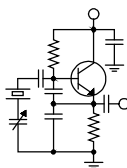


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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A Landmark Issue

Most folks don't pay a lot of attention to volume and issue numbers of publications such as this one, but each month, there they are, right in the page 1 header. I'll bet you just glanced at it, maybe for the first time in any issue, and you probably noticed that this is the first issue of our 30th year!

When *The Local Oscillator* first got its start, Crawford had just six stations. That's right, just six: KBRT in Los Angeles, KPBC in Dallas, WYCA in Chicago, WMUZ in Detroit, WDCX in Buffalo and WDJC in Birmingham. The year was 1990. We had very few full-time engineers – just Los Angeles and Dallas; the rest were contract engineers.

It occurred to me somewhere around that time that there was very little in the way of information sharing taking place between the engineers in our company, and this despite the commonalities in equipment and architecture. It seemed that our people were dealing with similar issues at the various stations, but all were working in isolation, figuring things out on their own and taking a much longer path to problem resolution. I thought that we would do well to begin a monthly newsletter for the express purpose of sharing such information between stations and engineers.

I didn't really know what the boss would think about this endeavor, so I sent him the inaugural issue – and he loved it. In fact, he didn't give me the option – he told me to go forward with it each month, and we did.

We needed a cool graphic in the header. Where would I get that? Remember that this was in the days of Windows 3. Graphics were, well, primitive in those days. There weren't many options for producing quality graphics on the cheap, but we had AutoCAD, which I used for drafting everything from schematics to site plans to directional pattern graphs. I used it to whip up a Colpitts oscillator

schematic, and somehow I exported it to a form usable by WordPerfect, which is what I was using in those days. That graphic has remained the same all these years.

In those early days, I did most all the writing myself. Our corporate expansion started in 1992, when we added Denver and Portland, and as our company grew, we began putting on full-time engineers in key markets. At some point, it occurred to me that the best accounts would come directly from our engineers rather than from me, so I began asking our chief engineers to write monthly columns. That has been the format ever since.

All those early issues were sent out by mail. The print format allowed us to fold the collated and stapled document in half, slap on a label, run it through the postage meter and put it in the mail. Word got out about the newsletter, and we began adding vendors, consulting engineers and others to the mailing list. At one point, we were mailing out about 50 copies a month.

And somewhere in the early 2000s, we began publishing online in the current PDF format. From there, distribution really took off. We no longer track readership, but it's in the hundreds. Broadcast engineers and other interested parties all over the world read it, and I am occasionally surprised by an email I get from someone I don't know who has been a faithful reader for years.

In 2003, Paul McLane, the long-time editor of *Radio World*, wrote a piece in that fine publication that he titled, "Cris and The Local Oscillator." I have the article matted and framed on the wall of my office. Paul wrote in praise of our humble publication, its reach and purpose. That national (worldwide?) exposure was probably responsible for the growth of our reader base more than anything else.

So here we are in our 30th year. The world is a distinctively different place than it was in 1990. Broadcast Engineering looks a lot different than it did in those days. And our great company bears very little resemblance to the six-station group it was back then. Is *The Local Oscillator* still relevant? Does it still serve its original purpose?

Based on the responses I regularly see, from people inside and outside our company, I would say that yes, it is still relevant, and yes, it still serves its original purpose. Accounts written by Brian Cunningham, Stephen Poole, Rick Sewell, Steve Minshall, Amanda Hopp and John White regularly describe the issues, processes and resolutions experienced in the field, and those have value. For my part, I try and convey a Crawford perspective on industry news and happenings as well as things going on inside our company. Of course, with such a wide readership (including people working for our competitors), both I and our other writers have to be careful what we divulge – we don’t want to give up any trade secrets!

So we proudly press on with our little publication. Thank you, constant reader, for your continued readership and support. Let us hear from you from time to time, especially if you have a different perspective on some issue discussed in these pages.

Database Change

Back in the day, the FCC Media Bureau (then the Mass Media Bureau) used a flat-file database for all its AM, FM and TV records. Everything was contained in one “flat” file. That format had its limitations, as you can imagine. Just think about all the fields that would be required to accommodate AM-FM-TV technical records in what amounted to a single table.

