The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Predicting the Future

As we go to press with this issue, we're in the middle of budget season. I was talking with my wife about this recently and told her it's not just about numbers and rotation schedules. We must, to some degree, read the tea leaves and predict the future. What changes in technology are coming or what new technologies are emerging now that will be in the mainstream in the coming year? How will our business look six or nine months from now? Will we still do things the same way, or will there be changes for which we must provide infrastructure? What about existing equipment, structures and systems? Will they be okay in the coming year or should we plan to replace or upgrade them?

While we can sometimes look at current trends and make predictions about what will happen, that is never easy and it's never a sure thing. Take AI for instance. That is one technology that has blown up in our industry over the past year, and some groups and stations have adopted and embraced it. We have not in this company, primarily because it doesn't fit the way we operate, but also because copyright and licensing issues still remain in flux. Will AI become part of our operations in the coming year? Could be (but I doubt it). See what I mean?

We set useful life limits on specific pieces of equipment based on our experience with those items. Some items get used pretty hard and we know they will wear out in a relatively short period of time. Other items tend to last a good long time, and we take care of them to ensure that long life. But in recent years, we've discovered that long-term parts availability is a problem and as a result, we have shortened our useful life numbers for those items. Transmitters fall into that category. We used to apply a 20-year useful life to transmitters, but over the past 10 years or so, we've run into parts availability issues time and again and in some cases, had to redesign parts of transmitters to accommodate different parts or subassemblies. Is 15 years long enough? Is it too long? Time will tell.

Some items have exceptionally long useful lives. We know they won't last forever, but they are so long lived that we don't have an empirical data set from which to derive a useful life. Transmission lines and (FM) antennas fall into that category. For all of my tenure at this company, I have applied a 30-year useful life to these items. Now that I've been here coming up on 40 years, I'm starting to see some evidence that my 30-year number is a good one. In the past year, we've replaced two FM antennas and one transmission line, both of which were originally installed in the mid- or late-1980s. Somewhere around 35 years, these things can develop issues and need replacement. We won't wait for them to fail. We'll keep our 30-year useful life and preemptively replace them accordingly.

On the opposite end of the spectrum are file servers and workstations. We apply a useful life of five years to these items. Why? Several reasons. One is that operating systems will often sunset within that time frame, and subsequent OS versions often have hardware requirements in excess of what these machines are equipped with. Another is that somewhere around six years, computer hardware tends to break down. A blue screen of death is in the future for any computer, and we want to replace it prior to that. Why does this happen? One thing we've seen is that microprocessor heat sink compound dries out and turns to powder, effectively impeding the transfer of heat to the heat sink. Another is that switching power supply components, usually capacitors, fail somewhere in the 6-7 year time frame. So we preemptively replace computer hardware ahead of that point.

Trying to predict the future in order to produce a good capital budget for the coming year

requires a lot of thought. Sometimes we get it right, and sometimes we don't. Hopefully the 2024 budget will be what we need it to be.

A Fond Adieu

In the last issue, I talked about the FCC's migration of the AM database to LMS and how in some ways this was premature. Just after press time, the FCC finally got the international tracking table populated, so (as far as I can tell) we now have a complete AM database in the LMS system. That allows us to bid a fond adieu to the old CDBS system, which served us well for a lot of years.

One other late coming federal data release came from the U.S. Census Bureau. In August, the DHC files for which we have been waiting were finally released. We got the census files needed to comply with the redistricting law a year and a half ago, but we didn't have the rest of the data that we needed for many of our broadcast engineering applications. Thankfully that data is out now and we have it processed and ready to use with our allocations software.

Better late than never, I suppose, on both these items.

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

Hello to all from Western New York! September has been a relatively quiet month, but that does not mean that we have not experienced any issues.

Earl Schillinger, our WDCX(AM) operator in Rochester, reported that he has noticed several "blips" in our AM on air audio. These "blips" were random, and lasted less than one second each time they occurred.

