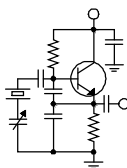


# The Local Oscillator



## *The Newsletter of Crawford Broadcasting Company Corporate Engineering*

---

SEPTEMBER 2014 • VOLUME 24 • ISSUE 9 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

---

### **A Problem Solved...**

At least that's the way that BMW likely sees its decision to eliminate the AM band from the in-car entertainment systems in its i3 electric cars. It's certainly not the way we see it, however, and our listeners would likewise not be pleased.

The problem was reportedly the same thing I observed in another vehicle a couple of years ago, namely hash across the AM band emanating from on-board computers and electronics. You might recall that I observed problems receiving even the strongest AM signals in the Los Angeles area in certain rental cars, particularly those with "glass cockpits" (i.e. computer touch screens instead of gauges and conventional controls).

The worst offender was a 2011 Ford Explorer that I rented while doing the final tune-up and measurements on the new KBRT facility. I found that KBRT's signal was noisy even where it was very strong (over 10 mV/m), and it didn't take long to figure out that the issue was coming from within the car. It was a "perfect storm" of a small-aperture antenna and a high level of spurious products being radiated from the vehicle control system. I could clear it right up by stopping and turning off the ignition. That shuts off all the electronics but leaves the entertainment system running for a fixed period of time (or until a door is opened). In that condition, reception was clean and clear.

Evidently, BMW had the same type of issues, but they were worse in the all-electric car. While we don't know what all went on internally at the automaker, presumably they tried for some time to fix the issue but eventually reached the conclusion that it was not worth the expense of the additional bypassing and shielding it would take to cure the issue. Still speculating here, but I imagine BMW, not wanting to deal with countless owner complaints of problems with AM reception, simply removed the AM band from the in-car entertainment system.

### **Problem solved.**

I think this is a big mistake, and not just because a good part of our company consists of AM radio stations. AM is still a vital communications medium. Think about it. In all the big markets, it's the big-gun AM stations that are the sources for news, sports, weather and local information. AM stations are among the highest rated in the larger markets, and for good reason. In San Diego, where we are building out new studio and transmitter facilities, the LP1 and LP2 stations are both on the AM band. Eliminating the ability to receive AM in the car removes a vital option for those car owners. I can't imagine not being able to receive the local news powerhouse, KOA, here in Denver, not to mention our own KLZ.

A year ago, I purchased a new (2013) Ford Explorer, a "glass cockpit" vehicle with three display screens. Thankfully the hash issues I observed in the 2011 rental are not present in the later model vehicle. I still hear a little computer noise on some frequencies, particularly the lower part of the band, but it is not objectionable. Ford, it appears, was able to solve the issues. I'm sure it cost them something for shielded wiring harnesses and bypasses, but evidently they considered it worthwhile to make that expenditure so that their vehicle owners could continue to enjoy access to all free, over-the-air broadcast stations.

Hopefully, other automakers will follow Ford's lead and not go the route BMW chose.

### **San Diego**

Bill Agresta has been hard at work renovating the transmitter facility of our new station, KNSN in San Diego. He removed the old Gates BC-1H transmitter and the old equipment rack.

Our friends at Lincoln Financial Media referred us to a first-rate electrician that really knows his way around broadcast facilities. He came out and

demolished the electrical feeding the KNSN equipment, installing a new panel and running circuits to the main and aux transmitters as well as the equipment rack. He also installed some conduit runs between the rack and telco board and the rack and aux transmitter.



Bill got the rack populated with new equipment, including the Nautel J1000 main transmitter. The entire radio station, with the exception of the aux transmitter, will be in one rack, a very neat and compact installation.

We still have to get the new 1.2 meter Ku-band satellite antenna and EAS antenna installed up on the roof, but Bill got the old satellite antenna and mount cleared off the roof to make room.

Since both the LP1 and LP2 stations in San Diego are AM stations, we have a bit of a challenge. We will have to receive those at a site from which two other AM stations transmit (KNSN and KURS). I built a trap for both those frequencies in a cast weatherproof project box, equipping it with an integral splitter to feed two receivers from the single rooftop antenna. Hopefully the 20 dB notches for the

local stations will be adequate to allow us to receive the LP stations, both of which are 5 kW and only about 10 miles distant.

We also have to get the new remote control wired to everything, including both transmitters, the antenna switch, the audio switcher and the remote base current ammeter. I plan to do that wiring myself the week of September 8.

As soon as the transmitter site work is done, Bill has to do the local studio wiring, which will be fairly simple. Then he has to do some reconfiguration of the audio chain at our Costa Mesa studio so that we do not feed L.A. area EAS tests and activations down the line to KNSN in San Diego.

All of this has to take place and be fully tested before the September 29 start-up date. If we can get our Internet service installed at the transmitter site (we've been waiting a couple of months now), we won't have any trouble making this date.

