The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

FEBRUARY 2010 ● VOLUME 21 ● ISSUE 2 ● W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

An Unwelcome Interlude

Most readers of these pages undoubtedly know by now that the New Year did not begin well for me. On January 4, I learned that a tumor in my spinal canal which had lain dormant for years had grown some 25% in the prior few months. Because of its location within the spinal canal, adjacent to the spinal cord, there was no question about what must be done ï it had to come out.

I wonôt give you the graphic details here. What you canôt reason out for yourself is readily available for the finding on Google, WebMD and other places. But what I will tell you is that those percentages that the doctors try to play down as they wave the release forms around in front of you ï a 1% chance of this, a 2% chance of that, a chance somewhere ñnorth of zero but Iôve never seen it in my careerò ï are worth paying attention to. Those 1 and 2% probabilities turned into 100% probabilities for me even though I took every precaution dictated by my surgeon and the hospital. What should have been ñroutineò was anything but, and four days after the original surgery I was in a fight for my life undergoing a second surgery.

Thanks to the divine intervention of the Almighty Creator/Healer through the mysterious mechanism of prayer, I pulled through the ordeal, and as I write these words a week following the second surgery, I find myself feeling better and becoming stronger every day. It is good to be back working again, tending to the affairs of this great company.

I am proud of each and every one of our chief engineers for the excellent work they did to keep the trains running on the right tracks during my absence, and I very much appreciate Elizabeth McGuireôs good work in managing the office during my absence.

And I thank each of you who wore out your knees praying on my behalf. God is sovereign, and yet He commands us to ñpray without ceasing.ò There is a mystery about prayer that I am convinced believers will not understand this side of heaven, but I am also absolutely convinced that prayer changes things. The Scriptures state that God is not a man that He should change His mind, but somehow the prayers of the righteous seem to enable or set into motion what God has already willed. However it works, thank you, dear friends, for praying me through this ordeal. It is my prayer that the remaining eleven months of 2010 will be some of the best in our companyôs history.

FM HD Power Boost

You would have to live in a cave in Afghanistan somewhere to be unaware that the FCC has at long last approved a digital power hike for FM stations. I have read the Report & Order, all 22 pages of it, and think I have a pretty good handle on it. Let me hit the high points for you:

- By now, just about every station operating in the hybrid HD mode has concluded that the digital coverage does not even come close to that of the analog. This is most apparent indoors and on portable devices.
- One of the big reasons that digital conversions have slowed down is because of the coverage issue ï if people canôt hear it where they want and need to hear it, why make the (considerable) investment?
- The current 1% of the analog power wonôt cut it but studies have shown that 10% will. On the other hand, 10% has considerable potential for causing adjacent-channel interference. So there is a compromise somewhere in there.
- Despite the relatively large number of FM stations operating at the 1% digital level, there have been no substantiated cases of

interference. Further, the FCC granted some stations experimental authority to operate with up to 10% digital power ï some of these with severe short-spacings ï and amazingly, no interference reports were received from other stations or the public!

- Most of you have undoubtedly read the trade press accounts of the studies conducted and compromise reached by iBiquity Digital and NRP Labs in recent weeks. Based on the findings of those studies, the FCC has authorized a blanket 6 dB (4X) increase in digital power levelsé sort of.

Normally, the rule would become effective on the later of 30 days after publication in the *Federal Register* (and if you remember the AM modeling rulemaking that was finalized in the summer of 2008 but did not go into effect until February of 2009, you know how long that can take) *or* announcement in the *Federal Register* that the Office of Management and Budget has approved the new rule and data collection requirement (and remember here that we now live and operate in the Obama ñbig governmentò era wherein nothing moves fast that the administration does not want to move fast). *Buté* the FCC also issued a supplemental R&O essentially authorizing us to implement the power increase immediately. Thatôs almost unheard of.

The second unusual thing is that ñsuperpowerò stations are excepted. Some of our readers may not know what constitutes a ñsuperpowerò station. In essence, it is a station that operates with a combination of power and height that results in a reference contour distance in excess of that for its class. CBC owns and operates one such station, WDCX in Buffalo. WDCX is a class B station, the nominal maximums for which are 50 kW ERP at 150 meters AAT. WDCX operates with 110 kW at a height of 195 meters AAT. As such, WDCX will be restricted, presumably now and forevermore, to digital carrier power 10% of its analog power. If youôre in doubt whether a particular station meets the ñsuperpowerò definition, the helpful folks at the Media Bureau have set up a website just for you:

http://www.fcc.gov/mb/audio/digitalFMpower.html

All you need is the callsign and facility ID number and youôll get a ruling within seconds.

