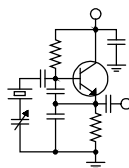


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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I Love a Parade!

As we sail through the summer months, the project parade continues. Last month, we did the tower light project at KLZ in Denver. In this project, we replaced the old H&P red beacon and marker light system (circa 1962) with a shiny new dual medium-intensity white/red Dialight LED system, which will eliminate the requirement to paint those two big 450-foot towers every few years and will save us a chunk of change on utility bills as well. We fairly well chronicled the project in the May issue of the *Oscillator*, but there have been some developments since.

The tower crew that did the installation provided me with the contract-required photos of the completed work, and I was not happy with some of what I saw. The primary issue was with the 8-conductor shielded UV-resistant SO cables that were used to connect each LED beacon/strobe fixture to the controller. Clearly the installer did not know what to do with the braid, despite the instructions contained in the manual, and so he pretty much removed all the braid and simply put the foil overall shield in the clip. That left each beacon fixture with only a thin piece of tinfoil for a ground.

Rather than have the original crew redo the beacon wiring, we sent tower climber/engineer Derek Jackson up, and he did it right, completely reworking the wiring at each level and connecting the braid to the supplied grounding block in each fixture. During this rewiring project, we discovered that the top beacon on one of the towers was mounted in such a

way that the fixture could not be opened to access the wiring because the hinge side was so close to the old beacon wiring J-box. We had Derek remove that J-box and install a “shark bite” ¾-inch cap on the

conduit. We also had Derek replace the CAT5 cables on the 11 GHz microwave system on the west tower with new UV-resistant shielded CAT5 cables. Those old cables were not UV rated and the outer jacket was completely gone in some locations.

So... we will stick a fork in it and call the KLZ tower light project done.

Now we move on to other pending projects, the first of which is the Wheatnet-IP project at KBRT. Back in 2015, we converted much of that facility to Wheatstone AOIP, including all of Nexgen and two production rooms. We did not do the control room at that time because we still had three years left on the Audioarts D75 on-air board. Those three years are up and now we are making preparations to replace the D75 with an LX-24 20-channel surface. We also plan to convert the remaining production room to Wheatnet. Mics in the talk studio, control room and remaining production room will be handled with processing mic “blades,” which will bring them into the system as individual sources, a departure from the old way of doing things, which employed a Shure SCM810 automatic mic mixer.

Amanda and I plan to head out to the west coast on Monday, July 15 and plow through this project in a couple of days. We will use StudioHub RJ-to-XLR adaptors for all the audio connections, and there aren’t many of those because Nexgen will



all be AOIP. Todd Stickler has been busy laying the groundwork, and we expect that he will have most of the production room project done before we get there.

We have to update the Navigator software in the station, then update all the blade and driver software before we start. That can be perilous (see Rick Sewell's column in this issue), so we'll have to be careful. We will also be making some changes to the network architecture to accommodate the additional traffic.

At the end of the project, west coast flagship KBRT will be all Wheatstone AOIP, from microphone to STL codecs, and it will be digital all the way to the transmitter. For our HD Radio listeners, it will be digital all the way to their radios. This is exciting for many reasons, one of which is that it will make the entire facility completely remotely routable. We have used Wheatnet to do some routing to bail us out of tight spots over the past three years, for example when an audio server failed, we were able to use a secondary audio server to play out the programming and route it to air in both Los Angeles and San Diego using Wheatnet, all from the very mouse and keyboard here in Denver with which I am writing this. With the entire facility converted to Wheatnet, the possibilities will be endless.

After that... we have budgeted this year for replacement of much of the Trango and Dragonwave microwave equipment in our company. Trango went belly-up a few years ago, and while it has been acquired by another entity and is still around, there is no support of legacy equipment. We plan to convert to Cambium equipment that has a huge installed base and reputable support. The question is, will the Cambium radios work with our existing antennas, especially the Trango-branded antennas? That's my next project, and we'll let Denver be the guinea pig because we have rooftop access to all the links at the

studio and an engineer/climber (Derek) that can tell us in a hurry what the situation is on the towers.

A Big Change

Brian Kerkan, chief engineer of our Detroit operation, has accepted a position in Florida and left the company at the end of June. We will miss Brian, one of the most capable engineers I have ever known. We wish him the best in Florida, which will be a lot easier to tolerate in the winter. During hurricane season... maybe not so much.

The search is on for a replacement, and we have a good prospect. Hopefully in these pages next month I will introduce you to our new Detroit CE. In the meantime, Steve Cuchetti, the assistant engineer for the market, will be looking after things. Rick Sewell and his crew down I-94 in Chicago may pop in from time to time to deal with any issues that Steve needs help with. We also have some good contract engineering resources on which we can draw, so I think we're fairly well covered in the transition period.

This is Only a Test

The next national EAS test is set for Wednesday, August 7 at 2:20 PM. Eastern. I have filed the required Form One for each of our stations, so we're good to go there. I plan to be on vacation and off the grid the week of the test, so Stephen Poole will be handling the Form Two same-day reporting. I'll send out instructions the week prior so that everyone knows what to do.

