The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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KNSN Is On the Air!

At 5:30 AM on Monday, September 29, KNSN in San Diego took to the air, bringing the KBrite brand to San Diego in a new and more qualitative way!

As late as mid-September, there was some doubt about the sign-on date. There were a couple of issues, both network related. The transmitter was installed and tested, the remote control was in and operational, the satellite receiver was connected and producing audio ï it would seem that we were good to go, but we werenôt quite.

Operating KNSN remotely and unattended requires EAS equipment at the transmitter site. We purchased and installed a Sage 3644 Digital Endec at the site. We connected it to the rooftop antenna (through a custom dual-notch filter) and had good reception of the LP-1 and LP-2, and we connected it to the Internet through a DSL circuit.

KNSN main (L) and aux (R) transmitters. Note the Burk ARC Plus Touch remote control below the main transmitter.

The FCC rules also require that the main studio for the station be within the 5 mV/m contour or within 25 miles of the transmitter site, and we have a studio/office that fits that definition. It has a mixer, source equipment, another Sage 3644 and an APT Horizon codec. The problem was that we did not have main studio and transmitter connected together. We had a good satellite connection to our Costa Mesa studio, but none to the KNSN studio in El Cajon. The problems were configuration of the DSL circuit at the transmitter site, configuration of the router at the studio site and configuration of the codecs on both ends.

I spent most of the week of September 8 in San Diego, doing the remote control wiring and programming, setting up the satellite link and putting the finishing touches on all the work that Bill Agresta and others had already done at the site.

One project that took a bit of time was rebuilding of the antenna switch. The RF contactor itself is a Kintronic Labs RFC-40, but the control circuit was ñhome brewò all the way. I couldnôt believe it when Bill told me that the controller was sending 240VAC through a 20-gauge multi-conductor control cable to actuate the solenoid! I purchased a 24-volt slave relay board and hardware from Kintronics and a 24-volt 5-amp power supply from Mouser, taking both with me from Denver. I installed the slave relay board and wired it to the contactor, then stripped off all the old wiring and relays from the home-brew controller. In a few hours, I had built up a new controller on the same rack panel as the old and wired it to the slave panel with new control cable. It provides for transmitter RF interlocking and for status indication to the remote control as well as both local and remote actuation.

With all that done, by the end of that week we were at a standstill, all dressed up with no place to go so to speak with no studio/transmitter link or communication. As I boarded the plane to head back to Denver I knew I would have to return the

following week to continue working on the issues.

The codec issue I mentioned above was that we could not communicate with the codecs using APTôs ñWorldnet NMSò control software. The older Horizon codecs do not have a built-in web server as the newer Horizon Nexgen units do, so the only way to set them up and monitor them is through this proprietary software.

Early the week of the 8th I managed to connect to and set up the codec at the transmitter site, but when I went to the studio I could not get the program to run on my laptop. It gave a weird error and bombed every time I tried. I worked with APT tech support for hours, uninstalling the program, reinstalling it and trying different builds/versions, all to no avail.

ñTry a different computer,ò they said, so we tried Bill Agrestaôs laptop. We were able to connect but could not actually do anything. None of the buttons we clicked would work. We tried different builds and versions on Billôs laptop and all had the same result.

When I got back to Denver, I gave the matter some thought. The Worldnet NMS program worked fine earlier in the week and then it stopped working. What had changed? I pulled up the add/remove programs screen and took a look. What jumped out at me was a Netgear program that I had to install to configure one of the routers. On a lark, I uninstalled that program and ran Worldnet NMS ï and it worked! Evidently something in the Netgear app was interfering with something in the APT app. I was more hopeful with the Worldnet NMS program now running, but I still had the DSL and router configuration issues to deal with.

Back in June I had ordered a pair of bonded T1s at the KNSN transmitter site to provide a 3 mbps bandwidth there. Nitel was the vendor but ATT was the carrier. As the weeks flew by, it became clear that we had a problem. Installation dates came and went, the last being September 16. With little confidence that ATT would keep this commitment, I ordered a DSL with static IP block directly from ATTôs small business group. Amazingly, that was installed within a week. Not so amazingly, it was not properly configured with the static IP block.

As frustrated as I was (and remain) with ATT, their installation tech was a gem. He provided us with his cell number and we made use of it the week of the 8th. He came back out one evening that week, on his own time, and worked until he got the static IP block working. He did not, however, get the ATT router properly configured and we were unable to port forward and route, but he promised to find out how to do that. He kept that promise.

I got back to the site the morning of September 16 to find the ATT high-cap installation tech there to install the T1s, telling me that there were cable problems. For one thing, the address of the site did not match the address of the cable to the building. It wasnôt even on the same street. The ATT high-cap engineer called me a little later and told me we would have to start over with the order because of the address discrepancy. The local tech also told me there were some cable problems that would have to be resolved before the circuit could be installed.

The long and short of it (mostly the long) is that we still do not have the bonded T1s and I have no indication of when they might be installed. That left us with the DSL, which has only 760 kbps of downlink bandwidth and 380 kbps up. The low DSL bandwidth, by the way, is caused by the 18,000+ foot cable distance to the downtown central office.

That meant that I had to get the static block and routing working on the transmitter site DSL. I got in touch with the original installation tech, the guy that left me his mobile number. He made good on his promise and got in touch with someone who knew how to put the ATT modem/router into the bridge mode. That information got me to the right screen in the router config web interface, and with some experimentation I found the right set of parameters that put it in the bridge mode. I was then able to configure our own router with the proper static IP and set up port forwarding for the codec, remote control, transmitter, EAS unit, etc. I cheered when I was able to hit the Sage Endec with my iPhone!

