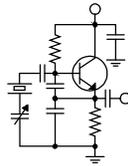


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

JANUARY 2019 • VOLUME 29 • ISSUE 1 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

Projects!

As January of 2019 begins, we begin a new slate of projects throughout the company. At the top of the list are several transmitter replacements.

In Denver, the KLZ main transmitter, a 1999 Nautel ND-5, is being replaced by a Nautel NX-5. The ND-5 has been rock steady these past 20 years, but the law of averages is bound to catch up at some point, and when it does, will the almost 40-year-old AMPFET 10 backup be up to the task of keeping our Colorado flagship station on the air and sounding great? We've got to be sure that we're not backed into a corner, so later this month or early next, we will move the ND-5 to the role of auxiliary and the new NX-5 will be installed as the new main. The AMPFET 10 will get a well-earned retirement.

This will provide a great opportunity to do some site reconfiguration and cleanup. The KLZ site was originally built in 1962, back in the CONELRAD days. There were two huge Gates 5 kW transmitters, a BC-5F and a BC-5U, at the site in addition to a Gates phasor and ATUs with all the CONELRAD switching. In the early 1980s, the 5F was replaced with the AMPFET 10. In 1999 and 2000, the 5U was replaced with the ND-5 and the Gates phasor was replaced with a Kintronics phasing and coupling system. In 2003, HD Radio was added to the site, including an outboard phase rotator network. Then in 2005, four additional towers were built at the site and the KLZ ATUs were replaced with new ATUs and diplex filters to accommodate the four-tower KLVZ nighttime antenna. The result of all this is a hodgepodge of RF plumbing and remote control wiring.

As part of the transmitter upgrade project, we plan to completely redo all the indoor RF plumbing at the site, replacing the loops of 7/8-inch Heliacx with 1-5/8-inch rigid line. We will electrically move the phase rotator network from its present

location in line with the main transmitter to in line with the common point network input. That way it will be in the circuit for both main and aux transmitters, permitting HD Radio operation with either transmitter.

We also plan to redo all the remote control wiring. It is currently all done on split 66-

blocks, and it is several layers of undocumented, messy wiring. We're going to fix all that. We'll also remove the old Ku-band satellite uplink and other unused equipment, cleaning up the racks.

Over at the KLDC Ruby Hill site, we have another transmitter replacement to do. The 1999 ND-1 there is being replaced with a Nautel J1000. The aux transmitter at this site is a Nautel P400 of indeterminate age – I found the P400 on a shelf at the then-WLLZ (now WRDT) transmitter site, brought it to Denver and changed the frequency from 560 to 810. It works, but it's been troublesome – switches and relays have been intermittent, and keeping it working has been a chore. Further, the station TPO is 660 watts, so while the P400 would keep a signal on the air, we can't use it long term without an STA and we take a coverage hit when we use it. The J1000 will be a major upgrade, providing increased reliability and the big modulation performance that we don't get with the J1000.

In Birmingham, the 1999 ND-5 at WYDE (1260) is due for replacement, and we'll be taking delivery late this month or in early February. The



ND-5 has been a good transmitter, but like KLZ's of the same age, the law of averages will eventually catch up with it. It's backed up by a 40+-year-old Continental 315R. We're having trouble getting parts and tubes for that transmitter, so its days are numbered. The WYDE transmitter project should be straightforward – pull out the old Continental and put in the new NX-5, swapping positions on the antenna switch and remote control.



The WDCX(AM) ND-5 (L) and 315R (R). A low-time ND-5 will soon replace the 315R.

Finally, in Rochester, the 1999 ND-5 at WDCX is up for replacement. The situation there is very similar to that of WYDE in Birmingham, with a Continental 315R backup. Here, we're not getting a new NX-5 but rather are getting a used but very low-time Nautel ND-5 from WDCD in Albany. WDCD was signed off and the license submitted in October, and the main transmitter, a Nautel XL-60, was sold almost immediately. A couple of years before we sold that station to DJR Broadcasting, we bought a new ND-5 to use as an aux (replacing a Gates BC-1). As a result, we have a transmitter that has been operated very little over the years and that has a known history.

