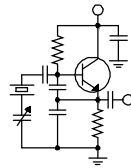


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Out With a Roar

As a rule, things in our engineering operations tend to slow down around the end of the year. Art Reis calls that particular time period the "National Goof-Off Fortnight," and for good reason: not a lot gets done during that time. For me, it's usually a good time to take some vacation, recharge the spiritual, mental and physical batteries and prepare to meet the challenges of the New Year.

Things didn't exactly work out that way this time around. While I had vacation scheduled for the last week of 2011, I ended up taking only two days. I even worked through some of the holidays to keep up.

So what's up with that, you ask? There were several factors. One was that we purchased two new transmitters – one for WYCA in Chicago and one for KLTT in Denver – and both had to be installed before the end of the year to take advantage of a significant tax savings. Art and his crew were able to get the WYCA transmitter installed and on the air in time, but in Denver, Amanda has no "crew," so it fell to me to help her with that project. We could have brought in a bunch of contract labor (and we did bring in some – it was a big project after all), but where's the fun in that? The last new transmitter I got to install was probably the transmitter we replaced at KLTT, and that was 16 years ago!

Another factor was that the planning work continues on the new KBRT mainland transmitter site. It is my hope that by the time most of you read these pages, the filing for the first phase of that project – grading and drainage – will be done and under review at the county. The list of tasks that project entails is seemingly endless, and dealing with engineers, surveyors, utilities, county officials and countless others in the process is a full-time job in itself.

We also have a couple of antenna projects

going on. In Buffalo, the new ERI SHPX-10AC which we installed back in October is not performing as expected in one key direction, and we are working with the good folks at ERI to remedy this. As best we can tell, several factors that exist on the tower were not and could not be accounted for in the range measurements, and as a result, we have a null in a direction where we should have a lobe. We have a remedial plan in place and are simply waiting on weather and a tower crew to implement it. It's winter in upstate New York, so we may be waiting awhile.

The other antenna "project" is at WYDE-FM in Birmingham. That station is a 100 kW FM with its 8-bay ERI SHPX 1,380 feet in the air. The week after Christmas, the transmitter began tripping off with high VSWR. Stephen used a TDR to look at the 5-inch transmission line. Thankfully that was okay, and with the line thus eliminated as the source of the problem, we sent a tower crew up to examine the antenna. They found that a pinched O-ring had allowed a small amount of water into one bay, which started an arc and destroyed that bay and possibly some other antenna components. As I write this, we are waiting for the manufacturer to open after its holiday shutdown so we can get the needed parts ordered and on the way. In the meantime, WYDE-FM is operating on its auxiliary antenna, which is face mounted just below the main antenna.

So you see, National Goof-Off Fortnight was anything but a time for goofing off for many of our engineers and me. I still need a break, and hope to take a string of vacation days in the early part of this month.

NX50 Installation

The original plan for KLTT's NX50 was to take delivery on Friday, December 23. A couple of things got in the way of that plan, however. One was a day's delay in shipping (which really turned into

three, since the delay occurred on a Friday and the transmitter did not then ship until the following Monday). The other was a snowstorm that piled a foot of the white stuff around the Denver metro area and made successfully getting a delivery truck into and out of the KLTT transmitter site a very iffy thing indeed. As such, we did not take delivery until Wednesday, December 28.



Amanda is the proud steward of the new KLTT Nautel NX50

That delivery date probably worked out better for all involved. I had my doubts that the forklift, our helpers and the delivery truck would all show up on schedule on the Friday before Christmas weekend. Everything worked perfectly for the Wednesday delivery. We got the transmitter, power transformer and ancillary crate off the truck and into the building in short order. In just a few short hours, we had the rig in place with power and transmission line connected.

Don't get the idea that all that somehow magically happened. It didn't. The bulk of the electrical and transmission line work took place on the previous day and on a day the week prior. We had to shut the station off the air for a couple of hours so the electrician could shut power down to the building and cut in the new 480-volt three-phase panel. While the electrician was doing his thing, Amanda and I were punching a 3½-inch hole in the top of the phasor, drilling the six 3/8-inch bolt holes for the EIA flange, installing the flange and part of the transmission line to the new transmitter, and re-plumbing the phasor to make the old main the aux and vice-versa. We did all that during the day so that we could open the back doors of the transmitter building and let in some light. The snow cover worked to our advantage there, reflecting in ample sunlight to allow us to see what we were doing.

Anyway, the conduit run and most of the 3-1/8-inch rigid transmission line run to the transmitter were done and waiting when the transmitter arrived.

We had also pulled out the old Nautel ND2.5 aux transmitter the week prior. On that same day, our general contractor came and enlarged the hole in the drywall to accommodate the NX50. I'm still amazed that the new 50 kW rig mostly fits within the same footprint as the old 2.5 kW aux (plus about ten inches or so). So the site was prepared and we were as ready as we could be for the new transmitter when it arrived.

It didn't take us long to uncrate the transmitter and get it off the skid. We used three 48-inch lengths of ¾-inch iron pipe to roll the transmitter into place, persuading it into its final position with the biggest pry bar that Lowe's sells. Archimedes was right: with a big enough lever, you really can move the world! And those iron pipes also worked great as rollers, allowing us to maneuver the 1,000-pound transmitter cabinet and 1,300-pound power transformer around effortlessly.



Not much to it – AC in and RF out (the rest of the signals enter via the floor trough below)

Nautel had really thought through the issue of getting the power transformer into the cabinet. I remember installing the ND-10 in Dallas back in the 1980s. We had to use two-by-fours to lift the transformer up and over the lip of the cabinet and set it inside. I about busted a gut doing that. The NX50 transformer is a *lot* bigger and heavier, so I was more than a little concerned. Would I need an engine hoist? Maybe something even bigger? As it turned out, I needed only my iron pipes and pry bar. Nautel installed a pair of wheels on one end of the transformer, so we were able to roll it across the floor on those and a couple of the pipes. A section of the rear lip of the cabinet comes off to allow the

transformer to be rolled right in. It was a snap! The biggest challenge with the transformer, as it turns out, was getting it off the skid and onto the floor without dumping it on its side.

With the transformer inside the cabinet, it was a simple matter of connecting primary and secondary wires, connecting the RF output, and going through the commissioning checklist. We started at 9:00 AM that day, and by 3:00 that afternoon, we had 52,650 watts from the transmitter making a lot of hot air come out of the dummy load! That was pretty much where we left it on Wednesday.