Then in the early 2000s, along came the Consolidated Data Base System, or what we know as CDBS. That system is a relational database with many tables, each containing grouped information but linked by a common key.

The transition from the flat file to CDBS was fairly painless, thanks to the efforts of the good people at the FCC. We had plenty of notice of the change; the CDBS structure, tables, fields and nomenclature were well documented; and the FCC exported data from CDBS back to the old flat-file format for *years* after CDBS came on line. The good documentation made it relatively easy for users such as me to make the transition, and the long-term export to the old format took away much of the

pressure to make the change within a certain time period.

Some time after CDBS came on the scene, we began hearing rumors about a new system, called LMS – the Licensing and Management System. I wish I could remember what year it was – sometime in the early 20-teens I think, that I attended the NAB Radio Show in Washington, DC. That was where I first heard about LMS, and if I recall correctly, the FCC’s Jim Bradshaw gave us a demonstration in a seminar at the show.

We didn’t hear much else about LMS for some time after that, until repack started up, and TV was moved to LMS almost overnight. That didn’t really have much effect on us – AM and FM were still using CDBS, and based on our past experience with FCC database transitions, I expected there to be good documentation and plenty of overlap when the transition eventually did come. There was some evidence to support that when TV began the transition – LMS TV records were regularly appearing in the CDBS database, so some sort of export was being provided, and there was a modicum of documentation on the LMS main page, which many believed would be expanded and expounded over time.

And then last September, the FCC issued a Public Notice stating that a number of FM application forms, including the 301, 302, 318, 319, 340, 349 and 350, were available in the new LMS online filing system. Users immediately began using that system to file applications. But a problem became immediately apparent: there was no export of FM records provided to CDBS, so for people using CDBS data to do FM searches and studies (which was everyone!) would miss applications filed in LMS and their subsequent actions. That was a *huge* problem.

I consulted with some folks I know at the FCC and got few answers. About all I did learn was that (a) there would be no export to CDBS; (b) we had better figure out a way to start including LMS data in our searches; and (c) while AM would eventually be moved to LMS, that move is not imminent.

So we as an industry had a problem on our hands, and it was made worse by the fact that expanded/better-expounded LMS documentation was not forthcoming. We had what was at best incomplete documentation, and at worst it was outright inaccurate! I spoke to a trusted insider at the FCC, who told me that even people in the agency were having to “muddle through” the system.

With some breadcrumbs provided by my good friends at Cavell & Mertz in the form of an SQL callsign search query of LMS, I was able to begin to figure out the database structure and how some of the various tables were related. I made an Excel workbook with spreadsheets containing my own documentation of the key tables. With that in hand, I began writing my own code to process LMS data into a form that I could use. In the process, I had to figure out nomenclature for various engineering field, many of which made no sense. For example, in the the service_code field of the license_filing_version table, the code “FS” designates an auxiliary system, and “FB” designates a booster station. I sort of get the “FB” designation (presumably FM Booster), but FS for an aux?

If you ask me how I spent my annual year-end vacation, I will tell you that I spent it working. That’s right, I worked 8-12 hours a day, every day (including Christmas Day) writing the code to make LMS data usable in my FM studies. I’m glad to say that it is now done, and I have my own set of documentation of the LMS database tables that I would be glad to share with any others trying to muddle their way through.

I can only guess that budget cuts, personnel shortages and the extensive use of private contractors is responsible for the much more difficult transition to the new database. I can hardly wait for AM to make the transition (he said, sarcastically). At least when that happens, we will already have a good handle on the LMS system, its structure and relationships.

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

Hello to all from Western New York! I am so ready to welcome in the New Year. The month of December presented problem after problem, some of which have still not been resolved. To add to all the issues, my father passed away unexpectedly on December 8th. Thanks to all of you who lifted our family up in prayer and the cards and phone calls while going through this difficult period. I owe everything I am to my father, who was a great teacher, motivator and above all, parent. I have had many difficult periods since his passing, but I know that he is with the Lord, and we will be reunited in Heaven.

