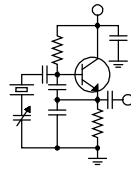


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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A Change of Seasons

Spring has arrived, at least according to the calendar although it's a little hard to tell at times looking out the window. We all look forward to spring, to the weather warming up, to winter gray turning to spring green, to longer days and the coming of summer. This is particularly true here in the Rocky Mountain region, where winter seems to go on forever. I'm ready for spring.

Where I live, spring goes by another name – mud season. Our mountain home is on an unpaved county road, and it gets downright gooey in April and May. The huge snow berms on either side of the road that have piled up from countless snowplow passes over the last six months start melting, and the ground gets saturated in a hurry – and stays that way for a good while. Our well water gets gray with sediment for a month or so as a result of the saturation. Still, we so love to see spring arrive because it points the way to the glorious summer to come. We press on through those few weeks of gooey roads and gritty water because the three months of summer makes it all worthwhile. It's the payoff for the inconvenience.

But with spring comes convective weather activity. Even as early as late February or early March we start to notice the skies have that springtime look, with cumulus clouds in the afternoons that sometimes grow to impressive heights. It's in this time of conflict, when winter and

summer collide, that we can get some really violent weather, and that poses danger, especially for broadcast transmission facilities with tall lightning rods sticking up into the sky. Lightning, wind and rain will come, and we've got to be ready for it. That's why I am taking this opportunity to remind our readers to thoroughly inspect your facilities, looking for issues that can lead to serious damage and down time.



While this UFER ground is not as vulnerable as some ground connections, that fat piece of bare copper is a mighty tempting target for copper thieves.

Topping the list is the ground connections at the site. Start with the tower. Is the ground lead from the tower present and intact? This is a vulnerable piece of copper, whether it's a strap or a large gauge piece of stranded wire. Copper thieves will invariably cut and grab that ground lead, and it may not be readily apparent that it's gone. It's also vulnerable to being cut or damaged by mowing/trimming operations, and strap in particular is vulnerable to tearing from frost heave.

Look at each ground lead or leads carefully and make sure it is solidly connected to the ground rod or rod array. Give it a good tug. If it moves or comes loose, deal with it.

Also inspect the grounds on transmission lines where they leave the tower and enter the building. If those grounds are missing or compromised, they provide a superhighway that lightning energy can follow right into your building and equipment.

One of the worst instances of lightning damage I have ever seen happened at WMUZ-FM in Detroit a few decades ago. It happened in late February. One of those early season thunderstorms came through and we took a grand mal lightning strike on our tower, and there was serious damage to our transmitter.

When I got to the site, the first thing I noticed was that most of the Bakelite fuse holders on the front panel of the power supply cabinet on the Continental 816R-4 transmitter were gone. Burned wires were visible in the holes, some still soldered to the tabs that were once part of the fuse holders. There was a lot of other damage as well. We had a brand new transmitter at the site, still on the skids but not yet installed, and I decided that the fastest route back to air was to get that transmitter connected and running, so that's what I did.



To remain effective, the points on a static dissipation array need to be sharp.

After that, we did some sleuthing and figured out what had happened. The tower ground lead had been severed, probably the prior autumn and likely by a string trimmer. That left the lightning discharge path down the transmission line and onto the chassis of the transmitter. And apparently, the utility ground was a better earth ground than our safety ground. The lightning energy jumped across at the narrowest points, which were those fuse holders, vaporizing them in the process. It was an expensive lesson well learned – check those ground leads!

There were some other instances with ground leads over the years, and thankfully they did not result in any lightning damage. On Red Mountain in Birmingham, a copper thief (that was eventually caught and sent to prison) kept stealing our ground lead, a fat piece of copper that he just couldn't resist and that he probably got \$3 for at a scrap dealer.

Thankfully our eagle-eyed engineers noticed the missing ground each time and replaced it.

Some of our towers are equipped with static dissipation arrays. Most such locations were so equipped because of a history of lightning strikes and damage. To work properly, the electrodes in these static dissipation arrays need to be sharp. If they have become dull and rounded by wind erosion, corona and actual lightning strikes, they will be ineffective. It is a good practice to look at these at least annually, either when we have a climber on the tower for something else or using a drone.



How's your fuel supply? Self-fueling is an option in some locations. Here, Fred Folmer refuels the KBRT generator from 55-gallon drums of diesel.

Along with spring thunderstorms come winds and power outages. Quite often, trees or tree limbs will fall across power lines and either break them or cause upstream fuses to blow. If there is widespread damage, it can take hours or even days before utility crews can get your site powered back up.

In preparation for that, if you have a generator, now is the time to test it and even have it serviced. How is the fuel supply? Are you set to be on your own for two or three days without utility power? In some of our locations, the gooey switchback roads leading to the tower site will prevent a fuel delivery truck from getting there until things dry out, and in those cases we self-fuel, purchasing 55-gallon drums of diesel, hauling and pumping it ourselves. If that's your situation, do you have a drum or two of extra fuel at the site?

How old is your generator battery? In my experience, lead-acid automotive batteries work perfectly... until they don't. That last little bit of linkage connecting one plate to another or between cells vaporizes and opens during a high-current

starter engagement, and the battery is done for. How can you defend against that when there is seldom any indication of imminent failure?

The only way I know of is to pay attention to the expected service life of the battery and the calendar. A 36-month battery should be replaced... after 36 months (clever, huh?). A 24-month battery should be replaced after 24 months. You might even want to get a little ahead and replace a month or so before the end of the rated service life.

Scheduled replacement isn't a guarantee that the battery won't fail – stuff happens – but it's the best way we can, within reason, guard against it. So mark your calendar and replace those batteries at the appropriate times.

