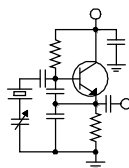


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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The Tune-Up

At long last, I get to write in these pages about the completion of the KBRT Oak Flat project, at least the main part (we still have to bring over the aux transmitter and some other equipment). It has taken us *years* to get to this point. What a thrill it was to actually make some RF from the site, adjust the pattern and fire it up at full power for the reference measurements!

Amanda and I got to the site about noon on January 7 and hit the ground running. We made the base impedance matrix measurements, measuring the impedance at each ATU output with all the other towers open-circuited.

With that information in hand, I immediately began working on the calibration models. Three of the towers, #1, #2 and #4, had virtually identical impedances. Tower #3, however, was a bit lower, and the obvious reason is the sheer size and the proximity of the antenna tuning unit (ATU) cabinet. That is the high-power and non-directional tower, and the components are necessarily beefy, requiring an ATU cabinet the size of a minivan. All that flat metal surface just a few feet away from the tower base produces a lot of stray shunt capacitance, probably 100 pF or so, which swamps the impedance of that tower base.

It really wasn't a big deal to get the models to calibrate. I had to use an additional 100 pF of shunt capacitance at the base of T3 to account for the low Z measured there, but otherwise all four models calibrated right up. It took me only a couple of hours to derive a set of directional base operating

parameters for the array, and we were ready to start adjusting.



When we got around to putting a little power into the antenna in the DA mode, we found T1, T3 and T4 to be in the ballpark in terms of power and phase. T2, however, was a horse of a different color. It is the low-power tower in the array, accounting for less than 5% of the total power, and its predicted driving point Z (DPI) was somewhere in the 3.5-ohm range with a reactance of something like $j30$ ohms. I could not get the tower to take any power; it was totally parasitic.

We had included in the design a 40-amp shunt coil across the output leg of the T2 ATU network to more or less resonate

the capacitive reactance of that DPI and pull the Z up to something in the 20-ohm range (which is certainly more manageable than 3.5 ohms!), but with the self-impedances all a little bit lower than the design values (the result, no doubt, of the proximity of the security walls), the modeled DPI reactance was more in the $j20$ ohm range. So to get that shunt coil to work, I tapped it down quite a bit, then made a change in the output leg coil to compensate for the reactance change of the load. That got a little power into the tower (we were working with just a few watts in the total system at that point, anyway).

Amanda and I worked for hours and hours, me at the tower base and her in the transmitter building, and we finally were able to sneak up on the proper adjustment. After a long battle, we had the parameters nailed on the model-determined values, thank God!



The tower #2 ATU - the 40-amp coil mounted vertically just left of center is the "resonating" shunt coil that we had to finesse to get things to work at that tower.

Next, we put 5 kW or so into the array with the parameters otherwise correct and I measured the impedances of each of the antenna tuning unit inputs. They were all in the ballpark, but I went ahead and adjusted them for $50 j0$, taking a couple of trips around the array to iterate the impedances and the operating parameters to their proper values.

The only one I didn't get was T2, which showed $26 j0$ or thereabouts. After a few attempts to raise the resistance, I gave up. There was so much insertion effect at that tower (from inserting the OIB into the circuit) that we didn't have control range to adjust it out, so there's no telling what the T2 ATU input operating Z really is. With less than 5% of the total power in that tower anyway, a 1:1 match is not critical anyway, so I left it where it was.

The following day, we fired up at full power midmorning and two teams set out with field intensity meters to make the reference field strength measurements. This was interesting because of the terrain close in.

Amanda and I, along with Don Jones of RF Specialties who had come out for the day, did three of the radials and were able to get three points on two of the radials up in the canyons. The third radial took us into Yorba Linda, where we had to work hard to find accessible points.

The other team, which included Joel Saxburg and Burt Weiner, did the other three radials, the ones on the east side which were all in the Corona area.

Then Amanda and I drove the signal to see what it was like. Amazingly (or maybe not so amazingly), it came up just about what we expected.

We lost some signal down into San Diego, not surprisingly because of the low-conductivity terrain between the site and that area, but we had sparks coming off the car antenna in Orange County (I measured 70 mV in the studio parking lot).

To the north and northwest in L.A., the signal was better than predicted, with 5 mV+ north and west of Inglewood and stronger signals back east into L.A. proper (which is closer to the site). We got some listener reports of a weaker signal in the San Fernando Valley and the Pasadena area, not surprising because of the reduced conductivity terrain.

Overall, it looks like the new facility is doing everything we expected it to in terms of coverage and performance.



Don Jones (L), Cris Alexander (C) and Amanda Hopp (R) after the KBRT directional array tune-up. Everyone is dead tired except Don!

The Day after Christmas

In my 36-year broadcast engineering career, I have done quite a number of large projects, several that took a year or more to complete. Without a doubt, the KBRT Oak Flat project was the longest running, most challenging and difficult of them all.

I love projects. I love to design, plan, build, tune and see a facility come together. Perhaps the biggest thrill for me is to see the finished product take the shape of my original vision (and that by no means happens every time!).

During big projects, I tend to become focused and single-minded so I have to be, really, or I tend to lose track of things. A side-effect of that mindset, however, is that I eat, sleep and breathe the project for the duration. To some degree at least, the

project occupies my every waking thought and often keeps me awake at night. This doesn't exactly endear me to my wife and family, my being preoccupied for months on end. They always look forward to the wrap-up, as do I.

