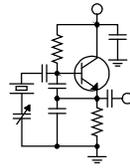


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Transmitter Projects

It's been a while since I've done any transmitter installation work. In fact, the last one was in 2012, at KBRT. That is, until last month, when I was involved in the installation of two new Nautel transmitters at two separate sites. One of these projects is still underway, so we'll deal with that one next month.

The project du jour was the upgrade of the KLDC (1220) transmitter facility at the Colorado Public Radio Ruby Hill tower site in Denver. We purchased that station in 1999, and immediately replaced the Gates BC-1T (I think it was a T model) with a Nautel ND1. Several years later, I found a Nautel P400 on a shelf somewhere (I think it was Detroit) and shipped it to Denver, where we changed the frequency and put it at Ruby Hill as an auxiliary of sorts. That's pretty much what we ran with for the last decade and a half, and the facility was definitely screaming for some love.

We hit the 20-year mark on the ND1 this year, and while the transmitter still works reliably, it's time to retire it to less demanding auxiliary service. So, we budgeted for a Nautel J1000.

Knowing the transmitter was coming, Amanda and I started making the preparations. This project presented the ideal opportunity to completely revamp the facility. The remote control wiring, while fairly simple, was messy, in several layers and mostly undocumented. The electrical wiring, well, who's to

say what code revision was in effect when that was done? And the RF plumbing... oh boy.

We pretty much demoed the facility down to the bones, keeping just enough stuff working to keep the station on the air. We had an electrician come in and run the new circuit for the J1000 and fix all the other electrical issues. We stripped out all the remote control wiring, and we even pulled out most of the

coaxial cable. We ran a new 1-inch EMT conduit between equipment racks to accommodate the RF monitor and remote control wiring to the new transmitter (and several LAN cables), and we pulled all the R/C wiring out of the ND1 and ran a new cable through conduit to that transmitter.

Next, we removed the 7/8-inch EIA cable clamp from the right side of the antenna switch box, mounted a female type-N chassis connector on a piece of copper plate drilled for

the 7/8-inch EIA hole pattern and mounted it on the side of the box and wired it with silver-plated strap to the main transmitter side of the RF contactor. We used a piece of Commscope FSJ2 "superflex" Heliex with N-male connectors to go between the Nautel's surge suppressor box and the new N-female on the side of the antenna switch. We moved the ND1's input to the switch to the aux side of the contactor. And we ran new ground strap to both surge suppressors.

To make room for the J1000 in the Middle Atlantic WRK-series rack, we had to move the audio processor, exporter, IBOC exciter and other



The new KLDC J1000 is on the far right with the ND1 aux in the center.

equipment down in the rack, and we took the opportunity to remove several pieces of equipment that are no longer used.

When the transmitter arrived, we got it mounted in the rack, manufacturing some vertical braces for the rear of the exciter drawer slides out of aluminum angle and l-brackets. Remote control, mag, phase and RF monitor wiring was installed, and the other ends of all those cables were cut to length and terminated. By the afternoon of the day the transmitter arrived on site, we had it making RF... but there was something wrong. We called it a day and headed home to rest and think through the issue.

The next day, we hit the ground running and, with the help of Steve Braley at Nautel, found two menu parameters that needed some adjustment. With that done, the transmitter came up at full power with full modulation, and we were able to do an IBOC setup on it as well.

That left the aux transmitter to get wired back in, and we spent a few hours doing that. Amanda was programming the remote control even as I was wiring it up to the aux. During the R/C wiring demo, I made the mistake (gasp!!) of removing the wiring for the NAX90 attenuator that is used with the ND1 to achieve the 11-watt nighttime power, and there was no manual or schematic at the site to which I could refer to figure it out. Again, Steve Braley came to the rescue and emailed me a PDF of the manual. Pretty soon I had that reconnected as well.

By the end of that day, we had the new J1000 on the air and sounding great in both analog and digital, and the old main ND1 had become the auxiliary. All the wiring had self-laminating labels on it so it would be easy to determine the function of every wire. What had been sort of a cruddy facility had become on a par with our other facilities. I'm proud of that little station.

Next, it's on to the upgrade of the KLZ transmitter site, with an upgrade to a Nautel NX5 transmitter as the central feature. Like the KLDC facility, the KLZ facility has over the years gotten pretty well layered, and nothing is documented. We plan to take that site down to the bones as well,

redoing all the remote control wiring and RF plumbing. The RF piping will be redone using 1-5/8-inch rigid, which will be a huge improvement over the big loops of 7/8-inch Heliax all over the place.



