The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

APRIL 2015 • VOLUME 25 • ISSUE 4 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

NAB Time

Itôs hard to believe, but the time for the NAB spring convention and Broadcast Engineering Conference is already upon us. Itôs always a time I look forward to, seeing colleagues and friends, learning about emerging technologies and products, comparing notes with others and meeting with vendors. Every year I come away with new ideas, more knowledge and sore feet.

This year, I have been asked to participate in an all-day Monday conference session, ñAM Radio Boot Camp.ò The name pretty much says everything. With so much consolidation these days and the changes that are taking place in the makeup of the broadcast engineering ranks, there are a lot of folks out there who have been handed AM facilities to take care of that have limited or no knowledge of how things work or what to do. The aim of the Monday session is to equip these people with the tools they need to keep their AM facilities running, in compliance and sounding good. Session segments include:

- Introduction to AM
- The Science and Art of AM Antenna Systems
- Grounding Systems: Why are they Mission Critical?
- Determining the Status of the Ground System: Tips and Tricks
- AM Transmitters: Solid State and Big Iron
- FCC Rules Specific to AM Broadcast
- Whatôs Going On: The Importance of Proper Monitoring
- Evaluating Potential Reradiators
- Hands Off! What Not to Touch at an AM Transmitter Site
- What You Need to Know About Proofs and the Method of Moments
- Be Careful! Safety Issues: OSHA, Tower, Electrical and RF
- Can I Lease Space on My AM Tower
- Digital Broadcasting on the AM Bands: Is it Ready for Prime Time?

The presenters include Ron Rackley, Ben Dawson, Tom Ray, Alan Alsobrook, Guy Berry, John Warner, Ben Downs, Glynn Walden, Andrew Skotdal, Gregory Borgen and yours truly.

My segment, ñEvaluating Potential Reradiators,ò will deal with the new rules on reradiators and using the method of moments to evaluate their potential effect on nearby directional and non-directional antennas.

I very much look forward to that session. Iôm sure I will learn a few things from the presenters and maybe even from audience members as they ask questions and interact with the presenters.

Phase Drift

(Readers who are not technically inclined might want to skip over this part ï your eyes may cross and stick that way.)

I mentioned last month that we have been dealing with a phase drift in KBRTôs tower #2. From the low night power (200 watts) to the 50 kW day power, we see close to six degrees of drift. It occurs gradually after power change, taking an hour or more to settle in. After power-down in the evenings, over about a one- or two-hour period, the phase will drift low and settle in at close to three degrees below the licensed value. Then after power-up in the mornings, after 45 minutes to an hour the phase will drift high and settle in at close to three degrees above the licensed value. We have to carefully manage the adjustment to keep the phase within the ±3 degree window allowed by the FCC rules.

There is very little change in the ratio of this tower during the drift, and there is very little change

in the other tower parameters as well, really no more than I would consider ñnormalò for diurnal component heating due to current. The common point impedance also changes very little with the shift in tower #2 phase (thatôs something I can monitor from anywhere with the NX50 AUI). All of this really pointed to an antenna monitor issue, and thatôs what I was assuming as we made some tests last month.

The results of those tests, which included swapping channels on the antenna monitor, showed quite the opposite. The antenna monitor is rock steady. It is indeed the phase of the tower that is moving around.

Searching for clues as to what the issue might be, I used a nodal circuit model, carefully adjusting the model to match measured impedances, currents and phases and then varying the values of components to see what effect the variation might

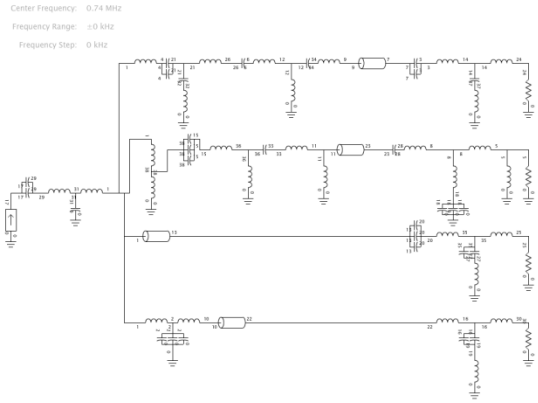


Figure 1 - Nodal Circuit Model of the KBRT Antenna System

have on tower #2 phase and current.

Tower #2 is unique in the KBRT system in that it has a very low driving point impedance (2 ï j20 ohms). We use a shunt coil to pull that impedance up to 25 ohms so that the tee-network has a reasonable impedance to look into. That low impedance changes very little with variations in phase, which means that the other tower parameters donôt change much with parameter changes in tower #2. The common point also doesnôt change much with these variations.

