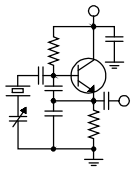
The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Good Riddance!

I'm sure we're all thrilled to see 2020 in the rearview mirror. It was indeed a difficult year on so many different levels. There's no need to mention most of those things – we're all painfully aware. But taking a more positive view, it was a year in which our radio stations and their staffs, particularly the on-air and technical folks, were able to shine. I am proud of what we achieved during local and state lockouts. We kept our stations on the air and provided our listeners with a vestige of normalcy during a time that was anything but normal.

As we roll into 2021, my crystal ball is cloudy. I won't make any predictions about the pandemic or the economic or political climates. There are too many variables in play to even make a guess. However, I will predict this: our people and our technical facilities will continue to shine no matter what else is going on. It's what we do, and whether 2020 was practice or was itself the main event, I am confident that we are as ready as we can be to deal with whatever the future brings.

Some other good things happened in 2020. We completely revamped and updated our on-air studios and TOC in Chicago, replacing the aging Wheatstone TDM system and G5 consoles with Wheatnet-IP AOIP gear and LXE consoles. The facility also got new cabinets, and we enlarged the Power92 control room by knocking out a wall and incorporating the space from the adjacent talk studio.

Just last month, we completed the Wheatnet-IP project in our Denver studios, preparing that facility for whatever the future holds (Jay Tyler calls it "future-proofing"), and we got a start on the same in Birmingham. We replaced aging Part 101 microwave systems in several markets with state-of-the-art Cambium links with more throughput and better fade resistance.

And while all the technical upgrades were great, perhaps our best move in 2020 was hiring Mike Kernen as chief engineer of our Detroit operation. Thanks to each of you for making Mike feel welcome and helping him get settled in. What a great relief it has been having his experienced and capable hands on the help in that complex technical operation!

So in some respects, 2020 wasn't so bad after all. But I'm still praying that 2021 will be much better.

Projects

The studio project in Birmingham continues this month, and hopefully that will be wrapped up by month's end. It took Todd, Jack and Stephen very little time to figure out the LXE (less time than it took Amanda and me I'm pretty sure), and the first control room overhaul went very quickly. Hopefully the rest will go just as fast.

The order for Detroit's LXE surfaces and blades has been placed and we expect that equipment to start arriving next month. Between now and then, Mike and Steve have a lot of prep to do, including upgrading the software on all the existing Wheatnet surfaces and blades – we found that Mike's predecessor never updated anything, including transmitters, so everything Wheatnet is still on 2015 software. They also have to plan their blade sources, destinations, logic and placement. We may need to tweak the order just a bit to make sure we have everything covered. We hope to get this project done before the end of the quarter.

We have been dealing with telco and ISP changes and upgrades all over the company in recent months, and some of that continues going forward. We got notice in Chicago that the two T1 circuits that we use to feed the Rockford station's transmitter site were going to triple in cost (they were already a

king's ransom), and that got us scrambling to find alternatives. Rick did a great job of researching the options and we have signed contracts for new dual IP-based services at the studio and transmitter site. We'll soon be shed of those gold-plated (but unreliable) T1 circuits for good.

In Denver, we continue to work on a couple of major projects that are in the early stages. One is moving KLDC (1220 kHz) to the KLZ tower site, which is already quasi-diplexed with KLVZ-N. That will require adding a seventh tower at the site to complete a two-tower DA for KLDC. The application is on file with the FCC, and now we're working our way through the process of modifying our conditional use permit to accommodate the additional tower. That involves surveyors, title work, utility locations, site plans, visual impact studies and a whole lot more. We hope to have the county application on file this month.

Also happening (or about to happen) at the KLZ tower site is a big road widening project, which will require eminent domain condemnation of part of the property along one edge, temporary construction easements, permanent easements and relocation of an irrigation canal. Overall, this will be a much-needed improvement in the area. That two-lane street out front is jammed with traffic mornings and evenings because of housing built just north of our site. But there will be some short-term inconvenience and pain, and we'll be working with the county and its contractors to maintain site access and site security during the project. Right now there are multi-colored survey flags all over the place – some of them ours (for the KLDC project) but most for the street widening project. It's going to be interesting (probably in the Chinese proverb sense).

Not Just a Job

I recently passed a milestone birthday, one that I never really thought much about until the last couple of years. And that birthday marked my passage, by some measures, into senior-citizendom, if there is such a word (I guess there is now).

As the calendar page turned on that date, I spent some time reflecting on my life so far. In those musings I realized anew that my almost 37-year tenure with this company plus many of the years prior were spent, vocationally speaking, in service of God's kingdom. Sure, I was and still am earning a living for my family, but beyond that, the work that I – and all the great engineers at Crawford Broadcasting Company – do has *kingdom impact* (another way of saying eternal value). Don't think so? Then listen to this little story…

Back in 2011 at the Orange County Planning Commission hearing for the KBRT transmitter site move project, longtime *Talk from the Heart* host Rich Buhler had recruited a small number of KBRT listeners to speak in support of our project. One of those listeners was a 30-something young woman.