With the transmitter site network working, that left the El Cajon studio network. I was unable to get it working with the static IP block the prior week because the router we had would not do port forwarding. I purchased a high-end Cisco router and took it with me to San Diego from Denver, and after fighting with it for a while I was able to get it configured, port forwarding the APT codec and Sage Endec.

The Worldnet NMS program did indeed work and connect to the codecs, and by the end of the day on the 16th the codecs were talking. I set them up for 7.5 kHz mono 64 kbps, which is well within the bandwidth limitations of the transmitter site DSL.

All the elements were at long last in place ï new transmitter, remote control, audio processor, remote control, satellite feed, EAS units and STL. KBRT station manager Sarah Jackson had already hired the two full-time employees to man the office and studio, so we were good to go.

With the restoration of a very qualitative KBrite signal to the San Diego market, this brings to a close a saga that started many years ago when we began to suspect that our landlord on Catalina Island was not going to renew our lease when it expired at the end of 2013. KNSN has a great, full-market signal, and with the new processing, transmitter and state-of-the art facilities it sounds wonderful.

I cannot wrap up this account without giving all the thanks, glory and praise for the successful outcome to my Lord. Thereôs no way it would have happened without His help and guidance. My frustrations aside, I could see His hand at work at every turn. This great signal will serve the Kingdom in a qualitative way for many years to come.

An Observation

During my travails with KNSN (and in particular in dealing with the network issues), it occurred to me that with all things technical becoming ñsmartò and ñuser-friendly,ò things really seem to have gotten a lot harder.

A good example is the configuration of routers. The ñoffice gradeò routers that we purchased for the new station, either Linksys/Cisco or Netgear, required the use of either supplied software or ñdumbed-downò web interfaces for configuration. Certainly someone who knows little other than how to type a URL into a browser window can in most cases have the router up and running to provide Internet access to his or her home or office in just a few minutes. Going deeper than that, however, is difficult and not at all intuitive.

For example, the menu that would put the ATT-supplied DSL modem/router in the ñbridgeò mode was on the ñsecurityò tab. How is that intuitive? Add to that the nomenclature ï ñIP passthroughò ï and you can see why both the ATT tech and I had trouble finding it.

On one of the routers we purchased, port forwarding was located on the ñgamingò tab. Again, how is that intuitive? Thank God for Google!

In some ways I can understand all this ï manufacturers are trying to make things ñsmartò and automatic so that someone with no technical aptitude whatsoever can use them right out of the box, but in doing so they should not make them harder for people who do know what theyôre doing and donôt want to simply use DHCP on a Class C network.

My recommendation would be to provide an ñAdvancedò menu that would allow tech-savvy users to bypass all the automated steps and go right to what they want. For what itôs worthé

EAS Updates

During the KNSN build-out, I noticed that the studio Sage 3644 was polling the IPAWS server okay but was not receiving tests because of a ñmismatched signature.ò An email to Sage revealed that the problem was out-of-date firmware in the unit. Evidently there had been several updates since the last time the studio unit had been flashed (that unit came from St. Louis), and in one of the updates were the new CAP signatures.

Check your Digital Endec units and make sure you have current firmware. 89.8 is the current version, but 89.6 and later versions are fine and do not require updating if you have one of those.

Sage firmware updates are available at: https://www.sagealertingsystems.com/support-firmware-new.htm

Tower Signage

New FCC antenna structure registration rules go into effect later this month. One of the requirements of the new rules is that we post ASR signage at the closest point approachable by the public.

I have sent out custom ASR signs to all our markets where we have towers that are set back from the public entry point. This mostly affects AM directional sites where the entry gate is some distance from the individual towers, but it affects some of our FM sites as well, where there is a site perimeter fence or natural barrier.

Iôll leave it up to our market chief engineers to decide on the best location to post this signage. The definition of the location where the public can approach is somewhat open to interpretation. It does not, as far as I can tell, mean the nearest point that a member of the general public can drive to. If they can legally walk to a point (that may be behind a gate across a road or driveway), that location is approachable by the public.

A good example is the new KBRT site at the top of Black Star Canyon in Orange County, California. The closest point that the public can drive to is some five miles distant, at the base of the mountain, but the public can and does walk, run and bicycle right to the gate at our site and beyond. As such, we donôt need to do anything else in terms of signage. We already have ASR signage on the gate at the site entry.

That may not be the case elsewhere, so engineers should use their best judgment ï and be prepared to defend that decision if the FCC should someday make an issue of it.

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

Hello to all from Western New York! It is hard to believe that we here in the Northeast are already well into the fall season. Summer seemed to last only a few weeks, and here we are, now getting everything ready for the long winter season. It would not be unusual to see snow flying by the end of this month!

There are still plenty of projects I want to complete before the cold weather hits. Our main concern is the repair of the concrete tower foundations at the WDCZ tower site. American Masonry has been contracted to make the repairs on all 15 concrete bases, and they are scheduled to begin the first week of October. They anticipate three to four days to make the repairs, provided the temperatures stay above 60 degrees during the daylight hours. Any temperatures below the 60-degree threshold will retard the curing process of the composite repair material.

The process that takes the longest is the acid washing of all surfaces that will need to be repaired. If the surface is not completely free of contaminants or rust, the composite material will not properly bond to the existing concrete, causing further chipping and cracking to the foundation. American Masonry came highly recommended, and I am confident their repairs will last for years to come.

In early September, Don Boye of Western Antenna & Tower completed the painting on the remaining two towers at WDCZ. The last two towers were heavily coated with rust, which had to be treated before any paint was applied to the steel. These free-standing towers were built in the early 1940s, long before galvanizing technology was used in the tower industry, so rust has always been a major concern in maintaining these types of structures [*especially when they're just a few hundred feet from Lake Erie – Ed.*].