What does change is the phase of tower #2 with a small variation in the capacitance of the input capacitor in the tower #2 ATU network. A 5% variation in the capacitance that cap results in a 5.7-degree change in the phase at the output with only a 1% change in the current. The specifications for the mica capacitor show that a 5-8% shift in value is to be expected. This would certainly account for the phase drift.

From-To	Resistance	Voltage	Current
R 5Ÿ 0	2.07000000	660.93 ∠ 18.330° V	31.92 ∠ **102.592°** A
R 5Ÿ 0	2.07000000	654.41 ∠ 12.632° V	31.61 ∠ **96.894°** A

Figure 2 - The first line shows the output of the tower 2 ATU with all components at their proper values. The second line shows the same thing with the input leg capacitor value increased by 5%. Note the very low driving point impedance of the tower (2.07 ohms).

Other modeling showed a lesser but still significant phase sensitivity with the three ATU network shunt leg capacitors.

To address this issue, I have ordered a Jennings 2,000 pF fixed vacuum capacitor for the input leg and a pair of Jennings 1,500 pF fixed vacuum capacitors to replace the trio of 1,000 pF micas in the shunt. These will be rock steady and Iôm confident that they will put a stop to the drift once and for all.

I had initially thought to do the input or shunt leg, one or the other, first and see what happens over time before doing the other, but considering that the cost of a trip out there, itôs best to just go ahead and replace both legs now. Chances are that sooner or later we would have to deal with the other leg anyway.

The problem is that there is a significant lead time ï 10 weeks we are told ï so it will be June at the earliest before I can get them installed.

Satellite Changes

At press time we are rolling out a new satellite system in our west coast operation. It uses a multiplexed stream that will provide two 128 kbps stereo program channels in a 300 kHz bandwidth, the same bandwidth currently occupied by CBC-1 and half of CBC-2. New receivers are in place at all our west coast stations.

This marks the end of the legacy Comstream Ku-band system that we have used in this company since 1994. Amazingly, one of the original DT-1000 uplinks (Detroit) was still going strong with the original CR-101 RF head at that location when we decommissioned it earlier this month. I wonôt miss the ABR202 receivers, especially the older ones (the newer Tiernan ABR202A receivers were a lot better).

This change will allow us to provide one program feed from KBRT to everyone on the west coast except San Diego, and another discrete feed to San Diego. This will permit separate programming of KNSN during the evenings and overnights when we

get that sales effort geared up. It will also take care of the EAS issue ï we have been turning KNSN off the air during KBRTôs RWTs to keep from airing Los Angeles area EAS tests in the San Diego operational area. The new KNSN-only program feed will be sans KBRT EAS.

The satellite system change is slated for April 6.

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

Hello to all from Western New York! This winter will go down in the record books in several categories: amount of snowfall in a single storm and longest period of time below freezing. We still are seeing remnants of the record setting eight-foot snowfall back in November, which paralyzed south Buffalo for five days and virtually brought the city to a standstill. There are piles of snow around the city that are four stories high and it looks like weôll be seeing the melting process well into the summer months. In February, we averaged 11 degrees daily for the entire month. Not once did we see temperatures above the freezing mark.

March has been a little more bearable, we did see a couple of days in the upper forties, which allowed us to assemble the new STL tower atop the studio building in downtown Buffalo. You may recall from my November column that high winds blew our previous STL tower over, causing non-repairable damage to the structure. I was able to position the STL antenna to where it would still work and we had adequate signal at the receiver location until the weather cleared and the roof was void of snow and ice.

With the help of several staff members, on Friday March 13th we hoisted the partially assembled tower, mount and ballast up through the access port on the roof and finished the assembly of the structure. By the time you read this, Don Boye of Western Antenna should have the STL and TSL antennas mounted on the new pole and working. We were fortunate indeed that none of the 1-5/8ò coax was damaged when the old structure tumbled down. Aside from the non-penetrating roof mount structure, the only items we had to replace were the mounting kits for the PR-950 antennas. The U-bolts were not galvanized and were heavily coated with rust; therefore re-using them was not a considerable option. I am not one who is fond of hot weather, having lived in the south for many years, but after this winter, I donôt think I will ever complain about heat ever again.

March kept me busy with the preparations for upcoming projects in our Rochester operation. Soon I will be installing a new AudioArts D-75 console in our production room, replacing the troublesome Tascam DM-3200 I installed many years ago. As this production room also doubles as an emergency on-air studio for both WDCX(AM) and DJRôs WLGZ-FM, we decided that an air-worthy console would be an ideal replacement for the Tascam. As we have the same model console in both air studios, it should be no problem with staffers to easily become comfortable using the new board.