Brian Cunningham will at some point, when weather and road conditions permit, rent a van and head over to Albany, pull the ND-5 out and transport it to Buffalo, to the WDCZ site. There, he will change the frequency from 1540 to 990 kHz. He has the proper power, a dummy load, room to work, and most importantly, heat at that site. And it's close to

home, meaning that he can do the frequency change without the pressure of the 90-mile drive to Rochester. Once done and tested, he will haul it over to Rochester and install it next to the existing ND-5.

Also on the project list are security camera arrays at all our owned transmitter sites that don't already have them. We have older NTSC, coax-fed systems at several of our sites, but even those will be upgraded with NVRs and high-definition camera arrays. These will give us the ability to keep an eye on our sites in a meaningful way, able to identify any miscreants that might come to do mischief (along with their vehicles).

The new Ethernet-based systems are, by nature, much better RFI-immune than the coax-based analog systems – we get “wavy lines” on many of the older cameras because of the high RF fields. Our engineers will be installing these systems themselves, and I will provide support from here. Amanda and I will probably go out to KBRT and install the system there, upgrading the existing analog system (with RFI problems).

In addition to all that, we have HVAC systems to replace in Birmingham and Denver, and we plan to replace/upgrade many of our aging Trango and Dragonwave Part 101 microwave links with new Cambium links. Birmingham's link from Red Mountain to the WYDE site will be the first such link to be swapped, and that is slated for this month. The Trango link there went up in smoke.

We plan to replace the remainder of the older Eventide BD500 profanity delays in our facilities with BD600 delays. The 500s are no longer supported – some key parts are no longer available – and they have been dropping like flies for the last couple of years.

Several of the eligible towers in our company will be converted to dual medium-intensity white/red systems this year. We have FAA approval for this for all of our Chicago area towers and have already converted the WYCA tower in Beecher. We'll work our way through the rest as warmer weather moves in.

Finally, we plan to complete the conversion of the KBRT studio to Wheatnet-IP later this year, with a new control room surface and conversion of the remaining production room.

We're looking at a very busy year!

The New York Minutes

By

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

Hello to all from Western New York! We have experienced a relatively mild winter thus far in the northeast, with very little snowfall to note. In years past, by this time we had logged numerous measurable snows and along with that, power outages caused by snapped utility poles and power lines due to excessive snow build-up.

I was hoping that this trend would continue well into the New Year, but it was not to be. In the predawn hours of New Year's Day, we had a cold front move into Western New York, bringing with it winds with gusts exceeding 60 mph. We lost commercial power at the WDCX-FM transmitter plant, located about 25 miles south of the city, down in ski country. Our standby generator kicked on immediately, so we did not lose any air time at all.

Unfortunately, I was not aware of any problem until I went to log into the transmitter mid-morning to check to see that everything was operating properly. I was unable to log in via the internet, and the phone lines were out as well, so I could not check the operating parameters of the station on the Burk remote control.

I will have to check with Verizon, our phone service supplier, along with Spectrum (internet) to see if there is some way we can change how the equipment is supplied with power. Currently, our services are powered at the pole, and when electrical service is interrupted, we lose both phone and internet, leaving us with no way to connect to the transmitter site from the outside world.

At some point within the past six months or so, our phone service was changed, as we have always had working phone service, even if the power was out. The Burk is plugged into a UPS, so we could at least communicate with it for a time, until the UPS ran out of battery power. As of this writing, we are still on generator power, and I have made arrangements with NOCO fuel to deliver more diesel fuel to keep us on the air, as NYSEG predicts that

restoration of commercial power will not be for some time.

December was a relatively quiet month, not too much in the way of problems, with the exception of the Buffalo NexGen backup drive failure. I generally check the backup activity every two to three days to ensure that the backups are performing as scheduled, and right before the Christmas holiday, I found that the back-up drive had failed. I was unable to access the backup disk at all, so immediate replacement was warranted.

I found a Western Digital 4 TB backup drive locally for under \$90, so I purchased one and installed it and programmed the software to backup nightly at midnight. I had installed an identical drive on the Rochester NexGen file server days after the initial Buffalo installation, so I went back and purchased another drive and swapped out the Rochester backup drive as well. These two drives have been in service for a little over three years, and although the Rochester drive was still operating, I decided to go ahead and replace it before a catastrophe happened and we didn't have a current, up-to-date backup to restore from.

