The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Satellite Change

I shouldnôt have been surprised when I got a call from our friends at Clear Channel Satellite late last month reminding me that AMC-1, the satellite which we use for the CBC Ku-band CBCSAT network, is approaching the end of its life. I have gotten different dates from different people, but the consensus is that we need to be prepared for end of life on August 14 of next year. AMC-1 will be replaced with SES-3.

Many years ago I went through a satellite end-of-life transition, and it was no big deal. SES World Skies and the other satellite companies seem to really know what theyôre doing. Somehow they fly the new bird into a location immediately adjacent to (or in front of or behind) the dying bird, then bring it up while simultaneously shutting the other down. Once theyôre certain that all is well, they jet the old bird out of the geostationary arc and move the new one to the center of its orbital box. The process is, or was the one time I experienced it, pretty seamless.

With the AMC-1/SES-3 transition on the not-too-distant horizon, SES has begun doing some frequency shuffling, and the CBCSAT frequencies are among those that got shuffled. On September 26, we moved from Transponder 13 to Transponder 1, with frequencies of 11703.3, 11703.5 and 11703.7 MHz for CBC-2, CBC-2 and CBC-3, respectively. The change went without a hitch, and I very much appreciate all the good work of our engineers and operations managers in making this change.

There is more change to come, however, and in the coming months we will have to deal with a polarization shift in preparation for the AMC-1/SES-3 transition. AMC-1 operates with a 26 degree polarization offset, i.e. the polarization is not truly ñhorizontalò or ñverticalò at the equator but rather offset by 26 degrees. SES-3 will have non-offset polarization, which will require us to move all our feed horns counter-clockwise.

SES is recommending that sometime in the weeks prior to the change, users rotate their feeds 13 degrees CCW, splitting the difference between the AMC-1 and SES-3 polarizations. With that small amount of polarization error we will have no trouble receiving AMC-1, and once the transition is made, we can easily and at our leisure move the feeds another 13 degrees to optimize it for the new bird. This is a good plan and one that we will likely follow.

We will likely have to move our uplink horns the full 26 degrees on ñD-Day,ò and we will follow the lead of SES in that regard. I canôt imagine they would tolerate polarization errors on transmit, even for a short period of time because of the interference potential to opposite polarization transponders.

As the time approaches, I will advise what to do and when. We will likely employ local contractors to deal with the uplinks at Detroit and Costa Mesa; Amanda and I can take care of the one in Denver.

Alternatives

Looking way down the road, Iôm not sure we are going to stay with satellite delivery for the long term. It has its advantages, including and especially the ability to deliver programs in real time (low-latency). The issue is that the equipment we use, including the modulation scheme, is now obsolete and as of last month is no longer manufactured. If we opt to stay with satellite delivery we will have to make a huge investment in uplinks and receivers. Arguably we are overdue for this anyway, since some of our uplink equipment dates back to 1994, but considering the cost of space-segment airtime, this isnôt particularly attractive.

The public Internet, while subject to outages and glitches at any number of points along a given path, is fairly reliable. We use it in Buffalo and

Albany right now to deliver several programs in real time with good results. Seldom do we have dropouts or complete outages. We must always be prepared with a backup program just in case, but itôs rare that we have to use one. Considering the low cost, that delivery method just about screams for consideration

in place of very expensive satellite delivery.

New IP codecs offer features that are designed to make them useful and reliable as an Internet delivery platform. The Worldcast Horizon Nextgen is one codec that is finding increasing use in STL applications within our own company, and it has possibilities for point-to-multipoint distribution as well. Newer units offer an option called ñSureStream,ò which permits the use of two separate IP paths from unit to unit. Each path is completely redundant, so if either path is compromised or fails, the other takes 100% of the load without interruption. We plan to use this feature in an STL application for WYRB in Rockford in the coming weeks, using two separate point-to-point T1 lines to provide the separate paths between units.

The other feature that the Horizons have is the ability to provide a stream to multiple receivers. We use this feature in our Denver market right now to good effect. KLVZ has separate day and night sites, so two STL paths are normally required. The Horizon Nextgen we use allows us to produce a single 256k 16-bit E-APTX stream at the studio and connect to it with separate Horizons at the day and night sites. I have not tried more than two connections, but the unit supports it. We could presumably make as many connections as we have the bandwidth to support, and that is where these units become very attractive as a point-to-multipoint distribution platform.

The KBRT transmitter site is one place we may make the investment in new satellite uplink and downlink equipment. We employ CBC-1 as a backup STL for that station because there are no utilities other than electric at the site. If the microwave link fails, we would be dead in the water without that satellite link.

So what is the timeline on all this? Weôve got a ways to go, about a year and a half left on our space segment contracts. As we approach that date, we will make a decision and invest accordingly. Until then, weôll ride out the AMC-1/SES-3 transition, enjoy the added power and gain of the new satellite and hope our aging uplinks hold together until weôre ready to make a change.

Goodbye to an Old Friend

Many of you may know by now that we sold KJSL in St. Louis last month. The reasons were myriad, and I wonôt go into them here, but the good news is that the station is now in the hands of another Christian broadcaster, the Bible Broadcasting Network. The callsign is now KYFI. We continue to own and operate KSTL in the St. Louis market.