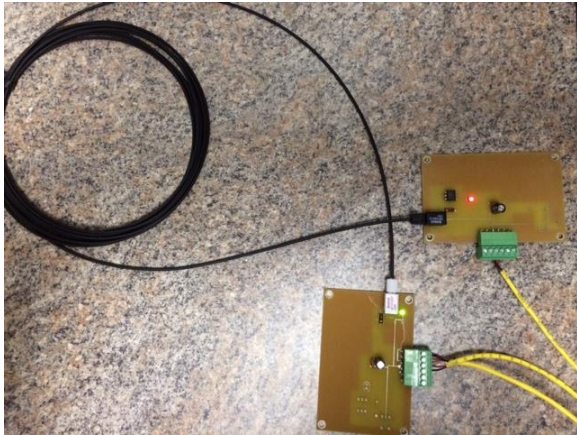
### **Tower Light Monitoring**

Over the last 18 months or so, we struggled to reliably monitor the LED tower lights on the new KBRT towers. We finally invested in a rather expensive fiber-optic solution that couples a contact closure across the base insulator. That did the trick rather elegantly.

Since then I have run into a similar issue at WRDT in Detroit, and with more LED conversions on our AM towers in the pipeline, we're going to run into the issue again. The problem is that the LED lights consume so little power that it's difficult if not impossible to detect the light-on/light-off current delta on the primary side of the Austin transformer. Hysteresis loss in the Austin is at least part of the cause of the primary current not tracking the secondary current linearly. We don't have this issue on towers employing lighting chokes instead of Austins.

The bottom line is that on Austin-equipped towers, we must monitor the beacon current on the secondary side of the transformer. The challenge becomes conveying that sample or the output of the monitoring device across the base insulator of the insulated tower.

Reviewing the pricing of the commercial fiber-optic monitor system, I decided that there has to be a less expensive way to do this. I started at the Mouser Electronics website, looking at various fiber-optic transmitter and receiver modules. Once I found some inexpensive (\$11-\$12) fiber modules, the rest was easy: just some resistors, a 4N25 opto-isolator and some fiber-optic cable and I had all I needed.



**Figure 1 - CBC custom tower light alarm fiber-optic system. The unit at the bottom is the transmitter and the unit at the top is the receiver. An LED on each unit indicates an active (alarm) state.**

Amanda has a cool electronics breadboard that I used to build up a prototype. It took some tweaking of the resistor values, but I got it all working. I then sketched out a schematic, designed a printed circuit board that would serve as either a receiver or transmitter, and had a batch made. By doing a single board instead of two, I cut our production costs nearly in half. Just populate one end of the board if you want a transmitter, and use the other end if you want a receiver.

The end result is exactly what I wanted. Close the contacts on the transmitter end and the open collector output of the opto on the receiver end goes low. And all this for about \$30 per tower! Contrast that with the cost of the commercial units that cost almost 30 times as much.

As we get into the LED tower light world more and more, we are now prepared with the devices we need to monitor off the tower. We'll simply use SSAC self-calibrating LED beacon monitors on the towers and employ our CBC-manufactured devices to relay the alarm signals off the towers.

### **New Tower Regs**

The FCC has enacted some new tower

regulations. The focus of the new rules seems to be closing the gap between FAA regulations and FCC rules, making the two rule sets consistent where they affect antenna structures.

One new requirement requires that owners display the Antenna Structure Registration (ASR) number so that it is visible to a member of the general public who reaches the closest publicly accessible location near the antenna structure base. Practically speaking, in situations where the property perimeter is fenced at some distance from the tower base(s) (such as is usually the case with AM directional arrays), a sign displaying the ASR number(s) must be posted at the entry to the property (on the gate or fence).

I have purchased a batch of custom ASR signs for all our sites where the public cannot get sufficiently close to any tower to read the ASR sign. We will be shipping these signs to stations in early September.

In some ways, this additional burden is an aggravation, and it requires broadcasters to spend money that gains them nothing. But on the other hand, it does make tower sites more readily identifiable.

Over the years, on several occasions we have received violation notices from the FCC because we did not have ASR numbers posted at the (locked) property entrance. In every case I responded that such is not required by the rules, and in every case the notice was rescinded. Evidently the requirement to post ASR signage at the property entrance was in a guidebook that FCC field personnel carried, but of course the requirement was not in the rules (until now).

By the end of the month and very likely well in advance of the effective date of the new rules, we will have all our signage in place. I just hope these relatively large signs don't end up tagged, shot up or stolen.

### **A Fond Adieu**

At the end of this month, Mack Friday, longtime Senior Engineer at CBC-Chicago, will be retiring. Mack will be sorely missed. We do hope he will stay in touch, and above all, enjoy his well-earned retirement!

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

Hello to all from Western New York! The end of summer is rapidly approaching, which means that we are scrambling to get all our outdoor projects done before the cold weather hits. By month's end, Don Boye of Western Antenna and Tower will have finally completed the tower painting at the WDCZ tower site in Hamburg, NY. A late start last year enabled Don to only complete three towers, and the remaining two have been difficult to complete due to bad weather conditions for the better part of the summer. If it wasn't raining, the temperatures were too low to apply paint. It has been touch and go for the past several months, but the end is finally in sight.

