The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Down to the Wire

As we slide into July (what happened to June??), the date for the relocation of our CBC-Denver studios and offices looms large. The technical move – studios and engineering – is slated for the week of July 18, and the office move is scheduled for the following week. What I am trying to figure out is how we got from having months to prepare for this to just a few weeks remaining.

The good news is that we are, for the most part, prepared. The infrastructure is in place at the new location – rack wiring, inter-studio wiring, LAN/phone wiring, even coax distribution of the rooftop receiving loop. If we didn't make any wiring mistakes, we *should* be able to relocate all the rack equipment, plug it in and be mostly set to go at the new location.

The "battle plan" is still somewhat fluid at this point because of several unknowns, but we plan to start in the wee hours of the morning on Monday, July 19. We're assuming that by then we will have a fixed 11 GHz microwave link from the new studio rooftop to the KLZ site. The FCC has granted the license for that link and the antennas and equipment is being installed as of this writing. But this is a new application for me, so I have a bit of a learning curve to get through. The good news is that we have a tower climber lined up who is also an engineer. We'll used our regular crew to rig the tower, hoist and hang the antenna and radio, but we're using the engineer/climber to check the electrical/LAN connections and do the path alignment.

Another assumption at this point is that we will have a working T1 circuit in place between the new studio and the KLTT transmitter site. This is a "cutover," i.e. the phone company will install the circuit at the new location and on moving day will cut the existing circuit from the KLTT site over to the new terminus. Sometimes this goes like clockwork – the telco techs do the cutover first thing in the morning and everything works – and sometimes it doesn't. There's simply no way to know. So we're planning for now to physically carry the on-air NexGen workstation out to the KLTT site and connect the mix output directly to the audio processor. We can run it in the "emergency control room" (ECR) mode for a couple of days if needed during the move. Hopefully we won't have to do this for more than a few hours.

One thing I don't have to assume is a working microwave link to the KLDC transmitter site. That is already up and running. In fact, that link is currently providing LAN connectivity to the new leasehold.

So by sometime on the morning of the 19th, we plan to be operating three of the four stations from the new location and the fourth station (KLTT) will either be operating in ECR from its transmitter site or from the ASERV from the new engineering room. That's the initial plan, anyway. Of course I fully realize that the best crafted battle plan goes out the window when the first shot is fired!

Once we get to this point, we can begin carefully dismantling studios and transporting the equipment and cabinets to the new location. Art Reis and Stephen Poole will be on hand to assist and direct parts of the project. We have new source, destination and logic cables made, labeled and ready for them when they begin wiring up the studios in the new location. Hopefully this will greatly speed the process. We will have our general contractor, Mike Kilgore, on hand to assist with the studio cabinets. Three of the studios use custom cabinets that may or may not come apart easily. If we damage the cabinets or break some laminate, Mike will be there to make repairs.

We can more or less take our time putting the studios together, taking most if not all of the remainder of the week to do that. With Art and Stephen on hand in addition to local engineers Cliff

Mikkelson and Jack Roland plus Amanda, my wife Phyllis and me, we'll have plenty of very competent and professional help. Because of the nature of the Wheatstone bridge router system, there really isn't that much in the way of audio and control wiring in the studios. I think each of the rooms can be operational inside a day. Of course there are always the "extras," that 5% of the work that takes 25% of the time – hanging the speakers, wiring up the talk studio, installing and wiring the Enberg annunciator board, etc.

We won't have phones until early in the week of the 25th. Because we employ a PRI (T1 trunk) for all our phones, relocating that is all or nothing. So while we may have some operators in the new studios before the move week is out, there won't be any live shows involving callers.

As I mentioned above, the office move is slated for the following week. I split the move into two segments for a number of reasons, the main of which is so that the engineering crew can work and freely move about without tripping over boxes, desks, movers and people. Plus there may be some blue air from time to time as things don't go completely according to plan.

Hopefully we'll have a report for you next month on the completed project.

Detroit Telco

For a number of years now we have been fighting a losing battle with a crumbling telco infrastructure in the area around our Detroit studios and the WMUZ transmitter site. The CBC-Detroit "compound," which is very nice and modern, is in the inner city and it is located in an area that is largely residential and in decline.

The issue is with the arterial telco cables under the main streets in the area. These cables are old, they are in bad shape and I imagine the splices are rat eaten. AT&T, the owner of this infrastructure, has zero interest in investing in this area, preferring instead to simply move our circuits from pair to pair. Sooner or later they will run out of pairs. I shudder to think what will happen then.

And so it is that we have phone trouble… trouble with our two PRI circuits, trouble with our point-to-point T1s, trouble with our ISDNs, trouble with our broadcast loops.

With no help coming from AT&T or FirstComm (our Telco reseller), we're on our own here, and so it is that we're working on an in-house solution to this issue. I have spent considerable time investigating our options, and one has emerged as an economical means of completely bypassing AT&T in the area – a point-to-point fixed microwave link from a different site to CBC-Detroit.

Greater Media owns a large tower complex about six miles away. This tower is home to the WRDT night antenna (a skirt on the 1,000 foot "Motower"), and there is good telco infrastructure in the area. The path is clear from there to the tower at our studio. I found some Trango equipment that will carry up to eight T1 circuits plus some Ethernet bandwidth. So if we can find a frequency, I plan to file an application and get us a license on 11 or 18 GHz.

The plan is to have all our main phone circuits brought in to the Motower complex and then microwave them over to CBC-Detroit. This Trango GigaPlus can reportedly do that.

We have come to an agreement with landlord Greater Media, so now I move on to the PCN coordination. It will take a month or so to get this done before we can move on.