The safety interlock system is simple – turn off the 480V switch on the left and that frees up the adjacent key, which will then open the back door of the transmitter. The key won't come out of the back door until the door is securely closed, and power cannot be restored until the key is replaced in the 480V switch. Simple but very effective!

Amanda and I hit the ground running on Thursday morning. While I went to the site and began the remote control, phasor interface and audio wiring, Amanda went on the hunt for a length of RG58/U and some BNC connectors for the 10 MHz reference signal from the rack-mounted exporter to the internal engine. We also needed some diodes to steer and isolate the phasor low/high power interlocks to the main and aux transmitters. By the time she got to the site late that morning, I had the audio and R/C wiring completed and was ready for the coax and diodes. By mid-afternoon, we had everything wired,

checked out and mostly working.

The instruction book wasn't entirely clear on some things, particularly IBOC operation. While it pointed to creating a preset for IBOC operation, it did not describe in detail the various options for IBOC + AM operation. As a result, I wound up with two audios on the analog channel, one time-shifted about half a second from the other. A phone call to Nautel support didn't get me an answer directly, but by talking to those folks, I got a clearer picture of how things worked and figured the problem out on my own.

With the spectrum analyzer display on the



The NX50 AUI screen – a thing of beauty.

user interface, it didn't take me long to tune up the IBOC. The spectrum looks pretty good, and HD performance is incredible. Out in the field, KLTT locks in digital in about a second and stays locked, both day and night. It's by far the best HD signal in the market, and the analog AM sounds great, too.

We still have a one issue to resolve. To keep both main and aux transmitters 100% capable, we will need a pair of AES distribution amplifiers to split the AES-1 and AES-2 outputs of the Omnia5.EX to feed both exporters with digital and analog channel audio (both are AES, but one is digital and the other is analog – that analog AES label still confuses me!). We also have to make the required occupied bandwidth measurements, which were due for the station the first week in January anyway. Amanda deliberately held off making them until the new rig was in and running to avoid having to do them twice.

The New York Minutes

By

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

Hello to all from Western New York! It is hard for me to comprehend that another year has gone by, and so quickly! It seems like yesterday I was shopping for a new lawn tractor for the WDCX-FM transmitter site, and now here it is, January 2012!

I've heard many of our senior generation comment on how much faster time goes as you get older, and I have concluded that it is fact. The older you get, the faster time flies. I think maybe it has something to do with how our minds perceive our actions, thoughts and daily activities.

For example, I can remember performing specific preventive maintenance duties years ago that took only 20 minutes; now, that same task takes an hour.

When evaluating a problem, it also seems to take a little longer to come up with a solution. It's not that we can't remember how to do things or we engineers certainly know our jobs. It's just that we have stored such a knowledge base on a variety of subjects that it takes our brains longer to connect the problem with the proper solution stored. And by nature, we apply many different solutions mentally to the problem at hand to come up with the correct fix. This all takes time, and it is going faster than you can even imagine.

Our bodies are not fairing as well as our minds. There are numerous tasks I performed while in my thirties that I would not even consider today, such as tower climbing and other vigorous tasks requiring greater strength and stamina. My mind sees my body doing these things earlier, but it cannot comprehend that now is a different time. My mind believes that the body can still perform like a 20 year old, and when I foolishly try, it's "Where's the Tylenol?" time.

I have aches and pains now in places on my body that I never even knew existed. I creak and pop while walking, getting up or sitting down. Any

activity can produce any number of such sounds, most of which are not pleasant!

I have always had a strong belief and

connection with God, but as I get older, I tend to lean a little stronger on Him, to please help get me through the day, or give me the knowledge to correctly fix a specific problem that I have little experience with, to give my body strength enough to perform the task at hand, and if you could, in the meantime, please help me remember where I put my car keys!



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

As you may recall, last month we installed a new 10-bay ERI antenna on the WDCX-FM tower to replace a similar 32-year-old antenna. We had the tower mapped several years ago in anticipation of perhaps renting space on the tower, so we were fully aware of all cable and conduit runs up the tower, and each had been verified as correct.

After installing the antenna, we found that we had lost some coverage area that we previously had, an area up to the northwest in Canada that produced a significant number of listeners and advertisers. We could not understand why we were experiencing this problem; the antenna was installed exactly to ERI specifications and in accordance with the pattern study. We had ERI map the horizontal and vertical relative field at their test site to insure that maximum signal would reach into our target area. The built up a mockup of our tower and all appendages that would affect the radiated signal, then used two bays of the same antenna and measured both the H and V relative fields all the way around. With that information in hand, we should have been able to know that with a specific mounting and orientation, we would produce maximum coverage to our target markets.

One thing to note is that the new antenna orientation did not change from the original antenna.

Only the mounting changed. The original antenna was face mounted on the 186 tower section. The new antenna was leg mounted with the addition of anti-rotation brackets which bolted to the adjacent tower leg.

In mid December, we had Don Boye of Western Antenna & Tower go up and take pictures of the installation and tower sections to see if anything could be seen to cause this problem. I submitted the photos to Cris and waited to see what folks a lot smarter than me would come up with. We also brought in Tom Silliman and had him look at the situation. After a short time, it was determined that a portion of the 3-inch feed line that runs up the adjacent leg of the tower to which the antenna is mounted, was not included in the mapping. The top guy wires, which change from fiberglass to steel some 20 feet down the tower are also in the antenna

aperture and it was impossible to include those in the mockup.

Our best guess at this point is that the feed line and guy wires are somehow skewing the pattern in the 300-degree range. As of this writing, we are waiting for the crew of Great Lakes Tower to come back and move the new antenna to its original mounting position on the tower face. This should give back our Hamilton, Ontario coverage and areas within the vicinity of Hamilton. Hopefully, the winter weather will hold off long enough for Tom and his crew to get this work done soonest! I will give you an update in next month's report.

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, stay warm and happy engineering!

The Motown Update

By

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

Chief Engineer, CBC-Detroit

ZIP One Saga Update

You may recall that last month we had been working with Telos on the resolution of connectivity issues with our client's Telos ZIP One codec. After various software updates and testing with our Telos Zephyr IP and our client's ZIP One (Dr. Joe) we reached a point where nothing seemed to fix the issues.