She took the podium and with quivering voice, told the story of another young woman who many years before had made a mistake and found herself with child. That woman was on her way to an abortion clinic that morning in the mid-1980s, struggling to see the road with tear-blurred eyes. As she drove, she scanned the radio dial looking for something – anything – to lift her spirits, and she came across a program where a man was talking to a woman named "George," explaining how God loved her and her unborn baby and telling her that she had choices that would not involve termination of her pregnancy.

That teary young woman heard what the host – Rich Buhler on *Talk from the Heart* – said and took it to heart. She turned the car around and went back home, carrying her unborn baby to term. The woman at the podium at the hearing said, "That baby was me. Had it not been for KBRT, I would not be alive today."

You could have heard a pin drop in that room. Stunned silence is the best way I can describe it. The vote – unanimous in favor of allowing our project to proceed.

But the bigger story was that *KBRT and its ministry saved that young woman's life*. And were it not for quality equipment and facilities, it might not have been on the air at that crucial moment in her mother's life, and the result could have been far different.

Think about that for a moment. How many times across our many stations from Oregon to New York, Alabama to California, does that kind of thing happen? A word aptly spoken at a crucial moment… will that word make it to air, to the radio, through the speaker and to the ears of that listener in a moment of crisis? It will if we have done our job.

But you see, it's not just a job. It's a *calling*. Think about that as you start the new year. You might find yourself motivated as never before!

Stay well!

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

Hello to all from Western New York!

As we enter 2021, I look back on the events that occurred last year and how that changed broadcasting. Today, remote broadcasting is the normal, for both radio and television. Our homes have become the new broadcast studios. Imagine if this pandemic happened 30 years ago, what kind of shape we would be in! The internet was just a vision, a concept yet to be developed. We had twisted pair copper for phone service, 7.5 and 15 kHz equalized circuits for point-to-point audio delivery. Analog cellular service was in its infancy, and that was very limited and sparse in most areas. Without today's technology, most stations would literally be up the creek for some time before some type of broadcast link could be set up for out-of-studio program origination.

Back in the day, many stations had the luxury of using Marti remote broadcast units, but these would be a nightmare today with so many stations sharing the same frequency. Trying to coordinate dozens of users, all wanting usage at critical dayparts, would be insane!

I have never been a big fan of the internet, but after the pandemic events of 2020, I have come to embrace IP and its reliability to keep our programming churning along, regardless of the origination point. Codecs now have the capability to provide near in-studio (stereo) audio quality with latency measured in milliseconds in both directions with forward error correction for any lost data packets. The internet has certainly proved to be a revenue saver!

In months past, I have reported on several issues we have experienced at the WLGZ-FM transmitter plant in Rochester, NY. First, we had our feedline damaged by unknown tower workers, then a burnout in the rigid line between the HD injector output and antenna input. This month, it's been more of the same.

I was notified that our HD-2 channel was down. When I arrived at the transmitter site to investigate the cause of the failure, I found that the hard-drive in the BE IDi-20 importer had failed. Coming armed for bear, I brought with me the spare importer from Buffalo, thinking that if the Rochester importer was dead, I would swap out the units to get the HD-2 back up. I installed the spare importer, and it would not boot! It was working when removed from service (Murphy's Law). So to get the original Rochester importer up and running, I removed the hard drive and processor fan from the Buffalo spare and installed them in the failed unit. After meeting the Windows and Xperi licensing requirements and rebuilding the network parameters, we were up and running! We lease out our HD-2 channel, so getting it back up and operating in record time was of the essence! Thankfully we did have a donor unit to help facilitate the quick repair.

Several weeks later, we experienced some type of electrical event which took both transmitters off the air. I was able to bring both back up via remote control, and parameters were normal. Later that day, the Rochester board operator phoned and reported that the HD transmitter's operating parameters were low, so the following morning I made the trip over to investigate. I was only able to manage about 600 watts output, and that with running the FXi-250 exciter to the max. The HD transmitter, a BE FSi-201, utilizes six PA modules, and I found that only three of them were operating at full capacity; the other three were at half power.

I phoned Jeff at BE Technical support and he explained that in all probability, one of the two output MOSFETs had failed, causing the reduction in output power. I am looking at the option of either sending the defective modules in for repair, or

exchanging them for rebuilt working PA's, whichever would be least expensive. Also, I found that the display on the FSi-10 IBOC signal generator had failed, but thankfully it has a GUI that I can log into to observe/modify the operation of the signal generator. It has been one thing after another for some time now at our Rochester FM transmitter site!

Operations in Buffalo have been much quieter than Rochester, but we have definitely had our share of issues over the last month. Several months ago, we had the Burk ARC Plus Touch lose its brains (twice), and I traced that down to a faulty power supply. I replaced it and all was well until just before Christmas, when it happened again! After closely examining the chassis, I found a wire in the power plug that did not appear to have been properly crimped. I could wiggle the wire and the remote control would dump all programming. I soldered the wire to the connector pin and have not had any other problems since.