Don used a rust retardant liquid that resembled milk to treat the rusted areas. After the chemical was applied, after a length of time the material would turn black, indicating that the rust had been removed. The material would actually create a barrier so any further rusting would be eliminated. After several coats of primer were installed, the towers were ready to accept new paint. With the exception of the beacons, these towers should be in great shape for at least the next 10 years. All of the secondary (side markers) lamps were replaced with LED lamps earlier this year, thus leaving only the beacon lamps that will have to be serviced as needed.

After American Masonry completes the concrete repairs, I will be replacing most of the existing ground straps on the tower bases. The existing 4-inch strap will have to be removed to expose the sides of the bases to accept the repair material, and most of the copper strap was already in need of replacement due to various repairs and damage that has occurred over the years. Don will assist me in bonding the copper strapping to the steel tower bases to insure a good ground path should lightning happen to strike the tower.

Once all of this work is completed, it would be a good time to inspect all of the ATUs, clean out any dust/dirt that may have accumulated over the spring-summer months and place a container of moth balls in each enclosure to deter any rodents or insects from taking up residence over the winter months.

I usually always replace the light bulbs each fall in the ATUs. There is nothing worse than walking out to the enclosure to investigate a problem (almost always at dark) to find the light bulb has blown, and you do not have a flashlight with you, so you have to walk back to the transmitter building to get a replacement bulb or other light source. It probably would not be a bad idea to place a spare bulb in each enclosure just to be sure you have a good light when needed.

Freshly painted towers at WDCZ(AM). That blue body of water in the background is Lake Erie.

I make it a habit to also check the weatherstripping around the doors of the doghouses. If any is missing or damaged, it can be easily replaced while the weather is still good. I have found that cleaning the surface with alcohol before attaching the adhesive-backed weatherstrip will provide a good, secure bond between the two materials, thus eliminating any chance of moisture or insects entering between the door and cabinet.

Another thing to check is the plastic vents located in the bottom of the cabinets. If they are cracked or missing, replace them. Kintronics can supply you with replacement snap-in vents, which are inexpensive and easily installed.

In Buffalo, our backup C-band satellite dish has a deicer package installed to deter any ice/snow buildup over the winter months. The deicer normally operates on its own, with a sensor that detects weather conditions and turns on the heaters when needed. Near the end of last winter, the deicer failed to turn on automatically, and the cause was found to be the sensor that mounts near the bottom of the dish.

I called the manufacturer and found that the sensor is no longer available, and there was no replacement available. After consideration, I decided that our remote control could turn on/off the deicer as needed. I installed a 24-volt DC supply inside the transmitter building and ran a 14-gauge zip cord from the building to the controllerôs 24-volt DC contactor coil. The relay inside the building that sends the 24 volts to the coil is a latching relay, so the heaters will stay on as long as the 24-volt supply is available. I have installed a macro in the Burk remote control that will turn off the supply voltage to the contactor after a preset length of time, or the unit can be turned on/off manually by raising-lower the appropriate channel on the remote.

In Rochester, we recently lost a portion of our STL path from the studios to the WDCX(AM) transmitter site. This path runs on fiber optic cable from the studios to the WLGZ-FM transmitter site and uses a Harris Intraplex as the audio transport. The Intraplex then hands off the audio to a 950 MHz digital STL transmitter which transmits to the receive site located at tower four at the WDCX(AM) tower site. From there, an AES/EBU signal is sent to the transmitter building via a 12-pair buried cable.

After testing several possibilities, it was found that the problem was the pigtail located at the FM transmitter siteôs STL dish. After replacement, all was well, but only for a short time. Several days later, the audio dropped off again for several hours, and then returned. I spent most of the next day going through the STL system, finding only textbook operation.

The next day, the board operator again called to report no audio. I immediately left Buffalo for Rochester, hoping to troubleshoot the problem while it was happening. As luck would have it, the audio returned when I was only a mile away from the transmitter site! I vowed to stay until the problem was found, and started at the (AM) transmitter site.

As before, all was well at the receiver end, so I went to the transmitter building where the AES/EBU audio feeds the Omnia audio processor. All was well there, so I moved on down the audio path to the Nautel importer. There I noticed a couple of the front panel LEDs were amber, not their usual green color, and looking further at the IBOC exciter, I found over 230 faults in the fault list! A hard reboot of the importer and exciter did the trick. It seems the exciter was in some weirdness mode and would drop audio randomly. Since the reboot, we have not experienced any audio drops at all.

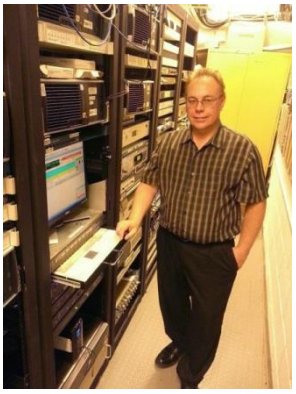
That about wraps up another month here in the Northeast. Until we meet again here in the pages of *The Local Oscillator*, be well, and happy engineering!

The Motown Update

By
Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC–Detroit

The fall chill is in the air in Detroit, and several projects are underway to be completed by year end.

I have received our Omnia.11 back from the manufacturer with the MPX over AES option installed. I couldnôt wait to get it out of the box.



You will notice that Telos has added a new XLR connector for MPX over AES.

I installed the processor in the rack, connected the AES feed from the Omnia.11 to the Nautel NV40. Our RDS encoder was connected to our existing stereo generator and there was only one composite line going to the transmitter.

To put it on the air, I toggled the main audio option in the preset menu to MPX over AES, and we had good quality audio, but something was missing. I noticed that the RDS did not work through the AES. After a call to Omnia technical support, I discovered that you can no longer use the SCA input on the Omnia if you use the MPX over AES option. This was after I relocated the RDS unit to where our processor was located.

