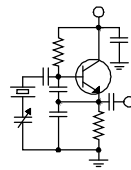


# The Local Oscillator



*The Newsletter of Crawford Broadcasting Company Corporate Engineering*

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## Wheatnet IP

Over the last month, Amanda and I wrapped up The Big Wheatstone Blade Project in our Denver cluster. We did this project in several phases, the first being the production rooms where we installed E6 control surfaces and two IP blades in each room.

That first phase gave us the opportunity to really learn the system, especially the networking, VLAN and multicasting aspects (and with which until then we had zero experience). When we wrapped up, we had three state-of-the-art VOIP production rooms with Nexgen using the WheatNet IP audio driver in each

workstation instead of a sound card. We learned how to make Nexgen talk to the IP blades in terms of audio and we learned how to configure the network, Nexgen and the WheatNet IP system.

Phase 2, which we wrapped up in July, was much riskier than phase 1 because it involved the on-air operation. Amanda will give her perspective later in these pages, but from my perspective, it was not particularly difficult. Rather, it required us to learn some additional things, mostly in Nexgen.

Getting a Nexgen audio server to work through the WheatNet IP audio driver and an IP blade

was not difficult. We (mostly Amanda) had mastered that in phase 1. There were some additional functions, however, that we had to learn. One was getting Nexgen to control the utility mixer in the IP blade. The way we get an IP blade to replace the external switcher (in our case the Broadcast Tools

ADMS 44.22) is to turn channels on and off in the utility mixer.

We map audio server channels, console program outputs and satellite feeds to mixer inputs, and we set up each utility mixer as a source in Nexgen. We map the utility mixer output to a bus that feeds the station audio chain. To send the audio server direct to

air, then, we have Nexgen turn on all the audio server channels

and turn off all the other channels in the utility mixer. To put the control room on the air, we turn on the console program channel and turn off all the audio server and other inputs to the utility mixer. By using macros in Nexgen these functions take place with a single click of the mouse (or as a log event), just as it worked with the ADMS 44.22 switchers.

All of that took some doing in Nexgen, but once we learned all the steps it was easy to repeat as we did the conversions for the other stations.



Figure 1 - KLZ IP Blade Utility Mixer

The other thing we had to learn was how to map logic inputs (LIOs in WheatNet IP to Nexgen so that a satellite relay can be used to fire a spot block or some other event. That was anything but intuitive, but we figured it out, mostly on our own.

Logic inputs to a blade are mapped to a soft logic output (SLIO in WheatNet IP). In the graphic shown here, INGRLY1, XDSARLY1 and XDSBRLY1 are all LIOs (logic inputs in this case) from satellite receivers, and Z-SLIO1, Z-SLIO2 and Z-SLIO3 are SLIOs (soft logic outputs in this case) that are mapped to Nexgen as inputs. In Nexgen, each is configured to fire the next spot block.

Once we figured all this out, it all made sense, and we made lots and lots of notes so we can help in other markets as we do WheatNet IP conversions in the future.

I did have one moment as we were installing KLZ's blade, which was the hardest because of all the satellite sources and signaling. The operator on KLDC, which was in a music segment, came into the engineering room where we were working complaining that KLDC was off the air. Amanda went to the KLDC studio and found the station on the air but with Nexgen paused. She clicked play and all was well. About 15 minutes later, the operator came back in complaining of the same thing. Sure enough, KLDC was paused again. We clicked play and all was well. In another 15 minutes you guessed it KLDC's Nexgen paused again. That was when the light bulb came on.

I had, a week or so earlier, created an input in KLDC's Nexgen that would pause the system when a closure was received on blade LIO 1. When



**Figure 2 - KLZ crosspoints showing logic input sources mapped to soft logic output destinations for satellite relays**

testing, I would make the closure, observe the pause and immediately click play so that the event was barely noticeable on the air. But what was going on this day? We were working on KLZ, not KLDC. Did we somehow have a KLZ input mapped to KLDC?

It didn't take me long to figure out the problem. When installing the KLZ audio server, the logic cable RJ45 accidentally got plugged in to the KLDC blade, which is right above the KLZ audio server and blade. Every time Laura Ingraham fired a relay, it would pause KLDC! Mystery solved. Of course I immediately deleted that test input on the KLDC audio server, just in case!

As I write this, all four Denver stations have been operating through refurbished audio servers, WheatNet IP audio drivers and IP blades for some time now. We had some minor Nexgen ghost in the



**Figure 3 - CBC-Denver's audio server stack with Wheatstone IP blades**

machine issues to work through that I won't go into here, but generally speaking all went very smoothly. This is a great simplification and improvement to our Denver engineering infrastructure, and I look forward to implementing it in all our markets in the coming year.

Still to come is phase 3 of the project, which is upgrade of the bridge router XPoint software. We have been running on the original software since 2006. The bridge router system is still amazing and continues

to serve our needs. We hope to keep it working for another few years. Wheatstone's Kelly Parker will come to Denver to do the upgrade in the coming weeks.

### A New Station

On July 25 we closed on the purchase of a new station, KNSN in San Diego. I told you a bit

about this station in my June column. It is a class C AM station operating on 1240 kHz with 560 watts full-time. The reduced power (nominally 1 kW) is because of the very high efficiency of the tall skirted antenna. KNSN does an amazing job of serving the San Diego market and beyond 24 hours a day.

Now that we own the station we have taken it dark and it will remain dark until we complete renovations. These include a completely new complement of transmitter equipment (we will keep the existing 1983-vintage Nautel AMPFET 1 as an auxiliary), a Ku-band satellite antenna and receiver to pick up KBRT's program feed, EAS equipment at both studio and transmitter site, remote control, processing, and audio switching equipment.