Early this month, I plan to perform the yearly occupied bandwidth measurements on our two AMs. Hopefully this will be the last time that this will be a requirement, as some are pushing the FCC to drop the ruling that requires the bandwidth to be checked for problems on a yearly basis.

Along with the occupied bandwidth measurements, I will fire up the FIM and check the monitor point readings to ensure that there are no issues that have cropped up since the last measurement. The Buffalo monitor points are made relatively quickly, as we do not have a power or pattern change, but the Rochester measurements take nearly four hours to complete, as there are day and night monitor points to measure. I do not anticipate any problems, as both arrays are stable and very near the licensed parameters. We had a cell tower erected



right across the road from our Hamburg transmitter site since I made the last measurements, and pre/post measurements were made by the contract engineering firm overseeing the project, noting no change in the monitor point readings, but as this is winter, with little to no outdoor projects to do, it is an ideal time to perform some confidence measurements.

That about wraps up another month here in the great northeast, and until we meet again here in the pages of The Local Oscillator, be well, and sending you best wishes for a prosperous and happy New Year!

The Motown Update
by
Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC – Detroit

Frosty greetings from Motown, and Happy New Year! December was a busy month for us. We finished relocating the WRDT translator. We ended up having some water in one of the connectors but resolved the issue pretty quickly. We retuned the WCHB daytime array after connecting the isocoupler and ran a set of radials for our proof. The FIM and my Prius got a little workout.

The translator performs pretty well, and hopefully will stay as it is. We ended up using an Omnia Volt processor, and it works really well. Setup time was minimal using the Quicktweak function. We have been trying various solutions to get the very best audio for our guests on the Bob Dutko show.

I ran across a solution called Cleanfeed at <https://cleanfeed.net>. Cleanfeed only requires a browser connection and provides high quality audio. The great feature is that once it is set up, all you need to do is send an invitation link via email to the remote party to establish a connection. The standard version of Cleanfeed is free.

Once the person of the remote end clicks on the link you send them, a connection is made. No need to mess with IP address setting or site names. I was really impressed with the audio, and the low latency. Clean feed provides a bidirectional connection allowing for talkback.

Cleanfeed also has conferencing available for multiparty connections. The Pro version gives you a few more features such as audio input and output selection for multiple sources. It is a great

low-cost solution to get people connected from outside of the station, and since it is browser-based, it works cross-platform.



It is exciting to see so many low-cost or free cloud or software-based solutions available for broadcast. With faster CPUs, dedicated hardware for some functions is no longer necessary. There is even a great software-based broadcast processor available from Leif Claesson called Breakaway (<http://www.breakawayone.com>).

Before Leif worked with Telos, he had his own software-based processor. Breakaway is a full-featured processor at a fraction of what you will pay for anything that comes close to its performance and sound quality. It even has built in fully dynamic RBDS and a full set of monitoring tools.

We had a little scare at the WRDT transmitter site. We had a low temp alarm and went to the site to investigate. Upon entering the building, we smelled heating oil. The furnace is a newer model, installed just a couple of years ago, but must have been built with a bad valve. The burner assembly filled with several inches of heating oil and caught fire. Fortunately, the fire was contained to the burner chamber, but could have ended up being a disaster.

We were able to get everything under control in a few hours, thanks to our great HVAC vendor. They had a new valve in stock and installed it by early afternoon.

For the holidays, I figured why not have a little Christmas Vacation adventure? I drove my \$650 1989 Winnebago Lesharo from Michigan to Pittsburgh. The trip went well, and I made it back ok. I had the closet filled with repair items just in case.

I always enjoy taking older things and repurposing them. My next trip may be to Florida and

Hamcation in February. We will have to see how it goes. I also plan many short trips to the park up the street from my place along Lake St Clair. I will set up my SDR and work solar for a few hours with a view.

Until next month, I hope 2019 is a great year for everyone! '73, from Brian, W8FP.

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

Happy New Year to each and every one of you! May God bless, and may this be your best year ever!

I'm recovering from Christmas. We had my mother come stay with us for the holiday, which meant that I had two women sitting at home, plotting and scheming, while I worked. It was with great trepidation that I would ease into the house after each day of work, wondering what the Beloved Twosome had come up with that day. But we all survived it, and in all seriousness, it was great to see her. Mom and I had a chance to really sit and talk for the first time in many years.