One thing I have dealt with in the wake of a big project's completion is, I suppose, a sort of *post-partum depression*. As I think back to other big projects, I remember how I put all my energy into reaching the finish line, getting the project done and getting back to *normal*, but I also remember how in every case, when I was done, I found myself thinking, *Now what?*

It's a lot like the day after Christmas for a youngster, weeks, maybe even months of anticipation building up to The Big Day, and even if the youngster got everything he or she wanted, the day after can be sort of a letdown. The reality is that the *anticipation* is an opiate of sorts; on December 26, that anticipation is all gone and the withdrawal begins.

As the KBRT Oak Flat project winds down, I once again find myself in that place. I knew it was coming, but that doesn't really help much. As things return to a more normal level of activity, one with a lot less travel (my wife is grateful!) and my attention more evenly distributed, I have to make a deliberate effort to get back into the old routines.

That's where I am headed now. Our engineers can look forward to more of my attention and focus in the weeks and months to come. We'll dust off neglected projects and resurrect deferred plans. I also plan to begin making the rounds of our markets in the spring, some of which I haven't seen in a couple of years.

We don't have any big projects planned for 2013, and that's a good thing. We have plenty of *little* projects to tend to. We'll make this a year of shoring up, fortifying and improving with special attention given to the *listener experience*, making our product different and better. I can't think of a better cure for the post-Christmas blues.

The (other) Big Day

We continue to await FCC issuance of Program Test Authority (PTA) for the new KBRT facility. We filed the Form 302-AM and moment-method proof-of-performance on January 11. The MLK holiday and inauguration day got us, delaying the acceptance for filing of the application until the 24th of the month. We expect PTA grant any day now.

The plan, then, is to *throw the switch* on February 28. Mr. Crawford is planning on coming

out to Southern California, and weather/site conditions permitting, he will personally push the *RF On* button on the NX50 at the new site (he can do it by remote control if conditions are not conducive to a site visit). He and I then plan to be on the air on KBRT that afternoon to discuss the new facility, the reasons for the move, all we went through to develop and build out the new site, and what we expect for the future. We are both very much looking forward to that day.

Until then, Bill Agresta and I still have some work to do at the site. We still have to bring the generator over, get it reconfigured for 480 volts and connected, and we have some transmitter issues to sort out.

We keep getting alarms on the NX50 transmitter indicating AES lock loss and audio input loss, sometimes several times in one second, each immediately followed by clearing of the alarm. There is no evident audio loss on the air, and we see no upstream errors (the codec shows no dropped packets and all looks and sounds fine on the exporter).

I had Bill bypass the exporter, pulling the *Analog AES In* (what an oxymoron!) and *Analog AES Out* (ditto!) connectors off the exporter and plugging them together. That seemed to solve the problem for a time, but then we saw a couple of other AES loss events over several days, each lasting just a few seconds. So something is still going on there. All that's really left are cables and a distribution amp.

More than likely we won't deal further with this until late in the month when I make another trip out. The glitches are of such short duration and occur so infrequently that they don't really represent any threat to the on-air audio, but that also makes the issue very difficult to troubleshoot.

Once we have PTA and have made the big switch, we can begin clearing out of the island site in earnest. Bill has already brought over a 27-foot trailer load of *stuff*. He thinks we can get the rest in another trailer load plus the shipping container that we have at the site for storage. We plan to bring that container to the new site for storage of non-critical materials, leftovers from the construction, site maintenance tools and the like, but we can fill it up with more *stuff* on the island before shipping it over on the barge.

I don't have a clear idea of how long it will take to vacate the old site. That depends, to some degree at least, on our landlord. They may or may not want some of the fixtures and items in place at the site. If they want them, that's less for us to move or dispose of. Hopefully we will be cleared out by mid-summer.

The New York Minutes

By

Brian Cunningham, CBRE
Chief Engineer, CBC – Western New York

Hello to all from Western New York!
I recently had the opportunity to work hands-on in a project for another local broadcaster utilizing IP-based control surfaces and IP engines. The system installed was an Axia Element along with the Axia iQ series consoles. Not having any experience or prior knowledge of how this system went together, I went in with eyes wide open and determined to learn how IP-based consoles worked from the inside out.

I must begin by telling you that I have planned/installed/maintained over one hundred broadcast/production studios in the past twenty years or so. Most all of these were in the analog realm, with a few digital I/O equipment mixed in. Wiring for these facilities were the common 20-pair audio snake to/from the studios to the rack room, utilizing B-66 punch blocks for all connections and cross connects, with standard stereo pair into and out of the source equipment to the main control console. Pretty straightforward stuff, most of you can easily do it practically in your sleep.

The first thing in installing the IP-based system is that you must learn to think outside the box. Yes, you still have to physically connect all source equipment to the engine or “brain” of the router system, but afterwards is where I had to readjust my way of thinking. In a conventional console installation, you have “fixed” inputs and outputs, therefore whatever you have designated for that channel, that’s what it is. In a router-based system, sources appear in a list, and they can be assigned to whatever console “channel” you desire. It’s the same for the outputs. You no longer need distribution amps to send a stereo pair to different sources. All this is taken care of in the engine programming.

Now, for all of the equipment to talk to each other, you must build a network capable of handling the data being sent from each source to the router. In this particular installation, a Cisco 1GB

programmable switch with 24 ports was selected to handle the network activity. Each engine was connected to this switch using a CAT6 cable, and all source equipment also utilized CAT6 cable. All of the connections into and out of the router were on RJ-45 connectors, with the other end being standard XLR/TRS/RCA, or in the case of network compatible equipment, a simple CAT6 patch cord connected the equipment to the engine.

