The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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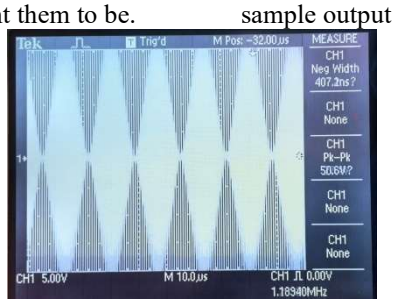
J1000 Issue

With the KLDC relocation project done, we spent a good bit of time last month fine-tuning the operation and getting things like we want them to be. Both the main and auxiliary transmitters are configured for hybrid HD Radio operation, and the performance is stellar. I'm amazed at how well it works and at the coverage of the station, both digital and analog, day and night. It's far better than it ever was at the old site, something that I can only attribute to a degenerated (or missing) ground system at Ruby Hill. It's like we got a brand-new radio station. The night limit on that channel is 4 mV/m, which makes the 50% interference-free contour 1.6 mV/m or thereabouts. The transmitter location allows us to put a 50% interference-free night signal over the core of Denver, from downtown south to Littleton. It's crystal clear in the parking lot at the office.



J1000 RF sample during the transition from low power to high. Note the P-P voltage.

We did encounter one odd issue with the Nautel J1000 transmitter. I noted immediately upon cranking the power up to the new 1 kW TPO that there was zero RF sample output level on the transmitter. A little investigation revealed that a 10-ohm 1/10-watt SMT resistor in the RF sample voltage divider chain was open. At the old 660-watt power level, that resistor was bypassed and so it wasn't an issue, but at 1 kW, the whole chain of resistors was in the circuit. That open resistor opened the circuit and prevented any RF from reaching the BNC jack on the back of the remote interface PWB.

I didn't have any 10-ohm SMT resistors handy, so as a quick fix I bypassed that resistor. That got me an acceptable RF sample. I then ordered some resistors from Mouser, and when they came in, I installed one. Note to self: don't try and solder in grain-of-sand sized SMT components after drinking a whole pot of coffee. I did get it done, and the RF sample output was at the correct voltage.

We carefully set the RF sample input level on the Inovonics 525N modulation monitor with the transmitter operating at 1 kW. Switching to the 12-watt night power level, the sample voltage was also acceptable, and the mod monitor gave a correct indication. The new issue showed up when switching from the 12-watt night preset to the 1 kW day preset. The mod monitor would go into overload, indicate "over-mod" and stay there. To see what was going on, I connected a scope to the RF sample output of the transmitter (I used a BNC tee with a 50-ohm termination attached). The sample output at both power levels was correct, in the 5V P-P ballpark, but when switching between the night and day presets, the sample would for two full seconds go to greater than 50 volts P-P. That is a potentially damaging voltage for the mod monitor, and it causes the AGC to run all the way down and stay there.

Talking with Nautel support about the issue, they were perplexed and asked if we had another J1000 we could try the same test on. We do, at KLVZ-N, so Amanda and I configured the same test setup – scope connected directly to the RF monitor output of the J1000 with a tee and 50-ohm termination attached. I created 12-watt and 1 kW presets and switched between them. When going from the low to high preset, the RF sample would go to 50+V P-P for two seconds. The behavior was the same on both transmitters. So clearly this is a design issue, not limited to the KLDC transmitter.

Our friends at Nautel support told me they would loop in their engineers to find a fix for the problem, and I'm sure they will come up with something to address it.

The way the circuit works is that there are eight resistors in series between the RF sample input (from the output filter CT) and RF sample output, and tiny relays are switched in as needed to bypass resistors and maintain a more-or-less constant 3-5V P-P at the output. The relay selection is driven by the controller board via an RS485 bus. Clearly what is happening is that as you would expect, all the resistors are relay bypassed at the 12-watt power level. Switching to 1 kW, it takes two full seconds for the relay configuration to be changed to select the correct setting for 1 kW operation (likely all relays open). What should happen is that at any power change, all relays should open, putting all resistors into the circuit and then switching in relays as needed to provide the correct sample output level.

My hope is that Nautel can fix this in software, changing the sequence. If not, I need to find some way of clamping that output voltage to less than 10V P-P without generating a bunch of square waves. For now, we've stuck a piece of wire into the low-level (antenna) input of the monitor and selected that input. That's less than ideal as there are noise sources at the site that can produce false indications on the monitor, but it's better than nothing. At least we can use the audio loss alarm on the monitor to alert station personnel if things go quiet for some reason.