New 1-5/8-inch rigid line connects the KLZ phasor to the external phase-rotation network. Very shortly, the remaining internal RF plumbing will be reworked to replace the 7/8-inch Heliax with 1-5/8-inch rigid.

That site uses an external delay network to get the load oriented the right way for HD Radio. That network, wall-mounted in a Kintronics cabinet, is currently in line only with the main transmitter, a 20-year-old ND5. We recently changed that so it's in the circuit for both transmitters, and we did that with 1-5/8-inch rigid line.

And of course we still have to get the 36-year-old Nautel AMPFET 10 and its power transformer out of the way to make room for the new NX5. We have an electrician coming to install the circuit for the new transmitter, which will come into the unit from beneath. We'll use a short piece of 3/4-inch EMT conduit to get the remote control, RF monitor and LAN wiring from the NX5 onto the cable ladder that runs above the equipment racks.

I'm looking forward to that project and to bringing KLZ up to current standards with fully-labeled, fully-documented and code-compliant wiring.

The New York Minutes

By

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

Hello to all from Western New York! This month marks a major milestone in my broadcast career as February 7th will be my 50th anniversary in radio!

It seems just like yesterday I was a young teenager, eager and learning the ropes to fulfill my dream of being in broadcasting. I began my career in radio at WKOA/WKOF in Hopkinsville, Kentucky as a DJ, but soon realized that engineering was my true calling. Growing up in the radio & TV business (my dad owned a TV sales & service business), I knew all about electronics – I would occasionally help out in the service/repair department, but I had my sights set on a radio career.

After about a year on the air, I began to “help out” the station’s engineer on almost any project I could. I spent endless hours shadowing the engineer, asking questions, and making a lot of mistakes. He seemed to enjoy the company, and having an extra pair of hands available certainly helped my cause. Not long after, the station owner gave me the opportunity I so long awaited, my official title of engineering assistant! The pay was lousy (\$2.10 an hour as best I remember), but the benefits of a free education were priceless, not to mention the prestige I amassed from my fellow high school classmates! The chief engineer, Marvin Mahoney, was hard on me and gave me every dirty job imaginable, but I hung in there and learned from the master. His work ethic was unlike any other I had seen at the time, and he instilled in me the need to do the best job I could, even under dire circumstances and harsh working conditions.

I have seen the hand of God involved in my entire career, placing people in my path that could teach and guide me along as I learned all aspects of the radio business. There are too many to mention that have given me great opportunities along my travels, but I can honestly state that my dream career

is far from over. I plan to be involved in radio until the Lord calls me home, hopefully many, many years from now.

I wish that there was some young person that I could relay all that I have learned over the years

to, but there seems to be little interest in the engineering side of radio amongst the younger generation these days. I tried to get both my grandsons interested in broadcast engineering, but both were discouraged by the long hours, being on-call 24/7, and the amount of knowledge you must have to adequately perform your duties. Who knows? Perhaps a few years from now, my

granddaughter will become interested in the broadcast field.

At the time of this writing, we, here in Western New York, are preparing for a major winter storm that forecasters liken to the Blizzard of 2014, which dumped nearly eight feet of snow in the Buffalo area. The forecast is calling for temperatures dipping well below zero, with winds in excess of 30 mph and blowing and drifting snow. As Lake Erie has not yet frozen over, the risk of lake effect snow increases the danger of significant snow amounts, well beyond expected totals.

Knowing in advance this was coming, I insured that all our generators were full of fuel and operating properly in case of commercial power failure. All equipment at the studio and transmitter sites are performing well, so I do not anticipate any major breakdowns during this coming weather event. Please pray that our stations are unaffected by the pending storms and that there is no loss of life from the pending severe weather conditions.

Operations, engineering wise, have been uneventful at the Buffalo stations this past month, and the only events I have to report on come out of our Rochester market. At WDCX(AM), we have a couple of tower lights out on night towers 5 and 6.



One beacon on each tower is out, and Don Boye of Western Tower is awaiting the right weather conditions to make the necessary repairs. Also, Don will be installing the last of the LED side marker lamps on these two towers, completing the LED lamping of all the side markers on our six-tower array.

At WLZG-FM, during a routine maintenance visit, I found that the Continental 802-B

exciter was in foldback mode along with a temperature alarm. Having worked on these units for years, I knew that the cause was a bad cooling fan on the rear of the exciter. I placed an order with Continental for a replacement fan.