The folks at Telos were able to replicate the issues with the Telos Zephyr IP and ZIP One. The connectivity problem was determined to be differences with the Fraunhofer codec code between the Telos Zephyr IP and ZIP One. When the ZIP One was designed, many improvements were made to the custom Fraunhofer code. If you use a ZIP One with another ZIP One, you won't experience any of these issues.

The gracious folks at Telos offered to swap Dr. Joe's ZIP One for a legacy Zephyr IP. I took

them up on their offer, and our client is elated. Dr. Joe indicated he would love to buy the ZIP One if the compatibility issues are resolved. He recognizes that the small footprint of the ZIP One would be ideal for traveling. Going forward, having a unit for the home and office would be best. This way he has the flexibility to do his show at home or the office depending on his very active daily schedule.

Telos indicated that they would like for me to hold on to the replaced ZIP One and work with them to field test the new software update that will ensure compatibility with the legacy Zephyr IP. I

indicated that I would love to work with them on this issue. Next month, I will keep you informed as to the progress on this very cool product.

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



News From The South

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

Don't tell Cris, but I'm actually writing this on New Year's Day. And on that subject, Happy New Year! Here's to a better year than ever!

Reflections from 2011 include ...

The Tornadoes of April 27th

Of course this would be one of our biggest stories, if not THE biggest. As I write this, there are areas in Alabama that still look like a disaster zone. It has taken so long in some cases to get insurance settlements, and to find a reputable contractor, that there are some homes and businesses that remain damaged. One of my neighbors on the next street over still has a blue tarp on the roof.

In Fultondale, some businesses may never return. The Super 8 and Days Inn motels on Highway 31 just south of downtown have been abandoned since April. It's beginning to look like they're closed permanently. Just north of them, past a row of abandoned and destroyed homes, an apartment complex continues to do repairs to its roof and upper walls.

I continue to thank God for his mercy toward Sandy, me and all of my friends and co-workers. But there are very few people in Alabama who don't know someone who was badly hurt or killed by those terrible storms. One of our tenants downstairs lost his mother. We're going to be living with this one for years to come.

The Great NexGen Upgrade (And Beta)

We finished our server replacements around the first of 2011, then helped several other markets with their own upgrades. As I said at the time, it was kind of surprising that NexGen didn't have a clearer (and easier) upgrade strategy for their servers. It turned out not to be a huge deal, primarily because NexGen essentially uses some standard and well-understood techniques (such as Windows file sharing).

Last fall, we offered to help RCS beta test

the latest version of NexGen. We were on an older version, so Todd first upgraded us to the one prior to the beta. We then installed the beta, as did Amanda out in Denver. Most of our stations never had a

problem, and I don't believe Amanda did, either. But WDJC is only our highest-billing station, of course and experienced random glitches that finally made us leave the beta entirely. It would fire off a spot set right in the middle of a song, or (even worse) play two things at once. I hated it, but when Todd suggested that we just pull the plug on the beta, I agreed with him.

New Sample Loops (And Copper Thieves)

At WXJC(AM), we were having trouble getting enough voltage to make our Potomac Instruments 1900 Antenna Monitor work on the night pattern. As part of last year's switch to modeling the night pattern, we replaced the old toroid-and-relay system with sample loops on the towers. We were right at the lower limit when we set everything up, but it soon became clear that with routine variations in weather, humidity and temperature, those loops were just a bit too small.

Todd, Jimmy and I crafted some new loops from aluminum angle and brazed them together. A new aluminum brazing rod that I discovered online was just the ticket. Had it not been for that, I doubt we would have attempted it. But by doing it ourselves, we saved the company a ton of money. The new loops work fine and the night pattern now reads just beautifully on the antenna monitor.

But no sooner had we finished that than the copper thieves came back. They had wiped us out a couple of years ago, the last time copper prices were over \$3.00 a pound. It took weeks to get all of that damage repaired (and I still get weary when I think about it!). Now that scrap metal prices have gone back up, of course, the thieves have returned as well.

There's an... unsavory, shall we say... neighborhood near the 850 AM site, and we believe



that's where the thieves are coming from. The old building (inherited from Hibernia when we bought the place in 1999) has been ransacked so many times that we're planning to demolish it in 2012. It's an attractive nuisance that has long since outlived its usefulness. I'd be perfectly happy to find somewhere else to store junk (or just throw the mess away).

But both times that the thieves hit that old building this past spring, they cut the phone line. The alarm wiring for the old building is run through the phone cable, so each time they'd cut it, the alarm would go off & but the alarm couldn't dial out! We'd get a call from the sheriff's office saying that the alarms were sounding and that we'd better check on things; that's when we'd discover the problem.

I've said this before here, but I'd say it again: unless it's close enough to get a good shot at the bad guy's face, video cameras are of limited usefulness. To start with, any thief worth his salt will wear a mask to obscure his face. But even if the thief doesn't bother, it's difficult to get a clear image. We have a reasonably-clear shot of the thieves walking past tower #2 after the alarm went off, but you can't make out details. (The guy in the middle of the shot had his hand over his face, anyway.)

Nonetheless, another thing we did just before the end of 2011 was to repair and upgrade the cameras at Tarrant. We've also added some cameras and better lighting at WDJC and WYDE-FM, both of which have also been hit in the past by copper thieves.

The WXJC-FM site in the middle of nowhere, out in the huge metropolis of Pumpkin Center, has never been bothered by thieves. It's really isolated. More interestingly, the thieves HAVE hit all around there, including the home just up the road from the site (they took the core from the central air unit).

Then I remembered that the super-nice lady who leases that land to us likes to shoot. She and her boyfriend go out there frequently for target practice (with our blessing, by the way). I guess the sight of those targets, riddled with holes & most of which are right in the "bulls-eye," too! & has caused the thieves to take their business elsewhere. Imagine that!

Still, it's a problem that all of us face, and I've become convinced that the only solution will be to crack down on the scrap dealers. Folks, you can't tell me that these dealers don't KNOW that something's fishy when a couple of teenagers drag in the big honkin' core from a three-phase air conditioner. (Or a bundle of telephone cable.) I don't know what the final answer will be, but that's where I

strongly suggest that the first effort be made.

MDCL

I knew that the shortwave guys had used this for many years; it has now become available for AM broadcasters. Cris has written about this in previous issues, so I'd just share my thoughts. The quick summary is that it's a beautiful thing and Nautel is to be highly commended for making the software upgrade available for free.