For sites with and without generators, is your utility power feed or any part of it overhead? If so, inspect it carefully for any anomalies. If there are overhanging trees, contact the utility and see if they

can arrange to have them trimmed back. Look for spreaders and yard arms that are cracked or broken, and look for any insulator anomalies. Report anything you find to the utility. And if you can, locate any fuses on that feeder so that you can visually check them if you do lose power. You may get faster service after an outage if you can tell the utility that you can see blown fuses hanging down at a particular location.

In addition to all that, the time to find out your UPS batteries are toast is not during a power outage. Check them under load if possible using the built-in test routine, and if they are more than a couple of years old, go ahead and replace them. If you have a generator, you'll get back on the air faster if everything at the site doesn't have to boot back up following an outage.

Spring is here, and spring weather systems are coming with it. Are you ready?

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

Hello to all from Western New York! In last month's New York Minutes, I discussed the availability of 4CX15000A transmitter tubes, and how the cost has risen substantially within the past year.

As many broadcasters are upgrading to solid state transmitters, supply and demand of rebuildable tubes have diminished considerably. As the reliability of solid-state transmitters has greatly improved since first generation models surfaced in the 1980s, many engineers have elected to do away with their old tube-type transmitters as back-ups altogether.

Solid-state transmitters will most often stay on the air with multiple power supplies or RF power module failures within the system, often at reduced power, but they are still on the air. I guess maintaining one transmitter is cheaper than two, but I am never fully confident without a good backup

transmitter in case of a catastrophic failure of the main. And it's going to happen, eventually.

So, when our backup Continental 816R-4C

failed last month during monthly testing, it was a no-brainer to purchase a new tube to get it back to full-power capability. After ascertaining all the options, I decided on purchasing a new National tube from Richardson Electronics.

On Thursday the 7th, I pulled the old tube out and installed the new one, and everything went smoothly. The new tube

tuned up quickly with very little adjustment of the cavity shelf. In the past, I have not had very good luck with Econco rebuilt tubes, at times going through as many as three before obtaining one that makes the transmitter happy.

Weather in Western New York can be very tricky this time of year. You just never know what to expect from day to day. At the beginning of March, we were blessed with several days of sunshine and temperatures near 70 degrees, which is highly



unusual for this time of year. Taking advantage of the warm sunny days, on Tuesday the 5th, I performed the quarterly tower inspections for both our Western New York tower sites.



The Austin transformers at some of the Hamburg towers are in dire need of retaping and sealing, which I will do shortly.

At the Boston, NY site, I did not find any issues at all, but at the WDCZ transmitter site in Hamburg, I discovered that several of the tower pylons had cracked over the winter months. For the most part, these cracks can be repaired, helping to extend the life of the resurfacing we did on them several years ago.

Cris recommended a DAP product to fill the surface cracks in the tower foundations. It is a siliconized grey filler and sealant designed specifically for concrete. Once I fill the cracks, I plan on coating the entire base with Lock-Tite, which will help ensure that the areas are sealed to prevent further damage.

I also found several of the Austin rings were in dire need of repair. Several of them simply need recoating, I did find one that had cracked clear down to the top winding of the transformer. I spoke with one of the engineers at Austin Transformers in Mississauga, Ontario, and he stated that as long as the

winding has not been damaged, a clear weatherproof silicon-based sealant can be applied to help seal up the crack. Amanda Hopp was kind enough to send me the part number for the Austin Lighting Transformer repair kit, which I then ordered from RF Specialties.



Surface cracks like this one in the tower foundations will be filled with a siliconized concrete caulk and the whole foundation sealed over to prevent water intrusion.

As with the base repairs, as soon as weather permits, I will tackle making these repairs myself. Along with the tower inspections, I had planned to make good use of the pleasant weather and perform our yearly occupied bandwidth measurements along with checking the monitor points field strength levels. Once I traveled about three quarters of a mile away from the array, I pulled over to calibrate the Potomac FIM-41 field strength meter. I was unable to calibrate, as there was a problem with the oscillator in the meter. Once I obtained approval, I sent the meter back to the mothership for repair and calibration. Hopefully, Potomac can make the needed repairs quickly and return the meter before the weather turns wintery again.

On Friday the 15th, I installed our newly acquired Inovonics 551 HD Radio Modulation

Monitor at the WDCX-FM transmitter site. After reading through the installation and user guide the night before, the installation went very smoothly. I must say that I was thoroughly impressed with this new modulation monitor. It clearly blows the Golden Eagle out of the water! I was really impressed with the built in spectrum display, along with many other features you normally would not expect out of a

modulation monitor. I can't wait to see the AM version !!

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

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

The Stupid Woodchuck

On February 2nd, that mangy groundhog named Punxsutawney Phil told us we'd have an early spring – and yet here we are. As I write this exactly seven weeks later, I'm watching a blizzard unfold outside my window. Now normally, I don't complain about winter too much, I've lived in Michigan my entire life and we get pounded by it, but promises are promises and I want that lil' bugger arrested for making false statements or something! This is exactly why you'll never hear me complain about the heat.



can say that it's slick, speedy, and it's easy to spin-up new virtual machines.

Inovonics Hits a Triple!

Our Sage ENDEC EAS systems have been listening for EAS tests and alerts on our LP1, LP2, and National Weather Service by way of the no longer manufactured Sage ENDEC receiver since probably the late 1990s. This single rack unit receiver held up to six tuners and was, of course, purpose built for feeding audio to the ENDEC itself. These units had few problems apart from the decaying plastic knobs, and most people found little need to

Virtual this Virtual That

Following a discussion a few weeks ago about a few computer assets, Cris and I concluded that it'd be good to have a few back-office computers replaced. These were machines that could not run Windows 11, had been in use well past their intended service life, and were a bit gray around the temples. This is normal, and we evaluate these things at least annually.

What's different this year is that rather than simply buying and installing new hardware, I had the idea to consolidate the applications these computers were hosting onto one virtual machine. Having recently relocated our audio streaming to a Wheatnet StreamBlade, I had a very new Dell rack mounted workstation with no assignment.