This link, if we can make it work, will also provide a path for audio and remote control between the studio and night transmitter site for WRDT. That would allow us to eliminate at least one phone circuit, maybe two. The only caveat is that there is a prohibition in Part 101 on using fixed microwave links in this service as the last RF link to a broadcast transmitter site. More than likely we will ask for a waiver. Our friends at Clear Channel have had some success in getting these waivers.

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

Hello to all from Western New York! The month of June has been quite busy here in the Buffalo and Rochester markets. Just as we had finished up the WDCX-FM antenna bay replacement at the end of May, the Rochester stations reported numerous problems with Internet connectivity and streaming problems.

Time Warner provides our Internet services, so a call was placed to their service department to investigate the cause of our erratic connection problems. The serviceman found a defective cable modem and Road Runner filter, replaced them and went on his way. Unfortunately, he left us in worse shape than we were in before his visit! We have two separate Internet connections. One is dynamic, which we use for only the office computers, and the other is a static connection, used for our streaming encoders, Zephyr IP and NexGen accessibility. For reasons unknown, he had switched several CAT5 cables around, causing additional streaming problems and difficulties in downloading programs from various FTP sites.

As is the case with most in-house computer networks, we did not have ours mapped out to easily identify which cable went to what location. It took me almost a complete day to get the network cables identified and routed to their respective destination.

With the networks again separate, we continued to have problems with our static connection. The Internet connection would work for an hour or so, then be off for several hours before we would be able to reconnect. At first I suspected a faulty router, so I programmed and installed another one, but the problem remained. After performing several diagnostic tests on our connection, I found that the problem was that we were exceeding our bandwidth allocation so we either had to upgrade our service or make some changes in our bandwidth usage. We had recently added another 64 kbps stream to provide audio for broadcasting via Flycast for WLGZ-FM, so the logical choice was to shut this stream down. Once Liquid Compass accomplished this, our connection problems have ceased. One good thing did come out of this: I now have a good understanding of how our networks are wired and have documented where each CAT5 cable ends up.

WDCX-FM Buffalo

I am happy to report that the WDCX-FM antenna is holding pressure and performing well after replacing the damaged bay last month. After installing the bay, Don Boye of Western Antenna & Tower Service inspected the entire antenna for any additional damage. He did note that there are two of the "T" blocks on the lower bays that have stress cracks due to movement in the antenna. However, they are not in need of immediate repair and will be changed out at some point before the winter months arrive.

The second week of July we are scheduled to have our aging air conditioning system replaced at the WDCX-FM studios. This system has been in service for well over 20 years and simply isn't large enough to handle our cooling needs. With the addition of so many computers in the production, air and talk studios in the past several years, the A/C was struggling to keep the work areas cool. In the summer months we have noted the room temperature in the server room as high as 108 degrees, causing the computer fans to shift into turbo mode to keep the CPUs cool. Solly Industries will be installing a new 3-½ ton high efficiency unit along with new ductwork and diffusers, and will balance out the system to provide the proper amount of cooling in each studio location. The office areas are cooled by a separate HVAC system, and that system is owned and maintained by the building owner.

Recently, while in Rochester, I received a phone call from the board operator that WDCX-FM had gone off the air during a thunderstorm. I tried to call into the Burk remote control to get the station back on the air, but the Burk would not answer. Even though the power was off, I still should have been able to connect via telephone as the remote is connected to a UPS, but after several failed attempts, I dropped what I was doing and headed back to Buffalo. When I arrived at the transmitter site, I found the generator running, indicating that the power had gone off at the site. I brought the analog and digital transmitters up without incident and began looking at the cause of the remote failure. The Burk was in la-la land, and a simple reboot brought it back to life. The failure was caused by a loose battery connection on the UPS, which should have sounded an alarm that the battery pack was not charging. I will have to pull the unit out to further investigate why the failsafe alarm didn't activate.

WDCX(AM) / WLGZ-FM Rochester

On June 9th, during a regularly scheduled maintenance visit to the Rochester stations, upon entering the WLGZ-FM transmitter site I noticed that the Continental 802-B exciter was running wide open at around 45 watts. From past experience with these exciters, I suspected that the MJ3001 pass transistor had failed. I switched the BE transmitter over to analog + HD mode and shut down the Continental to make the repair. Once I removed the T0-3 transistor, the socket disintegrated in my hand! Excessive heat over the years had hardened the plastic insulator, and once I disturbed the socket it fell apart. Looking through the spare parts kit, I found that I did not have a spare socket on hand, so off I went to try and locate one.

First stop was at a small Radio Shack, which stocked very little in parts of any kind. The salesperson suggested another Shack a few miles down the road that carried a much larger inventory of electronic parts. They did not have one either, which is a great disappointment – Radio Shack used to carry a lot more in parts. A ride back into the city to Gold Crest Electronics to see if they had one was another disappointment. They did not have anything in stock that would work but was eager to order one, with delivery in a few days. Stating we were off the air, I thanked him and started calling some of the market engineers at the other stations to try and locate one, but to no avail. I headed back to the transmitter and attempted to repair the socket, just to get us back on the air at full power.

Using a piece of perfboard, I carefully cut out the shape of the insulator that had fallen apart, drilled out the appropriate holes for mounting, and attempted to re-install the socket. It worked for a moment, then arched through the holes in the perfboard and died! In order to get us back on the air in full power, I had to drive back to Buffalo and get our spare exciter, retune it for 102.7 MHz, and drive back to Rochester and install it.

Once I got the exciter on the test bench, I found that the transistor had indeed shorted to ground, taking out the B+ regulator chip, fuse, and the power transistor in the RF amplifier. I also noted that the cooling fan had seized up.