We initially suspected our ISP, Spectrum, and contacted them to check out our internet service at the transmitter site that feeds the TieLine Bridge-It XTRA codec. They reported that they did not find any issues, so I dug deeper into the codec settings.

I found numerous lost packets and noticed that the jitter buffer was set to auto. I changed the jitter buffer setting to 500 mS, which took care of the issue. I checked in with Bryan Harper at Tieline and found that the auto setting of the jitter buffer couldn't react fast enough and was causing the lost packet issue.

So far, Earl has not noticed any further "blips" in our audio delivery from Buffalo to Rochester.

Another issue we recently experienced is caller audio from our Telos VXs on-air phone system would randomly drop completely. In the past, we would reboot the container server on which the VXs runs, but last Friday the 22nd, this did not cure the problem. The VSet6 call controllers could not connect to the server, and no show could be selected.

After checking all the settings and pinging successfully all components in the phone system to rule out any network issues, I placed a call to technical support at Telos. After checking several settings, it was discovered that after the reboot, the system was not able to verify the license key, which prevented the VSet6 call controllers from connecting to the server. After renewing the license key in software and rebooting the VSets, the system was back up and running again!

In August, Cris gave me a thorough tutorial of the VXs system, as I have not worked with this system before, and I learned a lot about how this it works. I absolutely love new technology, but the manufacturer doesn't really provide much documentation describing how the system works. In the past, you were provided a manual that explains everything, but these days, no such manual is provided.

With the move this past spring from downtown Buffalo to the northern suburbs, inventory this year presented quite a challenge! What would normally take a couple of days to complete, this year

took me about four days to wrap up. We added quite a bit of new equipment in the upgrade to all digital, and lots of analog equipment was retired to the storage room at the WDCZ transmitter site. Making sure that everything was accounted for and that locations were correct for each piece of equipment took longer than I expected, but I am confident that we now have all of our assets and their locations in good order.

Winter is rapidly approaching, and the remaining time to get our transmitter sites prepared for the long winter months is rapidly dwindling! Hopefully, October will remain on the warm side, allowing adequate time for me to get everything done. I am curious to see how our new Cambium Part 101 microwave links hold up in the Buffalo snow squalls.

Hopefully we will not have a repeat of last winter's blizzards, which presented us with over eight feet of snow, 70 mph winds and near zero wind chills. I recall last year going out to the WDCZ transmitter site after the blizzard and not being able to see the ATUs at the bases of our five towers! We were so fortunate that we did not experience any issues after that snowstorm, as getting to the towers was all but impossible.

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 Kernen, CSRE
Chief Engineer, CBC–Detroit

The trees are starting to turn, and as I write this the first day of autumn is here! My wife loves autumn because for her it means Pumpkin Spice Lattes are back! For me it means the dreaded raking of leaves, putting the cover on the convertible, winter wheels and tires on the truck, and (ugh!) the impending onset of winter. Having lived in Michigan for my entire life, you'd think that I'd be used to it by now. I'm not. For those of you reading this in Buffalo, I know you can relate!

A few small tech tips are always fun to read and either recount in your own experiences, or just store in the back of one's mind for future application.

Tool Time

We engineers depend on tools and are enthusiastic about them. My first tip involves a simple hand tool. I always get excited about a nice screwdriver, and I've just discovered a new one; the ECX screwdriver, and it's very likable indeed!

Milwaukee tools has introduced a new screwdriver and screwdriver bit called the ECX, and it's designed to take the frustration out of driving the screws on electrical devices.

You may have noticed recent electrical devices like duplex outlets have ditched the old, slotted screws in favor of a combination type screw that can be driven by a slotted, Philips, or Robertson square driver. I've tried all of the above and found that they each have their disadvantages. The slotted drivers slip out of place, the Phillips tends to cam-out and damage the screw head, and the Roberson is too small to get much turning torque to the fastener. The new combination screw heads are convenient in that you can use whatever driver you have handy, but they are often made of soft metals that easily get chewed up.