I placed a call to Nautel customer support, and will have to run a separate RDS line directly to the Nautel exciter inside the transmitter. There are options for RDS levels in the NV40 preset page. The audio is much better through the new AES link, with a transparent high end, and very tight peak control.

Overall, I would recommend making the change. I was told that the new Omnia.11+ will have a built in RDS generator, and the RDS can be sent with the main audio over a single AES link.

If you run a format where you need a real punchy low end bass, the new Solar Plexus feature in an upcoming release delivers. The change has made a noticeable improvement in the audio. The clipper sounds less grungy than the analog composite output.

Last month we also implemented logo support for WMUZ and WEXL using the Artist Experience data channels available on the HD importer. We will be sending ads and program-specific graphics very soon. All of this can be done without subscribing to album art.

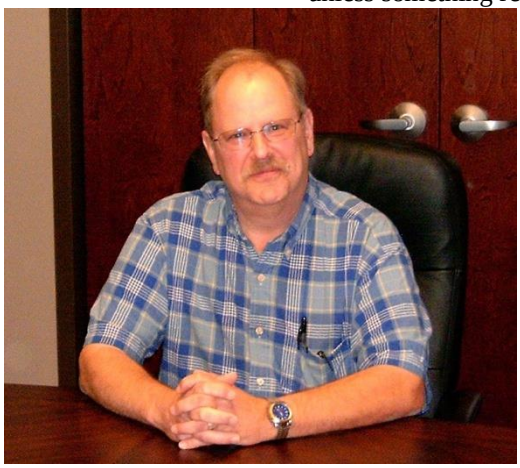
Before the snow starts, my next project is to install LED tower light monitoring on the WRDT(AM) towers. As part of my quarterly tower light inspection, I noticed that the current sense relays that were installed for the old incandescent bulbs, did not detect the small change that occurs when an LED beacon goes out. Cris Alexander designed and constructed a set of fiber optic monitor boards that I will be installing to provide accurate and dependable monitoring.

News From The South

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

Finally, I get to report success on that Birmingham to Cullman link that weôve been waiting on for more than a year! At one end is the WDJC-FM tower site on Red Mountain in Birmingham. At the other is the WYDE-FM site in Good Hope (near Cullman), AL. The relay point in the middle is the appropriately-named Mount High, about three miles Northwest of Warrior, AL.

Iôve posted some pictures here in previous issues, especially of the Mt. High site. Thatôs an old ATT Long Lines tower, built like a battleship, located on a tall hill that can clearly see both Birmingham and Cullman. The overall shot is within a few degrees of true north from Birmingham, through Mt. High, and to Cullman.



A Damaged Beacon

Just after I submitted last monthôs article, we had a tower crew come in to repair the middle beacon at Red Mountain. Toddôs wife works on Lakeshore Parkway in Birmingham, very close the WDJC-FM site, so he regularly sees it in the evenings when he picks her up to head home.

Figure 1 - Destroyed by rain when the cover blew off.

Todd had been telling me for some time that the middle beacon on WDJCôs tower looked like it wasnôt quite as bright as the top beacon. Both beacon sets have been replaced with LED units, which draw very little current. That made a voltage drop unlikely, unless something really major was wrong with the wiring. We were still pondering on this when the middle beacon died entirely. We obtained a NOTAM and called in a tower crew. This is what they found (figure 1).

The transparent cover over the light hadnôt been secured properly. It probably flopped around in the wind for a while, then finally flew into the woods. We never did find that cover. Water got into the beacon and destroyed it. This is extremely aggravating. We lost a beacon worth thousands of dollars and had to pay a tower crew thousands of dollars to replace it. Grrr!

By the way, the crew that failed to secure that lid is the same one that stripped the adjustment screws and improperly grounded the Dragonwave radios between Red Mountain and Tarrant, so I canôt say Iôm too surprised. I am angry, though.

Microwave Infrastructure Services of Corona, CA

Back to the good news. After wrangling with several other tower crews to get the WYDE-FM data link up and running, we decided to bring in Microwave Infrastructure Services from Corona, CA. It wasnôt cheap; we not only had to pay for a week of work, we had to pay their (considerable, obviously) travel expenses. But it was money very well spent.

As their company name implies, they do nothing but microwave. They donôt relamp, they donôt paint and they donôt splice coax. All they do is point-to-point data links. They came ready-to-rock with a truckload of tools, test equipment and spare parts. But what impressed Todd and me the most was

their practical, hands-on knowledge of these systems. They knew what to look for and how to fix it.

The work started on September 8. The first day was spent rigging the WDJC-FM tower and getting the 18 GHz Trango link restored to the WYDE(AM) (1260) site. It had died several weeks earlier during a severe storm. We had spare radios on hand but couldnôt get a crew to come mount one at Red Mountain. They did that and improved the grounding to help prevent a failure in the future.

Then the crew moved on to the 850 AM (WXJC) link between Red Mountain and Tarrant, AL. Unfortunately, we were unable to get that one back in service. After a solid day of work, we figured that the radios were probably defective ï likely due to water damage caused by the weather caps not being installed on the unused ports. (Grrrr again!)

Rather than spend more time on that link, we decided to pull the radio from the Red Mountain end. Iôm going to get another crew to pull the Tarrant end. Both radios will probably have to be returned to Dragonwave for repair. (Whimper.)

Cullman: 200 MBits!

By now, it was Wednesday and I wonôt lie: I was getting a bit nervous. The Birmingham-to-Cullman link was a double-hop, after all... four radios, with cables (fiber and power) and four dishes that would need to be tweaked. But Microwave Infrastructure Services came through for us. They ran the power lines and fiber, double-checked the grounding, then started tweaking. By sundown on Wednesday, they had the north end of the link (Mt. High to Cullman) working, albeit with weak numbers.