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

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

Greetings from Motown! With well below freezing temperatures, we have been using our indoor time to clean up several of our studios. We replaced monitors for our security system, and we added more cameras around the building. I had to replace one of the reject load fans on our Nautel NV40. After checking the transmitter status, I had noticed that one of the fans was running slowly. It was a simple fix, I love the nice layout on Nautel transmitters. Parts are easy to get to and service.

I am happy to say that all our transmitters have been operating well. Other than that reject load fan, it has been quite a while since we have had anything fail.

One of the projects that I started to work on was repairing our remaining broken EV RE20 microphones. These mics had been dropped, and either had bad frequency response or a terrible rattle when moved around. I decided to take a crack at disassembling them to find the cause.

I started on one mic with a rattle. Once the microphone was disassembled with its foam removed, I took off the top plastic piece covering the RE20 diaphragm. The noise I was hearing was coming from underneath it. When I looked at it more closely, I noticed that there is a plastic dome that sits directly under the diaphragm that had worked its way loose and was free to directly come in contact with the voice coil. To repair it, I had to find a way to remove the coil and diaphragm. It turns out that the coil and diaphragm sit on top on the magnet with no mounting pins. This explains why when an RE20 is

dropped, the frequency response sometimes changes. The voice coil can shift off center.

So I removed the very fine coil wires that

were attached to the solder posts below, and carefully lifted the diaphragm assembly off of the magnet. The black plastic dome that is also known as a “phase plug” fell out. I was able to clean the area where the plug mounts and apply glue to the surface. I centered it and glued it back into place. After allowing time for the glue to cure, I carefully set the diaphragm into place. After soldering the coil wires to the mounting posts and reassembling

the foam and microphone body, it was time for the test.



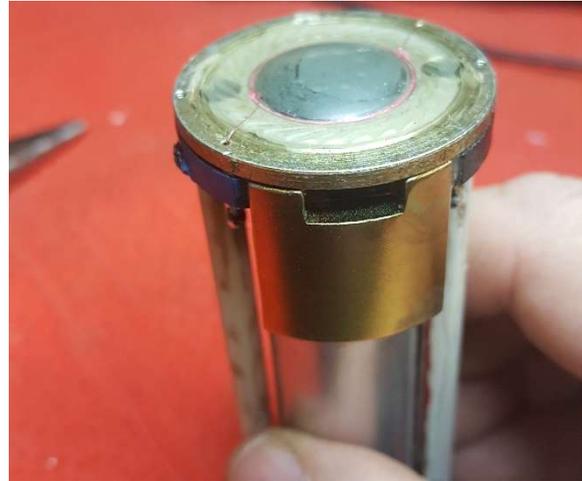
RE20 Motor assembly with top plastic cover removed.



RE20 phase plug

Upon initial testing, the frequency response wasn't great due to the voice coil not being perfectly centered, but I was able to make some small adjustments and dialed it right in. I put the top back on the mic and returned it to service. Since then, I have repaired a total of three of such mics. The repair is not that difficult... it just takes patience and some soldering skills.

We have visited all of our sites to make sure the generators and heating systems are working and fully operational. When the temperature goes into negative degrees, generator batteries are more likely



Motor with diaphragm removed.

to fail and generators are slow to start, just when you need them most.

I have been preparing the Lesharo for the upcoming Hamcation trip. I am looking forward to setting up my homebrew rig and running SSTV on 14.230. I will make sure to take plenty of pictures and provide an update next month.

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

Ah, let's start with the weather, as usual. We had a big scare a few days ago. The weather folks were predicting that we would get snow, and all it takes is a few flakes to shut Alabama down. I've explained this before: you folks who live Up Nawth make fun of us, but we don't have the big snow plows and salt trucks here. We can't justify the expenditure for something that might happen a few days out of a year. So, we just close down.

This time, it was a bust. At my home in Hayden, AL, we had at most a very light dusting. Birmingham received a bit more, but by 10AM, the roads were fine. Also as usual, the folks here are reading the riot act to the National Weather Service, but those guys



can't win for losing. Back in 2014, they predicted a light dusting with no accumulation, and we got hammered. Some people were stuck in their cars and had to spend the night wherever they could find shelter.

Now for engineering: sometimes we joke amongst ourselves about how computers, data transfer and software have become such an integral part of our business (and thus, our jobs as engineers). But honestly, some months, it seems like all we do is chase bugs and Komputer Ghosties™. January was no exception.

1260's Trango

Let's back up a bit: several weeks ago, we had a series of very windy storms come through that

knocked WYDE AM's Trango 18 GHz microwave link out of alignment. Logic said it was probably on that old self-supporting tower at 1260's transmitter site, so that's where we started. Todd came in on a Saturday and worked with the tower crew and sure enough, by the time they finished tweaking, the link was back in line.