We had secured a contractor last year to repair the crumbling tower foundations at WDCZ, but that work never even got started. The contractor kept putting us off when asked when he planned to schedule this work. After six weeks of almost daily phone calls, I received his insurance cancellation in the mail, a good indication something was terribly wrong. After leaving at least a dozen messages on his answering machine, it was then that I found out he was out of business.

After that, I literally called every concrete contractor in Buffalo to get someone else to do this foundation work, and as soon as I mentioned the word "tower," I was told they do not do that type of work. Running out of prospects, one of the contractors I had previously called gave me the name and number of a specialized contractor that he knew could do this kind of job. He came out and looked at the work needed, and yes, he could make the much needed repairs. I have been waiting for a month for a quote on the cost of the job, and just recently received the job estimate. Once approval is obtained, we will have to expedite his services to beat the cooler weather.

The final project to be completed at this site is the driveway repairs. The first 50 feet of asphalt is

crumbling, along with the culvert that runs underneath the driveway. The company that installed our new driveway last year at the WDCX transmitter site was approved to make these repairs, but have been extremely busy this summer with much larger projects. Hopefully they will attend to our project in short order. Once all of these are attended to, this site should be in good shape for years to come.



It's been quite a busy month in the engineering department of the Western New York CBC stations. We purchased two

new Burk ARC Plus Touch remote controls for our Buffalo stations, which replaced an older ARC-16 at the WDCX-FM transmitter site and Gentner VRC-2000 at the WDCZ site.

Along with the installation of these, we also upgraded the operating software in our Nautel NV40 transmitter. This was the first upgrade we have installed since purchasing the transmitter several years ago. For some reason, we were never notified that updates were available, and were unaware of such until Cris was able to remotely get into the transmitter's AUI and found that we were several updates behind. Nautel was quick to get us the flash disk to upload the new software, and the upgrade went very smoothly. We are now safeguarded with Nautel's "phone home" feature, which will notify them immediately when there is an issue with the transmitter. This is quite convenient since we only visit the site once weekly.

We had a blower motor recently fail in the WLGZ-FM transmitter in Rochester, and the replacement of the bad motor was scheduled for Sunday afternoon August 3<sup>rd</sup>. Upon arriving, I found that the transmitter had taken a lightning hit during a recent storm. Hardly anything worked on the Continental 816-R3C transmitter's controller board, and the reflected power on the power meter was at full scale. The BE digital transmitter would not come up at all, and the fault light on the transmitter's



control panel could not be cleared.

Suspecting a problem with the injector, I switched the digital transmitter directly into the auxiliary antenna and it came up with no problems. I switched it back to the injector's input and again I got a fault light that would not clear. Now on to the Continental transmitter's problems.

After pulling the controller board, I found several traces that had opened due to lightning. I was fortunate in that all of the opened traces were able to be repaired, and after replacing the voltage regulator, the board came back to life. As far as the reflected power goes, it was still full scale, so I bypassed the injector and plumbed the transmitter directly into the main antenna, and all was well with no reflected power.

Being a Sunday, I knew that there was no one at ERI that I could talk with about the injector problem. While on the way back to Buffalo, thinking while driving about the problem, I realized that I had not checked the reject load to insure that it was presenting 50 ohms to the injector. If one or more of the load resistors failed or changed value, it would definitely cause high VSWR in both transmitters.

To make a long story short, on my next visit to Rochester, I found that the reject load was over 76 ohms! Without a doubt, this was the cause of the VSWR issue. I pulled the load and brought it back to Buffalo to work on it. I had about a dozen used load resistors in my shop, and used some of these to replace the suspect resistors. Once I was done, I measured 51.5 ohms into the load, which I could live with. Next trip over, I will reinstall the load and replace all the plumbing I had to change to put the transmitters direct into the antennas.

With the cooler temperatures and rain we have had this summer, it has been difficult to keep up with the mowing at our transmitter sites. The grass seems to grow quicker than I can cut it. It feels like I am spending at least 20 hours a week on the tractor to keep ahead of the growth, but so far, Mother Nature is winning that battle, at least for now.

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

---

## The Motown Update

By

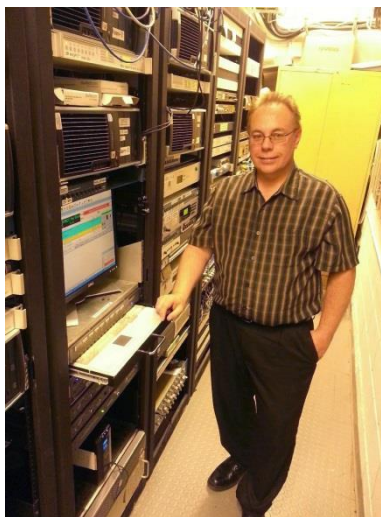
**Brian Kerkan, CBTE, CBNT**  
**Chief Engineer, CBC-Detroit**

Greetings from CBC Detroit! A number of projects have been completed in this month. We installed a new Slatercom LED lighting system on the WMUZ tower, and I connected the new lighting panel to the WMUZ remote control system.

