The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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More Change

In last monthôs column I noted that our technical operations were undergoing a season of change, particularly in the Chicago and Detroit markets. In these pages you will meet Brian Kerkan, our new Detroit Chief Engineer, and youôll be reintroduced to an old friend, Rick Sewell, who has taken the reins as Engineering Manager in our Chicago cluster. Both these guys have been on the job for about a month now and both have already made a tremendous impact.

Those arenôt the only changes, however. At the end of May we closed on the divestiture of KSTL in St. Louis to the Church of God in Christ (COGIC), and with that we exit the St. Louis market after 21 years. COGIC will keep the format of the station and continue to service existing clients and ministries. We know we are leaving the station in good hands.

As we leave one market we also take steps to enter another ï San Diego. We have contracted to purchase KNSN in San Diego. The transfer application has been filed with the FCC and we are awaiting grant.

KNSN is a class C AM on 1240 kHz. It operates with 550 watts non-directional both day and night. Why the reduced power level? Itôs because of the very high efficiency of the tall (201.9 degrees) antenna. The effective power is 1 kW.

This is one of the few class C stations that really covers a major metropolitan area. The transmitter site is located just south of downtown San Diego, providing the station with a near ideal location from which to serve the market. The tower is a 446-foot free-standing structure that is skirted in a ñfolded unipoleò configuration. There are actually two skirts on the tower ï two wires running up each leg, one each to accommodate KNSN and KURS, another class C station (1080 kHz) that diplexes from the site.

The existing transmitter is a mid-1980s vintage Nautel AMPFET-1, which is a good transmitter but is 30 years old. This will make a great auxiliary transmitter for us. We have ordered a Nautel J-1000 as a new main transmitter. We have an Omnia3.am processor on hand and will use that to make the station sound great. We have ordered a Burk ARC Plus Touch remote control.

At present we are looking for some studio space in the El Cajon area, which is in the east part of the San Diego metro area and near some of the ministries that we plan to serve. We already have most of the equipment we will need for the studio.

Thereôs no telling how long the FCC will take in granting the transfer of control, but it should not be long. We donôt own anything else in San Diego and there is no 5 mV/m overlap with KBRT to the northwest. I would anticipate closing in July sometime and weôll probably take the station dark for a while to get the new transmitter and other equipment installed and tuned to perfection.

So you can see that these are indeed exciting times for us at CBC, both in terms of engineering personnel changes and divestitures/acquisitions.

Remote Control Woes

A couple of months ago we purchased new

Burk ARC Plus Touch remote control systems for all four Chicago stations, both Buffalo stations and one Detroit station. All seven units were delivered and in early May we began the installation process in Chicago.

It didnôt take long for us to figure out that there was a problem. Rick Sewell and his crew programmed a unit, took it to a transmitter site and plugged it in only to see it lose its programming including the IP address. Further investigation revealed the same issue with the other three units. We sent one unit back to Burk and they found a hardware problem with the second version of the ARC Plus Touch circuit boards, which all of our new units had. Unfortunately, that means that we had to send all seven new units back to the factory for modification.

We got the first of the modded units back within a week and it is working okay (on the bench). As we get the rest of the units back, our Chicago, Detroit and Buffalo engineering teams can get back to the project of installing them.

I presume that the new unit I ordered for San Diego will ship with the mod already done.

Program Distribution

At the NAB convention in April, I was specifically looking for a means of terrestrial program distribution that we could use in our company. I looked at several different codecs and systems and really zeroed in on Tieline.

John Lackness of Tieline showed me the Genie Distribution codec (he calls it the ñGenie Distroò) that was created for the specific purpose of distributing programming to multiple destinations from a central hub, such as a network. He sent me a demo unit right after the show, and in no time I had it up, running and connected to six other sites ï some of them ours and some outside our company. The ñDistroò looks to be perfect for our application.

One thing I like about the Genies is that they can be ordered with a Wheatnet port. As we move into the AOIP world in our major clusters in the coming years, this will permit us to feed and take audio from these units with a single gigabit Ethernet cable. In fact, when we did the demo, we connected it to our Wheatnet switch in the Denver cluster and fed it from a Nexgen audio server.

We have now ordered two ñGenie Distroò ï one for Denver and one for Detroit, both with Wheatnet ports (they also have analog I/Os). We have ordered Tieline Bridge-IT codecs and rack mounts for all CBC stations and affiliates that donôt already have them. These should be arriving in mid-June. Once they are in and working, weôll begin experimenting with a target date for full implementation of August 1.

At our two ñhubsò we will install separate, dedicated IP services so that local Internet traffic wonôt bog down the feeds to the stations.

NextRadio

Many of you have probably read or heard about NextRadio, which is an app for receiving FM stations on some smartphones. CBC is getting aboard the NextRadio train with all its FM stations.

To accommodate some of the features of the app (such as album art, purchase tagging, etc.) we will have to set up a separate export to a ñmiddlewareò application that will run on a PC in each of our FM facilities. This ñmiddlewareò will likely be TRE (since we already have it in some markets). That will in turn format and transmit the information to the NextRadio cloud.

Iôm not clear on the timing of this just yet, but weôll make sure you have plenty of time to get it in and running. Stay tunedé

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

Hello to all from Western New York! It was the beginning of summer in 2005 when we began installation of our HD Radio transmitters in Buffalo and Rochester. We were the first stations in each market to begin broadcasting in digital, and we quickly became the ñgo-to guysò for answering questions for most of the other stations as they began their own rollout of HD Radio. In Buffalo, the other stations were slow to implement HD, but by the end of 2010, most had at least an HD-1 channel on the air. The typical problems were noted, mostly time alignment of the digital and analog streams and PAD data not showing up at all or hung up for extended lengths of time. As time has progressed, most of these initial problems have disappeared, and HD Radio continues to hum along in the Buffalo market.