But wait! Thereôs more! Certain stations can request increases beyond -14 dBc. This is essentially a ñcontour protectionò mechanism without all the complexities of §73.215. A table is provided in the Report & Order that lists the permissible increase based on the stationôs current analog field strength at the protected contour of the adjacent-channel station. For example, if your station is sufficiently spaced or terrain shielded to its closest first-adjacent channel station so that it produces 49.5 dBu or less at that adjacent channel stationôs 60 dBu contour, your station can crank up its digital carriers all the way to -10 dBc (10% of the analog power). There are five discrete steps in the table, so there are several values between -14 and -10 dBc, depending on field strength at the protected contour.

So what does all this mean for CBC? Presumably in the long term, it means weôll be cranking up our digital power on every FM except WDCX. Because I have no budget for hardware upgrades this year ï presuming this thing even goes into effect this year ï any increases we realize will be limited by the existing hardware and available horsepower. At most of our digital FM stations, we have some headroom. For example, at Power92 in Chicago, we use a BE FMi703 digital transmitter in a high-level injection scheme. The analog TPO is 24.2 kW plus injector losses, so we run the digital rig at 2.4 kW TPO. That rig is capable of 2.8 kW HD only, so presumably we can increase our digital power by 40 watts (400 watts less the 10 dB injector loss), which will amount to about 0.7 dB ï not a lot but better than a sharp stick in the eye!

WMUZ in Detroit has the most to gain with its new NV40 FM+HD solid-state transmitter. That rig is capable of 32 kW FM+HD and we currently run it at 27 kW or thereabouts. In short, we have room to run it up all the way to -14 dBc using nothing more than the front panel touch-screen controls.

I still have some studying to do on this. The last thing we want to do is cause any spectrum neighbors any grief, so weôll be looking at that before we crank anything up.

Abbreviated

This monthôs issue of *The Local Oscillator* is shorter than usual for a number of reasons. Many of our regular contributors are very busy right now with various projects, and I think I caught more than one by surprise when I started asking for their columns a few days ago ï they didnôt think Iôd be back in the saddle so quickly. Surprise! Weôll endeavor to be back to our regular length and format next month.

News From The South
By
Stephen Poole, CBRE, CBNT, AMD
Chief Engineer, CBC–Alabama

Snow In Dixie!

Hereôs a prayer that Cris recovers speedily from his surgery. Before he went in for his back operation, we had just received an actual, honest-to-goodness snow here in Alabama. He pointed out to me that Denver normally gets snow measured in feet; weôre lucky to have an inch or two here. Weôre far more likely to have ice, sleet and freezing rain ï in fact, we had another ice storm this past weekend. (Must be global warming.)

The thing is, as Iôve said here in the past, weôre really not wired for that here. Weôre just not wired for it at all. You folks in Chicago and Denver and Portland probably have entire divisions in your highway departments with dedicated equipment that does nothing but spread salt and plow icy roads. We donôt have any such thing here. At best, the Alabama DOT will attach some scraper blades to the fronts of a few dump trucks filled with salt, and we just have to make do with that.

Let me illustrate it even more clearly for you folks whoôre used to lots of snow: did you know that you canôt find tire chains around here? Theyôre special-order items. No one stocks them. For that matter, itôs hard to find thermal undergarments (what Granny used to call ñlong handlesò). Locating a really warm coat for the winter season is a trick, too; we usually have to special order them. Like I said: weôre just not wired for it here.

Not surprisingly, then, when thereôs even a hint of icy weather on the way, schools and businesses start closing ahead of time. If it turns out not to be as bad as predicted ï as was the case with both winter storms this past month ï you naturally get some people fussing about ñover-reaction,ò or even muttering about ñcrying wolf.ò The problem is that itôs very difficult to accurately predict snow or ice here in Alabama, because (according to the meteorological guys Iôve listened to, anyway) it depends on the confluence of a number of happy accidents. First, there has to be moisture and a chance of precipitation in general. At the same time, there has to be a cold mass of air moving into the area that will hit that moisture and cause it to fall in frozen form. We live in a region where itôs hard to predict just where and when the cold air will smack into the moisture. Thus, we could have several inches of snow or thick ice in Huntsville, just 70 miles up the road, while in Birmingham, weôre getting a slushy mix with mostly rain.

One other thing about the deep south: the meteorological conditions just described mean that weôre far more likely to get ice than snow. A light snow might strike an FM antenna and blow off harmlessly. But freezing rain, or frozen precip that melts and then refreezes, is another matter entirely. Once the antennas cool down below freezing, they can very quickly develop a thick layer of ice, causing the transmitter to fold back. We canôt really justify the expense of de-icers here; we just donôt get enough snow or ice to make them viable. As a result, when we do get icy conditions, we just have to roll with the punches and hope the VSWR foldback circuit works properly.