All of the programming and source designations are taken care of in software, so any changes to the system can be made in literally seconds. The entire audio path stays in the digital realm, with the audio being sent to the transmitter using the Zip ONE IP Codec. To me, there was a noticeable difference in the audio quality as compared to audio that had undergone several A/D and D/A conversions.

I am looking forward to installing my own “networked studio” in the future. I know many of you are using the Wheatstone IP-based bridge router system in your facilities, and if you are looking to replace your system, I would highly recommend looking into the Axia line. I found it to be very easy to understand, installation went virtually error-proof, and the quality and ease of operation was outstanding.

WDCX-FM, WDCZ(AM) – Buffalo, WLGZ-FM / WDCX (AM) – Rochester

We have heard from a number of listeners in and around the Toronto area who could no longer receive WDCX-FM because of interference from new Canadian stations operating on 99.5 MHz near the greater Toronto area. The sign on of WDCZ at midnight on New Year’s Day went flawlessly, and so far, with the station simulcasting WDCX-FM, the feedback has been good, with only a handful of folks who can’t receive the 970 signal because of location (most were in a steel-structured high rise). I am



curious to find out how far north the signal travels at night. Perhaps in the near future, my wife and I can take a road trip to ride the signal up north of Toronto, perhaps to the Maritimes!

Periodically and since about mid-summer, we here in Buffalo have experienced unusually high winds. It has been so frequent that Chicago may be asked to share its moniker, "The Windy City," with Buffalo. Recently, it has not been uncommon to experience 40 mph + sustained winds throughout Western New York, but along with the wind abnormality, we have not received anywhere near the average snowfall we would normally expect at this time of year. Not that anyone's complaining about the lack of snow. It seems apparent that we are undergoing some sort of weather pattern change in the Northeast. This past summer was a hot one, with average temperatures four to six degrees above the normal. It rarely tops 90 degrees in Buffalo, but last summer we had 27 days that the temperature was 90 or above. Folks, we ain't geared for that!

Operations in Rochester for both WDCX (AM) and WLGZ-FM have been quietly churning along, with no major news to report. Lately, the biggest problem I have had to deal with is the Internet quality we receive from Time Warner. The on again/off again service we have been getting recently is beginning to wear thin, almost to the point that we may begin looking for a new Internet provider. Unless someone new has come into town, our only other source of Internet would be Frontier Telephone. And their reputation goes back many years as one very unreliable company. But, then again, the reliability of Time Warner is beginning to rival that of Frontier's. I guess we will have to choose the lesser of the two evils.

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

The Motown Update

By

Joseph M. Huk, Jr.,
P.E., CPBE, CBNT

Chief Engineer, CBC-Detroit

In January we performed some repairs to our Nautel NV-40 transmitter, which I am very happy to say went very smoothly. In addition, we are rolling out the remainder of the hard drive upgrades to our NexGen audio servers. Last, we had an unexpected visit from our local FCC office which was a good learning experience.

Nautel NV40

The WMUZ-FM main transmitter, a Nautel NV40, had some minor issues last month. One day, during a normal inspection, I noticed a couple of errors on the status screen of the NV-40. It showed that one of the switching power supplies was not operating properly and indicated a defective power module cooling fan. After swapping the defective switching power supply with a known good

module, the problem followed the defective module. After confirmation from Nelson Bohorquez at Nautel, I was sent replacement parts for the transmitter.



Once those parts were replaced, the status page of the NV40 indicated there were two other power amplifier modules that needed to be replaced. I was sent those parts and replaced them. Then the transmitter indicated no other faults.

I was very impressed that through the troubleshooting and resolution process, the transmitter required no adjustment of DAC (Digital to Analog Converter) constants. The reject power at the output of all of the intermediate combiners was at its minimum point as they were before the issues. This is a major improvement over the way the

transmitter behaved prior to Nautel's updates. You see, I have one of the very first manufactured NV40 transmitters, and we have had to do quite a few field mods in the time we have had it. The transmitter is really stable now.

One thing I noticed while I was replacing the power amplifier module is that there was very little thermal grease between the amplifier device and the heat sink. Before I replaced the amplifier modules, I applied thermal grease to the back of the amplifier device. This way, the heat will be dissipated by the heat sink more efficiently.

I would like to thank Nelson at Nautel for his kind support with this project.

NexGen Hardrive Upgrades

We have been upgrading our NexGen audio servers and on-air workstations with larger-capacity drives. In the process, with the larger amount of space, we now have the free space to properly maintain the drives. To perform a disk defragmentation, Windows requires a minimum of 15% free disk space. With the new drives, we now have more file capacity and the means to perform the needed maintenance.

As of this writing, we have completed four servers with no issues. We have been very conservative in performing this work to avoid potential issues with all three of the stations in our cluster. As such, we have performed the work on one station at a time. So far, up to now, everything has gone smoothly.

While performing the upgrade on our WRDT control room workstation, everything went well except for an audio card issue at the end of the day. After reloading drivers (to no avail), we are not able to obtain any record audio into the machine. It looks like we have an audio card that isn't seated properly or perhaps an audio cabling issue. As you can guess, being that all the other machines went so smoothly, this is a disappointment. We'll shortly take another look at that machine, with fresh eyes,

and hopefully find the root cause of the issue. Next month, I will let you know what we found.

WEXL FCC Inspection

Toward the end of January, we had an unexpected visit from our local FCC office. As I viewed the inspector entering the building, I felt the palms of my hands getting sweaty. Then I started to think about all of the SBE seminars regarding station inspections. With most of the presentations I have attended it was mentioned that the commission will gravitate to EAS compliance first since it is a matter of public safety. This inspection did indeed follow that path.