We decided to do 850 AM first, since it's 50 kW during the daytime. We had some problems here and I know Cris and Amanda had some issues out in Denver; it turned out that we had older AM IBOC Exciters that needed to be upgraded as well. I turned all of that over to Todd and let him bulldog it; he got all of the software upgrades into the unit and we took it to Tarrant.

On the first software iteration, our carrier with average modulation was running about 26 kW on the XL-60's power meter. With the second attempt, it's a little higher & 30 to 33 kW & but there's still a substantial reduction. I am very anxious to see what this does for our power bill.

We upgraded the software for WYDE(AM) (1260) and have asked the FCC for permission to use MDCL there, too. It's a 5 kW station, so we don't anticipate a huge savings. Still, I wanted to reduce wear and tear on those power modules. We've come to expect the need to replace some of the transistors (especially the modulator MOSFETS) about every 1-2 years. I'm hoping that allowing that transmitter to "cruise" at a lower nominal level will help.

At any rate, I say again: thanks to Nautel, not just for providing this excellent software update, but for doing so at no cost to the end user. They could have charged a pretty penny for this and would still have been worth it. The fact that they've done it as their part to make the world a little "greener" says a lot about that company. I was a big fan of Nautel before; now I'm an even bigger one!

And For Next Year ...

We're going to spend the next year cleaning, tweaking and making our facilities look nicer. We're not scheduled to do any major upgrades or construction & a first for us, since I've been here! & and I want to take advantage of it. You know how it goes: there are millions of little things that you want to address, but you just never seem to get time? Next year, Lord willing, we will get that time. I'm looking forward to it.

I do know, though, what we'll be doing for January of 2012. Just prior to the New Year, WYDE-

FM transmitter kicked off because of a VSWR overload. From the way the VSWR meter it was acting (wiggling with modulation, regardless of power level), I suspected the antenna. We had Southern Broadcast Services sweep the line just to be sure, but yep, the main antenna was the problem. Their crew found a burnt bullet at bay number four of our eight-bay array.

I was able to run on the main antenna with 4 kW in (about 15 % nominal TPO). That antenna is right at the top of the tower, giving us a better look into Birmingham, 45 miles away. But at the end of the day, Jimmy and I decided to take the HD-R off of the auxiliary antenna and operate there. The main antenna (an ERI) is better and higher, but we figured having more power on the aux antenna might allow us to penetrate into offices a bit better.

Of course, this means that we won't have HD on WYDE-FM until we can replace that bay. The other irritation is that it did happen just before the holiday and we won't even be able to order the parts until after the first of the year. But we can't control



Hey, it ain't pretty, but we're at high power!

when things like this happen. My last picture from 2011 shows the plumbing rig that Jimmy and I concocted to get the main transmitter into the aux antenna. It ain't pretty, but it works!

Happy new year!

Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Santa Catalina Island! I hope you all were blessed with a joyous Christmas and are looking forward to an awesome new year!

I spent Christmas with my mom and dad and as usual, KBRT's Nautel XL12 missed me and decided to call me back to the island. This time, I noticed as I called our Burk ARC16 remote control, that it was at half power. I lowered it to our pre-sunrise power setting and it, too, was at exactly half power. Upon returning to the island, I expected to find that we had another one of our island power outages, but this time did not find any alarms, just our transmitter that somehow readjusted all of its power settings to exactly half of what they were when I set them. I checked the batteries on the control board and they were fine, though I did replace them anyway, then adjusted all the power settings back to where they should be. I am beginning to think that our XL12 is



alive and simply misses me when I leave!

After having to cut my Christmas short to return to my lonely XL12, I developed a bad tooth infection and jumped on a boat for a 911 trip to the dentist. I did not even make it to the mainland this time before I got a phone call from our studio that we were off the air!

I called the Burk only to find that nothing would work. I then called my backup, who had not even gotten out of bed yet, and had him run to the transmitter site. When he first arrived, he too had problems getting anything to come on, so I asked him to manually start the generator. When he did, he was able to fire up the aux transmitter, but the main transmitter, our XL12, appeared to have some issues. I decided to suffer through the tooth situation and head directly back to Catalina on the next boat.

When I got to the site, I was able to shut

down the generator as it was nearly out of fuel and whatever power issue we had was by that time gone. None of our clocks were blinking, so I suspected it was another case of a lost leg of our three-phase power.

With the XL12 seeming wacky again, thus losing my trust that it had only regained a short while ago, I decided to leave the ND10 aux transmitter on the air as I tried for another dentist visit. My mother was hoping this time I could visit her over New Year's Eve after getting my tooth situation dealt with. Arriving at the dentist, I was told that my tooth was too infected to touch, given some meds that I refuse to touch anyway, then I headed off to Mom and Dad's. Well, by now we should all know, right? I am off the island and something must go nuts!

I heard KBRT pop off the air for a few seconds, then back on, then off again, then back on. I was NOT happy! I have grown pretty good at keeping my cool through all this chaos but at that point I was starting to think that someone must be messing with us!

As I returned to the transmitter plant, the first thing I noticed was that our backup generator that has been waiting for service for quite some time now had a few warning lights on. I saw that it had over-cranked, lit the low oil pressure lamp and a low temperature lamp. I walked over to the propane tank to find it was empty, and with all the nice island

politics now in place, we have still found no way to refill it.

This problem this time appears to be the power from Edison going low once again, and my generator still needs to have its turn-on limit adjusted, but our generator mechanic has not been able to make it over here. Oh how I cannot wait to leave this logistical nightmare behind!

I repaired the low-voltage power supply in our XL12 and put it back on the air as of Monday morning, the 2nd of January. I am sure it will run great until I need to leave the island again for something!

We rode out several wind storms over the past month or so here at the KBRT Ranch, but despite all the hype and talk of how bad they were going to be, it was high wind as usual for us. In preparation, I went out and gathered anything that looked like it might become airborne and then just rode it out. That is one nice thing about our Catalina Island transmitter plant as it is built quite well, and I have become so used to most of what we face here that though things are oftentimes strange to most, I just ride it all out without major incident.