With Cris's encouragement, I decided to create a virtualization computer. I have three intended purposes for it: our audio logger/skimmer, our GSelector music scheduling system, and an SMTP server. I have chosen to use Microsoft's Hyper V virtualization environment and have been learning how to use it. I'll have more to report next time, but I

replace them. Recently though, ours became intermittent and would need power-cycling to restore audio, which is odd for a device that probably runs exactly zero logic processes. Nonetheless,



Inovonics 677 Triple Tuner

temporarily removing its power seemed to “restart” whatever had stopped. Knowing this unit's age, I decided to replace it with the slick new Inovonics 677 “Triple Tuner.”

Ok, so I'll admit to being somewhat of an Inovonics fanboy. The company has always turned out compelling and useful products over the years, and their recent additions to their lineup are real proof that they know their audience.

The Model 677 is purpose-built to be stationed at the front end of an EAS system, though it could certainly be used for other purposes. Its three

tuners are a perfect fit for most EAS participants' need to monitor LP1, LP2, and National Weather Service. I already had one of their INOmini 676 NOAA weather receivers but chose to employ the 677 for this purpose anyhow since it has a web interface and can be monitored via SNMP.

The 677 is everything a broadcaster could want from such a product. Its attractive design is small at only ½ rack width, and it has a bright and very legible display which is navigable with one button and one knob. Its three tuners are all identical and effectively operate autonomously, each having its own antenna connector. This is great because you may need to connect one to an AM loop, another to an outdoor FM antenna, and the third to a dedicated VHF aimed toward a distant NOAA weather transmitter.

All three tuners are accessible via Inovonics' excellent and familiar GUI interface that provides access to the tuners' expected functions as well as current and historical information about audio and signal strength from each. Various alarms are provided that can be output via email, SNMP (Traps and by probe query), and traditional rear panel hardwired open collector GPO. The unit can even be connected to dual power supplies for redundancy. FM multiplex is not implemented, which for the 677's intended purpose is fine, as reception in mono has the benefit of improving the SNR.

Backup Dump

I recently noticed that I could no longer backup my NexGen file server, which is an absolutely essential safety measure. For physical safety, I rotate the backup media (portable SSD hard drives) from the fileserver then to my laptop bag then to my office. In this way, the most recent data leaves

the premises and is safe from a destructive event at the studio site.

Troubleshooting the error log only told me that the backup destination could not be written to. I'm using Microsoft Server's included backup program v1.0 – yes, it's not received even one update, is as barebones as a Yugo and just about as fast. It can't span volumes, seems to have no provision for overwriting old backup files, and wants very much to be a thorn in my side. Unfortunately, it can do open file backup which is necessary for safekeeping a database which is constantly being accessed and written to whilst the backup is underway, making it at least minimally suitable for the task (like the aforementioned Yugo).

For way too long, our NexGen server has been used as an NAS. While naturally it is necessary to move files to the system, too often it's used as a parking location for whatever. Like the Hollywood backlot, what was once a memorable prop in a blockbuster movie is now forgotten and taking up space.

A comprehensive scan of the server's contents revealed years-old audio files both inside the NexGen database and sitting in folders NexGen knows nothing about. Several files were nearing 10GB! In total, I archived 400GB of audio and the Op's Manager probably deleted at least 50GB more from the NexGen system itself. It's important to remember that using Windows and deleting a file from one of NexGen's folders will leave a database record in NexGen referencing an audio file that's no longer on the system.

We're backing up again, but I want to get a better piece of software to do it.

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

From the “It Can Happen to Anyone” File

A number of you may have watched with interest the first landing on the moon in over 50 years by the Intuitive Machines IM-1 Odysseus Lunar lander. This commercial company was the first of what will soon be several in NASA’s CLPS (Commercial Lunar Payload Services) program that is designed to support their Artemis space missions scheduled to begin in late 2025. It’s an effort for NASA to effectively begin developing “space business.”

I watched with interest as their primary laser guidance for landing did not end up functioning. In a fortuitous mistake, they had tried to turn it on a day before the scheduled landing and the laser guidance did not respond to their remote commands.

The company’s specialists were able to program around it using a LIDAR system that was meant for secondary testing purposes, and that still provided a relatively soft landing, but the lander tipped over on a side of the craft that had no scientific instruments on it.

You might ask yourself why the primary laser system didn’t function correctly. It turns out that since lasers have the ability to ruin eyesight, the system, as a safety precaution, had a physical switch placed within it that was in the “off” position while they were preparing everything before it lifted off.

It was certainly a testament to the company’s ability to work around a problem and carry on with the mission, but it also is a reminder to me to give myself some grace about a forgotten minute detail. It literally can happen to anyone and at least most of my occasional missed details don’t have the possibility of creating a \$118 million pile of scrap on the surface of the moon.

Translator Interference

Last month, right around the time the ink had dried on my last submission to *The Local Oscillator*, I got a call from Dave Richardson. He does most of the heavy lifting for WXJC-FM/AM programming by maintaining the clocks and logs for the station. He lives west-southwest of Birmingham,

and he asked me if we were off the air. I checked my PRTG app on my phone and verified that we indeed were at high power and that we were modulating and

I tuned in the station on my drive north to our studios in Birmingham. Instead of hearing David Jeremiah on our 101.1 signal, I was hearing Hispanic ranchero music programming.

We purchased the site in Good Hope, Alabama nearly 21 years ago, and it is the first time I had ever heard anything that was not Crawford programming on the frequency since we had purchased it even at my home some 80 miles away from the transmitter site.

I live 40 miles south of Birmingham, and the interference continued until I got to Hoover, which is about five miles south of the Red Mountain area where our studios are located.

Dave confirmed that his listening cleared up when he got to the Hoover area from the west as well. I swapped a couple of phone calls and emails with Cris, and the next day took a discovery drive around Shelby County south of Birmingham.