We're due to replace that Trango with a Cambium link in the next week or two, as soon as the weather permits. We have backup STL systems in place, primarily using WDJC-FM's HD2 and HD3 signals, but it's nice to have the site back on its own link.

Nautel

We are also scheduled to replace the transmitter at 1260 with a new Nautel NX5. The ND5 will become our auxiliary, and we'll need to find a place to stick the ancient Continental 315R "Power Rock" transmitter that is in that building.

Once upon a time, that 315R was considered one of the finest and most efficient AM transmitters available. Nowadays, you're gonna have trouble giving one away. Finding parts for them, from the discussions I've seen online, has become a major undertaking. It's the end of an era.

But as I've said here in the past, do I regret it? No. I know that there are some engineers who long for the days of tubes, turntables and cart machines. I am most emphatically not one of them. Nautel has been building excellent transmitters for decades now. Their first AMPFET series made a lie out of several old wives' tales, namely, that solid state transmitters were unreliable, or were prone to lightning damage, or whatever. (The Harris MW-1 did nothing to improve this reputation, by the way.) (I won't even mention the horrible single-tube Gates Vanguard.)

By the time Nautel's ND series came out, in my opinion, they had the best on the market. The XL60 at 850AM is one of the best transmitters ever built, too. At 92.5, WYDE-FM (paired with 1260 in this market), our older Nautel FM5 will still make a good, clean signal at full power. The only thing we've ever replaced on it is a cooling fan. The new GV3.5 should last just as long. Yes, I prefer that: all you have to do is occasionally dust them off and you're essentially done with "maintenance." I've been spoiled.

Given that tubes are becoming more and more difficult to obtain, I'm not sure what a marginal operation with an ancient transmitter is going to do when it's time for tube replacement. Unless they can find a good, used solid-state replacement transmitter,

they could literally be off air for good at that point. I know of at least one station that did just that: they couldn't afford to replace their transmitter, the tubes were no longer available, so they just switched it off and turned in the license.

Oooh, Barracuda!

Back (as always) to computers/IT/data stuff (and so on). Part of my daily routine is to check on our Barracuda Spam Firewall to make sure everything is peachy. The Barracuda sends email summaries to me overnight, and I always give them a close look each morning. On Thursday, January 24th, I logged in to from home just before I left for work. I submitted some spam to Barracuda Central for analysis, logged out, and headed in to the office. Then I received a text from Todd: "The Barracuda seems to be locked up. When I restarted it, it stuck at the boot screen." I had just been in the thing maybe 30 minutes before it died!



One of the daily Barracuda reports. If I see our server in there, I have to take a closer look.

Todd pulled the Barracuda out of the rack and started checking as I drove in. It turns out that our unit had a bad hard drive. As the coroner in *Wizard of Oz* might have put it, it was not only merely dead, but "very and extremely dead." Todd was unable to get into it in any way, shape or form. Dead. Fortunately, we have "Instant Replacement" coverage on that Barracuda. The name of that service is misleading; it ain't exactly "instant," but at least they do get the replacement to you overnight. By Friday morning, it had arrived, and we started putting it back in line.

Todd will discuss Windows and constantly-changing interfaces in a moment; this problem is not unique to Microsoft. Barracuda had (once again – we've replaced that unit before) changed the user interface. Stuff that I expected to find in a certain place had moved elsewhere. Some options had changed. I did have a backup from the old unit, but it

was for a much older version of the firmware. I uploaded it into the new unit, and it took a while, but thankfully, the new firmware was able to figure out what I wanted. The unit came back up about 95% functional.

We put it back in line for incoming email, but I wanted the outgoing protected as well. They had moved some of that in the interface, and Zimbra (our actual email server) doesn't have a very-well-documented interface itself. But with a little tweaking and thumping on both ends – Barracuda and Zimbra – we finally got it working.

While Barracuda was offline, I switched Zimbra to directly send outgoing email itself. Whence arose a truly baffling problem (at least to me – let's face it, while I'm pretty good, I can't claim to be a Neckbearded Expert on email). Some ISPs, most notably Comcast and Gmail, were rejecting our email with error "530 7.2.1." That particular error decodes as, "authorization required." Huh? I just want to send an email to you!

My own ISP, Hiwaay, was also rejecting email with that 530 error. Todd and I are buddies with them, so I contacted their tech guys. They looked at the logs and couldn't find anything obvious. I posted a request for suggestions in the

Zimbra forum online ... and no one answered it. A lot of Googling showed that this does happen from time to time, and apparently, no one knows how to fix it.