We also have a studio to construct in our San Diego studio leasehold in El Cajon. We will use an Autogram Mini-Mix 12 there along with other odds and ends that we mostly already have in inventory.

I plan to go to San Diego the second week in September to wrap up the transmitter site work. The studio work and some of the transmitter work will be done by then, but I'll go down to make sure all is as I want it and make certain the station is ready to go on the air. We plan to return to the air on September 29.

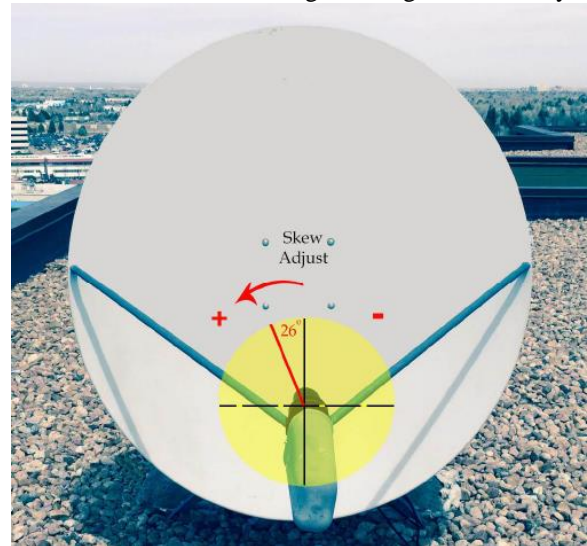
We're very excited about this new acquisition. It will restore and even improve on the San Diego area coverage we lost when we moved KBRT to its new mainland site.

### Satellite Change

On August 24 of this month, SES-3 will replace the AMC-1 satellite. We will drop two of our carriers, Denver and Detroit, on or before that date. Our Costa Mesa uplink and channel will remain on the air, and we will have to do a polarization change to make our antennas work with the new bird.

This amounts to a 26-degree clockwise

rotation (counter-clockwise as you look at the dish). Those stations that receive programming from KBRT will need to make that change on August 24 or early



on August 25. I plan to have a contractor make the change with the uplink. Stations should also plan to run alternate programming on August 24 since we don't know yet if we will be able to get our uplink moved that day.

### Internet Audio Distribution

With the exception of one station that has some kind of router configuration issues, the testing of our new Tieline-based Internet audio distribution system has gone very well. Stations are now receiving feeds from Denver and Detroit on their IP codecs instead of the CBC satellite network. Hopefully the remaining station will get things worked out in the next week or so. If not, it will have to make alternate arrangements for receiving programming.

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

Hello to all from Western New York! Before I commence with this month's report, I would like to send accolades to Cris, who on July 15<sup>th</sup> marked his 30<sup>th</sup> year at the helm of CBC's corporate engineering department. Through the years, I have had the opportunity to meet/talk with many of the major broadcast groups' DOEs, as I worked on numerous projects throughout the country, and I have yet to find one that equals the integrity and dedication Cris gives to his calling. Through his knowledge and assistance on various projects through the years, I have benefited greatly from this great resource, making me a better engineer in the process. There have been many people throughout the years who have in some way or another helped my career along, and Cris ranks near the top of this list! Congratulations on your major milestone of 30 years of service to CBC and all those under your tenure. I couldn't hand pick a better boss!



The month of July has been a busy one, which started out with electrical problems at the WDCX-FM transmitter site. We lost a phase in our three-phase service on July 1<sup>st</sup>, and as Murphy's Law would have it, our generator failed to start up to restore power to the transmitter plant. Upon arriving, I found a blown 200-amp fuse in the main disconnect, replaced it and got everything back on line, then directed my attention to the cause of the generator failure.

Unable to get the genset to run, I called our service tech in to troubleshoot the problem. In short order, he found that mice had nested in a wiring duct between the control panel and the generator's wiring input. After cleaning out the nest and repairing some of the control wiring that the mice had chewed on, he was able to get the generator up and running. About 4 days later, we lost power again, but the generator came up this time, but only for a short period of time. It would run for 30 seconds or so, then cycle down

and right back up again. Needless to say, our Nautel NV-40 did not like this at all, along with most of the other equipment in the plant. In order to stay on, I had to reduce power on the main transmitter until normal building power could be restored.

When we purchased the 50 kW generator some 10 years ago, it was more than adequate to handle our emergency power needs at full output power. However, since installing the new Nautel transmitter and Thermo Bond building with dual air conditioners, the current demand has risen considerably causing the generator to shut down on current overload. The generator is rated at 150 amps per leg. When I measured our amperage draw with an ammeter, we were consuming 146 amps per leg. When the A/C kicked on or recycled, the inrush current far exceeded the rated capacity of the generator, and it would shut down until the current draw was at an acceptable level. To alleviate this problem, I have diode-steered the generator's status outputs to the remote control to select a different preset on the Nautel's control panel. When the generator reports that it is 'ON', the transmitter will switch to analog mode only, which reduces the amount of current drawn to a level that is acceptable to the generator. When the generator's status returns to normal, the transmitter is signaled to return to FM + HD mode. In controlled testing, this has worked fine. We'll see how well it works next time the generator is called on in a power emergency.

Not long after the ordeal with the generator, I began to see random failures in the PA modules of the Nautel transmitter. In all, I had to replace two PA driver boards and one of the IPA boards in three separate RF modules, along with half of the 12-volt supply to RF module 3. These failures were attributed to the generator starting and stopping repetitively until I could get to the site and reduce the transmitters' power level. I've got to hand it to Nautel if they make troubleshooting problems a lot

simpler with showing all the modules operating voltages and various amplifier states of operation in the controller menu. At a glance you can tell which module is malfunctioning, and in most cases, which component is the cause of the failure.