With the exception of Cumulus Broadcasting, all of the major cluster owners are still broadcasting in HD: Townsquare, CBC, Entercom and Western New York Public Broadcasting. Only one station has turned off its digital carrier, a private, locally-owned AM operating at 1kW. Programming for the HD-2 and HD-3 channels has not changed since most were implemented and little or no promotions have been noted that these additional channels even exist.

It is interesting to note that an article appeared in the Los Angeles Daily News in February 2013 where a subscriber posted a question to commentator Richard Wagoner asking, ñWill there be a future for HD Radio?ò Mr. Wagoner responded that the future of HD Radio is truly up for debate. Some, including many engineers, feel it is DEAD. The number of stations going HD has stagnated and in some cases declined. Richard went on to say that he believed that the ñkinksò could be worked out, but to truly take off, broadcasters need to market it correctly.

I think Wagonerôs viewpoint was right on. Broadcasters have done little to nothing to promote HD Radio, and iBiquity should share some responsibility in this also. Had iBiquity been more aggressive in getting receiver manufacturers on board and retailers backing and stocking the HD Radio receivers, we would not be discussing this now. While many car manufacturers have recently indicated that they will begin offering HD Radio equipped radios in their cars as an option, is it too little, too late? Are consumers really going to invest in technology that they feel wonôt survive much longer?

I believe our best shot at keeping HD Radio alive is by getting the receivers in the hands of the car manufacturers. We stand a better chance of grabbing potential listeners as we spend so much of our time in our automobiles. The iPod Touch, smartphones and Internet computer streams fill the void while at work, home or play.

On April 27, 2012 the Buffalo News ran a news story with the caption: ñAfter 13 Years, Inventor Waits for HD Radio to Break Out.ò The story was about West Seneca (a suburb of Buffalo) native Robert Struble who helped to launch iBiquity Digital in 1999. Robert knew that it would take time to sell the public on HD Radio ï after all, it took 40 years for AM radio listeners to tune to the FM dial, and a quarter century passed before viewers of black-and-white television took to the NBC peacock. Robert went on to say in the news article that ñé these things take time. Thereôs a massive install base of existing analog radios. Thereôs a massive infrastructure of existing analog radio stations. [But] we have tremendous momentum and weôre picking up steam.ò At the time, iBiquity had reported in excess of 2100 stations broadcasting in HD Radio. Today, that number has dropped to little over 2000.

On a recent HD Radio blog it was reported that a little over 15 million HD receivers have been sold since 2006. 15 *million*? Where are these numbers coming from? Better yet, WHERE are consumers buying these receivers? Radio Shack and Best Buy no longer sell HD receivers, Wal-Mart

never began, and to the best of my knowledge, Crutchfield is the only retailer offering any choices in HD receivers.

I think these numbers have been grossly over-inflated, perhaps to make those who have invested a lot of money into this technology feel better about losing their hard earned dollars. But who knows, Iôve been wrong many times before. Perhaps iBiquity will wake the sleeping giant and start *really* promoting HD Radio, and stations will program their multicast channels with programming listeners will want to hear. And those engineers that have all but given up on digital radio will find that itôs not all so bad, that there is purpose in digital broadcasting. And to the owners of the stations who have stuck it out for the past nine years, patience, for the rewards are just around the corner *if* we can get everyone on the same page and promote what we have to offer the listener.

On to other thingsé

The majority of my time has been spent in Rochester this past month, working on a project at the WLGZ-FM transmitter site and taking care of audio problems at the studios and transmitter. In order to battle the ongoing heat problems at the WLGZ-FM transmitter site, we recently had a ceiling put in the building consisting of half-inch drywall. Above that was 1-inch foam board and reflective heat barrier material. This work was done by a local contractor.

The other portion of this project was to install a roof-mounted exhaust fan to pull the heat out of the newly created attic space. We originally had this work included in the quote, but after several revisions the fan installation was left out of the final draft. A separate quote was obtained, but we found it to be way too high for the scope of work involved. I decided I could do the roof work myself, so I ordered the roof fan and curb from Grainger and installed them. To say that this was easy would be a gross understatement, but the job got done and we ended up saving over $2,000.

The next and final step we need to take is to repair or replace the existing A/C unit. It is well over 15 years old and needs some service work. Our A/C repairman will evaluate its needs and make his recommendations accordingly.

I mentioned earlier that we have had some audio problems as of late. In fact, two separate instances of this caused severe audio distortion over the air. The first instance was due to a failed audio card in the Interplex STL. This developed right after we experienced an electrical brown-out due to a blown transformer right outside the building.

Over the years we have had a lot of problems that have been related to the electric feed, usually the loss of one of the three phases to the building, but the way this building is wired and that we are only a tenant so that rules out the installation of a UPS capable of handling the buildingôs needs electrically in case of a failure or surge. The cost to have the electrical wiring changed would be too high, so we at least have numerous smaller UPSes to protect our equipment from electrical problems.

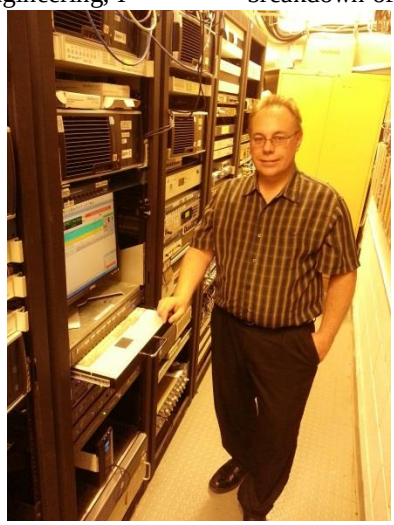
The other audio issue we had this past month was the failure of the A/D converter at the transmitter site. I have never seen one of these units fail before but I suspect that heat build-up inside the transmitter building got this one. I havenôt had the chance yet to open up the converter to see what actually happened to cause the failure, perhaps by next month I will report back on my findings.

