The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Insulator Failure

Readers may recall from last monthôs *Local Oscillator* that we had an insulator arc-over on tower 3 of the new KBRT array. Tower 3 is the high-power tower in the array with a little over 21 kW applied. That should result in something close to 25 kV at the top of the tower, which is well within the capabilities of the Hubbell insulator rods that attach the guy wires to the towers (those are rated at 65 kV wet). So it was a big surprise when one of the insulators failed on April 30.

Insulator rods from the top level of Tower 3. The bottom rod is the one that flashed over, turning it into a carbon resistor. Note that some of the fiberglass fibers were freed when the epoxy burned off. Also note the corona tracks on the other two rods.

A crew from P&R Tower arrived a couple of days later with replacement and additional insulator rods. They inspected all the rods on that tower and found, in addition to the rod that had flashed over, evidence of corona tracking on the other two rods at the top level and all three rods at the next level down.

Examining these rods closely, the real issue became clear. The problem was not voltage in excess of the breakdown voltage rating of the insulator rods. Rather it was corona, which was evidently occurring at the junction of the clevis and the insulator. That does represent a rather sharp 90-degree edge.

For the short term, I had P&R replace all the rods at the top and second level down, adding one more rod at each level to double the insulating capacity at those levels. I knew, however, that this would do nothing to address the corona issue, which would eventually track the full length of the insulators. We needed some corona rings to eliminate the corona altogether.

The great news is that Hubbell manufactures bolt-on corona rings that attach right to the clevis of the insulating rod. They can be easily installed in the field without removing the rod from the tower. Our friends at P&R Tower ordered these for us and we had them on site within a few days. We got a local crew from Wireless Infrastructure Services in Corona, California to come install them.

A check of the tower self-impedance after the insulator work revealed very little change, less than the 2-ohms and 4% provided for in the moment-method proof rules, so no ñpartial proofò would be required.

For what itôs worth, this was a first for me. I have not seen corona on AM broadcast towers, even at the 50 kW level, let alone arc-over of an insulator rod. So it was with some head scratching that I contemplated why corona is occurring on this tower when it has not been an issue on other towers of similar height and power.

Consultant Jack Sellmeyer told me of a 50 kW station in Tulsa (KRMG) on the same frequency with towers of the same height using the same insulator rods. He said he spoke to the CE at that station when he learned of our failure and was told that they had never had a corona or insulator issue.

So it must be something environmental and unique to our site. I believe it is the Santa Ana winds that frequently blow across that ridgeline. The winds come out of the California desert and are very dry, so they could build up a tremendous static charge in a

hurry. I think a combination of the peak RF voltage plus the static voltage is responsible for the corona on tower 3.

We will have to closely monitor the situation going forward to see if the issue develops on any of the other towers, but for now, I am confident that weôve done all we can to prevent further issues of this kind.

Power Outage

I wish I could report that after the insulator replacement and corona ring installation, all was well and operation returned to normal. That wasnôt the case, however. Right in the middle of all that, the power went out at the siteé and it was out for eight days!

Edison crews quickly determined that the problem was in the underground span between the NOAA radar site to our southwest (and where our primary power feed ties into the grid) and Pleasants Peak, another communications site a couple of miles south of the NOAA site. Edison disconnected the feed to the NOAA site where it ties in at Pleasants and got Pleasants Peak back on, but that left us and NOAA dead in the water.

A weather system moved in right about that time and it started raining, turning the whole range into a slick, muddy mess. Edison simply could not get its equipment and trucks up to the area of the problem. We had to wait out the rain. Fortunately, with the ever-present dry winds that prevail across the Santa Ana range, the soil in the area dries out quickly, usually within a day or so.

In the meantime, we were operating on generator power, using the 70 kW trailer-mounted generator we brought over from the island facility. With MDCL turned on, we were able to run the transmitter at a solid 40 kW for the duration. We got refueled twice during the outage by our friend and generator man extraordinaire, Tom Baser. The on-board diesel tank holds 220 gallons +/-, which gives us a 55 hour endurance at full-load. Of course we power down at night to just a couple of kW of load, so that 55 hours stretches to right at three days of 24-hour operation. Thank God for Tom and his willingness to refuel us during the crisis!

Eventually the rain stopped, and within a day Bill Agresta had no trouble navigating the back roads and trails to the NOAA site and Pleasants Peak, so we leaned hard on Edison to get a crew moving. After a lot of phone calls, I finally got in touch with a brother in Christ at Edison, Dana Montefu, who is the guy who schedules and dispatches crews in District 43 where our site is located. He got the civil crew out

Corona rings installed on top and second from top guy levels on tower 3.

to mark and uncover the pull boxes on the Pleasants-to-NOAA span, and later that day a cable crew came out and began troubleshooting.

The Edison crew found a ñblown spliceò at the first pull box south of the NOAA site. Thankfully they were able to repair it in the vault without replacing the conductors, and by 10:30 that night, power was restored to us and the NOAA site.