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

Art Reis, CPBE, CBNT, AMD
Chief Engineer, CBC-Chicago

New Transmitter

One of the things for which I've lobbied the last few years has been a new transmitter to replace our vintage Gates FM-5G transmitter (affectionately known in Chicago Engineering as "The Fire-Breather") at WYCA. This is the oldest transmitter in the company; it put the station on the air under its original owner back in 1965. For four decades it was the *only* rig in the house. And never mind that it's been relegated to backup service since Crawford acquired the station back in '97. I was almost ready to resign myself to just keeping the old girl – that is, until the NAB



Radio Show in Chicago this past September. Cris and I were there together, and there we saw one of Nautel's newer offerings, the VS series, specifically the VS2.5. Both of us rather fell in love with this little rig, which is a tenth the size of the Fire Breather and capable of only half the power, but what the heck? WYCA's licensed power is only 1600 watts on the main antenna anyway, so it made sense to go this route. Even so, I was quite surprised when Cris told me that not only had the request made the budget, it had to be on the air, for tax reasons, by December 31.

So, we went into year-end "scramble" mode,

quickly planning, acquiring parts that we needed (well, most of them), making calls to Nautel to answer questions and make decisions on configurations and options on the transmitter, which weren't many. Actually, the only real decision was to determine which size of feed line connector we wanted, 7/16" DIN or 7/8" EIA. We chose the latter since our installation already was using 1-5/8" coax throughout, and we had adapters on hand. The VS2.5 requires its own rack. We chose the tallest, deepest one we could find, namely a Middle Atlantic WRK44-32-SA monster, seven feet tall, and a bit more than half the width of the entire Fire-Breather.

Speaking of the Fire-Breather, what to do with her? Frankly, we didn't have the space to keep it in the transmitter building, at least not for long. Cris wanted to scrap it out. I didn't, because I thought that there might be a buyer for it. Well, there was. There were two, actually. To the rescue came my close friend of many years, Len Watson, who desperately needed a backup for one of his FM stations down south, and couldn't afford a VS-10 himself. On Wednesday, December 7, a day which will live in infamy, the Fire-Breather was put on the air for the last time, in order to allow the circuit breaker for the present Nautel FM-4 main (which is going into aux service) to be changed; we then started the disconnect process on the Gates. It didn't take long, since there weren't that many connections anyway, but that wasn't the fun part. Moving the box at all *ó* that was the fun part.

The Nautel FM-4 weighs maybe 600 pounds all told. The new Nautel VS-2500 weighs maybe 100 pounds, complete. It could almost blow away in a stiff wind. The Gates alone weighs 20 times that much! The plate supply transformer alone tips the scales at around 800. In a move which almost begs an insanity plea, we opted to leave it in the transmitter. We used a Johnson bar and rollers made of thick-walled conduit to get it off its inch-high platform, onto the floor, and down the hall. Len came in the following Monday inspect it, and liked what he saw. It's a good thing that there's three-phase power down there already.

During the project, it occurred to us to ask the question, "Could we get a lower electric rate by dropping a phase on the power line when we put the VS2.5 on the air, because it uses only one phase?" Since the Gates was the only three-phase device in the building, we called the local utility, Com Ed (aka "Commy Ed"), figuring that they might give us a lower rate for switching from three-phases to one. Dream on. Edison bills only on the amount of energy used, and not whether we're using it on one or three

phases. Of course, if you're replacing a three-phase transmitter with a single-phase unit, you can call your own local electric utility to see if changing to single-phase power would save you money. Just don't bet on it happening.

The old Fire-Breather isn't the only one like it in the Beecher building. There is also a second Gates FM-5G sitting in a nearby room for the last few years, taken out of service at WSRB when we put that station's first HD transmitter on the air. It still has all of its parts and its exciter, it was never cannibalized because there was never the need. When Cris mentioned the WYCA FM-5G in last month's *LO* we got a bite on that rig from a fellow in Minnesota. We also got another offer that rig from someone who wanted to send it Iraq. Really! Then the call came to send the rig to South America. Thing is, who wants to take a "5G" up in the Andes by pack mule, or on a boat to Basra? Shipping costs, anyone? Cooler heads have prevailed on both scenarios, and Tennessee is where the WYCA "5G" is headed. The WSRB "5G" is likely going to Minnesota, but that isn't quite for sure yet, so if anyone else is interested, contact Cris or myself via email and we can possibly hook you up. And, as for parts, we have plenty, including two MX-15 exciters, one for each rig. Both worked the last time they were tried.

While we're at it, is there anything your radio station needs? We have a bunch of things available. Let me know what you might want and drop me a line: areis@crawfordbroadcasting.com.

Emailing Log Files into Your Automation

How does your traffic department put the station commercial logs (or programming put their music logs) into your automation system? Most likely, the method used is "sneaker net." You know the drill: Create the log and format it to be politically correct for your system, then transfer it to either floppy disk or memory stick, and load the log file from the mobile medium into the automation system's main workstation for use on the air. That's okay, I guess, as far as it goes, but there's a potential problem *ó* often, the memory stick (especially) is used for other things, and it becomes a potential carrier of computer malware. Regular readers will remember an article on this subject by Larry Foltran a few months back. In our case, that scenario of viruses gaining access to our computer systems via infected memory sticks came true for us, at which point, James Kelly and I put our collective engineering feet down and banned the use of memory sticks in any non-office computers in the station. That meant that an alternative method had to be found, which we did

ó it was right there in front of us: email. And email has one major benefit which is undeniable ó a routine checkout with anti-virus software is always a part of the package.

Sending the log via email isn't difficult. In addition to our Crawford domain, we also have one through our local ISP. When we opened up that account, we also bought a package of email accounts, available at maybe ten or twenty at a crack. Our ISP set us up with the domain name of our choice, which we use for in-house emails. Then we picked an appropriate email address (such as, say, logdrop@whatever.com) for the purpose; the ISP, working with James, set that up for us as well. Both AT&T and Comcast have been very cooperative with us on this.

The next step was to go to the automation log load workstation and set up an email program. Obviously, Outlook is readily available, although Thunderbird or any other such will likely work. Go into the email program and set it up with rules which will reject all emails except from the email addresses of the members of the traffic department. That makes the process much more secure.

From there, the traffic person can email the completed file to the logdrop@email address. The virus scan does its work of checking the file for malware and viruses. Then the traffic person then goes to the automation workstation, opens the email, extracts the file and drags it over to the automation log input page or point. That concludes the process, sans virus.

While it would be nice to have the email drop the file into the proper directory without any human intervention, a little thought as to why it shouldn't or wouldn't happen is probably in order. Basically, the only place where the email can drop the file is into its own set of folders. Who knows what kind of mischief could be done via email otherwise? Besides, a bit of manual labor at this point of the process is also good for a final vetting of the file, making sure that it's going into the automation in the way in which it is supposed to.