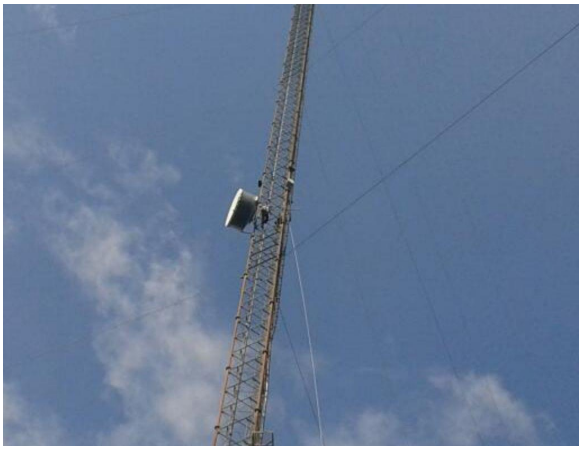


Figure 2 - Running the Fiber to the 8-foot dish at WYDE-FM.

On Thursday, they got right back to work. Watching them path those dishes reinforced what we already knew (and had tried to tell the crew that messed us up last year): tweaking these things takes time, patience, and more time. If you *ever* see a tower crew trying to adjust one of these microwave dishes by ñhandò (i.e., by loosening the bolts and manually sweeping it from left to right), holler at them. If they persist, call them off the tower and find a different crew. They are only wasting your time and money.

You cannot adjust these links that way. Itôs not that difficult at 950 MHz, even on a really long shot with larger dishes. Itôs very hard at 6 GHz with 8-foot dishes (and even harder at higher frequencies, of course). Especially when youôre using dishes with a very narrow beamwidth, itôs essential to (a) make sure everything is mounted properly and that you have functioning fine adjustment screws, and (b), that you take the time and patience to turn those screws a teensy little bit at a time. You have to tweak a smidge, then wait to see what happens. Tweak some more. Rinse, repeat, wipe hands on the tower.

This was really driven home to us as we watched the numbers on that Cullman link slowly come up. It took *hours* of patient tweaking. But once they were done, we had RSSI values in the mid-30s. That wasnôt quite what the PCN had called for on one end of the link, but given that it was September in Alabama and ridiculously humid (and that the Mt. High to Cullman shot goes over a swamp), we decided to call it good. As I type this, the link has been operating for over a week, through high humidity and a few scattered storms, without a single dropped packet.

Figure 3 - He happy -- and so am I!

Iôm very happy... and I want to thank Microwave Infrastructure Services for an outstanding job. Of course, if they *really* loved me, theyôd open a branch office here in Alabama!

The Big Bad BASH Bug

Windows lovers have been embarrassed many times over the years with one vulnerability after another. Well, POSIX systems (Linux, BSD, MacOSX, etc.) finally had an embarrassment of their own last week. The Bourne Again Shell, or BASH, one of the most popular terminal programs, had a bug that had been there for years without anyone noticing it. No way to pretty this up, either: it was a good ón.

Without getting all geeky, hereôs the essence of it. Most operating systems allow you set what are called ñenvironmentò variables. In Linux, itôs this simple: at a terminal prompt, I can enter something like, ñset MYVALUE=16.ò Later on, I (or a program running after Iôve logged out) could ask for that value; the OS would say, ñ16.ò This BASH bug would allow a malicious user to execute code along with the ñsetò statement! Not good.

Fortunately, the Linux community had patches out within a day. All of our company servers have been updated and are no longer vulnerable. But I had one minor scare as I was typing this tonight. I noticed that I wasnôt receiving email; I tried to send a test email and got, ñyour server is not responding.ò I went into the mail server remotely and, while everything seemed to be running, the ports that we use for sending and receiving mail werenôt listening.

Apparently, when I upgraded the mail server earlier this week, something had changed for Zimbra, our mail program. It appeared when I was backing up the server (which requires a brief stop and restart of the Zimbra software). A quick reboot made it work. Whew! Donôt scare me like that!

Until next time, keep praying for this nation!!!

Valley Notes

By
Steve Minshall
Chief Engineer, KCBC

Arc Flash. That term should bring on a feeling of healthy respect if not outright terror. Each year more than 2,000 people are hospitalized with severe arc flash burns and injuries. Arc flash is a rather gentle term for a very violent electrical fault. I would call it a plasma explosion, I think that is a bit more on target.

The subject was brought to my mind by a recent incident at a radio/television transmitter site. An engineer was measuring voltages in a generator automatic transfer switch when things went terribly wrong. From what I understand, his meter arced internally placing a virtual short across the test leads. The meter and the test leads turned almost instantly to white hot plasma. The explosion of plasma, heat, light, and molten materials severely burned his face and arms. He was blinded as was the person standing next to him. From what I understand the two will recover from the eye injuries, they are fortunate in that regard.

I donôt know the current condition of the engineer, but he was expected to stay in the hospital for a week or two and then have a recovery period of weeks or months at home. As far as these things go he was relatively lucky. He could have easily been permanently blinded or killed. He was also lucky that he was not working alone because he was not capable of calling for help after the accident.

The physics of Arc Flash are interesting and impressive. An arc can occur between high current conductors by a ñbadò meter, a dropped tool, or even dust. Once the plasma is formed it is dead short across the conductors and the resistance of the short decreases as current flow increases, it is a runaway

situation. The plasma can propagate from the fault to bus bars or terminals creating a plasma circuit between phases. Fault currents can run in the neighborhood of 20,000 amps during a 480 volt arc flash. Do the mathé that is a lot of power!

Plasma temperatures can reach as high as 35,000 degrees. Thatôs hotter than the surface of the sun! When metals suddenly, within a few cycles of AC current, reach that sort of temperature, they produce a rapidly expanding gas, which is the very definition of ñexplosion.ò The energy produced is released in the form of blast, heat, sound, and light. It has been noted that an arc flash in a typical 480-volt panel can release the same amount of energy as three-quarters of a pound of TNT.