Another urgent Rochester project is the replacement and repair of several of the fences at the WDCX(AM) tower site. The high winter winds blew the entire side out of the fence at tower 1, and several pickets will have to be replaced at the other five tower fences. These fences were installed just before I came on board thirteen years ago, and through the years, a lot of maintenance has been performed to keep these up to standards. I am thinking down the road we might want to replace these with a 6-foot chain link fence. They are definitely more durable, will hold up better to winds, and are easier to maintain. The only downside is the fact that you can see through them, so a copper thief has a better

opportunity to see whatôs there without tearing down a wooden fence panel or door. I guess the deciding factor will be cost, as steel prices have not come down for quite some time.

The month of March was also ñOccupied Bandwidth Measurement Monthò for both of our Western New York AMs. I performed the measurements the 3rd week of March and found both stations to be in compliance. At the Buffalo AM, WDCZ, we diplex with WHLD, which results in extra measurements on the in-band 3rd order harmonics. On the 2B-A measurement (1570 kHz) it was undetectable. However, the 2A-B measurement (670 kHz) was almost impossible due to Canadian station CTR on 680 kHz. That fact was noted in the engineering statement and filed in the engineering file at the transmitter site.

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

The Motown Update
By
Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC–Detroit

Hello again from CBC Detroit!

March has been a busy month in preparation for our new Wheatstone equipment. There were cables to pull and test, switches to program and racks to clear. I am using this opportunity to completely rewire the production studios. I am looking forward to eliminating unnecessary DAs and having a neat, clean, documented, and fully labeled installation.

We are also gearing up for the Marketron Visual Traffic conversion. New machines were setup, and software installed. We have also purchased backup drives to store our Nexgen audio library off site in case of a disaster.

We are in the process of terminating the ISDN service at our transmitter sites and replacing it with IP service. This will give us an IP audio backup, remote control, and the ability to add IP cameras for remote video feeds back to the station.

We have been using an AES direct composite link to our NV40 Nautel transmitter since May of last year. The audio sounds so much better, and has absolute peak control. With the ability to deliver such better quality, I have to wonder why MP3 content ever gets put on the air.

There was a recent posting that caught my eye. The article was titled ñThe Ghost in the MP3.ò It featured a test sample of the content removed from a MP3 once lossy compression is applied. The test track was Tomôs Diner by Suzanne Vega. The content can be found at www.theghostinthemp3.com. This web page has a lot of great information and links to uncompressed and compressed content.

The samples that I found that were most interesting were the Dream Chords. The uncompressed and compressed samples are presented, The Dream Chords consist of Sine Waves, and the compressed content clearly shows what can be artifacts can be heard when an MP3 is played through broadcast processing. You can hear the edginess that occurs once compression is applied.

The fuzz that can be heard on MP3s is further amplified, compressed, and clipped through the stages of broadcast processing. I think this is a good demonstration of what happens when MP3s are used in the music library. Once the artifacts are further clipped, the audio sounds very rough.

I am surprised by what is deemed as acceptable audio. On a recent trip to Atlanta for my daughterôs wedding, I had an opportunity to listen to a lot of radio, both terrestrial, and satellite. It made me think about how all of this compression works.

Psychoacoustic coding is a very interesting concept. According to some, the compression that is applied should not be perceived at all, and not audible. My ear can hear it.

One of the ways psychoacoustic coding works is by taking advantage of masking. Masking occurs when the brain prioritizes specific sounds ahead of others. Depending of the dynamics of the overall sound in the mix and a specific vocal or

instrument, one or more instruments could be masked depending on the volume and frequency at a specific moment in time. The theory is, that by eliminating the information that is deemed maskable, the overall perception should not be effected.

During my long drive, I had the opportunity to listen to a lower bitrate codec. I usually listen to terrestrial broadcast audio, but I had a few hours of listening to another source of audio. The low bitrate codec used clearly took advantage of masking, but was very perceptible if you love music and like the texture, harmonics, and dynamic layering that is present in the original recording when it was mastered and produced.

I could tell that the sound of the cymbals had their texture vary with the other elements in the overall mix. Vocals were smeared, horns did not have depth, and there were artifacts ever present in the high end.

I was curious if my wife could perceive what I was hearing. After all, she was willing to pay for this service. Once I explained what to listen for, she noticed the difference.

She did not notice it before I mentioned it. I guess that in focus groups, they determined the lowest possible quality that was acceptable. This is the reason that the cell carriers can get away with using lower bitrate vocoders. I find myself guessing what the other person says most of the time due to the fact that some speech just sounds like noise, depending on how loud it is, and if it meets a certain loudness threshold.