Then I found that the Burk ARC16 which we use for WMUZ had version 4.6a firmware, which meant that it would not communicate with the Autoload program. I had recently upgraded the ARC16 at WEXL to an ARC Plus Touch system. The retired ARC 16 system at WEXL had version 5.4, so I was able to swap the systems. That made programming a whole lot easier than using DTMF for everything!

I prepared the WMUZ NV-40 for Omnia Direct. The firmware and AES cable are in place and we should be up and running by the

end of August, feeding composite to the transmitter via AES.



beacon.

Some of the towers still had the old

WRDT had its tower lights converted to LED fixtures in the past, and upon inspection I determined that the current sensing relays that were in place with the old incandescent bulbs was not sensitive enough to reliably detect a beacon failure through the Austin transformer. I had to pull the beacon fuse on the tower to verify it. I used a TLM-2 tower light monitor from FM Services as an option to monitor the LEDs, but I had to locate them on the tower. The current delta of the LED lights was not sufficient to detect on the primary side of the Austins. The beacon current transformer is now wired in after the flasher module to reliably detect the

mechanical flashers in place. I ended up moving the photocell back to the tower, allowing the monitor board to have power at all times. The TLM-2 will detect beacon out, flash rate, flash fail, and side marker failure. It has a timer to determine if the photocell is failed and leaving the lights on during the day.

Contacts on the TLM-2 are provided to interface the alarm outputs to the remote control. I started looking for options to get the control signal across the tower base. I found a low cost RF board set that provided a digitally coded signal to a receiver board located in the ATU building.

The receiver has relays that I utilized to get

the signal back to the transmitter building across existing house pair. It is set up as fail-safe, so if the power goes out, if the RF board set fails, or if there is an alarm, all conditions will cause a status change on the remote control.

The RF transmitter has a 12-volt input, so I was able to use the TLM-2 power supply and the set of relays to turn it off if a failure exists.

Cris Alexander also designed a low-cost fiber solution that will work well for monitoring LED AM tower lighting across a transformer. The solution is under \$100.00 and would be worth considering in congested areas where an RF solution could be adversely affected.

---

### News From The South

By

Stephen Poole, CBRE, CBNT, AMD  
Chief Engineer, CBC-Alabama

The weather here in Alabama has been HOT. Hot and humid. We've had air conditioners railing right and left, and tower light issues, and transmitter blowouts. We've had *fun!*

#### Contactors Burnout

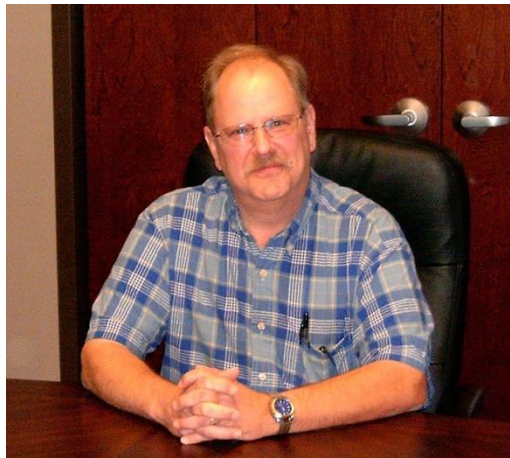
The Broadcast Electronics FM-30T at WYDE-FM in Cullman decided last week that it wasn't getting enough attention. We'd been there a lot lately, what with tower light issues and air conditioner problems (more on those in a moment). But apparently, we weren't petting it and saying, "good transmitter" often enough.

This latest event started with a phone call: the FM was off air. I was able to get it back up via remote control, but the power was low. I headed to Cullman (about a 50 mile drive) to take a look.

The plate voltage on the FM-30T was about 6,000 volts. It normally runs around 9,500, so I immediately suspected the high voltage contactor. Again. I've lost count of the number that we've replaced over the years. That's definitely a weak spot in that transmitter. In my opinion, that contactor just isn't beefy enough.

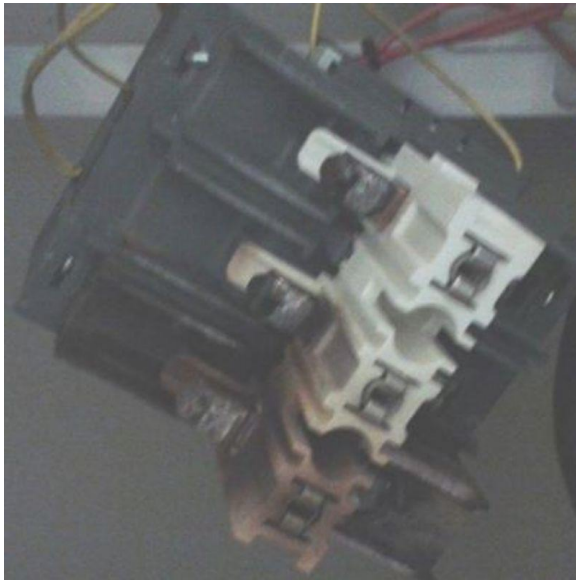
Fortunately, it's not hard to take that contactor apart. The coil assembly is spring-clipped

in place; you simply twist four screws a half-turn and it pops right off. But Figure 1 shows what that revealed (not pictured: pieces of burned phenolic scattered on the floor of the transmitter).