Strangely, I didn’t hear the station as I drove near Dave’s residence until I turned to the east and headed to Montevallo. For the better part of 20 miles, I heard nothing but the translator programming with no interference from our WXJC-FM signal at all. I heard the interfering station’s legal ID as “WBIB AM 1110 Centerville Alabama and W266EB FM 101.1.” I was recording on my phone and sent the recording to Cris.

Armed with that information, he was able to sift through the FCC’s database and gather that the FCC had indeed permitted a 250 watt translator to WBIB AM on 101.1. Cris immediately did an interference study and determined that their 25 dBu pattern was indeed encroaching on our 45 dBu contour. Full-power stations are permitted to bring listener interference complaints against translators within the full-power station’s 45 dBu contour, and because the translator is co-channel with our station, any translator interference at a complaining listener’s location that is greater than 25 dBu in amplitude would be considered a legitimate complaint.



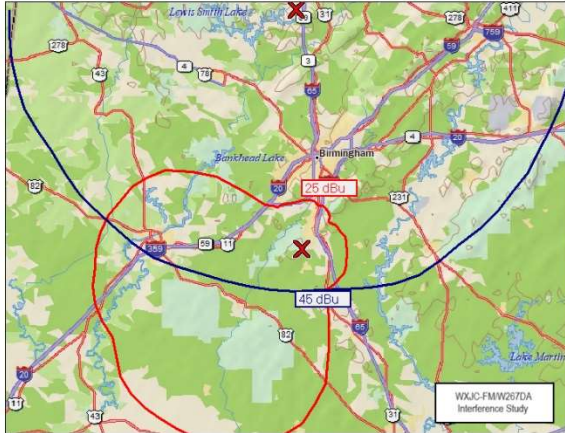


Figure 1 - The interference study that Cris ran.

Cris and I began to marshal our resources. We were talking to Josh Myers in Buffalo that handles the wxjradio.com website and Melissa Secchiaroli in Buffalo that handles social media for 101.1. Here in Birmingham, creative writer Steve McKenzie was making promos about the interference and how to proceed as an interference complainant, and Dave entered them into rotations in the clock and logs.

Cris had determined that given the size of the population that the WXJC-FM signal covers (around 1.5 million people) that we would need per the FCC translator interference rule to garner at least 20 legitimate listener complaints within the given area of the interference. This meant we would likely need at least 25 to 30 as we would have to do a determination at each individual point that was reported to us. Cris identified Angela Williams in Chicago as an expert about how to get those

complaints done, and I was able to talk to her about some tips from her experience in our Chicago market.

Cris had also reached out to the translator licensee and consulting engineer and explained that they were clearly going to have to do something about their interference, either cessation, power reduction, height reduction, or applying for a change of frequency. He got a quick response. They seemed amenable to changing their frequency, and within a week had already found a good spot on the dial at 95.1 that they could apply for.

The translator licensee asked that we continue our complaint-gathering efforts while they worked on a new application with the FCC for the frequency change, which would be outside the +/- three channel minor change window. Cris was thinking that it would be drawn out process.

We were surprised, however, that the translator licensee was so amenable that they basically turned off the translator. I was worried at that point about how I was going to continue to get interference complaints when no interference existed, but several days after they had turned the offending translator off, Cris informed me that the FCC had basically set a land speed record in their approval of the change application, and the translator was able to legally move to 95.1 and the entire ordeal was over.

I really am thankful to work with such a group of people that worked as a team to handle this interference issue. It is a real testament to the talented individuals that God has placed in our company. It was also a reminder to me of my primary purpose in engineering beyond keeping on the air is that I'm called to protect our signals and their licenses.

I hope all of you have a great Easter and may God bless the work of your hands.

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

You may have noticed by now that my mind doesn't work like most. When I'm planning my *Local Oscillator* submission each month, all sorts of odd memories pop up. This month it was ... flat frogs.

These were fairly common when I lived in NC; I haven't really seen them in Alabama. (We're more likely to have smashed armadillos here.) But to a young boy playing in rural North Carolina, flat frogs were part of the playground equipment. These were frogs that had been smished on the road, with all the goopy and ookie stuff cleaned up by scavengers; and finally, dessicated by the hot southern sun. When the process was complete, you had a stiff, thin frog-shaped shell that could be peeled off the road and carried proudly to amaze your friends.

One thing that puzzled me, though, was the fact that many flat frogs seemed to be facing into traffic. You'd expect the frog to panic and be smished as it was running away. But then I thought about it. Frogs aren't known for intelligence. Imagine Mr. Frog, crossing the road at night, munching on skeeters and other delicacies, when suddenly, a car approaches. He turns and is mesmerized by the headlights: "Oooh, SHINY!" Smish; game over. Score: automobile 1, frog 0. Nature takes care of the rest and you have a new toy. To an 8-year-old kid, it was a beautiful thing.

Speaking Of Changes ...

There are times when I feel like a flat frog, when I consider all the stuff that we have to know nowadays (see Figure 1 for example – more on that in a moment). A conversation with Mike Kernan, Detroit's Doctor of Blinky Lights, revealed that many of his devices that used to be able to send status emails are no longer able to. We've run across this before at other stations, and I'm pondering a solution for Mike (and possibly elsewhere, because it's only going to get worse in the future).

The big ISPs and email hosts are so desperate to stop spam that they're putting some draconian rules in place. You either follow them or your email doesn't get delivered. I've mentioned

before about all the hoops I had to jump through getting Sender Policy Framework (SPF) and Domain Keys Identified Email (DKIM) in place on our email server.

The problem is exacerbated by the fact that some older equipment simply won't do SSL/TLS. Most mail servers now (including ours) won't accept unencrypted connections. For a while, we had an older Scalix instance running for these, but we finally took it down because it was an obvious security risk.