But once the Barracuda was back in line, Comcast, Gmail, Hiwaay, and all the other folks suddenly started accepting our email again. When I get time, I'll have to run a packet sniff/scan on Zimbra's outgoing to see the actual transaction, and then try to figure out what Zimbra is leaving out. It's always something.

Headphones

I'm going to turn it over to Todd in a moment, but one final thing: the new headphone stations that we installed a while back are already giving problems. We added a little 1/8-inch jack to each unit so that we wouldn't need 1/4-inch headphone adapters (which inevitably get lost or stolen). I've mentioned Todd several times here, but believe me, Jack has been busy as well. He's essentially in charge of replacing these jacks. The ones we installed are apparently not terribly reliable, so we've gone with a more expensive, all-metal Switchcraft type.

Until next time, keep praying for this nation!

Nexgen and Windows 10 Todd Dixon, CBRE

If you have ever felt like you have gotten to the end of your learning about computers or operating systems, give Microsoft six months and they'll have generated a completely new interface for you to learn and adapt to that is "more user friendly than any of its previous offerings." We began wrestling with Windows 10 when our new, shiny streaming server that came with Windows 7 on it came and a month later upgraded itself to Windows 10 without any help from us. Of course, it immediately loved the Wheatstone Blade that each of the streams was on. So much so that every time it upgrades to a new version of Windows 10, the streams get scrambled between channels and we have to manually redo the audio on the correct channels.

At the end of June, we incurred a direct lightning strike at the studios that knocked out a few pieces of equipment. Two of the pieces were the ASERV machines for WYDE-FM and WDJC-FM. We had replaced a handful of the same vintage machines when we upgraded to Wheatnet, so we were able to temporarily get the machines replaced and the stations were back on the air. Cris ordered

some Dell replacements for the two ASERVs, and after having to overcome a backlog on the initial order, we received the new units in early August.

We went about getting them ready to go on air with all the necessary drivers, Wheatnet accouterments, and the RCS tweak tool and list. We added the ASERV for WYDE-FM into the system complete with Windows 10. At the time, WYDE-FM had been and was a talk format and the ASERV for it lightly queried the database for audio as much of the hours were filled with hosts microphones and phone calls. We didn't observe any real change with the new machine in place.

Enter the other ASERV, WDJC-FM, with the Darth Vader March in the background. Going through the same drivers, tweak tools and checklist, we placed the other Windows 10 machine in the system. Once the second one was installed, we started having both of the ASERVs going into local database mode. Sometimes the issue would completely knock us off the air, other times not. It occurred at entirely random times and random intervals. The fix was simple, almost always

involving a restart of Nexgen.

It was reminiscent of similar problems we had with Nexgen in 2015 which were network related. So, we started checking switches (no collision errors), rechecking our RCS list (about seven times for me, at least three each for both Jack and Stephen), and even replacing cabling.

We finally got a break when it happened while we were here and were able to handle the problem really quickly. The error in the log was bad packet match that was coming from WDJC's ASERV IP address, and it was flooding WYDE's ASERV – the two machines running Windows 10. When we

couldn't find anything conclusive on the internet, we rang our engineers about what version of 10 they were using. We were on an older version, so we upgraded. Of course, the Windows 10 upgrade meant that everything was back to default settings on our machines, and we had to go through the RCS checklist again.

So far, we're on day 11 without an issue, and lately, that is a record. I hesitate even writing it on paper. If you hear a loud scream that is generally southeast of your present location in the coming days, you'll know that we're back on the mat with Windows 10 in the Birmingham market.

The Chicago Chronicles

by

Rick Sewell, CSRE, CBNT, AMD
Engineering Manager, CBC–Chicago

The Artist Experience

Two years ago, we set about putting HD graphics on WPWX and then later WSRB. Our primary purpose was to open a new revenue stream for the stations. It was also important to make sure we had a good appearance on all the dashboards that newer vehicles are incorporating on an ever-increasing basis.

If you don't at least have your station logo on the HD graphics, the display will usually put up some default graphic like a radio tower along with the frequency. We not only wanted to have the station logos plus sponsorship logos, but album artwork as well.

We chose to use Center Stage RDS from Arctic Palm as our middleware. We had heard that it was the software with the most flexibility. It turns out that Arctic Palm was also purchased by DTS, which eventually became part of iBiquity (Xperi). This is definitely a plus since we would be able to work with support that knows the middleware through the end product in the importer, exporter and engine.