I think we have an opportunity to raise the bar on audio quality. We can convey the reasons why high quality content should be used and not MP3s, and why we should keep our content clean. I plan on sharing this with our air talent, and I think anyone could hear the differences between the source and MP3 encoded files. Providing consistency is important to developing a good overall sound for your station. Some broadcast groups use specially mastered content that is provided specifically for radio.

One of the features I like on a popular processor is what is known as the ñundo function.ò Undo can and does soften the effects of excessive clipping in produced material that is overproduced.

Once our Wheatstone conversion is complete, the Nexgen systems will deliver audio direct to WheatNet via IP drivers, with NO sound card. Itôs hard to believe how far we have come from the days of carts, and the Volumax and Audimax.

No analog device will be in between the automation and the transmitter.

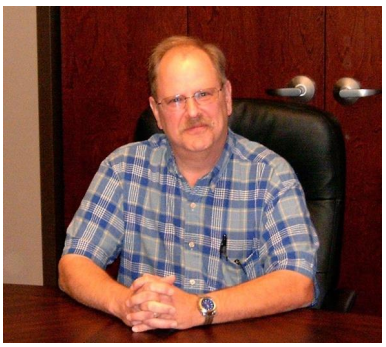
With the reliance of the IP network to deliver audio end to end, I have been looking into our backup plans in case of a network failure. I still want to have a way to route around the Blades and send audio directly to the STL. Backup power and surge protection is very important, as always. With lightning season ahead, I want to be prepared. This is a great opportunity to evaluate your grounding.

During NAB last year I attended a great engineering session on grounding hosted by the Copper Association. The session provided a lot of useful information, and some of the case studies can be found at: http://www.copper.org/applications/electrical/pq/casestudy/nebraska.html.

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

Ok, letôs pick right back up from where I was at last time. As I write this, WDJC-FMôs new Nautel GV40 is on air. We had some problems with it, but theyôve all been rectified and it sounds fabulous.

The first problem was the big one: it wouldnôt stay on air. It would run for a while, then pop off. The problem seemed to be getting worse, too; we were down to less than 10 minutes on air after a few days.



The status screen warned: ñLost communication with rack 4.ò A serious round of troubleshooting followed, along with several calls to Nautel support. Joey Kloss went above and beyond the call of duty, having us check everything, step by step.

The transmitter has four racks, numbered from left to right. We decided that the fourth controller card had a legitimate problem, so

Nautel overnighted a replacement. While we were pulling the old card, the problem revealed itself: one of the heat sinks had either been improperly soldered, or had jostled loose in shipment. At any rate, we installed the new card and it stayed up.

That problem solved, we moved to the second one. It wasn't an emergency – we were on air and making licensed power. But Cris had ordered our transmitter with two exciters, with automatic failover. You might think this is overkill (who needs two exciters?) but in this particular transmitter, the exciter is the driver for the RF output stages. There isn't a separate IPA.

The second exciter would come up and make analog FM, but the HD wouldn't work properly. Jeff Welton with Nautel stopped by and took a look at it. He called Joey again and had him become involved with the case. Another round of troubleshooting followed. I physically swapped the exciters and the problem swapped as well. Ergo, the backup exciter simply didn't want to make an HD signal. Joey had Nautel overnight a replacement and the problem cleared up.

There's one remaining issue that we need to resolve. It's also not an emergency, but it is cause for concern. With the much more accurate metering in that new transmitter, it has become obvious that we have too much reflected power from the antenna. With 27 kW forward we're getting 400 watts reflected, which works out to about 1.3 VSWR. That's too high. We have a tower crew coming to pull maintenance on the antenna. Hopefully, that will clear up the problem.

Figure 1 - The new GV40 being driven with AES from the Vorsis AirAura3 processor.

Figure 1 shows the happy transmitter on air, making full power with HD. We're driving it with AES from the Wheatstone Vorsis Air Aura (seen in the rack to the left of Figure 1). I remember years ago when we first switched to an all-digital STL – the difference was striking. The difference between analog inputs and an all-digital air chain into the exciter is just as noticeable.

WXJC(AM)

Out 850 AM site in Tarrant, Alabama becomes lonely if we ignore it for too long, and it makes its displeasure known. That was the first transmitter site that I rebuilt for the company, right after I took the job here in Alabama, so I have a special attachment to it. Apparently, it has an attachment to me as well.

Fortunately, things were finally winding down with WDJC-FM, but instead of being able to take a little breather, WXJC's transmitter kept shutting back to reduced power. I have a protection circuit (described here in *The Local Oscillator* a few years ago) that instantly drops the power if the pattern goes out of tolerance. This told us that something was wrong.

When Todd and Jack went to investigate (I was working on the remote control for WDJC-FM), the daytime pattern was indeed out of tolerance. There followed several frustrating days of troubleshooting. The problem was intermittent; the pattern would seem to be okay, then it would suddenly creep up and away.