Summertime is project time, and one that I am happy to recently complete is the installation of our new Burk ARC Plus Touch remote controls. In the past, we have utilized the LanLink 900 to deliver Internet to the transmitter site. However, it was extremely slow and unreliable. Last month, we had Time Warner install cable Internet into our transmitter site to use with the new remote control and Nautel's web interface.

I had pre-programmed the Burk to match the existing wiring scheme in the old ARC-16, so the majority of the installation was programming and building the network for Internet connectivity. I installed a new Cisco router and programmed it to open the necessary ports to be able to securely remote into the equipment, and everything was working well until Murphy moved in. The next day, we were unable to remotely connect to the site.

Upon investigation, I found that Time Warner had not turned off DHCP, which had re-assigned the IP address of the host computer. Once I had that changed, I was still not able to remote into the site, and after some time, found that one of the pre-made network cables was defective. Changing out the bad cable did the trick, and the system has been working flawlessly ever since. The only change between the old remote and the new one that I did not like was the ability to plug the phone handset and

phone line into the remote unit. The ARC Plus Touch only allows for a phone line to plug into the unit, if you wish to have a phone attached also, you must add one of those dual phone plugs, which can be troublesome at times due to poor connectivity. Soon I will just add an RJ-11 phone jack and parallel its input to the block and remote control.

Another project underway is the completion of the tower painting at WDCZ. Don Boye has been working sporadically on the painting, which lately has been hindered by the weather. We have had some really unseasonably cool days and nights, with temperatures in the upper 40s and low 50s at night, and mid 60s during the day with limited sunshine. With the lack of adequate sunshine (heat), the paint does not adhere well to the tower, causing bubbles that will eventually pop and peel once heat begins to dry up the moisture trapped between the steel and the layer of paint. This, along with rain, has slowed the painting down for now, but Don is certain that the remaining two towers will be completed by summer's end.

Other work slated to be completed this summer at the WDCZ tower site is the re-surfacing of the concrete tower foundations. Our contractor is behind on his scheduling due to inclement weather, but assures us that work will commence in the next couple weeks, weather permitting.

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

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### The Motown Update

By

**Brian Kerkan, CBTE, CBNT  
Chief Engineer, CBC-Detroit**

This month has been full of projects. We have the Tieline Genie network up and running, and we are now feeding audio for the Bob Dutko show to Portland, Albany, and Denver. The connections are automated and switched through the Wheatstone XPoint software using Wheatstone's scheduler to make and break connections. So far so good. I have found the Tieline equipment to be easy to work with, and very reliable.

I took the opportunity to install the Report-IT Live application on several



Android phones. The quality for remotes has been exceptional. It is important to have a good internet connection with enough bandwidth to make real time connections reliable. Any shared IP connection can be an issue without having Quality of Service QOS. Without QOS controls, all IP packets are treated the same. On a GSM or CDMA wireless connection, this can be an issue when there is network congestion.

The answer to providing an alternative to a circuit-switched connection such as ISDN using an IP network is the use

of Quality of Service or QOS. Two methods of QOS are Resource Reservation Protocol (RSVP) and Multiprotocol Labeling Service (MPLS). I will be covering these in a future column.

We are in the process of upgrading our Omnia.11 to Omnia direct. This will provide an end-to-end digital link from the console to the exciter. This will allow us to send the MPX (composite) output from the processor to the Nautel exciter over AES. The MPX signal is sampled at 192 kHz and sent directly to the exciter as a digital signal. The digital composite signal will not be affected by issues that an analog signal does, such as overshoot, AGC, or DC components that effect sonic bass performance.

Cleanup continues at the WRDT day site in Monroe, Michigan. It has been a good opportunity to look at the ATU huts and patch up holes to keep rodents out (and preventing another carbon path to ground!).

We will be installing LED tower lights on the WMUZ tower soon. I have been looking for cost effective solutions to monitoring LED tower lighting. FM Services makes a microprocessor-based monitoring device called the TLM-2. It is an update to the TLM-1 monitor they have sold for years. The TLM-2 has an auto-calibration function, will provide beacon flash alarms and can detect side markers or beacon faults from a single current-transformer mounted at the breaker panel. I am interfacing the TLM-2 into our remote control system to provide discrete alarms for beacon, side markers, or flash failure. This month has been full of projects. We have the Tieline Genie network up and running, and we are now feeding audio for the Bob Dutko show to Portland, Albany, and Denver. The connections are automated and switched through the Wheatstone XPoint software using Wheatstone's scheduler to make and break connections. So far so good. I have found the Tieline equipment to be easy to work with, and very reliable.

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### News From The South

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

The weather here has actually moderated as I write this. Today was absolutely beautiful: sunny, breezy, with a high in the 80s. We're supposed to have a record low tonight. (Must be Global Warming.)

But prior to this nice spell, we've had nothing but one storm after another. We've had one frontal system after another. It has been so humid, we've been draining the condensation from the dehydrator compressor at the WYDE-FM site a couple of times a week.

We didn't have much damage, thank the Lord ... but finally, our number came up at a couple of sites.

#### Power Outages And Lightning Damage

In July, we had some power outages coupled with generator issues at the WYDE-FM site in Cullman. We started popping off air. Normally, this is for no more than a few seconds: the generator comes on, we switch over, and the BE FM30 automatically brings itself back up and makes a loud 'ping' noise on the air when it does, believe it or not! Not sure how it does that...

But now, the outages were lasting longer. Something wasn't right. It's a 50 mile drive from Birmingham and the first few times this happened, the utility came back up before we could get there. We had just had the generator serviced a few months ago and everything was fine. We had replaced the controller card in the transfer switch just last year, too.