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

I am excited to be part of Crawford Broadcasting Detroit. After trying desk work at Saga Communications as their Director of Engineering, I decided that being part of the day-to-day operations of a station is my passion. I like that every day there are new challenges and opportunities to effect change and make a difference.



It didnôt take me long to get to work here at CBC-Detroit. The first thing I do every morning is check the status of the transmitters. My first day was no different.

When I walked into the area where the WMUZ(FM) transmitter is located, I noticed that the Nautel NV40 was running very hot compared to my experience with other Nautel transmitter installs I have performed. I noticed that a plenum was built above the transmitter with an offset on the exhaust duct. The plenum was built with very little volume to allow the hot air to exhaust. The transmitter was in fault status, with a power supply failure, and a PA module failure. All the modules were extremely hot.

After gathering information on the history of this transmitter, I discovered that it has had ongoing issues. It was put on the air at -14dBc and reduced to -20dBc because on ongoing stability issues.

After replacing the defective power supply and repairing the RF module, I started to investigate the reason that this transmitter was running so hot. When the plenum was designed, it did not allow enough volume of warm air to be exhausted, which contributed to backflow pressure. The heated air stayed in the cabinet, essentially cooking the modules and power supplies.

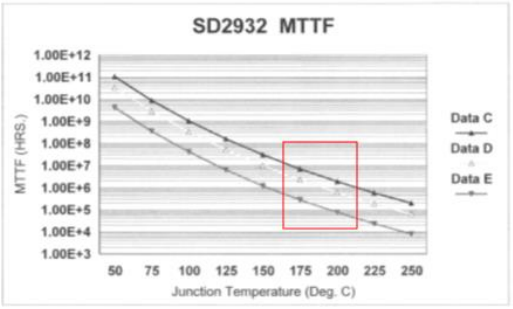
I brought our HVAC contractor in to discuss a better approach. We decided to add in-duct fans to each of the 14-inch ducts to help with pulling the hot air that was backing up inside the transmitter to the exhaust fan outside. This will bring the overall temperatures down, and allow for operation at -14dBc.

The effects of heat of semiconductors are well known. The conductivity of semiconductors increases with the increase in temperature. A breakdown of covalent bonds take place in the semiconductor due to increase in temp but more and more increase in the temp may result in the breakdown or damage of the semiconductor which results in the decrease in conductivity of semiconductor.

Gary Liebisch from Nautel published a white paper that addresses transmitter cooling. He made an interesting statement in his paper that can be downloaded at: http://www.nautel.com/wp-content/uploads/2012/12/Nautel-FM-HD-Radio-Transmitter-Cooling-Technologies-Tradeoffs.pdf.

In his paper, he said the following: ñWhile the typical air ambient design limit is 50°C, in actual practice the devices are subject to mixed ambient temperatures over their life. MTBF analysis shows us that an average ambient drop of 10°C can yield a 30% improvement in MTBF. To the extent that a user can control ambient air in an air cooled system, reduction of the average from 50°C to 40 or 30°C will yield an order of magnitude improvement in FET MTBF.ò

Junction Temperature and MTBF



It is definitely worth examining your plant for proper cooling and air flow. It will not only keep you on the air, but will prolong the life of the equipment.

News From The South

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

Thereôs an old saying that quiet people are the ones whom you need to watch. If thatôs the case, then Todd Dixon, my only remaining assistant, is beyond dangerous.

I donôt know if you need to watch the dumb ones, though, except as entertainment. A guy I knew in high school, as thick as two short planks, would catch softballs with his face. His hands were useless for the task, but his nose apparently had a phased-array radar built into it. He would unerringly allow the ball to smack him right between the eyes, then roll into his hand. After a great deal of debate, we decided to call these events an ñout.ò We were afraid the guy might eat the balls otherwise and we had a limited supply. Ah, great fun and good times.

But back to Todd, who is anything but dumb. He quietly entered a contest at MCM Online a few months ago. He then quietly won it and said not a word to me until his prize arrived: a 3D printer. Then he boasted about how he was going to make chicken-head knobs and other valuable items on the fly.

Now, you donôt have to convince me that automated manufacturing and rapid prototyping are here to stay. At Laser Laminates, a nearby business thatôs leasing some tower space to us, they use a computer-controlled laser to cut laminated plates for motors and transformers. Itôs fascinating to watch. And when I visited Wheatstone a while back, I saw their cutting, shaping and fabrication equipment. They even have a machine that will carefully check the finished circuit boards for mistakes.

While industrial 3D equipment can use many different materials, the ones that you see in the hobby magazines typically use plastic stock. They heat the plastic and melt it, then use a plotter assembly to move the ñprintò head into position. It squirts out a measure of plastic and then moves to the next spot. If you do a Web search, youôll see that people have made some amazingly good-looking items with these inexpensive printers.

Toddôs little 3D printer, though, has thus far refused to do more than make misshapen ThingsÊ that donôt begin to resemble what the computer screen is displaying. They look like someone mounted a glue gun on a paint shaker with neurological problems. To date, Todd has produced several small, interesting-looking blobs with stringy trails of plastic ñhairò all over them. No chicken heads.

Todd will call up a ready-to-go file for something that looks like Thorôs hammer: the printer makes a little hairy blob. He then pulls up a file for a plastic lever: the printer produces a hairy blob. Itôs great fun, if somewhat wasteful of plastic stock. But, given that the plastic (it looks kind of like clear weed-whacker twine) is cheap, I guess thatôs not a problem.

One day, we shall achieve the ability to make chicken head knobs and other useful items for the Company. At present, the best we can do is hairy blobs. If any of you need one, just let me know.