We first discovered a bad capacitor at tower #4. Cris loaned us a couple of caps from Denver and that seemed to fix it, so we ordered a replacement and installed it. The pattern immediately snapped back into place, so we figured we'd found it.

The next day, though, it dropped power again. Sure enough, the pattern was out of tolerance. We went through the system and banged on everything with a section of PVC pipe, but the problem just wouldn't show up. We had no choice but to start digging deeper. Since #4 had already had one problem, we started there. Sure enough, the bullet at the input connector to the ATU looked corroded. We replaced it, the pattern seemed fine and we were happy.

That is, until the next day, when the pattern drifted again. I had been communicating with Cris and we had both been brainstorming about possibilities. It was pretty obvious that the problem was intermittent. We had a shiny new Array Solutions 4170D analyzer that was invaluable for troubleshooting, but we were coming up blank. We began to suspect the monitoring system: maybe the pattern was actually okay and we were being misled by the antenna monitor.

The antenna monitor itself wasn't a suspect because the night pattern seemed fine. No drift, stable as a rock. We began to suspect tower #5, the

reference, because all the other towers would increase ratio and change phase when the drift started. The only good news was that, by now, the drift was pretty constant. We couldnôt get the pattern to come back in no matter what we tried.

The 4170D said all of the sample lines and loops were okay. Finally, in desperation, I turned to the antenna monitor and began running some tests on it. It acted fine, but I decided to let it just sit in test mode for a while. Hah! After a few minutes, it began to drift. A call to Potomac Instruments was made: our 1900 was just about old enough to experience a problem that theyôd seen before. Some of the chips in it would become unstable in time and would have to be replaced. Oh, and yes, *it was an intermittent problem.*

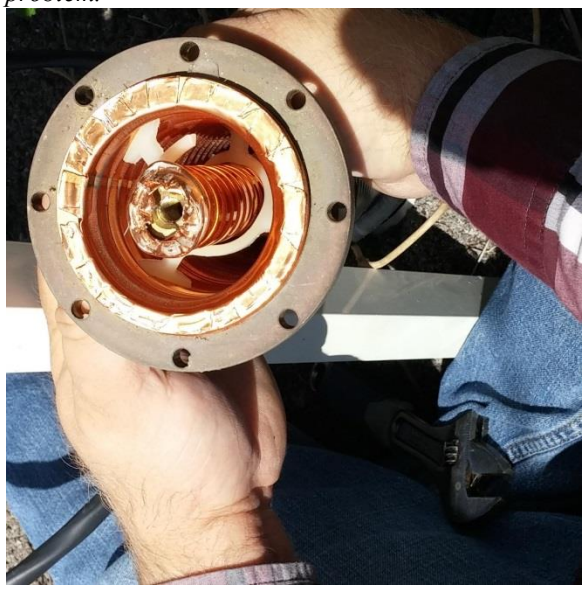


Figure 2 - Tower #5 at WXJC. Note the gap between the inner conductor and the screw connector.

Iôve known engineers whoôve had too much ego to admit mistakes; Iôve never been one of them. (It seems a silly waste of time to me.) I had noted earlier that, when the pattern would drift, the common point impedance would seem okay. That was a strong clue, especially with our system, which has high-impedance towers. Itôs not possible for that array to be greatly out of tolerance without the common point impedance dramatically shifting as well.

To be fair to us, thatôs what led us to carefully check the sample lines and the feed to tower #5. See Figure 2, which shows one problem that we found ï the connector at #5 was sloppy and needed to be re-dressed. That didnôt fix the problem, either.

But the moral of this story is, trust yourself. Learn the theory and then apply it. If you see something thatôs unlikely, look for something *less* unlikely. Keep notes, too; I have all sorts here for WXJC, many made while we were building it in 1999. But, the lesson was learned and I share it with everyone so that you can benefit from it.

WYDE-FM

The BE FM-30T that had served as WDJC-FMôs main transmitter for many years is now in the building at 101.1 FM in Cullman, ready to do service as an aux. We already have an FM-30T up there, so the decision was made to have two like transmitters in service at the same site. Worst case, we could always rob parts from one to repair the other and stay on the air at full power.

Danny Dalton, who helped us move the GV40 into WDJC-FMôs building on Red Mountain (discussed last time) was called in again for this move. His big tractor with the forklift attachment made short work of pulling that transmitter from storage and moving it onto his trailer. It also made short work of moving the transmitter into the building at WYDE-FM in Cullman.

Figure 3 – WDJC-FM's BE FM-30T headed to WYDE-FM in Cullman.