Seeing KJSL leave the fold was sort of sad for me. It was one of the first stations that we acquired in our expansion in the early 1990s, and it had some historical significance as well as one of the old line regionals. In the 20 years we owned and operated the station we did many improvements, including replacing the transmitter and the entire phasing and coupling system.

The latter was a real challenge for me, as the night pattern had some serious impedance bandwidth issues that were a function of array geometry as much as anything else ï there wasnôt a lot that we could do in the phasor to make things better. When we were looking to acquire the station, I noticed immediately that the modulation at night was reduced considerably from its daytime norm of 85-100%. The engineer that was there at the time told me that they had to do that to keep the transmitter from tripping off with high VSWR during modulation. We lived with that for some time, but I resolved to fix it and I did in the new phasing and coupling system.

The issue was tower #3, which had a very low nighttime driving point impedance. With modulation, the driving point Z would alternately go negative, then positive, causing all kinds of trouble back at the common point. Because there was so little power in that tower at night (160 watts or thereabouts), I designed the new phasing and coupling system to dump the transmission line from the tower into a dummy load at night. That did it. We lost the very minimal benefit of that 160 watts, but we gained good night impedance bandwidth.

Iôll hang onto that and a lot of other memories from KJSL, and who knows? Maybe the new owners will need some help with the antenna someday and Iôll get my hands back in it.

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

Hello to all from Western New York! Each year, the first full week after Labor Day, my wife and I take our annual pilgrimage to Gettysburg, PA for a week of relaxation. We have been there each year for the past 20 years, and enjoy the time away immensely. As the time for vacation approaches, my work load increases somewhat as I take steps to insure that everything is in top working order, from the transmitter plants on down to the studios. As I do not have any on-site engineering backup, I try and locate/solve any problems before I leave. Thereôs nothing worse than being hundreds of miles away and one or several of your stations are off the air! That happened to me last year, and believe me; nothing ruins a restful vacation more than having major problems when you are so far away. One thing that I can count on is, *something* unexplained will happen just days before I am scheduled to leave, and this year was no exception.

We had planned on leaving early morning on Saturday, September 7th. I had actually worked Labor Day so that I could go over all our equipment and sites to identify any problem areas, and this would give me ample time to make any repairs that needed to be done.

On the 4th, a Wednesday morning, I received a call from the WDCX-FM board operator that the audio was off; the transmitter was working fine, but no audio was going out over the air. I walked him through checking several things at the studio, and noting that everything there was okay, I headed straight out to the transmitter site in Boston, NY.

Upon entering the transmitter building, I immediately saw the problem: our Omnia 11 was dead! I switched to the backup STL and audio processor to get us back on the air and commenced investigating the cause of the Omnia failure. There were no lights, no screen or any indication that the unit was even getting power! I unplugged the unit several times and plugged it back in, each time with no results. There are no serviceable external power fuses, so I thought I would pull the unit out and take a look inside.

After removing the unit from the rack and placing it on the workbench, I again attempted to plug it in to see if it would boot up, and again nothing. I removed the 158 screws on the unitôs top and took a look inside to see if anything looked out of place, a loose connector, failed components, blown fuse, anythingé All were fine. I plugged the unitôs AC cord back in again, and it booted right up! After booting, I removed power and re-applied, and it booted right up again!

By now, I am scratching my head, as there was no reason found as to why the unit failed. I re-installed it, and it has been working perfectly ever since! As I mentioned earlier, each year, something really weird happens that cannot be explained. I guess its Satanôs way of trying to annoy me while I am away, keeping me right on the edge, expecting to get that call that something has failed, and we are off the air!

WDCX-FM, WDCZ(AM) - Buffalo, WDCX (AM) - Rochester

The weather has been very cooperative in September, allowing us to get several projects underway or completed. Don Boye has been working for the past five weeks or so, painting the 5-tower array at WDCZ (AM) transmitter site in Hamburg, NY, and JM Enterprises completed the driveway installation at the WDCX-FM transmitter site. As of this writing, Don has completed three of the five towers and is hoping that the weather holds out and the remaining two can be done before the cold air arrives. The towers are not galvanized and were constructed in the 1940s, which means that they have to be scraped and rust treated before any paint can be applied. Don is treating any exposed rust with an inhibitor, which stops the oxidation process

Figure 1 - New driveway at the WDCX-FM site.

immediately. He follows up with a coat of primer. On the orange color bands, one coat of paint is sufficient. However on the white bands, two coats of paint are needed to properly keep the inhibitor and primer coats from bleeding through.

We have also contracted Freedom Restoration Services to repair the surface cracking on the tower foundations, but they have not been able to get to us yet. We did not get this work approved until early summer, and their work schedule was already months behind. I am relying on them to get the work completed before the cold weather hits. Any more cracking of the foundations could lead to serious foundation issues. We need to nip this in the bud before any more damage occurs.

WLGZ-FM - Rochester

We have experienced well over a dozen failures this summer of the A/C unit at the WLGZ-FM transmitter site. The A/C is a through the wall Bard 4-ton unit, which is approximately 17 years old. The failures have been everything from the phase monitoring module to shorted motors, and compressor shutdowns from excessive head pressure and temperature sensor overheating. The failures, coupled with the unusually high temperatures we experienced in July and August, caused heat to build up in the transmitter building, measured well above 150 degrees! Each time this occurred, our Wegener Unity 4000 satellite receiver would fault out on overheat, and the Burk VRC-2500 would lose its brains and have to be re-programmed. We have had several HVAC guys to look at this site, and have a good plan in place to insure that this does not happen again.