The inspector was very polite and indicated she was only going to focus in on WEXL. She came in with a checklist of documents she wanted to review. First she inquired as to our process of handling EAS confirmations and the review and filing of those confirmations. In our case we have both an electronic and paper copy of the EAS traffic. She then reviewed EAS received and transmitted weekly and monthly confirmation sheets for specific days on her check list to ensure they were in our files. Next, she looked over our operating logs. She then inspected the EAS unit in WEXL and proceeded to make sure I had a copy of the State EAS plan and the FCC EAS Handbook. I looked over the books as I passed them to the inspector, and indicated that I knew there was a more recent copy. She was very benevolent and indicated that I just download the latest copy.

My advice, after going through this experience, is to make sure that you take time to not only make sure you have the needed documents, but ensure you have the latest updates. Remember, radio stations are an ever changing, living and breathing creature. We need to keep up with them.

Until next time, be safe, and if all goes well we will be reporting to you from the pages of *The Local Oscillator* next month. Best regards.

News From The South

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

As I've said here many times: Alabama isn't wired for snow. We just aren't set up for it. We can't handle it. We have the wrong tires. The various highway maintenance departments don't have the salt and snow plows. We just cannot deal with it.

Some of you folks Up Nawth and out West get snowfalls that are measured in feet; in Alabama, we're (un)lucky to get a few inches. But that's enough to make everything grind to a halt. People run around with their hair on fire. The stores sell out of milk and bread (I've never understood that one; Milk and Bread Stew must be very popular when you're snowed in). It's chaos.

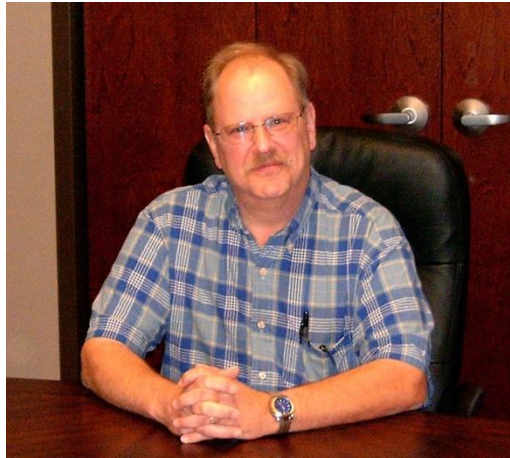
To my huge embarrassment, in spite of the fact that I have driven in snow many times, I couldn't even get my truck out of the yard after this snowfall. This was a wet, slushy snow that was mixed with ice and it soaked into the

packed solid. I decided to sneak around the back way, behind the Social Security building, only to look up and see a huge SUV coming toward me, in my lane. On the wrong side of the road. The woman had a look on her face that was a cross between *Ol' Man On A Mission!* and sheer panic. I quickly pulled off to the shoulder and let her pass.

No, trust me: we ain't wired for snow. At all.

New STLs

We ordered 4 sets of the APT Worldcast Horizon Nextgen codecs late last year. 1260 AM was the first to go in; there were a few wrinkles at first. For one thing, the RFI at that site meant that we got some data errors, but increasing the data latency to two seconds did the trick for that one.



Snow Ho Ho, Right Here in Dixie!

clay. My wheels couldn't get purchase, so there I sat.

I had to fetch Sandy from work early the day the snow fell. It was pandemonium; everyone was trying to leave at the same time. The streets were



The APT Worldcast Horizon codecs carrying audio to the transmitter sites. The Moseley at the top is WDJC's 950MHz backup link, and the Intraplex at the bottom is for WYDE FM.

The rest are currently in use, but the transmitter ends are parked for now at the 93.7 site on Red Mountain. Not surprisingly, with the bigger pipe provided by the Dragonwave link, and given the lack

of RF interference up there, we're able to run these at very low latency and they sound fine.

We must still ferry some extra feeds for backup and for the HD-R multicasts. We've kept the older Intraplex online for that, using the venerable Adtran 408e T1-Over-IP box to make it work.

I have to say that, thus far, I really like the APT Horizon units. They sound good and are very easy to configure via the built-in web interface. As we install Dragonwave links from Red Mountain to 850 AM and 92.5 FM, we'll simply move the codecs from their current parking spots to their final locations at these transmitter sites. It's a win-win.

Moving the Mail Server

We finally got our Metro Ethernet installed last month. As I've whined in previous issues, it seemed to take *forever*, but it was up and running in early January. 10 megabits up and down, guaranteed, all the time! It was beautiful.

We ran into one small issue: Windstream had only given us one IP address. We needed more than that, but to their credit, their technician came right out and re-provisioned the router in a matter of minutes. I was very impressed with their service.

At that point, Todd, Jimmy and I started planning the mail server move. That thing has lived in a co-location at Hiwaay Information Services for a couple of years now, primarily because we were unable to obtain real high speed bandwidth here in the past. With Metro E in place, we could make the big switch and eliminate that expensive monthly co-location charge.

Moving a mail server always involves compromises. You have to weigh this option against that, all while keeping an eye on the budget. After considering all of the options (including using a relay at Hiwaay to just forward the email to the studio location), we decided the best and simplest approach was just brute force: take it down and move the blooming thing.

For those who care: the primary reason why we ruled out the forwarding idea, even though it would have made the DNS transition a bit smoother (more on that in a moment), was security. Folks, if you run a mail or web server nowadays, you know what I'm talking about. If the script kiddies can find a way to hack your system, they will. We could have rigged up something, but any "something" that we rigged would have problems of its own, requiring that we troubleshoot and keep an eye on things during the move - on top of everything else.