ECX drivers have a head shaped to match these combination screws and therefore make excellent contact, apply more torque to the fastener, and don't cam-out. There are two sizes, and I recommend getting them both before doing your next electrical project.

Tachy Tech

Next, I have a computer fan tip. If you have a computerized device with a motorized fan, it may very well have a tachometer lead that feeds a "tach" signal back to the computer so that the rotational speed of the fan can be read and monitored. Fans are mechanical devices and occasionally fail. Their failure can lead to overheating which cascades into malfunctions or other outright damage to the host, so monitoring them is desirable.

Recently, I replaced a fan whose tach signal was erratic, often reading much higher than the fan's

maximum rotational speed and at times dropping out altogether. I noticed the intermittency on the system log and looked at the live tach data, which was at times showing 7700 RPM on a fan that should max at 6400 RPM. Even though the fan still ran, I replaced it to fix the tach issue.

8 (Gigs) is (Not) Enough

For some time, our local business coordinator has had issues printing to her local printer. Printing had been relatively smooth, but recently it slowed to a point where it could take hours for all of the print jobs to print while she was doing billing and month end tasks. Onesie-twosie printing was perfectly fine.

Since her primary billing application was somewhat inflexible, not allowing her to easily stop reports she was printing, and stopping the jobs inside the print queue was balky, she would end up very frustrated.

Microsoft Windows 11 has a ravenous taste for memory. Even on machines with SSD drives, processes can be slowed to a halt by filling up the computer's RAM memory. This is because the operating system manages the RAM and dynamically expands it by creating a file on the hard drive (or SSD) that it uses to imitate RAM memory. The trouble is, hard drives and to a lesser extent SSDs, are orders of magnitude slower than RAM memory.

What I found was that the print spooler was taking her large print jobs and the OS was swapping RAM to the hard drive, slowing the process to a crawl. Once I inspected the system specifications, I could see she only had 8 GB of RAM installed and that the OS was using 100% of it. I've noticed lately that the Edge browser uses high amounts of RAM even with only a few browser tabs open.

To mitigate this problem, I installed an additional 32 GB of RAM, and (possibly only related to this model printer) I started sending her jobs via the network, disconnecting the USB link. Clearly there are some software design issues with the USB driver, too, as it refuses to remember critical printer configuration parameters.

Deal Breaker

Last, I have GFCI circuit breakers. A GFCI circuit breaker is similar to a GFCI outlet, like you'd expect to find in a kitchen or a bathroom, the difference being that it is located inside an electrical panel, and it protects an entire branch circuit.

GFCI devices work by sensing and comparing current flow in the hot and neutral wires. If the measured differential exceeds a preprogrammed threshold, the breaker will trip.

The idea here is that current must flow equally from a source to a drain. If the drain current isn't equal to the source, it's assumed that there is leakage or current finding an alternate path back to the source. This could potentially cause a shock or a fire, so the circuit is interrupted.

Unfortunately, protecting an entire branch circuit is a bit tricky, and most of the time, lighting isn't protected by GFCI devices. GFCI protection is not required by the NEC (National Electrical Code) for lighting, although it is not specifically prohibited, either. However, I've learned that it may also be undesirable, especially where LED lighting is employed.

In our new storage building at the WMUZ(AM) transmitter site out near the Detroit airport, I've installed 100% LED lighting. This lighting trips the GFCI breaker regularly, causing me to have to install GFCI duplex outlets on this circuit and remove the GFCI breaker.

Researching this problem, I found that I'm definitely not the first to experience it, and the explanation for why GFCIs don't get along with LED lighting is an interesting one.

LED lighting contains driver circuits to transform line voltage to the lower voltage needed for LEDs. Usually, LEDs require between 1.8 and 3.3 volts, so a driver circuit is a part of every LED fixture and bulb that's designed for a direct connection to line voltage. This circuit is what causes the GFCI trip because, depending on its design, it can contain capacitors which cause a small imbalance in current flow between the line and neutral conductors. Imbalance combined with significant inrush current is what GFCI devices are designed to detect, causing a trip. Why this doesn't happen with other GFCI protected electronic devices is a mystery to me.