Right now, however, is the right time to make sure that all your EAS equipment is in good shape. Make sure that all your monitor sources are coming in loud and clear with no interference or noise, and that you're receiving weekly and monthly tests as required, including IPAWS tests.

The New York Minutes

By

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

Hello to all from Western New York! The frigid Canadian winds and blowing snow have finally given way to warmer southern breezes and rain, a sure sign that early summer has finally arrived!

I don't remember the vegetation growing as fast at the tower sites as it has this year. In just a matter of three or so weeks, the grass at the WDCZ transmitter site has grown over waist high. Constant rain has kept me from getting the grass cut for the better portion of late-May/early-June, so when the weather finally broke in mid-June, the cutting was on! I like to keep the growth cut low in and around the towers, as it keeps the rodents and insects at bay and also keeps the grass and vines from inching up the tower legs, causing impedance issues with the network.



WDCZ tower field before mowing.

As the WDCZ transmitter site is located in a residential area, we must keep the grass cut no higher than 10 inches (according to the Hamburg Town ordinance) or we face the possibility of a fine from the town's building and grounds inspector. This applies to the land around the building and also where our property adjoins other properties.

In areas where property boundaries meet, the grass must be cut 60 feet from the adjacent property owner's boundary, except in the event

where the properties are separated by wooded areas. Therefore, the tower field is exempt from the 10-inch measurement, so I generally try and cut it at least twice during the summer months. Once the initial cutting is done around the towers and herbicide is

sprayed around the tower bases and fencing, keeping the site mowed and trimmed can be accomplished and maintained with minimal effort.

In Rochester at the WDCX(AM) transmitter site, we normally have the field cut near the end of July, but due to the warmer temperatures and above-normal rainfall, the grass grew at an unprecedented rate. By June 1, most of the

field was at or near the top of the 6-foot fences surrounding the towers. Our mowing contractor was



WDCZ tower field after mowing.

reluctant to use his conventional tractor to cut the field as there was a lot of moisture still on the ground. Attempting to cut with the ground as wet as it was would have caused considerable problems with the tractor getting stuck in the mud, and most importantly, potential damage to the ground system of the 6-tower array.

In order to get the property mowed before it grew unmanageable, the contractor used a Trac-Cat, which has a brush-hog on the front and rubber tracks



WDCX(AM) tower base area after mowing.

instead of tires. With this piece of equipment, he was able to get the field cut with no problems. Hopefully we will have a drier summer which will retard the growth so cutting can be kept at a minimum.

As broadcast engineers, we are tasked with keeping our facilities running as smoothly and efficiently as possible and at minimal costs. This requires us to perform maintenance/repairs on equipment which is beyond that used for strictly broadcast. Performing preventative maintenance on equipment is one of the best failure-preventative actions we perform.

Near the end of May, I began servicing our A/C systems at all of our transmitter sites to get a leg up on the cottonwood and dirt that normally accumulates in the condensing coils. Our HVAC contractor gave me several cans of Vu-Brite last year to clean the coils and showed me what needs to be checked and serviced to maintain a good working system. Following his instructions, I cleaned the coils, vacuumed out the entire enclosure and checked vital electrical connections for tightness and signs of heat build-up and corrosion throughout the units.

Despite all this, in less than two weeks, both the A/C units at the WDCX-FM transmitter site failed! I called Solly Industries, our HVAC contractor, and they immediately came out to repair the units. In the first air conditioner, he found that a relay controller board had failed. He had a new replacement on his truck, so he was able to get it back up and running quickly.

The tech took a lunch break and returned an hour later to troubleshoot the problem with the other air conditioner. As he was working on the unit, a loud boom emitted from the first unit, causing the breaker

to trip. Returning to the first unit to determine what had blown, he found that the compressor had shorted! He was at a loss as to why the unit failed, as the head pressure checks were well within limits, but attributed it to the age of the unit – which is 12 years old.

Getting back to the second unit, he found that the condensing coils in the rear were clogged, causing the unit to not cool properly. He mentioned that I had done a great job in cleaning the front of the coils, but without using a pressure washer, the cleaning of the rear coils is all but impossible. As we do not have water on our property, he had to go back to the shop to get a 55-gallon drum of water and a pressure washer to clean the rear portion of the coils.

The following day, he returned to replace the failed compressor. Both A/C units are now working properly, but a valuable lesson was learned: in some instances, it's best to leave the maintenance procedures to the professionals who have the tools to do the work properly!

On Thursday, June 20, while in the middle of our afternoon talk show, the Telos 2x12 phone hybrid began shutting off and on, along with the two desktop directors attached to the hybrid. We shut the system down and began troubleshooting the issue. It was found that the host desktop director was causing the issue. As we do not have any service information available, we sent it back to Telos for repair. In the interim, the host is using his laptop to log in to the call screener software via VNC to put the phone callers on the air.

On Monday the 24th, while on the air live with Andrew Farley, the call was disconnected and immediately there was a woman on the air speaking Spanish! She had not called into the station. Apparently she was talking to someone on another line, and somehow she was connected to our phone hybrid! We immediately went to dump on the delay unit to get the unknown caller off the air. Meanwhile, Andrew tried unsuccessfully numerous times to reconnect with us with no success. I've never seen this happen before, but I guess with fiber VOIP, anything is possible.