DNS Percolation

I've mentioned this in previous issues: one of the joys, when moving a server, is changing the DNS. As you know, this is a worldwide system that allows you to use easy-to-remember domain names like `crawfordbroadcasting.com` instead of an IP address like `73.12.33.36`. There are big authoritative servers for each top level domain - `.com` and `.org`, for example - but they can't handle the load by themselves. Each ISP typically has its own DNS servers that regularly check these authoritative ones, then maintain a local cache for their users.

The key is how often they check for changes. A good ISP will honor the "time to live" specification in each DNS record; if it's set to, say, an hour, each ISP's DNS server is supposed to check once an hour for changes on that DNS record. From the standpoint of Internet efficiency, there's an obvious tradeoff: make this too short, and the Web will be flooded with traffic as each ISP constantly checks for updates. Make it too long, though, and your changes won't be noted for several days (or longer).

We call this "DNS percolation." If you move a server to a different IP address, it takes time for that change to "percolate" through all the various ISP's DNS servers around the world. Even with a relatively short time to live, some ISPs only check,



The mail server back home at our studios. Below it is the aforementioned Intraplex for WDJC's HD-R multicasts.

say, once a day, just to save time and bandwidth.

In this case, however, it appeared that `mail.crawfordbroadcasting.com` was pointing to the new IP address within a few hours. (Here in Birmingham, it changed within a matter of minutes!).

We had feared that this would cause chaos over the weekend, but it turned out to be a non-issue.

Reverse DNS

Also mentioned in previous issues: you have to worry about this nowadays as well, especially with a mail server. To briefly reiterate how DNS works on email: when you send an email to `joes@somehost.com`, your email client looks at the address. It sees the domain `somehost.com` in this case and looks it up in the DNS records.

The DNS entry for `somehost.com` should contain what's called an `MX pointer` to the name of the host that handles mail for that domain. This is typically something like `mail.somehost.com`, but in fact, it could be anything, including `whatever.someotherhost.com`. Your email client finds that MX record, then gets the IP address of the mail server. Finally, it sends the email to that IP address.

Here's where it can get tricky: that other email server might do what's called a `Reverse DNS` (or `rDNS` if you're a geek) on *your* email server to make sure it's legitimate. Simply put: it will see that you sent `joes@somehost.com` an email from our server's IP address, or 209.248.109.246. It then

does a *reverse* lookup on that to see if the IP address matches the name in the MX record. Here's the result of an rDNS on our IP address:

Non-authoritative answer:
246.190.248.209.in-addr.arpa
name = mail.crawfordbroadcasting.com.

The server at `somehost.com` is satisfied and allows your email to go to Joe. But if that doesn't match, his mail server may block the email, thinking that it came from a compromised computer or a hacker somewhere else. Here's the point: it takes a while to get the new DNS info to `percolate` through the DNS servers, and it also takes a while to get the rDNS to `percolate` as well.

In this case, though, Windstream was able to get the rDNS changed from Hiwaay to their systems by Tuesday after the server move. We might have had a few emails rejected over the weekend, but I didn't receive any complaints. Breathe a sigh of relief and thank the Lord: it could have been ugly, but went very, very smoothly.

Thanks to Todd and Jimmy for yeoman's work during the server move, and until next time, keep praying for this nation!

Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

Greetings from the new mainland KBRT transmitter site at Oak Flat!

Things continue to move forward here, although slowly at times, especially after the recent days-long rain event. Although only some minor showers were originally predicted, we ended up getting quite a bit of rain and even a pretty good thunderstorm last Sunday night, January 27th. The storm was intense enough to test our new site, and although we got a few minor alarms on our Nautel NX50, everything held remarkably well, including our microwave link to the studio.

In the week prior to the storm, I was on the island at our old site packing and loading a large 22-foot trailer that we wound up overfilling by some

4000-pounds! As it was getting barged to the mainland, I traveled ahead to prepare a place to unload and sort everything in Corona near our new site.



Corona we drove.

This transfer took the better part of our day, but once we arrived, I still had to offload the extra trailer I brought because it was an open type utility

After the storm dumped its last bit of rain on us, our neighbor Larry and I each drove to the barge dock in Wilmington, me with an empty trailer in tow. Once we arrived, it was back to work, offloading that extra 4000-pounds, then reloading it into the empty trailer I had hooked to my truck. Once the 22-foot trailer was within a safe weight range, we tied off the load and off to

trailer and could not be secured. I got some help from my neighbor, Dean and his forklift to offload a couple large crates, and then did the rest by myself, finishing up at about 9:00 PM.

As I had already figured, the physical part of this move is some very tough work. It has already taken some very long days, late nights and some very sore bones by bedtime, but it has gone exceptionally well thus far and we have saved a substantial amount of money by renting what we need and doing it ourselves. As I write this, I am preparing to unload the huge 22-foot trailer, this time with the help of our operations manager Todd Stickler (who, by the way, is in a lot better shape than most people I know), so this should go well.

The new transmitter site is very close to complete now. I need to get up there to do the last few things, but the roads have been impassable by passenger vehicle after the recent rains. I did manage to make it up during the storm. In fact, I was the last one to make it all the way up before it became completely impassable.

That last trip, however, was an experience even for me, someone who has done a lot of serious

off-road 4x4 driving. Most of the trip up was done at nearly a 45-degree angle to the line of travel, even bouncing off the side of the hill a time or two. The way down was in 4-low, keeping my speed to under 10 miles per hour, so when I needed to give it some gas to pull my front end around a corner, I had some headroom without hitting an unmanageable speed. I am still getting to know our roads up at the new site but I think we will be able to work around the few times they get so muddy as to be impassable. If they do become an issue, there are still quite a few tricks in my little bag here. I can always hike or bike up there.