As I write this, Iôm in the process of changing the frequency on that transmitter. This isnôt a trivial job. To start with, BE apparently uses aluminum spacers in the socket to help tune out the tubeôs grid capacitance. These are specified in different diameters and quantities for different operating frequencies. Having been burned many years ago when I replaced a socket in a Harris FM25K, Iôm rather sensitive to this one! The socket is part of the tuning (unfortunately).

Next, adjusting the neutralization is a picky and tedious job. You must carefully slide a bunch of copper straps (all of which must end up at precisely the same height, mind you). Finally, the 2nd

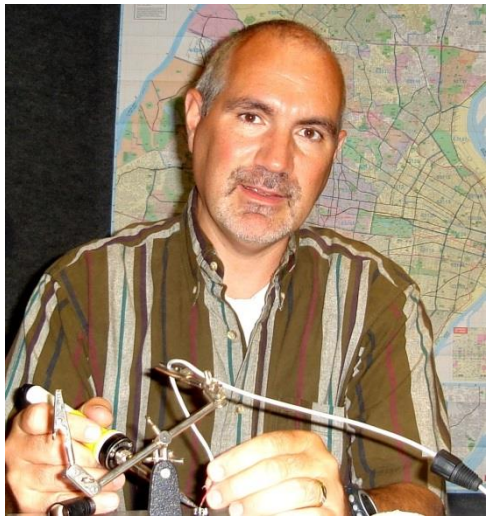
harmonic trap, located in the back of the cavity, has to be carefully retuned. I will have to cut the strap, which serves as an inductor, for the higher operating frequency. Both the neutralization and the 2nd harmonic adjustments require a spectrum analyzer, which fortunately, we now have.

Coming up: getting rid of that reflected power at WDJC-FM, finishing the frequency change on WYDE-FMôs ñnewò auxiliary and a whole bunch of other stuff, including the installation of our new Wheatstone Blades and Wheatnet IP. Until next time, keep praying for this nation!

The Chicago Chronicles

By
Rick Sewell, CSRE, CBNT, AMD
Engineering Manager, CBC–Chicago

It has been nearly a year since we began installation of the Burk ARC Plus Touch remote control units at all four transmitter sites. I am still learning and exploring ways to use this system to its fullest capacity. One of the things we had thought about at the outset was the idea of using the remote control to automatically switch to the auxiliary transmitters when the remote control determines the main transmitter is off air.



The ARC Plus Touch has a way it can do this rather simply by using the meter action function. If a meter alarms low you can have it perform a ñraiseò or ñlowerò on any command channel of the remote. So if your main forward power goes below a certain level you can have it turn on the aux transmitter with whatever channel you use for aux transmitter on. This had been suggested as a means to do this.

I had my concerns with this method. I also wanted to get to know the ARC Plus Touch better and get a true handle on its reliability. I was also new to the entire facilities here in Chicago so I needed to gauge if the need warranted the possible downside of automatic switching. So for these reasons I tabled the idea for a while.

Recently, I decided to tackle the idea again, but I wanted to make sure I had a rather foolproof system that would only go to the aux system if it was absolutely needed and wouldnôt do so if it was getting a false alarm. My biggest concern was to avoid having two transmitters on the air at the same time.

I implemented this first at the WYRB transmitter site. Since this site is over 100 miles away from the studio and we have times when we are in walk-away operations, it was a prime candidate for something like this.

Again I was concerned that we not go to the aux with false indication of a main transmitter reading. Now knowing that the Arc Plus Touch will occasionally lose its Ethernet connection with the IP8 Adaptor and thus show a value of zero on all the meter readings. If this happened and you had the remote control simply hit ñraiseò to turn on the aux transmitter as suggested with the meter action option, you could end up having two transmitters on the air and you definitely would have turned on the aux transmitter when it wasnôt necessary.

I decided that I would use the meter action function to launch a macro that would eventually turn on the aux transmitter if certain conditions werenôt occurring. One of those was to test to see if the remote had lost Ethernet connection to IP8 Adaptor. If that had occurred it would simply stop the macro from running.

The method I created to test to see if the IP8 was no longer connected was to create a virtual channel that summed up the values of all 16 channels of metering. If the Ethernet connection to the IP8 Adaptor is down all of the meters display zero. So my virtual channel should show zero as well.

I also wanted a couple of other provisions in my system, one to turn off the main transmitter if the macro had performed the switch from the main to the aux transmitter but not if a human had done the switch. This way you wouldnôt have the macro turning off the main transmitter if you were running it

into the dummy load. I also wanted hold time in the macro so the main transmitter had some time to recover from an event like a power loss where it would be off for a short time while the generator came up. So I put a couple of ñwaitsò into the macro so it will test for the conditions as listed above and then if the main is back above 50% it will stop the macro.