At WDCX(AM), we noticed that the program audio quality was degrading, with a tinny sound and a lot of background hash. I rebooted the Nautel Importer and IBOC exciter, and when I brought the transmitter back up, it constantly folded back and would not stay on the air. I switched to the analog exciter B and removed the defective units and thoroughly checked all connections and cards for proper seating, checking for any possible clues as to the cause of the failure. Finding nothing burned or out of the ordinary, I phoned Nelson at Nautel and he recommended that they be sent back to Nautel's mother ship for repair.

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

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

DSL Gloom

Winter in Detroit is gray and cloudy most of the time with brief periods of general awfulness. I've been too busy up here with lots of stuff like fixing misbehaving transmitters and getting to the bottom of some vexing network issues to really worry about the weather. One such network problem emerged at our WRDT site, not far from the medium size town of Monroe, Michigan. Nothing wanted to work, including our ARC Plus remote control, which is an indispensable lifeline to the site some 80 miles from my home. The secondary AOIP STL also was on the fritz.

Though WRDT's location is not isolated, it still cannot be served with anything better than DSL. While building out cable to the site is possible it's too costly, and frankly DSL gets the job done (I hate to admit). To me the letters DSL suggest "Dead Slow."

Our DSL circuit came with a horrid consumer-focused and almost completely unsupported modem/router. The nasty little thing stares back at me from its shelf, an ominous gray cloud hanging over it like so many December days. Okay, okay, but if you knew what I've been through with this thing, you'd excuse the hyperbole.

The basic problem with it is that it's not powerful enough to reject the attacks by nefarious doers seeking to wreak havoc nor to exist in a professional environment where port forwarding is required. It sees attacks coming from China, The Netherlands, Russia (of course) and even some domestic… but that's another story. There is no alternative to the little AT&T-supplied Netgear that I could find, and Netgear themselves essentially disavows this device. Worse still is AT&T's "support" chain which transferred me no less than seven times before disconnecting me altogether without helping me in any way whatsoever. Thank goodness that little telephone 'adventure' took only two hours to fall flat.

My difficulty with AT&T aside, it's important to note that DSL is going the way of the dodo. Yes, it stinks, it's all there is, and you can't have it anymore – terrific... This from AT&T, dated October 2020: "As of October 1, AT&T has discontinued sales of DSL service." AT&T says that the company will no longer take new orders and current DSL customers will not be able to make

changes to the speed of their service or move service to a new location. They do not specify a sunset date for the technology but if ISDN's termination trajectory gives us any foresight, I wouldn't be surprised if they 'urge' customers to adopt other technologies simply by jacking up the price (of DSL) until it can no longer be endured.

Until then, I shoehorned an equally obstinate little Ubiquiti Edgerouter X into the space between it and my network, forcing the DSL modem to simply bridge its traffic. I win! For now...

Intermittent problems are the absolute WORST!

I probably don't have to tell my fellow engineering brethren this. We've all beaten our heads against the walls trying to find an issue that just won't reveal itself. 'Shotgunning' the problem is sometimes too expensive, and frustration ensues.

Since joining the team at Crawford, I've had way more than my fair share of intermittent issues, the nastiest of which was a poor ground, on someone else's transmission line at our ¼ wave point, on a self-supporting tower where we are tenants. I wrote about this in a prior issue of the *Oscillator* and am reminded of it and its solution now. Why? Well, it has to do with confidence. You see, I was new at Crawford, had zero experience with this site/tower/issue, and had no clear idea how I'd find this problem – a tower that works, then doesn't, then works then doesn't. Worse, much of this 'circuit' was not something I could inspect myself – critical parts of it are 180 feet in the air on a tower I can't climb.

This story I have told, and fortunately the issue is gone. It's gone not because I have some amazing skill or magic powers, but because I didn't give into it. I kept trying things and using whatever resources I could until the issue revealed itself. Yes, it was frustrating, and I was nervous – a new guy in the spotlight needing to find a major issue with one of the company's critical signals. But it finally revealed itself when I really bore down on it and refused to believe all had been explored.

The point? Be resourceful, through and above all else, patient. I'm incredibly grateful for the resources and patience I received from Cris at Crawford's HQ. Crew after crew, two local consultants, a contract engineer, and even a drone flight didn't find what lurked under that tape at the ¼ wave, but we drove to the endzone with determination using the entire team and it didn't matter who scored but that we did score.

Intermittent issue can cause eye-twitches. Keep trying; do whatever you can. Use the resources at hand, whether they be support personnel, colleagues in other markets or the guy in the next office. Have confidence, you'll get it eventually. Each time you do your confidence will grow.

Now I have to go and figure out why our AM guy's mic intermittently "goes flat" while he's talking.

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

And another year begins! As it happens, I shall turn 65 on the 25th of this month, but my mind is still nice and young. (I hope.) Not a whole lot happened here in December, with the exception of installing the new Wheatnet stuff in our studios. Todd and Jack have been concentrating on that.

I took some vacation over Christmas visiting the family in North Carolina. My task before leaving was to make sure that all of our sites were ready to go with some form of aux transmitter or backup STL feed while I was gone. But as it turns out, all was quiet. Todd and Jack did their usual outstanding jobs. It's a real blessing to have assistants who can handle things while you're out of town.