The New Digital Age

Cris and I have chatted quite a bit about the future and how digital is going to play a part in our operations. In some markets, we're already selling ads for display on capable receivers, and I'm sure that's just the start. There are zillions of companies offering products for broadcasters now, but we'd like to keep as much as possible "in house." We're not allergic to spending for an off-the-shelf solution, but they can come with some serious "gotchas."

I've ranted here in the past about the chaotic, sometimes weird systems used by Amazon Web Services (AWS) and Google. I'll now include Facebook, because all three of them have developed their own in-house versions of programming kits that can be used to create apps. There are others, of course. All of them are based on good ol' Javascript and JSON (JavaScript Object Notation), or comparable technologies, but each has a learning curve. Even worse, they're like glue: once you get stuck with them, it's not easy to switch to something else.

For web development, WordPress still has the top spot. There are many advantages to using it: it's well-supported, there are a host of plugins that can be used to make just about any kind of website you might want, and (for the most part) you don't need to be a programmer to use it. A What-You-See-Is-What-You-Get (WYSIWYG) editor lets you drag, drop and rearrange things to get just what you're looking for.



The disadvantages are that it's bloated and slow, and the plugin zoo has become almost

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Figure 1 - Thankfully, the logs pointed out what was causing our WordPress problems.

unmanageable. People will install a bunch of plugins, then stop using them ... but they're still active. This leads to my very most favorite suggestion from WordPress support: "Disable plugins one at a time until the site works again. That's how you find the offender." Heh. Easier said than done. Also, what if two plugins conflict with each other? You have to pick which one gets deleted, or find a new plugin that meets the need.

Upgrading PHP

When we recently upgraded our corporate webserver to PHP version 8, a plugin and the theme for one of our websites caused that entire site to die. One of WordPress's most adorable features is that if the whole system has clabbered, you'll get a blank white screen in your browser. Josh Meyers did most of the repair work on that one; my help was to pinpoint problems in the logs. One positive change in our PHP stuff is that we're using PHP-FPM, a more high-performance version of PHP. It is much better about logging errors, too, and that was invaluable. See Figure 1.

We had no choice but to upgrade. We had been using PHP 7.4, which has been retired and is no longer supported. For a while, Red Hat's official repositories didn't offer PHP 8. It was only after a bunch of people hollered that they finally made it available. There were workarounds, such as manually installing it yourself, but that's not a good idea unless you like doing a bunch of work and troubleshooting. But now that Red Hat has joined the year 2024, the upgrade itself took less than 15 minutes, then our webserver was back up and running.

As for PHP itself, I've stated here in the past that it's easy to use and is also very well supported, but it changes over time. Things that used to work

just one or two versions ago might not work now. If you're using a plugin or script that relies on older behavior, it may just stop working – or even worse, start doing things that are baffling. Or, as I just said, die altogether and generate a blank screen. When you try to go directly to the WordPress Admin page to start disabling plugins, a "Critical Error" screen might pop up.

One of our goals is to bring all of this into focus and to keep track of who installs (or installed) what.

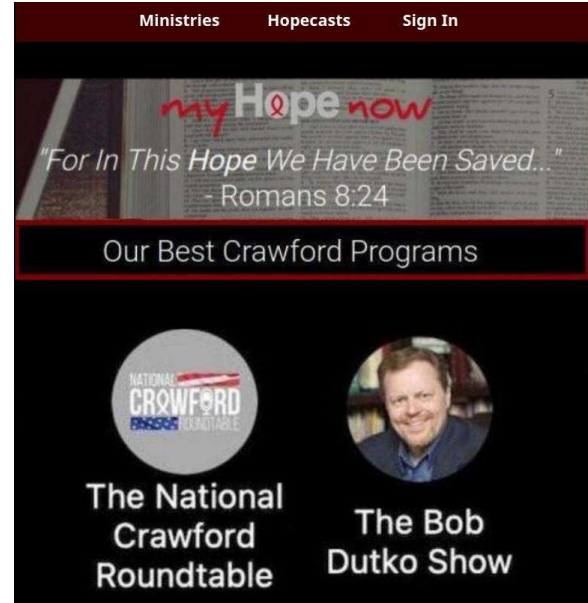


Figure 2 - Our new MHN Google App.

So Much To Do ...

As I write this, in no particular order ... we're going to install an SSL cert on Barracuda to eliminate the "unsecure" warnings that pop up in most browsers nowadays. Worse, the latest browsers don't give you a choice: you can't say, "Take me there anyway." Nope. You are instructed to tell the website owner that it must be HTTPS. When the "owner" is a little rack-mounted widget, you will find that said owner might be hard of hearing. You're stuck with plain-text, unencrypted HTTP.

I've also been working on a new DataSplit program at Cris's request. The POR system (which has been running for almost two years now!) uses plain-text records. That way, even if the server screams in panic and runs out the back door, worst case, we have plain English, printable backups on a separate server.

For the DataSplitter, I decided in mid-development to switch to a database. That's not going

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to use a bunch of text; it's gonna be simple network commands like, "Take this packet and send copies to 11.22.33.44, on ports 11000, 11001, and 11002." Or, to different IP addresses, or over the Internet. Such a simple idea, but very powerful.

We're still working on moving the My Hope Now (myhopenow.com) website and apps to in-house

control. This is a going to be a multi-month project; see above re: AWS luring you and then gluing you to their stuff. (Heh.) Figure 2 is a rough screenshot of the opening page of our new Google Play app.

That's enough for now; until next time, keep praying for this nation!

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

Last year we installed a new transmitter at our Burnham site, a Nautel GV30. This has been a great installation so far.

The one factor that was left out in the initial installation was an exhaust system to assist the transmitter's heat exhaust from the top of the transmitter and dump it outside.

Since it was summer, it didn't take long to get an idea that it was a definite need as the air conditioning in the building, three Eubank systems, would not keep up with the heat load that was dumping into the building.