Almost Done

I made a trip to the KBRT site in mid-May to install the auxiliary transmitter and wrap up a few other issues. This time, I took my wife Phyllis along so she could see the place that has occupied so much of my time, energy and attention over the past few years.

Bill Agresta had moved the Nautel XL12, which was the main transmitter at the island site, to the new site a couple of weeks previously. The power transformer was sitting in the middle of the transmitter building floor, and the power modules were in boxes all over the place.

Bill and Todd Stickler installed the power transformer (they are young and have good backs). I installed the power modules and reconnected all the cables that had been disconnected prior to the move. Bill and Todd ran the electrical feed into the transmitter through seal-tight conduit and made the connection inside. Todd and I ran the remote control cable and CAT5 mag/phase cables from the rack into the rig, also through seal-tight conduit.

Phyllis got in on the act, helping me with the remote control and interlock wiring, and then she got to work cleaning up the transmitter. It had been set in a wall at the old site and had drywall mud on the side

panel plus some adhesive of some sort and various stick-on labels that Bill had applied to assist his backup people in identifying controls and indicators. The 10-year-old transmitter now looks like new.

Of course we also had to do the RF plumbing, and that was a snap with 1-5/8 inch rigid line. Everything lined up as designed and we soon had the transmitter making 12 kW with a perfect IBOC spectrum and good modulation. My friend Joel Saxburg was kind enough to come up to the site with his bride Judy and his spectrum analyzer to confirm that all was well.

L-R, Joel Saxburg, Phyllis and Cris Alexander with the shiny XL12 behind.

The equipment rack is now fully populated, with the Exporter Plus and AM-IBOC for the XL12 taking up 2RU plus spacers, and the Tiernan ABR202A satellite receiver occupying the very last available space in the rack.

One other thing I did while at the site was connect a line from the generator transfer switch through a pair of diodes to both a status input of the remote control and a control line on the NX50 transmitter. When the transfer switch is on generator power, a hard contact (an auxiliary contact on the switch itself) provides a closure that we are diode steering to both indicate generator power on the remote control and activate a 40 kW max power lockout on the NX50. I was able to test all this while at the site and confirm it worked properly.

With the aux transmitter working, the final piece of the project was the Ku-band satellite link at the new site that will provide a backup audio feed to the site. Everything is delivered to the site through the Dragonwave microwave link, but if that goes down, we need a way to get audio to the site. We have a Ku-band uplink at the studio and dedicate a channel for KBRT STL use.

Bill got the antenna installed, and we brought our friends at Wireless Infrastructure Services back to the site to align the antenna. They had some trouble at first, with their equipment (a ñSatellite Buddyò) indicating the antenna was on AMC-1 when it was, in fact, on an adjacent bird. They eventually figured it out, however, and we now have a solid satellite-delivered backup audio feed.

Now we are clear to completely dismantle the island transmitter site and cancel the $1,000 per month T1 line, phone lines and other utilities. The buyer can pick up the Nautel ND10 transmitter, and we can clear out the remainder of the ñstuffò still at the site. We hope to have all that done by the end of this month.

So Long (sort of)…

It is with sadness that I report the departure of Detroit market chief engineer Joe Huk from our employ. Joe has accepted a position back in the automotive industry, working for General Motors on its OnStar program. We certainly wish Joe the very best in his new job. He will be missed. Sort of.

Actually, Joe is going to continue in a contract engineering role for CBC-Detroit for a little while to give us time to recruit and hire a new chief engineer. He will tag team with Russ Harbaugh to respond to emergencies during the transition.

If you know of anyone who might be qualified for and interested in this major market chief engineer slot, have them contact me at techjobs@crawfordbroadcasting.com.

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

Hello to all from Western New York! Where have all the radio engineers gone? As time goes on, the broadcast industry is losing way too many good engineers to outside interests, and good replacements are few and far between. Back in the 90s when the computer industry began to really boom, a lot of broadcast engineers morphed into the computer/networking industry, as there was a great need for technicians and network installers, and many saw the chance for a normal 9 to 5 job without all the hassles of on-call 24/7, low pay and reduced operating budgets. Many stations simply took advantage of contract engineering services when they lost engineering manpower, but by doing so, they saw a drastic change in how the stations engineering needs were being addressed, and the level (quality) of services were diminished due to a ñlack of ownership.ò

I recall that back in the mid-80s, when the FCC relaxed the rules about having competent, licensed engineers on staff, many smaller stations were letting good engineers go and replacing them with young, inexperienced kids who got their electronics training at Radio Shack. I know of several stations that did just that, and it was not too long before scores of problems popped up, including unpleasant visits by federal inspectorsé definitely not a sound financial choice. Many of the engineers who were pushed out of their positions found solace in the growing telecommunications industry, as the cellular boom was just over the horizon.

Looking back into the 70s, I recall a great time to be in broadcast engineering. While AM was the predominant king at that time, many stations were experimenting with FM stereo, and various ñundergroundò formats, nothing of the sort that was ever heard on AM radio, and behind every experimentation was the station engineer.