Tower Strobe Systems

As I write this, WYDE-FM is currently

under a NOTAM. One of the flash heads on the 1,380-foot tower isn't working, and TWR's diagnostics say that it's time to replace the xenon tube. Rather than complain about the weather (yes, it's raining here again) or about how difficult it is to get a tower crew to come do work nowadays (don't get me started on that), I'd rather take a break and discuss these strobe-type obstruction lighting systems.

The first rule you should already know: don't ever modify one of these or try to use a cheaper substitute for the (hilariously expensive) factory-recommended flash tubes. If the FAA should ever get word of it, you shall get thumped. This makes the price on components much higher than need be, but that's government regulation for you.

The second rule is also well known to anyone who has worked on these systems: they're dangerous. The flash tubes in them typically operate at several thousand volts and the tubes can explode if they become stressed or unhappy. Better yet, if you operate the xenon flash tube at the wrong voltage, it might flash, but it'll produce the wrong spectrum. You'll get tons of infrared (which causes heating) or ultraviolet (which produces ozone, which, in addition to being no fun to breathe, will attack the plastics and rubber items inside the flash head).

Oh, and it goes without saying that you should never, ever look directly at one of these things up close when they're flashing ... especially without the factory-supplied bezel, filter or cover in place. These not only protect you in case the tube explodes, but they help filter out the aforementioned infrared and ultraviolet. You won't see it, but it can damage your vision. Also, similar to an arc welder, the brilliant flashes are strong enough to cause serious damage to your retina, but are of such a short duration, your eyes might not have time to adjust.

Why could the tube explode? Because the xenon gas is under a very high pressure and you're forcing a lot of energy through there in brief, strong pulses. Most xenon strobes for obstruction lighting use thick quartz glass to help prevent this. I've personally never had one explode around me, but I've heard professional photographers talk about it. It's loud, scary and dangerous, if you've got scorching-hot quartz glass flying around.

This is why you're told to carefully wipe all fingerprints or other soils from the tube when you install it. These won't weaken the quartz (a common misconception). They catch more of the light, especially the aforementioned infrared. This results in hot spots across the glass wall of the tube. Uneven heating can cause cracks, and the tube will ultimately shatter.

Figure 1 shows a basic xenon flash. Many of us have built hobby circuits like this, using small xenon tubes intended for a few hundred volts. At low voltage and normal temperatures, xenon offers a high resistance, so very little current will flow through the tube. The capacitor charges up through the resistor. Eventually, the capacitor reaches a high enough voltage to trigger the tube: the xenon turns to plasma, which has a very low resistance. The capacitor

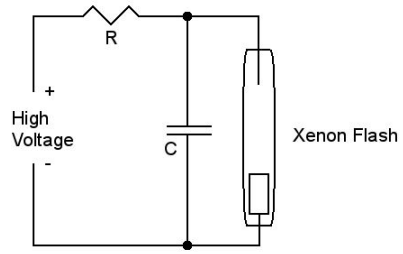


Figure 1 - A Simple 'Hobby' Xenon Flash Circuit

discharges very quickly through the tube and you get a bright flash of light.

The circuit shown would flash repeatedly at a rate determined by the time constant of the resistor and capacitor. This resistor is typically made adjustable so that the rate can be varied.

Figure 2 is based on the old EG&G/Honeywell units that we used at WYDE-FM for many years. Most newer strobe systems don't come with schematics; they expect your tower crew to order complete assemblies and to replace them. But this older system, while a pain in the neck, was designed for field service at the component level. I learned a lot about these things when I was maintaining those flashers on 101.1's tower. It illustrates all of the basic principles.

The flaws in the simple circuit of Figure 2 are obvious: first, there's no way to vary the intensity, and there's no way to synchronize the flash rate so that all of the strobes on the tower flash at the same time. Figure 3 adds a few refinements for an FAA-approved obstruction lighting system.

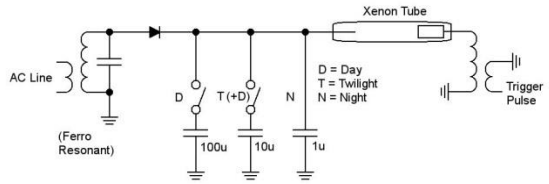


Figure 2 - A typical strobe system for obstruction lightning

To the left, you have the high voltage power supply. A step up transformer pumps the AC line to about 3,000 volts (typical for these systems). The EG&G design has a capacitor across the transformer to make it resonant at 60 Hz; thatôs important. I found out the hard way that if this cap goes open, the very next flash will probably blow the fuse and damage the rectifier(s) as well.

An FAA-approved strobe system must have different brightness levels: day, twilight and night. The EG&G simply switched different capacitors into the circuit, adding more for higher brightness. The 1uF night capacitor is always in circuit. For twilight, 10uF is placed in parallel, for a total of 11uF. For full-blown day mode, a 100uF is switched in, for a total of 111uF.

Hereôs an interesting fact that I never knew until I started working on these things. Day and twilight modes make a single bright flash. Night mode, though, rapidly strobes the tube several times for each flash event. The EG&G, for example, does this 8 times for each ñflash.ò This improves visibility at night and is more effective than a single bright flash. As you drive around at night, you can see this on most towers with a strobe system, especially if you turn your head rapidly during a flash event.

Any professional flash system, whether for obstruction lighting or photography, will have a way to ñtriggerò the flash. Some systems use a separate trigger lead on the flash tube. In some cases, this can be a fine mesh of wire around the quartz: an extremely high voltage forces electrostatic energy into the xenon, which ionizes, allowing a full plasma-flash-cascade event to occur.

The EG&G system uses a trigger transformer in series with the cathode. The tube normally sits at 3,000 volts, just below the threshold needed to start a flash event. A trigger pulse will then cause the cathode to go much more negative, increasing the voltage across the tube. The xenon gas ionizes, and a few microseconds later, you get the avalanche of current as the xenon is heated into plasma. A very bright flash is emitted.