The first thing on our agenda is to install a roof fan, capable of removing 3000 cfm of air at the roof level. Secondly, a spray-type foam insulation will be applied to the underside of the roof and rafters to help insulate from any radiant heat from the roof itself. Thirdly, a drywall ceiling will be installed with vents over the 2 transmitters to duct the heat away from the room area. By venting the transmittersô heat out of the room into the roof area, the A/C will not have to work as hard to get the room air down to a comfortable level, and the transmitters will only be drawing in cool air that has not been affected by the temperature rise of the exhaust ports.

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

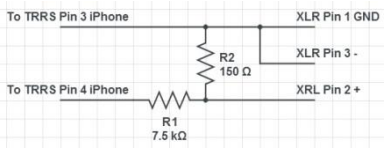
By
Aaron McEachern
Chief Engineer, CBC–Detroit

Hello from Detroit! I hit the ground running here as we did not have a full time engineer for a few months. Joe Huk has been very helpful in guiding me through the systems in place here.

After three weeks on the job, we took a lightning strike on the FM tower at the main studio. I quickly found the rumors of lightning at this location to be true. In the recent past, the grounding at the building had been upgraded with improved grounding on the tower and equipment racks. I am sure this lessened the effect of the strike. In all we lost about 40 ICs in analog outputs, and a few I/O ICs in the Wheatstone Bridge Router. We also lost output ICs in the FM modulation monitor, Comrex Matrix, a DBX compressor and a Satellite receiver. We lost the RS-232 port on our RDS encoder. The lightning also got into our network, taking out couple of ports on network switches and a few network cards. The only damage to our Nautel NV40 transmitter was a PA module.

I found an interesting app for the iPhone, in an advertisement for the Telos ZIPOne. It is Luci Live. It is also available for the Android and Blackberry platforms. It is a light weight remote codec, which will connect to the ZIPOne with the RTP protocol. To enable RTP, you must have firmware version 1.8 or newer on the ZIPOne. You must also have port 5951 forwarded on you firewall.

I have done a lot on testing on our local network, but limited testing using G3. Luci Live and the iPhone have very low tolerance on the input. You must pad the input for line level. For a pad, I used a 7.5k ohm resistor in series with a 150-ohm shunt. I have also found the easiest way to build the adaptor for the phone is to use a camcorder cable. It comes with the molded 1/8ò TRRS Connector. The resistors fit nicely in the XLR plug. See the drawing below.



I would also use a compressor on the input. Depending on your application, the output can be used at line level or with headphones.

Luci Live Lite only cost $29.99, but only supports the G722 codec and the full version is $349.99. The full version supports many codecs and allows prerecording. See features below.

- RTP or UDP low-delay streaming, two-way, so including return channel
- 1-Way Shoutcast/Icecast streaming
- Record while broadcasting
- Play prerecorded material while broadcasting
- Codecs: MP2,AAC, AAC-HE, AAC-HEV2,G711,G722,ULCC
- 24-bit ULCC audio codec, 44.1 to 384 kHz sample-rate.
- N/ACIP compatible
- Sample-rate from 44.1 to 384 kHz
- ASIO support on Windows
- Studio quality audio
- Constantly updated to the latest IP-technology and standards
- Free help desk via email

News From The South

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

Weôll start with some sad news: Wayne Wallace, long time host of the Dixie Gospel Caravan on our stations here in Birmingham, died in early September after an extended fight with cancer.

Mr. Crawford came to Birmingham for the funeral and told a funny story about how the late Larry Adcock and Wayne convinced him to play Southern (quartet-style) Gospel on WDJC 45 years ago. He said that heôd never heard the music before Larry approached him. Once he did, he loved it and the Dixie Gospel Caravan was born. Forty five years(!) ï first on WDJC, then on WXJC.

Wayne won several awards over the years, including the Golden Mic award and ñDJ Of The Yearò from Singing News Magazine. He was on a first name basis with most of the top names in southern Gospel, from Bill Gaither to Hovie Lister. He was a professional who took his product seriously. Wayne was picky about what heôd play.

Letôs be honest: many people in radio, as soon as they hear the term ñSouthern Gospel,ò think of a hokey, corn-pone DJ playing scratched records from the Singing Stump Pullers of South Nostril, TN. Wayneôs program was classy, with the Cathedrals, the Florida Boys and the Speers and regular interviews with top artists. The man was a consummate professional.

But Wayne was also a sweet Christian and humble fellow who never let his success go to his head. He was the same great guy in the days before he passed away as he was when I first met him in December of 1998. Wayne loved the Lord with all his heart and considered the Dixie Caravan his ministry. He never had a harsh word for anyone, and heôd (quite literally) give you the shirt off his back if he thought you needed it.

Ah, but alas, Wayne was less adept at high technology. Oh, knew how to run a board and could certainly keep his program on the air. But anytime something new came along, weôd have to spend some time with Wayne to make sure he was comfortable with it. He could mix audio sweeter than sweet, but email? Took him *forever* to get the hang of it.