If any of you has any ideas or have had this happen to you, please let me know. I am hoping this was a rare, isolated incident. The incident was recorded, and we had one of our employees who speaks Spanish, listen to the playback to ensure that nothing offensive went over the air. The woman was talking about a birthday, so we were counting our blessings after that event!

News from the South

by

Stephen Poole, CBRE, AMD
Chief Engineer, CBC–Alabama

As usual, we start with the weather. I see where Cris and the gang out in Denver had yet still more snow last month; we’ve had one heavy rain after another. We have moisture condensing everywhere, mold in places ... and bugs. Lots and lots of bugs.

In addition to being bit on a part of my body that shall not be named, I have bite-bumps on my arms and legs. Maybe mosquitoes, maybe fire ants. The latter have the adorable tendency to *float* whenever the ground is saturated. If they find your foot, they’ll climb up your leg and sting you on general principle, just because they can. Eventually, a queen will float some distance from the old hive and establish a new one. Seriously, one sure sign that you’ve had a lot of rain is new fire ant mounds dotting the landscape. It’s a beautiful thing. Time to break out the Amdro Fire Ant Killer.

The best one, though, occurred at the studios. As engineers, we get all sorts of requests, some strange, some routine. In late June, we received an email from Justin Brown, midday host on WDJC-FM, stating that there was a “bad smell” in his office. Ah. OK, we should run that down. Because Jack is the junior assistant, he was dispatched to investigate. (Rank doth have a privilege or two, and running down foul odors ain’t exactly my strong point – especially not given that my sinuses have been stopped up since April.)

Jack did indeed investigate, and forthwith reported that, indeed, there was an odor most foul in the environs of said Master Brown’s office. It seemed to arise when the lights were turned on. It actually took some time to run it down, but Jack eventually found the World’s Largest Stink Bug inside of one of the ceiling fixtures. The light would frighten it, and it would then engage Chemical Warfare Protocol #1. Just because it could. Malodorous t’was, indeed. Donning a hazmat suit and gas mask, then flinging said stinky bug back into the wild took care of the problem.

Offsite Backup

We have a backup server now for our critical data, especially the RCS Nexgen stuff. Todd has

copied everything over to that server, and we are prepared to move it to Red Mountain. The studios have a high-speed Dragonwave link to that site, so, it’ll be a simple matter to do regular backups off-site. I don’t know if the Dragonwave would allow a rapid restore in the event of a meltdown, but (1), we really did want an offsite backup, running hardened Linux; and (2), the WDJC-FM site in Red Mountain Park is only about 10 minutes from the studios. In a

serious emergency, we could quickly go up and fetch the thing if we had to.

We’re still pondering the battle plan for this one, but I suspect what we’d do is use the Dragonwave to pull down enough stuff to stay on air, then physically fetch the machine for the Big Restore of everything else. We can then clone the original drive with data intact.

Hardly a week goes by without another news report of someone getting hammered by one of those “Crypto/Ransomware” viruses, so we consider this to be a pretty high priority. If only it would stop raining ...

Generator Monitors

I wrote about this previously. We have a combination of Arduino and Raspberry Pi units at both WDJC-FM on Red Mountain and WXJC-FM in Cullman. These monitor the generator and, should we lose power in the middle of the night, will send a warning, then reduce TPO if the outage is extended.

So far, so good, but there’s still more to be done – chief amongst them is the ability to remotely monitor the generator fuel. I had been wracking my brain for a reasonably-priced solution, then discovered that Tractor Supply carries some nice sending units that are well under \$100. Once the weather clears up, Lord willing, we want to get those in place.



Cullman Tower Lights

Speaking of the weather, during brief periods of sunshine, we managed to do more troubleshooting on the tower lights at the 101.1 FM site, and made some real progress this past month. The problem appears to be bad/corroded wiring in the junctions on the tower itself, some of which goes back to the original installation.

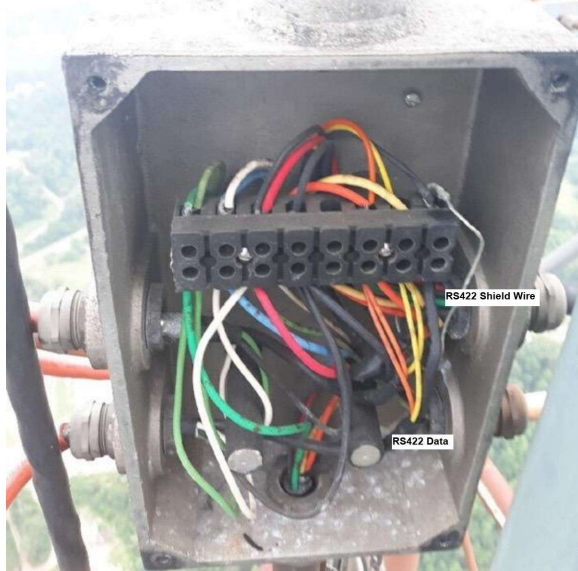


Figure 1 - The data shield isn't supposed to touch ground.