The reason for the resonant input transformer is to protect the power supply during these brief, high-current discharge events. The diode doesnôt conduct during the flash; the energy comes from the juice stored in the capacitors. Once the capacitor has discharged, the flash event ends and the capacitors can recharge more slowly, ready for the next flash.

This final image (Figure 3) is one of the old tubes from our top beacon (the ñAOLò). This is typical of what a xenon tube will look like when itôs time for replacement. At the bottom, some of the cathode metal has sputtered or ñspalledò onto the inside of the glass, turning it black. At the top, the quartz itself shows signs of wear from ablation: repeated flashes have caused hairline cracks, giving the tube a cloudy appearance. Either is a sign that the flash tube needs to be replaced.

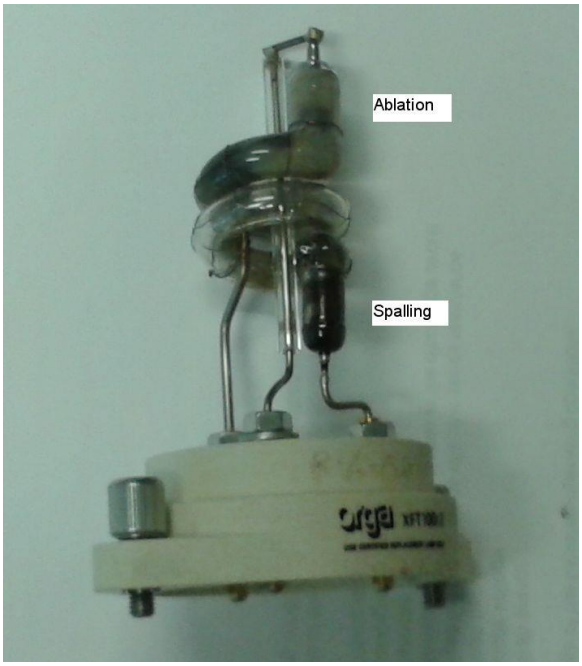


Figure 3 - A typical old xenon tube showing typical signs of wear

Thatôs about it for this time. Next time, Lord willing, the rain will have ended and Iôll finally be able to report on our new Dragonwave data links! Until then, keep praying for this nation!

Valley Notes

By
Steve Minshall
Chief Engineer, KCBC

May brought an interesting project to KCBC. The original production console for the station was a good old rotary-pot broadcast console. Built in 1987, the room had the requisite turntables, cart machines, and reel-to-reel decks. Hum was always an issue, especially with the phono preamps exacerbated by a 175 kVA distribution transformer only 12 feet away.

Over the years the turntables, cart machines, and reel-to-reel decks went away to be replaced by computers. The first replacement for the old console was a Tascam mixer. The Tascam required a complete rewiring of the studio and a neat wiring harness was made for the array of ¼ò phone jacks it presented. A few years later the Tascam was replaced by a Mackie that was plug-compatible with the wiring harness.

Eventually the Mackie was replaced by a digital Tascam Mixer. This was only partially compatible with the wiring harness and the studio wiring was starting to get a little messy as these things tend to go over time.

Our latest upgrade to the production room is the replacement of the Tascam board with a broadcast board. After a couple of decades of using mixing boards, we are back to a broadcast console, and it is a welcome change. With production being done almost entirely in the computer environment, the need for a myriad of equalization, pan and effects pots no longer exists.

The new console is an Audioarts D75 (manufactured by Wheatstone). This is the best console I have ever had the pleasure of working with to date. Since none of the old mixer-style wiring harness was usable for this console I decided to completely rewire the studio. This approach would be easier, faster, and much cleaner than trying to adapt the 20 years of wiring present.

I set out one day with wire, various connectors and a couple dozen DB25 plugs and started making new cables to connect the console to every piece of equipment in the room. I figured it would take a couple of hours but I was off by a factor of 5. Ten hours later I had a complete set of cables.

A few days later, John Yazel and I started the process of installing the new console. It took a couple of hours to remove the old wiring and vacuum the insides of all the cabinetry. The new console was put in place and the wiring was hooked up, as much as possible anyway. Initial testing was straightforward and revealed, for the most part, a very clean operation. There were, however, a few hitches.

The first little problem I ran into was that in my attempt to get as much equipment on AES as possible, I had assumed that certain pieces of equipment had AES inputs. Such was not the case, although they did have AES

The KCBC production room with the D75 in place.

or SPDIF outputs.

Hum raised its ugly head once more in the room. The phone interface hummed and so did the utility computer. The addition of a ñhum eliminatorò (a box with transformers) solved the phone hum problem completely. One hundred year old technology to the rescue! The computer was not so easy.

The utility computer continued to hum even

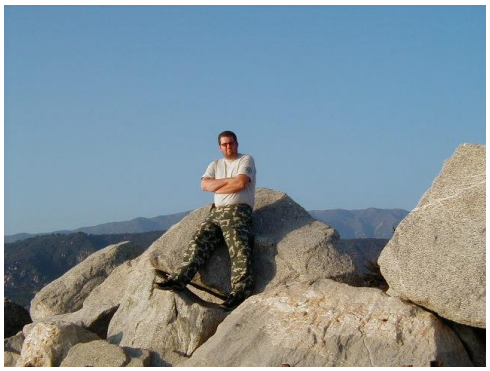
with a hum eliminator in place. I decided the way to fix this was to get a sound card with AES or SPIDIF inputs and outputs. There are many options available for internal and external sound interfaces but I found what looked good to me on eBay. This was an M-Audio USB sound interface with SPIDIF ins and outs for under $50. With the installation of this sound interface the computer is now dead quiet.