Microwave Link

One other thing we've got to do for the new KLDC facility is upgrade the microwave link between the studio and transmitter site. We're currently using an iBiquiti PowerBeam AC500 in the 5.8 GHz band for the nine-mile path, and it's working, but with occasional digi-burps and Max Headroom stutters (if you don't know who Max Headroom was, Google him!). We have ordered a new Cambium PTP 450i system with 3-ft. antennas and are awaiting the arrival of the radios. At some point, when we get all the hardware, we'll get a crew to install it and greatly improve the link. The PTP 450i we ordered features dual-polarity, which should make for a solid, high-throughput link.

Codec Updates

Our Denver market is all Tieline in the codec department. We have an array of Barix Exstreamer 1000 codecs as internet backups, but all our primaries are Tieline. Other markets are headed that way as well.

I single out Denver here because we have a "robust" STL architecture. We use a Gateway 8 at the studio to feed 256 kbps 48 kHz streams to nine different destinations. KLZ has its AM at one site and an FM translator on Lookout Mountain. KLTT has its AM and an FM translator at the same site but in a different location on the property. KLDC just has its AM. KLVZ is the real challenge: It has a day AM site, a night AM site (shared with KLZ), a translator at the day AM site but a different location on the property, and an FM translator on Lookout Mountain. To handle the multiple incoming streams, we use Gateway 4 codecs at the KLZ and Lookout Mountain sites; all the other sites use Bridge-IT XTRA standalone codecs. Oh, and I didn't mention that the KLZ connection backhauls four different satellite channels to the studio. And we have a hot-standby Gateway 8 at the studio. Did you get all that?

Until now, we've had to sort of cheat to get all those feeds to work. We've had to use Tieline's "Smartstream" feature to create a pseudo-multi-unicast so that one stream can feed multiple codecs. That worked, but there was a problem – if the primary connection dropped out for any reason, the next Smartstream connection would capture the backhaul. The result was that we would lose the satellite feed backhauls from time to time, especially after heavy rains (rain fade on the 11 GHz path) or after power outages. DRR recordings would be blank, and live feeds would be silent.

We complained to Tieline, and they listened. Toward the end of last month, they released a firmware revision that provided the Gateway codecs with a true multi-unicast function. We implemented the update as soon as it came out and reprogrammed our codecs to take advantage of it. That fixed our issue and gave us some additional tools and options, including the ability to mix connection types in the same program. For example, we can, in the same program, have multi-unicast connections for KLZ, KLTT and KLVZ and a peer-to-peer connection for KLDC, complete with forward error correction.

If I haven't said it before in these pages, I love Tieline equipment, and I love their customer service and support. Thanks to all the folks at Tieline that listened to us and worked so hard to get the update done and out the door. Why can't Microsoft be that responsive?

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

Hello to all from Western New York!

Where did the time go? October 15th marked my 20th year on staff with CBC. I remember well the first weeks/months as the chief engineer of Crawford's Buffalo, Rochester and Syracuse stations.

My first task was to clean up the transmitter sites in all three markets. Vegetation was well out of control, and the transmitter buildings were not much better! The previous engineer did nothing in the way of keeping the sites clean and orderly, which resulted in snakes and rodents having free reign in the equipment. It took months of intensive cleaning and brush removal, but the end result was well worth the effort.

I have always taken much pride in the way our facilities look, and in my opinion, how your transmitter sites look (inside and out) reflect on your dedication to do your job well. I am a firm believer in regular maintenance, and by doing so, it makes it much easier to keep our sites clean and orderly. I would not hesitate at any time to give someone a tour of our facilities!

On October 6th, our HVAC contractor finally installed our new Bard 6-ton A/C at the WDCX-FM transmitter site. The new unit was ordered late last year, and due to Covid-19 shutdowns, the factory was months behind in getting product out to distributors.

The initial install projection was August 1st, but delays from the manufacturer kept pushing that date ahead, and luck prevailed in our favor, as the unit we received was initially manufactured for another customer who canceled their order, so we got moved ahead in shipping. Our unit (at last check) was not going to be shipped to us until late November!

The new A/C is operating well, and next year we have budgeted to have the second unit replaced. Hopefully, we will not have to wait almost a year before the next unit is installed!

The new Amherst studios are moving right along. We finally received our occupancy certificate from the town inspectors, and I have been busy performing pre-installation work when time permits. The TOC is coming together nicely. I have the racks installed, ground strap run and the cable ladder installed. All network wiring has been done, with NexGen and Wheatnet network cables run to all four studios.

Weather permitting, Josh Meyers and I will be installing the non-penetrating microwave dish mount on the roof early this month along with associated wiring for the microwave link to the SUNY (relay) tower. The other end of this link, the SUNY tower to WDCX-FM tower in Boston, NY will not be installed until after January 2023, when our lease starts with New York State.