I began my career in 1969, not too long before AM radio gave up itôs dial dominance to FM stereo, but I do recall at that period in time, the chief engineer was revered, and usually was the ñtop dogò on the stations staff, even ranked above the station general manager. Somehow along the line, I think we lost the respect and dignity our profession once had.

Time marches on, but our duties remain the same. Whether it is the 70s or today, our job is to keep our plants running as best they can be, and maintain the facilities as if they were our own. I guess it all comes down to attitude (and throw in a little respect for good measure), and how much of yourself you are willing to invest into your career.

By todayôs standards, if you have ego issues, need to regularly hear just how great you are and how the station just couldnôt run without you, maybe its time you looked elsewhere for something to do. Chances are, if you have been in your position for many years like I have, you have a true passion for what you do. I consider it a privilege to be able to work each day as a broadcast engineer. If the day ever comes that I wake up in the morning and dread going to work, I think it will be time to hang up the Simpson 260 leads, and go find a nice, comfortable, shady spot to lie down in and peacefully pass on.

Last spring, after an unusually hard rain, followed by heavy fog and cool temperatures, we lost the WDCX-FM STL signal at the transmitter site. Don Boye, our tower guy, found that water had entered into the 1-5/8ò coax via a hole in the line that was caused by wind blowing the coax back and forth across a tower leg junction point. The additional movement was caused by a hanger that had broken, allowing the movement in the line. Don made the repair to the damaged section of the line and replaced the broken hanger. We then proceeded to remove as much of the water as we could by cutting the outer jacket back at the point where the line goes from vertical to horizontal and making a small hole at that point with an awl to drain the water out. Don then plugged the small hole with a rubber plug and sealed

the entire area. The line has been doing fine, holding pressure and good signal level for almost a year, or until recently.

With almost the same weather conditions as last year, we recently lost the STL path and had to employ our backup analog STL. Don found that again, water had collected in the line, causing the reduction of signal at the receive end. A thorough check of the line showed no damage or point of entry for water to get in. Don surmised that the moisture in the line was a remnant of the previous occurrence, water that was lying in the corrugated rings of the coax, had finally made its way down to the horizontal transition of the line. He opened up the previous repair, removed the rubber plug and drained out about a cup of water from the line. After re-sealing and pressure checking the line, we put the digital STL back on the air with no problems.

During a recent maintenance visit at the WLGZ-FM transmitter site, I noted that one of the cooling fans located in the bottom of the BE FMI-series transmitter was growling. Not having a spare on hand there, I noted the problem and planned on repairing on the next visit to Rochester. I had two spares in Buffalo and brought both, just in case, when I made a follow-up visit several days later. I located the bad fan, which was in the rear of the unit, indicated by the resistance when turning the blades by hand. After an hour of disassembly, the fan/motor was replaced and the transmitter returned to air. Now I had another one starting to squeal loudly, so I shut it down and checked which one was howling. Locating a second bad fan, I repeated the disassembly process and replaced the other fan located in the back of the transmitter. After completion and turn-on of the transmitter, I hear some high pitched squealing from the front two fans. Murphyôs Law always kicks in, in times like this. I guess I should go ahead and replace the front two fans, as they have been in full time service for almost eight years. A call to BE parts department is in order.

We have been on the air for five full months now at the WDCZ AM-970 site, and reception reports have been better than expected. We are hearing from many different areas of Canada that currently cannot receive or are receiving interference to our FM signal, that the AM is filling in nicely.

I have been working diligently at the WDCZ transmitter site to get the facility up to our standards, not that it was bad when we purchased it last year, but there were some maintenance issues that needed to be addressed. We recently purchased a new Kubota 29 HP tractor and 72ò mower deck to keep the lawn and grounds cut down below the 10ò maximum growth as outlined in the Town of Hamburg ordinance. It has been tough to get the grounds cut, as recent rains have hindered my progress, but upon every sunny opportunity, I am getting the weeds cut down slowly but surely.

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!

News From The South

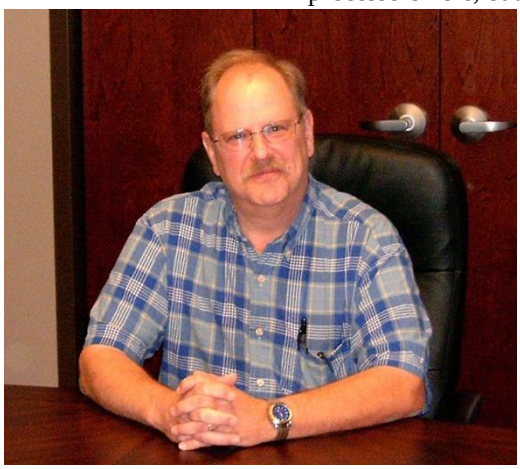
By
Stephen Poole, CBRE, CBNT, AMD
Chief Engineer, CBC–Alabama

ñJesus was the only perfect man who ever lived,ò said the pastor in his sermon ï but was surprised when an elderly gentleman in the back shook his head, then stood.

ñIôm sorry, pastor, but thatôs just not so,ò said the old guy.

ñWhat do you mean?ò asked the pastor, starting to turn red.