These contactors can in theory be rebuilt, but this one was so scorched, I just didn't trust it. (They ain't all that reliable to start with, remember.) I called BE and of course, got someone's voice mail. I waited and waited ... then called back, got an operator and said, "I require a human." I was eventually routed to Jeanne in parts, who told me that they didn't have that contactor in stock.

While I looked for (and waited for) a contactor, I had a choice: I could stay on the BE at reduced power, or go to the Continental 816-R4 backup transmitter. Those were great transmitters in their day, but this one is not only old, it has a lot of corrosion inside. I don't like running it unless I have no choice. Sure enough, when I fired up the filaments on that old 816-R, some rust flakes blew out of the top. I left the BE on at reduced power while I (re)cleaned that Continental very carefully, especially around the tube socket and anything near a high voltage.



**Figure 1 - Burned and melted and melted and burned.**

We had received that Continental as a hand-me-down from Detroit. I told Cris that they must have had a lot of humidity up there because there was so much corrosion inside. We've been cleaning it regularly, but it seems to breed rust. Cris said, "Yeah, Detroit is near these things called the Great Lakes. They're called 'Great' because they're really big." Heh.

I'll tell you what, though. That transmitter ran a bit hot, but it saved our bacon. The truth is, I think those old Continental exciters sound better. No doubt they aren't as linear, but it's a nice distortion. Or something. They're just warmer and sweeter to me.

Meanwhile, we looked for a replacement contactor. Todd called our heating and air guy, thinking he might know someone. I talked to him, and the result was one (1) astonished HVAC tech. The largest he deals with is 100 amps. I tried Grainger and looked online. Finally, I decided that I would just have to order it from BE and wait. But when I called back (after begging for a human again), Jeanne told me that their supplier had one on hand, so they'd be able to ship it right away! Go figure.

The contactor arrived on Saturday. I drove into the studios to pick it up, then headed to Cullman to put it in. The result is shown in figure 2.

Cris tells me that we will be getting new Nautels in the near future. They'll be most welcome. But honestly, I'm torn about whether to keep the old Continental or the "newer" BE as our auxiliary. The

Continental sounds better, but let's face it, it's old. (It still has the tube driver stage.)

On the other hand, while the BE FM-30T has problems, I know most of them now and can work around most of them. Off the top of my head:

1. Lose the IPA? Re-bias the tube for class A/B and drive directly from the exciter.
2. Lose the screen supply? You're still on air, but at lower power.
3. The thing arcs and trips the breaker? Use a long 2x4 to reset it from a safe distance. Wear shades. (The hat at a jaunty angle is optional.)
4. High voltage multiplier annihilates itself and burns a hole in the RF cavity? Time to braze a patch.
5. Controller dies and/or starts doing inexplicable things? Replace the power supply.

Rinse, repeat, wipe hands on your assistant's shirt. All of these are real-life problems that I've had with these wonderful transmitters. But I figure we'll stick with the BE.



**Figure 2 - The new contactor in place. Wonder how long it will last?**

#### **Air Conditioning**

We had some really mild weather for several days in mid-August, but then the weather turned oppressively hot and humid again. Naturally, and of course, several of our air conditioners decided to fail. As I write this, there are five invoices waiting in my inbox for PORs and processing.

At WDJC-FM, the problem was a bad expansion valve. That building has an emergency



vent fan, but when it's already 100 degrees outside, that doesn't help much. The IDI computer kept freezing because it was just too hot inside that building.

At WYDE-FM, we had a similar problem: a leak in one of the lines let all the coolant out of one of our units, so the building was too hot. (This was while I was up there working on the transmitters.) That IDI computer kept hanging as well, and once again, the emergency vent fan only helped so much.

At WXJC-FM, the compressor exploded and emitted black smoke while Todd and the HVAC guy were watching it. This one didn't require much troubleshooting, but we had to buy a new compressor.

Finally, the rooftop units at the 120 Summit studios failed twice requiring emergency service. The problem was that the stage 2 compressor wasn't coming on due to a faulty controller.

I tell you, I know the new units are more efficient, but they just don't make them like they used to. And that's a fact.

### **Tower Lights**

WDJC-FM's middle beacon failed a couple of weeks ago, probably due to mis-wiring by the tower crew that installed it. (See previous issues for much grumbling and general despair regarding this tower crew). We have another guy coming to look at it.