Wire ladder in the TOC at the new studio leasehold.

Patriot Tower, with whom we have done business in the past, was originally lined up to do the

installation but had to back out due to contracted obligations to other customers. I did find another local company who has antennas already on the SUNY tower, to do our STL installation. Cris has been working with Transwave Communications' engineers on the technical specifications of the project.

We are hoping that they will be able to get the Boston-to-Hamburg link up before too long. This will provide simulcast audio to our five-tower array in Hamburg, NY.

You may recall from last month's column the issues we experienced with our fiber-optic cables and WHLD's cables being cut by Spectrum and Verizon installers. Well, we had another cut instance on October 12th when I cut our cable with the lawn tractor! Verizon didn't bury four feet of the cable from the pole, and I was unaware of this and ran over it with the lawn mower. This has gone beyond funny. This will be the fifth time that a new cable has been run from the service pole to our building. One more time and I am going to request (demand) an overhead cable be run to the transmitter building. Not much chance of it getting cut again!

On Monday, October 24th, during a regular maintenance visit to the WDCX(AM) transmitter site, I noticed that the tower 5 parameters in the night pattern were running almost out of tolerance. This has occurred numerous times over the years, so I didn't think too much of it, I just dialed it back in and all was good… for a time.

On the following Wednesday morning, Earl Schillinger called from Rochester and reported that there was a strange swishing sound on the AM carrier. The sound was erratic, with no pattern noticed, so I made the trip back over to check out the issue.

When I arrived, the first thing I checked was the antenna monitor and noted that tower 5 was out of tolerance and bouncing around. I suspected that something was perhaps heating up in the network in the doghouse, causing the impedance to change. Using an IR thermometer, I scanned the entire network but found nothing. I did hear a slight arc randomly, but could not see where the arc was originating.

Next, I shut off the light and shut the door to create a darkroom of sorts, and was able to locate the problem. The 1/2" copper tubing that connects the output network to the tower had come loose and was arcing to the buss bar that connects the network to the tower. The threads were shot that connected the tubing to the buss bar, so I drilled out the threaded hole and installed a nut/bolt to secure the copper feed tubing. I had to go back and re-adjust the night array, but all dialed right back in. A check with Earl on Thursday found that the swishing sound was gone, and the array readings are rock solid.

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 happy engineering!

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

You may have read about this in my previous *Local Oscillator* contributions. Our emergency generator at our studio and FM transmitter facility has gone toes-up. After having trouble with it responding to power outages and shutting down with a fault code, we were finally able to pinpoint the problem. Well, maybe a bit broader than a pinpoint, but at least it's a diagnosis.

I began to suspect that the generator was running on five of its six cylinders when the sound it made seemed to have a tiny but perceptible miss. You could hear that the exhaust flow through the turbo had little pulses suggesting one of the six cylinders was not contributing to the gas flow through it. That turned out to be true, and a compression and cylinder pressure test confirmed the demise of cylinder 1.

A decision was made to replace the unit. Unfortunately, the time needed for a new one is 45 weeks (!!!) from the date of order to delivery. That's not including setting and connection, or initial startup. This means that we're very near to a year without emergency power, which most readers here will know is completely

unacceptable for a broadcaster. The interim would have to be covered by a rental.

While rental units aren't impossible to find, they are in high demand due to hurricane Ian. We settled on Sunbelt Rentals and had a trailer-mounted portable 125 kVA unit dropped off in our parking lot.

It was important to get the rental as close as possible to the building's transfer switch since we'd need five runs of 4/0 locomotive cable to connect it. Our natural gas meter, electrical disconnects and transfer switch are on the exterior of our building halfway down a very narrow corridor – not someplace I'd trust anyone to back up a 10,000 lb. tandem axle trailer. I hitched it up to my truck and with some help from a spotter, I backed it down there myself, but it was a very tight squeeze, especially where I had to make a turn. This reduced the need for about 500 feet of the expensive DLO cables.

Mike had to thread the needle when backing the rental gen into this tight space.

The next problem to tackle was fueling. The unit has enough onboard fuel for about 20-30 hours, depending on the load presented to it. The last power outage we had here lasted nearly four days, so we needed a way to refuel it quickly ourselves. For that I ordered a 540-gallon tank with integrated pump to be placed within hose reach. The tank was set and then filled a couple of days later with off-road diesel, which is perfect for stationary engines because it avoids road taxes which in Michigan are somewhere around .85/gal. for diesel.

We connected the block heater and lastly, we added a battery maintenance charger because I know the battery won't stay charged for a year!

I'll be writing about the installation of the new generator in a future issue of these pages.