For album art, we used the TagStation service. This worked by sending your artist and title information to TagStation which they used to display album art on their NextRadio app, and then they sent it back to your middleware which eventually

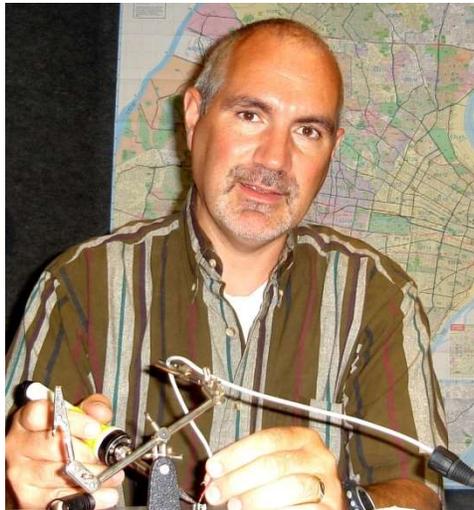
displayed the album art on the HD Radio.

This was all working fine until last October, when we heard TagStation was probably going to discontinue the service in the near future due to lack of financial support. That left us wondering where this technology was headed. I immediately emailed support at Xperi to see if they had a plan to replace this service. The word was that they were working on it.

Then, in the middle of December, TagStation officially announced that album art service would stop. Again, the word from Xperi support was that they were working on a solution. So at that point, we were without album art. At that time, both stations had a yearlong sponsor whose logo would appear on the dashboard whenever album art would not display. Obviously, this sponsor was now on the dashboard 24/7. This probably sounds favorable to the advertiser, but in my opinion, it

probably is better not have a static logo up constantly because eventually to the viewer/listener it just blends into the background. I feel it is a much better atmosphere for the advertiser where there is a dynamic experience that causes the advertiser artwork to stand out.

In early January, we got word that Arctic Palm was coming out with an update to the Center



Stage middleware that would include an album art with the service, “The Connected Car.” This is interesting because I always thought of the “connected car” implying that the car was connected to the internet. In this instance, for HD graphics, there is no internet required. I guess you could make the case there was an indirect connection from the internet through the radio station.

In order to get the new update for the Center Stage software, we had to update our support license. This is a nice way of saying we had to pay for support again. Once we did that, we updated the software and entered the login credentials for The Connected Car service and we had the album art displaying again.

At first, the artwork display seemed very sporadic. Perhaps, this was due to them still building their database of artwork, or maybe it took a while to meet demand of the station sending the artist and title information for that artwork to become a part of their database. Whatever the case, I have seen an increase in the amount of songs that have the album art accompanying them on the display.

It appears to work the same way as TagStation in that the middleware sends the artist and title to The Connected Car and then the album art is sent back for display. The one thing that I noticed that is different between the two services is that The Connected Car stores the album art for a much longer period than TagStation used to do.

Formerly, the associated JMSAC had a folder on the middleware computer called, “Work.” In that folder you would find the station logo, sponsor logo and artwork for upcoming songs. Once used, the song artwork would be deleted. The Connected Car update now uses a folder with the station call sign and the word “art” for folder name. For instance, one of our folders is named WPWX ART.

What I noted different is that the Album Art persists much longer than before. Instead of them being deleted after their time is done, the software is storing them for later display. For how long, I haven’t



Photo of an HD Radio screen displaying album art on WSRB.

figured out yet. But it seems smart to me that they have it ready to go. It probably places less demand on the internet that Xperi has to maintain for all the stations it is sending artwork. I would guess server infrastructure would be less under this scenario as well, if the middleware for each station looks to find the artwork first on the local folder.

Finally, this probably makes it quicker for the process of sending the artwork from the middleware to JMSAC, importer, exporter, engine and then the consumer’s HD Radio receiver. This all has to happen before the song actually plays on the radio. The HD Radio actually stores the upcoming artwork in its memory and then displays it when it gets the command from the engine to display. The bandwidth that is used in the HD signal is not that great. So, anything that makes this process quicker will make the artwork get there on time.

We were without album art for a little more than a month; it’s good to have it back. I think it is imperative for terrestrial radio to have a sharp looking display on the center point of the dashboard. There is and will be an ever-increasing competition for this important part of the new vehicles.

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

The topic this month is a look at the radio history of the Portland area. Currently, the oldest existing transmission facility in the metro area is the KPFJ and Fire Alarm Telegraph building. Built in 1928, the building housed the monitoring for fire pull boxes scattered around Portland, and KPFJ, which operated at about 2 MHz. The photograph shows KPFJ as it existed in the 1930s.