This is very time-consuming work. The tower crew has to climb to each level, then remove the covers from the junction boxes, temporarily rewire for ground tests, then move to the next level. But finally, I no longer feel like we're throwing jelly at a tree. Previously we were unable to get anything to sync or report status; all of the lights were "freewheeling." At present, as I write this, the bottom tier of lights is reporting status again, and the lights are in sync. Now for the remaining tiers, one at a time.

This lighting system uses a proprietary RS422 protocol for sync and control. The wiring is just odd; everything goes up the tower in a big, thick, double-shielded multipair. There is a big shield around the entire cable, which is connected to earth ground, as well as bonded to the tower. Inside, three large wires carry the 240V 3-phase to the lights. At each junction, you send different phases to different flash heads to even out the load distribution.

Also inside, though, is the balanced, twisted pair for the RS422, with a separate shield ... and this shield *can't* touch ground. The data pair must also be terminated at ground level and on the tower with 150-

ohm non-inductive resistors, for a nominal bus impedance of 75 ohms. You don't see the resistors in Figure 1, but it does show the original installer's attempt, which required heat shrink tubing and lots of electrical tape. They must have missed this one (orange and yellow are the data lines.) If that inner shield touches the outer shield, the junction box, or any other ground, the lights intermittently lose sync and the status reports on the monitor change to "missing." In the past, we'd get them working and assume we were done, but in time, they'd fail again.

Technically, we could blame this on the tower crew, because we carefully (painstakingly) explain this every time they troubleshoot. But it's human nature. If you see a shield, unless you're on a tower in Denver (evidently), you ground the daylight out of it. Furthermore, if you see multiple shields, you tie them together. Right? When you consider that it's late in the afternoon and the crew is tired (it takes many hours to climb that 1,380-foot tower), though, it's certainly understandable. In Figure 1, it looks like one of the "inner" RS422 shields was simply pulled out a bit and was contacting the metal box at times. I think it's a terrible design on the original manufacturer's (Orga) part.

What did we do before the invention of cellphone cameras and drones? We had to completely trust the tower crew. The AOL up at the very top has always been the most likely to fail, and in fact, that was the initial failure this time. Naturally, that's where we started. But this junction box is quite some distance from the top. While this is taking a lot of time (read: expense!), we're running it down. We're making progress, for which I truly thank the Lord.

The junction box up at the AOL, the one containing the 150-ohm termination, was obviously admitting water, so I had Jack build up a replacement. We used a sealed, waterproof box that formerly housed a Transtector that was cooked by lightning. We can still ground the outer shield of the big Orga cable with a stud through the side of the box.

Todd will finish up with something I promised last time: we think he has fixed the WDJC Audio Server issue. Until next time, keep praying for this nation!

Putting an ASERV Problem to Bed Todd Dixon, CBRE

Some of you have read here previously or have been queried by us about our problem with Windows 10 and it hanging our ASERV4 machine

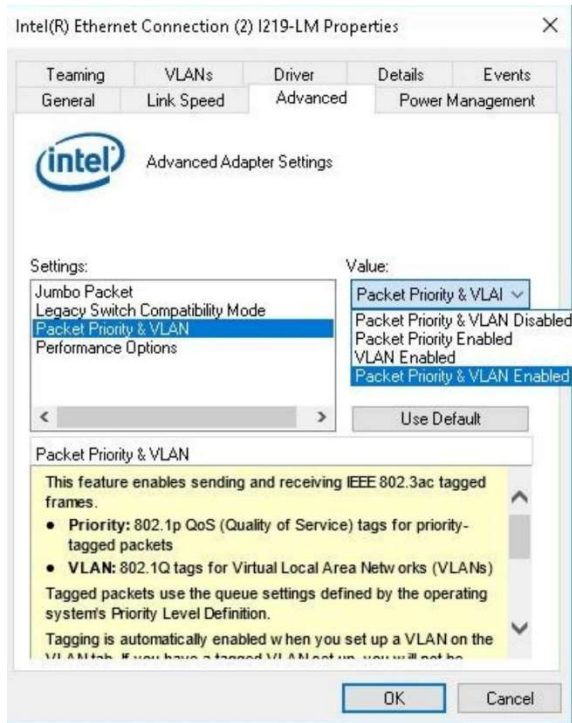


Figure 2 - Todd found this cryptic little setting in Windows 10. Might want to check it ...

(WDJC-FM) on a regular basis. The control room screen would go blank, and when you got to the actual machine, you would see Nexgen's telltale red message banner, "Secondary database not connected." Sometimes the hang was severe enough that it would force our other Windows 10 machine (ASERV2-WYDE) to completely blank his daily log.

The quick fix for the AS4 machine was simply to restart Nexgen. Keep in mind that I had gotten RCS support involved several times and Jack, Stephen and I had gone through their network documents step-by-step and multiple times at that. So, after a morning call that involved me pulling over to VNC (on my mobile!) into our system and restarting WDJC-FM's ASERV once more, I guess that was the proverbial last straw for me.