The Tribulations of TLM

At our 560 AM WRDT transmitter site in Monroe, Michigan, we have four towers, each with

The TLMs are now located inside the tuning houses.

three LED beacon lights. Because of the need to decouple the electronics of the light monitoring systems, which were mounted on the towers, a fiberoptic transmitter and receiver circuit was employed with a length of optical cable to communicate an alarm condition back to our remote-control system. While this arrangement is effective, the "weatherproof" boxes that housed them were anything but. The first one I ever opened poured out at least a quart of water. Over the course of two years, I was continually chasing issues with the tiny TLM and fiberoptic circuit boards getting wet. They frequently were found with corrosion, the wet ICs were malfunctioning, and in some cases fried. Whenever a system was down, a compulsory call to the FAA was made and requisite NOTAM issued.

I made the decision to upgrade the weatherproof boxes to something, er, weatherproof and in doing so, I also decided to change the configuration of the system. The monitors would be much happier inside the tuning houses out of the reach of the weather. Relocating them would allow me to wire more of the status outputs back to the remote control, saving us from chasing down ambiguous alarms at a site that's for me nearly 75 miles each way!

It took a bit of doing, relocating the photocell, adding a new box for the TLM circuit boards, and moving the TLM's current transformer to the tower light breaker panel, but now all four towers now have TLMs protected from moisture and with one less layer of complexity because we no longer need the fiberoptic isolation circuits.

One special thing to note is that because these are AM towers, the electrical feed to the lighting is isolated by use of an Austin ring which is

an open-air transformer that allows the 60Hz 120VAC lighting to work while at the same time not allowing a path for the tower's RF or DC and not carrying a ground to the base of the tower. An Austin ring does consume a small amount of electricity while it's connected, whether there is a load connected to it or not. By relocating the photocells to the line side of this transformer, we also eliminate this parasitic loss whenever the lights aren't needed. The TLM doesn't mind being ahead of the Austin transformer and looks at the change in current from baseline to lights on during each flash cycle.

Now that all four towers are done, I expect our tower lighting monitors to function much more reliably and we gained some efficiency in the process.

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

We're already at the point of the year where Christmas regalia is rolling into the stores. To me, it's just a reminder that the end of the year is coming more quickly than I thought it was and a month like October makes it pass that much more quickly.

Nautel NX50 AUI Failure

Early in the month, we had an issue where the NX50 out at our Tarrant transmitter site didn't raise to day power. It certainly didn't used to be this way, but the first thing that came to my mind at the time was, "Well, the transmitter needs to be rebooted." So I traveled out to the site to do just that. Only when I powered it down and back up, the AUI got hung in a boot loop.

Obviously, the transmitter can function without the AUI, but unless you committed everything to memory for your presets and other settings, you're really flying blind on its operation as all of the instrumentation is shown via the AUI. We ended up being able to run with no problem, but the situation had to be resolved. The AUI software runs a version of Debian Linux, but it is Linux, so I at least I had some footing to try and figure out what was going on.

I started to dig into possible replacement of the storage device that was used by the control computer in the transmitter. This NX50 was put into service in 2020. A lot of Nautel's AUI software is run on 4 GB compact flash modules, but this transmitter had an 8 GB solid state drive (SSD) that was flashed with the compact flash disk image.

What I came to find out is that the log files had filled all of the disk space available in the disk partitions of the 4 GB image, so when I rebooted and the disk was full, there was no room for the software to function or even to boot up!

Nautel customer support was exactly what you typically have come to expect and provided all of the software and documentation. The only problem was that there wasn't any documentation for a NX series that had an SSD drive, so they had to provide me with GV series write-ups. I am super familiar with disk imaging since I end up using it a lot with Raspberry Pi and writing live Linux ISO installs to USB, but for some reason it took a number of tries to get this imaging to work right. I joked with Cris and Stephen that the 103rd time was the charm. Maybe it wasn't that many, but I wouldn't be exaggerating to say that it was in the neighborhood of 60. To end on a good note, the image did end up getting written to the SSD and it was even an upgrade to version 5.1 of the AUI.

The Theme for the month is...

Normally this time of year, we have some real doozies in the way of storms as we transition from warmer weather back to cooler weather, but not so much this year. Excuse me while I dry the tears from my face over that… Other storms happened, though, besides the Nautel incident above that were just as worrisome.

Everyone has been dealing with the Microsoft updates that devastated Outlook's ability to send email with many mail servers, but our Marketron Visual Traffic server stopped sending reports out at about the same time. Everything else in Visual Traffic was working fine, even generating the reports – they just wouldn't send and would sit in a "pending" state.