Below is the macro I used.

Lines 1 and 4 of the macro is where I test to see if there is a disconnection from IP8. If it is zero the macro is ended. Lines 2 and 5 test to see if the aux is already on. If so it ends the macro with the assumption a human has already made the switch to the aux. This prevents the macro turning off the main while youôre trying to run it into the dummy load.

With the combined two minutes of wait time and line 7, if the main is back up and working, in this case above 50%, the macro ends assuming the main is back up and on air. This accomplishes enough hold time to allow the main to get back up on its own before going to the aux transmitter. It also allows some time for human intervention to turn the main back on again as well.

The macro will also send text messages to the engineering staff to let us know that an automatic switch has occurred. Finally, if the main transmitter is still up and on, the macro will switch off the main to prevent having two transmitters on the air.

```
1  : If value of "IP8 SUM" on site "WYRB-Kirklan" = 0, goto line 15
2  : If value of "Aux Pwr" on site "WYRB-Kirklan" > 1.5, goto line 12
3  : Wait for 00:01:00
4  : If value of "IP8 SUM" on site "WYRB-Kirklan" = 0, goto line 15
5  : If value of "Aux Pwr" on site "WYRB-Kirklan" > 1.5, goto line 12
6  : Wait for 00:01:00
7  : If value of "Main Pwr" on site "WYRB-Kirklan" > 1.5, goto line 15
8  : Raise "Aux TX On" on site "WYRB-Kirklan" for [default]
9  : Wait for 00:01:00
10 : If value of "Aux Pwr" on site "WYRB-Kirklan" < 0.5, goto line 9
11 : Send email message "WYRB Aux TX turned on because of Main TX low power" to email list "engineering text"
12 : If value of "Main Pwr" on site "WYRB-Kirklan" < 0.1, goto line 15
13 : Lower "Main TX off" on site "WYRB-Kirklan" for [default]
14 : Send email message "Main TX turned off due to switch to Aux TX" to email list "engineering text"
15 : End macro
```

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

Local news is one of the major services that broadcasters provide for our communities. I turned on the radio yesterday for the latest news to learn the latest headlines.

At the top of the news, was a story in which Portlandôs Mayor Dilbert was pushing to ban the job application form. He also unveiled the companion measure to the Portland fair wage act of $50 per hour. Mr. Dilbert indicated that asking a potential employee to fill out a job application form amounted to an outrageous roadblock to employment. After all any employee need only show up occasionally to be eligible for Portlandô $50 mandated wage. After the requirement for ID to vote was outlawed as a poll tax, the nest step in fairness it to outlaw the form as a poll tax according to Dilbert.

Speaking in support of the initiative, Adam Scott, spokesman for the Coalition for the Advancement of Legal Fairness (CALF) said everyone is entitled to his or her fair share of the gold.

Meanwhile in the state capital of Salem, Governor Katjumper promoted the Earthquake Prevention Act, which he had signed shortly before his unexpected retirement. The scientific consensus is clear: he said ñDihydrogen Monoxide (DHMO) is a clear contributor to global shaking. When DHMO falls out of the sky, the land will slide. Damage due to DHMO amounts to billions in road repair.ò

Itôs undeniable: humans are the major contributor to Dihydrogen Monoxide with farm fields being major contributors. Every year hundreds of toddlers die of exposure to this toxic substance, while just next door this poison is sprayed on your neighbor's lawn.

The former governor insists that the move to ban Dihydrogen Monoxide is absolutely vital. ñRemember the tragedy of Oso, Washington and ban this dangerous substance.ò Donôt be fooled by its safe sounding chemical formula H^2O.

And thatôs the April news report

In real news, Bill Johnstone of the Oregon Association of Broadcasters announced the passage of the ñfirst informerò legislation by the Oregon House. This will assist Oregon broadcasters during an emergency or disaster.

The legislation will allow broadcasters, engineers and Oregon emergency management personnel to develop a credential program to assist broadcast engineers to have access to broadcast facilities when access is limited during an emergency.

The legislation, HB 2210A, passed the Oregon House by unanimous vote and will now move to the Oregon Senate.

Meanwhile in Portland, emergency planners are well aware that in the event of a major earthquake the ability of local and state governments to respond will never be enough. A significant solution is the Neighborhood Emergency Team (NET) and Community Emergency Response Team (CERT). These programs provide training for local neighborhood residents so they can assist others. Itôs the ultimate in citizen involvement.

In the broadcast world, many broadcasters have moved to the Internet for connectivity and broadcast content transport. KKPZ is no different, using the Internet and other new technology to improve efficiency at lower cost. Much of that new technology comes with the vulnerability of complexity.