When I got to work 10 minutes later, I started comparing all of the ASERV machines (as I had done countless times before). This time I spent longer looking at network settings that RCS didn't direct you to, and I found that the Windows 7 ASERVs all had "VLAN and Packet Priority Enabled" for each network card (NetworkAdapter>>Properties> >Configure>>Advanced) and our Windows 10 machines did not (see Figure 2). Nexgen documents don't point you there, and I simply hadn't seen it because I wasn't looking there, but since that change to "VLAN and Packet Priority Enabled," we haven't had a single misfire on either of the Windows 10 machines and we haven't had to restart Nexgen for that reason in almost a month.

I wish that we could offer more of a climax to the end of the story than "Well, I clicked this and made it look like the settings on the other machines and now there is harmonious balance," but when dealing with computers, it is often just that simple (and frustrating). All of the drama was wrapped up in a simple mouse click.

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

We recently upgraded one of our production rooms from the Wheatstone TDM system to the Wheatnet system. We had to force it into a hybrid mode last year. Our automation computer in the room, a standard Nexgen workstation, was still equipped with an Audio Science card with the inputs and outputs connected to the punch blocks and the Wheatstone system.

When the computer first died, we were able to revive it by “Frankenstein-ing” some parts from another computer in the bone yard that was the exact same model. This worked but made us vulnerable because it was on Windows XP and our anti-virus software was no longer compatible with that operating system.

So, we eventually put a Wheatnet digital blade in the room as a sound card replacement for the Nexgen workstation and upgraded the computer. This hybrid mode, where the Wheatnet blade becomes a bridge of sorts between the Nexgen workstation and the Wheatstone TDM system, is what we use in our control rooms. So in that sense, the room was then more in line with the four control rooms.

However, it started me thinking that if the room was actually fully converted over to the Wheatnet system, we would have greater flexibility and be ready for the future, which would include a facility-wide Wheatnet conversion.

The most expensive part of the equipment was a Wheatstone E6 control surface and could be converted to function the Wheatnet environment. So it was really just a matter of purchasing a mix engine blade and few other items to move this room to the future.

The plan was put in place to make this conversion in 2019. Since we already had a digital blade in the room, we didn’t have to make a lot of purchases to make this work as entirely a Wheatnet room. Besides the mix engine blade, we needed some analog inputs and outputs for Wheatnet. Rather than

purchasing an analog blade, we went with the M4 mic processor blade, which can be used separately or as part of the Wheatnet system.



As you might expect, the M4 provides mic pre-amps and processing. And with a Wheatnet NIC, those end up showing up in your Wheatnet infrastructure as sources that can be connected whatever destinations you desire, in this case most likely on the E6 control surface faders.

The feature that the M4 has that allowed us to forgo the purchase of an analog blade was that it had four analog outputs. Since we didn’t really need a lot of analog outputs with the room mainly being AoIP and otherwise AES, the four outputs would be all we needed for main monitor speakers, cue speaker and headphones, plus program on hold for the telephone hybrid.

The Nexgen workstation has a four-channel Wheatnet PC driver, so it no longer needed to be routed through the digital blade and then onto physical wires. It now had its sources and destinations as part of the Wheatnet infrastructure and, subsequently, it is connected to the surface faders through AoIP connections.

We also have two other computers in the room, one for Vox Pro, a two-track editor and the other as an Internet PC for audio from the Internet. This PC keeps us from exposing Nexgen or Vox Pro to the issues that come with being on the Internet.

The M4 processor came in handy for these one-channel PCs. The M4 has four USB ports that will connect to the USB port of a PC computer and then Windows will recognize the port as a standard Windows audio device. This allows the computer audio to now be part of the Wheatnet infrastructure, showing up with a source and destination in the system. This saved us having to purchase a Wheatnet PC driver for each of the computers. The only thing I would like is for this to work with Mac computers as



The E6 control surface is now part of the Wheatnet AOIP system.

well.

We started the conversion process by entering the mix engine blade and the M4 blade into the system. At that point, the process came to a grinding halt. The two newer blades were at a later firmware version than the rest of the blades in the system, and they immediately took control as the route master.

If you have blades of differing versions on a system, you can have some weird things take place, like where sources become disconnected from their previous destinations even though they appeared connected and locked in the Wheatnet Navigator software. We saw some of this happening and immediately took the new blades offline.

We found out we needed to upgrade the physical blades to the newer firmware. However, this meant all of the PC drivers in all of the PC workstations had to be upgraded as well, all at the same time so everything in the Wheatnet system would continue to work together.

It took some planning and coordination with programming and operations, but we were able to get

everything converted within a couple of hours. We did face one major issue with the upgrade in that a couple of our Nexgen workstations would not work with the newer PC driver. We eventually isolated these two machines, which were the same model as our only 32-bit computers left in operation.



A new mix engine and M4 mic processor blade were added to the existing digital blade in the room.

Wheatstone stated the newer PC drivers should work with 32-bit computers, but we're fairly confident that was the issue. We had to purchase a few new computers to replace the older 32-bit machines.