After Marketron support spent a couple hours looking at it, they suggested a complete wipe

and rebuild of the server. Fortunately, once I blanked Windows to a factory state, they did a lot of the heavy lifting to get their software back to a usable, working state. Of course, to carry on the theme, their support had never quite seen VT do this, either. I guess I can always tell support folks "You're welcome…" for increasing their database of problems they've never seen before.

I'll close this month with a tease for next month. For a number of years, we've had a system in place for our talent on WDJC to voice track their shows in the event that they couldn't or wouldn't be in the studio. It involves using talent accessing the system remotely and picking the spots that they want to insert voice tracks, recording them locally wherever they are and then pushing them to the station and allowing the RCS Audio Format Converter (AFC) to put them into carts using a template.

Of course the drawback to this method is that the talent don't actually get to hear the transitions between audio. Rick and Amanda both have talent that need this functionality. In Amanda's case, she has a client that had that ability using Teamviewer, but is struggling to get the same results with RealVNC. Rick, on the other hand, is trying to use the RCS remote app (available in mobile app stores) to be on the same network and be able to voice track.

Jack and I have an idea that we're working on and hopefully we'll have it fully tested, working, and documented so that talent might be able to actually voice track and hear audio without the need for any of that.

Jack is really a wizard with Wheatnet and I'm glad he's on our team down here. After I pitched a thought to him, he had an idea on paper in pretty short order.

Have a great month, and in the midst of all the sometimes-difficult problems we have to deal with, be thankful for what we get to do and the Savior for whom we get to do it!

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

Boy, I'll be glad when this election is over. I cannot understand how or why the campaigns think that bombarding me with email and/or text is a great way to get me to support their candidate. My phone lets me block the texts … one at a time. Pain in the neck. It's especially annoying that they're using the same techniques as spammers – changing phone numbers, using different email addresses, the works.

But we did have a busy October in Birmingham. While my title is Cousin IT now, I still help out with RF stuff at our transmitter sites. In early October, we had a meltdown in the day pattern for 850 AM, WXJC. Todd ran out and checked it; the problem was in the ATU for tower #4. I drove in and agreed with him, then decided to declare the shunt leg capacitor in the day T-network to be D-E-D dead. The analyzer said that it was still a capacitor, but the value had gone up markedly. With a vacuum cap, this is a sure sign that it has run hot enough for the plates inside to warp and sag too closely to each other. Under load, the cap would fail.

Todd will probably tell you about his fun with our Nautel NX50 transmitter; the AUI was caught in an endless boot loop. This is something you don't think about until it happens to you: without the AUI on their NX series AM transmitters, you're hosed. The GV series of FM transmitters have a separate display on the controller, but that AUI is basically it on the NX.

There are buttons inside the NX that will allow you to do RF ON and OFF, and raise and lower power, but there's no way to check anything else (unless you've wired and calibrated it into the remote control, which thankfully, we had with our critical metering). We couldn't edit presets and the remote web interface was giving a blank screen.

Thank the Lord that Cris told us to wire the phasor pattern interlock into the power limit function on that transmitter. With the day pattern broken with the tower #4 issue, we had to run the 1 kW night system. Every time I hit the RF ON button while we were troubleshooting, I trembled a bit, hoping that the preset was correct and/or that the power limit

would protect me. I did NOT want to put 50 kW into our nighttime phasor. Doing so fills the transmitter building with lots of stinky smoke and creates much additional work, and we already had plenty.

Cris and Amanda sent us a spare vacuum capacitor that they had on hand out in Denver. We

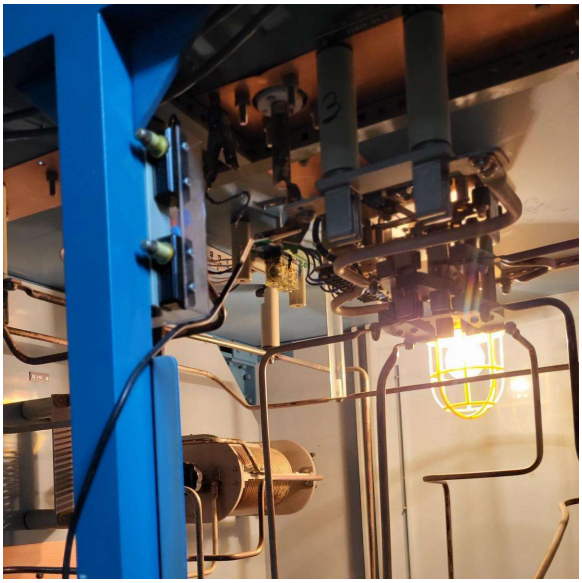


Figure 1 - Measuring the transmission line lengths at WXJC.

decided to take this opportunity to do a complete phasor-in-to-tower retune on tower #4 (and coming soon to a transmitter site near us, all of the other towers as well). I used our AIM 4170 analyzer to get accurate lengths on our transmission lines, then reworked the phase budget for #4. I supervised while Todd retapped all of the components in the ATU to the generated values, and Todd, Jack and I took turns doing the tower #4 section in the phasor. End result: the tower 4 phase control is now about centered, and the system works like a hose. Thank you, Lord!