This method may sound a bit arcane at first thought, but once you get use to it, you'll enjoy the peace of mind this little lash-up brings. It's time to ditch the stick when it comes to filing logs into your automation system. Let your email system do the security work so that you won't have to fret about what may happen to the most important part of your programming chain.

Public File Thoughts

In our last episode, I mentioned something

about how the "Occupy" (as in "squatters") folks were looking to hijack radio station air time by getting into the audio chain through the EAS system. This month, we've received word that the jerkweeds are resorting to separate tactic: microscopic examinations of the public files of conservative talk radio stations (and not any other formats), to find reasons to challenge those stations' license renewals.

Partly because of that, many e-mails have been flying back and forth between various member of the Crawford engineering team, and as one outcome, a policy has been developed regarding how the public files are to be handled when the public shows up. Things covered include: training the receptionist to understand the process and reception's part in it, so that he or she knows what to do (very important); where in the station the requesters should be taken; per-page costs of copies ordered; and making certain that no questioners are ever left alone with the public files (we've heard horror stories of files being stolen in other stations).

Lately, the FCC has decreed (dictated?) that as of a certain date in the future, television stations are required to put their public files on the Internet. This has raised something of a hue and cry within the industry, a kind of "How dare they demand that?" response. I've given the issue a good deal of thought, and my response to those who would balk at putting their PF's on line is, "Why not? Why *not* put your public files on line, in PDF form, even?" Aren't these, after all, *public* files? The Internet is as public as it gets! Forget what your competition would do with them. They have the means to see your public files anyway. I'd like to hear from anyone who has a real argument against this idea.

Look: with the PF online, your staff doesn't have to be distracted from doing what they were hired to do, to handle this. There wouldn't be any danger of file damage or loss due to sabotage by a requester (assuming you have proper security on your for your server. Your station's copier would have a little less wear and tear on it. And the questioner can get the information he or she wants without the travel expenses. And, having your PF on-line means that station management will have a great incentive to update the PF in a timely fashion, every quarter. Don't forget to provide on the web site a date of last update. Unless I'm missing some great detail or specific which could shoot me down, this whole issue of the public file online is a win-win deal for station and public alike. And, at least in this area, the FCC can also inspect your public file right online. It's one less reason for them to come out to your station and inspect. Don't bet that they won't, though. There are

still the tower lights and the EAS system.

Cleaning Up Another Mouse-Victim

No matter what *they* think, the inside of a 3-1/8" brass/copper hard-line coaxial elbow is not the place for mice to build a nest. Yuck! The elbow shown in the picture was one such victim. I couldn't even bring myself to take a ~~before~~ picture of the damage, it was that gross. A couple of my cohorts in engineering even suggested that I would be better off recycling the thing for the metal. But at some \$300 a pop that such things sell for today, no way. So, after everyone else begged off this little cleaning project, I decided to show why I was the boss, and do the deed myself.

For the project, I used a pair of three inch rotary brushes on an electric drill, one plastic and one brass wire, sized for the coax 3/8-inch for the 3-1/8", 1.5-inch for the 1-5/8" variety; an extender bit for the drill; a half-round file, a water hose with nozzle, and... the dishwasher. Yup, read on. I started with the water hose, to knock off as much of the nest and the droppings as it would knock. Then I used the end of the half-round file to loosen and remove the harder stuff. The drill, bit extender and fiber brush were

next. I strongly recommend wearing a dust mask during this part of the project. Bet that the dust is toxic. Next, use the dishwasher, lower level, away from whatever dishes are sharing the experience. Point the open ends down, obviously. Finish off the



project with the brass wire brush at the end of the extension. The end result should look like the one in the picture. Polishing off the outside with Brasso or Tarnex is totally optional. Bon appetite!

Until next month...

The Portland Report

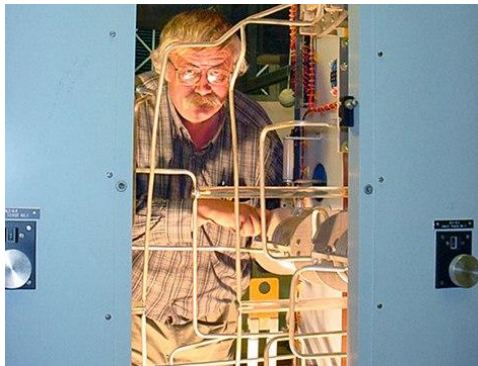
By

John White, CBRE

Chief Engineer, CBC-Portland

Happy New Year! I wanted to pass along one of my old years resolutions. Every once in awhile, I like to pick out an old loose-thread problem to resolve. We all have them. Something that isn't quite right but doesn't rise to the level of needing immediate attention. These kinds of things tend to stick around and never get resolved and never really cause major problems. They just become nagging little irritants.

I developed one of those with the HD exporter some time back when the GPS fault light popped on. The condition didn't cause a failure or other obvious problem, but wasn't "normal" either. I checked out the status menus and learned several things. The GPS was tracking a constellation of six satellites and the GPS was locked. The same menu also reported



the error PLL unlocked.

Huh. It can't be both locked and unlocked at the same time! So I checked the exporter manual, which told me a whole lot of not very much. Most of the inner workings of the exporter and exciter being proprietary limits useful information in the manual and complicates troubleshooting greatly.

Still, things were operational, so I waited for a convenient time to chat with Nautel. For those of you on the east coast, non-emergency Nautel calls are simple. Out here on the left coast, Nautel's end of business day equates to noon local time. And my problem definitely didn't rate an emergency callout to Nautel.

During the next few days, I saw the status change from six to five satellites, and sometimes only

three. That told me that the GPS tracking and lock was on going and active. Yet the unlocked error message persisted.

Talking with Nautel, they concluded, as I had earlier, that I didn't have a major problem. We didn't see a component or module level failure, and Nautel felt the error should clear in time. It didn't.

So I tried a number of GPS restarts: disconnecting the antenna to force the GPS to reacquire tracking, setting the coordinates to approximately nearby (123 - 45) so the GPS went through a startup, and finally shutting the exporter down and rebooting. Nothing changed.

Finally, I scheduled a 6:00 AM (local) call to avoid the end of day at Nautel. I spoke with Ricardo, and we talked through the problem, quickly concluding the usual solutions weren't going to work. Ricardo spoke with others at support, then called back with the suggestion of a power off cycle of the exporter. That hadn't worked earlier and didn't work again, leaving both of us to wonder if it was possible that we really did have a component or module level failure.