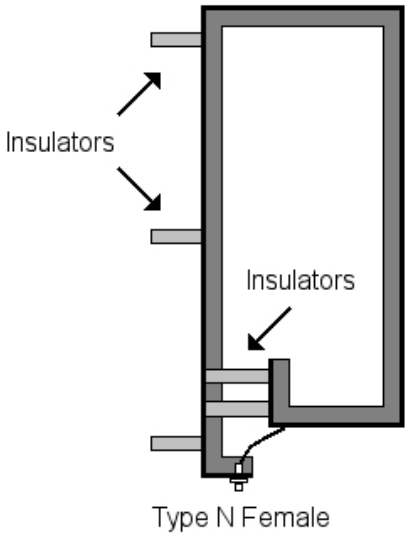
It goes without saying that we checked those foldback circuits before the cold weather rolled in. We also ensured that the remote controls were working properly, ready to switch to aux, or change audio input, or do any other fundamental thing to stay on air. Especially in an area like ours, once the roads ice up, we canôt drive to the transmitter sites. If we had forgotten to set up the Omnia to automatically select backup audio, or if we didnôt have a way to switch the antenna remotely, weôd be out of luck

until the roads cleared enough to allow us to drive. We also ensured that we had a second way to get into the remote control at our key stations. Web-capable remote controls are nice, but if the Canopy dish ices up and you can't get access that way, you'd better have a POTS backup.

Plastic Insulators

Here's another case of learning more about something than I ever thought I would. In the previous issue, I mentioned that we were preparing to model the WXJC array in Tarrant. I've been looking for ways to address a few odds and ends, not the least of which was what type of insulators to use on the sample loops. I'm not a big fan of ceramic exposed to our weather here, which can go from almost freezing at night to quite warm on the tower, in a matter of hours. We've had a lot of trouble at the Tarrant site with ceramic insulators cracking every time the weather changes.

The loops themselves aren't terribly complex; in fact, the name says it all. They're just loops. We're currently letting the imitable Danny Dalton weld together some angle iron for them. We decided to make them 25" x 12", instead of the more common 48" x 12" after a conference with Cris. This 50,000 watt station has a couple of towers that would result in too much voltage at the input of the antenna monitor unless we shortened the loops. A drawing (figure 1) shows what we're up to. The insulators won't have much stress on them, but we do want them to add a little extra rigidity between the inner and outer loop. The three insulators to the left are for mounting to the tower.



Andrew and Cablewave both make plastic all-weather insulators that would work for this, but neither had them in stock. They didn't plan to have stock anytime soon, and besides, they were surprisingly expensive. I started looking for alternatives and one obvious idea was for us to make our own from plastic rod stock.

Like most radio engineers, I knew about PTFE (Teflon®) and common plastics such as PVC, but I had no idea that there were so *many* different plastics available now, each with specific strengths and weaknesses. PTFE is popular for insulators in our line of work, but it's very expensive. Nylon isn't very strong, and unless it has been specifically treated to be UV-resistant, it isn't suitable for exposure to sunlight. PVC is even worse. Clear acrylic has decent UV resistance, but has other problems: it's almost as brittle as ceramic, and it's not really that good of an insulator at RF frequencies.

That's when I decided to go all scientific and do some research. Polymers are extremely common; the DNA in your genes is a good example from nature. Plastics are just man-made polymers: long, repeating chains of molecules. They gain their strength from those chains, and generally speaking, the longer the chain, the stronger the plastic. There is a multitude of different ways to create these molecular chains, each resulting in different properties. Eventually, my search took me to a common, but tough, UV-resistant plastic called Ultra High Molecular Weight Polyethylene, typically abbreviated as just "UHMW."

UHMW is similar to PTFE in many respects. For example, it has a low coefficient of friction, so it feels slick to the touch and most materials won't bond to it. But it's stronger than PTFE and for AM frequencies, is fine as an insulator. (I couldn't find any specifications for VHF, so I'd hesitate before using this in an FM or TV transmitter.) It's basically a form of polyethylene with extremely long molecular chains, whence the name, "Ultra High Molecular Weight." It doesn't absorb moisture. Unlike PTFE, it's quite abrasion-resistant; one common use for it is to line the trays for industrial chains and conveyor drives. You may have seen UHMW on the drawers in your kitchen: it's the off-white, "slick"-feeling plastic that many manufacturers use for bearings to make them slide more easily.

Finding UHMW rod in small quantities at a rational price, though, proved to be another challenge. US Plastics stocks it at a rational price (for that matter, they had a decent price on PTFE),

but they could only ship it via truck freight. The shipping would cost many times what the plastic did. Then I found a Website called ñonlinemetals.com,ò based in Seattle, that would sell me four 3/4ò diameter, 2ô lengths for about $12. The shipping was more than the plastic in this case as well, but the total was still less than $25. We plan to cut the rods into 3ò and 4ò lengths, then either drill and tap holes into each end, or simply use self-tapping stainless machine screws. I hope to have a picture of the first sample loop in the next issue.