Windows As a Subscription

Plenty of industry pundits are predicting that Microsoft is going to take Windows down the subscription pathway pretty soon – perhaps with Windows 12. You will pay a monthly or annual fee and you're (supposedly) guaranteed the latest version of Windows, free of bugs and headaches. (Heh.) If you're using any of Adobe's creative stuff, you're already familiar with this type of thing. The Office/Microsoft 365 stuff uses this model as well, so it's a logical step, I guess, to move Windows itself into that box.

Like everyone else, Microsoft wants everything in The Cloud™. Remember, the "cloud" is just someone else's computer, somewhere else. If they have trouble with that computer that's located somewhere else (and it happens), you lose access to everything. When you add in privacy concerns – even though every cloud provider assures you, pinky-dog-spit-swear that they'd never mine your data – it's possible that this could eventually cause some users to move away from Windows.

To what? Linux? That's what I use, and it's a lot easier to deal with now. The Windows Emulator (wine, which stands for "wine is not an emulator" – heh) has gotten pretty good and can run a wide range of must-have Windows applications. If you haven't tried it lately, give it a spin. Apple appears to have become more rational about pricing for their stuff nowadays, so there's another alternative. But that's up to you.

The Dead Laptop

Something else that I had to declare D-E-D in October: my personal HP laptop, which I inherited from Sandy after she moved all of her stuff onto her iPhone. The keyboard was dying, so I did a bunch of web searching and found a replacement. The advertiser even listed my model number! However, I was unable to find one at HP's website for my specific model, and that should have been a clue. Should have.

The new keyboard arrived and I disassembled the laptop, only to discover that, in fact, the keyboard isn't replaceable. It's plastic "welded" in place. I guess I could have pried it out and figured

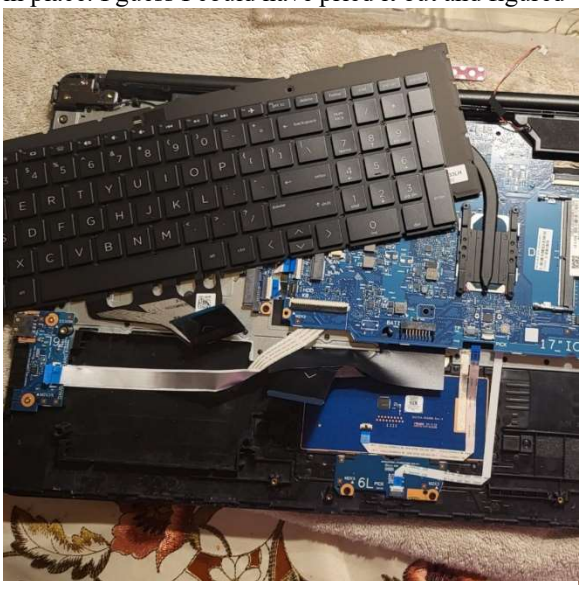


Figure 2 - Sadness, thy name is a busted laptop. He D-E-D dead.

out a way to hold the new keyboard in place, but it was just too much trouble. If you've ever worked on a laptop, you already know that space inside is at a premium to start with. Start adding clamps and other hardware and things get crowded in a hurry.

Then I hit a bigger roadblock: during the disassembly and reassembly, something obviously got damaged. The laptop will not boot. There began a hilarious weeks-long attempt to save everything on the existing hard drive, a 512 MB SSD. This uses the M.2 form factor, so I ordered a little adapter from

Figure 3 - This cell tower is in the running for World's Most Heavily Loaded.

Amazon, plugged the SSD into it – and it half worked. I could see my directories, but the folders were empty. Ungood.

To make a long story short, I finally managed to get all of the important stuff off of that SSD. I'm still missing some files, but at least I'm back up and running. I'm trying to decide on a new laptop.

I also installed an SSD in my older AMD-drive desktop system at home. That one was pretty straightforward, I'm glad to say. With that SSD in there, it's a new computer, too. It's unbelievably fast.

Two-Factor Authentication

You've probably run across this already: you want to log into a website, or use an app, and you're told that a special, one-time code or pin will be sent to you. You receive it via email or text, then enter it to complete your login. It's an excellent additional step to keep people out of your stuff. Even if they happen to steal (or guess) your username and password, they'd have to intercept your email or text to get that one-time code.