The WYDE-FM site in Cullman went through several NOTAMS before we were able to get a tower crew to relamp that one. One of the flash stations had failed, but because we do things by the book, we called it in to the FAA. Todd says that the tower crew was a bit surprised by that. Most people don't call us until several lights have failed. How they can avoid FCC fines is beyond me. We don't want to take the chance.

As I write this, the tower flashed beautifully for about a week and then one of the flash heads died. We're under a NOTAM again and waiting on a crew that (a) we can trust, and (b) is willing to climb that 1,380-foot tower.

If I didn't have a sense of humor or if I took all of this too seriously or I would be unhappy. But I'm not. I'm delighted, pleased and blessed. Hope you are, too. Until next time, pray for this nation!!!

---

### **Mainland Memoirs**

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

It's been a very busy month as our new San Diego station, KNSN, is getting a major makeover and we are preparing it to go on the air with it on September 29<sup>th</sup>. The new Nautel J1000 transmitter is now installed along with the new Burk ARC Plus Touch remote control and a few other nice and new devices. That should put us on the air in the San Diego area with a clean, solid and very reliable signal. As we prepare our air chain, we are already getting a very positive reaction from the community and our staff at K-Bright is very excited, awaiting the final launch.

The transmitter site in San Diego is an interesting one, sitting in the middle of a police

impound yard. We recently negotiated the use of the small restroom in the barn at the impound yard, something that may not sound like much, but after a



day of working here, being covered in dirt, it is nice to have a big shop sink to use to wash off all that dirt and of course, have a toilet available. The site is located right in a major freeway crossing and has pretty easy access, a major plus compared to many sites. It also benefits from being located within the police impound facility since the facility is well secured and manned 24/7. We

share the facility with a Spanish language station, KURS, on a diplexed, self-supporting tower. Overall, this is a very nice transmitter site, and I believe it will serve us very well for a very long time.



---

## The Local Oscillator

---

Sept 2014

---



We recently leased a small office in El Cajon that will become the KNSN studio and office facility. It, too, is located in a nice setting that serves its function very well. We will be completing the installation of the studio shortly and are in process of hiring staff in the San Diego area.

As I write this I am sitting at a Denny's near the KNSN transmitter site, going over today's plan. Thus far that includes putting a satellite dish on the roof of the transmitter building, installing a disk-cone antenna on that roof, then wiring up our satellite receiver and the EAS receivers. We are praying for a good signal from the LP1 and LP2 stations there. Then we will be on to finishing the RF wiring and a few LAN connections. If all goes well, we should be done before the Labor Day weekend. Cris Alexander arrives for the final touches the week of the 8th.

Well, looks like we are done with breakfast here, so I've got to get underway and get to work. 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.

---

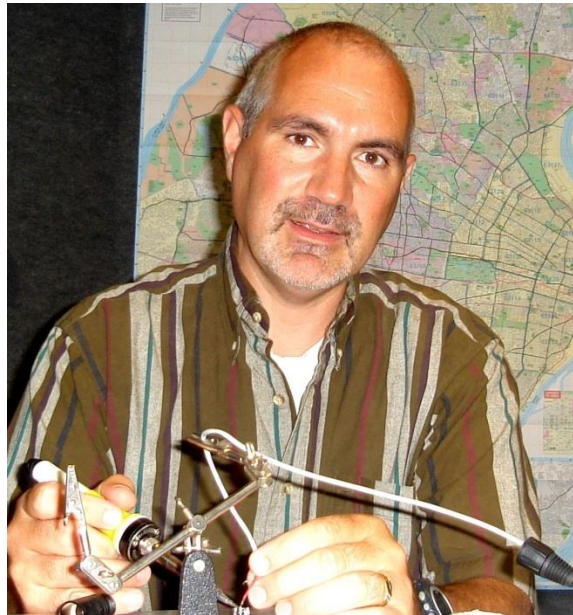
## The Chicago Chronicles

By

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

In 2011, a Nautel NV40 transmitter was installed at the WPWX transmitter site. There are a lot of things to like about this transmitter, and I certainly looked forward to learning more about the transmitter first hand when I accepted this position earlier this year.

I had the chance to see a couple of them up close while working at Clear Channel in St. Louis. We had four of our FM stations located at the "Super Site" there that had ten FM signals combined on one antenna, so I got to see a lot of different FM setups while working at



the site. The two CBS FM stations there recently installed an NV30 and an NV40. Then shortly afterwards, Emmis purchased one for a station they moved to that site. I'll admit that I was guilty of "transmitter envy." Is that a sin?

From what I have been told about the history of this particular WPWX NV40, it has performed well but it did have a few bumps in the road, having lost a few power modules. The conclusion was that we needed to increase airflow through the transmitter to stop losing power modules.

The NV40 does have internal exhaust fans, and we had a shroud already installed to direct the hot air out the building. This had been designed by a local mechanical company, but it seemed like it was not a good design and created too much negative pressure. We asked them to add fans to the system, but it didn't work out with them because they didn't really see what was wrong with the work they had already done.