While talking with Bill Cook at Continental Electronics when ordering the replacement parts, I found out that Continental has a service modification that would prolong the life of the MJ3001power transistor. It is simply a 4-ohm 100-watt resistor in series with the B+ feeding the transistor. By adding this resistor, it will reduce the input voltage to the power regulator, greatly reducing the amount of heat generated. Those 802-B exciters that operate between 8 to 20 watts have noted premature failure of the power transistor due to thermal breakdown.

One thing to note is, that the maximum output power will be reduced to about 30 watts after installing the modification. However, if you need to run the exciter at or near the 50-watt max, you can simply unplug the resistor from the Molex connector. Once I get the mod kit from Continental and install it, I will reinstall the exciter and make this modification on our spare one.

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
Joseph M. Huk, Jr.,
P.E., CPBE, CBNT
Chief Engineer, CBC–Detroit

In June we were challenged by many thunderstorms that came through metro Detroit. We suffered damage to some of the components in our broadcast facility but recovered in short time.

We continued to have issues with our T1 circuits within our WMUZ studio facility. FirstComm, our T1 service provider, has worked with AT&T to contain the issues.

Last, our programming offerings from our Detroit cluster are continually expanding to our sister station KJSL in St. Louis. As the project expands, we have recognized the need to solve issues with our Wheatstone switcher.

Lighting Damage

On Memorial Day weekend we experienced a series of thunder storms that damaged various pieces of equipment. Our keyboard/video/mouse (KVM) interfaces were damaged during the storm. The failure modes varied from having no video to screens all in one color. This rendered the system unusable. Anthony Faletti (our chief board operator) and I went though all of the KVMs and replaced the defective transmitter units from new stocked parts. We ran short of replacement parts for the KVM in WRDT. To contain the issue, we used one monitor for the viewing of NexGen and other broadcast related programs.

I did some research on the Internet to find a company that carries the exact model of Avocent KVM. Unfortunately, this company is not on our approved list vendors for which we have an existing account. Therefore, to ensure compliance with corporate policy, I did a deeper dive into finding a similar product from one or our approved vendors. First I tried Microcenter in Madison Heights, Michigan. In a discussion over the phone with one or their associates, they explained they had a device that would work over CAT 5 or 6. After clearing the purchase with Cris Alexander, I went to Microcenter to see if the unit was exactly what we needed. It turns out that unit would work. However, I was not able to purchase six units as originally planned. They had only one unit and they were no longer going to carry any more. So I purchased the unit and installed it the WRDT system. The new IOGEAR KVM works well and it does not emit excessive amounts of electromagnetic interference (EMI) like the Avocent units.

At this point I needed to complete the task by finding more IOGEAR KVMs. I called Art Reis to find what other computer vendors for which we currently have an account. He explained that PCMALL is his vendor of choice. He gave me a contact and told me to tell them that Art suggested I call. The customer service representative Tauna Davis indicated that the IOGEAR KVM that I requested was no longer available. She called IOGEAR and obtained the new model number of the replacement KVM. I now have the new KVMs and will be ready if we experience another unfortunate act of nature.

The Ethernet port on the LANLink transceiver was also damaged by the storm. I called Mosley and they indicated, based on my testing and the testing I did with them on the phone, the port was indeed damaged. Andrew at Mosley sent me a new transceiver under warranty and it worked great. All I needed to do was program all the settings via a terminal program. I put the damaged unit in a box for shipment back to Mosley. Mosley set up a FedEx call tag for the package to be picked up on June 15th. So far, the new unit is working well.

In addition to the KVMs being damaged, we lost our audio monitor feed to various sources in the WMUZ plant (i.e. silence sensor, DRR and

transmitter room monitor). Upon further investigation, it turned out that the Inovonics modulation monitor did not have an audio output. I removed the modulation monitor from the rack and placed it on the bench for further analysis. I found the service manual for the unit and started troubleshooting the issue. I found that that audio from the receiver was present up to the final audio output operational amplifiers (op-amps). IC 8 and IC 9 were found to be damaged. After replacing the ICs, the modulation monitor was operating properly. Subsequently, it was placed back into the equipment rack and put back into service. So far everything has been smooth as silk.

The following Saturday, the WMUZ main transmitter, a Nautel NV-40, went off the air. After trying to turn it back on to no avail, I told Miles Countermen, our board operator, to start the Continental standby transmitter until I could arrive on site. When I got there, I found the transmitter behaving very strangely. LED were flashing on and off on each switching power supply module. In addition, the blowers were speeding up and slowing down. At no time was I able to get the transmitter to turn on. I examined the status log on the NV-40 to see if any information stood out that would give me an idea as to what was the root cause of the issue. It seemed that most errors were pointing to the exciter module. I called Nautel to obtain further guidance in troubleshooting the issue.

I had a conversation with Nelson, the engineer on duty. We went over the status log once again and determined that one of the lines, mixed in with the other faults on the log, indicated that I had lost one of the AC phases being applied to the transmitter. At that point, he suggested that I look for a series of indicator lights at the rear of the transmitter to see if, in fact, I had lost power in one of the phases. He told me to look in the lower right hand corner of the transmitter. It turned out that the lights were in the lower left hand corner as you are viewing them from the rear of the transmitter. When I observed the lights, 2 were glowing very brightly and the other was dim. Nelson indicated that I further investigate the power feed going to the input of the transmitter. I told him that I would call him back with my findings.

On the wall, in front of the transmitter, there is a knife switch that controls the main transmitter power feed. Since the switch was in the off position, I opened the box and found three Buss fuses on the load side of the switch. Using an ohmmeter, I measured all three of the fuses and found one to be open. I was lucky to find one replacement above the knife switch. I subsequently replaced the fuse. The transmitter came up normally and I put the NV-40 back on the air. The power was slightly low and I noticed that one of the power supply modules was indicating no DC output. I swapped it with a known good module and the issue followed the defective module. Nelson and Nautel promptly shipped me a new module for exchange. Upon arrival, the module was replaced and the transmitter was back up to full power.