The Mail Server

Iôm still a big fan of virtualization, but Iôve discovered that it does have some flaws. One that afflicts many of the popular virtual machine managers (including VirtualBox, the one we use) is that the system clock will drift off time. This is due to the VM trying to emulate the hardware clock internally. If the PC thatôs hosting the VM should get bogged down, it wonôt ñtickò often enough and the clock starts losing a lot of time. We have a Network Time Protocol (NTP) client running on all of our servers, but the drift was so severe that at least once every two days, NTP would declare that it was beyond its ability to correct and simply give up. Weôd have to go in and reset the time manually, then restart NTP.

As often as not, the first warning weôd have that the time had drifted would be when our users would start complaining about mail coming in with weird times on them (ñthis says I sent it last Wednesday, but I know I sent it Thursday morning!ò). Itôs also possible that some of the other strange problems that weôve experienced the past few weeks were related to virtualization.

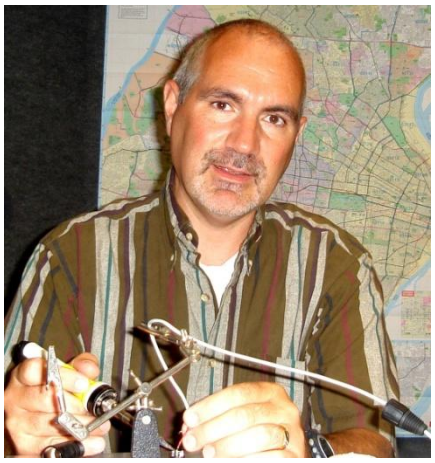
To address this, we eliminated the virtual machine and moved the mail server back ñonto the hardware,ò that is, running directly on the PC itself natively. This took about 3-1/2 hours on Saturday evening, January 16th, but I finally got it moved out of the box, onto the server machine itself, and then restarted. Our mail database has grown to where it averages between 3-5 Gigabytes of data, and even on a direct PC-to-PC connection on a fast Ethernet, takes a LONG time to copy. But as proof that we live in the Modern AgeÊ , I did all of this from home via a remote link. There were few tense moments when I was afraid Iôd have to run to the studios to physically restart something, but it all worked out fine, thank the Lord.

We still like virtualization and we may still use it on lower-demand servers that arenôt quite so time critical, but weôll have to leave it aside for something like our extremely-busy mail server. I do still recommend it as an excellent way to run a different operating system without having to dual boot. I have Windows XP running ñin a boxò under OpenSuse Linux at home and absolutely love it. When I need to do something Windows-specific (such as check our streams, or do my taxes), I can simply fire up VirtualBox, start the XP guest, do what I need, then close it back down, all while still enjoying Linuxôs security and reliability.

Thatôs enough for this time; letôs pray that Cris heals quickly and gets back to work. Next time, I hope to have some pictures of the sample loops with our homemade insulators. Until then!

Gateway Adventures
By
Rick Sewell, CBRE
Chief Engineer, CBC–St. Louis

Tower workers are a special breed. I for one am glad that there are those willing to go to the extremes of climbing a tall tower and sometimes in some of the worst weather to help us do what we do in the broadcasting business.



Its not just broadcasting; almost every one of us is affected by the work these folks do on a daily basis. Every time we pick up a cell phone or use one of our handy mobile devices, we can thank the guys that do the dirty and dangerous work of climbing a tower.

I donôt consider myself someone who is afraid of heights, but I would not want to do what they do. I have watched enough of these guys climb and work on towers to know that it is not only danger that is part of the work but it is obviously very tough on the body. Thatôs why you donôt see many older guys out there doing the work.

I know that there are times that we as broadcast engineers might have a complaint or two about the professionalism of some of the crews. I have been one to voice those concerns in the past, but with that said I am thankful there is *someone* willing to go out there and do that work.

In January, we had the incandescent fixtures for the marker lamps replaced with LED fixtures on the KSTL tower. With one of the incandescent bulbs out in one of the existing fixtures, we didnôt have the luxury of waiting until summer.

When we made the decision to go with the LED fixtures instead of having someone run up the tower and simply relamp the incandescent bulbs, I knew that it was going to a cold day or several cold days of work to get the job done. Not the couple hours it would take to just simply relamp the tower. I began to wonder if I would find a crew willing to take on that sort of job in St. Louis in January.

Fortunately we had a crew in St. Louis willing to do the work. We waited for a break in the weather, at least according to the forecast. For the most part, either we either had very cold weather, or if it was warm it was raining to almost flood conditions. Neither was really conducive to tower work.

When we finally did have a dry and somewhat warmer day in the forecast, we decided to move to get the work done. When the owner called me that morning saying he wanted to go for it that morning, I told him the forecast had snow in it but he seemed confident that the forecasters were probably correct that it wouldnôt be in our area until five in the afternoon and would be mainly south of us. I was willing if they were ï after all, I would be on the ground.