The city closed down the fire department operations in the building in the 1980s and sold the property to Sunshine Dairy, which had a milk plant adjacent to the property, behind the Fire Alarm Telegraph building as shown in the photograph. Sunshine Dairy used the property for office and dispatch. Recently, the dairy plant property was sold for a high-density residential development. The dairy retains ownership of the Fire Alarm Telegraph building and KPFJ property. Some Portland area broadcasters are promoting possible ways to protect the historic property.



Ben Dawson, an internationally known PE with Hatfield & Dawson, worked in the facility and provided the following narrative about what is now the KKPZ transmitter and studio facility.

“The photograph could have been taken most anytime between the original construction and about 1963 or 4 when the AM transmitter was replaced...

“The 506B2 [Western Electric FM transmitter] was only running the driver stage by the time I worked there, because the Oregon Journal management didn’t think paying the power bill for 10 kW operation was worthwhile. I had worked on two other 506B2s in Boston, so I was familiar with it. KPFM had one too, which originally was only a 1 kW and the 10 kW was added later by Bob McClanathan, causing it to have one Continental front panel, which certainly looked strange, because Bob couldn’t find a WECO one.



KPFJ and Fire Alarm Telegraph Building.

In a previous column, I talked about a 1958 photograph of then-KPOJ, 1330 kHz, owned by the Portland Oregon Journal newspaper. The station, which was KALE prior to the opening of the new 1948 Mt. Scott facility, looks much different today.



The pre-fire KPOJ transmitter facility at Mt. Scott.

“The AM transmitter on the right wall was all handmade except it had a Western Electric oscillator, and was electrically similar if not identical to KOIN’s, but laid out in a much nicer and more spacious fashion. (I actually worked on KOIN’s one time before it was dismantled, and it was rather a kluge.) It was conventional high-level plate modulated, with 891s and 892s. Its most unusual

feature was that it had separate power supplies for the modulator and the PA, and they were plenty beefy, so it would modulate very well if the tubes were good.

“The audio input and monitoring gear was in a rack on the left side of the photo. Included in the audio gear there was a panel with two VU meters, one for AM, the other for FM, in that rack, and I now have it in my rack of stereo gear at home. The modulation monitor was (I think) an RCA 66A, the best modulation monitor ever made, and the phase monitor was a Western Electric. The processing gear included one of the GE units which were a real doorstop so you could set things for pretty high peaks without difficulty. There was, of course, no positive modulation limit at that time.

“A lot of the station’s audio gear was handmade, mostly by Tommy James, who was the transmitter supervisor and a real craftsman. And next to the two racks was a very ancient Western Electric 1 kW transmitter, which was a pre-Doherty unit that was, I think, grid modulated. It had come from KIEM, in Eureka, evidently when they went to 5 kW and surplused it. I never saw it run, but Herb Davidson (who was the chief engineer – he was later at KOIN-TV as chief) told me it would run but badly as there were no new tubes for the PA.

“I was on duty when one of the [AM transmitter] supplies blew up its filter reactor. I had to jury rig the system to run both PA and modulator

on one supply, and the control circuit was complex enough that one contactor wouldn’t latch properly, so I ran a length of twine down through a conduit hole in the floor to allow me to pull it in manually from the main floor, as the power supply iron and contactors were all in the basement. The phasor was on and behind one panel of the transmitter, which was open frame, not enclosed. In those days the spurious emission standards weren’t very stringent, so an open frame transmitter wasn’t unusual.

“I found it very interesting when I went off to school in the east to find that none of the Boston or New York AM stations had handmade transmitters. In the late ‘50s and early ‘60s, half of the Portland market AM stations had handmade transmitters, and a slightly different half had handmade audio control boards. And of the six original FM stations (KGW-FM later KQFM, KEX-FM, KPFFM, KPOJ-FM, KOIN-FM, and KPRA/KWJJ-FM [which was dark by sometime in the early ‘50s]), three of them had locally made CelRay antennas. (There are still at least 3 CelRays up on AM towers, but of course not in use - in Longview, Pasco, and Albany, left up because they’re part of the AM tower.)”

Thanks to Ben for his recollections about Portland area history. Until next month, I depart with the thought that if we forget where we have been, we can’t know where we are going!