Last weekend, more storms came though. The NV-40 once again went off the air. Upon arrival at the station we found another line fuse open. Subsequently, the fuse was replaced and the transmitter was put back into operation. Just before I was ready to wrap up the project, I noticed that the output power of the transmitter was a bit low (26.1 KW VS 26.7 KW). Further investigation showed that power module number 4's status light was flashing red and green. Under normal conditions the LED should glow green. I swapped the power amplifier module with a known good one and the issue followed the amplifier module. I talked to Nelson at Nautel and he indicated that he would ship me a replacement module free of charge. The module arrived the following Tuesday. The module was replaced and the transmitter was returned to full power. These storms really caused us many setbacks this month.

800 Number Project

I have been in contact with FirstComm, our telecom systems integrator, to obtain a toll free number for our live syndicated Bob Dutko show. That program is now serving both the St. Louis and Detroit areas. Therefore, to show goodwill to our listeners in St. Louis, a toll free number was deemed necessary for our listeners outside of Detroit.

After sending FirstComm Bob's wish list and striking out on every number, they came up with a number that was not on his list but very close to his request. Bob is a very smart broadcast profession and felt that it is very important to utilize a number that is easy to remember. I replied to Frank Franciosi, our General Manager that I needed guidance on proceeding. He said that he and Bob wanted to call FirstComm directly to better understand their process for searching these numbers. When I heard back from our General Manager, he said it required some delicate, but forceful inquires to have them review our list once again. FirstComm finally found a suitable number on the list. I applaud Frank on his delicate tenacity. He taught me that it's important to question our venders

to ensure that all possible efforts have been exhausted to archive our desired goals.

RCS Sample Rate Issue

We were having issues with the sample rates being incorrect on recorded program material in the WMUZ control room. After further study and another call to RCS tech support, the technician indicated I needed to go to global control for the sample rate. By changing it in that location, the sample rate on any recorder would follow suit. We made the change, and the issue seems to be resolved. We waited about two weeks before we gave the green light to recording any program material (i.e. voice tracking) in that studio. Since Anthony Faletti, our chief board operator records material on a daily basis in that studio, we were able to confirm that the fix worked. This issue was intermittent so we needed time to prove, over time, to ourselves, the success of the fix. At this time we deem the issue is closed. We felt that the issue originally occurred due to a power outage and subsequent corruption of the configuration file.

Wheatstone Computer Scheduler Issue

With the advent of the KJSL programs originating from the WMUZ, WEXL and WRDT facilities, we are finding it useful to automate the switching of audio sources to the satellite uplink. The Wheatstone computer scheduler software seems to have an issue. After creating working Salvos, scheduling more then one event in the scheduling software causes the software to lockup and require a reboot of the software. I have had numerous conversations with Wheatstone regarding the issue. I supplied them with screen shots of the error messages, the bridge router firmware version and the computer scheduler software version. In about a week, Wheatstone sent me a new release of the schedule software. The new software works beautifully. Now we can automate the switching of many audio and logic sources for a given show time slot and station to our satellite uplink transmitter. This will make our facility much easer to manage and eliminate human error.

Microwave T1 Project WMUZ to Motower Link

As mentioned above, we continue to have issues with the telco infrastructure to our studio facility in Detroit. To addresses these issues, Cris Alexander and I have been working on a microware link to Greater Media's Motower facility about six miles away. Greater Media's market chief engineer, Mike Kernon, indicated very reliable telecom infrastructure at his plant. While Cris has been running a profile study and power budget analysis for this new project, I have been supplying him with obstruction field data to ensure we have good clearance for a robust link. So far things look very promising and we hope to have it implemented soon.

Continental Filament Fuse Holder Issue

At the beginning of June, I started the Continental transmitter to ensure its proper operation. Upon startup, smoke started from the area of F3, the filament power supply fuse. After shutting the transmitter off, I noticed that the fuse holder had melted and disintegrated. I called Continental parts and ordered a new fuse holder and a set of the exact ceramic 10 amp fuses. The parts arrived in a couple of days and I replaced the fuse and fuse holder and the transmitter was back in operation. Due to all of the transmitter outages this month, I was very pleased with the reliable operation of the trusty Continental FM transmitter.

Remote Broadcasts

Since the frequency of remotes is going up at our Detroit cluster, I am going to try to streamline the remote equipment kit. There are a couple of mobile rack cabinets in the station. I am going to make every effort to install the remote gear in one of these mobile racks. This way everything is together and ready to be used. In addition, I would like to get a new RPU antenna for the Marti. If possible, I would like to use the Marti for this event and use the Comrex as a backup. I also plan to buy an FM log periodic antenna for the SCA receiver for IFB. I will keep you informed as to my progress next month. Until next time, be safe, and if all goes well, we will be reporting to you from the pages of *The Local Oscillator* next month.

News From The South

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

Cough, Cough... Ahem...

Has it really been five years since I passed the CBRE exam? Well, yes it has ... and we've been so busy, I forgot to (a) sign up for the CSRE test (my next goal) or to at least (b) renew the CBRE. For now, because I believe in the SBE's certification program, I've sent in the renewal until I can take the next test.

The moral of this story is obvious and simple: If you have professional memberships and certifications, don't forget to keep track of renewals and test dates! Otherwise, like me, you'll be looking in the mirror and saying, "It's your own danged fault!" SBE has sent several renewal reminders to my house. Each time, I'd see it, think, "Wow, time's getting short" ... and would then leave the blooming paperwork on my kitchen table.