I look back on this project as an enjoyable time. One reward we now enjoy is the renewed operation of the ñRECORDINGò light above the studio door that has been dark for the last twenty years.

Mainland Memoirs

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Southern California! May has been a month of planning projects and then getting buried under computer issues. With several projects now on the drawing board I have had to put a couple on hold as I deal with viruses and malware on various computers at the KBRT studios and offices. Sometimes it seems like everything seems to hit at once.



This particular outbreak began with someone who unfortunately infected some machines with a Trojan using a flash drive. As I dug in, I began to find many other issues, things that just never got set up properly here in the past. Through this I have implemented a program that automates much of our maintenance and provides an excellent security suite, a program I am hoping will save us a lot of time here in the future.

In the past, much of each Friday had someone going from machine to machine running cleaners, defragging and scanning for other issues. The new security program will now automate all of that and send me an email if there is an issue with a machine.

The strange thing is that as I was dealing with issues caused by the Trojan, we also began to experience hardware failures. From a drive in a Nexgen production machine to an entire computer, machines began to not like us here. Now that we are past most of the issues, we called a staff meeting to discuss, among other things, our daily workloads and how those pertain to our reliance on computers. This meeting proved to be a major boost for me as I now understand the daily requirements for each machine and peopleôs frustrationôs with those machines.

The KBRT staff and I are now working together to update the way we use our computerôs and I am working hard to design a network system here that will save us all a lot of time and headaches while preforming our daily tasks.

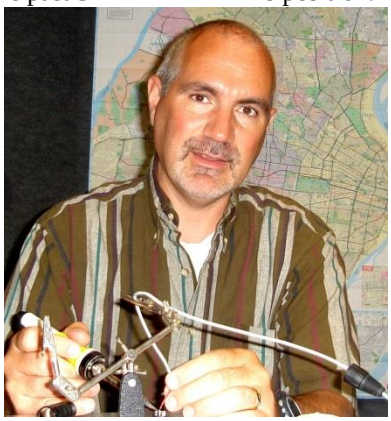
As all this chaos was going on, I was able to break away and get a couple of other projects started. We accepted delivery of our new 75 kW dummy load here at the studio. I was able to haul it up to our transmitter site with a rented trailer, then get a crane to lift it over our security wall and set it next to the transmitter building (it is an outdoor load). Working with my Operations Manager Todd Stickler, we were able to explore and begin drawings for a complete facility rewire, something that will bring the KBRT studios up to par with the new transmitter site, making things easier to navigate and troubleshoot. Looking forward, this will be a very busy summer, but we should come out shinning brighter than ever.

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

Itôs been nearly four years since the byline Rick Sewell has appeared in the pages of *The Local Oscillator*. That was far too long in my opinion. It has been an interesting journey for me the past 3½ years. If you had asked me four years ago if I would end up in Chicago I would have probably told you no. The roots run very deep for me and my family in our hometown of Belleville, Illinois, a suburb of St. Louis.



But I would have probably had a little pause before offering that ñnoò because my son and his family, with our only grandchildren, live in Chicago. So in reality in wasnôt totally out of the question because we would visit Chicago frequently to spend as much time as we could with them.

If you asked me four years ago would I ever leave Crawford Broadcasting I would have also said no. I love the company and never really wanted to go anywhere else. Yet somehow I ended up doing exactly that. I had been approached several times by the Director of Engineering at Clear Channel in St. Louis to come work for him and had pretty much always dismissed it out of hand. It was really something I didnôt want to do.

However, four years ago I was approached again and I thought that maybe I should at least pray about it. That was when things got surprising for me. I had earnestly sought Godôs direction in this and I wanted to really be open to whatever He wanted me to do. It seemed the more I prayed about it the more I got the sense that He was leading me to take the job with Clear Channel.

I was very reluctant and put the decision off as long as I could. Finally, I had to go where I felt God was leading, even if I didnôt understand or like it. I remember calling Cris to give him my notice and as soon as I hung the phone I asked myself, ñWhat did I just do?ò I had a job I loved and I just gave it up and I couldnôt even verbalize a reason for doing it. My heart was definitely not in it.

My hope was that as I followed Godôs lead I would begin to understand why. Even a year later I was still questioning why I was at Clear Channel. Then the Director of Engineering who hired me moved up to take another position in the company and told me I would probably be the heir apparent for his position.

I began to think maybe this is the reason why God brought me there. I would be promoted to the top level engineering position for the six-station cluster there. Thatôs when the Regional Director of Engineering told me, ñIt would be a slam dunk to put you into the position since you have been here for a year and know the entire facility. But weôre probably going to bring in someone from outside Clear Channel because we have the opportunity to strengthen the local engineering team, since it is easier to find a good number one than it is to find a good number two.ò

What do you say to that? I took it in stride and figured God had a plan. It was one of those times when I had to learn to humble myself every day. I soon had a boss, not of my choosing, that fully realized that the job had been down to either him or me and he quickly set about to demonstrate in subtle and not so subtle ways that he was the right choice and I wasnôt. All I wanted to do was show up to work and do a good job and be at peace with the decision that was made. However, I had to be reminded on a regular basis that he was the one chosen for the position. As I stated earlier, it was a humbling time, and I am sure that I needed it.

At the beginning of this year I had made it my New Yearôs resolution, Lord willing, to make an employment change by 2015. It was shortly after that Cris called me and asked me to think about going to Chicago to take the position that I eventually accepted. At the time it wasnôt a question of whether I wanted the job. It was the whole idea of moving that scared me.

After a lot of prayer and numerous discussions with Cris and, of course, my wife, we decided this was the right choice for us at this time in our lives.