Some time ago, we acquired what was the auxiliary Nautel ND-5 transmitter from WPTR in Albany, NY, to be used as a backup transmitter at WDCX(AM) in Rochester, replacing an old Continental 315R. I brought the transmitter back to Buffalo to perform the frequency change from 1540 to 990 kHz, and temporarily put it at the WDCZ transmitter site where we had three-phase power and a 50-ohm dummy load and plenty of room in which to work.



After almost six months of waiting, we finally received all the parts from Nautel to perform the frequency change (the holdup was the 990 kHz

crystal). The frequency change work started out well, but when the time came to start retuning the output network, I found that my test equipment was being swamped by the RF from the two transmitters on the air at the site.

I was able to complete the first step of the retuning procedure, which was to null the third harmonic trap, but this was not easily done. The oscilloscope’s input was being swamped by 1270 (our tenant), and I was unable to generate a 2.97 MHz signal strong enough to overcome the stray RF in the building.

Cris remembered that he had a broadband amplifier capable of producing 100 watts of signal, so he sent it to me to aid in getting the harmonic trap nulled. Even with the additional signal, I could not overcome the signal from 1270. Not having any way to filter out the offensive signal, I tried using our FIM’s external RF input tuned to 2.97 MHz, which



Test equipment set up for third-harmonic trap adjustment.

worked perfectly! I was able to see the third harmonic signal, and using the FIM, was able to adjust the tap on the inductor to obtain the null.

The next step is to tune the combiner network. After completing the worksheet to determine what the network needed to be tuned to, I again was derailed by stray RF that was swamping the probe of the HP Vector Impedance Meter.

At this point, Cris and I agreed that in order to get this work completed, it would be best to load the transmitter up and take it to Rochester to perform the remaining tuning. Hopefully the weather will hold off long enough for me to get the transmitter loaded and delivered to the WDCX(AM) transmitter site.

Another issue that has been dogging me for months now is the SWR fold-backs we were experiencing with the WDCX(AM) transmitter. I narrowed the issue down to the Nautel Exporter Plus, which would send erratic signals to the IBOC exciter



I used a FIM to detect and null the 2.97 MHz third-harmonic in the high RF field at the WDCZ site.

of the transmitter. After doing a hard reboot of the exporter, the signal would be fine for several weeks, and then start again. After a reboot, things would be good again.

As the issue was so sporadic, Nautel was hesitant to have me send the exporter in, as it would in all probability sit on the bench and run flawlessly for months until the issue exposed itself. Steve Braley at Nautel and I agreed that we should wait until the exporter failed completely before attempting to diagnose the problem.



Adjusting the trap in the ND-5 output network.

On Tuesday, December 30, while performing routine maintenance at the WDCX(AM) transmitter site, I decided to reboot the exporter, as it had been several weeks since the last reboot. Well, this time it would not boot back up into a functional state. I obtained an RMA from Nautel and had the Exporter Plus on its way for repair in a matter of hours. I am anxious to learn what the issue was that was causing me so much grief.

Right before Christmas, we lost our Telos 2x12 hybrid at the WDCX studios in Buffalo. The hybrid was totally dead, almost assuredly a bad power supply. Since we have numerous programmers that rely on the phone system for call-ins, I arranged to lease a replacement hybrid until ours could be repaired by Telos. I could have gambled and just ordered a replacement supply, but I was unsure if any additional damage had been done when the supply failed, and we did not want to lose the revenue if the replacement of the power supply was not the only issue.

That's about it from here (it's *enough!*). Let's hope the rest of the year is less eventful! I'll bring you updates on the ND frequency change, exporter and hybrid next month. Until then, Happy New Year!

News from the South

by

Stephen Poole, CBRE, AMD
Chief Engineer, CBC–Alabama

There's an old joke in the South that goes, "If you don't like the weather, just give it a few minutes – it will change." *[They say that in Colorado, too – Ed.]* In early December, we had a brief icing event. No real harm was done; both 101.1 and 93.7 showed a bit of reflected power, but neither Nautel transmitter folded back. By morning, conditions had warmed enough for the reflected power to return to normal. I had stayed up to keep an eye on things, but it worked out fine, thank the Lord.