Don't forget those renewals!

Headed To Denver

I'll be in Denver the middle part of July along with Art Reis and the ever-redoubtable Robert "Bubba" Payne, helping Cris and Amanda move into their new studios. Cris and Amanda will no doubt relate the details of all the fun they've had getting their STLs worked out. If you've ever done a move, you know that is usually the biggest headache. The good news is, they're about done now, so all I'll have to do is supervise and catch up on my sleep when I get out there. (Heh, heh.)

(Amanda was kind enough to ask what sort of snacks I like. I don't know if she'll be able to arrange my quiche and smoked salmon trays with iced Perrier, but she's a resourceful gal; I have high hopes. Heh again.)

All joking aside, moving several stations without downtime is a major project. I'm honored and tickled that Cris and Amanda think I might be able to help. We had to do the same thing in 2006 with our five stations here and it involved temporary STLs and lots of NexGen's "Emergency Control Room" mode. We didn't have to put an Audio Server at a transmitter site, but we were prepared for that eventuality. NexGen is so flexible, as long as you can think both in and out of the box, you can usually find a way to stay on air.

Of course, there is still the fact that Art, Robert and I will all be in the same city at the same time. Denver will never be the same. Cris is a very brave man.

Email Scams...

Most email scams concentrate on the human factor nowadays: they try to get you to click a link or send in your personal information. People get taken by these things every day, which is a shame.

A pat on the shoulder goes to those of you who alert us to email scams. Larry Foltran has even covered this at some length in his *Local Oscillator* columns. The latest nod goes to Sylvia Thompson at KKPZ who forwarded an email to me claiming to come from "Microsoft Support." It warned that a critical update was available, with a handy link to click to "fix" the problem. Of course, anyone who clicked that link probably received a very unpleasant surprise in the form of malware that installed itself, and then hid itself, on their computer!

You combat this with simple common sense. Most major software packages, from Windows itself to Internet Explorer and Firefox, to plug-ins like Flash Player, will update themselves if you've registered them properly. If you need a critical patch or fix for any key software, the updater should tell you. There would be no reason for Microsoft or Adobe or Apple or any other major player to send out an email to millions of users – that would simply be a doubling of bandwidth and effort. The updaters built into this software do it for them.

...And Bogging Down...

We've also had a lot of trouble lately with

the mail server slowing to a crawl at times. This speed issue has prevented us from even considering the Zimbra mail server for now. We have been looking at two possibilities: (1) we can co-locate our equipment directly at our ISP's offices about five miles away, or (2) we may be able to get dedicated, high-speed bandwidth from a local secure wireless link. Todd has been looking at the latter possibility for us. John White has used this service in Portland and says that they're excellent. Look for us to take action one way or the other before I leave for Denver in mid-July.

For now, the same request that I made in an all-points email several days ago still applies: please don't routinely send huge attachments via email. It's one thing if a valued client wants something right away; we'll do everything we can to help you with that. But if you're working on something and want to take it home, for example, don't email it to yourself. Use a flash drive (a "pen" drive). You can get a 2 gigabyte stick for less than $10 in the checkout line at Wal-Mart nowadays; everyone ought to have a couple!

...And Spam!

Finally, spam is a real problem. I've mentioned this before, but it just seems to get worse with each passing day. To give you an idea, here's a recent trends, the ratio has deteriorated to less than 5%!

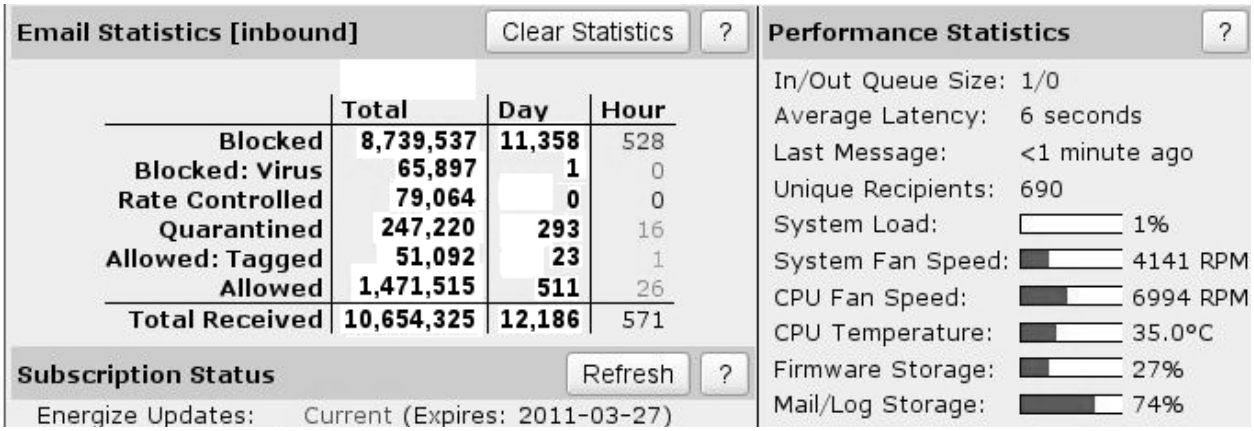
There are two reasons why spammers keep doing this. First, their costs are obscenely low, a tiny fraction of one cent per message. Second, a scammer only needs *one person* to give them the login name and password for their bank or credit card company and they'll call it a good week. Simply put, the "payoff" to cost ratio (from their warped point of view, at least) is obscenely high. When you then consider that most scammers are based overseas, beyond the reach of law enforcement here in the States, they have every incentive to do it and virtually no incentive to stop.