I called the heating and cooling contractor that we use almost exclusively, and the owner came out to look at the situation within a few hours. Unfortunately, after they lost a few employees, they couldn't get to this project until later. Then we got into the winter months, and it really wasn't an issue at those temps.

We did want to make it a priority before we got into warm temperatures this year. Thankfully, our heating and cooling contractor had some of his staffing issues resolved, and the project was completed recently.

I believe they did a great work as far as appearance and functionality, but I am a little

concerned about the capacity of the fan itself. I have found that working with cooling contractors on these type projects, they put a lot of concern that the exhaust system is picking up too much of the conditioned air and putting it outside and causing the AC system to run more.

I share their concerns; however, I can usually tell if we are well balanced by putting my hand at the small gap between exhaust hood and the top of the transmitter. Hopefully, I am not feeling a lot of movement in either direction.

In the case of this installation, I can feel air moving out of the exhaust hood and it is warm. This means that we are still dumping more hot air into the building than desired and not moving it outside. I would rather feel a little more suction at the gap and my hand feel cool than the opposite. A good balance would be best.

So, we will see how it performs this spring and early summer and if we find the exhaust fan installed in the exhaust hood not keeping up with the heat load, then we will have to get a better fan with higher capacity. Otherwise, I was very pleased with the installation. See the photos below for details.



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Note that there is a gap between the bottom of the hood and the top of the transmitter. A good indication that the suction airflow is just right is no air movement around this gap.



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

I have been using laser cutting services to make panels for various broadcasting and hobby projects for the last 15 years. Laser cutting provides an effective way to produce custom-made panels and metal parts. In the case of electronics and broadcasting, the most common items to have laser cut are panels to mount components or to make control panels that may contain switches, potentiometers and other components.

Before I discovered laser cutting, I typically made my own panels using a hand drill, drill press, jigsaws, files, etc. Laser cutting provides an

often results in a hole that is slightly larger than desired, albeit generally acceptable. Beyond just making an accurate hole for a toggle switch the laser

can produce a little tab inside the hole to locate the notch that is cut in the threads of the toggle switch.

For decades I struggled with toggle switches. It is always an exercise to keep the body of the switch vertical while tightening the mounting nuts. With a tab to line up the switch the alignment problem goes away. It seems

like a little thing, but having experienced mounting switches with the alignment tab, I don't want to go back.

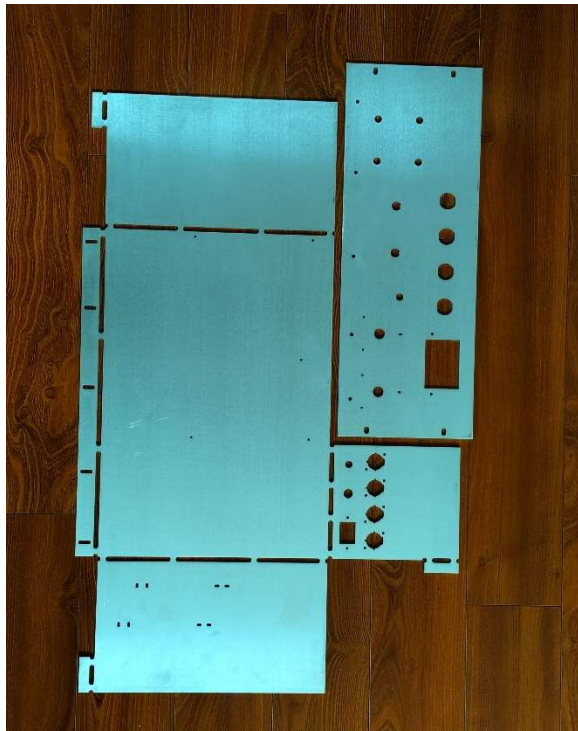


Figure 1 - Laser cut panels arrive flat and have to be folded to create the chassis.

alternative that is more accurate and allows for making openings that are not round. An example is a toggle switch. Drilling a hole for a toggle switch

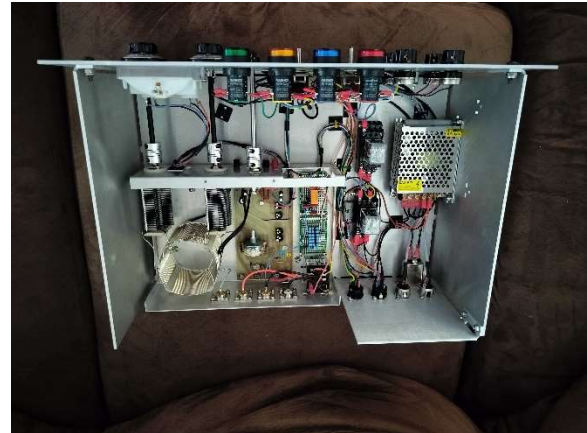


Figure 2 - The control panel chassis of my "new" ham transmitter.

Potentiometers often have a tab for alignment, fuse holders and indicator lamps often have flat sides on the threads or dimples to align on a panel. With laser cutting, these features can be utilized. Rectangular holes for such things as meters and power jacks are easy to incorporate with laser cutting, a task that before would have involved drilling holes, using a jigsaw, and a lot of filing.

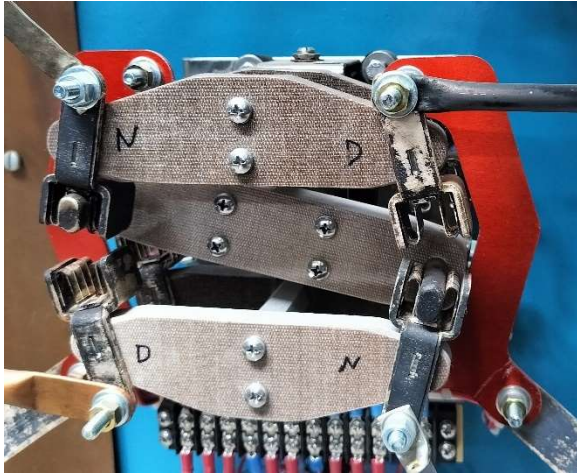


Figure 3 - A laser cut plate is used to connect two sections of an RF contactor together.