Several years ago, he decided that he wanted a computer at home. Of course he needed our help with it, so Todd gave him some guidelines on what to buy and told him to bring it in. A few days later, we heard a clattering noise in the hall. The door flew open and Wayne hauled in a maxed-out, 3-foot tall, silver and gray Gangsta Box. Truly *Gangsta*. Had blue light ropes all over it. The fan on the cabinet looked like it belonged in a Honda Civic... assuming, of course, that said Honda caused the lights to *strobe* while the fan turned!

You couldnôt have chosen a computer less likely to match his personality, but thatôs precisely the one he picked. We had a lot of laughs over that one (Wayne included). Todd set it up for him and Wayne hauled it back home, happy as could be. We could just imagine him editing an interview with Dottie Rambo on that monster: glowing lights, big oversized fan and all. We wanted a picture of the Gangsta of Gospel at his Gangsta Box, but never got one.

I know heôs walking on streets of gold now and is no longer in pain, but Iôm going to miss him.

Tower Work

As the year heads to a close, weôve got a couple of big STL projects to complete. The first is a new Dragonwave link from WDJC-FM (93.7 FM) on Red Mountain to the WXJC (850 AM) site in Tarrant. The second is a double hop from WDJC-FM to a tower near Warrior, AL, then from that tower to WYDE-FM (101.1) in Cullman, AL.

WDJCôs 700ô stick has become rather busy in recent years. Not only are there two 8-bay FM antennas near the top, we have several STL dishes at

various heights. The City of Birmingham has their police and fire antennas on that tower as well. We're actually close to capacity on it, so I'll share this reminder: if you have a tower that's in danger of becoming overloaded, you need to plan everything carefully in advance.

When upgrading our STL systems, we remove the old dishes before hanging the new ones. We have to come up with an alternative means of signal delivery while we work, of course, but it's safer that way. Storms can pop up in Alabama without warning. The last thing we want is to be in the middle of a project, with one too many dishes on the tower, then halt the work for several days because of bad weather.

The old 950MHz link from Red Mountain to WYDE-FM in Cullman has been removed – both the 10' dish and the coax. 850 AM is still on its old 950MHz link (when it works, anyway) and its 8' dish is still up there. We'll have to figure a way to keep 850 on the air for a few days while we replace its 950MHz link with the aforementioned Dragonwave.

By the way, if any of you need a 10' STL dish and about 400' of 7/8" coax, let me know. Otherwise, we'll just put it on eBay.

Mo' Adtrans

I've said it before: Adtran makes great stuff. But man, it's complicated. To be fair to them, most of it is designed for Common Carrier use (read: the Big Bells), so even their most basic boxes come with zillions of configuration options.

We've been using the MX408 series here to ferry T1 over Ethernet. Chicago needed the exact opposite, a way to ferry 1.5 Megabits of Ethernet over two different T1 lines. We purchased four of the MX410s from Adtran – and then I turned them over to Todd. And ran.

Hey, I had to budget requests to finish. (*cough*)

Being fair to Adtran, the MX408 is capable of doing several T1 lines over a single high-speed Ethernet link. Likewise, the MX410s that we're setting up for Chicago can use more than one T1 for increased bandwidth. Both can do "drop and insert" on the fly: you can configure them in dozens of different ways.

Nothing wrong with that. I can see where a Telco might want that kind of flexibility – you can literally string MX408s and MX410s in series and parallel, "dropping" and "inserting" DS-x signals and Ethernet as needed, all through the chain. But if all you want to do is ferry ONE T1... or ONE Ethernet connection... well, the units are massive overkill.

Green Blinkies On The MX410s. Dig The Groovy V.35 Connectors To The Left!

Naturally, you might ask: didn't we look for other solutions? Sure. In fact, we found a couple of neat little boxes that claimed to do Ethernet over a T1, plug and play, and they were even cheaper. But at the end of the day, we kept coming back to Adtran's reliability. Their stuff just doesn't quit. We have Adtran equipment at our stations that has been running for years without a glitch. You can't beat that.

Adtran also has excellent tech support. I'm not ashamed to admit it: when I configured the MX408s a couple of years ago, I ended up emailing Adtran for help. Todd decided to call them on the MX410s, got a Good Ol' Boy who walked him through everything, and eventually, they were "talking" as well. Adtran is based right up the road from us in Huntsville, AL. Worst case, they said we could just bring the dang things up there and they'd set them up!

Budget Time

All of us have been doing budget requests for 2014. But Laura Scotti and the gang here have been doing such a good job, we've actually got a little room in our budget for the first time since the economy headed south a few years ago. Todd, Jimmy and I have become experts at repairing and extending the life on older equipment during hard times. We don't quite know how to act now.

Some of it is just stuff that we've put off for a couple of years, but that now must be done – primarily NexGen workstations and switching software for NexGen-to-Wheatstone control. We're still using the old (ancient) ACU-1s as audio switchers in many cases. We've got a few Broadcast Tools switchers in line, but our three primary signals

are still in analog on those Sine Systems units. They work and they sound great, but itôs time to replace them. Besides, being able to do all switching directly in the Wheatstone will make us considerably more flexible.