I don't know what the answer is, either. But I know that it loads down our already overloaded server and spam firewall at times!

Ranting with Art

Last month, Art Reis discussed his concern with manufacturers who require that you either buy expensive assemblies from them or just send in a unit for repair. We're doing a duet here: I have ranted about that myself. Long gone are the days when you were given a schematic and service information with a new piece of pro equipment.

Those companies that require factory service say that they're doing it because so many



Look at the ratio of junk to legitimate messages!

snapshot from the Barracuda Spam Firewall administration screen. I've highlighted the pertinent information in the left two columns. The first shows the totals of all activity since we replaced the Barracuda in late February of 2009 (about 16 months ago). The second column is a typical daily summary.

The totals from last February show that historically, the ratio of allowed to blocked, quarantined or rate-limited messages runs about 14%. In the daily summary, which is an indication of more components are surface-mounted nowadays. I don't know about everyone reading this, but there are plenty of us who are fine with this; it's just not that big of a deal. Yes, it requires an investment in some new tools and equipment (don't try to remove a surface mount IC with solder wick, for example!) but again, that should be my choice and an option.

Like Art, I have also suspected that many of these companies simply view repair as an additional source of revenue, as orders for new equipment have

fallen. But we need to warn the vendors. When we purchase new equipment, we will ask: do you provide service info and can we repair it in the field? If the answer is "no" from Vendor A, but Vendor B says, "Yes," guess which one we're going to buy?

Audio Fundamentals: Slew Rate

Art also likes to tease people with technical questions, so I've been inspired to share some of the eclectic knowledge that I've gathered over 30 years. My background is actually in music and high-end audio. One of my first full-time jobs was servicing McIntosh, Klipsch, Altec and other professional pro audio equipment in Fayetteville, NC. I love radio and have a blast working in it, but I've always had a soft spot in my heart for designing, building and installing high-end audio.

The technology has certainly changed over the years. For example, when I started, the class A/B, bipolar, complementary-symmetry amplifier (say *THAT* three times, really fast!) was the standard. You've certainly seen these on schematics: this is the classic amplifier consisting of NPN and PNP transistors in a complementary (whence the name) "stack." Nowadays, you are just as likely to run across a class G (switched supply) or a class D (PWM-and-filter) design. And of course, most audio is now stored and transported in digital form.

But in spite of that, there are some fundamental principles that still apply. When all is said and done, even the most carefully crafted 32-bit, 192 kHz oversampled digital audio will be converted to an analog voltage to drive speakers or headphones. That's when all the old stuff that I cut my teeth on comes into play, and slew rate is just one good example.

First, a little background (which I may expand on in later issues): operational amplifiers, or "op-amps," are everywhere nowadays, even in this all-digital age. These chips are used all over the place. Even if you have the latest Wheatstone or Axia audio-over-IP system feeding an all-digital STL which in turn feeds a digital exciter, there will still be op-mps on the analog inputs and outputs, if nothing else.

The data sheets for op-amp chips specify the maximum ratings, inherent distortion and noise, and so on. One of the most important specs is the Gain Bandwidth Product, or GBP. It's a direct figure of merit that tells the upper -3db frequency at any selected gain. For example, a chip with a GBP of 1 MHz will be -3db at 1 MHz at unity gain, -3db at 100 KHz with a gain of 10, and so on. You simply divide the GBP by the closed-loop (i.e., with feedback) gain to determine the -3db upper-limit frequency.

Given that, you might (as I did when I was younger and more foolish!) see a chip with a GBP of 1 MHz and think that you can run a 50 or 100 KHz signal through it at unity gain. Ah, but this is where the slew rate could bite you, if you're not careful! GBP is an important specification, but it doesn't tell the whole story!

Slew rate, simply put, is the maximum rate of change in signal that a given circuit can support. It's analogous to the switching times ("Ton" and "Toff") of digital circuits. The bare-minimum required slew rate, in volts per second, for a pure sinusoidal signal at a given frequency is determined by the formula,

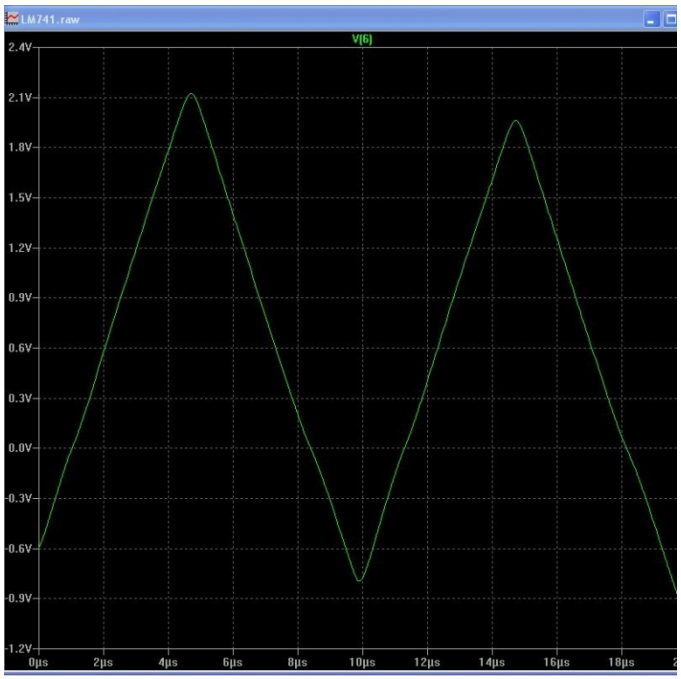
$$2\pi \text{ [Freq (in Hertz)] x [peak voltage]}$$

Divide that by 1,000,000 to get the more familiar volts-per-microsecond (V/uSec). But using that formula, you can see that to get +18 dBm (10.26 volts) peak at 15kHz, your chosen amplifier better have a slew rate of at least 1 V/uSec.