I flew with Delta. I've grown to love that airline and it's my carrier of choice. The plane wasn't filled by any means and Delta was offering some special incentives so ... long story short, Sandy and I flew first class. We were on CRJ900s – not exactly my favorite plane – but at least we had some leg and seat room. The only excitement was on the final leg, coming back home on Saturday. The plane that did the flight from Atlanta

(ATL) to Birmingham (BHM) shook and rattled enough to worry me at times. But we made it, thank the Lord, and all is well.

2020 ends on a sad note: Chris Tobin, well-known to those of us in the engineering community, died in December while shoveling snow. Folks, listen to the doctors when they tell us to be careful doing that! Take breaks, drink plenty of fluids, and don't overdo it. I never met Chris in person, but I have done a few TWIRT (This Week in Radio Tech) webcasts with Kirk Harnack, where Tobin served as co-host. His death was a shock and a surprise, and my prayers are with his family and friends.

Wheatnet

This really is the big story for the month. I know some other markets (notably Chicago and Denver) have been installing the new LXE surfaces and additional blades, and once a few glitches were worked out, Todd and Jack were able to begin our project. Given that the studios are mostly empty right now, and that many of our employees are working from home because of COVID, it's an ideal time to do something like this.

I'm really pleased with the way that the new stuff looks. Cris ordered filler plates to cover the holes in the tables. These were huge, because we're replacing older G6 control surfaces. It looks pretty nice to me (Figure 1). Jack is threatening to do strange things with the OLED displays and button colors. Maybe I shouldn't encourage him, but I couldn't resist: the thought of a flaming eyeball moving across the surface quickly, and at random, makes me smile.

Figure 1 - Nice job by Todd and Jack!

Backups!

We all hear this constantly. We're told to do this regularly. And yet, we find reasons to put it off. I'll share a story this time that, thankfully, didn't involve a critical server at work. In fact, it was a personally owned computer: Sandy's old Dell laptop. The hard drive had started chuckling a few weeks ago, so we essentially switched it off and ordered a replacement, a new HP.

When the new HP arrived, I switched on the old Dell and it wouldn't boot. Uh, oh. I won't bore you with all the details, but it appears that a hardware failure on the hard drive is to blame. The primary superblock (i.e., the data that acts as the "master index" for everything else on that partition!) was unreadable. Further, this was part of a Logical Volume Group, using Linux's Logical Volume Manager. I was able to find some backup superblocks on the partition (Figure 2), but as of this writing, I've been unable to mount it and pull any data off of it. Rather than make Sandy wait for her new HP, I'm next going to try to pull her bookmarks and passwords from her phone, then import them over to the new laptop.

But back to frequent backups. We all are familiar with the problems: nowadays, we have many gigabytes (if not terabytes or more) of data, and it takes time to copy all of that to a safe place. It's not a casual operation. But it must be done, and I want to slap myself for failing to make a recent backup of Sandy's laptop as soon as we heard the hard drive start grinding.

(Well ... actually, I did make a backup, but had a senior moment: I was using the excellent PartedMagic disk tools. I booted onto the PMagic USB drive, zipped up her critical files, then copied them ... but I completely ignored the fact that PartedMagic runs in RAM. In other words, all of the critical files were copied to RAM, and disappeared into the ether as soon as I switched the computer off. Sigh.)

Logical Volume Management (LVM) and RAID

These things are nice, but they are not foolproof. What if you're hit by a "crypto" virus, one of those things that encrypts your entire drive and wants you to pay ransom to get it back? What if you lose the RAID controller itself? What if several

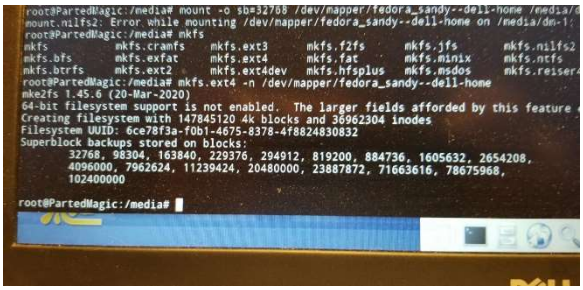


Figure 2 - My poor wife's laptop lost a hard drive.

cylinders (or the equivalent, in a solid-state drive) have become unreadable? If enough data is corrupted, whether under LVM or RAID, you're *hosed*. It's just that simple, and that's what happened with Sandy's laptop. When that superblock was physically damaged, the entire volume disappeared. To be honest, I may have made matters worse in my attempts to recover it; long story, and I won't share it here.

But the bottom line is: MAKE BACKUPS. Regularly, faithfully, and regardless of how inconvenient it might be, or what other things you need to do. It's as essential as changing filters and cleaning the equipment at your transmitter sites.

I've also got to share my thoughts on both RAID and LVM. These aren't foolproof. They have strong advantages, but see above re: losing something in the hardware. Your worst nightmare is to have your disk(s) spinning away, corrupting data right and left without your knowledge. LVM, in particular, is subject to write caching failure modes. In other words, to speed things up, the computer might stack up everything that needs to be written, and then write it out to disk later. That way, your computer runs nice and snappy. But obviously, if anything happens to prevent that write (power failure and your UPS didn't work, hardware – as already mentioned – or you name it), you're hosed. Badly.