The hardest part of changing these towers over to LED fixtures is getting the old fixtures off. This time was no exception. They had one at the upper level of marker lights that took about an hour to get loose. The other one on that level would not come loose at the joint between the conduit and the fixture but kept coming loose at the joint between the conduit and the junction box on the tower. They finally had to give up on that one and just take the pipe, with the old fixture off the tower with the plan to replace both later.

When they finally got to the lower level of marker lamps on the tower, the first fixture they worked on went off rather quickly, but before they could get the new LED fixture in place the snowstorm that was supposed to be hours away and well to the south suddenly hit.

I was certainly ready for them to get down as they hurriedly got the new LED fixture in place. Looking at these guys through binoculars and not being able to see them all that well because of all the snowflakes gave me an even greater appreciation for the work they do.

They were able to come back and get the work finished a few days later, but this was a first for me to see a tower crew working in the snow.

The Chicago Chronicles
By
Art Reis, CPBE, CBNT, AMD
Chief Engineer, CBC–Chicago

Project Scheherazade

First, the answer to last monthôs question: How to test an FET.

It involves only an ohm-meter and a nine volt battery. I believe that this applies to N-channel devices. Itôs the method which Nautel uses to test its own RF output devices.

Ground the gate pin of the device *momentarily* and then check the resistance from source (negative) to drain (positive). There should be infinite resistance. Then take a nine-volt battery, make a resistive voltage divider to apply a small voltage between the gate and drain, no more than seven volts, no less than two, again momentarily, and measure the resistance again between source and drain. The resistance should be zero or close to it. Any deviation from the norm and you can toss it.

This monthôs question: What is a Franklin antenna?

Disaster at WPWX

As I was completing the January article for *The Local Oscillator,* I noted that there was a major problem in the main WPWX antenna at Burnham. This antenna, which actually consists of 18 elements operating at three levels (as opposed to one element at each level) is ï you guessed it ï directional.

Servicing FM antennas, and this sort of antenna in particular, is potentially very problematic as opposed to AM antennas (unless youôre running a Franklin, in which case all bets are off). The entire FM antenna is ñup there,ò several hundred or even a thousand feet or more, which makes access to it by mere sane folks (i.e. non-tower climbers) virtually impossible.

Oh, Iôve climbed my share of towers in my career, painted one, too, a 300-foter with a class A FM on top, right through the aperture, without so much as knowing it could hurt me at full power, which is what the rig on the ground was putting out when I was working around it. Mind you, this was 30 years ago, when I had a lot more energy than sense. Now, climbing towers by Engineers is a firing offense in this company. I donôt mind. I donôt have enough testosterone and too much blood sugar and heft to do it anyway.

So now, the only alternative is to rely on the only instrument an Engineer normally has at his disposal on a daily basis, a wattmeter which reads both forward and reflected power. Even then, when you find a high reflected power reading, you have to guess at whatôs going on up there, and then send someone who is nuttier than you are to go up and find out whatôs *really* going on.

AM antennas, in contrast, are *so* much easier to work on. Except for the sampling loops, which not all AMôs use, everything is on the ground, in a shed or weatherproof enclosure, where mere mortal Engineers can get their hands on the parts (with the RF turned off, of course). Thatôs one of the reasons I like working with AM. You can see, analyze and repair without spending $75 per man-hour and up on a tower crew.

And there are fewer wrong guesses with AM than with FM, too. In our case, we started noticing a gradual rise in the reflected power on both of our main transmitter wattmeters across a period of a week or two. From a little under a hundred watts, the reflected power went up to over 450. Clearly something was wrong up there, but of course we werenôt sure what. Cris suggested that we had probably burned up a bullet near the top. I suggest something more ominous... an antenna failure.

We had to do *something*, and that something initially was to call in one of our local tower climbers with a time domain reflectometer (TDR) to do a sweep of the line. Worst case scenario? A failure in the main transmission line right in the aperture of the backup antenna, which would have put us off the air while repairs were made. No, it wasnôt that bad. The problem was much closer to the main antenna, maybe right at it. Thatôs when Cris suggested the bullet

failure. Either way, we had to send a crew up the tower to deal with the problem. We scheduled that for the December 29th. Enter the weather, and the next thing you know, the date was the 31st.

The WPWX antenna just as it reached the ground... total weight: 800 pounds!

What the crew found out when they got up there was that the problem was not at the top bullet, nor was it anywhere else in the transmission line. Sure enough, it *was* in the antenna, and it looked like two of the nine driven elements in the array, one horizontal and the other one vertical, were involved. Cris, the tower crew and I huddled on the phone for a few minutes, and the decision was made. The antenna had to come down.