They say time flies; it certainly does. I hadn't even thought about the fact that I'd been with the company for 20 years until I got a nice anniversary letter from Mr. Crawford in December. Twenty years! A lot has changed in that time, but one thing is still the same: this is, by far, the best company that I've ever worked for. I consider every day with Crawford Broadcast a bonus and a blessing.

Not a lot happened last month. Lots of rain, the usual flash floods, one power outage at 101.1 (WXJC-FM) in Cullman with a generator that wouldn't start, and a repaired generator at the studios. But truly, it was the holidays, so we didn't try to start any big projects.

Given that there's really not a lot to talk about, I think I'll start 2019 with some random thoughts and observations.

Sirius XM

We bought a new Jeep Compass a few months ago, and of course, it came with Sirius/XM in the dash. I've been less than impressed (again; this is

the second time I've tried it). The audio quality is severely lacking at times. Tune a "station" on the S/XM receiver, then switch back to FM, and the

difference is astonishing. WDJC-FM has rich, wide stereo separation, a crisp high end and tight, super clean bass, courtesy of our new Omnia.11 processor. I can't say the same of the audio quality on S/XM.

I don't know if they're getting desperate; I have no idea what kind of sweetheart deal(s) S/XM offers the manufacturers to put radios into the dash. But this new vehicle comes with a *year* of free service. (Our previous

vehicle, a Ford Focus, only came with 6 months, as I recall. I never renewed it.)

One annoyance is that the system is adjusted to make the Sirius/XM audio noticeably louder than the AM or FM. This is an old trick that has been used to sell cheap stereos for many decades: unsophisticated listeners will tend to think that the louder sound is better – at least at first, anyway. But it's really noticeable, and it's really aggravating. If I'm switching to the S/XM receiver, I have to remember to turn down the volume before I push the button, or it'll blow out my ears.

I'm trying to be objective here; I realize that S/XM can be viewed as a competitor to what we do. If so, though, they're not doing a very good job of it. They're no different from IHM or Cumulus in the way that they play the same songs over and over.

Better yet, they offer all of those different channels, and yet, you'll hear the same songs on these different channels! They also have a zillion sports channels, which is overkill, in my opinion. I think they do that just to pad the numbers, so that



they can honestly say, “We’ve got hundreds of channels!”

Incidentally, among their most popular programming is the comedy channels. These have commercials inserted approximately four times per hour; most of the other channels are commercial free. They are interrupted by promos and/or an announcer, though. Very *chatty* announcers. So much for “more music, less talk” on S/XM. The 80s music channel has some of the original VeeJays from MTV on right now, and it’s hilarious to listen to Nina Blackwood trying to be Hip And Cool™ now, decades later. (Especially given that she sounds like her false teeth are rattling.) A fellow named Preston is a host on the Classical Music channel, and he loves to ramble at length. He mispronounces the names of the composers at times, but hey; he’s an expert. If you don’t believe it, just ask him.

Some say that terrestrial radio, AM and FM, is dying. I still don’t see it. As recently as just a few months ago, I saw yet still another study that showed that over 90% of Americans listen to radio for at least a few hours each week. Truthfully, I wonder if Sirius/XM will still be around for the long haul. Given that their programming sounds more and more like bad terrestrial radio, complete with short playlists and overly-chatty show hosts, but with inferior audio quality, and given that they charge for the service, I’ll be surprised if they are. I’d love to see figures for the number of people who pay to continue the subscription whenever the free trial expires.

NexGen

It’s official: the voices in my head have taken a vote, and we believe that Windows 10 should be crushed and melted. I’ve detailed here in the past some of the joys that we’ve been having with our RCS NexGen system in Birmingham, and after a lot of digging and head-scratching, we’ve decided that most of the issues are caused by the operating system. Windows 10.

I’ve detailed some of the problems we’ve had in the past, most notably the tendency for WDJC-FM (but not any other station!) to just lock up and die at random. We have two file servers, a primary and a secondary; the way this is supposed to work, if the primary becomes unavailable, your Audio Server(s) should silently and invisibly switch to the secondary,

then back to the primary once the problem resolves. WDJC-FM doesn’t want to do that. RCS Support has looked at it and can’t see anything wrong.