New Storage Building

While the new storage building was completed in July, there was still lots of work to be done. I decided to tackle the electrical project myself, and having been an electrician in a former life (back when I was young and sprightly), I thought it'd be fun and nostalgic.

The project required a trench and underground conduits to be run from the existing transmitter building to the new building, including a new panel, lighting, outlets, wiring, and a pinch of low voltage work. Nothing too exotic and nothing I hadn't done before.

I rented a trencher from the local big-box for what should have been an easy 55-foot dig. Unknown to me was that because the water table was high in the area where the transmitter building is, the original construction required the grade to be raised significantly, and the contractors did this by trucking in fill. The fill they used was laden with bricks and broken concrete.

The photo above shows what was removed from around 12 feet of trenching. Fortunately, as we continued, we pulled fewer and fewer pieces of concrete from the trench, easing the work significantly.

Apart from the aforementioned issue with a GFCI breaker tripping in sync with the outdoor lighting turning on, the rest of the job went smoothly (if you don't count the sparrow-size mosquitoes trying to bite us!). We installed high-bay LED lighting, two LED outdoor floodlights, and several outlets including a cord-reel.

For organization, I was able to obtain a couple of very nice abandoned wheeled shelving units, and we've mounted a shelf for a radio (of course), hooks for the weedwhacker, brooms and shovels. To wrap things up, we'll get the security cameras and alarm system installed very soon.

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

Raspberry Pi 5 on Sale in October

I suspect that it's become a fairly regular item in my monthly *Local Oscillator* columns to mention SoC (System on a Chip) boards, and, in particular, Raspberry Pi projects and uses. These credit card sized silicon wonders have become a staple of anyone that wants to do something that doesn't require a supercomputer to run. They're relatively cheap and have a fantastic community of "makers" behind them with rich documentation all over the internet.

Since COVID-era manufacturing of most older chip technology processes in the 14 nm to 40 nm space that these SoCs use took a hit due to shutdowns (China makes a majority of these older, mid-level technology chips), the Raspberry Pi Foundation found itself not able to get the boards in the quantity that it had in the past. Consequently, the law of supply and demand kicked in, and everybody who had Raspberry Pi 4s were selling them for over $250.00 for the 8 Gb models.

As I've mentioned a couple times, there were equivalent SoCs in the market, but none had the reputation or popularity of the Pi and a number of manufacturers were facing the same crisis.

The 4 Gb version of the Pi 4 launched in June of 2019 and the 8 Gb model in May 2020. In April of 2023, the Raspberry Pi foundation began displaying their new version, the Pi 5, and lately, early testers have gotten their hands on them and put them through their own tests.

The new Pi is slated to sell for $60 for a 4 Gb model and $80 for an 8 Gb model. The pricing for the new models, if anything, will bring the Pi 4 asking prices back down from the strato-sphere. Even though the older Pi's had become more plentiful in recent months, the 8 Gb models which were originally $75 were still selling at Amazon for around $100.

So, performance-wise, what is one to expect from the new Pi 5? Besides a boost in CPU performance from quad-core A76 Arm processors running at 2.4 GHz, the real performance enhancer on the board is going to be the in-house designed RPi0 southbridge chip. As in most modern motherboard manufacturer architectures, the Pi 5 is

Notable additions to the Pi are A.) PCIe Gen 2.0 certified ribbon connector, B.) a power button, C.) a real-time clock battery connector, D.) 2 ribbon connector interfaces for cameras/displays, E.) a better power efficiency circuit, and F.) a Raspberry Pi foundation designed "south bridge" chip.

going to take advantage of a chip that does nothing but act as a hub for input and output functions. The chip takes the processing load off the main Broadcom SoC so that it can focus its efforts on other number-crunching efforts. Effectively, this additional chip increases the bandwidth capacity of all the I/O.