Now, a few weeks later, as I write this, we've had a ton of rain and we're under flood watches and warnings. We're expecting several more inches in the next 24 hours. Tomorrow, or next week, who knows? Maybe we'll get snow. Maybe another tornado (Alabama had a few of those in December, though none came near any of our sites).

My mother came and stayed with us over Christmas again, which is always a pleasure. Thanks to the changing weather, Sandy's leg was bothering her, which is always *not* a pleasure. She's considering a knee replacement – or at the very least, another arthroscopy to ease things a bit. For Christmas, we bought an exercise bike, and that seems to help the knee, but the leg still bothers her.



Figure 1 - What a seriously blown fuse might look like.

Now, THAT'S a Blown Fuse!

One of the severe December storms killed the fuses that we have installed in the phone line at the 92.5 FM site in Pumpkin Center, AL (see Figure 1). All of our critical phone lines have fuses and varistors, but 92.5 has been the most likely to get hammered. I included an image several months ago from one of the really bad strikes – the wiring on the pole had actually melted and had set the grass on fire.

The phone line comes in through (in this order) several turns around a toroid; an AC line filter; fuses in line, with varistors to clamp surges to ground; and finally, another toroid. After losing the phone interface on more than one remote control unit, we decided to do whatever we had to. So far, this is working, though not without trips to WYDE-FM to replace the fuses.

The AC line filter is a standard unit, available from Digikey or Mouser. You've seen them on the AC inputs for most equipment. The most common that I've seen is the kind that has a built-in IEC power receptacle, but it's easier to use the ones with blade or solder terminals on input and output (Figure 2). They're not perfect – in fact, I had one that managed to get itself fried by lightning a while back – but they really, really help. They may be specified for 60 Hz, but they actually don't start attenuating until well above audio frequencies. There's no audible effect on the phone signal.

We're scheduling with ATT to get DSL service to that transmitter site. They've only recently begun to offer it in that remote, isolated, middle-of-nowhere area. The tower is too small to support a data link, and thus, it's the only station to date that doesn't have any form of Ethernet/Internet access to/from our studios. That'll be nice. What will also be nice is if ATT can figure out some way to keep that DSL working through storms. We'll see.

Crawford Live

You'll be hearing about this shortly, if you haven't already: we have a new corporate website. I set up the database and WordPress install, but Josh



Figure 2 - A standard AC filter works fine on a POTS line.

Myers in Buffalo did the design and content work. We had to regenerate our SSL certificate (again), and I always cringe a bit while I install it – we have over a dozen sites living together on that server! – but it came right back up.

This gives me a chance to whine (again) about WordPress. It's by far the most popular content manager for websites, but wow, it's a pain. It wants to store all links as absolute (site.com/pagestuff), instead of relative (~pagestuff), so just moving a site takes a good bit of work. There are dozens of plugins that will help you build a great-looking site, but they don't always play well together. Best of all, if you contact the plugin's support team, they'll tell you disable all *other* plugins until you find out which one is causing the conflict.

We've been using a plugin called Elementor which is in a completely new category. You have to add and change several things in the configuration to get it to work. For one thing, it requires PHP version 7, which neither Red Hat nor CentOS officially support at present. For another, it wants a lot of memory. Lots and lots of memory. So far, our server (which we deliberately overbuilt and overspec'd) is handling the load, but it'll be interesting to see what happens in the future.

Y2.2K

It has been twenty years now since the Great Y2K Non-Event. A computer bug was supposed to bring down civilization, but in reality, absolutely nothing of note happened. As I've mentioned here before, I was a noted (perhaps even, "infamous") Y2K Gloom debunker. I spent entirely too much (wasted) time trying to convince all the Chicken Littles and Doomlits that the year 2000 would *not*

result in widespread power outages, bank failures and airplanes landing upside down.

And now, we start our second decade after the Non-Event. The threats nowadays are primarily from malware, especially so-called ransomware: bad viruses that go into your computer, encrypt everything, and then demand a ransom to let you get your data back. These things continue to make the news from time to time. Sadly, in most cases (especially with smaller municipal governments), the victims will decide just to pay the ransom.