ñMy wifeôs first husband was the most perfect man to ever fill a set of overalls,ò he groused. ñIf you donôt believe it, just ask her!ò



Jesus was indeed perfect. Weôre not. But it is possible for someone to be in the perfect position to do the job that God has called them to do, and weôre blessed beyond measure here in Birmingham. Weôre meeting our goals, the staff is pumped and we see great things in the future for this market.

Ten years ago, I first met a smiling, curly-haired young lady who had accompanied Mr. Crawford to Birmingham. A few months later, our station manager just up and quit without warning, and Laura Scotti was forced to move in and take charge. At the time, it seemed like a crisis, but in the long run, it has worked out splendidly. She is, without a doubt, the best thing that has ever happened to us here.

Happy 10th Anniversary, Laura and hereôs to 20 more!

Studio Work

The severe spring weather has finally ended, meaning that we donôt have to run to transmitter sites and refuel generators quite as often. Weôve been able to tackle several different things at the studios, including a bunch of cleanup and rewiring.

One of the things that WDJC wanted was a new mic scheme. Instead of running all of the mics through an outboard mixer, Chris Mileski wanted separate pots assigned on the Wheatstone control surface. To do that, of course, weôd need mic preamps. I had a couple of spare Symetrix mic processors here, but we needed two more. I took an old Symetrix compressor and added some mic preamps, replacing the expanderôs release time control with a pot to control the gain. It worked even better than I hoped it would. More on that preamp in a moment.

Weôre also replacing the older CRT-style televisions in the studios with flat screens, starting with WYDEôs talk room. Laura provided the set, and Todd and Jimmy mounted it (with a good bit of muttering; according to Todd, getting the anchors into that wall was a trick). The TV itself wasnôt that heavy, but trying to get a solid anchor on a wall covered with sound treatment takes a bit of work.

Figure 1 The bottom processor has been modified for mic-level inputs.

Speaking of the sound treatment, we're going to address that as well. When the studios were first built, we noticed that the rooms seemed awfully "live" and bright. We used a treatment that had worked quite well at other studios, a fiberglass ductboard covered with sound-absorbent cloth. You

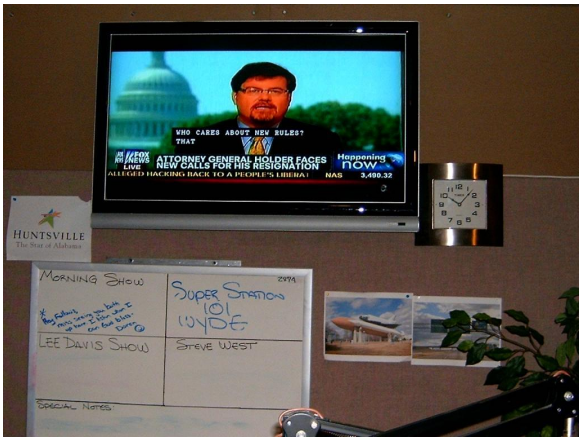


Figure 2 Todd and Jimmy mounted this flat screen in WYDE's talk room. (Yes, we'll need to move the clock.)

can get this ductboard at any heating and air supplier; it exposes coarse fiberglass insulation on one side, with a foil covering on the other. But the contractor had installed everything backwards: the cloth was over the foil, so we had a hard surface facing into the rooms! The contractor came back and added some additional panels that were done correctly, but the studios have never sounded like we wanted. We're going to address that in the near future as well.

Sonex and equivalent foam tiles are surprisingly expensive (which is one reason why we've used the ductboard trick in the past). One of the most effective treatments I've ever used is to mount 2x4s along the wall, just as if I were placing studs. You fill the gap with thick fiberglass, then cover it with an attractive cloth. It works splendidly, but they have the same drawback as the foam tiles: you can't hang anything on the walls!

We're going to borrow a trick from your local movie theater and use thick curtains. Because we're in a commercial building, they'll need to be fire retardant, which means we can't buy them at WalMart. But it'll still be a bargain and a tremendous improvement over what's in there now. We'll add the 2x4s-and-fiberglass "boxen" to the ceiling to finish it up.

The Mic Preamp

I've raved about operational amplifiers ("op-amps") here before; the latest devices sound great, are inexpensive, and are extremely easy to use. Some purists dismiss them, but frankly, they don't know what they're talking about. Yes, older op-amps back in the 70s (the redoubtable 741 comes to mind) were generally awful, but that's just not the case anymore. The latest units have wide bandwidth and high slew rates combined with extremely low noise and distortion. You can't beat them.

And if you run across one of those self-proclaimed experts who wants to insist that they're evil? Of all the things you could tell them, just use this: almost every recording done in the past decade or two, whether country, rock, urban, or whatever, has passed through dozens of the things on the way to CD or MP3. Even in the digital age, op-amps handle the analog gazintas and gazoutas. They're everywhere, they sound great and don't let people who are stuck in the previous century tell you otherwise.