The accuracy provided by laser cutting is quite outstanding. Dimensions are typically within 1/1000 of an inch. This provides accurate layout of the panel as well as accurate dimensions of each opening cut in the panel.

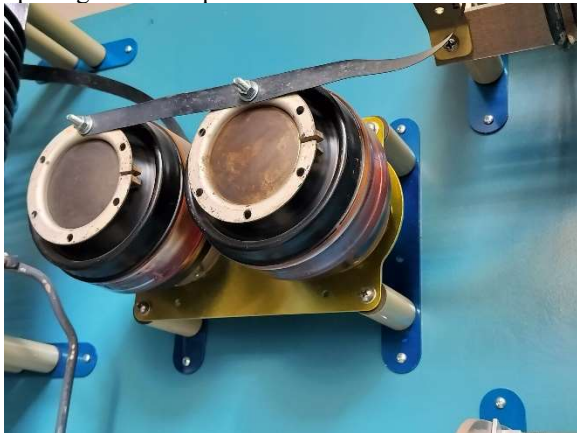


Figure 4 - A laser cut plate is used to mount a pair of vacuum capacitors.

A while back, a friend of mine arranged for a McMartin BA-1K AM broadcast transmitter to be given to me. I am currently in the process of converting it to ham radio use which requires some moderate modifications electrically and physically. Internal to the transmitter I have made several aluminum panels to support new output network and band switching components. Of these panels, two were cut and drilled by hand the old-fashioned way, mainly because I had the material on hand and the layouts were simple and not critical. I had two panels laser cut because the sizes were larger than the

materials I had on hand and the layout and other features were more critical.

External to the transmitter, I needed to build a control unit that would interface the transmitter to the ham radio world. This unit contains transmitter control, monitor sampling, grid drive tuning, audio level adjustments, RF sensing, and T-R switching.

My control unit is completely custom built, and I decided to laser cut the front panel as well as the chassis. As can be seen in Figure 1, my laser cut panels arrived flat and were folded to create the chassis as seen in Figure 2. I am very pleased with the finished product.

Over the years I have used four different laser cutting services. The first one was a local company. At first their prices were quite reasonable, but after a time they became pricier. The next company I tried was online, and they did a good job, but like the first, their prices started out low and then began to increase. The third company I tried was again local, and they started out with some really nice pricing but, you guessed it, prices got out of hand pretty quick.

So now I am on my fourth laser cutting service. I am using an online service: sendcutsend.com. As the name implies, you send them a drawing, they cut it, and they send the cut parts to you. So far, I am very happy with these guys. I send them a CAD file, pick the material, pick the thickness, and then pay for it. Several days later, I get a nice flat package in the mail that contains my parts.

Laser cutting does cost money, but I think it is reasonable. Price is based on the overall square inches that your project requires, the time the laser runs, and the number of penetrations that are required. One thing that needs to be remembered is that you are getting material cost included in your final price. Materials are really expensive these days, especially in small quantities. When you subtract the cost that you would pay just for the metal, it makes the total price look quite reasonable in my opinion.

Most electronics work that I do is with aluminum. Most of the aluminum parts that I have had cut are from 1/8-inch sheet. I did use a 3/16-inch panel for mounting a heavy Variac in a recent project. For mounting a large RF switch I used 1/4-inch aluminum plate. Other metals are available, such as steel and stainless steel. Stainless steel is hard to work with and it is hard on tools, so it makes even more sense to get that work done by laser cutting.

I use TurboCAD to draw out my parts. When I'm done with the drawings, I convert them to the Drawing Exchange Format (DXF) before submitting them for a quote. If you are going for



Figure 5 - A portion of a long laser cut busbar at the power division point in our night phasor. This turned out to be an elegant way to strap four J-plugs together.

precise fits, it is a very good idea to accurately measure all of the components and hardware that will be mounted on or through the laser cut parts. I have found unexpected dimensions on switches, potentiometers, and other components. It seems that the metric system has crept into the specifications for these parts.

The precision of laser cutting is a blessing, but it can be a curse if you're not careful. For example, a 10-32 screw will measure about 0.187 inches, but you don't want to draw your hole as 0.187. You need a little bit of clearance. I use 0.190 inches for a 10-32 screw. Generally, you want to add two to four thousandths of an inch to the diameter of the part that goes through the whole. You can add a few more thousands just to be sure. I tend to err on

the tight side, and sometimes I have to pull out a drill or a jewelers file to remove a few more thousandths.

One neat thing about making holes with a laser is that they do not have to be round holes. A laser will make a slot just as easy as a round hole. Let's say, for instance, that you're mounting a vacuum capacitor flange on a plate. The capacitor flange has six evenly spaced holes, so you already know that the holes are 60° apart. You just need to measure the center-to-center dimension of a pair of opposite holes. You could draw the six holes with 0.190-inch diameters to use number 10 screws, but if something is off, you will end up with a drill in your hands enlarging the holes later. It takes a bit more time with the drawing software, but you can make your holes 0.190 x 0.250, for instance, and eliminate that problem.

Here are a few examples of laser cut parts that I used in the KCBC antenna system. Figure 3 is a plate used to connect two sections of an RF contactor together. Traditionally you would bend, flatten the ends, and punch holes in a silverplated copper tube. I think the aluminum plate looks good, does an excellent job, and is a timesaver, especially when outfitting all of the contactors in a large directional antenna system. A recent check with a thermal imaging camera shows that these plates are running stone cold in the 50 kW system.

Figure 4 shows a pair of vacuum capacitors mounted on a plate. You can see that it makes for a very clean and robust installation. You may note that I have painted these parts with an anodized color, it makes them look better. Of course, they are not painted in the spots where electrical conductivity is required.