It is very interesting how God orchestrates the plan He has for our lives. I can see now that

although the Clear Channel time in my life felt like my ñwildernessò time, I can see clearly now how it has prepared me for this time. From a technical standpoint it definitely prepared me to work with FM facilities, HD Radio and IT. From a managerôs perspective I learned some things I wouldnôt want to repeat myself. Spiritually, I definitely learned much but still have much to learn.

With all that being said, I am very excited to be back with Crawford Broadcasting Company. I am very thankful to Mr. Crawford, Cris and God for this opportunity. I am also excited about being in Chicago. I have been here for a month and I have thoroughly enjoyed the warm welcome that I have been given here. It has been a pleasure working with some very professional people who, like me, love to do ñgreat radio.ò

I couldnôt be more pleased with the team of engineers working for me. They are making this transition so much easier. The facilities are great. Mr. Crawford and Cris have really put the best equipment at our disposal. Now itôs our job to make sure we are working at ever higher efficiencies. That is the challenge that is before me and I am enjoying it thoroughly.

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

In the last month, another state has recognized the importance of broadcasters during an emergency as Oklahoma has adopted a First Informer Broadcaster Law. Here in Oregon, broadcasters are also working on emergency disaster response planning. We have looked closely at the First Informer implementations across the country in an effort to learn from others.

The Oklahoma definition of a broadcaster as ña broadcasting station engaged in and deriving income from speech via over the air communicationsò seems problematic. A first blush analysis by a local engineering and legal resource suggested the definition excludes non-comm broadcasters such as PBS-affiliated stations. It also could conceivably exclude music stations while including other commercial speech such as taxi dispatch for example.

At the moment we feel that for purposes of emergency preparedness the definition of broadcasting should be based on the FCC definitions. The goal would be to include radio and TV (both commercial and non-comm), low power radio and TV, local translators and cable head ends carrying local radio and TV signals.

Another aspect of emergency planning we are discussing is the development of a plan for emergency use of broadcast resources. The local ARES (Amateur Radio Emergency Service) plan is a partial template for the broadcast plan. The ARES plan is currently being updated, but the general format is a useful example.

Generally the plan uses two lists: one list of needs and the other list of resources. Using the two lists, resources can be matched to needs. The ARES plan, for example, identifies District 1 (five local counties), the City of Portland (POEM), East Multnomah County, and NET Teams as needs. The resources are apportioned something like the following: ñTo meet broadcast objective we are looking at the RPU frequencies and resources to handle broadcast coordination and information distribution during a disaster.ò

This last winter, ice fall damage has been a serious problem. Detuning skirts and apparatus on nearby local towers has been particularly prevalent. Four of five detuning systems are or were non-functional. All of those had failures of the detuning adjustment box involving the spark gap insulator. These boxes use flat brass riser bars to connect to the skirt commoning ring.

These bars can act a lever to twist the connecting shaft. It appears that ice fall in particular hitting the riser/commoning ring puts a rotational torque on the connecting shaft through the bell

insulator. That in turn places a sheer force on the insulator holding the high side of the spark gap. I am currently looking for solutions to limit future damage of this type.

Spark gap in a detuning box with the high-side insulator broken as a result of the lever action of falling ice on the outside feed tubing.

Several columns back I did a series on restoring a historic RCA field intensity meter. Since then I have become aware of a local club which owns a collection of early radio receivers, including the 1920s Hallock and Watson receivers which were built here in Portland. The club is hoping to spark interest in an effort to protect the early radio history of Portland and the North West.

As an industry we broadcasters haven't been particularly effective in preserving our history, which includes historic national broadcast content, announcements and coverage of historic moments. A small few of those moments have been preserved.

A few years back I had the chance to work with Lee McCormick who was at the time the chief for KINK and 620 KOTK. While visiting the transmitter site (620, originally KGW), I did learn there was a lot of historic material at the Delta Park transmitter building. Most of that went into the dumpster when the station was sold and the property turned into wet lands.

During the 70s I did transmitter watch at the KEX transmitter. There were a stack of transcriptions stored at the transmitter, which appeared to have been recordings saved from the 30s and 40s. I have no idea if they still exist.

I know of three area collectors who have significant collections of material and original written records. The station call desk plaque from the Portland Police AM transmitter is still in existence here in Portland along with microphone flags from KOIN(AM) and the camera tube from the first TV station (KWJJ-TV).

I found a bit of background of the Hallock-Watson team on line, including some of the notable historic achievements of the Hallock and Watson pair. Watson installed the Deforest transmitter at Station PE, the United Wireless Station, located at the 1,072-foot summit of Council Crest in Portland's West Hills. On June 28, 1911, Watson handled the distress calls of the steamer SS Spokane which was sinking in the Gulf of Alaska. He directed some of the rescue work and received $25 as his share of the salvage money.

The pair joined together in business in 1921 as the Hallock and Watson Radio Service and started broadcasting first as Station 7XI, and later, in 1922, as KGG on 360 meters. This early 5-watt station operation was an Esso motor-generator transmitter with a flat-top antenna above the building.

Another highlight was Watson's dream of a police radio communication system, which he first proposed in 1921 to the Portland Chief of Police. The dream became a reality in April 1932 when the firm of Hallock and Watson built the 50-watt transmitter and later a more powerful 500-watt system for police station KGPP. As I noted above, the station call desk plaque is still in existence here in Portland. Watson said that ñPortland actually had in operation the first "Police Radio" in the world, although at the time it was not municipally owned.ò

The problem is that if we don't make an effort to facilitate the protection of this material and history, it will disappear and become just a faint memory. Not even a ripple of the past.

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

Exporter Plus Update

Last month we were finally able to get the Nautel Exporter Plus for KLZ working properly again. We would find the unit turned off on occasion. It wasnôt happening often, so we didnôt think much of it. I think I kept thinking maybe I turned it off and forgot about it because that is something I would do, rebooting it from time to time. Finally, we started paying close attention and would check it via Telnet and found that it would indeed turn itself off. So let the troubleshooting begin!