To show you how easy they are to use, take a look at the schematic for that mic preamp I mentioned above. I'm using one of my favorites, the National Semiconductor (now part of Texas Instruments) LM837. If you've browsed the schematics for high-end audio mixers, you know that chips like the SSM20xx series used to be the choice for mic work. The fact is, the "837 actually has better performance! That's how far they've come over the years.

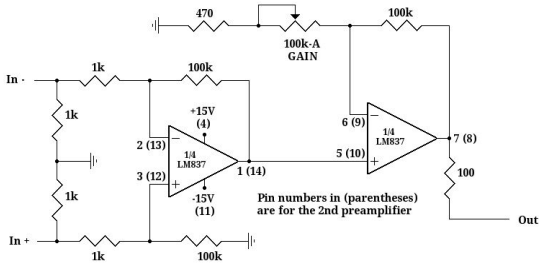


Figure 3 This mic preamp was added to the Symetrix compressors to gain two processing channels.

I built this thing in a couple of hours on a Radio Shack project board. The common mode rejection is excellent, the noise is virtually inaudible, and the gain is adjustable from about 36db to 70db. The RE-20s are notorious for low output, so we needed a lot of gain. The LM837 provides it with room to spare.

The first section to the left is a fixed-gain

preamp that will accept up to a 300mV balanced signal before overloading. The second section, on the right, is adjustable from 2db to 40db, allowing us to dial in the precise amount of gain desired. The LM837 has four amplifiers per package, so I was able to do both preamps with a single chip ï two per mic. The power supply was simply tapped from the Symetrix unit itself.

Even though I mounted the preamp board inside the case, I still used shielded cable for all connections. Our studios are nice and quiet, but if yours arenôt, you may need to add additional RFI and/or EMI filtering at the inputs. Add some ferrite beads, or even some series inductors on the inputs, with 220pF-470pF capacitors from each input to ground.

Itôs going to be a busy summer, but weôre happy! Until next time, keep praying for this nation!

The Chicago Chronicles

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

Who's going to do this?

Donôt you just hate it? You come up with this idea that is *so* good, but because of some circumstance or other, usually a lack of money or the ability to patent it, you know you canôt implement it. Itôs happened to me twice now, and this latest one is, well, you be the judge.

The first time it happened was back in the early 80s. Iôd just been hired as the new CE at Satellite Music Networkôs original Chicago area facility. I had been CE at one of their affiliates, so I had a fair working knowledge of the state of the satellite technical art back then. Anyone who was involved in the engineering of a satellite affiliate back in that day will remember that the satellite network signals were piggy-backed on the WGN-TV Chicago satellite transponder. That posed a lot of problems for affiliates, with sync-buzz noise and interference from adjacent transponders always an issue, and the need for heavy filtering the rule. As an affiliate engineer, I had to deal with that as well.

As part of my orientation, I was sent to the uplink facility to learn how that end of the operation worked. When I got there, the first thing I said to the manager was, ñJust *why* does this radio network *have* to share transponder space on WGNôs transponder? Wouldnôt it be better if there was a transponder with nothing but our little subcarriers on it? The bandwidth of the signal could be smaller, eliminating so much interference from the adjacent transponders, the subcarriers could be more powerful, and youôd not be beholden to WGN for the livelihood of the transponder.ò The uplink manager said that the idea was preposterous, that I shouldnôt even be thinking like that, and we should continue with the tour and training. I did so and then left to be the CE at the studio end.

Lo and behold, in less than a year and a half, the transmission setup was changed, the network and the other audio subcarrier users were separated from WGN, and a lot of technical problems were solved. Hello, FM^2! It was then that I realized that my idea had been picked up, and others were making a lot of money off what was, in reality, my idea. Yes, I felt naïve and a little stupid (and cheated). A friend who had worked at the uplink and had later left confirmed my suspicions. Lesson learned. My next idea, I patented. Didnôt make any money on it, either.

Now I have another idea which, this time, I might as well throw out there, because I donôt know of any individual, especially me, who has the means and the wherewithal to make this happen like the Big Boys can.

Again, a little history, about which most should know: Back in the day, there were three ways to get a remote broadcast back to the station from wherever: Marti radio, dial up phone line, and equalized loop. Outside of Marti range, the EQ loop was it if you wanted any audio quality. It cost like the national debt and the lead times were problematic, usually three weeks to a month. Equalized lines were best suited to things like sports remotes where the same venue was used multiple times, or an often-used concert venue. And stereo had its own issues as well,

with phase-stabilized pairs being the rule. It was a logistical nightmare and it was labor intensive, hence the cost. That technology may not be dead quite yet, but I have no clue as to whoôs using it anymore. Here in Chicago, we stopped using our last church remote analog voice grade line about ten years ago. We donôt miss them.

ISDN was the ñnext big thingò for remote pickup, and it lasted a fairly long time. A digitally based dial-up service, it solved a lot of the problems which had been attendant to equalized loops, the lack of bi-directionality, for one thing, But, as we should all know by now, ISDN is going the way of the dodo bird. There will be no more new ISDN installations in some areas after this fall, though existing ISDN infrastructure will be allow to stay on-line for now.