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

New Year, New Transmitters

Normally, January is a slow month for us, much like December. Not so much in 2019. The month was spent preparing for the KLDC transmitter to be installed. We needed to get some electrical work done and needed to plan out redoing some things we didn’t like. We had an electrician come out and install the surge protector for the transmitter ahead of the transmitter install. We had to move equipment down in the rack as well. We had the Nautel P400 at the bottom



of the rack with the audio processor, exporter, and AM-IBOC above. We went ahead and removed the P400, removed some unused equipment and were able to move everything down the rack so we could have room to install the J1000 at the tippy top.

The installation went fairly smoothly. We noticed right away the rack rails for the transmitter exciter drawer were not long enough for the 24-inch deep Middle Atlantic rack. This would be a problem as, much like a server, it needs that support in the back. The

unit came with a bracket that was supposed to mount across a rack I believe to support the power amplifier deck. We modified it: cut it in half, screwed it to the top of the rack and then to the rack rails. That gave the unit the support it needs so we don't need to worry about it sagging in the back and potentially damaging the unit when we have the exciter pulled out for adjustment or servicing.



KLDC's new J1000 transmitter!

We were able to get the transmitter installed and turned on, putting out RF the first day. However, things weren't quite right as it kept going into cutback when we raised the power over 200 watts, and it would not positively modulate more than 60%. It was late, so we went home and came back to the issue with fresh eyes the next day. Thankfully, Steve Braley at Nautel was around and willing to help us out. I think he and my dad were about to give up hope, thinking there was a serious transmitter issue that would require factory repair.

Just as Steve was ready to tell us to ship the whole transmitter back, Steve thought of something. We checked two parameters in a super-secret factory area several menus deep. Sure enough, those two



We manufactured brackets to secure the rear of the exciter drawer slides.

parameters were wrong – way wrong! After setting them correctly, the transmitter began putting out full power, modulating correctly and staying on the air.

After that, we did an IBOC HD setup and got the spectrum where it needed to be. I must say the station sounds great! I am looking forward to springtime storms to see just how well the J1000 holds up. The J1000 we have at KLVZ-night does great, so I am hoping for the same here as we have always had issues with the ND1 during storms – no damage, but it would go into cutback.

NX-Link Issues

One of the big things I was excited about with the J1000 is the fact we can have NX-Link, which gives us a graphical user interface for the transmitter. I am a big fan of things being on the internet. I know it opens us up to issues if not done properly, but it makes life easier.

The first thing I did while my dad was working on the J1000 was try to log in to the transmitter. Nothing would ever happen. Firefox wouldn't load anything at that IP address; it would just reset the page back to Google or wherever it was at the time. Interestingly, I could ping it with no problem.

I set up a port forward and Nautel confirmed they could get on it. I tried it on my phone – perfect. My office computer, laptop, our AutoPilot computer in engineering as well as our Nexgen computer all could not get to it but could ping it.

I haven't had a ton of time to dig into the issue, but I now know it's our antivirus program, ESET Nod Antivirus. Pausing protection does not solve the issue. I have to go in to the advanced settings and start disabling everything manually. Here's the thing. I will start to enable things, one at a time, and when I can no longer get to the transmitter, I put that setting back; however, that doesn't fix the issue. That makes tracking down what exactly is blocking it difficult.

If anyone else has had this issue, please tell me what to do to fix it. For now, it is what it is, and I will get to it sometime after we get the KLZ NX5 installed.

KLZ Transmitter

With the KLDC transmitter installation over, we have moved on to the KLZ transmitter. This one is going to be a bit more work for us, but in the end, I think everything is going to look great, mainly because that's how we do things in Denver. The transmitter should be delivered and installed sometime the first week in February. We have an electrician scheduled to come out and help us remove the transformer that goes with the AMPFET 10 and then do what's needed so we can power the new NX5. We are doing some RF plumbing to allow both the NX5 and the current ND5 run in HD when needed. As it was, we would only be able to run one or the other in HD. I am sure my dad included some details in his column.

I am looking forward to the new transmitter. It is a learning process to install and get things working, and it's fun seeing how far transmitters



New RF plumbing to and from the phase-shift network so that both KLZ transmitters will work in HD.

have come. I don't have to worry about connecting all these different commands, meters and statuses into our remote control. Instead, I do the critical stuff and the rest, I can easily go to the transmitter's online AUI if I need to.

Coming Up

As you know, this time next month we should have the KLZ NX5 installed and up and running, Lord willing. Beyond that, I honestly don't know what's coming up. I have been so focused and busy with these transmitter installations that I haven't had time to think ahead beyond February. I am sure it won't be nearly as busy, which will be nice. I look forward to spending time learning both new transmitters.

That about covers it for this edition, so until next time... that's all folks!!!

The Local Oscillator
February 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

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

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

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

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

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

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