A final thought on solid state drives. Some years ago, I mentioned some in-depth research that showed that "consumer" hard drives really weren't much different from expensive so-called "enterprise" units. That may not be the case with solid state drives. From what I've been reading lately, these range from dismal to acceptable. These definitely use write-caching, and the better enterprise-quality drives have supercapacitors (or the equivalent) to keep the drive alive long enough to ensure that everything is written, even in the event of a catastrophic power failure.

Solid state drives are becoming better and more reliable all the time; this is a moving target. But for now, be very careful about trusting a $70 SSD in your critical file server. This will no doubt change as these drives are improved. But another side of this coin, in my humble opinion, is that old-style spinning disk hard drives aren't as reliable as they used to be. There are reasons for this – the biggest is that, to get that terabyte capacity, the manufacturers are cramming zillions of tiny little tracks ("cylinders") on the magnetic disks. There's little room for error there. Imagine a microcassette tape with 32 tracks on it and you'll get the idea; in truth, a typical high-density hard drive crams the data more closely together by several orders of magnitude. Itsy-bitsy, tiny little tracks.

Anyway. Bottom line, can't say it enough: MAKE REGULAR BACKUPS. Do your personal equipment as well, whether it's your company-supplied laptop, or those devices that you own.

Figure 3 - COVID-safe entry for contortionists!

Thoughts About 2021

It has become pretty clear (to those of us

who don't get our news from CNN, anyway) that the presidential election suffered from spectacular fraud and cheating. The mainstream media keep saying, "There's no real evidence of that," but they obviously don't want to investigate it. Donald Trump should have been reelected in a landslide. I am still praying that God will expose the corruption behind this farce, and I hope you will as well.

On the lighter side, I saw Figure 3 today (as I write this) at a travel stop near Cullman, AL, and posted it on Facebook. My brother commented that it would be perfect for a chiropractor. For most of us, though, the very idea of trying to stand on one leg and put a foot into that hook makes one itch. Ain't gonna happen.

But this is typical of some of the insanity that is going on around us. Look: COVID is bad. Especially if you're elderly, or have serious medical issues, it can kill you. But Sweden, which has never locked down to the extent that we have, has a death rate (as a percentage) that is much lower than ours. How can that be? There's a lot of evidence now that forcing people to stay home, all living in the same house, may actually cause more people to become infected, because one person will run to the store, pick up the virus, then bring it home to the entire house.

Maybe? I don't know. Google this and you'll get a dozen different opinions. I just know that this can't continue. I've never been big on conspiracy theories, but daggone, it's hard not to wonder when you see Lowes and Home Depot open for business, while churches are told to stay closed. (Thankfully, the courts are finally getting involved in that.) Many small business operators, especially restaurant owners, are becoming quite desperate. I realize that the government has just churned out another "stimulus" package, but eventually that bill is coming due as well. We've borrowed the money for that, and the national debt has been growing exponentially.

But hey; God is in control. I honestly don't see how anyone can live without faith in an almighty, loving Heavenly Father. And it's not just a throwaway line each month when I finish with, keep praying for this nation!

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

As we begin the New Year, I am reflecting back over the last year. I am sure we are all trying to put this last year in the rearview mirror as quickly as possible. With that said, I can certainly see many positives in 2020 along with the big obvious negatives.

How I view 2020 from a work standpoint is that it was a year of learning. I knew we had a big year ahead of us as we were still trying to complete a 2019 project when the year began, and then we had a really big project looming with a complete rebuild of our control rooms with a total conversion of the facilities from the Wheatstone TDM Router system to the Wheatnet audio over IP system.

The reason we had a 2019 project still remaining was that we had an issue with an antenna replacement that was about to ship in late 2019 but somehow the deicers were left off the antenna build. I caught that omission just the day before it shipped. Then once it did ship, we had trouble finding a weather window for a tower crew to replace the old auxiliary antenna on our Lansing tower.

The plan called for a two-frequency antenna so we could create a lower powered offsite auxiliary site for WPWX on the Lansing tower. We would use the frequency agility of the recently installed Nautel GV5. We installed a 1-5/8" coax switching network so that we could position the GV5 on the new dual frequency antenna.

Once the antenna was installed in February, and due to the deicer installation, it ended up being an antenna with two 3" bays that could handle 30 kilowatts. Crawford Broadcasting Director of Engineering, Cris Alexander recognized this as a golden opportunity to actually up the power considerably if we installed a new transmitter and replaced the transmission line with 2¼" coax. In this case, it was

17 kW ERP.

So, just as we moved into the thick of the pandemic quarantine and with the studio rebuild looming, we got ready to take shipment on a new Nautel GV20 transmitter. This was still in the early days of the pandemic and the world was still trying to get a handle on the way in which the virus was transmitted. Still, our engineering crew didn't flinch, and with masks on and hope that none of us had the virus, we worked closely together and got the installation of the transmitter finished.