This brings us to the present state of the art, namely, the Internet. Those who have used the Web for originating remote broadcasts will readily attest to the fact that, of the two modes of Ethernet use, the wired mode is vastly preferable to the ñover-airò variety. If you wonôt attest to that, I will. Regular readers of these pages already know what a disaster 3G service is, at least in the major metropolitan areas. 4G is a lot better but it isnôt fully developed, at least not here in Chicagoland ï yet. Wired Internet, as presently practiced, is problematic because it usually involves tapping into the clientôs own IP system, a thought which is guaranteed to cause a lot of paranoia in the mind of said advertiser, and either more paranoia or, *if* they are independent contractors, visions of dollar signs in the heads of the IT folks, meaning more paranoia with the client... and the AE on the account.

So, what to do? Well, how about this? Why doesnôt some ISP entity provide something new, namely an on-demand Ethernet drop service. Hereôs how it might work:

A radio or TV station or some other entity would order a wired Ethernet drop to be delivered to the site of the remote broadcast or whatever, for the use, however long, by the station, be it for a day, week, month or say, a whole sports season. The drop, just like an EQ line or ISDN, would be run right to the place where the station or the client wants it. The line would terminate in an RJ-47 jack with an IP address. I would strongly encourage the use of IPV 6 addressing *only*. A firewall would be available at extra cost, though I doubt that it would be needed because the equipment which a broadcaster would attach to the line would have already have it. Then, the broadcasterôs line check would consist merely of attaching the station equipment to the line and setting it up, and configuring it for the line. As an option, the line would query the equipment for its MAC address or addresses, to prevent unauthorized use. The cost of installation would be a lot less, since the skills required to install the line (after any initial setup of the system) would be minimal, at least as compared to setting up an EQ or an ISDN line. Such a service might be paid for on a per-use basis, or on a subscription basis for a yearly fee, for as many remotes as a station would want. It all makes so much sense that I really wonder why no one else has thought of it yet. For those who pooh-poohed the idea, my response is, ñHey, thatôs how they did it EQed lines and ISDN. Why *not?"*

Yet, apparently, no one has... yet. Iôve checked with several entities, including Comcast/ Cimco and Telos Systems about this. Those Iôve talked to at both companies acknowledge that this is a really a good idea, but that they know of no one doing anything like this at present.

Thatôs why Iôm putting this idea out there, risking the possibility of insulting the collective intelligence along the way, hoping someone will know who, if anyone, is doing something like this. Or, maybe, this would inspire someone out there *to* do it. I donôt know if the folks who make it happen will get rich off this idea, after all, I donôt *think* that itôs patentable, but Iôve long since learned that to tap an untapped market will never put you in the poor house.

One of 'those' tips...

This is one for the wise, who happen to own an earlier vintage Nautel transmitter with four or five kW output. But make no mistake: This story isnôt really about Nautel, in the final analysis, but about any company which has vintage equipment still out there in the field. Read on.

We have several vintage Nautel FM-4/5 transmitters here in Chicago operations, and for the most part they operate very well, not perfectly, but we can deal with them very efficiently. However, we recently experienced something with our FM-4 rig in Lansing which gave us pause.

It started when the exciter, a Nautel NE-50, which began to lose AFC lock after a short period of operation. We subbed in a backup exciter, then started to fix the thing ourselves, but Cris told us to send it out to the factory instead, because the repair would be guaranteed. Good thought. Off it went. It came back two weeks later, went back into the FM-4, and failed again. We *knew* that the factory had fixed *and* vetted this box, so James and I, with help from the factory took a closer look at the situation, and found some weird things.

First, the readings on the exciter were not quite right the way we were used to. And the VSWR reading was the weirdest of all, 2.0 watts. The problem was in the transmitter, right in the IPA stage. How had our backup exciter survived? The fact that it had, had thrown us off the trail. But then the IPA stage began to fail on its own, as it got skittish about the level of its voltage input (which is adjustable). The factory got called again. Turns out that the IPA wasnôt the only part in the rig which needed checking.

Figure 1- NAFP-68 IPA Power Probe

In the RF path between the exciter and the IPA stage there is an innocuous little module with the designation NAFP-68 (see Figure 1). Its function is listed as the IPA Power Probe, and if it is malfunctioning, or missing, the rig wonôt work. Itôs a VSWR detector, actually, and while not a complex box, it has its foibles, as weôve learned. IPA RF goes through the box, gets sampled in a transformer setup, detected, the resulting signal turned into a DC voltage, and thatôs its output, which feeds the controller circuit. Talking to the factory about this box yielded two valuable pieces of information. First, if the box decides to misbehave, the most common failure mode is in the solder joints from the transformer to the PC board. Touching the connections up with a fresh point of solder will calm them down. The second point was scarier. When I asked if I could order a replacement for this particular box, just to have it as a spare, the response was, ñNot at the moment. Hmmmm, not only do we not have any of these in stock, but we donôt even have the parts to make any new ones up.ò

Uh-oh. Letôs see if I have this right: If I have a transmitter with a particular part included, and that this part is crucial to the piece of equipment operating at all, and this part is not available from the manufacturer, either now or in the near future, what can I do? Now, as I said at the outset, this is not a problem limited to this particular manufacturer. *All* the manufacturers have this situation, to a greater or lesser degree, especially since the some parts which were used in the original design may not be available any more. And weôre not even counting the folks who have retired since they originally designed and provided customer service on this item, either.