We were really scratching our heads until I managed to get there while the utility was still down. The generator was running, but the transfer switch was still in the 'Utility' position. It hadn't changed. I was just getting ready to manually honk it over to 'Emergency' when the utility came back up. I then tried the generator manually and was able to make it work, so I just scratched my head. We had only lost

one phase from the utility, so I figured, maybe that old controller was just fooled by that.

Then it happened again. Once again, I arrived to find the generator running but no transfer. Thankfully, the utility came back up before we lost any revenue (or I had to do the

mentioned manual 'honk-over' in the rain!). But I asked Todd to call our local service company; they aren't cheap, but we had no choice. They sent a tech to investigate.

Obviously, the controller wasn't seeing the right voltages from the generator. The generator was definitely doing its job. (I had already confirmed that before we called for service.) The technician put his test probe on the controller card and all the

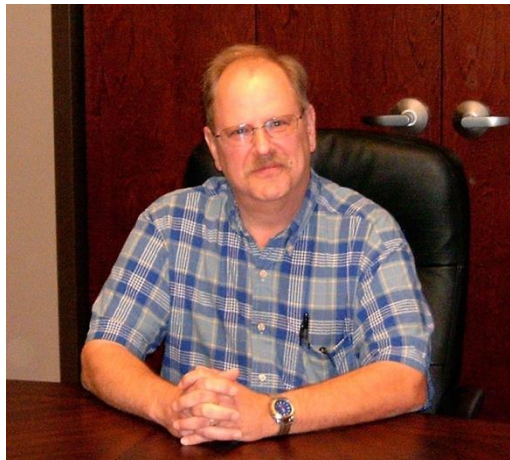
voltages were there. He pulled the connector and checked the voltages on the 'bottom' of the connector (i.e., where it plugs into the board). The right values were there.

Long story short, he finally found it: a very intermittent loose connection. His high-impedance meter didn't draw enough current to make the voltage drop, not even with a corroded crimp in the Molex. (Something to keep in mind, by the way; that can bite you. Some Old Timers swear by their ancient Simpson 360s for that very reason.)

At any rate, we fixed it and she's happy. We have a lot of power outages in Cullman, so we want that generator to be ready to go at any time. As many outages as we've had since April, we will doubtless have to refuel it again a time or two before the year is out.

#### Those Data Links (Whimper)

We've been waiting and waiting for a tower crew to come finish our microwave data links here in Alabama. We have yet to get the link from Red Mountain to WXJC, as well as the 'double-hop' from Red Mountain to Cullman, in service. We've



simply been unable to find a crew to come do the work.

Now we have an additional joy: at Red Mountain, a lightning strike knocked out the Trango link to WXJC (1260 AM). Now we're waiting on a tower crew come work on that! In the meantime, 1260 AM is rebroadcasting one of our HD2 channels. We sent our Day Sequerra receivers to the factory for an upgrade; they're reliable enough now for use as an emergency STL.

Todd has become our local semi-kind-of-expert on these data links. His mind must be damaged, because he actually enjoys working with them. He and I (with Cris's help) have become pretty good at programming them, setting up the parameters, all that jazz.

Now if we could just get a crew... and in fact, we're planning to bring in a good company from the West Coast to do the work. It'll cost, but we've been stymied for months here and we simply can't wait any longer. I hope to finally (finally!) be able to report success in the September issue.



**Figure 1 - The dishes are in place, still silent. But not for much longer!**

### Ah, Tower Crews

Now for another rant about tower crews. We've covered this before. Cris mentioned last month how many problems we're having now and pointed out some bad work in Chicago. Earlier, he and I both described in detail the shoddy work that one company did for us here in Birmingham. Cris also wrote a detailed article about this for *Radio World*.

WYDE-FM, in addition to power outages and generator issues, has been under a NOTAM for weeks and weeks. I've had the replacement lamps on

hand for a while; I simply haven't been able to find a crew to install them. As I write this, thank the Lord, we have finally found someone to do the work and we can put at least that headache to bed.



**Figure 2 - The link from Red Mountain, looking toward Tarrant. Also soon to be in service, Lord willing!**

I try to be understanding. Relamping that 1380-foot tower in Cullman is a real job; there are 4 levels with 3 flash stations each, with a final AOL strobe on top.

(Those who are superstitious might note that the tower is about 1300' high and that we have 13 flash stations. But I refuse to surrender to that type of thinking. My God is greater than a mere number! Now, the fact that it is located on a geographic feature named "Schmuck Mountain," might be significant ... but no, I refuse to think about that, either.)

We had talked to two other companies before finally getting this crew to agree to the job. The most aggravating, frustrating and mind-numbing thing is that you'll call a crew, they'll say they'll get back with you... and they never get back with you.

On our data links, we have one company that has repeatedly promised, double-dog spit swear, that they'd be there by the end of the week... and then never even showed. Never called, never emailed.

On WYDE-FM's relamping job, we finally had one crew show a few weeks ago. They took one look at that big, tall tower and got cold feet. No, I'm not kidding. This guy complained that he was getting old and just didn't want to climb something that tall. Whimper.

As Cris pointed out in his *Radio World* article, though, things have changed. Broadcasting only represents a small fraction of their business. Most of it is work for the wireless phone companies



and other large companies.

## OSHA

But regardless of where the work will be done, OSHA is now keeping a closer eye on it. We have to protect ourselves, so we require a liability disclaimer, signed by the supervisor or owner of the company, before they ever set foot on the tower. Cris explained to me that it's especially important to make clear that *we do not in any way "supervise" the crew while it does the actual work*. We tell them what we want done, we establish the lines of responsibility and they take it from there (we take responsibility for reducing power or removing excitation from an antenna the crew is working near, but it's up to them to advise us when they reach that predetermined point).