Once the Wheatnet update was finished and all the fires put out for that, we were able to get back to the production room conversion. The E6 control surface had to also get a firmware update to switch it from working with the Wheatstone TDM system to the Wheatnet system. Wheatstone support helped us get that accomplished without a lot of problems.

The room has been up and running for a while now. It has been reliable and without any issues. It is ready for the future of an all-Wheatnet facility.

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

Remote Controls

When I got started in radio back in 1980, I was introduced to my first remote control system, a Schaefer system that used stepping relays at both ends of a two-pair DC phone circuit. Even then this was a pretty archaic system at that time that probably dated back to the 1960s. It did work, however, and it was a good introduction to transmitter remote control.

Over the years I've seen a lot of different remote control systems. It seems that almost everyone involved with broadcasting was selling their own version of a system. Some of them were pretty nice, and some were somewhat harebrained. I even homebrewed a couple of systems myself.

In the old days, remote control systems connected the studio to the transmitter so that the transmitter operator could reside at the studio. What a cost savings this must have been, not to have to maintain a transmitter operator at the transmitter site! In those glorious days, there was an operator on duty at all times keeping watch over the transmitter, usually from the studio site via remote control.

One system stands out in my mind from the old days. It was a Potomac Instruments system that was complete with a dot matrix printer and a desktop CRT for the studio. That was fantastic stuff back in 1986. The Potomac Instruments system had a neat feature in that it would interface directly with the older Potomac Instruments AM-19 antenna monitors, which required a relay closure for each channel to be read.

Somewhere in the 1980s, the idea of using a dial-up remote control system on a standard telephone line became a viable option. At the time, it was pretty controversial, raising questions like, how do you maintain a failsafe on a dial-up line? It was a whole new paradigm and was one facet of the eventual elimination of transmitter operators at the studios.

For the engineers, it was nice to be able to directly connect to the transmitter site via any telephone rather than have to talk the "transmitter operator" through the various steps. Still, the dial-up systems were somewhat cumbersome to use over the phone.

After a certain former senator invented the Internet, a new possibility for transmitter remote control was on the table. This is where I am today, installing my first Internet-accessible transmitter remote

control system. I'm pretty excited about this, but I know that many reading this have been using this type of equipment for a very long time.

I've been installing our new Burk ARC Plus Touch system here at KCBC. I am really impressed with this remote control and all the possibilities of what it can do. It has been a learning curve for me, that's for sure, but it's coming along nicely. It is really a joy to be able to bring up the user interface on my phone or my computer at home. It makes it much easier for non-engineering people to use the transmitter remote control system if the need arises.

The ability to use scripts and macros is an exceptionally nice feature. My uses for such are pretty limited, but I know of others who made great use of them. I know of one station with towers located in the San Francisco Bay that uses the scripts to constantly readjust the antenna pattern to keep it within tight limits while the tide changes. It has proven to keep rock solid antenna parameters as the water level changes beneath the towers.

Retirement

This month I have called it good after 28 years of working for I Heart Media and its predecessors. It has been a great run; I've done a lot of things that many engineers never get to do, and was able to work with a lot of great people, including some exceptionally talented RF engineers.



The Local Oscillator July 2019

I am very pleased to be able to continue on with KCBC. It will keep me active in the broadcast industry. I love radio, I love AM radio, and I love directional antenna systems, so this is a great fit for me.

When I started out in 1980, I worked for a station that had a four-tower, inline, directional antenna system with an FM transmitter at the base of

a tower. Now at the other end of my career I am working at a three-tower, inline, directional antenna with an FM transmitter at the base of the tower. Like all great stories, the end reflects the beginning.

I am going to thoroughly enjoy working with a single station now. I already feel more relaxed just having to be concerned with only one station. It sure does ease the mind and the blood pressure.

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

At press time, EAS is in the news. As I was writing this, we just received an NWS severe storm warning. Hail and lightning in Clackamas (and Mt. Scott) Oregon. A real storm, 60 MPH winds and quarter-sized hail. Not a hurricane, but a real storm.

On the other EAS front, Oregon is planning for the coming national EAS test. This test will be the first time we will initiate an EAN using the Primary Entry Point System. In Oregon, the message will be sent directly to our two PEP Stations. KOPB-FM 91.5 Portland Oregon and KPNW-AM 1120 Eugene, Oregon.

In the Portland area, we monitor KOPB as our LP2 Station. For the test to be successful, stations must be monitoring one or both of these PEP stations or a station that monitors KPNW-AM or one of the OPB radio or TV stations. In rural Oregon, many stations will be at the end of a long analog daisy chain of rebroadcasts. The quality at the end of the chain may not be so great.

As always, we have considered the Murphy factor. If for some reason (and everyone greatly hopes not), the test has issues, we can schedule a make-up Monthly Test on the 14th of August, 12:15 am. Murphy won't get an invitation this year.

Computers. Love them or hate them, they are a central part of today's radio environment. Even the equipment that isn't a computer often hides a computer inside.

One exciting aspect of this is the growth in

affordable test equipment. We are seeing this in the RF network analyzer market segment, of both VNA and SNA flavors. A small analyzer RF package

connected to a USB computer port allows a laptop computer to become the instrument front panel.