I am pretty sore now and need to get some rest before doing it all again tomorrow morning, about 10,000 pounds yet to unload. I look forward to completing this move and I will continue to share what I can with you.

Until next month, the Lord bless you and keep you; the Lord make his face shine upon you and be gracious to you; the Lord turn his face toward you and give you peace.

The Chicago Chronicles

By

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Chief Engineer, CBC—Chicago

Regular readers of my columns here are aware that I tend to dwell less on events here at CBC-Chicago than I do ideas and concepts. I generally believe that discussing ideas is more interesting. Not this month. Chicago Engineering is a beehive of activity, with various projects coming to fruition, all at once. Then, throw in there a really nasty find me problem, and well, *this* is the cure for anyone's writer's block!

First, we upgraded the RCS NexGen basic software. Actually, we upgraded it by about four iterations. There's a reason for that. We don't do it every time because we're concerned that it would be potentially disruptive, especially if bugs creep into the code, which it did in two of the iterations which we by-passed. The latest version, 2.12.3, however, had proven itself in our other markets to be a real

pussycat, so we jumped. The install took most of a day and the database had to be upgraded in steps, so we were naturally on pins and needles until it was done. The result was worth it. This is a great version of the NexGen software. So now we move on. The next upgrade is scheduled for sometime this month. So soon?

Second, there is the Dragonwave STL Project. This one has been in processing for

well over a month, again because when this one goes on line, we want perfection. As of now, the only things left to do are: run the CAT-5e Belden 7919A cable into the rack room from the studio tower, and leave it there, weather-proofed for the tower crew to take it up; wait for the POR to be approved for the tower crew; and, wait for the tower crew to show up. It should be done by the time you read this— we



hope.

Third, we have a new phone system in the planning stages. With very few changes, the present system, a Nortel Meridian, has been around about 20 years. We're looking to upgrade our C.O. connection to a PRI, and this means a whole new PBX setup. Mack Friday has been the nose to the grindstone on this one and he's been working like a slave on it. Like the rest of our projects, he wants this one to be perfect from the moment it's turned on.

Into this mix of planned projects came two emergencies, both of which behaved more like unwelcome guests. First, the starter on the emergency power generator at the Kirkland site went bad and put us off the air during a power outage in December. Cummins N-Power came out and found the problem in the course of doing their normal semi-annual maintenance run in late December. The issue here is that this generator is kind of a square peg in a round hole. Originally installed in our Burnham facility in 1991, this 70 kW, three phase big boy was moved to Kirkland as its first emergency power generator in 2004 after a new, larger gen was installed at Burnham. For its part, Kirkland requires no more than 25 kW and one phase. Talk about overkill.

And then there's the age factor. Ford makes most of the engines for Cummins's emergency generator lineup, and after 20 years in the field, there seems to be less incentive to fix a generator than there is to replace it. Parts are harder to find, repairs are much more expensive, and even with piggybacking the removal of the starter with the normal maintenance visit, the cost to fix the thing ended up being \$1100+! And that's after Ford sent the wrong part the first time. The entire ordeal left the generator for dead for around 3 weeks. Blessedly, there were no utility outages during that time! that we know of.

This gives us pause. I'm figuring that it's time to retire the old girl, and get a new one with one phase and about 25 kW output. But there are still questions: Should we stick with propane or go, as our Cummins technician suggests, to diesel? Should we stick with the brand we've been using or look for a new vendor? These are just two of the questions. One thing is certain: any new generator is a year away, at least, and we're going to be careful about our search. I'll let you know how we arrived at this decision.

WPWX Outage

Then there was the outage. At 3:00 AM on January 22nd, I was called at home by the operator at Power 92 telling us we were off the air. I quickly called the remote control and found both the

main and aux transmitters to be on the air. Cute. I turned the backup off. The audio disappeared, even though the main Nautel NV40 was still on. I put the backup back up. Audio returned. I then went to shut off the main. Or rather, I tried to. It wouldn't drop off. Uh-oh. I left the backup on and in five minutes was in the car and headed to the site. Listening to the station on the way in, I could barely tell that there were two rigs on the air. Odd.

When I arrived, I found that everything I'd observed at home was true. The main was on but in *Local* mode, and it had no modulation. So was the backup, with modulation. I took the main rig down, then I went through the NV40's logs looking for remote/local entries. Funny, there was only one, a switch to *Local* back on January 8. I'd changed that parameter several times the previous day, and not one of them were noted in the log. I saved that question for later, and moved on to the issue. I tried for some time to get the rig's audio to come back up with various tricks that I knew. No luck. Fatigue was setting in, I was working, alone, on three hours sleep, and the temperature in the building was around 50 degrees. We were on the air and stable, so I vowed to resume the sleuthing in a few hours.

A few hours later, I was back and performing more procedures to find the source of the modulation outage on the main rig (which wasn't affecting the aux), and calling Nautel again, just to let them know I was back at the site and needed some help here.

Sometime around then, James called. The station was transmitting in mono. No stereo pilot. Oh, really? A check at the car radio confirmed it. The station was transmitting in both mono and HD, the latter in stereo. That had to be a first! Remember, the aux transmitter twins were on the air. Unlike on the NV40 main, there is no analog baseband switch to allow for instant back and forth switching between main and backup processors (note to self: change that). This meant that I had to change the aux rig over from the Omnia 11 to the Omnia 6 by the old *push-pull* method, which would mean a loss of 5 seconds of audio in the Chinese Fire Drill.