Ricardo went to confer with engineering and called back about an hour later. He suggested we try another power cycle with the exporter, this time leaving the power off for five to ten minutes. Engineering had observed that occasionally status information can hang around in memory, which an extended power down can correct. This solution did work, problem solved.

I want to take a moment to recommend a book: "Thinking in an Emergency" by Professor Elaine Scarry. It's a recommendation with reservations as the book provides insight into how decisions are made in an emergency, but it also includes a political perspective not anticipated by the reader.

One example the author raised is thinking habits in response to an emergency. Here, professor Scarry relates the Aesop fable of the donkey. A merchant goes to market with a load of salt. While

crossing the creek the donkey laboring under a heavy load stumbles in the water. Some of the salt devolves, lightening the load. The second week, the donkey stumbles again and brays about the lighter load. The third week the merchant takes a load of sponges and the donkey stumbles again.

In a Boston Review book interview professor Scarry said: "I have been working for many years on the problems that arise from the population being willing to suspend its own responsibility for self-governing actions. One of the things that has seduced people into giving up on their own actions is the claim of emergency that because certain things require very fast action, there is no time for ordinary processes of deliberation[.]"

The professor goes on to describe the calm following the Kobe, Japan Earthquake. The local neighborhood groups were a resource, which allowed its civilian population to respond effectively, an observation that is consistent with data following the North Ridge quake in California. The majority of the rescues were done by ordinary people while first responders had their hands full with the complicated and dangerous rescues.

Here in the Portland metro area, emergency responders realized years ago that a 9 or 10 quake would overwhelm government response not just for days, but for weeks if not for months.

For the past 15 years, local emergency planners have spent a great deal of effort with development of Neighborhood Emergency Teams (NETs) and Neighborhood Emergency Response Teams (NERTs). Much citizen training has been invested to give people the knowledge to respond in a disaster.

This amounts to moving the immediate response and on the spot decision making down to the citizen level, while moving the government response to a critical support level. Quite different from the idea that in an emergency, responders will come and rescue me.

Rocky Mountain Ramblings
The Denver Report
by
Amanda Alexander, CBT
Chief Engineer, CBC - Denver

What a month December has been! I must say, it was busy, but fun, but it did start off sort of bad. The end of November we had a nice snow storm. It made a mess of the roads.

We were waiting on a delivery of transmission line for the new KLTT transmitter. It was going to be a long box because of the 20-foot length of the line sections. The trucking company was supposed to give me 24 hours notice because the KLTT site is unmanned. Lo and behold, on the first, a crazy driving day with icy roads, unplowed parking lotsí you get my drift... I got a phone call and the truck driver was at the site. So I headed out and met the guy. It was a full size semi. He barely got it through the gate. Then he kept getting stuck. He was unable to turn the truck around. So he dragged the long box off the truck and had to drag it all the way around to the back of the building. He was not happy. Then when he was ready to leave, he couldn't. I ended up waiting for a good half hour as he had to rock is truck back and forth to get unstuck from the mushy ground we had from the snow. He finally left and I was able to go home.

I must say, this whole transmitter installation excited me a bit. It was a first for me. While yes, we did move a transmitter from the old building at KLVZ to the new one, it just wasn't the same. At KLTT, we had to plan to remove an old ND 2.5, have the hole in the wall enlarged to fit the new NX50, get electrical work done and plan on how to keep the station on the air as much as possible during the installation process.

The week after Christmas proved to be a busy one, too, with this all going on at that time. We ended up having to take the station down for a couple of hours while our electrician did some work to get us ready for the new transmitter. This also allowed my dad and me time to get into the phasor, punch the hole needed for the new transmission line and to get that part of it hooked up to help minimize down time

the next day when the transmitter actually arrived.

I must say, sleeping Tuesday night was a bit difficult. As my dad likes to say, ðI'm too excited to sleep!ö Wednesday came and we got to the site ready to work. The truck was set to deliver the NX50 at 9AM. They actually arrived ten minutes early!! Mike Kilgore from Kilgore Construction showed up a short time later with the forklift. Then the fun began.

Mike began carefully removing the crates and slowly rolled them into our building. The transmitter crate was the fun one. We had less than an inch clearance in height. After a few

tries and a few bumps, Mike was able to get the crate in the building. We then uncrated the transmitter and began rolling it to the hole we had for it in the wall.

Thankfully it fit in the hole nearly perfectly. Then, while the electrician was installing the power interlock switch for the transmitter, we began cutting the last pieces of transmission line to fit. I must say, it was a little more difficult than I thought it would be. We had not yet seen the adapter Nautel provided us to fit the transmission line so we ended up drilling a couple of holes in the top plate of the new transmitter. It wasn't until a few hours later we found it. Oops. It didn't really matter, though. We got the transmission line connected and then began running the wire for audio, network, and remote control. Cliff Mikkelson routed the wiring for us and tie-wrapped it off. It really looked like the factory had done it, it was so well done. We called it a day at 4:30.

The next day, Thursday, we began the finishing up process. My dad got in early to begin wiring the remote control. I had to wait several hours as I needed to go to Radio Shack to pick up some RG58/U cable and diodes that we needed. I finally got out there and began my work of routing the RG58/U from the Exporter Plus to the NX50, and then finished up the routing of the network cables going from the NX50 to the Exporter Plus and the



network switch. This proved to be difficult as the crimp tool I bought for the site did not do a good job at crimping, so we kept having bad cables. I finally got it, though. My dad finished up the remote wiring and then more fun began.



Keith Peterson installs the brackets for the new 3-1/8" transmission line



The shiny one is the new transmission line for the NX50

We turned the new transmitter on and began testing it. We found we had two audio sources on the analog AM that were out of time sync by maybe half a second. After talking to Nautel Emergency Support, we were able to get this fixed. I was able to begin playing around with the transmitter at this point, learning the various screens and what all the new unit can do. I was able to get email set up on it so when there are various faults, I will know.

I must say, I am loving this new transmitter so far. I love the fact that we can log into it from home or anywhere and see what all is going on with it. While we do still have it connected to Burk, we don't really need it so if the Burk ever fails, we are



Mike Kilgore maneuvers the crated transmitter out of the truck

not dead in the water. I know we have not even begun to scratch the surface on all the NX50 can do; I am looking forward to learning more and more about it as time goes on.