With daylight getting short, we made a necessary but fateful second decision: The entire antenna had to come down in one piece. In retrospect, that was *not* a good idea, but we felt we had no choice. Sorry, but doing this job after dark just didnôt seem safe. So, down the monster came, well, most of it, for the first time since it was installed over 23 years ago. We left the horizontal reflectors on the tower pylon. That pylon sure looked naked up there without our DA..... something like a small UHF TV transmitting antenna.

The pictures tell the story. When the antenna got to the ground, its 800 pound weight made it very unwieldy, and the result was that, well, it landed funny, the bottom matching section first. Oh, crunch, oh, bend! Well, that part, at least the outer conductor, would have to be replaced. Cute. But, with the entire tower crew and three of us from the staff working feverishly with 9/16ò wrenches and ratchets, we got all of the driven elements and reflectors off, lowering the weight and making handling the thing at least manageable, and we put the radiators and reflectors into the main transmitter building. The interbay assembly was separated into two pieces and put into the old original transmitter building. That was an absolute requirement. Twenty-five years ago, a seven-bay Dielectric antenna, left outside at that very site, disappeared overnight, never to be seen or heard from again. There wasnôt even a ransom demand. That wasnôt going to happen this time, but this time we were blessed to have the abundant indoor space we needed to both store and work on the entire antenna system.

And work on it, we did. Everyone in the department got involved. Job one was to look for damage, which we did while the tower crew was there. And we did find it, although not as much as weôd thought. Indeed, the top vertical element was fried, big time. The Teflon insulator which spaces the inner conductor from shorting to the outer conductor was completely gone. Also, the inner conductor and connecting bullets for that element were damaged as well. The scope of the damage to that one element was indeed sobering. That must have been some lightning strike! There was no doubt that this was the cause of our problems. And there was also no doubt that the lightningôs damage had caused, across time, more damage to the inner workings of that element until it finally failed completely, some weeks later.

A new matching section being installed by Warren McFerren, Brian Bonds and a tower crew member.

In checking the horizontal elements, we could find no damage to any of them, although the tower crew had said there was. No problem. Frankly, Iôd rather it be that way.

As we stripped off the driven elements and reflectors from the antenna structure, we did one thing right: we numbered each element, not only on the element itself, but on the point at which it was

mounted. We also drew ópoô arrows on all of the elements, so that theyôd all go on the tower in exactly the same orientation in which theyôd come off of the tower. I cannot recommend that procedure too highly. It saved our butts.

The newly-overhauled/repaired antenna going back up.

After storing the various parts, all of us took turns cleaning and replacing things across the next couple of days. All of the O-rings, Teflon insulators and silver-plated bullets (not the kind the Lone Ranger used) were switched out. So were all the mounting chains, J-bolts, and hardware, and there were nine sets of those. The chain I obtained from a local farm/truckers supply house, and it was actually heftier than the original.

Weôd sent back the damaged vertical element to the antenna manufacturer, ERI, down in Chandler, Indiana. They took one look and declared the thing dead. ERI claims not to make that antenna type anymore, but they managed to come up with a replacement element and got it shipped out to us, along with a new outer conductor for the damaged matching section. We were blessed in that, if the damaged element had been one of the horizontal ones, they would have been weeks manufacturing a replacement. ERI, throughout this entire process, was a joy to work with. Everyone there did what they could to help us get this project off the dime and back up in the air again as expeditiously as possible.

The replacement antenna element and six-foot outer conductor for the matching section showed up and we checked to see that the antenna went back together exactly the way it was designed to, no mean feat, as it turned out.

From there, the weather took over. Hey, this is Chicago in January, after all. The date for re-install had to be moved back three or four times. Finally, on January 15, which was one very grey day, the weather more or less cooperated, and the antenna went up----this time in four pieces. ERI had advised me that I should make a measuring stick exactly ten inches long, to act as a measuring spacer for use to properly align the elements. Just on a hunch, I made two of them, and it made things a lot easier for us. One stick went up the tower with the installation crew, the second stayed on the ground with the ground crew. That was another good move, because that alone speeded up the installation time quite noticeably. Another thing we *didn't* do helped. We didnôt clean the outside of the interbay lines. All of the places where the reflectors and other such parts had mounted had left those places shiny, so it made mounting those in exactly the right place again, a snap.

The re-erection work started around nine in the morning. By three in the afternoon, the job was done and the antenna was back on the air. The reflected power is somewhat higher than it used to be (200 vs. less than 100 watts, all told) but itôs not something which we cannot deal with, and a lot better than the 600 watts we had with the damaged element. Iôm already lining up someone who can help reset the position of the ceramic slugs inside the matching section and really get the reflected down. Itôll require someone from the tower climbing company to do the actual changes, but what the heck?

In my 41-plus years in this business, Iôve never had to do something quite like this before, nor for quite the same reason, either. Itós just another reason why I really like doing what I do. Itôs always something new, and something different. And itôs never dull.