That doesn't sound like much until you consider that many older amps can't do this. If we're talking about operational amplifier chips, the classic (and redoubtable) uA741 is limited to about .5 V/uSec. At lower levels and lower frequencies, the problem might be inaudible, but when you drive it hard, the slew rate limiting will have an obvious effect on audio quality.

(And remember, that 1 V/uSec figure is a bare minimum; to be safe, you really need several times that. For one thing, strong transients could cause all sorts of horrid-sounding, brief distortion products of the "what in the world was that?" variety.)

Two of my favorite ICs for audio are the National Semiconductor LM837, which has a 10 V/uSec slew rate; and the Burr-Brown (Texas Instruments) OPA134 series, at 20V uSec. In addition, both have greater bandwidth, lower noise and distortion and the ability to drive a 600 ohm load directly. Here's a tip: if you're working on an older piece of equipment, you can often improve performance simply by upgrading the old ICs. The LM837 is pin-compatible with the quad TL074 and the OPA2134 is a direct, plug-in replacement for the NE5532, RC4558, TL072 and a host of other dual chips.



SPICE Simulation of Slew Rate Limiting on a 741 op-amp

Let's finish with an illustration taken from Linear Technology's excellent (and free, see their Website!) LTSpice simulator. This shows what happens when you try to get a 100 kHz sine wave from a 741. The op-amp simply can't follow the changes fast enough, squashing the sine wave into an ugly triangle:

We'll look at other interesting things in the months to come. For now, when you replace a chip, make sure it's at least equal to the original, or if you can't find the exact replacement, use a better one. Slew rate is just one reason of many.

Until next time!

Gateway Adventures
By
Rick Sewell, CBRE
Chief Engineer, CBC–St. Louis

What's the surest way to get someone to touch something? Put a "Do Not Touch" sign on it. This is definitely true in radio. It's almost always true that if something has a knob, that knob is going to get turned by someone who is not qualified to turn it. Especially, if there is easy access to the controls.

Early in my career I worked in a lot of stations where the rack room and the control room were combined. Right there at the fingertips of anyone who wanted to mess around with the sound of the station were the controls to the station's processing.

When I mean anyone who wanted, I mean *anyone*. It is often true that engineers and program directors will butt heads over the sound of the station. Certainly every jock has an idea on now to make their voice sound better. But in these type circumstances the nighttime janitorial service has the opportunity to put their input into the situation. And I am guessing that they occasionally did.

I once managed an FM non-commercial station where a member of the board of directors would regularly stop by the station and adjust the processing, sometimes several times a day. He

was a nice guy who had a direct involvement in my employment. That being said I finally had to get up the nerve to tell him he had no right to touch the equipment. This finally occurred after he had messed with the processing so much that "ears were bleeding"after listening to station for just an hour. In that case, I also had to follow up after him to make sure the station's processing was not causing us to hit too many peaks per minute because he often left it in such condition.

It has been a while since I worked with that kind of nightmare situation. Fortunately we have a great boss at Crawford Broadcasting who knows that you really can't leave rack room equipment out where there is easy access to it.

Recently I went against my gut instincts in this regards. We needed a second call screening computer in the control room for a new talk show that was starting on the station. The one we had in the control room was only logistically available to the board operator. We were now putting a producer/call screener into the equation and giving him a separate desk in the control room.

I did not have any available desktop computers but I did have an old laptop that I thought I might revive for the occasion, so I did just that. It definitely had some issues but I was able to get it running. I hoped it would at least do in the short term until we found a better long term answer.

Using a laptop in a "shared" situation was definitely something that went against my instincts and I reluctantly put it into this service because it was a computer that had already hit the retired list two years earlier. I put my label printer to use putting on the computer a sign reading, "If you're not authorized do not touch."

I did this on a Friday and when I came in on Monday when the new program was to start, I found the laptop not working. Upon closer inspection, I found pieces of plastic from the laptop's casing over the desk. Obviously, someone had picked the laptop off the desk and dropped it! So much for people paying attention to my "Do Not Touch" label!

My gut instincts were right. Laptops are for individuals and not for open workstations. Fortunately, this was a computer that had already been written off a long time ago so there was no financial loss in the situation.

You would like to think that people would respect labels warning them not to touch something, but it is human nature not to do so. That's why as engineers you have to design open areas to be as "idiot proof" as possible.

I have always thought that every radio station engineering department should be equipped with a fingerprint dusting kit. Of course, fingerprinting employees would probably not be too politically correct in the current work climate, so I wouldn't expect that to happen anytime soon.

Valley Notes

By

Steve Minshall

Chief Engineer, KCBC

Most of the work for the KCBC night pattern is finished. In fact, it's all finished except for some housekeeping chores. This last month we took a number of impedance measurements of the system, transmission lines and at the tower bases, for future trouble shooting.

The most interesting work was getting the HD to play on the night pattern. The impedance cusp was facing the wrong way on the Smith chart, so the first order of business was to rotate it around to the correct orientation. This was not too difficult since the phasor has a dual tee-network for the common point matching.

The rotation was set and the tee-network components were adjusted for the best looking sideways smiley face on the smith chart. The next step was the mag/phase delay adjustments in the transmitter. The transmitter adjustments were straightforward, but the result was a spectrum that was not as good as I wanted. Returning to the phasor

common point, I carefully made minor changes to each element, readjusting the transmitter each time while monitoring the spectrum. This process yielded a significantly cleaner HD spectrum. The Smith chart was not quite as pretty but the spectrum is the bottom line.