As I write this, a few hours ago, I just gave away the last of our Harris FM-5G transmitters, to a friend who was desperate to have one. Thatôs pretty desperate. That rig hasnôt been supported in more than ten years. I hope my friend can find whatever parts he needs for it when heôs putting it back on the air. He may not. Iôm not ragging. Having been in the manufacturing business in the past, I can attest to that. I donôt know if thatôs the case with my little IPA Power Probe box, but Iôm taking no chances. Yes, I fixed the gimpy box I had, but I have a transmitter site with one of these same transmitters in it, and itôs the *only* analog rig at that site. You bet Iôm going to try to acquire one of those IPA Power Probe boxes as a spare, even if I can fix the one I have. Iôd rather be down for the time it takes to do the swap, than be down for the time it takes to fix it and then put it back in the rig.

But this gets me to the point of this article. If you have legacy equipment in your transmitter site stable, and there arenôt many radio broadcasters who donôt, youôd better start doing an inventory of whatôs in those rigs, what you have for spares, if any, and what the factory can supply on a momentôs notice in case of an emergency. Or not. They may not always be able to help you, and thatôs a surprise you donôt want to have.

In addition to the manufacturers, you might want to check out such places as the surplus electronics web sites or businesses you cater to the legacy transmitter market.

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

May was one of those months when all sorts of events combine to keep things interesting. It was cold and wet, continuing the trend to cooling. With the Canadian/arctic air contributing snow to the east coast and tornadoes in the south, the northwest is fortunate that we donôt get many severe weather storms of that nature.

On the technical front, the month was ñtypicalò with a streaming computer that failed, again. We had a number of phone lines that failed. The generator started just fine, then stopped with ñovertempò after 30 seconds. And an audio processor failed. In other words more or less normal.

One challenge of having a facility in an area shared with other communications services is the ongoing problem of interference. In many cases the problem is solved by a phone filter. Its amazing how cheaply built many telephone sets are these days.

There are lots of interesting interference problems as well, such as hearing a radio station when the doorbell rings. Or the Morse code H (four ñditsò) that interferes with a two-way channel. Thankfully, that problem didnôt come from *our* radio transmitter. Still with a lot of different services living in the same area with residences, the visible broadcast facility attracts the most attention.

Probably the hardest problems to solve are mixes of several transmitters. In several cases I have received a complaint that ñé your station is interfering with is ï ò (fill in the blank). Once, in the general area of the complaint, a mix of KKPZ and another broadcast station can be heard. When that happens, finding the source can be a real problem. Invariably, itôs the result of a poor connection in power or cable wiring somewhere on one of many power poles. It can also be a wire fence.

Other than receivers for ñDFingò a signal, one of the best tools for solving this kind of interference is a hammer. Applied to a pole, the vibration can often correct an intermittent connection and resolve the problem. At least for a time.

At Mt. Scott, I also have the reverse problem ï towers that interfere with the KKPZ signal. Most of them are detuned and only need monitoring and occasional adjustment, a difficult situation when multiple close-spaced towers are involved. One new tool I found is a RF current transformer.

In the past I have used a home-built shielded loop to monitor current. The loop is close coupled to a conductor of interest and the output connected to a FIM to monitor the relative current magnitude of a single frequency. I now have a new tool to perform that task. Originally produced for use with the Stoddart NM20B noise and field intensity meter, an RF current clamp-type probe was used to monitor conducted current.

The probe works on the same principal as the Delta TCT series of RF current transformers. The current conductor serves as one turn of a current transformer. As a clamp probe, the Stoddart probe has one real advantage, the probe can be easily clamped around conductors for measurement without disassembling the conductor.

Stoddart RF current probe

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

Burk ARC Plus

While I have been enjoying the new Burk ARC Plus remote control units, we have noticed some discrepancies that can be quite the nuisance. At the beginning of May we began noticing one of the parameters for one of the towers at one of the sites was out of tolerance. I headed out to the site to find everything okay. Instead, what I found was the calibration in the ARC Plus was off. It took a while to get it to calibrate properly.

I still don't get why I have to fight with the calibration so much, but I do. I know it is in part because of modulation, but even with averaging on, things still tend to wander. The common point current at KLDC can't seem to stay right in the ARC Plus. It is becoming more and more difficult to deal with. Obviously when something goes out of tolerance you have to deal with it, sometimes reducing power or whatever to broadcast legally.

We rely on the system to keep us informed as to when things are in tolerance or out. So in the next month I will be keeping a much closer eye on everything and will have to be even more diligent at trying to get things reigned in. I hope to be able to report back next month that things are working properly again.