The wireless networking, although the same chip as the Pi 4 (WiFi 5AC) is twice as fast. The USB 3.0 now gives 5 Gbps bandwidth throughput where it was clearly a bottleneck in the previous generation when you connected peripherals that required higher bandwidth.

Every benchmark I've seen indicates that the Pi 5 is greater than two times faster in almost every measurable category with the exception of the ethernet port, which is still 1 Gbps. Even the SD card slot supports nearly double the data reads and writes if you use a UHS-1 microSD card.

The PCIe slot is also a game changer as you can add nearly any PCIe card to it (think 10 Gbps NIC, graphics cards, RAID cards, NVME hard drives). Not that you'd make this board into a gaming machine, but the idea of creating a NAS solution or even a really portable desktop replacement is certainly not off the table.

Is the new Raspberry Pi 5 as fast as some other SoC manufacturers and their small form factor offerings? Well, no, but you also will pay twice as much for their products and only get a modicum of performance benefit.

The real argument for sticking with Raspberry Pi over other manufacturers is, and always will be, the sheer volume of the community support that you can draw from and the quality of their documentation. To be honest, I'll probably have a difficult time keeping myself from at least getting the 4 Gb model just so I can see where the state of the technology is in 2023. I hope after reading this that you might as well.

We'll visit again next month on these same pages and until them may the work of your hands be blessed by God.

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

My 12-year old heat pump decided to die a few days ago. I'm still recovering from the cost of the replacement; Todd can share how much the company will need to spend for a new 30-ton unit for our studio/office building. Prices continue to rise and lead times on the larger commercial stuff have become ridiculous. Fortunately (thank God), in my case, the Bryant unit that I want is in stock and the plan is for it be installed the day after I submit this article. For now, a couple of window units make my home livable.

But instead of my usual yapping about Alabama weather, I'll do a product review. At one time or another all of us have added some shielding for RFI and other elektrik unpleasantness. In the past, I've used thin sheets of copper or aluminum tape. I would then carefully tack-solder the sections together. Back when prices on copper were fairly reasonable, I once ran the wiring for a new studio through 1-inch pipe. Double duty – the lines were shielded and I had a ready-made ground run. Win, win. (A 1-inch copper pipe is equivalent to a 3-inch strap, according to Mr. Pi.)

Figure 1 - Eterart is the brand name, and it's 'Perfact!'

I do a lot of shopping on Amazon nowadays. I was pleasantly surprised to see the copper tape shown in Figure 1. Sure, plenty of other folks make copper foil and copper tape, but what caught my eye was the "conductive adhesive" thingie. Ten bucks for 20 feet sounded reasonable, so I ordered it.

It turned out to be "perfact" (as declared on the label) and sure enough, just overlapping the tape runs ensured a good ground throughout. I don't have a milli-ohm meter, so I can't tell just how well the ground transits through the glue, but an ordinary multimeter shows me zero ohms from the copper on the right (the pickup switch cavity in my Les Paul) all the way to the output jack. Nice.

In other news, there is such a thing as "conductive adhesive." Y' learn something new every day.

Windows Sysinternals

I promised a couple of issues ago that I'd start covering some ways to do deep troubleshooting on pesky Windows problems. I'll focus on Windows 11, given that Microsoft has been quite aggressive (think: Atilla the Hun in a business suit) in upgrading everyone to that version. These little programs work on many older releases, though, so don't think you're stuck if you don't have Number 11.

Google "Windows Sysinternals." In my case, the top hit was to Microsoft's Learn section for the package. In addition to detailed documentation and videos, there are download links for those using older versions of Windows.

In Win11, you can just open the Microsoft Store app and enter "Sysinternals" in the search bar (Figure 2). Click to install the Suite and you'll end up with a "Sysinternals" item in your Start menu. Look at all the available utilities. Most of these you'll probably never use, but some are quite useful. I'll take a look at a few in this column and – Lord willing – more in the future.