The transmission line didn't show up until later in June, but once it was finished, we were able to go on the air from the offsite auxiliary should we have problems at the main site. While the coverage was obviously not as good as the 50 kW main site that was much closer to Chicago, it does hit the main neighborhoods the station's format is trying to reach. Our Program Director was quite pleased when we tested to signal.

While we were in the middle of that installation, the new LXE control surfaces and a stack of blades showed up. Since we were also getting new studio cabinets as part of the project, we had to work through the logistics of where to store everything. One bright spot was that with the pandemic, no one was using the conference room. The other good thing was the cabinetry manufacturer was 90 minutes away, so they agreed to deliver the cabinetry when we were ready for each room, so we didn't have to find storage space. Once we cleared out the old equipment and cabinetry, they would bring in the new cabinets. It worked out well.

This project was really a lot of fun for the engineering crew, and it was definitely the highlight of 2020. There was also another smaller project with the replacement of the Trango 18 GHz Ethernet radios that connect the Hammond Studio to the Lansing site. This involved antenna replacement as well.

Looking towards 2021 last month, I had decided to look for a way to replace our two T1 lines out to our Kirkland transmitter site, which is 100 miles away. I figured that was something we would have to address anyway at some point. Well, at the risk of being called Nostradamus, in mid-December, we got word that the phone companies were quadrupling the rates on our T1 lines. So we went from thinking about ways to replace these lines to we've got to do it *now*!

We do have a plan fairly well fleshed out at this time and have already had some of the installations in place. But we'll save that for next month's *Oscillator*.

It's hard to imagine 2021 presenting us with the challenges and learning opportunities that we had in 2020, but then again, who knew at this time last year that 2020 was going to what it was?

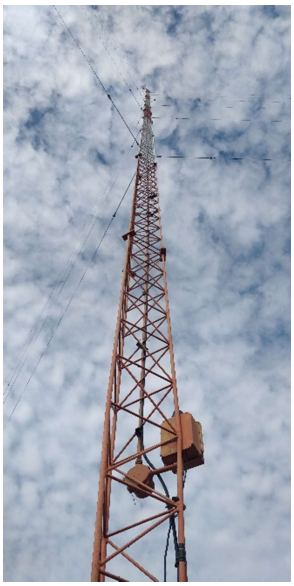
Valley News
By
Steve Minshall
Chief Engineer, KCBC -- Modesto

One aspect of broadcast engineering that I have really enjoyed over the years has been tower inspection and maintenance. Over the years, studios have gone from cart machines to SSDs, but towers and antennas have stayed pretty much unchanged. I enjoy walking the fields, sighting up the towers and checking on the guy wire hardware.

Throughout the years, I have spotted three broken guy wires on different occasions, and this does not count the 350-foot tower that was cut down by vandals.

During an inspection of a five-tower AM site, I found a pile of black cord lying all over the fence. At first I was not sure what it was, but soon realized it was Philistran guy cable. Looking up at the nearby tower, I could see that it was missing one guy at the top level. The tower was bent over resembling a banana. The cable had been damaged perhaps by a bullet, or maybe during original installation, eventually resulting in a failure of the inner Kevlar strands.

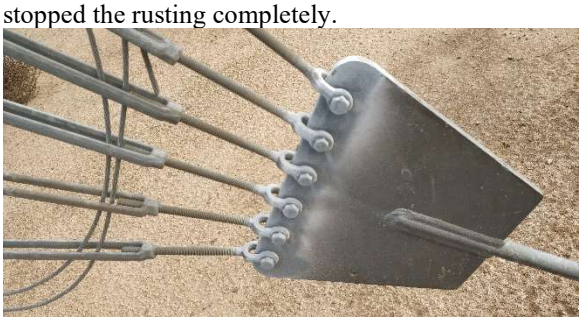
Years ago, I worked at a station where we installed a 120-foot STL tower at the studio. The guy wires were anchored to steel posts in order to clear the building. I thought the backstays for the posts were poorly engineered, and it wasn't long



before I was proven correct. One morning I came to work and immediately noticed the tower guy wires were loose and lying across the roof of the building. The steel post was bent over, and the tower was leaning. The backstay cable had broken. Probably fifty people had already walked by the bent post and under the sagging guy wires but no one had not noticed anything wrong.

Very recently I was working at a TV translator that I maintain by contract. After I was done working on the station, I did a quick look around the site. I found a guy cable lying across the trees of the orchard. Evidently, someone ran into it with a farm implement. I can only assume that they must have known they broke the cable, but no one had reported it. Someone was very lucky not to have been wearing a 500-foot tower home.

Recently I did a walk around inspection of the KCBC site. I found all in order. Sighting up the towers, they all were straight as an arrow. In the past, I found some rusting of the hardware at the anchor points and I sprayed the offending parts with cold galvanizing paint. So far, the zinc rich paint as stopped the rusting completely.



The cold-galvanizing paint has kept this anchor plate rust-free.