In fact, I was in Cullman today, meeting with the crew that was going to do the relamp. We talked about this and they told me that, yep, OSHA is really poking into their business now, too.

Nowadays, someone running a tower crew must follow much stricter guidelines. They have to be certified and undergo periodic training and testing. There's a written test, and of course they have to demonstrate proficiency and safe operating practice on an actual tower.

One test is rescuing an injured buddy. They split into two man teams and take turns: one guy will play the injured guy up on the tower; the other goes up to "rescue" him and slowly lower him down. They are required to carry all of the necessary equipment to be able to do that rescue, too. The days of, "Two Tower Guys Working Out Of Dad's Pickup Truck" are over.

(This increases the cost, of course, but I see a bright side. One of the crews we formerly used just hired drinking buddies from the night before a job. We called them the "puke crew," if you'd forgive me for being blunt, because every time they'd climb, someone would invariably hurl from the heights. Todd and I quickly learned to stay inside the transmitter building. Way inside.)

Some of these companies may be very safety-oriented now... but that's it. They *only* know

safety. They know nothing about basic troubleshooting, using a meter, or how to correctly attach coax and connectors. Many of them don't really know how to deal with microwave data links: how touchy they are to align, how critical it is to get the polarization right, and so on. They might *ó* *might* *ó* be able to install an RJ45 connector (I've had several crewmen brag to me about this), but that's about it.

The crew that did the horrible work on those data links was SAFE. They were the most safety-conscious crowd I had ever watched. They charged us *out the nose* for the work that they did, primarily because they were constantly taking breaks and tying off every few feet, installing temporary safety lines and having daily "safety meetings." They required hard hats anywhere near the tower. They had fold-out sandwich signs announcing this fact. They would not let *me or Todd* near the tower unless I was briefed and was wearing a hat. *Safety!*

I wish they had shown half as much interest in little things like, oh, say, not leaving off the weather caps, not stripping the bolts on the AZ/EL adjustments, properly grounding everything *ó* you know, the *minor* details. But *daggone*, they were *safe!*

I guess we will just continue to do the best we can do. We'll ask for references and only hire people whom we can trust. Cris wants photographs from the tower now. I will obey *ó* not just because it is a Rule From The Boss, but because I wholeheartedly agree with him. The burned hand teaches best.

In the past, we could trust tower crews to at least do a halfway-decent job. And let's be honest: at lower frequencies, you could sometimes "wink" a bit on some of it. Miss a screw here, forget some tape there, it wasn't the end of the world. But not at 11 or 18GHz, and certainly not with electronics mounted on the tower.

Ah, but now I'm just repeating myself and telling you what you already know. Sorry. No need to keep floggin' that horthie. Until next time, keep praying for this nation!

**Mainland Memoirs**

**By**  
**Bill Agresta**  
**Chief Engineer, KBRT**

Greetings from Southern California! As you may remember, last month I was awaiting Cris's arrival to complete the installation of our new dummy load at the KBRT transmitter site. Now that is done and moving forward, we have begun to put together our new San Diego station, KNSN. I still have plenty of ongoing work at KBRT (like those weeds in our transmitter field that seem to never stop), but those projects will be juggled in here and there, many on the weekend for now.

As we move forward, I'm praying that our new Ethernet network at KBRT stays solid. We have had a hiccup reported here and there, but since I have yet to see any of these issues myself, I'm praying those are simply operator error as our staff is getting used to operating the new network. For now, the main focus of use for this network is to make audio available between our FTP download machines, a few machines used to edit only and our Nexgen system, without having to walk around sticking flash drives and CD-ROMs in here and there as we were doing. This should make the process easier, faster and save us money on CD-ROMs.

I have also begun to update our studio speakers, installing powered speakers in most of our studios. The old speakers were so big that people were hitting their heads on them once in a while, so our board operators are glad to see the new speakers go in. I am amazed at how nice these small, Fostex

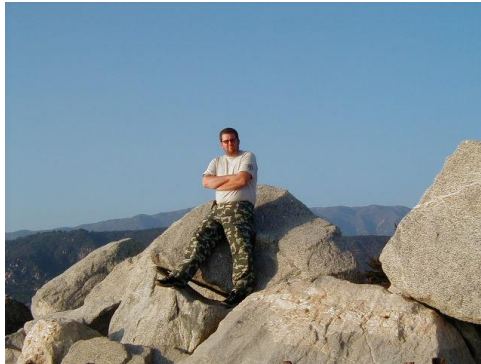
powered monitors perform. They sound a lot better than those bulky JBLs that were so heavy. I never felt good sitting under them, and of course, most of these

new speakers cost less than half, many times one-quarter the cost of those old JBLs. And another plus is that there is no need for an amplifier (and those Crown D75s were not cheap either!). Seems so crazy after all we paid for those. A close friend of mine who works as an engineer for Fox has a shop full of JBL studio speakers and D75s because they were throwing them away. How times change!

As I move forward in San Diego, we will be purchasing some basic office/studio furniture, a network router, then assembling everything needed there at the El Cajon office/studio location. After that, it's up to remove some old equipment at the KNSN transmitter site just south of downtown San Diego and get it prepped for the new rack and Nautel J-1000 transmitter.

I have decided that I love San Diego, but after this work is done I am saddened that my visits will be limited to once or twice per month as I am needed there. Thus far, everything is moving along on schedule with this project and I pray we might even get this one done ahead of schedule.

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

June and July, as expected, brought their share of electrical storms, and we had more than our share of difficulties through the storms. This is not uncommon, since we broadcast engineers know that lightning storms will usually get us at one point or another.