Figure 5 shows a portion of a long busbar at the power division point in our night phasor. This turned out to be an elegant way to strap four J-plugs together. Also note the blue adapter plates that provide a nice way to mount the insulators of various components to the cabinetry.

I have used laser cut parts to mount FM coaxial switches, dummy loads and other broadcast equipment. I hope that this will be helpful to someone that has an application for custom made parts.

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

Things are Greening Up

Spring is finally here. We had a good week of beautiful, warm weather before winter came back and reminded us in Colorado that it is not done with us yet. With all the moisture the snow has brought, things are already getting green. Buds are on the trees. It is time for allergy season. Well, for me it is always allergy season, but spring is always worse.

Dylan was able to get out with the tractor at KLZ and get the rest of the mowing done and then spent a good amount of time at each tower base spraying weeds. I will have him move to the other sites as well. The hope is that getting things sprayed early will help knock the growth down. I need to set the sprayer up so I can spray the field some. I will not be able to do the entire field at KLZ, I do not think, but I may try.

Engineering Room Floors

Several years ago, I had Keith bring our floor machine to the office to give the engineering room floors a good cleaning and polish. This is something we have done every year at the office and at the transmitter sites.

Something happened the last time he did the office floors and they just looked horrible. I have worked hard to try to get it cleaned up. I found the magic eraser helped make the floors white again, but those little things don't last long.

Earlier this year I found I had some floor stripper solution and poured just a little bit on the floor, let it sit, then used a sponge to scrub. To my surprise, that spot came clean! So I bought some more floor stripper and an abrasive sponge and began working. I diluted the floor stripper a bit, got on my hands and knees and went to work.

I was not expecting it to take so long but it did end up taking me a full day of scrubbing the floor and getting it cleaned up and re-sealed. While it is not perfect, it definitely looks a thousand times better, a much more professional looking room than

before.

95.3 FM Antenna Replacement

When the Louisville, Colorado LPFM station surrendered its license for 95.3 FM, we took it as an opportunity. We have a 95.3 FM translator on Lookout Mountain, and that LPFM station both required us to attenuate our signal to the north and caused spotty interference in the Denver area.

My dad worked hard to figure things out and was able to get us a grant to raise power.

This included an antenna upgrade (broader pattern), so at the end of February, we met a crew at our Lookout Mountain site and they swapped the antenna out.



The cardboard container the power divider came in worked as a makeshift square to ensure the elements were 90 degrees to one another.

You'll see in one of the pictures my dad using a very scientific tool as a square to get things started as we assembled the new antenna. The guys did a great job, and we are now at a higher power and people are noticing the difference. It is just too bad we have a couple of houses so close to the site that we have to protect for second-adjacent. Otherwise we

really could've cranked up the power.



The tower crew works to tighten up hardware on the 95.3 FM antenna at Lookout before raising it to its final elevation.

Record Levels

One vexing issue we have noticed recently is that on the Windows 11 Nexgen computers, sometimes the record levels on device 1 will get lowered. I know we have had the output levels get adjusted by mistake. Most new keyboards have a shortcut to turn the volume up and down, and at times, it has caused issues. Thankfully, most people now know that if playback seems low, check this first. The record levels, though, are not as easy to adjust. It is a multi-step process just to get to the menu to make the adjustment, and most of our people are too afraid (thankfully) to even poke around under the hood to find this.

I began checking daily in hopes that I could narrow down the time from when it was good to when it was adjusted to allow me to snoop with our security cameras. I found nothing, though. I googled the issue, and what I did find was that sometimes, in Chrome, when you use certain apps, Chrome adjusts the record levels.

We use Cleanfeed often here in Denver, and we use it most on the computer that was seeing the most adjustment. Cleanfeed uses Chrome, so I figured that was my issue. If you go into Chrome and in the address bar type `chrome://flags`, it takes you to a menu. Search for Allow WebRTC to adjust the input volume and disable it. So far, we have not had any further reports of the input levels being adjusted, hopefully solving our problem.

DRR Woes

Don't you hate it when there is an issue that

you just cannot figure out? I have written about mine in the past as it has come and gone now for close to a year. We would find that a scheduled DRR event would not record the entire scheduled length. RCS looked into it, and we can clearly see in the internal logs the recording starts and stops, but when it finalizes it, it shows only minutes being there instead of the full program length.



The finished product... the Kathrein-Scala CA5-FM/CP/RM looks out over Denver metro from 7,383 feet AMSL (2,100 feet above the city).

The suggestion was that the source disappeared, but once I explained that we have had that happen and when the source has no audio or is gone (in Wheatnet), it just records silence; it doesn't truncate the program length.

I have not had any reports of this in a couple of months now, but I still do not know the solution. RCS made several changes that had no effect. I noticed the issue disappear mostly after I went through all our recordings and told the system to record to local drive. It will record the file to the local computer and then move it to the server.

We also had done a reboot of our main Cisco switches that NexGen and Wheatnet are on. These were last ditch efforts.

Did one of those measures fix the issue? I still do not know. I saw the issue a couple times after doing all this, and then it disappeared. Did things just take some time to catch up, or is it all one big coincidence and in the future it will rear its ugly head again?

Coming Up

April is here already!?!? NAB is just a couple of weeks away. Things are quickly getting green, and soon it will be a busy season. I am praying that the growth doesn't explode on me like it

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did last year. I at least have help this year to keep things under control once the growth does start.

We will also be moving our 94.3FM translator from the tower base into the building. We have a rack already that just needs to be cleaned up and painted. The transmission line came in and is sitting in the garage at the KLZ site. The new

transmitter is on order and will ship soon. This will be an interesting project and one I am looking forward to.

That about covers it for this edition. I pray you all stay safe and well. And for those of you going to NAB, have fun!

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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/100.7 MHz, 5 kW-U, DA-1

KLDC • Denver, CO
1220 kHz, 1 kW-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 • Brighton-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



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