Now perhaps it's time for high tech to get involved with tower maintenance. Many engineers are now using drones for tower inspections. I have seen recently that drones have been used to spray herbicides at dams and even been outfitted with flamethrowers to rid trees of wasp nests in the south Pacific. If a drone can spray herbicide or gasoline, then why not some red paint? With the huge expense and inconvenience of tower painting the old-fashioned way, I can see the use of drones for tower painting in the near future. A quick search on the internet reveals that drones are already being used for other painting applications. It looks like the future is here!

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

COVID, a four-letter word with five characters. The first of the four horsemen has become a foundation of creative response at KKPZ with our audience and staff, and in Oregon in general.

Several of our staff established a pre-holiday quarantine regimen to reduce or eliminate exposure to the virus. Meanwhile, our governor has locked down more and more of our daily interaction, closing restaurants, stores, and other small businesses.

The pandemic response to conditions at care facilities prohibits visitors, with interaction limited to phone conversations. My kid sister currently resides in a care facility, which begins to feel like a small jail cell rather quickly.

The station facility has the same feel these days as there is seldom more than one person in the building at any particular time. This is a practical answer to the medical and political conditions. It also limits the positive interaction between our station and our audience. Not well covered by media is the apparent inverse relationship between strict

lockdowns and the proliferation of the virus. Tighter lockdowns do not appear to be effective in limiting the rise in cases.

Obviously, I have been paying particular attention to my sister's health situation, and found it's never too late to learn. Diet does have a great deal to do with immunity and health. Generally, a plant-based diet can enhance health with a great deal of power.

Originally, as the new vaccines were coming on line, Operation Warp Speed had prioritized the initial rollout to healthcare workers, the "elderly," and those with health limitations. More recent decisions at the incoming federal and the state levels has changed the priority to healthcare workers and residents of long-term residential health care facilities. The "elderly," and those with health limitations, no longer appear to be a priority. In any case, if I ever get access to the vaccinations, I will eat a few florets of fresh broccoli to boost the effectiveness of the vaccine,

So the political and practical health aspects of our day-to-day response to the pandemic has become a new normal. Life goes on in the new normal. That is until it doesn't. As I noted above, our staff was practicing a pre-holiday quarantine regimen, and of course it was then that the internet connection began acting up. Slowwww only begins to describe using the internet. Some 34 seconds to load a page, and any uplink activity required by a remote application was just simply impossible.

Our internet is provided by Comcast, which is the only service that's readily available. In this pandemic environment, contacting Comcast repair is just wonderful. Not.

With no one actually in house at Comcast, the automated contact process shows every flaw in design and execution. The result is hours spent on the phone attempting to get resolution. I will avoid a detailed description and save both space and patience by simply saying that it took hours on the phone just to report the problem. Of course, (according to their recorded announcement) I could have gone online and reported the problem. Yeah, right!! Well at least we didn't have internet phone service at the building.

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

Wheatnet, Wheatnet and more Wheatnet!

What a month December was! It was filled with removing old Wheatstone TDM equipment and installing the new Wheatnet equipment.

The first studio, KLVZ, we began on November 30. This studio was difficult. The room is small and allows us no access to the back of the cabinets. This meant all the wiring work had to be done from the front, which just made things a bit more difficult.

We began working in the studio at 6AM and left close to 5PM that evening, and we still weren't done. We knew this studio would be the longest, as it was the first one. We had to figure out a rhythm for the other three studios.

It was also a learning experience with the LXE console. We had clearly misplaced/lost a USB drive with some software that we needed to configure the console. We also had printed an outdated version of the user manual (from the manufacturer website), which led us some distance down the wrong path before we discovered the effort.

I began opening other boxes and found another thumb drive, which saved us. We were able to install the software and print the updated manual.

I really enjoyed being able to clean up the wiring in these studios. Years of removing/adding new equipment somehow meant the wiring was a bird's nest. And those studios were pretty much put together in one day when they were moved from the old studio location near downtown. While it still isn't perfect, it is much better than it was.

I am really having fun learning the new LXE consoles and figuring out how to program up the buttons and really customizing them. While we don't need a bunch of customizations here in Denver, I am

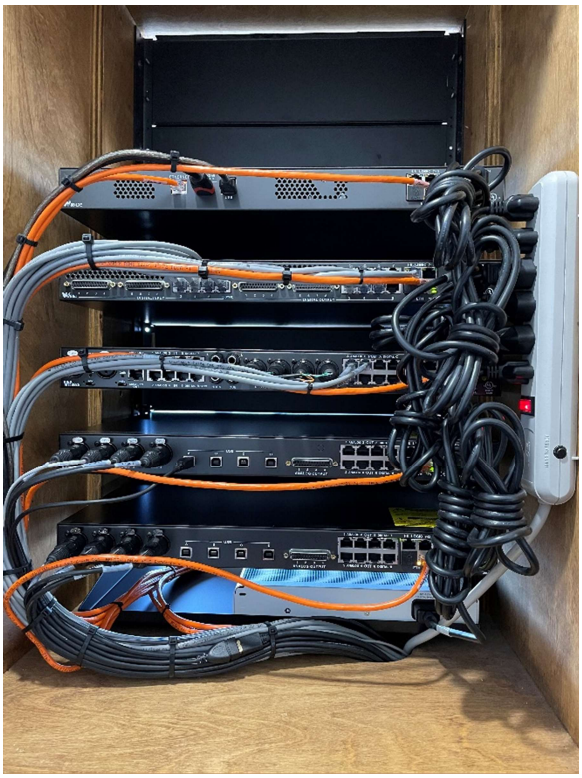
Getting the new equipment configured and ready to install.

waiting for the one person who wants to take the leap and try out some new things. We have a few people who I think will one day want to try this out.