Well, I hated to do it, even if it was past morning drive, but I did. Voila! Analog stereo! Quick, reboot the Omnia 11. Done. Now, should I reverse the Fire Drill and bring the 11 back up? James said yes. Five more seconds of audio outage. Great. Now on a hunch, it was time to check the time alignment on the 11. We've never had luck getting the time alignment tight with the 11. But, after this re-boot, which was the latest of many without success, the Omnia 11 time-aligned perfectly. Go



This BNC connection looks okay...

figger.

Now, back to the feature: Feeling by now that the transmitter site had been glitched during the night, I went back through the whole place looking for issues, and found and corrected several. None of them solved the problem.

Nautel called. The CSR I worked with is probably the oldest hand at their shop now, and despite severely degraded audio on our phone connection which slowed us down, we made what I thought was considerable progress on the hunt for the cause. However, it got to the point where he just *had* to get into the rig over the Internet, and he had me pull a plug on the main supervisory board to enable him to do it better. But then, Murphy joined the party--we discovered that our one Internet port was already in use by Prophet to perform that major software upgrade I mentioned earlier. To make that long story short. Prophet was, of necessity, into our system for more than the length of a work shift. By the time we were ready for Nautel to get in, it was after hours, we were put into their answering service, and their on-call CSR was handling another off-air emergency.

As I was headed home that evening I received a call from Cummins, our generator folks, telling me that they needed to get into our Kirkland site, the *ō*way out^ō one, early the next morning. The replacement starter had arrived for our emergency power generator, which had been off line for over two weeks. I called James and gave him the assignment to Burnham the next morning in my stead, to deal with the NV40. Even in solving problems, Murphy is there.

As I was headed back to Hammond from Rockford the next afternoon, James called. They^ød found the problem! The Nautel CSR had gone into the transmitter via the web and was watching the



...but it isn't. Cold temperatures caused it to open up, killing baseband audio to the transmitter.

goings-on as James made some checks and adjustments to the transmitter. All of a sudden, as James was just moving things in the back of the rig, the audio came back, and disappeared again. And again and again. Well, whaddaya know? The baseband coaxial connection had gone intermittent, right at the entrance to the transmitter, and that was taking the audio off the air.

I can now theorize why: temperature. The NV40 was installed in February of 2011, but between then and now, the temperature in Chicago had never gone below around 25-30 degrees. This year, for the first time in several, the Chicago winter went to zero degrees F., and the temperature near the floor of the transmitter had gotten to below 20 degrees. The NV40 has no vent flapper valve on its air output to put its waste heat into the room instead of outside; therefore the room was absorbing the cold air from the outside. The transmitter likes it that way, but this audio connection didn't. The coax used is not RG-58 but rather RG-303, the same stuff used by Nautel in their RF connections inside their transmitters. We use RF connectors which are sized for that type of coax. I took pictures of the baseband coax connection at the T connector where the audio feed is split to go to the twin exciters. In short, everything *looks* perfect (see photos) but it isn't. Needless to say, the entire cable, not just the connector, was replaced. So far, it's peace at last.

There are some lessons to be learned here, even by me after all the time I've been doing this. First of all, the engineering maintenance checklist is never complete. There's always something to add. When the weather is cold, some extra things have to be added. If you're ducting waste heated air out of the transmitter, it's a good idea to set things up to be able to keep that heat in there at times. And

remember Murphy's Law #14: The thing which looks perfect, which is seemingly above reproach, well,

there is where the problem is. Always.
Until next month!

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

Another KLTT Power Module Failure

Twice in the last month the KLTT NX-50 transmitter has had a power module failure. Both times, of course, I did not receive an email about the failure. The first time I had the IP address off by a digit and the second time around was after the mail server was moved so I didn't even think to change the IP address after that.

Much like before, we were able to call Nautel and get them to send us a warranty replacement module. In troubleshooting though, we did blow two fuses. I must say, that was fun. We were at the site originally to get our yearly building inspection done by Brighton Fire. After the inspector gave me the all good for the site, BAM! The fuses blew. The look on the inspector's face was priceless. I think he was waiting for a fire to start.

Neither failure was due to lightning or any other external event as far as we can tell. The first failure was a modulator. We're still waiting on the results of the post-mortem from the second.

California

I was finally able to go to California to help with the wrap-up of the KBRT Oak Flat project the beginning of January. I must say, it was a nice trip. It was the first time my husband and I had been apart since we've been married. That was hard, but the trip overall was good. I learned a lot.

The first day was a hard one. We got the

base impedance matrix measurements done, but once in the directional mode, we could not get one of the towers (#2) to take any power. After a lot of hard work, though, sneaking up on that low-impedance

tower's adjustment incrementally, we were able to get it right. This allowed us to get everything ready for driving around and doing field strength measurements on Wednesday and Thursday of that week.

Burk Technology

Our four new ARCPlus remote control units arrived and will be installed by the time you

read this. The setup process was rather simple, time consuming, yes, but still simple. Before doing the setup, I went into our AutoPilot 3 program and did screen shots of everything for every station. This made it easier for setting up each station's ARCPlus.

We are going to run most of our important events, such as power/pattern changes and sign-on/off, using clock-dependent macros straight from the ARCPlus units. This will insure that those things will happen even if we lose IP connectivity to a site or AP2010 inadvertently gets shut down. We will use AutoPilot 2010 to do the rest. I look forward to fine tuning these units to get them the way I want them.