Unfortunately, thatôs all I have the time to write this month. Next month, more fun with the Village of Lansing, and another big adventure in pilot tone synchronization. Just another reason to love what I do.

Until then, blessings to you all!

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

Itôs been 30 days now and the new combined KKPZ transmitter/studio is beginning to feel like home. We are now in the stage of finding paperwork or whatever that we know was in a box, so where did it go?

The move seems uneventful now. A bunch of glitches showed up as they always do. We had a phase swap in control audio so the analog (mono) listeners lost audio for a short period. The control server got analog audio connected to its digital input. Funny how NexGen record doesnôt work with that configuration, isnôt it? It just goes along believing what itôs told.

As always, the last ten percent of the job is ninety percent of the work. Music on hold, listen line, things like that which aren't critical path. I also have been identifying a number of issues that are new because of the combined facility. Security is an example. The alarm system doesn't fit the new needs, so we have to think about how we structure security, locked doors, and the whole approach. The problems with the alarm system reliability don't help that either.

Ridgeway Tower Farm

Overall, the list seems to get longer as more items go into the finished pile. The list has been going from tasks like move the studio to less complicated ones like why no audio on the B exciter? That turned out to be three bridging clips that got removed. Donôt ask me how or why.

So things ought to be calming down, right? Well, not exactly. I got an interference complaint and it came from a creditable source. I see a rectification or mix problem like this fairly often at Mt. Scott, although it is unusual to have an MF/HF complaint. The usual problem is on VHF or UHF.

So off I went down to the Willamette National Cemetery. There are several clear areas there free of overhead wiring making for an excellent place to use for monitoring. After tuning around for some time, I was just about to close up shop when I heard snap-crackle-pop. No, not that kind. I didnôt have milk.

What I observed was a random impulse-type of noise, popping and snapping with occasional short periods of sustained hiss for a second or two. The noise seemed to be about 70 or 80 dB down, although that is difficult to judge because of the FIM meter ballistics. The noise was random and intermittent. Occasionally the noise would be relatively constant and at other times, short bursts with minutes of quiet in between. I learned later the noise also disappeared for long periods.

Finding these problems is often a process of elimination, and of course the hope is the problem will continue to show to allow for testing. I was able to get some observation one Thursday evening; however, Friday, the problem was showing reliably for some time and I was able to get some good observations.

During my observations I heard audio from 1640, 1190, 1520, 1080, and I think 750. With multiple audio it's hard to pick out individual audio. 1190 and 1520 are quite close together, so their being in the mix was no surprise. Hearing 1080 was a

surprise as itôs quite some distance away. In any case, multiple audio like that is an indication of rectification mixing.

Continuing with elimination, I switched between main and aux for 1640, (Nautel and Contental). I also did the same with 1330, as well as briefly switching ND on tower 1 and 3. The noise continued through all those tests, so I know the problem isnôt our facility.

I still had a couple of things on my test list. And then the problem stopped. You saw that coming didnôt you? Murphy is in good form today.

Actually, thatôs a clue, the noise stopped when the wind stopped blowing. This is entirely consistent with loose coax rigging, antenna mounts, power line cables or detuning skirt problems. I'm just guessing here, but the characteristics are consistent with some moving and randomly shorting.

I had wanted to take a look at the Ridgeway tower farm and the field intensities for both 1640 and 1330. If the problem is in one of the detuned structures, it could well be causing random fluctuations in 1330 field intensities. Of course by the time I found a gate code for Ridgeway, the problem stopped. The attached picture is of some of the Ridgeway tower farm.

Hmmm... I never thought I would be wanting wind.

Rocky Mountain Ramblings
The Denver Report
by
Amanda Alexander, CBT
Chief Engineer, CBC - Denver

Wow, is it already February? Where has the time gone? While in some ways I canôt believe the month has come and gone, the last part of January just dragged on. I guess the fact that my dad was in the hospital after surgery and had a complication or two didnôt help things go by any faster. All is well now and he is home recovering.

T-1… Again?

For a few days during the month of January, the KLTT T-1 would drop out on us and by the time I got the backup working, the T-1 would be back up. After having this happen a couple days in a row, I decided to call Qwest. I spoke to the lady who had dealt with this before and she opened a ticket on the 13th. They worked on it for a couple days and I guess whatever they did worked. I guess some pairs of wires didnôt match up with the color code they are using now so they replaced the wires with the correct ones. This makes me assume the problem was with the wires, maybe a loose connection and taking out the old and replacing with the new just seemed to fix it.

NexGen

As I mentioned last month, we have been having issues with NexGen control room screens going blank and losing connection with the file server. RCS first told me to do Windows updates on all the computers to get them to SP3 and a .NET 2.0 or later pack. As many of you who work at stations that have a lot of live shows know, getting into the production or control rooms is not an easy task by any means. I decided to come in on a weekend to work on these computers since I knew I would have free reign over most of them. After many hours I was finally able to finish. I was glad to know that the issue would be over and that I wouldnôt have to field anymore calls about the screens going blank. WRONG! The next day I received a phone call from Charlie Grimes about the same issue.