I was surprised, however, by what took place at the WPWX transmitter site in Burnham, IL. Not only is there a generator in place, but a flywheel UPS was installed ten years ago to cover the gap between the time the utility power goes down until the generator is up and running.

We had a couple of storms come through the area on June 30<sup>th</sup> that produced eight tornados, so there were a lot of outages in the area that lasted for days. We had a problem with the studio generator that cost us about 45 minutes of off-air time for all four stations. The generator had an alarm that was causing it to be stubborn after startup, but we eventually got it back up and running and the stations back on air.

The generator/UPS at the WPWX transmitter site that night performed exactly as expected. We never had a second of transmitter down time. However, the next day with clear skies in the area, it became a different story. Apparently, the utility company was working in that area, restoring power to other customers, and we had surges coming through the lines.

We would expect that the UPS and generator would handle these situations without any problems. The UPS is designed to handle any change in voltage levels within milliseconds. However, the actual experience turned out to be quite different. Not only did we have off-air time but we sustained damage to both our main and auxiliary transmitters. Some other equipment suffered as well.

I was actually watching the events play out through our new remote control, through the ARC Plus Touch mobile web page, even though I was a hundred miles away at our Kirkland transmitter site. This certainly provided me with some insight. I watched the generator start up and run for minutes and then stop. This was occurring about every ten

minutes that afternoon, coinciding with the times the transmitters would go off air.

In the meantime, we were seeing surges noted by the transmitter final voltage and amperage readings and then going off air. This shouldn't have occurred with both a UPS and a generator. We contacted our generator repair tech and the UPS tech support to have them look at what was happening at the site at that time.

Each of them was able to produce logs from the events so we could see what was happening. As you might expect, each of them also pointed the finger at the other.

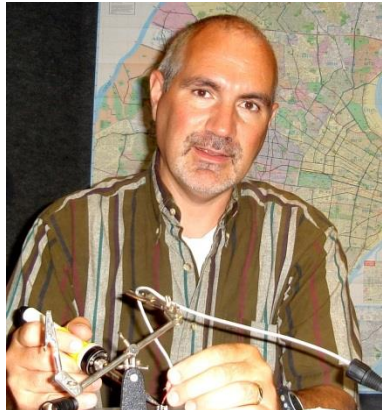
Everything was given a clean bill of health by each tech support company, which still left us with the question of what happened. We then had a repeat of the same problems the next weekend, thankfully without the transmitter damage.

I started digging through the logs generated by both UPS and the generator and studying how each was setup in its configuration. I was hoping to find out why, if both were working properly, we would still experience the problems, including the off-air time we had.

The flywheel UPS should provide, even with a full load, about 20 seconds of useful time. That should be enough time for the generator to get up and running and then transfer to carry the load. However, that was not our experience recently. When I looked at the UPS log, I definitely saw times where the UPS had completely discharged after 37 seconds and then left a log entry that there was no source available. This meant that neither the utility company nor the generator was available.

This would seem like it pointed to a generator problem. But we had a clean bill of health on the generator. I wanted to figure out how this could happen and hopefully find a way to prevent it in the future.

When I examined the configuration settings of the UPS and the generator, I believe I found my answer. The UPS is set to begin discharging milliseconds after the onset of an over-or under-



voltage condition. According to its log, this was working properly. In fact, looking over the log for the past two years, I could see it happens quite often at that site. The generator settings were another story.

When the generator sees an over- or under-voltage, it goes into a three-second hold before it does anything. If the utility comes back on it will stop the cycle. If the utility is not back after the three-second hold, it will then start the engine and wait until the generator is at full speed before transferring the load. If the utility comes back on during the engine warm up it will again stop the cycle and not transfer. This is why we saw the generator come on but not transfer and run for a five minute cool down.

Even after the generator engine is at full speed, it also has a 3 second hold where it will hold the load off from either the utility or generator position. Now again we are talking about 20 seconds of useful power from the flywheel UPS. So with all these hold times, we were right up against the time when the generator was up and ready to go.

But this still didn't explain why we saw a full 37 seconds of discharge and the UPS going into bypass because it saw no source available.

This is what I theorized happened during those occurrences: The incoming utility power was experiencing repeated voltage drops, with a regularity that exceeded the three-second hold time of the generator, but were coming in quickly enough in succession to cause the UPS to discharge completely without the generator ever doing anything.

All it would take is an under- or over-voltage situation to occur at a regularity of about every four to five seconds and you would create a situation where the generator would keep continuing to go through its three-second hold cycles. In the meantime, the UPS would completely go through its entire charge and then eventually go into bypass which would leave the transmitter site open to whatever the utility was sending down the line at that time. Which obviously wasn't good considering it was sending an over or under voltage condition every four to five seconds. This is why we were off air and saw equipment damage.

Now for the solution: I didn't want to completely eliminate the hold time at the beginning because we could have the generator running quite a

lot under the circumstances that occur at the site on a regular basis. That's what the UPS is there for in the first place, to cover those minor outages and keep the transmitter happy without starting the generator.

What we decided to do was to put the hold



#### **Flywheel UPS at the WPWX transmitter site**

time down to one second. This way if one or two of the power cycles were missing we would cover it with the UPS without disturbing the generator. A look at the UPS log showed this kind of event happens several times a day at that site. But a shorter one-second hold time should eliminate the events we saw recently where the UPS is completely discharging without the generator even starting. We also reduced the other three-second hold time where the transfer switch holds between the utility and generator down to two seconds.

The results so far have been good. We haven't seen the generator starting unnecessarily at all, which was a fear of mine, and during the one power outage that did occur, everything transferred cleanly without any off-air time or equipment damage.

The long term results are what will really tell if we have solved the problem, because apparently this has not been a normal occurrence in the ten years since the UPS was installed. However, in my short tenure it happened more than once and we had costly repairs on top of the off air time. So it needed to be addressed.