Horizons

We got the last of the WorldCast Horizons in and installed for KLZ and KLTT. Both installations went flawlessly and have been working great. Now we are trying to decide if we want to get several more Horizons to use for the various feeds we get in at the KLZ transmitter site over satellite. We get several shows in from different C-band channels. So currently, we have the Horizon just for the STL path (program audio); we still use the Intraplex to bring back all the satellite feeds. It is something we are going to have to think about and either use the Horizon or find another piece of equipment that is just as good to bring back those feeds.

Spring

It's that time of year again. The rains are making the grass, weeds and other things grow. It amazes me how fast things grow around here. One day I'll be at the site and things are fine, the next day it's grown two feet. It is crazy and having three sites I have to maintain becomes difficult. Thankfully Keith is able to do a lot of it for me. As we start the process of mowing at the sites, I also have to start scheduling time for cleaning at the tower base antenna tuning units. At least mowing and working outside gives me time to work on my tan.

Wheatstone Power Supply

We have been through two power supplies in the Wheatstone satellite router in the KLVZ control room. Of course both happened at inopportune times. Both days when this occurred it happened to be after a weekend. When the board op arrived at 5:30 AM, he discovered the problem. The APC UPS we have in the room, which is about a year or two old, was screaming. Everything plugged in to it was off because the UPS had tripped out on overload. I bypassed the UPS to get our equipment working and I find the satellite router not working.

The first time this happened, thankfully we had a spare power supply. We were able to plug it in and get things working again. The second time, however, the power supply that failed was at the factory being repaired. We were able to borrow the power supply from KLDC and get KLVZ back on air before the live show both mornings. The second time, though, leaves us a studio down. Thankfully the station doesn't have any live programs for a day, but it is looking more and more like KLDC will be broadcasting from the KLVZ studio until we get that power supply back.

I am working to find out if the UPS has something wrong with it that would cause the power supply to fail or if maybe there is something wrong

with the satellite router that is causing the UPS to freak out. As soon as I get the router working, the UPS works fine. I am almost afraid to put anything back in line with the UPS just in case it is killing the power supply, but if it isnôt we have another issue altogether that would seem to be more catastrophic. I guess weôll play the guessing game until we figure it out.

Burk Oopsé

I received a phone call early one morning that KLTT was off the air. I immediately opened AutoPilot and found it not able to connect, so I put it on ISDN without really thinking much of it. It seems any time there is lightning in the area it messes with the Trango radio or power supply on the tower and the only way to fix it is it to power cycle it with the breaker. When I got to the office, I found that the towers for the night pattern had no or very little RF.

My dad, who tends to get up way before me, had noticed no signal and started digging into it. I quickly went out to the site after he told me what was happening and as soon as I walked in the door I knew the issue was inside. I could smell something had burned. I took the station down for a few minutes while I investigated and found the capacitor in the shunt leg of the night common point had blown. I was able to go to KLZ and grab a bigger capacitor of the same value since we didnôt have an exact spare, and put it in and brought everything up with no issue.

Now, the question is, why did the cap burn up? For KLTT, we have what we call ñlightning power.ò When the transmitter gets a fast VSWR trip, it immediately puts it to 10kW ñlightning powerò to help protect us from damage to the transmission lines. At night, we have a max power lockout set so that the power cannot exceed 1.5kW, which is our licensed night power, so when a trip occurs at night, the transmitter will go to the 10 kW power level but the max power lockout will not permit the actual RF output to exceed 1.5 kW.

I have a macro in the ARC Plus that activates when the ñlightning powerò status goes low. It waits 30 minutes (presumably enough time for the storm to dissipate or move away) before switching the transmitter back to high power. When high power is activated by the ARC Plus, it also sets a 53 kW max power lockout, removing that 1.5 kW ñcap.ò

What I did not factor in when creating the macro was the nighttime storm. We were on the night pattern when that macro ran, it turned the 1.5 kW max power lockout off and put the full 50kW into the night common point. BOOM! Iôve never heard a cap burn up, but based on the mess it made Iôm sure it made a loud noise. Thankfully the mess is easily cleaned and there doesnôt appear to be any other damage.

Looking Ahead

June looks to be a month of mowing and spring cleaning. I plan on getting out there and getting the sites looking good for summer. Also ahead is the start of the rewiring of the KLZ transmitter site. After years of adding and removing things, the wiring has begun to look like one gigantic birds nest. Remember that we have not only the KLZ transmitter facility there, but also the KLVZ-N facility, the CBCSAT uplink and its audio switching plus a whole bunch of C-band receivers and audio feeds. As I begin to get my ducks in a row, I will begin the long, tedious process of figuring things out and hopefully by the end of summer the site wiring will look brand new.

That about wraps up another edition so until next timeé thatôs all folks!!!

KBRT • Avalon - Los Angeles, CA
740 kHz, 50 kW-D/0.2 kW-N, DA-1
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/4.3 kW-N, DA-2
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
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
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, 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

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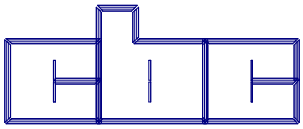

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