication error for a known-good password, it's possible that someone was trying to hack their account. Tell them to wait a while and try again.

But the scammers and crackers continue to be most successful with phishing scams. I received one last week that was actually quite well-done; it wasn't just a single message with a link to be clicked.

Figure 2 - My latest toy: an Ibanez 12-string.

This one had a bunch of CC'd messages, a long thread of them, to make it look even more legitimate. It was another one of those "your order has been received" scams, where they want you to contact them so that they can ask for your banking or credit card info.

All I can say is, be vigilant and never, ever click a link in an email unless you are 100% (not

90%, not 95%) sure it's legit and you know from whence it came. If need be, call (don't use the number in the email!) or email the sender (don't hit "reply," write a fresh message!) for verification.

My Hope Now

I'm helping with the "backend" work on this website, and I have to say that it's pretty nice (Figure 1). In fact, it's outstanding. Josh Meyers and Company have done a great job on this, and I'm honored and pleased to be a (small) part of it. The biggest problem is that it has grown into an Internet-spanning hydra, with some parts on Amazon Web Servers (AWS), some on a third party website, internal links to Google stuff, and you name it. Josh is certainly capable and creative enough to redo the site in WordPress (in fact, he already has a demo site made up). I have to add the user accounts and redo the mobile apps. But it's coming!

Finally, Figure 2 is my latest home studio acquisition. Eventually, I'll have time to actually make music again, but there's a song that I've written that wants the sound of a 12-string. There was a black Friday special on this Ibanez, so I bought it. It sounds fantastic, too.

Until next time, keep praying for this nation and have a blessed and wonderful Christmas!

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

Generator Update

Last month, as I was writing the article, I stated that the new generator installation at our Burnham transmitter site was being completed at the same time. That all went well, and in fact, we had a planned outage due to construction in the area within a few days after the startup was completed. When the generator ran, it performed well during that first outage that lasted about four hours.

The one thing that the tech from Cummins was concerned about was the fuel capacity of the system and if it would handle a full load for the 150 kilowatts for which it was rated. He was worried about some reducers that were installed around the regulator just before the gas pipe goes into the fuel port of the generator. Since we would have difficulty providing a full load, he suggested that we have them come back with a load bank test.

We did that, and what he found was when we started to get near a 100 kW load, the fuel supply pressure would go from 2 lbs. of pressure to about 1 lb. It would still run at 100 kW, but when the load bank was set to 110 kW, the supply pressure would go to zero and the unit would shut down.

This pointed less to the reducers being an issue as the supply that the propane company was giving us. It's still possible that the reducers might be an issue, but without making sure the supply is correct, we won't know for sure.

The propane supplier (Amerigas) had to make changes on their part when we installed the new generator because the old one needed liquid propane and the new unit took vapor. Subsequently, they had to move to a different tap on the propane tank and install a new regulator. The regulator was the problem. The Cummins tech looked up the specs on the regulator and found the BTU rating was 1.4 million and the generator called for 1.8 million. This is why the regulator couldn't keep with the generator when it went over 100 kW load. We are waiting to hear back from our propane supplier on what they can do to solve the problem.

18 GHz Problems

Just a few days before this writing, we had disconnection notices from our remote controls to the Burnham transmitter site. Since we got notifications from the Burk remote controls at our Hammond and Lansing locations about losing touch with the Burnham Burk remote control, it was easy to see that the network connection between Hammond and Burnham was not working.

This path is provided by a licensed Part 101 18 GHz microwave system, specifically a pair of Cambium PTP820S radios. I first went to the Hammond rack room and rebooted the radio there. I

wasn't able to get any indication of data getting through and I couldn't get in touch with the web GUI of either radio.

One of our engineers, James Kelly, went to the Burnham site and rebooted that radio, but that didn't do anything to restore the connection, either. At this point, we switched to a backup unlicensed 5.8 GHz Ubiquity Power Beam pair. This immediately got data traffic going again.