The first instrument familiar to most broadcast engineers was the Power Aim 120 (now the 150). That instrument took the place of a General Radio 916AL, RF oscillator, and paper logging and is a much smaller footprint and faster than the old workhorse.

Computers. Love them or hate them, they are demanding a larger and larger slice of the engineer's maintenance time. Fortunately, our mission-critical computers are high-quality, well-designed workstation computers. Equipped with a RAID mirror, each of them has had a drive fail in the past and continued to operate until the drive was replaced.

One of the systems has had the other drive fail and will have it replaced shortly. The remaining original drives, which have accumulated high operating hours, are likely to be failing soon and will be swapped out.

I have actually had more problems with the flat panel monitors, many of which have been repaired at least once and are now approaching end of life.

Until next month, keep track of the bits and bytes.



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

Tower Light Replacement

June started off with us getting the KLZ tower lights replaced with strobes. Those towers have been in need of paint for the last year or so, and when it came time to decide paint or strobes, strobes were the better way to go.

We hired a company that we have had do other work for us before, and they've always done a good job. They scheduled three days for the work, a schedule which we had our doubts about. They worked long days, to nearly dark, to stay on schedule. They actually finished up at the end of the week.

When they were done, they sent us photos of the work, which looked good for the most part. But there was a ground wire at each box that was not done right, despite there being clear instructions. Having little confidence that the original installers could get it right, we decided to have another guy we know, who has experience in broadcast engineering, come out and do this work.

We learned earlier in the week that these guys are iron workers, and doing the electrical part isn't really in their wheelhouse. The guy who climbed to correct the work found several other issues, major issues. The lights were not mounted properly. Some of the stainless hardware had seized and they just left it, barely hanging on the tower. They also mounted the mid-level lights on one tower in a way that the lights did not sit properly on the tower. Conduits were left open at the top of the tower, they omitted the drip loop on one fixture, and more. The original company came out and "fixed" the hardware issues per our request.

All this work took longer than it should have. We finally were able to call the project done with just a few days left in the month. It's not that we were out there working every day. Once the initial work was done, we had our guy come out a few times over the last few weeks to deal with the issues. He is just one guy, so we only had him climb one tower a day. The original company realized what went wrong (a worker who was going on vacation went on

vacation in his head a little early) and they made things right financially.



Security Cameras

We were able to get internet service from CenturyLink to three of our four Denver tower sites. At KLZ, we wanted to install a camera on the barn because it has a line of sight to the main gate. We've had several break-ins over the last few months and we want to catch who is doing it. The idea was that we would plug a Ubiquity NanoBridge into the NVR of our

security system, since the NVR has its own internal switch. We would mount the NanoBridge outside the transmitter building and then put the other end on the barn. From there we would mount the camera on the roof of the barn and run cables up to it from inside the building.

That is what we did for everything, so only inches of shielded, UV-rated CAT5 cable are exposed to the elements. It all worked out nicely.

Before we actually mounted anything, we had it all set up and working inside the building. Once it was all installed outside, things quit working. It was very frustrating. The fact that I had a horrible toothache for days didn't help. I have a very high pain tolerance, but when it's in the head, it is amazing how much it affects everything. We finally called it a day and decided to come out the next day to deal with the work.

While we were having tower work done, we also had a tree company out dealing with the tree line along the road. Taking down the dead trees and limbing the live ones. They had a big shredder out there, and once the work was done, they left that for several days until they could come back out and pick it up. Upon arriving one day we noticed the lock was cut... again! We didn't see that they had actually done anything other than cut the lock. Now, remember, while the security camera was installed and powered on, we were unable to get it to talk to the NVR (DVR). So we had no footage of who it was.

As we were leaving for the day, we noticed

there was some more debris where there hadn't been before. We weren't 100% sure, but we thought maybe someone dumped it. Once I got back to the office, I went to work looking at our camera from the main building, which can see out that way some. I noticed shortly after we left a couple days before, a truck showed up with a big trailer. I could not see the tree shredder, but based on how long they were on the property over there, we determined they were most likely trying to get the machine started so they could get rid of their trees. When they couldn't, they just dumped it. Because of the distance to the area, we could not get a clear shot of the truck license plate or the guys that were with it.

One thing I learned through this process is the camera has a MicroSD card slot. I can easily put in a MicroSD card and have that run as a backup of sorts. If, for some reason, we lose the connection to the NVR, I can at least look at the video from the card. I bought a few 128GB cards that I plan on putting in this camera and probably some others at other sites.

We were finally able to get the camera working with the NVR. It turns out the new NanoBridge we had installed (it was a spare that had been on a shelf unopened for a few years prior) was the culprit. We replaced it with a different one and things have been running smoothly since.

Alarm Problems

We recently upgraded two of our alarm systems to IP based. We upgraded several years ago to cellular based so that if the phone line was ever cut, we still had a connection for emergencies. Once we got the internet installed at the KLZ and KLVZ site, we changed our phone to an IP one. The IP feed is via an underground cable, so there is little exposure there. Anyway, the phone works perfectly. I updated the phone number with the security company, too, since they want that info despite it being cellular.