There are also zillions of scams coming in via email and telephone. Sandy gets a kick out of the scammers who claim to be from the IRS or Social Security. She will inform them that she used to work for the federal government. The smart ones immediately hang up. The profoundly stupid ones will continue (in broken, accented English, mind you) to tell her that the police are on the way to lock her up if she doesn't *immediately* give them \$500 over the phone. Heh.

Oh, well. All you can do is be careful, stay alert, keep good backups and mind your P's and Q's.

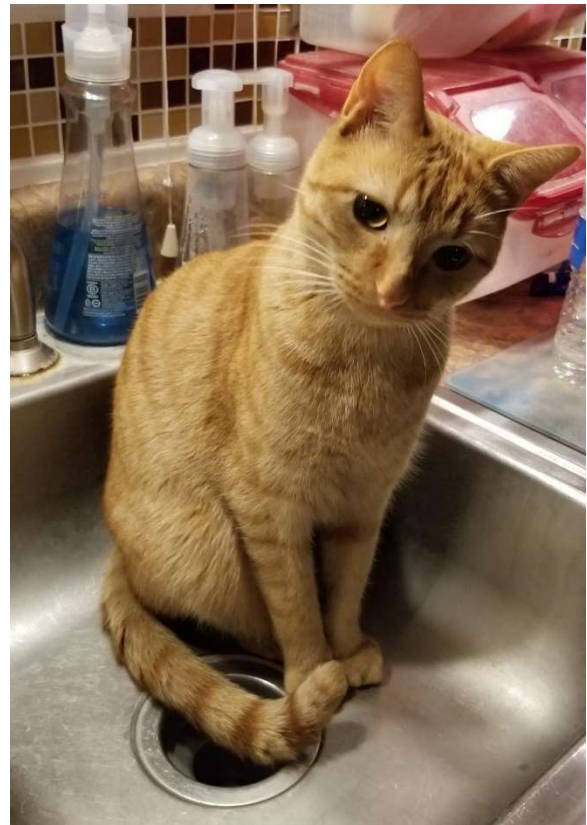


Figure 3 - The newest member of the family: Charlie. He says Happy New Year to all!

STL Issues

I mentioned last time that we'd had trouble with 850 AM's data link. Not long after submitting that article, 101.1 WXJC-FM's main STL stopped working. In that case, the link itself was fine, but the studio Horizon Nextgen codec locked up and just stopped working. I was able to force it over to the backup (93.7 WDJC's HD2), and we were back on the air in short order.

Once we were back on, naturally (and obviously), I started trying to reboot that Horizon. It wouldn't do it. It would make it to the point where all the meter LEDs would flash on and then hang. Since we had more bad weather coming, I didn't want to

chance using WDJC's HD2 for any length of time. The quick workaround was to disable 101's HD2 and to send the primary signal over that digital link. That got us a primary and backup, which took the pressure off.

Todd looked at the studio codec and decided to swap out a suspicious-looking power supply. The Horizon booted right back up and by the end of the next day, HD2 was restored and we were back to normal operation.

That's about it for this time. Honestly, not a lot happened in December, which is typical. I hope everyone had a blessed holiday, and here's praying for the best in the 2020!

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

Of late, the backup transmitter at the WSRB transmitter site has been problematic to say the least. Back in October, we were seeing difficulties with the transmitter. We actually thought we had a transmission line issue because the reflected power had risen significantly over the prior few weeks, even before the transmitter had started having issues. This was combined with the leaks we reported earlier in last month's column. I had at the time started discussing with tower crews about the possibility of replacing the line, but before we got too far down that line of action I remembered that we hadn't actually run the transmitter into the dummy load.

When we decided to do that, it became apparent we didn't have a line or load issue, as the same issues were showing up on what we believed to be a good load with the dummy load. We were also able to see the high reflected power indication was due to the transmitter itself, as we had an external Bird wattmeter showing that the reflected power was not nearly as high as the transmitter was showing.