In the past, we’ve gotten it working for a while, but then the random blank Control Room screens and hangs will start creeping back in. This most recent round of hangs was finally solved when Todd noticed that the *secondary* (not primary) file server was looking for updates and would hang at times. So far, so good, but we’re keeping an eye on this. Once we confirm that the fix worked, I’ll have Todd write it up – hopefully for next month’s edition of the *Oscillator*.

On the update thing: all operating systems, and most software packages, seem to assume that you have a high-speed Internet connection now. A few years ago, one of the games on my smartphone just stopped working when I drove into an area with no coverage. This was a game that I had paid for; needless to say, I was annoyed. The game apparently wanted to “phone home” and check on things each and every time I started it up.

Todd, Jack and I have decided that the most recent versions of Windows are just as bad for this. They want Internet, period. They want to check with Microsoft’s servers, they want to look for updates, and they want to download things. We keep our NexGen system completely isolated from the Internet, save for a couple of heavily-firewalled remote control machines. Nothing else on the network should be able to touch the Internet. Windows 10 apparently objects to this.

Anyway. More on this next month, Lord willing, after we confirm the diagnosis and the fix.

Looking Ahead

Looking ahead to 2019, we’ll be installing a new transmitter at 1260 AM. We’ll be (hopefully) getting WXJC-FM out from under an Eternal NOTAM due to its mis- and dis-functional tower lights. We’re going to clean up; some of our sites are starting to look a bit rangy. There are millions of little things to be done ... but when aren’t there?

Like I said, not a whole lot to natter about this month. Until next time, keep praying for this nation. God is still in control, and we need to trust in Him!

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

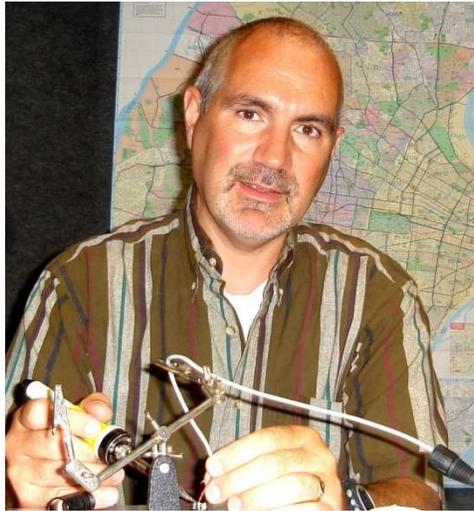
During a power outage at our transmitter sites, if we have a properly-working generator, we know that we will be back on the air rather quickly. Still, there is the inevitable time that it takes for the backup power system to acknowledge the outage, start the generator, and when it gets up to speed, transfer the load to the generator. This can be anywhere from ten to twenty seconds of time. Then it usually takes some time for the equipment to power up and restore the signal to air. This takes even longer with equipment having microprocessors as part of the design – those devices have to “boot up.” There are hardly any devices in our air chains that don’t have microprocessors.

Many broadcast transmitter sites not only have generators but have now installed UPS units to back up the equipment that runs off 110 volts AC. This makes the time off air a lot shorter. We are even beginning to see where transmitter exciters and controllers are now on a UPS to shorten the time it takes for the transmitter to recover from a loss of power.

Generally, the thing that takes us off air at most sites nowadays during a transfer to generator power is the transmitter. It is just not practical in most cases to have a large enough UPS available to keep a high-powered UPS ready for this short amount of time off air. Most UPS systems are designed for 110 volts. Most transmitters are not only way over the load limit but are either split-phase or three-phase. You’re not buying an off-the-shelf UPS to address the needs of most transmitters, even for the short time it takes for a transfer to generator event.

I had never really encountered a transmitter being downline electrically from a UPS until I had the chance to work here at Crawford in Chicago. The

WPWX transmitter site has a whole site flywheel UPS that will take the entire electrical load, including the 40 kilowatt transmitter, by itself for about 45



seconds of run time. I wasn’t here when it was installed, but it wasn’t just for generator transfer events that we made that investment. The site was subject to short power dropouts and brown-outs that were too short for the generator to come on but long enough to take the transmitter off the air. These events happened daily, sometimes hourly (or worse!), so it was well worth the price of the UPS. With the UPS and the generator operating properly, a power outage at the site is

unnoticeable to the listener.