We got other mechanical contractors' ideas on improving what we had. Most wanted to start the project over and some insisted we couldn't make improvements without starting over or even suggesting we expand the opening in the wall. This obviously was going to greatly increase the cost of the project. That's when we took matters into our own hands. This project was headed up by our Senior Engineer Mack Friday, and he began working with South Suburban Heating & Cooling to add fans to the existing shroud.

South Suburban designed the mounting system that would add the fans to the shroud. The local engineering staff here took care of the wiring, being spearheaded by Mack. At first we went with DC fans and had them completely in place and the system installed. When we went to test the system, the power supplies for the fans began to overheat.

I went over the specs of the power supplies that were being used for the fans. At first appearance they seemed adequate, but there were some variables that hadn't been taken into account, and this was why the DC power supplies were overheating. I wasn't comfortable with this arrangement, fearing we would lose the fans, thus increase the drag on the airflow instead of increasing airflow. Not good for this very expensive transmitter.

I like to keep things as simple as possible, and my theory is the more power supplies you have in line that can take you off the air, the more you're going to go off air! So I decided that we would eliminate the power supplies and just go with AC instead of DC fans. Each fan would have its own fuse and all would then be tied into one breaker at the distribution panel. This way if there was a problem with one of the three fans, it would hopefully blow its associated fuse and the other two fans would keep on working. We might see an increase in the transmitter temperature until the problem was fixed, but hopefully that would not take us down.

Once the AC fans were installed, the system worked great. We could immediately tell the increase

in airflow. In fact, opening the building door became a little more difficult due to the increase pressure created by the exhaust fans.



**NV40 Exhaust Fans at WPWX**

The good thing is that we accomplished our goal. By increasing the air flow, we decreased the temperature inside the NV40. The problem we had immediately following this installation is that we needed to improve the filtering of incoming air. The filter arrangements there were not as tight as they should have been and we definitely had more dirt in the building.

One of the things I wanted to make sure we had was a way to know remotely if we had a problem with one of the fans. This would be very important. I thought about adding a temperature probe to the exhaust ducting. However, there was a very simple solution. The NV40 already had an internal temperature monitor that was available to be connected to the remote control. All we had to do was connect that to our remote control and set up the appropriate alarms.

One of the features that I like about the installation of the new exhaust fan system that Mack and South Suburban designed into the system is a way to bypass the fans. They did this by installing a hinged system of the fan mounting. That way if the fans are not working, we can open up the mounting and remove the fans out of line with the exhaust. We would essentially be at the level of airflow that we had before the fans were installed. This is also very convenient for servicing the fans.

Since this project was well underway before I arrived, the credit goes to Mack and the rest of the engineers here for a project well done.

## The Portland Report

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

The Bridge-IT IP codecs are on line as we finish the migration away from satellite delivery of program services. While the transition went smoothly at other stations, the transition here in Portland was bumpy.

KKPZ has Comcast cable internet business service that ought to do the job. As they say, the saying is easier than the doing. Initially it seemed that the setup and configuration of the new Bridge-ITs went smoothly. The Comcast modem/router was configured to forward ports to the codecs. Asking the Bridge-IT to connect to Denver resulted in a connection.

Once Cris had the Portland Bridge-IT IP address, the automated connections from Denver and Detroit came on line. The audio quality was good, so I began to consider placing the codec on line. Famous last words. 48 hours later, Detroit failed to connect. Retracing steps with the Bridge-IT and gateway found nothing obvious or in error. An outbound connection request timed out. Hmmm. Then suddenly Detroit connected.

I didn't have a manual for the Comcast modem/router and consulting the modem/router help manual returned a lot of not very much. I did an internet search for the key words of the modem/router model number, port forwarding, and manual. The results did not return a link to a PDF of a Comcast modem/router manual, but the results did return a large number of complaints that the unit didn't work in one form or another. Not good. In fact most comments suggested bypassing the Comcast router in favor of an external router.

We tried one solution after another. We even replaced the Comcast modem/router. That did fix the lockup problem but did nothing to solve the connection going to sleep.

To make a long story short, I consulted with Cris, Amanda, and Todd. We made sure the router configurations were proper, and I even tried several other configurations with the same result. The inbound connections worked for 24 to 48 hours, then

failed until an outbound connection was attempted.

Exhausting all possibilities both reasonable and unreasonable, I consulted a local guru. His comment was, "Well you know the Comcast boxes are pretty much consumer products." So I began to

prepare the case for spending the money for a router to handle the port forwarding.