I may be preaching to the choir here, but I have reason. Throughout my education of radio and electronics, I never even heard the term of Arc Flash until about ten years ago. All the safety training I have received has been centered on prevention of shock. This was, of course, the big danger with tube transmitters where interlocks and shorting sticks were emphasized.

It would seem to be so simple and easy, even safe, to measure the 240- or 480-volt terminals in a panel with a meter, but that is where the danger lies. What looks so easy, and what we have all probably gotten away with, is to stick meter probes on the terminals and take a reading. The first thing to consider is the rating of the meter. Only the better meters have been designed to prevent arc flash and are rated as such. Never do these measurements with a meter that is not designed to prevent arc flash. Second is personal protection gear for the body; protection against blast, heat, light, and sound must be considered.

The subject is vast and there is much information available on the internet regarding arc flash and the protective gear that needs to be used.

We all have the need to make these measurements at one time or another, but letôs be smart and safe about it. Do your research and find out what you need to be safe.

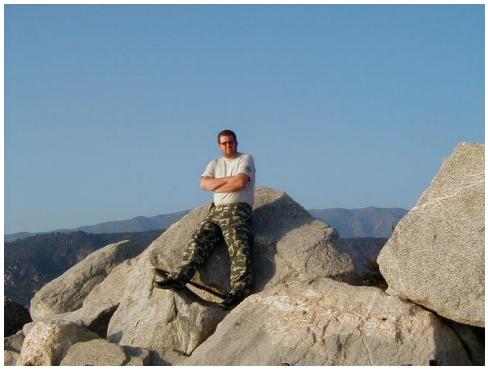
Mainland Memoirs

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Southern California!

Itôs always a great thing to return from vacation to good news here at work! Our new station, KNSN 1240 in San Diego, is on the air!

Iôm sure Cris will report as well on this but I wanted to write to you all about how well this project has gone, despite some major issues that tried to set us back. We continue to work to resolve many issues, one of the biggest, getting our T1 service activated at our transmitter site, but we have found good temporary solutions in the meantime and were able to meet our September 29th deadline to get KNSN on the air!



Now that we have met our on-air date, we will continue to work on the T1issue, the KBRT studio and engineering room rewiring project as well as the minor adjustments needed at our KNSN studio and offices including a new roof-mount antenna for more reliable EAS reception, some fixes to our office computers and other office related stuff. I am glad to report that none of this has gotten in the way of broadcasting a quality signal. I feel that KNSN will be a major benefit to the Christian community in San Diego.

Here in Costa Mesa, we continue with the rewiring project, replacing analog multi-pair cable with AES snakes and pulling new CAT5/6 cables into the studio conduits. Things are looking great but the project has been slower than we had hoped. One factor is that I have not been available as much as we originally planned because of a lot of back and forth to KNSN. Another is the accumulated mess that has compiled over the years of me being on Catalina Island and not able to oversee the situation here at the studio with much detail as I am able to now.

Though this project has taken longer and been more involved than I had inspected, I am glad to finally get this done. I look forward to the quality work that is now being done getting completed. Since we are mapping this project so well, I will be able to troubleshoot and resolve future issues much more

quickly and with better quality fixes. This will also make future upgrades much easier to do and put us in a position to accomplish these upgrades faster yet with more quality than before.

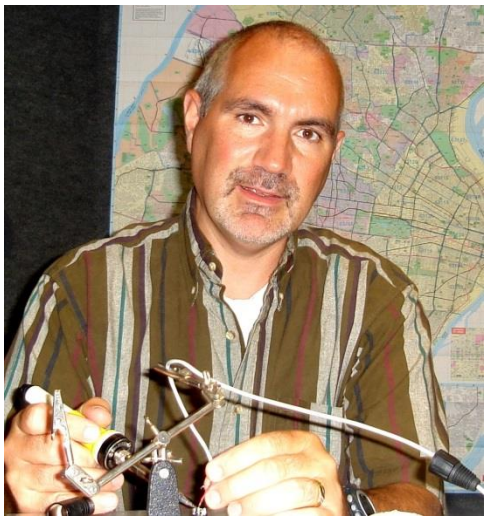
With all this KNSN work going on, I am preparing for a few trips to the KBRT transmitter site here in the next week to resolve a few issues up there. The fun never ends here. No, I am not being cynical ï I love to work at the KBRT site as long as it is not 100-degrees plus as it was before I left on vacation. Now that the weather has returned to a nice 85-degrees I will be able to get some outdoor work done like our brush clearance and some building maintenance, do some work in our tower-two antenna tuning cabinet then get some maintenance done inside the transmitter building.

There is plenty to do here and now that I have returned from vacation with a refreshed attitude, I am ready to hit the road running. I better get going here, plenty of things waiting for me so 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

Back in June, I wrote about our experience with the new ARC Plus Touch remote controls we installed at all four of our transmitter sites. You may recall we had trouble with the units working on our network until they were sent back to Burk and they modified the NIC portion of the remote control. After that we got them working properly.



Now that we have had them on our network for more than three months, we feel confident that they are stable in this environment. I still havenôt the time to get out of them as much as I would have liked to at this point, but I have done some experimenting with macros recently.

For the most part I have used the ñStatus Actionò feature of the software to launch macros to perform an action from the remote control, send a message or to do both. This function uses either a status on or off to trigger the event you want to take place. I have a couple of examples of macros that get launched by a status on or off.

My first example is used to lighten the load on the WPWX UPS/generator combination during a power outage. We found this last summer that the flywheel UPS at the site can sometimes fully discharge before the generator is up and running enough to take over the load. We made some adjustments to the timing of events, shortening the hold times of the transfer switch to help get the generator going quicker, and I believe this helped. The other side of the equation is to lessen the load so that we could squeeze a few more precious seconds out of the flywheel UPS.