I am looking forward to a slightly slower February after the whirlwind of a month January has been. That about does it for me, so until next time that's all folks!!!

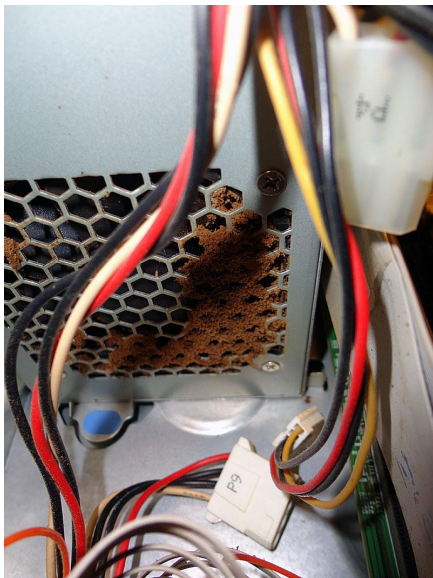


Digital Diary
by
Larry Foltran
Corporate Website & Information Technology Coordinator

It's Housekeeping Time Again

Folks will often report that their computers aren't running properly, with symptoms such as sluggish performance or long boot cycles. These are most often than not related to the computer's software. What is often forgotten or simply ignored is maintenance under the hood. That being said, I typically like to start the year with some tips on keeping a computer's software running properly. Well if those can be considered "Chicken Soup for a Computer's Soul," this article represents a trip to the tech spa.

I was recently given a computer that wouldn't boot up at all. As I looked at the exterior of the case, I noticed a caked on layer of orange dust. Based on my experience from playing in smoky clubs back in my rock band days, I knew the computer had been around a lot of cigarette smoke and I braced



Orange dust coated exterior and interior surfaces.

myself for what I would find inside. Once the case was open, I found much of the same. Essentially thick computer dust balls infused with what could only be tar and nicotine from cigarette smoke. Aside from the root cause of the computer's refusal to boot, in this

case a dead power supply, some general cleaning was in order. Normal computer dust, generally light and fluffy, can be mostly cleared out by holding the



computer on its side and letting gravity do its thing. In this situation, the residue adhered to the computer's components. Cleaning it would not be a fun task, but this computer served as a perfect candidate for this example.

The first step I normally take is to tip the computer sideways as I mentioned earlier.

It should be quite obvious that the computer should be powered down and unplugged prior to doing so. Weather permitting, I prefer to clean computers outside. Any stubborn or persistent dust can be blown out using canned air or, my preference, an air compressor. If using the latter, be sure to keep the output pressure relatively low to prevent any damage to the components. Also, when dealing with a computer full of dust, I often like to wear some sort of mask because I am severely affected by large amounts of dust. A simple medical style mask does the job well.

While keeping the computer on its side or at a slight angle, blow the dust out of every vent, fan, and crevice inside the computer. When clearing dust from the fans, be sure to secure the fan blades so they will not spin. Allowing the fan to free spin from blowing air does a great job of cleaning the fan, but can cause a number of problems. Aside from exceeding the designed spin speed for the fan leading to mechanical damage, spinning the fan in the opposite direction of normal operation can actually generate a back current which has the potential of causing damage to the mother board. A wooden or plastic coffee stir works very well to keep those fan blades from moving while you're blasting that dust out.

Also be sure to clear any dust from the exterior portion of the case. The specific computer used in this example had an external cutout in the case which accumulated a ton of dust and was quite difficult to reach properly.



Before...

For any persistent dust clumps, I will sometimes use a vacuum. I've read some warnings against this in the past, specifically relating to static electricity generated by vacuums. Quite honestly, I've never had a problem and generally use a plastic hose attachment. If you prefer to play it safe, there are numerous battery powered vacuums made specifically for use on computers.

Other areas that I generally pay close attention to are any heat sinks on the various components especially on the CPU. These have the potential of collecting quite a bit of dust and sometimes a few blasts of air won't be enough to clear them out. A cotton swab or piece of paper towel with a light layer of rubbing alcohol will do the trick here.

If available, I will also use a soft brush for some tough to reach areas. If I have time on my hands, I'll sometimes remove the entire component or even CPU heat sink to ensure I clear out as much dust as possible. If removing the CPU heat sink, make sure you have some thermal paste on hand for a fresh application.

The power supply can also accumulate a ton of dust. Following the same rule I covered in terms of the fans, I will sometimes blow some air into the



...and after.

intake openings of the PSU. Again, if time allows, this can be removed for a more thorough job.

After the interior is as clean as possible, a rag with a mild spray cleaner will get the exterior looking new again. Pay close attention to any unused ports or crevices in the case as dust will also find a way to accumulate in those areas. A soft brush or a cotton swab with some rubbing alcohol will do a great job of clearing out the dust in these areas.

So now the important question of how often should you clean the inside of your computer? My answer to this is that it all depends on the level of dust in your environment. If the items in your office tend to accumulate dust quickly, it's a safe assumption that your computer will suck that dust in at a similar rate. In those scenarios, perhaps every 3 to 6 months, leaning towards the 6 month side of the spectrum. I will typically open my computer cases every year and give it a once over. It doesn't take too long and makes a world of difference in terms of hardware dependability. Of course with the way technology has been advancing these days, your computer will most likely be obsolete before it needs a good cleaning.

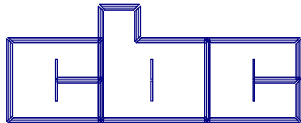
í until next month!

The Local Oscillator
February 2013

KBRT • Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1
KJSL • St. Louis, MO
630 kHz, 5 kW-U, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLWZ • 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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