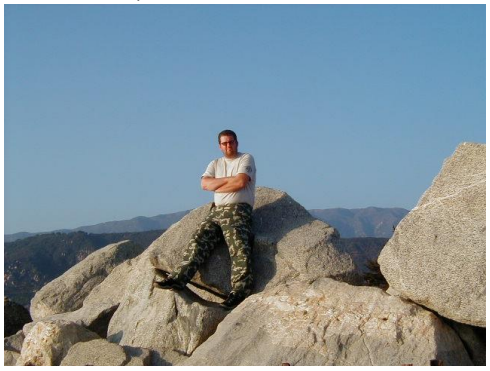
Jimmy had to play point man on some of this, running to transmitter sites to check roof conditions (Tarrant definitely needs replacement) and tower paint. Cris and I were grousing via email this morning as I write this, about how paint just doesnôt seem to last anymore. We painted four of the towers at Tarrant in late 2008-early 2009, and three of them are already turning pink. Itôs depressing.

But thank the Lord that we can afford to paint them, is all I can say. Until next time, keep praying for this nation!

Mainland Memoirs

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Oak Flat! The perception of time can be a funny thing. Each day working at KBRT seems to fly by, days to weeks to months, all gone in a flash it seems, yet here I have just left on vacation, the same destination and friends I vacationed with almost exactly a year ago, and it seems like it has been forever since we have seen each other.



Things at our new transmitter site have gone pretty well with a situation here and there, but nothing I have not been able to manage thus far. Todd Stickler and I continue to look forward to new upcoming projects. God has had His mighty hand on us and our new transmitter site as well as all of our studio operations, and I look forward to these upcoming projects, some of them as soon as I get back.

One of these projects will be the removal of our old towers on Catalina Island, our final project there before we say goodbye forever. Right now this is scheduled for the middle of October. After that, itôs back to Oak Flat to meet up with Cris for another project. It will be nice to work with Cris once again as we install a new and more reliable tower light monitoring system.

Last month was an incredible one indeed, lots of little things got done and together they made a huge difference in our operation. One of those projects that is still ongoing is the installation of cable Internet to our studios in Costa Mesa. The cable company just recently pulled cable into our complex and very quickly we signed a contract and had service installed. That new service simply blows the doors off our old DSL service. As soon as I return, I will get it set up on our network and through the microwave STL to our transmitter site, where the added bandwidth will solve many issues we have seen pop up since we have gone on the air. Though these are all really just minor issues, none of them seriously affecting our broadcast signal, having the issues eliminated will be a major plus for us. From our VOiP telephone service, remote control of devices in our broadcast chain to the remote control of our security systems, the added bandwidth will make things much smoother for us.

Sadly, the day I left for vacation, our brand new NX50 experienced a power ñcubeò failure, its very first. I guess this is its way of protesting my leaving. Other than this one very minor issue, I have fallen in love with this new transmitter. I was iffy on the idea of computer and touch screen control after first installing it, but none of the things I feared seem to be issues here. It has been so nice to have such power diagnostics right at my fingertips, and the control has been nearly flawless.

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

A Cautionary Tale

This is another one of those articles which is aimed at those who are just getting experienced in the field of contract engineering ï or maybe you're into a new gig, checking things out.

One of the basic truths of this business is that heat is *the* enemy. That should be so ingrained in the heads of those who design a transmitter site (or yes, a studio facility) that more than one means of subtracting heat from a facility is not an option, it is required. This is the story of a very small station which overlooked that truth, and paid a very big price.

Because there is a developing shortage of competent broadcast engineers, we all get calls from folks out there with a really desperate need to have one. I have one of these that I work at from time to time, and the station is a whole different concept from radio that I knew back in my youth. The entire operation is enclosed in one eight-by-eight foot building, complete with transmitter, equipment rack, Internet connection with Barix boxes all the way back to the studio, which is located far away in another state, and the public file– a radio station in a box, if you will.

And, one air conditioner. Just one. And, as I mentioned to the owners when I first saw the place, *no* other means of cooling ï no vent fan, louvered air intake, second air conditioner, nothing ï and a 35-year old 3,500-watt tube type transmitter. I can tell already that you're starting to get ahead of me.

This article is not meant to tell you so much that there was a melt-down as much as it is to tell you what it caused. But let's start with the why. The day was hot for late August, 96º, when I got the call from Home Base telling me the station was off the air. It had been that way for almost a day, but no one had called me, and the remote control is not set up to alarm me. I went to the site and instantly found the first clue. The AC wasn't running. But even that didn't prepare me for what hit me when I opened the door. The wave of superheated air about knocked me down. I re-opened the door, jumped back, and waited several minutes for the air in there to cool down. Just from a distance of a few feet, I could tell that the temperature in that little building had been at least 150º, possibly more. When it felt safe to go in, I did. The next moment, I was taking pictures. You can see them below, and as you can see, the damage was pervasive.

The breakers for both the transmitter and the air conditioner had tripped. I reset the AC breaker and the air came back up. In a few moments, cooler air came out. It was apparently quite OK. That's when I realized what had happened. A power surge had hit the building, tripping the breaker to protect the air conditioner. The scenario fell into place from there.

But, the *damage.* Much of the plastic in the building had either warped or melted outright. A computer keyboard (pictured) had melted grotesquely. Several pieces of equipment had flat out died from the heat, mostly IP stuff. It was interesting to note what did survive. Those items designed for broadcast service, including the remote control, audio processor, exciter, and computer, other than the keyboard, came out of this okay. For now.