We're working on adding this to all of our critical servers. I've been too busy putting out fires elsewhere (see about re: the 850 meltdown, for one thing) to work on it, but it's definitely on the front burner. For now, we'll probably just do email. Sending texts requires a good bit more work, depending on who your cell service is with. These aren't free services, either: you have to pay for them.

The World's Most Loaded Tower?

I leave you with one last image. There's a tower just north of Birmingham that Cris has joked about every time we've passed it, headed to 101.1 FM in Cullman. But I think I found one that beats it: I took a (terrible) picture as I was driving through Atlanta on I-20. That has to be, without a doubt, the most heavily-loaded tower I've ever spotted. You can't even see the pole under all the coax.

Until next time, don't forget to vote and keep praying for this nation! God's got this!

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

We continue to work our way through the issues that have come up in the process to have auxiliary HD operations once again at all our transmitter sites.

Last month I wrote about the plan that we put in place to have the new Nautel HD Multicast+ importer/exporters paired up with our main Nautel transmitters at each site. The second part of the plan was then to use the pairs of Nautel Importer and Exporter Plus that had previously been on the main transmitter to the backup role matched with our BE auxiliary HD transmitters.

At the time of that writing, I had reported that we had only one of those installed. I am happy to report that all three have been installed and they are working great. However, that has not meant we haven't had any challenges left in this project. In fact, we have more than I would have expected.

Sofia display of HD1, HD2 and HD3 logos.

Some of the Exporter Plus units, once taken offline, came back up with issues. One had to be sent in to Nautel because it had the older style motherboard that could not be field flashed for reprogramming as it would show only an "initializing" screen on bootup.

The Exporter Plus worked fine but the LCD display is malfunctioning. We are awaiting a new one, which should arrive in the next few days.

Beyond that, we are also finding that we are fighting the older BE HD auxiliary transmitters. Some of them have not been used for a bit due to the fact that their matching exporters were down and not repairable. This is often the case when a unit hasn't run for some time and you apply power… prior and unknown problems arise.

This has certainly been the case for us in this project. I am confident that we will find cures and get the project that I thought would be finished in a few weeks accomplished.

One of the big pluses that I mentioned last month was that we would be able to expand our capability in using Station Logos on HD displays where we hadn't been able to do it previously. We now have logos on all our signals, the HD2 and HD3 stations, and two of our stations, which never had them on HD1 either, now are looking really good in car center panels.

Rocky Mountain Ramblings
The Denver Report
by
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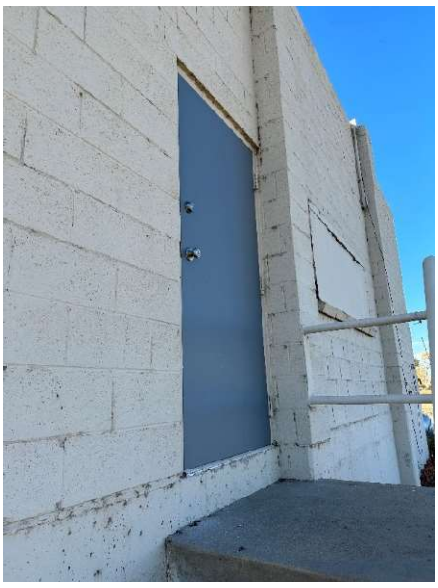
New Door

We were finally able to take delivery on the new back door for the KLZ transmitter site to replace the one that had been badly damaged when someone tried to break in. Delivery came on a Friday, and afterwards I waited for my wonderful husband Jordon to come and install if for me. While I waited the couple hours for him to arrive, I went ahead and was somehow able to drag the door through the garage and up the stairs into the building. I also was able to get the old door off. The new door was a snug fit and looks great! All that is left to do is paint it.

Neglect Can Really Bite You

As many of you may remember, the KLTT day/night pattern switching has had issues for a good long while. At sunrise, the station would switch pattern but would not come up to full power always. It would more often than not get stuck off air until it could rock it between day and night modes a few times. I ended up writing it in the remote control macro to try it up to three times. Any time I go out to the site, I do the switch manually just to see if I can find the issue, to see if the status lights on the antenna controller will give me a clue as to which RF contactor is at fault, but in true form, it always worked perfectly when I was out there.



The new back door at the KLZ site.

On a trip with my dad to the site to replace a safety switch in the John Deere riding mower, I thought I'd test it. This time, the issue happened, and I could not get it to correct itself; the system would come up in the night mode but not the day mode. The transmitter showed a VSWR shutback. That was good in that it allowed us to go through and find the issue, but it was bad in that I had tested it during the middle of the day and we ended up losing a bit of paid programming. I was able to get it back on the air on the night pattern, so we stayed there while we inspected.