At the same time, Crawford is implementing a new satellite platform with the replacement of the old Comstream gear. The new receivers represent a mix between conventional satellite delivery and Internet control. These new receivers implement control over the Internet, simplifying the operation in some ways while creating new connectivity demands to initiate the operation of the receivers.

The bottom line is the older satellite delivery technology will continue to be functional and can be used to deliver vital information into a disaster area.

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

AMPFET P400

You might remember the issue we had back in February with this transmitter. To recap, we noticed in December originally that both the main and aux transmitters were on at the 1220 KLDC site. Normally this cannot happen because of the interlock. However in February, we found it was a DIP relay that was faulty. We ordered a new one from Nautel and replaced it only to notice a few weeks later the issue was happening again, this time on a maintenance trip to the site. This time around we decided to adapt something heavier for the task. We ordered a relay with heavier contacts, soldered it to a DIP header and plugged it into the original socket. So far, it seems to be working well. We'll see if it'll hold up.

Tower Light Monitor

I had my first experience with the new way to issue a NOTAM. One night in March I got an alarm that a tower light on KLTT tower #1 was out. I immediately called and decided to issue the NOTAM for 14 days. That would give me time to verify a bulb was out and to get someone out to climb. I had Keith go out and look and he didn't notice a bulb out. I made him go out again with binoculars and again, he said no bulb was out. I had already asked Derek from Today Works to come out to the site. Derek does our light tower maintenance work and could, if necessary, climb up to the controller box or the beacons to investigate.

Checking the current to that tower in the building with a clamp-on ammeter, we found it to be normal at 11 amps peak at 230 VAC. We also checked the output of the current transformer and found it to be normal.

The only other place the issue could be was the tower light monitor, a Potomac TLM, and we haven't had an issue with it in many years. We checked the rectified sample right at the comparator and found it to be well below the reference voltage, thus the failure indication.

We still don't know exactly what happened to produce this condition. We made an adjustment to the reference voltage so that it was at about 80% of the nominal sample voltage. That way if all four beacons are properly drawing current it would show "on" but if any of the four lamps failed it would show "off."

We still need to replace the terminating resistor for that particular channel on the monitor. For some reason it had been replaced with a 130-ohm ¼-watt resistor (all the others are 390-ohm ¼-watt resistors). My guess is that the original burned out and Ed (or someone) replaced it with whatever they had on hand. Since it is a comparator circuit with an adjustable reference, it would still work just fine with a different load resistor value.

Prairie Dogs

It seems the prairie dogs at the KLTT transmitter site are migrating closer to our building and the tower bases. It is hard to keep them under control when they breed like rabbits. For every one that is killed, five seem to pop up in its place. We do what we have to in order to control the population. I have checked with the county and it is legal for us to do since they are infringing on our infrastructure.

Normally I'll take my husband out on a weekend and we'll spend a few hours with our .22 rifles picking them off. This is the easiest way for us to keep them under control. In the past we've hired a company to come out and gas the prairie dogs, but that was pricey and the prairie dogs didn't stay gone but for a year, if that.

Our only other option, which is definitely the most fun, is using our Rodenator (www.rodenator.com). This pumps an explosive mixture of propane and oxygen and then ignites it, causing a sometimes spectacular underground explosion and causing the tunnel to collapse. This is

what we did around our building in late March. We found the active holes and ñblewò them. Then we covered the holes so that the next trip out we can see which holes still have activity.

With the warmer weather I am definitely going to try and spend more time at our sites keeping control of the prairie dogs so they donôt do any more damage to the sites. It is amazing how quickly their holes appear and what I see when I look down the holes. One day Iôll look down and see the concrete the guy anchors are in.

Spring

Spring has sprung here in the Rocky Mountain region. Driving around the area I see the farm fields are getting green with whatever crop was planted. The trees are getting buds and some even leaves are now appearing. This can only mean one thing: the growing season is upon us. In years past weôve tried using a product Home Depot sells called Noxall around the tower bases. The problem with Noxall is you have to get it down at the perfect time, prior to spring moisture and germination. It is hit or miss, mostly miss for us. This year we are going to just buy some Round-Up herbicide. We have a backpack type sprayer that can be worn and weôll get the tower bases sprayed down good every so often until growing season is done. Hopefully this will make it easier to maintain the tower bases this year.

That about covers it for this month. I pray you all stay safe as spring storms are coming. Until next timeé thatôs all folks!!!

KBRT • Costa Mesa - Los Angeles, CA
740 kHz, 50 kW-D/0.2 kW-N, DA-1
KNSN • San Diego, CA
1240 kHz, 550W-U
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/4.3 kW-N, 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
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
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, 3.8 kW/126m 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

Crawford

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