However, a few hours later, we got the same notifications. I was able to remotely login and reboot the Power Beam at the Hammond location and this restored the connection. This got us going again, but it happened a few more times. I decided to see if a firmware update might give the pair more stability. This seems to have worked.

As for the Cambiums, the unit at the Burnham site seems to be working properly but has alarms for disconnection of the wireless connection. That makes sense. The unit at Hammond can be reached if it is directly connected to a laptop but not if you put it in on the network switch, which makes no sense. It also shows no alarms for the wireless disconnection, which also makes no sense. To me this points to the Hammond unit being the issue. We are waiting to hear back from Cambium support for their thoughts on the problem.

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

Updates

Lumen (aka CenturyLink) has become a four-letter work in our book here at Crawford. Some of you long-time readers may remember that years ago, we used to use the work Burk as a four-letter word due to some issues we had with their early products. Thankfully, those days are long behind us, we love Burk now! But Lumen recently took the cake.

After having no studio or office phones for three full business days at our Denver facility, we then had no internet for two weeks at the KLZ transmitter site. Numerous missed appointments (by them, not us!) and calls later, I was able to find out that the civil contractor widening the road in front of the KLZ site did indeed cut the line when they dug just outside our gate. I thought this might be the case as the day the internet went down, I had no access to the site because they had dug up the area. I told CenturyLink about this being a possibility, but they didn't see any issues. So, again, several missed appointments later, someone at long last did show up, and took all of five minutes to tell me the line was cut and that he would have to get another tech from a different department come out.

The next day, that tech did show up and quickly found the issue. After being told what the issue was and that CenturyLink may not repair it because we are the only customer and it's copper (why would they care about a paying customer anyway?), he suggested I talk to the road crew to see if they'd dig it up for us. If they would, then repairs would not be an issue.

It was when I contacted the civil contractor that I found out they knew they hit the line and reported it, yet CenturyLink had no clue. Not surprising. The tech I was working with at CenturyLink surprised me later in the day saying he was able to talk to his boss, relayed the importance of the internet for us and was able to get a crew out to dig and do repairs.

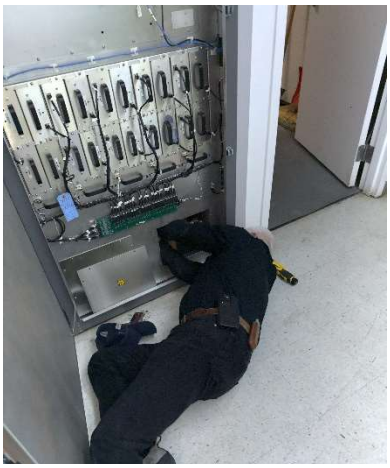
I thought for sure this was going to be a battle, but thankfully, two weeks and a day after it initially went out, we got our internet back!!!

Lumen is still a four-letter word, despite this guy's best efforts. Truth is, they should have had that report of the cut line and immediately investigated and repaired it. Instead, they never did anything with it, and it took time out of several days for me to wait and deal with waiting on someone to show up.

The time wasn't all wasted, however. I was able to get a good cleaning done at the KLZ transmitter site on one of the days I sat around waiting for CenturyLink to show up. Many dead spiders were disposed of. I was able to get the storage shelves cleaned up, items thrown away that were no

The Austin Ring primary was taped up to keep water out of the windings until we can completely rewrap and epoxy paint the whole thing in the spring. We've got several of these to do.

longer needed, the floor got mopped and a lot of bug spray was used in hopes of putting an end to the remaining spiders.



The old man helping me out with re-tapping the NX50 transformer. I couldn't reach the back (front, really) taps from the rear.