The Process Explorer

You're probably familiar with the Process Viewer that comes with Windows 11. The Process Explorer included in this suite is much more powerful. In fact, once you start it, you may click on "Options" in the menu bar and select "Replace Process Viewer" to make the Explorer your choice.

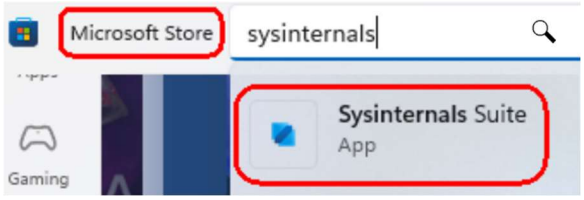

Figure 2 - Installing the Sysinternals Suite in Windows 11.

In Figure 3, I've right-clicked on one of the running processes. Note the option in the pop-up menu to scan for viruses. This uses a bunch of different anti-virus vendors to check a specific file for possible bad stuff. If you see a process that's eating CPU or taking up a ton of network bandwidth for no obvious reason, check the file for malware. Nice!

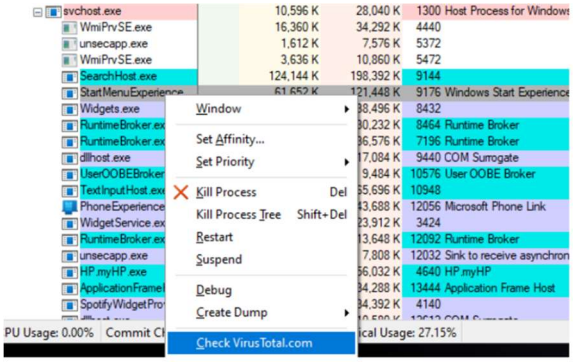

Figure 3 - The Process Explorer

There are other things that can be done with each process. Note that one of the right-click options is "Kill Process Tree." Even a cursory glance at the listings will show that many programs start multiple sub-processes. To ensure that an entire process "tree" is killed, Daddy Program and all his chilluns, you select this option.

I should also warn you about the "Set Priority" option. Without getting way out into the weeds, multitasking is essentially an illusion. The speed of modern processors means that the OS can switch between threads so quickly that it appears that they're all running simultaneously. But each processor core can actually execute only one thread at a time.

The operating system uses a very complex set of rules to decide how long a given thread should run before switching to another. Increasing or decreasing the priority can have dramatic results. Your nice, smooth desktop could very quickly become unresponsive and "jerky" if you play around here. In truth, you normally shouldn't touch this. If you ever decide to do try, don't do it on a critical server, especially not one that's making on-air audio.

AutoRuns

Last time I complained about an HP update that insisted on installing something called the "Omen Optimizer." Windows 11 has a bunch of stuff that wants to run at startup; unfortunately, much of this is hidden from the standard Windows tools. The "AutoRuns" utility will list everything, and I mean everything, that comes up during the boot (Figure 4).

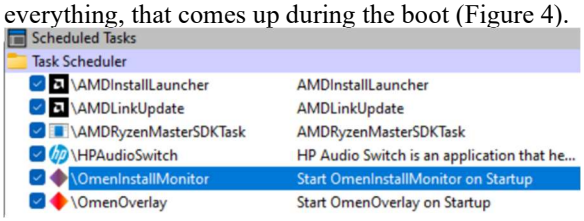

Figure 4 - Viewing everything that runs at boot up.

On my music workstation, AMD and HP have dozens of start-up programs, including the entire Omen suite. I've highlighted one of them in the figure. If you suspect malware after finding a process that eats a lot of CPU and Internet in the Process Explorer, see if it's automatically run at startup. You can use this to locate the offender, stop it from running and once again, scan for viruses with a right click.

Other Tools

Finally, you know how I natter about security all the time. One tool that caught my eye is called "TCPView." This does as the name implies: it shows you all network connections, local or remote. Some of them might amuse you: for example, the Windows Service Host (svchost.exe) establishes a constant connection to Microsoft. Even more amusing was that when I right-clicked and selected "Whois" (which is supposed to show you info about the remote IP address), it was "unable" to get the info. Heh. I turned to my Linux workstation and did a "whois" in a terminal to get the lowdown.