We proceeded with the next three installs on the 7th, 14th and 19th. Each one went much smoother than the previous. KLDC was done on the 7th, and it was the easiest room as it had the best access to everything. I remembered all the stuff I did in the previous room, so I had a flow to go with. Get in there, unscrew all this stuff, remove it, then begin pulling these few network cables back to the box in the wall and then this and that. Because of how the other room went, I knew what to look for and how to do the work in the next room.

The KLZ control room with its new equipment, still waiting on some rack filler panels.

KLTT was a bit more difficult because it is a "sit-down" studio, so everything was lower with the equipment racks on the ground, and there was maybe a foot for me to fit between the wall and the back of the cabinets. It made for a long, uncomfortable day.



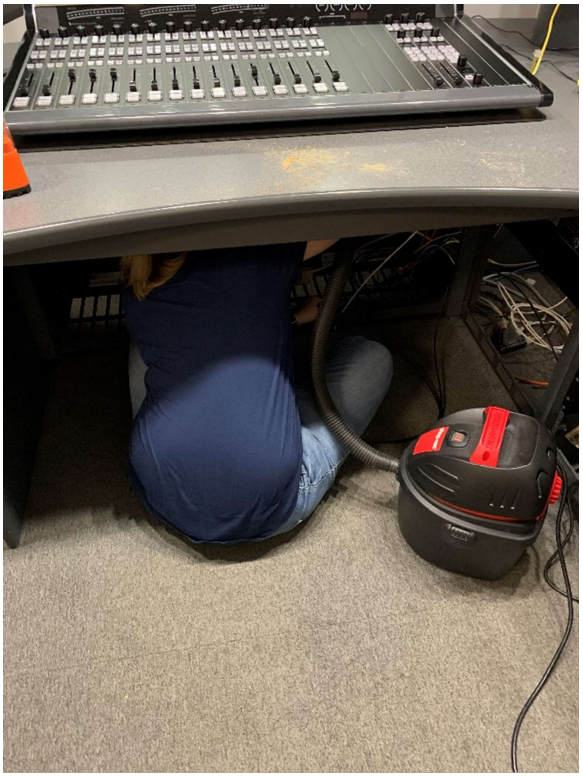
The KLZ blade stack from the rear. By the time you read this, the bundled power cables will have been replaced with 1-foot EIA cables.

KLZ we decided to do on the Saturday before Christmas. My dad had Christmas Eve off already, so had we started on Monday, we would have had three days to get that room and then the TOC done.

The Denver TOC -- almost done.

We decided to do the work Saturday when no one was at the office, and we brought in my mom and husband to help us out. They helped make the

day go by faster. Instead of stopping to go get lunch, we were able to get them to go so my dad and I could keep working. My mom did a great job helping keep the work space cleaned up and organized, and Jordon did much of the heavy lifting, including helping get the big groups of cables through the remaining wiring in engineering without having to cut anything and without knocking any stations off air. Both Jordon and my mom made this last studio fun to do and made the day fly by.



This is where I spent much of my time during the project, folded up like a pretzel under the cabinets.

By getting this work done on Saturday, it allowed us to come in Monday and begin working in the TOC, identifying any remaining wiring that needed to be removed and then rerouting and reorganizing the remaining cables, making sure all cables were cut to the proper length and just getting things looking good again. This also allowed me to take Christmas Eve off and spend time with some family and have a lengthy time off as I had the time off between Christmas and New Year's, giving me a full nine days off work. It has been a much-needed break, and I have enjoyed resting up.

What Awaits

When I get back to the office on the 4th, I will still have work to do in engineering. All of it is minor, just things to help make things look and flow better. I will move some equipment around in the racks, redo some more wiring in the back of the racks and then re-route some wiring. We have a plan to keep all the orange Wheatnet wiring in its own bundle with everything else separate.

I am excited to be able to spend some time messing with the consoles and Navigator and getting things the way I like it. I have many a filter to create in Navigator to help us quickly find and keep track of everything. I will need to go through Navigator and make sure all the sources and destinations are labeled properly, and anything no longer used is relabeled to the default.

One thing with the old X-Point (Bridge Router control software) that I was bad about through the years was labeling. I cannot tell you how many things were no longer used or changed names and I did nothing but remember it in my head.

That about covers it for December. I know many of you will be reading this after but remember to wish my dad a happy birthday (12/30). He is 60-years young and still going strong! I pray you all stay safe and well.

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770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz/97.5 MHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz/95.1 MHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz/94.3 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
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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
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