As reported last month, we did have a tower crew repair three leaks on the transmission line. However, we still had the issue with the transmitter itself. It was determined that we had six (!!!) bad PA

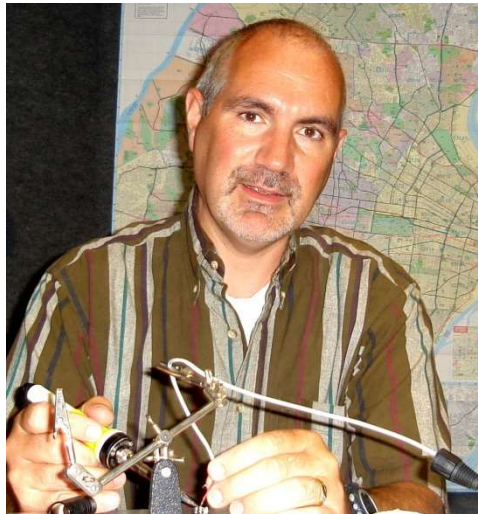
modules. We sent these to the manufacturer for repair.

BE found various issues with the modules and repaired them. Once we got them back, we put them into the transmitter and expected everything to be working well. However, once we had the transmitter at full power, another module failed. We were still able to make full power, but the module issue had to be addressed.

We attempted to repair that module ourselves, but several of the parts were literally crumbling from age and heat. So, we again sent the module for repair.

When we got that module back, we were ready to finally have our backup transmitter run with no alarms. Once we re-installed the power module and we put the transmitter on the air at full power, all looked good: full power with no faults.

However, after we let it run for 45 minutes, you guessed it, another module was showing up with a high reflected power alarm. So, this now meant we had an issue with yet another module. We'd had problems with eight of the sixteen power modules within the prior two months. None of this was an issue just three months prior.



It's hard to believe, but that transmitter is almost 17 years old, it was moved to backup status in early 2018 when we installed the new Nautel GV-5. I have always noted that the BE transmitter always

seemed to run hot. My guess is that all that heat and age have taken its toll. It is probably not a stretch to think we will probably have to rebuild *all* those power modules before the unit will stabilize.

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

Antenna tuning units: every AM radio station has one or more. Some are just little square box next to the tower, and others are small buildings. At KCBC, they are of the small building variety, about 100 square feet, actually.

Those buildings are now over 30 years old. Over the years, they have required quite a bit of maintenance. They have been painted several times. Patches have been put over holes that woodpeckers have made. About half the sheet siding has been replaced over the years. A few years back, we put in real entry doors to replace the hinged sheets of plywood. It seems that they are the gift that keeps on giving.

This year, the roofs needed attention. These buildings are roofed with composition shingles. I did the reroofing myself. The roofing materials from Home Depot only cost a few hundred dollars, which is much cheaper than calling in a roofing contractor. I have done roofing a number of times before, and it is pretty easy... and almost fun (almost!).

December might seem like a poor time to work with composition shingles, but this is California, and even in December we sometimes turn

on the air conditioner in the car. We had some nice days of short-sleeve weather to get the job done. One of the nicest things about December is that the wasps, for the most part, are sleeping.

December turned out to be CF card failure month at KCBC. I have never had a CF card failure before, but I was lucky enough to have two failures

in one month. The first was the computer on the door of the Nautel NX-50 transmitter. The second was the internal CF card of the Nautel Exporter Plus.

I had quite a time trying to get the CF card flashed for the NX-50. I think most of my difficulties were related to Windows 10, but I finally got it. In contrast, flashing the CF card for the Exporter Plus was a breeze. Thanks be to Nautel for detailed instructions and great customer service.



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

It's another new year as we begin 2020. Best wishes to all as we look forward to the challenges for this coming year.

One such challenge for the broadcast industry is the competition from the Internet for eyes and ears. For radio broadcasters, the competition for ears is being met with streaming and podcasting of radio programs. Television broadcasters are integrating live digital programming with Internet-based links to accompanying content related to the program.

In today's Internet media, the traditional news providers no longer have the gatekeeping control of content they once enjoyed. "Big Media" now has competition as Joe Sixpack can use Internet access, which bypasses the big three: NBC, CBS and ABC.