I already devised a macro on the remote control that put the main transmitter to half power when the transfer switch moved to the generator position. This certainly helped but it was somewhat after the fact. It would lessen the load to the generator but wouldnôt do anything to stretch out the flywheel UPS time.

We added another Plus-X IIU to the WPWX remote control, and this gave us an additional 16 status indications. With this we added the ñUtility Availableò indication from the Onan transfer switch. So as soon as the utility power is gone we can have the remote control switch the main transmitter to half power before the transfer to generator, thus extending the UPS available time and having less load for the generator when it goes on line.

Hereôs the macro that gets launched when the remote control sees a ñstatus offò when the utility power is no longer available:

1 : Wait for 00:00:03
2 : If status of "Utility Unavailable / Utility Available" on site "WPWX-Burnham" = "Utility Available", goto line 5

3 : Lower "MnHalf Pwr" on site "WPWX-Burnham" for [default]
4 : Send email message "WPWX Main transmitter taken to half power because Utility was not available for 3 sec." to email list "Eng Email"
5 : End macro

The first part of the macro is a three-second hold period. This gives time for the UPS to handle a momentary power outage where the generator doesnôt come on and keeps the transmitter at full power during such an event. If the utility is back after the three-second hold time it will go to line 5 and end the macro and normal operation is not interrupted.

If utility power is still not back after three seconds, the macro will switch the main transmitter to half power and send the engineering list an email that it has done so.

Another macro that I was able to set up with our increased status capability is to let us know when the generator has been left in manual. If the generator is left in manual, it will not be available during a power outage, so having a means to let us know when someone left it in this condition could really save us from an embarrassing and costly mistake.

This type of macro can also be used to let you know if a remote control is left in maintenance mode or a transmitter is left in ñlocalò control, all human mistakes that can prove costly. I wish that I could be notified when the remote control has its ñlimits monitoringò turned off but there is not a test for this condition that I could find in the ARC Plus Touch macro verbiage. This could prove useful as well to help minimize human errors.

Here is the Macro that gets launched when the remote control sees a ñstatus offò for the generator being in the ñautoò position:

1 : Wait for 00:15:00
2 : If status of "Gen Manual / Gen Auto On" on site "WPWX-Burnham" = "Gen Auto On", goto line 6
3 : Send email message "Generator Not in Auto Position" to email list "Eng Email"
4 : Wait for 00:15:00
5 : If status of "Gen Manual / Gen Auto On" on site "WPWX-Burnham" = "Gen Manual", goto line 3
6 : End macro

The first thing in the macro is a 15 minute hold period. This way we donôt get a notification for when some sort of routine maintenance is taking place and the generator is switched to manual temporarily. So if the generator is switched back to auto before the 15 minutes is up it will not send notification. If it isnôt switched back to auto by the 15-minute hold period, it will send an email to the engineering staff and begin a 15-minute loop where it will send an email every 15 minutes until the generator is back in the auto position. Hopefully getting attention before the generator is needed during an actual power outage.

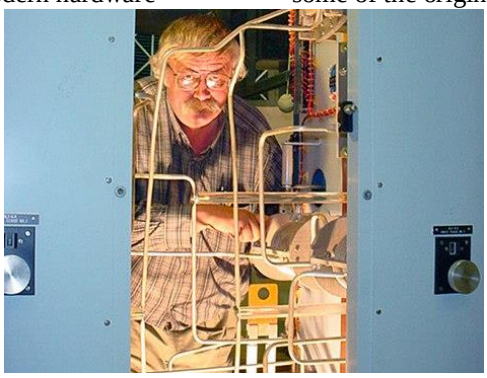
These are a few ways we have gotten creative with the new ARC Plus Touch remote controls from Burk. I hope to do a lot more, and I will share that as we go along.

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

I suspect we CBC engineers think of *The Local Oscillator* as an in-house publication, and we donôt think much about the reach our publication has.

One of my pet subjects, possibly even rising to the level of a peeve, is that as modern hardware production progress we are forgetting the knowledge these advancements are base upon. Here in Portland, a local club owns several historic radio receivers from the 1920s. Several items have the historic connection as they were built by a local Portland manufacturer. With that history and heritage in mind, I have been looking for a venue to display those items. With great disappointment, I found little opportunity or interest.



As an engineer I tend to think in terms of hardware, nevertheless basic knowledge and the content of early radio tend to form the triad of broadcasting history.

I recall visiting a local hometown station in the early 60s. This station had been a long-term network station during the early years of radio. The ñstudioò was downtown, complete with space for live productions. However, the transmitter site was an eye opener for this young lad. There in front of the RCA transmitter was a control facility worthy of the Starship Enterprise. To the right were two transcription lathes, and in back ñstorageò were hundreds of transcriptions from the 40s and earlier. Prior to remote control, the transmitter operator sat at the command console while monitoring the operation of the transmitter and recording content from the network on a real record lathe.

Over the years, many of those transcriptions were saved for later use. Then at station after station, that old ñstuffò was discarded to make room foré

Following that theme, a few months ago in these pages I did a series about the restoration of an antique WX2 field strength meter. I didnôt think much about the wider interest potential at the time. That was until Cris forwarded an inquiry from Bob Meister. It turns out that Bob has restored several of the WX2 series instruments as well as authoring several articles in industry publications on the subject. Itôs good to know there are others interested in preserving our industry heritage.

At the moment, we are attempting to discern some of the original factory alignment and calibration procedures based on documentation that likely long ago was consigned to the dumpster. As we reverse-engineer those procedures, thatôs likely to be a detailed and interesting discussion. Nevertheless, Bobôs interest shows that others do care about the early history of our industry. I also observe that *The Local Oscillator* has a much wider audience than we might imagine.