## The Portland Report

By  
**John White, CBRE**  
Chief Engineer, CBC-Portland

Technology rolls along, though sometimes technology finds bumps in the road and hopefully the bump is not the engineer. And that seems to be the way the transition to Internet codecs is progressing in Portland. Just recently, Comcast installed cable to Mt Scott, finally providing high-speed Internet service. KKPZ installed business service including a "business" gateway modem. And that is where the tale begins.

The bright and shiny new Tieline Bridge-IT arrived with not much info and a cryptic "quick start" sheet. Turns out the quick start wasn't necessary in the mode that CBC will use.

It says here in fine print that all that is required is to forward ports and then we're good to go. Well, it turns out that the words "good" and "go" were not operative in the same sentence. I turned on the codec with port forwarding set at the cable gateway and the connection from Denver delivered excellent audio.

"Good to go," I thought. But the next morning I no connect. So I started to troubleshoot by originating a connection to Denver. That worked and once I disconnected, the automated connection from Detroit clicked on.

To make a long story short, it seems the cable modem/router needs a periodic poke with a sharp stick. Otherwise it forgets the codec exists.

There should be an answer here. I just hope it's not introducing the router hardware to a hammer. What is it they say about living in interesting times?

Over the past decade or so, two disasters have captured the public attention. As Katrina roared down on the Gulf coast, the broadcast industry stepped up to inform the public. As a whole, our industry was ill-prepared to respond to Katrina, and yet the public was informed.

With lessons learned from that, we were better prepared when Sandy hit the east coast. With the approach of the storm, broadcasters in New York sat down and within a few days put together preparation for the coming storm. With little

planning time, our industry again responded.

Both events left us with lessons of what does and does not work. And the threat of hurricane Sandy encouraged an effort to advance our status as "first responder" during disaster.

Here in Oregon, we are preparing to introduce facilitating legislation for the next legislative session. Some of the prior legislation in other states has suffered from one flaw or another. Our hope is to avoid pitfalls with proper preparation. Broadcast engineer credentialing is high on our list of desirable

attributes.

On a separate front, we here locally are developing a "Broadcast Emergency Plan." The plan is not a rigid set of actions so much as it is a set of guidelines. As the executive summary says, "This plan is comprised of decisions that can be made prior to a disaster. It also provides a framework for making decisions during a disaster."

For the first time locally, broadcasters as an industry are working to voluntarily coordinate our resources toward informing the public in times of emergency. Taking a tip from Amateur Radio planning, the draft plan contemplates a coordination net.

The need to coordinate broadcast resources to provide emergency maintenance or restoration of broadcast facilities is not limited to transmitters. The goal of this net is to coordinate the efforts of all engineering resources to the restoration of broadcast signals and content collection resources. Coordination net frequencies are broadcast RPU frequencies.

When normal communications facilities have failed, an alternate information collection method is needed. The draft plan also recognizes the need for a "reporter net." Based on the pool concept familiar to most news media, the reporter net utilizes RPU frequencies to collect information from the field for broadcast. Probably not familiar to the news media, the draft plan contemplates a net control station to minimize congestion.



Finally, the Portland area has an operational Local Relay Network (LRN) that supports EAS. When normal communications facilities have failed, the ability to collect information from emergency responders will be critical. These responders will frequently, but not exclusively, be local, state and federal authorities and agencies responding to the disaster.

These local and state authorities are also likely to be equipped with transmission equipment that connects to the LRN. The draft plan contemplates the use of the LRN equipment to provide a long form communication resource during a disaster.

Stay tuned as the plans progress.

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

**Wheatstone Upgrade Continued**

Last month I talked about our Wheatstone upgrade. We finally finished upgrading our audio servers near the end of July. It was a difficult process. One installation would go fine, and then the next would be problematic. The issues weren't the upgrading of the computers, but just getting things to work. I have no doubt it was user related (pilot error), but I was still rather irritating nonetheless.

The KLTT audio server had been working fine. One day, though, it decided to start turning off channel 1 in the utility mixer which was the feed for ASERV channel 1 when the console was off. As you can figure, this presented a problem, killing the audio for every third item in the log. It's no different than leaving a fader down or turned off when it is used in a rotation. We spent a few days trying to troubleshoot this issue. I'd call RCS support and they would say it was a Wheatstone issue. I'd call Wheatstone support and they would say it's a NexGen issue. And back and forth it went.

Kelly Parker at Wheatstone, who was working overnights on an installation in Alaska of all places, tossed a couple of suggestions over the email transom: "It's the DRR!" That seemed impossible, but we suggested it to RCS nonetheless.

I finally found a couple people at RCS who seemed to understand a little better the WheatNet system, so we went through the settings. Finally, in the source settings for the DRR machine, we found a source that correlates with that ASERV channel 1.

We have no idea how it got there. The DRR CPU is not even linked to the KLTT blade! So we deleted it and it disappeared even from the list of available

sources for the DRR. There is absolutely no reason for this to have happened, but once we deleted that source, the problem went away. What was happening was that when a DRR recording would start or stop, it would turn off all sources, including that KLTT ASERV channel 1.

The KLZ installation was a bit complicated. We waited until last on this one

because it is the one that does a lot of satellite switching. Before we installed this I found a problem with the KLVZ blade. We switch to a satellite show Monday through Friday. The NexGen spots would play during the hard time breaks; however their audio wouldn't go on the air. Instead, the satellite show would stay on. We quickly found out that this system is a bit different and that at each break we have to leave the audio server channels on and just switch the satellite channel on and off to allow NexGen audio through. Once we figured this out we were able to start on KLZ.