There is also the fact the equipment is much safer when it is not subject to surges that might occur with the transfer to generator and then back to utility. That is actually what got me to thinking about a UPS on the transmitter at the WYCA site. We have a generator there, and a UPS that keeps the rest of the equipment running during the transfer event. Of course the transmitter itself was not behind a UPS, and it was always subject to a lot of different power events in this somewhat rural location.

Since I have been here, we lost final RF amplifiers twice on the main transmitter. Both times it happened was during generator transfer events, once during a significant ice storm and the other during a severe electrical storm. Now, maybe it was coincidental, but it got me to thinking about putting the transmitter on a UPS. This site was also subject to the very short electrical dropouts. I knew that we were not going to go with the expense of a three-phase whole site UPS.

This meant using a UPS connected directly to the main transmitter. Our main transmitter at the

site is a Nautel VS 2.5. The normal output of the transmitter is 1,500 watts. The transmitter electrical input is wired for 220 VAC split phase. With these requirements, I knew the possibility of using an off-the-shelf UPS was within reason.

Knowing the transmitter runs at 1,500 watts, not the full 2,500 watts for which it is rated, made this even more of a reality. Of course, you have to factor in the actual efficiency of the transmitter to get a figure for the actual load the UPS will see.

So, with that in mind, I started looking for 220-volt split-phase UPS units. This was a purchase I had never made before. I even went as far as talking to Jeff Welton at Nautel about my idea. He said he thought it would work, but it sounded like no one had really tried this before with a VS 2.5. So, this meant I was walking out on a limb by myself. Still, the math worked.

I found a unit that would handle 30 amps; I had checked our amperage on each leg to the transmitter and it was nominally at about 27 amps. A little tight, but it should work. The UPS was rated at 3,500 amp-hours. Even when I factored in efficiency, I figured I had enough room for the load to spare.

When we went to install the UPS, I decided that instead of directly wiring the UPS output to the transmitter's electrical input, I wanted to be able to bypass the UPS quickly in case there were issues. That meant using connectors that could be quickly disconnected.



We went with the 30-amp, 220-volt twist-lock plugs. This also meant we needed a place to plug the transmitter and the exciter into in case we decided go into bypass mode. So, we put three female twist lock outlets in the rack that were all connected to the breaker for the transmitter in the breaker panel. One outlet is used for the UPS full-time, and then the

other two outlets are available for the transmitter and the exciter when we bypass the UPS.

Once we had it installed and turned the transmitter on, it was time to see if the UPS would actually hold the load when it was on air. If you have used a Nautel VS 2.5 or similar transmitter, you know that when you hit the RF On, it doesn't immediately go to the full preset power. It gradually builds until it reaches full power. In this case, 1,500 watts RMS.

This time, I was not only watching the transmitter's forward power but looking at load percentage on the UPS as well. As the transmitter got over 1,200 watts, I noticed that the load percentage of the UPS was getting near 90-percent. I was starting to think that as soon as we got to full power, the transmitter was going to pop the breaker of the UPS.

However, that didn't happen. Once the transmitter settled down at full power, the UPS showed a load of 97 to 98 percent – much tighter than I wanted, but if we had purchased a UPS that would have given us a bigger margin, we would have paid a lot more. My guess is that I didn't factor the exciter into my original thinking. That's where I lost the margin I thought I had. If need be, I could have switched the exciter to a 110-volt input and put it on the other UPS.



That has proved to not be necessary, as we have had the arrangement up and running without problems for quite a while now. It is nice to have a transmitter that stays on during generator transfer events. The other big plus is that we are not losing PA modules during these events, which occurred at least twice to my knowledge before we had the UPS.

The only thing we found causing on air interruptions during generator transfer events was the 5.8 GHz Ethernet radio that had its power supply at the base of the tower, which was wired to its own breaker in the breaker panel. Once we re-wired this to go through a small UPS, the power outages are no longer perceived by the listeners.

It is not practical from a cost stand point, nor necessary, to have every transmitter on a UPS, but it sure is nice when you can do it.

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

It has been an interesting fall season here at KCBC. First, we had the fires. It seemed the whole state was on fire for a while. We had several weeks of constant smoke in the air. Some days were so bad that people were driving with their headlights on. Kids were not allowed to play outside at school, and no one worked outside any longer than they had to. There was a great deal of loss of life and property from the fires, with one town not far from us being completely destroyed.