In an example of great minds, when I called Cris to lay out the case, his recommendation was to install an external router. A few days after the new router was delivered, the connection was working and stable. My take-away is that as much as the Comcast internet service is touted as business oriented, it is

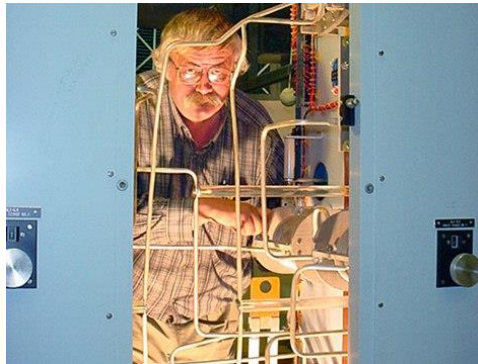
severely lacking in service to meet business needs.

By now most everyone in the industry has heard about the Disney decision to migrate away from terrestrial broadcasting. The local Disney station, KDZR on 1640, is diplexed with KKPZ at our transmitter facility. I don't have any special inside information, but some industry pundits have reported that Disney's decision was impacted by a survey that suggested that only 18% of the Disney audience listened via terrestrial radio.

My observation is that Disney intends to sell the stations in a responsible and orderly manner as they move to a different business model based on a digital format.

Recently a small, Richter 6 earthquake hit the Napa Valley of California. This quake, which caused extensive damage but no reported deaths, portends a possible future for the Pacific Northwest. Much of the California damage was due to liquefaction when soil becomes almost like a liquid when shaken by an earthquake.

The threat here in the northwest is the subduction earthquake, much like the recent quake and tsunami that devastated Japan. Most Northwest earthquake discussion assumes a quake in the 8 range, although numbers in the 9 approaching 10 are possible. Downtown Portland is on fill which is subject to the same liquefaction that damaged the Napa Valley.





While chatting with a local emergency services manager, I learned that the internet fiber trunks serving Oregon follow the fault lines to Seattle. Repair or replacement with alternate trunk lines could well take three to five years. One presumes that would also impact long distance

service.

Local emergency services managers say that even if they had unlimited resources, a major quake would overwhelm responders. Local planners have promoted ordinary citizens training in the form of Neighborhood Emergency Teams.

---

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

August started off beautifully! I spent the first week of the month in beautiful Lake City, Colorado. It is a yearly trip I've done for as long as I can remember with my parents and now with my husband also. The fishing wasn't all that great but it was still nice to get away from everything for a week. August has been a slow month here at CBC-Denver. We haven't had any projects going on.



back to Day Sequerra for repairs. The units would reset the IP address after a reboot, sometimes the

stations would reset, and one unit the unit would default to European channel spacing (9 kHz).

After the units were returned, within months we had other issues come up that they wanted us to send them back for (again). Thankfully, I was able to sweet talk them into sending me the new boards that needed to be installed. This fixed the

### **Healthline**

We have had some issues with the feed from Healthline. We receive the feed from Cumulus Satellite. One week the feed sounded like they were in a tunnel. The next week there were chirps and stutters here and there. Then the tunnel was back. I was able to get in touch with Cumulus and they verified that is how they are receiving the feed from GABNET. Now we are waiting on GABNET to get the issue fixed.

issues we were having.

After having one of our board ops let me know the red light on the Arbitron monitor was flashing, I went to reboot the M4.2S for that station. This typically fixes the issue. What I found this time is it would not respond. I could not get the front panel buttons to work and a reboot did not fix the issue. We had to send that unit off for yet another repair. Hopefully the fifth or sixth time is the charm right?

### **More Mowing**

It appears that we need to mow again at the KLZ transmitter site. Thankfully it's not much but enough that we need to hook the brush hog up to the tractor and make a few passes to cut down what's grown up.

### **What's Next**

September will be a month of inventory and figuring our next year's budget. Inventory is always difficult as we have so much stuff in Denver, especially out at the KLZ transmitter site (where we store surplus equipment for the whole company). I am hoping I did a better job this year than in years past at keeping up with changes to the inventory.

### **Day Sequerra**

It seems that since we upgraded our studio monitor receivers to the new M4.2S units, we've had a lot of issues. We have had to send all four units

That about covers it for this month. So until next time! That's all folks!!!



---

The Local Oscillator  
Sept 2014

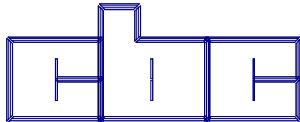
---

**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*  
**KLVS • Denver, CO**  
*810 kHz, 2.2 kW-D/430 W-N, DA-2*  
**WDCX • Rochester, NY**  
*990 kHz, 5 kW-D/2.5 kW-N, DA-2*  
**WDCX-FM • Buffalo, NY**  
*99.5 MHz, 110 kW/195m AAT*  
**WDCZ • Buffalo, NY**  
*950 kHz, 5 kW-U, DA-1*  
**WDJC-FM • Birmingham, AL**  
*93.7 MHz, 100 kW/307m AAT*

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

---

CRAWFORD  
BROADCASTING  
COMPANY



Corporate Engineering  
2821 S. Parker Road • Suite 1205  
Aurora, CO 80014

email address: [crisa@crawfordbroadcasting.com](mailto:crisa@crawfordbroadcasting.com)