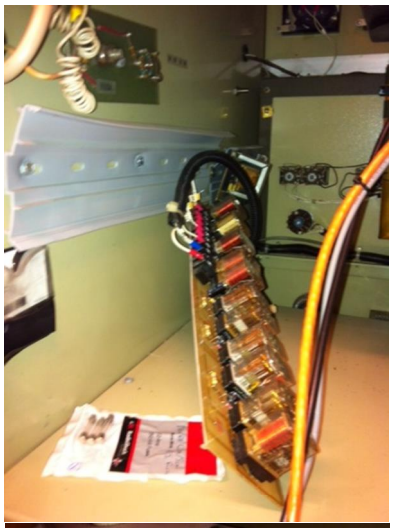
Then there was the transmitter. It had suffered the most. See the pictures. The best news was that the tube socket survived well, but many of the plastic items inside had melted. The tube, which had been in service less than 1000 hours, was blackened and dead shorted, and its plate blocking capacitor, which surrounds the anode, had not only lost its silver coating, but the solder which held the capacitor to its connection tabs had melted. The meters, both inside and on the front panel, had warped to the point where they were no longer usable. The once-straight shorting bar had assumed the shape of a candy cane. The plastic rod part of the interlock system was an S-curve. This one really cost.

Station ownership is now giving me my carte blanche to put the place into overheat prevention mode. Part one is a new vent fan, intake louvers, a filter slot, and a thermostat to manage it all. Part two will be the installation of a thermostat which

will be connected to a relay, which will not only tie into a remote control alarm, but also to the transmitter filament interlocks. If the room temperature goes over 96 degrees, the transmitter filament interlock will open, shutting down the filaments, but not the fan, before any damage can occur.

Here at CBC-Chicago, we have several means by which to keep the heat down at the big Burnham transmitter site. We've always had two air conditioners in the building, of course, and emergency venting fans in the last several years, and that sufficed for our two big tube type transmitters. But with the arrival of our new solid state Nautel HD/FM rig last year, we realized that heat had become a much bigger issue, and we upped the number and the power of the air conditioners from two to three, each with about double the power of the old ones. We still weren't comfortable with that, so now we're adding an exhaust fan to the NV-40's ductwork. The replacement air will come from an existing, filtered intake vent which has been right in front of the transmitter since day one. Yeah, it may sound like overkill, but take it from me, it isn't, and the adage, "better safe than sorry" cannot be overemphasized" now that I've seen what a disaster heat can cause to even a small installation.

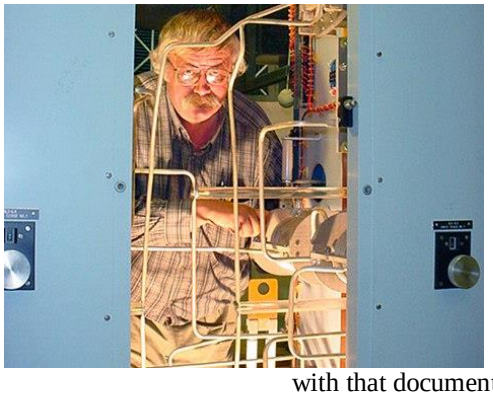
That article I promised about auto parts stores as a resource will have to wait another month. Sorry about that. Until then, blessings to you all!



The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

Last month I talked about detuning of taller structures and monitoring detuning adjustment by looking at the RF current in a tower. I learned from Texas PE Jack Sellmeyer about a complex installation that he had engineered to collocate two stations on the same property. The two stations were not sharing towers in a classic diplex configuration. Both stations were widely separated in frequency with the lower frequency station using very tall towers.



The taller towers required stacked detuning skirts, and here is where I picked up some very useful tips form Jack. The upper skirt adjustment is some distance up the tower, requiring a climbing rated individual to install and adjust it. Being a landlubber, I have come to appreciate the talent and discipline exhibited by those who work on towers. Itôs a talent that isnôt often possessed by RF technically oriented individuals.

I can see some fairly clear goals for adjustment of the upper skirt:

- Minimize the stuff the climber has to haul up the tower for adjustment.
- Make monitoring the adjustment as simple as possible
- Make the adjustment itself as simple as possible

To accomplish these goals, Jack used an antenna monitoring current loop mounted just below the upper skirt adjustment network. The coax from the loops terminated in a weather-tight box just above the base of the tower. That left the current monitoring equipment on the ground. With the lower frequency transmitter turned off, loop current at the base of the upper skirt for the other transmitter is monitored from the ground.

Once that was accomplished, Jack profiled the detuning adjustment and produced a translation chart which allowed the engineer at the base of the tower to instruct the tower climber to turn so many clicks clockwise or counter clockwise.

In addition, Jack established a number of fixed points and field intensity meter orientations to allow additional monitoring locations. Doing this, Jack was planning ahead for those times when the antenna parameters or monitor points were out of tolerance. Armed with that documentation, it became a simple matter to compare the current measurements to the normal measurements for the installation. Thus it is fairly easy to get an indicator of where and which of the two antenna systems is the source of the problem.

Itôs worth talking a bit about what kind of indicator can be used to adjust or monitor detuning. In a simple situation of only one AM station, it could be possible to use a simple broadband rectifying voltmeter. I have found solutions of this simplistic nature usually create more work, not less.

As an indicator to monitor tower RF current, I prefer a frequency selective indicator. Several different possible sample transducers, such as shielded loops, the Delta enclosed core (toroid) current transformers, or the clamp-type probe I mentioned in the July column. Each type has a particular advantage. As with transducers, several indicator solutions are also possible. Spectrum analyzers and frequency selective voltmeters are the most common. I have used both.