The rains finally came, and within a day or so, the smoke was gone and the fires were mostly contained or out. With the rain came a problem with our FM translator for KCBC. We began having SWR shut backs. We could not operate over about 10% power. We did the normal checks of transmission lines and the isocoupler, but as suspected, the problem was up on the tower.

Our tower crew was able to respond almost immediately, and they found all the weatherproofing intact at the antenna. However, when they removed the weatherproofing from the three power divider DIN connectors, they found water in one of them. They dried out the connector and resealed all of the connectors. The SWR returned to normal and we were back to normal operations.

The one hitch in the whole process was at the tower company billed us for the work. It was not that long ago that the same company installed the antenna and did the weatherproofing, so arguably it was their fault that water entered the connector. The situation was discussed with the tower company, and we worked out a compromise payment.

I have never had to call a tower company back to repair any work that they performed previously, so this kind of caught me off guard. The lesson learned here is that when you have equipment installed on a tower, you need to nail down what the warranty is on the work before the installation.

I was a little disappointed in the DIN connectors. They look so robust that I would have thought that they would be very weatherproof. Talking to the tower guys they told me that some DIN connectors are waterproof and some aren't. They had a few on the truck that were waterproof, and those had an extra gasket inside to provide the seal. This was my first experience using DIN connectors, and they seem like a really nice step between an N-connector and an EIA flanged connector, just as long as they are properly weatherproofed.



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

The Christmas holiday has passed with a New Year on the way. In the tradition of broadcast radio, we submit a lost column from last April. This is a “best of” column; please do not call.

This month I have an odd subject. It started as odd topics often do with something totally unexpected and strange. Something that at first glance wouldn't seem bizarre. In this case, I had a semiconductor component with odd markings.

I took advantage of an internet search, which returned several sources with partial information. It soon became evident that several of the sources gave conflicting information, particularly the proper connection orientation of the part. That puzzle stems from decisions made 250 years ago when “natural philosopher” was the name for what are known today as “physicists.”

We join Mr. Peabody and step aboard The Wayback Machine. A twist of the dial, and poof! It's the 1750s, as Mr. Peabody opens the door. We step out into woodsmoke and negotiate our way around the horse droppings as we step to a village door and meet the natural philosopher named Ben Franklin.

We learn that Mr. Franklin is widely known for his experiments using kites, keys, and other astounding devices. After years of study, Franklin needed to select between positive and negative for the charges observed in his experiments. In 1752, prior to the understanding of electricity being associated with the electron, Franklin chose a convention regarding the direction of current flow. In this, Franklin demonstrated that between only two choices, any random selection will be wrong 90 percent of the time. With this choice, he exhibited the principals later published by Edsel Murphy: if anything can go wrong, it will.

Several Murphy Law corollaries are also applicable. Kettering's Law: If you have always done it that way, it is probably wrong. Also, Leahy's Law:

If a thing is done wrong often enough, it becomes right. A corollary: quantity, or doing it wrong a lot, is a defense to error.



So now we have the principle of Electron Current vs. Conventional Current. An electronics textbook illustration demonstrates that admirably. Printed two years apart, the same electronics text promoted that current flowed both with and against the diode arrow symbol. Neither version of text indicated whether conventional or real current flow was used, aptly demonstrating that two wrongs

make a wrong.

Some of the gyrations needed to support the convention that current flows from the positive terminal of a voltage source to the negative terminal are astonishing. One narration held that current flow is the movement of ions, which are atoms without a few electrons. In this view, electron flow is replaced with the movement of nottatrons. Also, the Edison shows that the hot electrons attract nottatrons from the cold plate in a light bulb.

In classrooms, electron flow may be used in grade 11 and nottatron current used in grade 12. When determining the direction of fields, use the right hand rule in one case and the wrong hand rule in the other.

On commenter stated that: “Changing from Franklins Conventional Current to Electron Flow would cause a degree of confusion for old and new students and errors would occur, so Conventional Current was kept to ensure there was no confusion with those already trained with Conventional Current.” So, this all only “seems” confusing.

At press time, the writings of an obscure natural philosopher have been found. We now know that the big ball of fire in the sky does not radiate light. In fact, the sun is a dark sink, it sucks up dark. The sun does not radiate photons, it attracts nhotrons.