Temporary Repairs

I am not a fan of temporary repairs. I find that temporary usually becomes permanent because it gets forgotten. Some of the Austin Ring transformers at the KLZ and KLTT tower sites need repair. I had hoped to get it done before the cooler weather set in, but that just did not happen. I was able to take a Saturday and go out and use some electrical tape and get the worst spots taped up to keep the water out. Once spring gets here, I will go back out with the repair kit, get them retaped and painted and looking good. I have no intention of allowing this temporary repair to become a permanent one.

Another temporary repair, if you can call it that, was having to re-tap the Nautel NX50 at KLTT. Several weeks after noticing our ND50 B-minus was showing to be considerably higher than normal (80 volts rather than the usual 72), I got reports of the station popping on and off. It sounded like an arc at a tower to me.

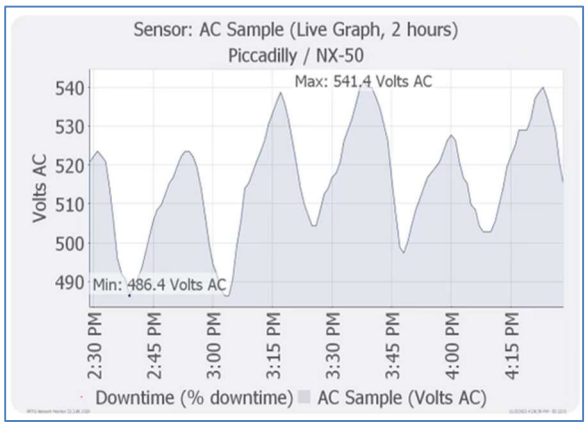
It was a little bit windy that day and the growth at some of the tower bases may have been causing the issue. I drove out and immediately made my rounds to the towers. There wasn't any growth tall enough to cause the issue (I ended up pulling what little there was around the tower out of the ground to be sure). I opened the ATU cabinets and looked at everything and listened as well. I could hear when it would pop off air but didn't hear anything arcing at any tower. I then went into the building and opened the phasor cabinet and just listened. Once again, nothing.

While I was doing this my dad was on the phone with United Power, trying to get to the bottom of it. The determination, after seeing the transmitter had high DC voltage alarms, was that it was protecting itself due to the high AC voltage coming in the building.

We were able to run on the ND50, as it was not as sensitive to the high voltage. The next day we re-tapped the NX50transformer for 500 volts (it had previously been tapped for 480 volts, which is what the incoming three-phase has been since the place was built in 1995). This would allow us to run on the NX50 until United Power fixed the issue.

As it turns out, that issue was that they were drilling to the northeast of our property, essentially right next door. These drilling rigs are electric and require a ton of power. To accommodate them and to help prevent voltage from dropping too low, United Power ran the series regulators on the 12.5 kV feeder about a half mile south of our site up about 10%. Most people wouldn't notice this as it is residential near us, but due to our unique operation, we did notice, and so did our transmitters. We hope to have things back to normal soon as the drilling rig is gone and the need for extra power is gone. All we can do though, is wait. While we wait, we can tell from the incoming AC voltage whether the drill motor is

running or not.



We can tell when the drill rig is running – the incoming AC drops to 486 volts during their heaviest loads, rising to 540 volts when the rig is off altogether. That's quite a swing. United Power says the issue is voltage drop on the 12.5 kV feeder wire.

On The Horizon

With December upon us, project season is winding down. It is time to play catch up and finish any remaining projects for the year.

In Denver, I think the only thing we will need to get done is move our online stream over to a new thing. We already have it in place and working, there's just some behind the scenes work that needs to be done to finalize it before January 1.

I will continue working to make sure our equipment is in good shape, that the studios and transmitter sites are cleaned up and in good shape.

I look forward to a short month of work as I will be taking time off the last week of the month to bring me into the new year. I pray you all stay safe and well, have a blessed Christmas and New Year. I will see you all next year!

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
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 MHz/95.3 MHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz/107.1 MHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz/94.1 MHz, 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/107.1 MHz, 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
WYDE-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT
WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

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