Internet connectivity does have costs to consider. Connectivity is dependent upon very complicated and complex infrastructure which is highly bandwidth intensive. The deployment of large fiber networks has been able to keep up with demand

at the expense of large, complicated hardware investments. The larger and more complicated the infrastructure, the more fragile the system becomes.

In large disasters, large and complicated communications networks such as the Internet fail more frequently. Power destruction systems have the same failure characteristics, although local generators can operate independently to provide backup. Internet cell sites cannot operate independently.

Local broadcasters do have advantages that we ought not forget. Broadcasters can reach a large population over a wide area while requiring no infrastructure of any kind between the broadcaster and listener. No other medium has this ability to provide public safety information during a disaster.

With the glitter and dazzle of the latest Internet app, this is a detail worth repeating: broadcasters can reach a large population over a wide area while requiring no infrastructure of any kind between the broadcaster and listener. No other medium has this ability.

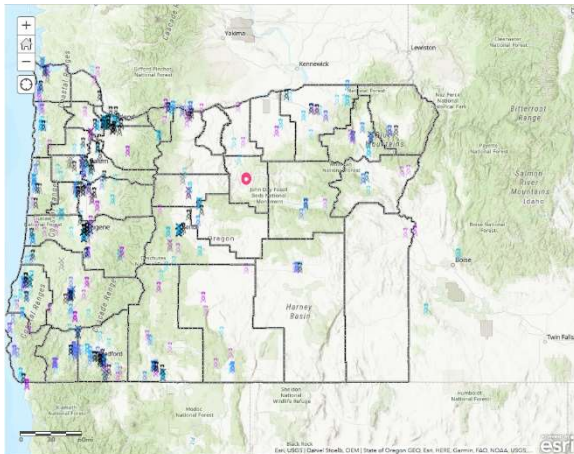


Figure 1 -- Raptor view of the entire state -- note the red bullseye showing no broadcast facilities in that county.

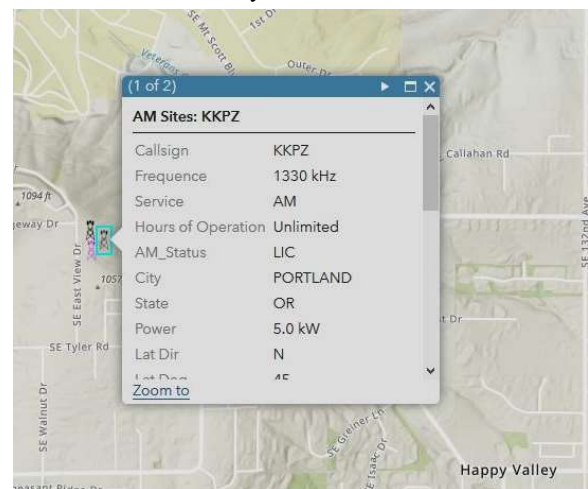


Figure 2 -- Close-up of the KKPZ site in Raptor.

Here in Oregon, broadcasters have been actively promoting our ability to reach the public. The latest project has been adding a broadcast layer to Raptor, the Oregon GIS system for emergency managers. After exporting FCC data, a draft is now available. The draft is graphical, much like Bing Earth. The view can be expanded to the entire state or focus on small local areas.

One disappointment is the accuracy of the lat/lon information in the database. In some cases, errors of as much as a half mile have been seen. The statewide view shows the penetration of broadcast

facilities. Only one county (shown with a red bullseye) has NO broadcast facilities. See Figure 1 above.

The level of detail is illustrated by the close-up of the KKPZ facility. The pin for the location of KKPZ is tower 1, the phase center of our array. Our translator is accurately shown at the communications tower, just to the south of the building. See Figure 2.

During a disaster operation, Oregon emergency managers will have access to broadcasters as a vital public information resource. No other media can provide this service.

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

Merry Christmas and Happy New Year to everyone! It is hard to believe that 2020 is already here. With a new year comes new projects and equipment.

Besides the new microwave radios we will shortly be replacing, the first project is canal maintenance at the KLTT transmitter site. We have a large irrigation canal that bisects the 50-acre property, and it is our job to keep the growth out of it. We agreed to this back when we bought the site because we did not want canal contractors coming in with their machines and tearing up our ground system that runs beneath the canal.