I called Nautel and gave them our readings and they told me what they thought was wrong: a fan. I had opened up the Exporter and at the time everything was still working fine. The issue didnôt happen right away after being powered back on. In fact, it would sometimes work for days. Otherwise I could stay at the site and watch the unit until it would fail. I decided to take a leap and get a replacement fan. When I received it, I went out to install it. It wasnôt until we took the other fan out that I realized it was indeed the culprit. I could plug it in and run it, but if I would barely touch it, it would stop and not start up again. So I installed the new fan and it has been working now for the majority of a month without another mysterious power down.

Mowing Trip

In May, we finally had to take our new tractor out to the KLVZ site to do the first round of mowing. Jerry Ford, a neighbor, keeps horses on our land out there and at KLTT, but from what I understand, last year was hard and he had to sell many of his horses. Normally heôd have a half dozen or more horses out at KLVZ to help us with our mowing operations. This year, he put four out and they just cannot keep up with all the growth.

My dad and I took a day and hauled the tractor and brush hog out there and mowed the front of the property, around the building, towers and guy anchors, as well as a path to each tower. That site is small enough (15 acres) that you would think we couldôve gotten the whole property done, but with all the flood debris and prairie dog mounds, we took it slow so as not to run over anything that could damage the tractor, brush hog or ourselves.

We found that when hauling the tractor, if we use my dadôs snowmobile trailer for the brush hog, we can cut our time in half. Otherwise weôd have to load the brush hog, drive it out, tie it off to something and yank it off the trailer, then go back and pick up the tractor. Using two vehicles with two trailers let us get everything transported in one trip.

Iôve got to say, hauling that tractor for the first time was a bit nerve-wracking. Iôve never used a trailer brake control before, but thankfully, my husband has. He showed me what to do and it seemed to work well.

Wheatstone Upgrade Part 2

It looks like the order has been placed for us to get Wheatstone IP Blades for our Nexgen audio servers. This part of the upgrade will take a little longer as we will need to upgrade our computers. This means more RAM, possibly new hard drives, and a complete reinstall of everything NexGen related.

We currently have one computer set up and running Windows 7. This computer was one of our older XP HP workstations that was a spare unit. When we replace a current audio server with this computer, Iôll take that computer and do the upgrade, then we will install it along with the blade, and move on to the next until it is all done. These computers are six years old, but thankfully weôve only had one issue with a Windows 7 installation and we are fairly certain it was the hard drive. I am not looking forward to dealing with the computers, but I guess it is part of my job. I do know I will be thrilled when it is done.

KLTT Ground Wire

Keith had been mowing at the tower bases at the various sites. He noticed that at one of the KLTT towers, the lightning ground wire was nearly completely cut through. No doubt it was from years of nicking it with the weed eater string and blade. Thankfully it had enough slack in it that we were able to do a simple repair using some split bolts.

Exporter Update

iBiquity recently sent an email out requesting that all HD stations update their exporters to the newest firmware (4.4.7) as a bug was found causing some sort of an issue in some receivers, so that is what we did. I Telnetted in to each exporter, wrote down all the info and then we headed to the sites, starting with KLZ.

It seems that the first one is always the most difficult as it is the first one weôve done in a while. We just went straight to the Update Software without even thinking about it, despite the fact that the two menu options above it were to fill in the file name and location. This caused issues for us. The unit froze. We had to pull the power plug to get it to restart. Thankfully it came back and we filled in the proper info and once we did that, things went well.

When things came back up the diversity delay was obviously off, so we adjusted it to be right, then we moved on to the other sites. The other three sites did not have any issues with the diversity delay. When they came back up after the post-update restart, the delay was dead on. Again, we thought it was all good.

As we left the KLDC transmitter site, we noticed it wasnôt locking in HD. It would lock, then quickly unlock. This was a bit weird as it had been locking fine at the site. We have never really paid much attention to when and where it locks in that area so we thought it might be normal, but after we got a mile or so away we decided there was a problem.

We decided to turn around and go back and found it no longer locking at the site. We went in to do a power down reset of both the exporter and exgine/exciter. This seemed to fix the issue. We listened to the station all the way back to the office and it did not come unlocked until the lightning started to roll in.

It was during this storm when stations started going off due to the microwave links going down in heavy rain that I realized KLZ had another issue. I would hear it fine in analog, but as soon as it locked in HD it was silent. It had been working fine as we did check the station before we left the site after the update. I put the station on the B exciter so it would be analog only. I called Keith and after the storms passed, he went to the site and did a power down reset of both the exgine/exciter and exporter. Again, this fixed the issue. Nothing in our instructions said we would need to reboot the exgine or exciter.

After this, I was listening to the station and noticed the delay was off (again). It was dead on when we set it, so we arenôt real sure what happened. Thankfully we were able to remotely fix it easily and got things back to normal again. We have not done the reboot on the KLTT exciter yet, mainly because it is for the aux transmitter (the main transmitter was updated a while ago) and I am trying to not make a special trip for this. However, it will need to be done soon. We did do the KLVZ exciter reboot and that station seems to be okay as well.

So for anyone who has the Nautel AM IBOC-Exciter or Nautel Exgine and Exporter Plus, you might want to consider rebooting both units again after the initial update.

Next Time

Next month will involve more mowing, maintenance of the sites and upgrades. No doubt it will be a busy month. It seems summer is always a busy time. But, I will continue to work hard to make sure my four sites are working and in good shape. So until next timeé thatôs all folks!!!

KBRT • Costa Mesa - Los Angeles, CA
740 kHz, 50 kW-D/0.2 kW-N, DA-1
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX • 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
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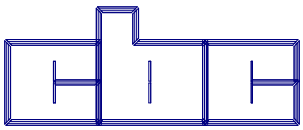
COMPANY



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