If you see a program that you don't recognize that's connected to something in China, well ... you might want to slaughter it. Go into your firewall and block that remote IP address while you're at it. Lord willing, I'll cover that in some detail in a later article.

Normally I tell people to download stuff and play with it. With the Sysinternals Suite, play carefully on an isolated computer. Some of these gadgets will make a system unusable (for example, if you accidentally disable a critical service that's needed during bootup).

I wouldn't install these tools willy-nilly all over the building, too. Someone might stumble across Sysinternals in the Start menu and start clicking. Install only as needed and delete after trouble-shooting. Don't leave the Suite on anything but your "play and discover" computer (and do a good backup before you start!).

My Hed B Full

I've never been afraid to admit that I don't know something. My little comment above about not realizing that there was such a thing as a "conductive adhesive" is an example. [*Hey, we use Conduct-o-Lube all the time on our phasor roller coils, so why not conductive glue? – Ed.]*

Over the years I've run across engineers who seem reluctant to confess a lack of knowledge. My response is simple: no one can know everything. I know things that you don't, and you know things that I don't. Let's share.

When Cris interviewed me for the job way back in 1998, he (with justifiable pride) said that the company had a "TDR." I told him I was deeply impressed, then asked, "What's a TDR?" He told me and I realized he was talking about a distance-to-fault device. I've never been very good with acronyms.

I have learned a lot working with this company, too. Right now I'm boning up on Amazon Web Services ("AWS," if you're kewl), which essentially runs containerized applications for web sites. Think Dockers for web pages, and you won't be far off the mark.

Sometimes I feel like my head is full, but with a little cramulation (a good Alabama term for you there), I manage to squeeze a bit more in. Have fun playing (carefully!) with the Sysinternals stuff. Lord willing, we'll have more on that in future issues. Until next time, keep praying for this nation!

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

In last month's article, I wrote about the progress or lack thereof, with the installation of the new generator at the Burnham transmitter site. I think I remember being sarcastic about a mid-October installation in that article. When will I learn to not say things like that?

So, at the time of this writing, we do finally have all the correct parts to convert the system now from liquid propane to vapor for the fuel needs of the new generator that was sent to us. Unfortunately, the electricians we hired are busy rewiring a steel mill.

So, we are looking at the second week, weather cooperating, of October for installation. No sarcasm about pumpkins or turkeys on this one. It is the project that never ends. But when it is the right time, I believe we are greatly improving how this site handles electrical outages and then eventually improving the Lansing transmitter site as we move the other generator there in a significant upgrade in capacity.

As we get ready to start the final quarter of 2023, we are still chasing down some of our budgeted projects for the year. Most of these are actually with one vendor. We are waiting for this vendor to get past the cooling season and before the heating season starts to get these finished.

We are also getting into the time to plan next year's projects. Most of our facilities are fairly mature, so the reality is that we are primarily looking at two things. One is anticipating equipment and facilities that may break down and get them before it is an unplanned expense. The other is to look to see what we could improve and how can we do things better or more efficiently.

That takes a combination of knowing where we are going as an industry and a vision of what is happening inside your building from a programming standpoint. These are not always easy to predict because of the volatility of both. Five years ago, who would have predicted that half our workers would working remotely?

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

Mowing & Spraying

I would say September was productive for the Denver market, at least in terms of the KLVZ site. I was able to get the Kubota tractor out to the KLVZ tower site and got the place mowed down again.

We then brought out our water tank and our new tow-behind sprayer. My dad and I hooked it up to my car, filled it with water and the 24-D herbicide concentrate, then did a test run to somewhat figure out how slow I needed to go. Once we figured that out, we called it a day and headed back to the office where we both had tons of work.