I have been working with RCS for several weeks on this issue. One stated it was a firewall issue. How could this be if it worked on all computers before? I proceeded to call again and this gentleman changed the network delay. The delay was set for 150 mS, which was greater than the default. They changed it back to 100 (which is the default) and from here we wait. I get to try to keep track how often this problem is occurring and hope we can get the delay to the perfect number so we

never have this problem again.

Spare NexGen Computer

We have an older (6 years old) Dell computer that began failing in a production room. I kept it going as long as I possibly could. Knowing its death would come soon, I pulled out our spare NexGen workstation, thinking it would be ready to plug and play. To my horror, I found the CD-ROM drive missing and after examining what was left, realized the computer was not the spare but instead another production room computer that began to fail a couple of years ago. I tried getting the computer back in working order with no success.

After thinking it was working great after a few days of nothing going wrong, I replaced the original faulty computer. Just like that, the ñnewò computer failed. I put the old one back and began working on the ñnewò computer. We ended up buying a new processor, fan and motherboard for the spare computer. This was my first solo rebuild of a computer. We were able to get NexGen installed and the computer has been working flawlessly ever since. I also replaced the CD-ROM with the CD-ROM from one of our control room computers since they donôt need CD-ROMs for those.

I was hoping to rebuild the old Dell computer, I took the entire case in and we found that no motherboard available that would fit in the case. We ended up ordering a new HP computer and this newly-repaired spare computer will again become the spare workstation and the new one will become the production A machine.

Preparations for a Move

I ended of the month of January by tracing down the wires in the engineering room racks. After several months of planning to do this and having various things go wrong that prevented me from taking the time to trace, I finally got the time. I am going to trace the wires in two different ways. First, I am going from the equipment. I want to find out where all the wires from the equipment go, whether itôs to the blocks or to another piece of equipment. The second way I will be doing this is by using the spreadsheets Ed created when we first did all this and trace down starting at the blocks. This will be a lengthy process no doubt, but I do hope to find wires that are no longer in use. I want to make sure we have free space on the blocks if possible. I predict this will become a time-consuming project but look forward to figuring out what we have and donôt have and really getting a good look as to how things are wired.

During the tracing of the wires I am also keeping an eye out for what cables will be needed at the new building. Coax for sure, CAT-5, cross-connect cable and audio cable are all must haves. The question will be how much. I am not worried about ordering too much as I know we will use it in time. It seems we get a new show or new equipment to test out and we end up needing cable of some type, whether at the studios or at the transmitters.

The build-out is just around the corner. One month away! Things are moving so fast with this whole thing it is nerve-racking. I feel so unprepared. I only pray that God will protect me from the attacks of the evil one long enough so I can get all my preparations finished.

Update on Dad

I think I kept most everyone updated about my dad after his surgery on the 21st of January. The surgery went well. He seemed to be doing fine until the night of the 23rd when he had a fever and began leaking from his incision site. After the doc came in and did a procedure on the table, it became a waiting game. I had been on a retreat with my young adult group at Keystone, Colorado and after speaking with my mom felt it best to get home as soon as I could. He was in and out of sleep for a day or so. Monday the 25th, my mom received a call from the hospital that they were rushing dad into emergency surgery. I rushed to the hospital from work; my mom did the same from home. It turns out that the first layer had fluid build-up in it causing the issues. The surgeon was able to get it to seal properly this time and the next day they kicked him out of the hospital. He has been home since the evening of the 26th. He is doing very well. While still in an enormous amount of pain, he is able to walk around and do things. He doesnôt do anything he doesnôt feel he can do to be safe. I am sure he will be back to being his normal self in no time. Thank you all for your prayers and words of encouragement for my mom and me during this whole ordeal. They were a great help to us.

That about does it for this edition. So, until next time, thatôs all folks!

KBRT $ Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA
KCBC $ Riverbank - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1
KJSL $ St. Louis, MO
630 kHz, 5 kW-U, DA-2
KKPZ $ Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ $ Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC $ Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT $ Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ $ Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
KSTL $ St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND
WDCX $ Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX $ Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDJC-FM $ Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL $ Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WLGZ-FM $ Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT
WRDT $ Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ $ Detroit, MI
103.5 MHz, 50 kW/150m AAT
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, 6 kW/65m AAT
WYCA $ Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE $ Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND
WYDE-FM $ Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC $ Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM $ Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

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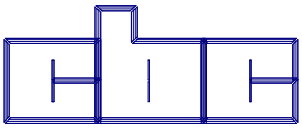

Corporate Engineering

2150 W. 29th Ave., Suite 300

Denver, CO 80211

email address: crisa@crawfordbroadcasting.com