I had already told the board ops what to expect so they could prepare. What should have been a quick install ended up taking nearly a full two hours. We ran into some issues but we finally got it. We did find that with the upgraded audio server, we could no longer play a DRR back while it was still recording, at least not with just 30 seconds of buffer. We used to have to wait 20-30 seconds to start playback in order to not have issues, but now the



playback would stop after a couple of minutes. After a couple days trying to figure this out, we decided to just forget it and adjust how we do the playback.

The next step for us will be to have Kelly Parker from Wheatstone come out to Denver and upgrade our XPoint software and do some upgrades on the bridge router system. This will complete the upgrades for the year thankfully.

### More Mowing

I mid-July we were able to get back out to KLTT to finish up the mowing. Thankfully, this time weather was not a factor. It actually was a nice day, overcast and cooler. Mind you, cooler meaning 80s or so, but still I'd take it over 90 degree weather when working outside. The mowing went very well and we got most of the thistle knocked down with our



### Mom mowing the yard around the KLTT transmitter building

new Kubota tractor and the brush hog.

Many thanks for the help of my mom who spent the day with us at the site. I think she may have had a little too much fun on the small John Deere tractor mowing around the building. With everything being mowed, I can now go out to the site and see the prairie dogs and maybe even see some of them die of lead poisoning.

### Tower Work

Over the Fourth of July weekend while I was away in the mountains, I got a text message from the ops manager saying KLTT was off the air. It wasn't, of course, but it didn't have any audio because the microwave link was down. I was able to put it on ISDN remotely to get audio on the air, but I could not get the Trango Apex 11 to reset. Something was wrong with the Trango radio itself. When I got to the office Monday I began working on getting someone to climb. I was able to get Derek Jackson out to help us.

We purchased a spare radio earlier this year and thankfully we were able to get it installed on the tower. Once Derek did that, we could see the studio 11 GHz signal but for some reason the link would not lock. After speaking with Trango we learned the firmware has to be up to a certain version before the newer radio would talk to the older one, and well, we hadn't updated the firmware since we put the unit up at the building in 2010. Once we updated it the radios began talking and we have been fine ever since. Now we are waiting for Trango to fix the radio and send it back to us. They tell us they won't even look at it for another four weeks. Glad we have that spare!

The next day we had Derek out to KLVZ as we noticed a week earlier an issue with the tower lights. They would come and go on the south tower. The day my dad and I went out to look into this was a windy day and we found that if the wind blew just right we'd see a short between hot and neutral in the beacon wiring on the tower (the beacon fuse was blown). Turns out it was just a beacon bulb issue. One of the bulbs somehow shorted out, blowing the fuse and causing the issue. Derek replaced the beacon and all has been fine ever since.

July was definitely a busy month. I am looking forward to starting off my August in the San Juan Mountains of Southwest Colorado. I'd be fishing, ATVing and just plain relaxing before I have to come back to work and begin the yearly task of inventory. So until next time! that's all folks!!!

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The Local Oscillator  
August 2014

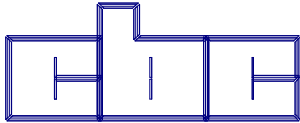
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**KBRT • Costa Mesa - Los Angeles, CA**  
*740 kHz, 50 kW-D/0.2 kW-N, DA-1*  
**KNSN • San Diego, CA**  
*1240 kHz, 560W-U*  
**KCBC • Manteca - San Francisco, CA**  
*770 kHz, 50 kW-D/4.3 kW-N, DA-2*  
**KKPZ • Portland, OR**  
*1330 kHz, 5 kW-U, DA-1*  
**KLZ • Denver, CO**  
*560 kHz, 5 kW-U, DA-1*  
**KLDC • Brighton - Denver, CO**  
*1220 kHz, 660 W-D/11 W-N, ND*  
**KLTT • Commerce City - Denver, CO**  
*670 kHz, 50 kW-D/1.4 kW-N, DA-2*  
**KLVZ • Denver, CO**  
*810 kHz, 2.2 kW-D/430 W-N, DA-2*  
**WDCX • Rochester, NY**  
*990 kHz, 5 kW-D/2.5 kW-N, DA-2*  
**WDCX-FM • Buffalo, NY**  
*99.5 MHz, 110 kW/195m AAT*  
**WDCZ • Buffalo, NY**  
*950 kHz, 5 kW-U, DA-1*  
**WDJC-FM • Birmingham, AL**  
*93.7 MHz, 100 kW/307m AAT*

**WEXL • Royal Oak - Detroit, MI**  
*1340 kHz, 1 kW-U, DA-D*  
**WRDT • Monroe - Detroit, MI**  
*560 kHz, 500 W-D/14 W-N, DA-D*  
**WMUZ • Detroit, MI**  
*103.5 MHz, 50 kW/150m AAT*  
**WPWX • Hammond - Chicago, IL**  
*92.3 MHz, 50 kW/150m AAT*  
**WSRB • Lansing - Chicago, IL**  
*106.3 MHz, 4.1 kW/120m AAT*  
**WYRB • Genoa - Rockford, IL**  
*106.3 MHz, 3.8 kW/126m AAT*  
**WYCA • Crete - Chicago, IL**  
*102.3 MHz, 1.05 kW/150m AAT*  
**WYDE • Birmingham, AL**  
*1260 kHz, 5 kW-D/41W-N, ND*  
**WYDE-FM • Cullman - Birmingham, AL**  
*101.1 MHz, 100 kW/410m AAT*  
**WXJC • Birmingham, AL**  
*850 kHz, 50 kW-D/1 kW-N, DA-2*  
**WXJC-FM • Cordova-Birmingham, AL**  
*92.5 MHz, 2.2 kW/167m AAT*

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