While trying to get the somewhat full sprayer back inside the tower base fence, which is where we were going to store it while at the site, it tipped over and broke off the valve and fitting on the back of the tank, causing a good amount to spill out until we figured out that we could fix it temporarily. I'm not going to even try to explain what we did because I don't think it'd make sense.

I ordered the part we needed and went out the next week only to find a spray nozzle had also broken off and I didn't notice. That quickly ended my day. I went back and once again, ordered the needed part. Once it came in, I was able to repair the sprayer and begin my work.

I spent a full day at the site spraying. It was boring. Thankfully I was inside my car, with the AC on. Near the end of the day, after my last fill-up of the tank, I noticed while driving that I could see the spray arm from my driver side mirror while driving straight. That was odd, considering that I couldn't see it all day out of either mirror without turning my car. I went ahead and continued with my spraying until I emptied the tank.

Imagine hours and hours of up one row and down the next, squinting to see my tracks so I know where I've been...

Afterwards I inspected the spray rig and realized I had bent a support for the axle, causing it to be cocked. Undoubtedly, I unknowingly put one of the sprayer's wheels in a prairie dog hole and that caused the damage. I was concerned this may have damaged the tank itself, but after inspecting it I realized I could buy the bracket and replace it. We were able to do that, and the sprayer is as good as new!

More Mowing

Mowing has been a big part of my month. I spent another day at the KLZ tower site mowing. It took me the better part of the morning to mow inside the six tower bases, the barn area and around the building and satellite dishes.

From there, I got on the tractor and did the area from the building up to our gate and the area around the outside of the barn fence. That took a while as well.

I finally called it a day and will go out sometime the first week in October to hopefully finish mowing the site.

I'm hoping with fall that some of the weeds that have grown up at the KLTT site will dry up and blow away. If not, I'll have to take the tractor out there and do some work.

The axle bracket got bent, probably when a wheel went into a prairie dog hole.

There are Days I Hate Computers!!!

Computers are still something that continue to make me scratch my head. We had an employee tell me she could no longer open any Office 365 programs. The computer would come up with an error that said something to the effect that the TPM wasn't working, whatever that is. I did some googling, because that's how real engineers solve problems, and attempted the troubleshooting it suggested. Nothing worked. I figured it was a motherboard issue.

Next, I contacted Dell support, and after doing their troubleshooting, they also determined it was a motherboard issue and the options were to send it in for repair which would most likely involve motherboard replacement, or just getting a new computer.

We chose the latter, as the computer is several years old. We bought it during Covid when the supply chain was horrible. All we could find locally were refurbished computers. So, while refurbished and installed in 2020, the computer dates to 2015. I'd say it's had a good, long life.

We purchased a Dell Optiplex Micro 7010. This machine is remarkable. It's maybe 7 inches long and wide and only about 2-3 inches tall. It has an ethernet port, one full size HDMI and display port, four USB (2-3.0) on the back, two on the front. It has

a solid-state hard drive. It does run hot, but that's part of it being so small. It really packs a punch.

After getting it all set up and put in place, I was informed it wasn't working. When I set it up, I used Wi-Fi. In the office, it gets a hardwired connection. After putting it in place, I remembered I needed to set up the network printer, so I knew the computer was working when I installed it. I began looking into it and found the on board NIC was not working. Device manager would show it couldn't start.

This was a brand-new computer so once again; I contacted Dell support. They had me try numerous things which didn't work. The final thing to try was reinstalling Windows 11. I am happy to say, so far so good. I have not been able to make the problem come back, which is good.

Coming Up

October brings what I hope to be the end of mowing season. I will also have to make time to spend at each transmitter site. The fences need to be repaired. I have some Austin ring transformers that also need to be repaired. Then there's the normal cleaning of the sites and ATUs.

My hope is that I can finally get the sites to a good place. It's crazy how quickly things start looking horrible. I do my best to keep things in good working order, but when a site is neglected just by not showing up, things start to fall apart fast. If I can get away from the office for a bit each week, it will allow me the time I need to get the sites back to a better place.

I think that about covers it for this edition. I pray you all stay safe and well.

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