A Field Intensity Meter (FIM) is the ultimate frequency selective voltmeter. Early FIMs such as the RCA WX2 and the Nems-Clarke Model 120z field strength meters were designed exclusively to measure field intensity. The Potomac Instruments follow-on meters provided a switched antenna and external input allowing easy connection to a current probe.

Figure 2 - A piece of tin foil makes a handy attenuator for the FIM-21/41 when using the external input.

The PI FIM 21 and 41 have one weakness in this application that I discovered while using a FIM-21 as a detector for an impedance bridge. As I approached the null, I found increasing interference from a nearby 50 KW station. Initially I thought the problem was signal induced in the tower I was measuring. Then I noticed the interference was dependent upon the FIM orientation. A quick check suggested something like 10 to 20 dB signal leakage across the antenna/external switch when in the external position.

Since then, I have used a simple adapter when I use the meter in external mode. A small piece of aluminum foil is placed over the antenna contacts as shown in the photo. When the antenna/lid is opened, the foil deforms, allowing the power switch to activate while simultaneously shorting the antenna and decreasing stray signal pickup.

A few years ago, Potomac Instruments released the new 4100 Medium Wave Field Strength Meter as a replacement for the FIM-21/41 series. Scott Marmorine of Site Safe is shown displaying the new meter on a recent trip to Portland to check detuning of an ATC tower near KKPZ and KDZR. The instrument contains a built in GPS, a compass and automatic storage of measurements, time and location.

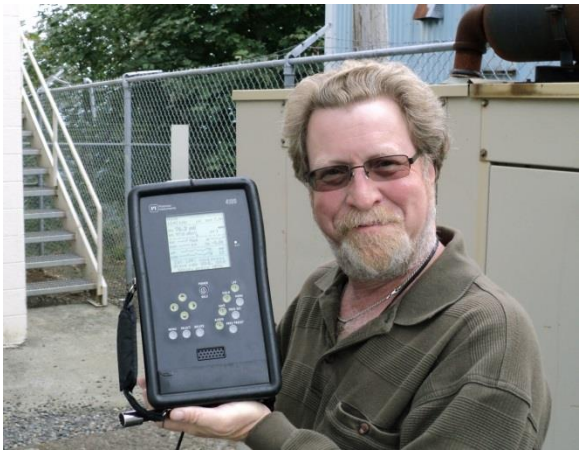


Figure 3 - Scott Marmorine of Site Safe shows the new FIM-4100.

Scott said the new meter is worth the high investment cost (about $14k!) for those making numerous field measurements, a comment echoed by Kyle Wesley of Radio Disney. In contrast, Gray Haertig, a local Portland PE, said that he hasn't needed an FIM lately due to the method-of-moments design approach.

All in all, the picture is mixed as it always is as new technology develops.

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

Recertifications

I must say, I just love doing moment method recertifications. And by that I mean itôs not too fun, but it has to be done so I do it. This time it was the KLVZ day antenna that needed to be done. The deadline snuck up on me, and with the long Labor Day weekend soaking up several days on the calendar, it didnôt give us a whole lot of time to get it done. Once I realized it was due, I had about a week, and that included the holiday. Thankfully everything came out normal.

After doing KLTTôs recertification earlier this year, I learned that plotting my course ahead of time for the reference field measurements would prove to be more time efficient. So this time around I did that. It only took me a little over an hour to get the measurements done because I didnôt go by radial but instead by location.

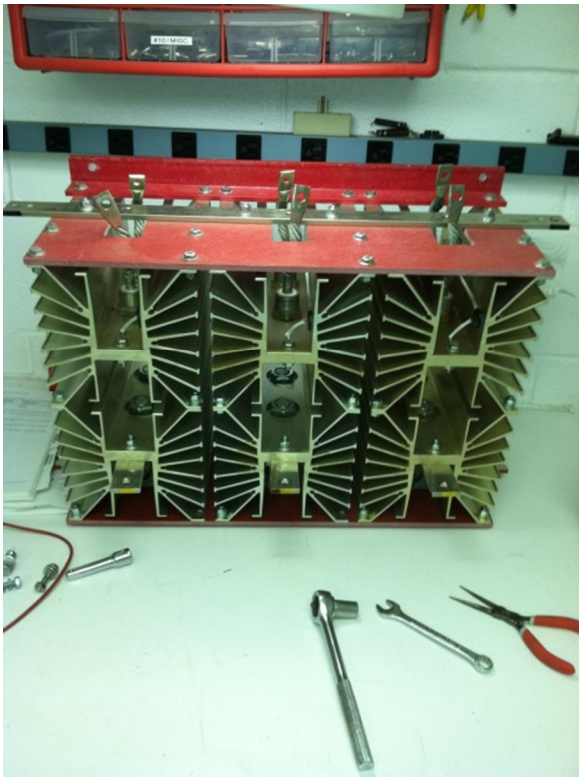
KLTT Backup Transmitter

In the midst of doing the KLVZ-D recertification, I found an issue with KLTT. We had a storm the night before, and although everything came back up fine, I guess during the night we must have had another storm or a power surge. I found I had no control over the auxiliary transmitter. It would not turn on, I could not get it to switch power levels, nothing. Upon arriving at the site I found the 200 amp 480-volt breaker on the panel tripped. When I reset it, not only did it trip again, so did the 100A 480-volt breaker on the front of cabinet 2 of the transmitter. So while I was doing my measurements, my dad actually headed to the site to help me determine the issue.