Until next month, happy New Year, all!

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

Backflow Preventer Installation

We've had running water at the KLZ transmitter site, well, forever. It was a site that used to be a manned facility and had people working there full-time, so of course they needed a bathroom. One day while at the site doing some work, I heard a knock on the door. It was someone working with the North Washington Water District who said he had been trying to get in touch with us (they do have our office number on file), and that because the site is a commercial facility, we are now required to get a backflow preventer valve installed at the site.

I don't much understand the purpose of this other than it's a huge inconvenience and testing it annually is a waste of money. I know other markets of ours have to deal with, this but this will be a first for us in Denver. So we have hired a plumber to come out and install one.

HVAC Upgrade

We had the HVAC system at the KLTT transmitter site updated quite a few years ago. We left the old unit on the roof and installed a brand-new unit. I don't remember the year, but I assume it was around the time I started at Crawford Broadcasting 16 years ago. The current unit has become a trouble child these last few years. While it still works, it seems to cost us a lot of money each year to keep it up and running. We decided it was time to upgrade again.

The plan is to remove the old unit (the original from when the site was built in 1995) and put a new unit in its place, leaving the current unit in place as a backup. That original unit has so much hail damage that we have never been able to use it as a backup when the main fails. We have to pay extra to have a company come out and deal with the issue ASAP so that our equipment doesn't overheat.

Thankfully, with the NX50, it doesn't get as hot as fast, but it still gets up there on those hot summer days. It will be nice to have a new unit and to have a functional backup unit at the site later this year.



ARC Plus Power Supply

Another one bites the dust. At least that's the song that plays in my head when I think about it. One night right after Christmas, I was minding my own business when I got a Facebook message from a gentleman I really don't know.

We have some mutual friends, and I believe he is a radio engineer as well. He said KLVZ was still on the day site. Did I mention it was around 9:00 PM? I immediately began looking into the issue.

I should have received alarms about this, but got none. I found that AutoPilot was not connecting to the ARC Plus at the KLVZ day site and I could not log directly onto the unit. We suspected another power supply failure.

We last replaced the power supply in that unit 2-3 years ago. We had noticed it happening to all our units throughout the company, so we began proactively replacing them before they failed. When we arrived at the site, the first thing I did was shut off the transmitter. Remember, KLVZ has two sites: the day and then the night which is located at the KLZ transmitter site. Thankfully, the night site was already on, so I turned off the day and then pulled the dead ARC Plus out of the rack. Within a few minutes, I was done testing and confirmed the problem was indeed the power supply.

Thankfully, we had a spare supply at the office, so early the next morning I hurried in, grabbed the power supply and headed back out to the day site. Within a few minutes, I had the new power supply installed, the unit tested and back in operation. Thank you to Burk Technology for making this an

easy install! I know other equipment where replacing a power supply is quite the chore.

With this unit failing, we are working to take proactive steps again. I am working with Burk to get new power supplies ordered for Denver and will begin replacing them one they arrive. I tried to find a direct source for these vendor supplies but was unsuccessful. Burk must have bought them all up.

Looking Ahead

With the exception of the ARC Plus power supply failing, it was a quiet end of the month. I think December tends to be like that. Many people take time off, myself included, and it just seems to be national goof off month. It's a month when you don't want to start a big project unless absolutely necessary so as to avoid having to work on a holiday or your time off.

As I look ahead to January and 2019 as a whole, I know that in Denver, we will have a busy year. We will be replacing two transmitters, getting a new HVAC installed at a site, replacing two production workstation computers, upgrading our microwave links and so much more. It will no doubt make the year fly by and tomorrow, I will be writing the column for January 2020! Okay, maybe not that fast, at least I hope not, but I can say it will not be a boring year work-wise. I look forward to the learning opportunities these various projects will bring me.

I do hope each of you had a fantastic Christmas and New Year's. That about covers it for this edition so until next time... that's all folks!!!

The Local Oscillator
January 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

KLZV • Denver, CO
810 kHz/94.3 MHz, 2.2 kW-D/430 W-N, DA-2

WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2

WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT

WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1

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

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



Corporate Engineering
2821 S. Parker Road • Suite 1205
Aurora, CO 80014

email address: crisa@crawfordbroadcasting.com