We have a lot of property at the site, and trying to keep up with it over the years has been hard. I had never dealt with it much before, back when I was an assistant engineer, and then when I took over as chief, I didn't think much of it. And then we got some letters telling us to deal with it or else, so we hired someone to come out and cut several trees and dredge the silt out. After several years, the trees are back, and no doubt the silt as well, but whatever on that. So I've hired the same company who did some amazing tree-removal work at the KLZ site last year to come in and deal with the trees all along and in that canal. I look forward to getting it cleaned up, especially since many of those trees have huge thorns on them. Having the contractor come out will also clear the little road we use to drive to the towers,

which is a plus.

You see, when we did the maintenance last time, the plan was to have the contractor clear out the



trees and put them on the ground next to the canal where we could then bring in a wood chipper (think "Fargo") and deal with that part of the project ourselves. What we did not realize were how big those thorns were (1-3 inches typically and super sharp). So we ended up not doing much at all. Because of this, we had to create a new path to tower 4, as the road runs right next to the canal and is still covered with

those old trees.

With 2020 here, I look to the future and begin planning. We have the big projects that we have to do, of course, but I have my own projects I want to do. Many of them have been years-long projects that I never really followed through on.

I must say, I am spoiled having Keith around. I appreciate so much all he does for me day in and day out. He is nearly always available to go deal with something rather than me. Cleaning up things, mowing, moving equipment...etc. But I still create projects in my head, and then decide I don't wanna. One of the big ones is mowing. Keith does a great job mowing the sites with the tractor and brush hog.

But one big thing I want to do is mow places we haven't really mowed and then use the bucket to break down prairie dog mounds. I really wish we had

a box blade, and perhaps we will look into that, depending on how difficult it is, since we always seem to have issues removing the brush hog from the back of the tractor. But it would be nice to just go scrape those big mounds down all over the property, even though they will most likely be dug out in a matter of hours. But especially along our tower paths. It has become like driving a mine field, except we know where they are and have to swerve like crazy to avoid them.

Then, once the growth is gone and the mine fields are taken care of for the most part, I'd really like to get some weed killer and spray like crazy. We get Canada thistle and have received love letters from the county before, telling us to mow or spray. After we had the KLVZ site sprayed down, it took a few years for things to begin to grow back, making maintenance easier. I'd like to replicate that at KLTT. We do have horses that are kept on the site, but they have so much land that even if the areas around the towers was bare, they would be just fine

as they have the rest of the property and the property behind us which they also go to.

I want to go through to each and every ATU and do a good cleaning in them. At the KLTT site, I even have new weatherstripping and locks to install at each of the ATUs. I've had the stuff for two years now.

Getting each and every site cleaned is something I've wanted to do for a while now, and not that they are trashed, but I want to make sure they are looking even better. I want to get our barn cleaned out at KLZ. It's time to get rid of a lot of the old, unused items, items that have not been touched since long before I came to Crawford Broadcasting in 2002. I could really use the room in that barn for our tractor, trailer, backhoe and other accessories. But until things are removed to make more room, I cannot do anything.

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

The Local Oscillator
January 2020

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1

KNSN • San Diego, CA
1240 kHz/103.3 MHz, 550W-U

KCBC • Manteca - San Francisco, CA
770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2

KKPZ • Portland, OR
1330 kHz/97.5 MHz, 5 kW-U, DA-1

KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1

KLDC • Brighton - Denver, CO
1220 kHz/95.3 MHz, 660 W-D/11 W-N, ND

KLTT • Commerce City - Denver, CO
670 kHz/95.1 MHz, 50 kW-D/1.4 kW-N, DA-2

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

WDCX • Rochester, NY
970 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
970 kHz, 5 kW-U, DA-1

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

WCHB • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D

WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D

WMUZ-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT

WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2

WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT

WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT

WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT

WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT

WYDE • Birmingham, AL
1260 kHz/95.3 MHz, 5 kW-D/41W-N, ND

WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2

WYDE-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT



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