Our annual occupied bandwidth measurements were due on January 4. We were able to get the aux transmitter done at KLTT as well as the analog of KLVZ done. We decided that since the new transmitter is in and since we have the NE-IBOC back from Nautel for KLVZ, we had better redo the measurements. In doing so, we found the Anritsu Spectrum Master that we use for these measurements has gone "deaf." When we make the measurements in the usual locations, the noise floor of the machine is above the limit line for the mask. We have to do a lot of extra work to get the equipment to properly see the spectrums of our stations, namely moving in very close. We have decided to send the analyzer off to Anritsu for a recalibration, hoping that will fix our problem. Once we get it back and it is working, we will go ahead and reshoot each of the stations just to be 100% all is okay.

Many thanks to everyone who helped with the installation of the new transmitter at KLTT: Cliff Mikkelson, Keith Peterson, Oleg Dyachenko from Berg Electric, Mike Kilgore from Kilgore Construction, and the people at Nautel who worked to help us get the thing running properly. Without any of you, this installation would have been 100 times harder.

The month of January looks to be another busy one. I have several little projects going on that I need to focus on. I pray you all had a very merry Christmas and a happy New Year! Until next time! all folks!!!

Digital Diary
by
Larry Foltran
Corporate Website & Information Technology Coordinator

The End of the Mac Pro?

During a recent conversation with Art Reis, chief engineer of our Chicago market, he mentioned that a vendor he works with alluded to a shift in Apple's strategy in terms of product line, specifically, the potential demise of the Mac Pro workstation. With this information tumbling in my head, I decided to do some research and see what I could find.

According to close friends of mine who work exclusively on these types of machines for graphic design and video work, the Mac Pro offers a robust platform for the type of data and processing intensive work they do. Would the elimination of the Mac Pro leave this special sector of Apple's market empty handed? Based on my research, the iMacs and Mac Minis could certainly be boosted to fill any gaps caused by the departure of the Mac Pro. But with skyrocketing profits related to their tablets, smartphones and other portable devices, does it even make financial sense for Apple to remain in the overly saturated workstation or tower computer market?

Apple has certainly cemented itself in the portable electronics market. When my kids asked for an mp3 player last Christmas, they asked for an iPod. I see more and more TV spots for smartphones attempting to make the product advertised appear superior to the iPhone. Even my 70-year-old mother had an iPad on her Christmas list this year. A quick stroll through a cellphone store will prove that the smartphone market is extremely saturated. Plus, more and more tablet style computers have been coming on the scene in attempts to compete with the iPad. Regardless, Apple has successfully pushed itself ahead. It really comes as no surprise that they would ditch the Mac Pro and focus on what's hot. I do find it somewhat ironic that Apple began as a company selling desktop personal computer kits and now seems to be moving away from its roots. What's next? Perhaps the iPrint?

Running Low on Bandwidth

During the last several years of writing *öDigital Diaryö* in *The Local Oscillator*, I have

touched on the diminishing availability of data bandwidth and how that affects the claim that IP based radio should be the direction of choice for



broadcasters. Well, here we go again. The FCC recently opened up what is deemed 'white spaces' in between specific channels in hopes of boosting capacity for mobile carriers. The FCC claims that this is unused, but based on what I've read the TV stations that utilize portions of this spectrum disagree.

In all honesty, I'm out of my realm when it comes to specifics on spectrums, channels and white spaces. What I do clearly see is that we're quickly running out of room for the explosion of wireless data being transferred every second. An article related to the FCC's move indicated that if the current trend continues, we'll be at a spectrum deficit by 2013.

In terms of the impact on radio, I believe this attempt to free up more bandwidth is another clear indicator that exclusively IP based radio is not around the corner. In my opinion, moving radio to exclusively IP delivery makes no sense. Terrestrial radio enjoys a local delivery system that can accommodate an infinite number of added receivers with no impact on the signal source or necessity for increased bandwidth. Radio currently enjoys a delivery system unaffected by data throttling, consumer data service costs and network latency. But for some reason, there are some folks who want to push it there.

QR Code – Here Today...Gone Today

One of the things that came on the web scene during 2011 that I felt had potential is the QR Code or Quick Response Code. I believe I touched on it in one of my articles during the year. But as a refresher, it's a graphic code that can be read by a camera equipped smartphone and then links to the web site specified within the code. In the most basic terms, it's a barcode for the general population.

Unfortunately, these haven't caught on as I expected they would and there is a good chance that they will slowly disappear. The primary reason is that most people don't even know what they are. As I began rolling out QR codes for our company's

mobile sites to staff members, I found that people had seen other examples on printed materials, but had no idea what they were. Quite plainly, if you don't know what it is, you most likely won't use it. Further, QR code readers are third-party applications. Unless they are included as base functionality in new smartphones, many users simply won't bother downloading and installing these apps.

The other problem with QR codes is that those who do know how to use them have quickly realized that a code will typically be connected to an advertisement of some sort. In most instances, users won't even bother scanning them because they know they will be using their precious mobile data bandwidth to view an ad. The content that is linked

by the QR code needs to be of some value to the user.

Finally, there are the security implications. Email users are told time and time again never to open an attachment from an unknown sender for fear of a malware infection. QR codes pose a similar problem for smartphone users. I foresee malware and security issues as a whole to become a significant problem for smartphone users as we move ahead. The direct content link provided by the QR code simply makes it too much of a risk.

Unfortunately, all indications are there that the QR code is heading into its cyber sunset. As 2012 begins, we'll simply keep watching the tech horizon for what's coming up next.

Until next month!

The Local Oscillator
January 2012

KBRT • Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA

KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1

KJSL • St. Louis, MO
630 kHz, 5 kW-U, DA-2

KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1

KLZ • Denver, CO
560 kHz, 5 kW-U, DA-1

KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND

KLTT • Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2

KLVZ • Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2

KSTL • St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND

WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2

WDCX • Buffalo, NY
99.5 MHz, 110 kW/195m AAT

WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT

WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D

WLGZ-FM • Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT

WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D

WMUZ • Detroit, MI
103.5 MHz, 50 kW/150m AAT

WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT

WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT

WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT

WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT

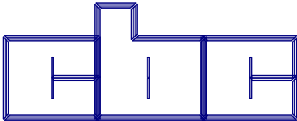
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND

WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

WXJC • Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2

WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

CRAWFORD
BROADCASTING
COMPANY



Corporate Engineering
2150 W. 29th Ave., Suite 300
Denver, CO 80211

email address: crisa@crawfordbroadcasting.com