He was there for some time before I arrived and found that a rectifier was bad. We pulled the whole bank out of the transmitter and began troubleshooting. Turns out that five of the six 400-amp rectifiers in the bank were shorted! Once we found the issue, we were able to get in to our spare parts and start replacing things. We put it all back together and all is right with the world again. Or at least with that one transmitter.

Flooding

As I am sure most of you have heard from the news, we had some rain in September. Many areas of the state have been flooding; towns have been lost as well as lives. During the rain, I was keeping a close eye on two of our sites. I noticed that KLZ had a roof leak of some sort and periodically a lake would begin to form in the building. I originally thought somehow the water from the swamp cooler was causing the issue. It wasnôt until later on I found



KLTT rectifier bank -- five of the six 400A rectifiers were shorted!

another area of the roof membrane that had separated. At the time, I didn't have time to do much about this. I was able to get Keith to go buy some sealer that works when wet and he was able to seal it up in the rain. So far no more issues with that roof. We are in desperate need of getting the roof replaced as this year has worn on it. Hopefully next year we will be able to get this done.

Despite its proximity to the South Platte River, the KLZ site itself was mostly unaffected by the floods. It did rain a lot out there, and driving on anything but the road was impossible, even with a 4Runner. We did have some mysterious issues happen. The Saturday after the rain (or more like during a lull in the rain before one more set of showers came though), I got a call from Security Central, who monitors our alarm systems at all the sites. We had two alarms at KLZ: the main garage door and zone 10. They were telling me Zone 10 was the barn; however, later on we found this to be untrue. I went out to the site to find no issues. Everything was locked up. I opened the garage door and went inside the building. I could not get the system to clear.

While trying to figure this out we found an issue with the garage door. Yes, it opened, but it would not close. Evidently there was something wrong with the safety sensor PE beam. Was this an effect of the rain or just complete coincidence? After trying to get the sensors to work on the door, we finally pulled the rope and manually shut the door. I put a lock on it to prevent someone from gaining access from the outside.

Back to the alarm issue, with the door shut, the alarm still showed not ready. I called Security Central and they were stumped. Zone 10 was not used. It had failed us a couple years ago and they moved it to another zone. There was no reason for zone 10 to give us any issues as it isn't even wired up. Then the main garage door magnetic contact wouldn't clear, either. It was shut and making good contact with the alarm sensor. We worked with Security Central for a long time trying to bypass two zones. I would bypass Zone 2 (main garage door) and it would show bypassed but then it would quickly say Zone 10 bypassed instead. No matter what I did I could not get it to work. Finally, out of the blue, everything started working again, sort of like Brian's Omnia.11! I was able to set the alarm with no issues.

The garage door contractor came out a few days later and replaced the safety sensor. The closer works fine now.

Thankfully the only site that flooded was KLVZ, and it is built for flooding. The Platte runs right alongside the site, so when we built the place in the flood plain we had to build it on piers, placing everything above the flood elevation provided by the U.S. Army Corps of Engineers.

The water in the photos came from the local quarry, though, not the river. While the river was a raging torrent, it never left its banks. I kept a close eye on things because we do have some things that if the waters got too high might cause us issues. The photos I have were taken by our friend Mike Kilgore. He lives in the area and kindly drove out to check on things for us. He took these pictures so I could see what things looked like.

After the storm we found no significant damage to anything. Our sites weathered the storm great!

Rodenator

We have a prairie dog issue at several of our sites. Thatôs nothing new. Those little critters, cute as they are, are terribly destructive, tunneling all over the place and chewing through wires, conduits and radials and absolutely denuding the ground where they live of vegetation.

As the years have gone by, the prairie dogs have migrated closer to the areas we donôt want them. Despite my best efforts to protect our sites from these destructive beasts, the population has just exploded.

Some of you may remember us purchasing the ñRodenatorò a couple of years ago. It is a device you stick in a prairie dog, mole or gopher hole, pump a mixture of propane and oxygen into the hole, then ignite it. BOOM!! The idea is to humanely kill the varmints and simultaneously collapse their tunnels. We finally had some time and favorable fire conditions and decided to use this piece of equipment.

At the KLTT transmitter site, the prairie dogs have moved right up to our building and have even burrowed under it some. We found the freshest holes and collapsed them. We are hoping to get ahead of the population in order to protect our site and infrastructure. While prairie dogs are cute to many people, those of us who have had to deal with them know just how destructive they can be. If you want to see the Rodenator in action at our site, take a peek at the videos at: http://www.crawfordbroadcasting.com/Eng_Pics/PD_Eradication/.

Looking Ahead

I am not too sure what October holds for us here in Denver. September was a hard month because of the rains. I am hoping for a less stressful month, a month to get caught up on many items that have fallen off the radar. It will be a month of preparing for winter. The snows are coming and that means having to get certain site maintenance done. I will update you all next month, so until next timeé thatôs all folks!!!

KBRT • Avalon - 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
KSTL • St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WLGZ-FM • Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT
WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT
WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND
WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

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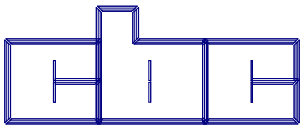

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