One thing we noticed right away was an "FC error" on the system. This doesn't affect setting the alarm at all, but just means it is having trouble communicating with the main office. I called them and they confirmed they were seeing things just fine. We decided the issue was with the way our phone is set up, something we cannot change. In looking into our options, we decided going IP based was the way to go. They came out and upgraded and all seems to be working well. We hope to upgrade KLTT, but until we can find an internet solution (if any) for the site, that is on hold.

KLDC J1000

During one of the big storms we had in June,

I think we must've taken a lightning hit at the KLDC transmitter site. We usually pop off the air during storms and I will bring things back up at a lower power. I'm not sure what happened to be honest. I had it at low power and things were working fine. I switched it to high power once the storms were past, and it wouldn't go to full power. When we went to inspect the transmitter at the site, we found power module alarms. We took the module to the KLZ transmitter site, which isn't too far away, because it has a better work area, and we have another spare parts kit for the J1000 located at there. It was a good thing we did, because the spare parts kit that came with the KLDC J1000 didn't have everything the KLVZ-Night J1000 had.

I had to do some other work while at the KLZ transmitter site, so my dad decided to troubleshoot the module. He found several issues, replaced the components, tested everything and we called it good. We went back to the KLDC site and installed it only to have the alarms come back.

We got on the phone with Steve Braley at Nautel, our knight in shining armor when it comes to transmitters having issues. He sent us a list of things to check and what parts are normally needed. I went ahead and ordered the spare parts needed, many of which we had used from our two kits, so that we would be prepared and could also replace what was used. There was one resistor that was not checked and that was most likely the culprit (it was completely open when it should have been 2.3 ohms). We replaced that along with a few other resistors for good measure, and once everything checked out as it should, we went and installed it. Thankfully it worked and continues to work.

We have had J1000s scattered throughout the company since probably 2005. I know the KLVZ-Night transmitter has one of the first ones sold. 14-years of using them and this is the first major issue we've ever had. Nautel has been great with their manuals in including step by step troubleshooting. This meant that unlike with the ND series, I don't have to struggle to remember how to repair it.

Awning

Several months ago, we had a major windstorm and it took out the awning at the KLTT transmitter site. Years of wind grabbing it and wiggling it finally took its toll, and this storm was the straw that broke the camel's back. I went out to check on all the sites after the storms had passed and this was the only damage I saw at any of our sites. It was barely hanging on, scraping up against our door



A new and much sturdier awning covers the entry door at the KLTT transmitter site. We plan to put an LED security light under the awning to make it easier to get the key in the lock at night.

and taking the paint off. This awning is important as it will keep rain blowing out of the west from coming in over the top of the door.

We decided to have my husband build us a new one. I first contacted a gentleman who has done work for us before, but his business is booming with several major commercial jobs and he had no time to help. My husband is a general contractor and is very good at building things. We asked him and he delivered. I might be a bit biased, but this new awning is better put together and looks so much better than the old one. Only time will tell if it will hold up to the harsh conditions that the site experiences each year.

Coming Up

The other day, I was thinking about things and realized we're halfway through the year. I was mainly getting back in touch with some friends from our old church, which we left at the end of December. We started the new year at a different church, one I had been a part of for nearly ten years at one point. I couldn't believe, and still can't, that we left that church now nearly seven months ago. I let seven months pass by without reaching out to friends. It is just so crazy to me how fast this year has been. It has been a very busy one for us in Denver with several projects, making me the busiest I've been in years. And, come July, things aren't going to slow down. My dad and I will be making a trip to California to do a big project at KBRT. We plan on updating their entire blade system to the latest and greatest firmware. We are also upgrading one of the control rooms to be 100% Wheatnet. This project should be fairly easy, but as we all know, things do happen and what should be simple can become difficult. I enjoy doing this kind of work, especially in another market.

I also have the transmitter site visits Mr. Crawford wants us to start doing with employees. I had already begun that with the KLZ site. The plan was to get each site back in tip-top shape and then have people out. That is still somewhat the plan. We do have growth at each site this year, something we didn't have last year, so with that means mowing. I hope to have all this done and be able to do the site visits for the three remaining sites by the end of the month, August at the latest. Only time will tell if I can stick to that.

That about covers it for this edition. I pray you all have a great first month of summer. Until next time... that's all folks!

The Local Oscillator
July 2019

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1

KNSN • San Diego, CA
1240 kHz/103.3 MHz, 550W-U

KCBC • Manteca - San Francisco, CA
770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2

KKPZ • Portland, OR
1330 kHz/97.5 MHz, 5 kW-U, DA-1

KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1

KLDC • Brighton - Denver, CO
1220 kHz/95.3 MHz, 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

KLWZ • Denver, CO
810 kHz/94.3 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, 5 kW-U, DA-1

WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT

WCHB • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D

WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D

WMUZ-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT

WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2

WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT

WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT

WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT

WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT

WYDE • Birmingham, AL
1260 kHz/95.3 MHz, 5 kW-D/41W-N, ND

WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2

WYDE-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT



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