As we start this new month, local northern Oregon broadcasters will be discussing a preliminary plan to guide local broadcastersô response to a major disaster. The major event the Northwest can expect is a large earthquake. To put that in perspective, a large earthquake in our area is between 8 and 9, possibly larger.

Many of the services we take for granted will simply disappear. The Internet is just one example. The Oregon Internet service is trunked out of Seattle with the trunks running parallel to fault zones. Several service providers have indicated that aside from small pockets of local service following an earthquake, replacement service may be three to five years away. Obviously that Internet radio station and the satellite radio with studios in New York City and no local presence will be useless during an emergency.

New developments in earthquake response may be placing new demands on local broadcast services. A recent ñboil-waterò development in Portland illustrates the disadvantage of some of the popular tools. That ñboil-waterò announcement was distributed by reverse 911. Since that announcement covered more than 400,000, it required a mere six hours to complete. Reverse 911 is a good tool for what can be called narrowcasting ï when a small neighborhood is involved.

Consider those new earthquake warning

programs have been tested in Japan and other large quake-prone areas. The 15 to 30 seconds needed for the earthquake energy to propagate to populated areas allows sufficient warning to stop elevators, rail, and other sensitive traffic. Modern electronics can detect a major quake via GPS and provide nearly instantaneous warning to population centers. To be effective in that environment, I suspect that EAS will require some major modifications. The preamble for the system announcement can be longer than warning time.

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

Healthline Update

The ongoing issues with our GABNet feed have become quite the nuisance. I have to wait for a report from our local board op, then I have to contact Cumulus/Westwood One, who then contacts GABNet. After weeks of not having any luck with getting the issues fixed, Ron Rollo at Westwood One finally got through to someone who made things happen. It has taken a couple of weeks but, at least for now, it would seem the issue is fixed.

Inventory

Thankfully, this year, inventory was rather painless. I set a goal for myself last year to keep better track of equipment. So when I finished inventory, I saved it to my computer, and from then on, I would mark on that list the changes. Then when I had a lot of changes I would let Elizabeth know so she could make the changes on her list. This meant inventory took a lot less time as things were where they were supposed to be. For those of you here at CBC that have issues with keeping track like I did, I recommend this technique. It seems like it would be a pain, but not really. I always keep a copy of the inventory on my iPad and I can make changes as soon as they happen. With Evernote, you can also keep a copy here and make notes. We'll see if I can do an even better job this year and make it so next year I don't have to make any changes.

Signage

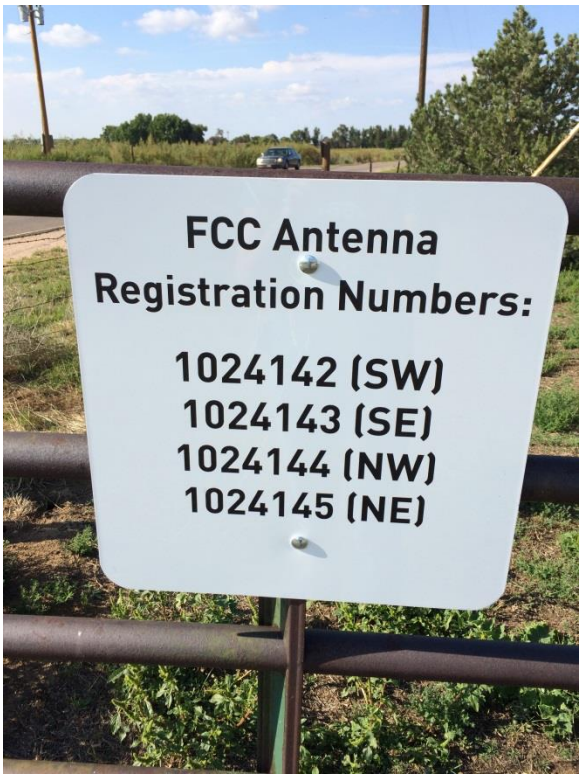
We recently acquired new signs with FCC-required tower information to hang on the gates at the transmitter sites. It is amazing to me how we engineers think. To mount these signs properly, we were going to get a piece of channel and some all-thread and make some U-bolts to mount these signs. A lot of work right? I took my husband with me to the sites to do this little project, and being the guy he is, he found a much, much easier way. We found a flat spot on the gate where we could drill a couple of holes so the sign is mounted directly on the gate with no channel. Of course this got be thinking, why not do this with the rest of our signs? So I was able to do a few more of the other signs we keep on the gate. We are going to have some address signs made that are more durable, and when those come in I will finish this little project up.

Wheatstone Update

October 1st will be the first time weôve done an upgrade to our Wheatstone bridge router since it was first put into use. That was nine years ago. Iôm not actually sure what to expect. I am hoping for a smooth update, but past experience dictates we will have problems. To help prepare, we have discussed the possibility of the stations not being able to have live shows the entire day. We would much rather be safe than sorry.

To get us through the update we have created simple cables that go from an output of the Wheatstone blade for the audio server over to the Arbitron encoder which then links it to the delay and STL. This will bypass the console and bridge router system completely and allow each station to stay on air. This is an update that is needed, but one I am definitely not looking forward to.

That about covers it for this edition so until next timeé thatôs all folks!!!



KBRT • Costa Mesa - Los Angeles, CA
740 kHz, 50 kW-D/0.2 kW-N, DA-1
KNSN • San Diego, CA
1240 kHz, 550W-U
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT
WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND
WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

CRAWFORD
BROADCASTING
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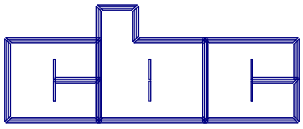

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