We looked inside the phasor cabinets and did not see anything obvious. We then moved to the tower bases. We started with tower 3, which is right behind the building. We looked at all the components, and other than it being very dirty (one the vent plugs had popped out), nothing stood out.

We then moved over to towers 1 and 2 on the other side of the canal. Everything was perfect at tower 1 but at tower 2 we found the Austin ring transformer had settled and the two rings were touching. Not good. Thankfully, this tower only has about 5 kW in it and there wasn't any damage. Apparently, when a tower crew replaced the base insulator a few years ago, they neglected to tack weld the pipe joints, which allowed the vibration of the tower to cause movement. We turned the station off briefly to correct the issue, but that didn't fix the immediate problem – the station would still not come up on the day pattern. This was the first thing we found.

Back across the canal, we revisited tower 3 behind the building. This time we put our hands on all the components, checking each J-plug and coil. This time we found J302 was actually fried! The shorting bar had evidently gotten very hot to the point where the handle was brittle. We were able to remove it, take it back to the building and clean up the jack and found a spare shorting bar to use. We reinstalled

This J-plug jack got really hot. A temporary fix is in place until we can replace it.

it, yet the issue persisted.

At this point we had moved back into the building and noticed, after resetting the transmitter, that while the null meter on the common point bridge would dance as the transmitter kept trying to come up, the common point ammeter showed zero current. This really narrowed down the problem to right there, between the common point bridge and the input to the common point network. Upon inspecting, Cris found the fingers for the day mode side of the RF contactor were brittle and falling apart. They had been very hot and lost their springiness, and very likely this was the cause of our intermittent day/night switching all along.

I immediately headed to KLZ to go through our spare parts and find something that would work for us while my dad stayed at the site and began disassembling the switch. While I was on my way back to the KLTT transmitter site, my dad found in one of the many parts drawers a new set of the fingers we needed, so he nearly had it all put back together by the time I arrived. With a full week of no-issue pattern switches now behind us, this appears to have solved our issue once and for all.

One important thing to note: regular maintenance is a requirement. Truth is, I have been slack over the last couple years, putting it on Keith's list of things to do each year. His health has prevented him doing his usual thorough job, and I did not even think of going to the site to do it myself. In the past, the same symptom had been caused by sticking RF contactors or dirty microswitches, so that's what we were thinking this time as well. Perhaps if I did a better job at keeping the ATUs cleaned up and going out for visual inspections each month, I would have noticed most of this.

So, we will work with the station and plan sometimes when we can take it down to make it safe, and get inside each ATU to get things cleaned back up and to make sure all is good with the various connections.

The "old man" reassembling the repaired day/night RF contactor.

LED!

Last month I was able to get all the interior lights at the KLZ and KLTT transmitter sites converted over to LED. KLZ was a bit of a chore because the ceiling is a bit higher, but with two ladders, my dad and I were able to split them up and get them done. KLTT took only a couple of hours. Once again, my husband came out with me. He enjoys helping with varmint control at the site, so I promised him some time doing that while I did the work inside. When he was done, he came in and took over doing the work while I supervised.

It's great to have bright, highly-efficient LED lights now, especially at KLZ where I leave a couple of lights on all the time now to allow our inside security cameras to be able to see things if someone were to get in.

Coming Up

As winter is quickly approaching (it's snowing here as I write this), I will make plans to do good cleanups at each station, beginning with KLTT. I know the ND-50 transmitter is in need of me taking each power cube out and cleaning the modules really well. I have been noticing signs of mice in the building for a while and have been working to keep the inside clean and even have some poison out. We found three baby mice dead in one of the phasor cabinets, so clearly they do still get in, one of the perks of having a site surrounded by open farm fields. I hope to be able to replace the door sweep on one of the doors to hopefully close up some gaps. I will continue to keep poison around the site to hopefully make the mice feel unwelcome. There is definitely a lot of work to do at each site and as weather permits, I'll be at the sites getting things done. I pray you all stay safe and well!

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1
KNSN • San Diego, CA
1240 kHz/103.3 MHz, 550W-U
KCBC • Manteca - San Francisco, CA
770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2
KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz/95.1 MHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz/94.3 MHz/95.3 MHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz/107.1 MHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz/94.1 MHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WCHB • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D
WRDT • Monroe - Detroit, MI
560 kHz/107.1 MHz, 500 W-D/14 W-N, DA-D
WMUZ-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2
WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT
WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE • Birmingham, AL
1260 kHz/95.3 MHz, 5 kW-D/41W-N, ND
WYDE-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT
WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

Crawford

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