Next subject, weeds. This year's weather, sun and rain has been perfect to grow weeds. We have weeds like never before. The KCBC site was taken over by the weeds. Normally, annual or bi-annual spraying controls the weeds, but this year was different. Since we are at the end of the weed growing season and just about into fire season, it was time to get rid of them. For the first time we had to hire out for a complete mowing of the site's 22 acres. Hopefully we can get a new, proactive weed spray contractor and get it done right from now on.

Mowing the KCBC site for the first time in many years

Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Santa Catalina Island! Another month has passed and things are gearing into summer very quickly here. The town has begun to fill with people though this year they do not seem to be spending much and I am beginning to see hikers up behind our tower field most every day now. The Catalina Island Conservancy has opened a trail called "The Trans-Catalina Trail" that runs right behind our tower field just feet from our back fence line. This gets me on my feet once in a while as it is hard to tell from our building if the hikers are inside our fence and near our towers. I guess in time I will get used to seeing people out there, but in the past that was a rare sight.

We do still have a pretty good little heard of buffalos here and they like to congregate along our fence line, something they have done for years. We also have quite a serious overpopulation of deer here, but

for some reason they have not been around our site for sometime, I think because they have grown accustomed to town because people feed them down there. As for the goats and wild-boar, I have not seen either in many years though some locals still say that some remain alive here on the island even after the very aggressive extermination program. Now the island faces a new "threat," raccoons! More on these new friends in another column…

I am glad to be in a much better position this month in regards to finishing our brush clearance as my pastor was able to find a couple guys who have been a major help to me. It is amazing how things work out sometimes, God is so awesome!

One of these guys came into our church looking for food after losing his job several weeks prior. We were not only able to send him home with some food for his family, we were able give him and his brother a week's worth of work doing brush clearance in the KBRT tower field, a blessing to us all. Each year this job seems to grow larger as our weeds grow thicker, but for this year, the job is about done. While those two guys worked the field, I was able to get some much needed cleaning done outdoors and had them around to give me a hand here and there for tasks that required more than one person.

Though things on the island are not looking very good to me, KBRT is clean and shining, ready for another summer. The KBRT Ranch, being one of the stops along the Inland Motor Tour, is seen by thousands of tourists each year and thus requires a bit more upkeep than most transmitter sites or tower fields.

One of the things we are noticing as we clear our fields is how much erosion we encountered this year. We experienced several major downpours this year and now it is really showing. After our brush clearance is complete I will have to spend a few days out on our old Ford tractor repairing our roads so they are back up to par. In fact, this erosion along with our squirrel overpopulation might have me on our tractor repairing our roads more now than ever before. Those squirrels have become very aggressive even to the point of digging under our retaining wall behind our building. How I wish I had a way to get rid of them all!

You may recall that awhile back, our transmitter started occasionally going back on-air after sign off at sunset, once while I was standing very near it. Well, the phantom remote control issues seem to have stopped after I changed our remote control system password over a month ago. This proves to me that our transmission equipment was in fact being highjacked by an unauthorized person who got hold of our password by some unknown means.

This last month went by without a power outage, something that rarely happens here. We see anywhere from one per week to one per month on a good month here, and these are not nice outages – we occasionally ride the Edison generators all the way down, frequency and all. Getting through an entire month without an outage is a nice thing, and I am hoping that it catches on as I am prepared to do this many more times in the future.

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

Project Sheherazade

Last month's question was, "What is Litz wire?" Litz wire is actually a form of multi-conductor cable in which multiple *insulated* strands of wire are woven together to form a wire that has two important qualities, one electrical, one mechanical. The individual wires within Litz wire are also

characterized by their tiny gauge – #36 is not an uncommon size for use in Litz wire, for instance, no matter what the size of the finished product.

The electrical property is that in AC applications, skin effect, the propensity for alternating current to be confined to very close to the surface of a wire, is minimized (or more

accurately, taken advantage of). The higher the frequency of the AC, the more pronounced skin effect phenomenon becomes. This leads to an increase in electrical resistance to AC in a given wire. Litz wire mitigates against this by make the surface area of a given wire much greater than is the case with ordinary wire, thus solving problems such as those of a too-low Q in a filter or other such tuned circuit.

The mechanical property which makes Litz wire interesting is its flexibility. Litz wire is so limber that it is used almost universally for connections within speakers, especially between woofer cones and the outside world. As most of you know, in speaker design the ideal is for the least amount of mass in, or resistance to movement in, the cone of the speaker. Since the theory of operation of a speaker involves the playoff of a moving coil against a magnetic flux, and since magnets are notoriously, comparatively massive, the coil has to be the component which does all the moving. Thus it must be directly connected to the moving cone. But how can the moving speaker cone connection stay viable for millions of back-and-forth operations without breaking a wire? Litz wire, that's how.

Litz wire is also used in very low frequency applications where the AC resistance of the inductor's conductor must be kept very low because the coils are of necessity so large. Station WWVB, the National Clock and Wrist Watch control station which operates way down at 60 kHz, uses a great deal of Litz wire in their operation, particularly in coil windings since at the values of inductance which must be used in 60 kHz tuned circuits, conductor resistance is otherwise a major issue. Harris, in its great MW AM transmitter series of years ago, used Litz wire in the inductors which were part of their 70 kHz bandstop filters. Without those filters, every MW-5 and -50 transmitter would have a serious spurious emission problem 70 kHz out, on either side their carrier. Without Litz wire, the design of a reliable filter for the purpose would have been a lot more difficult. BE has in recent years also used Litz wire in its AM transmitters, particularly in the output filter sections.

Most coils operating within a tuned circuit tend to be rather lossy. A lot of electrical engineering types will tell you that the letter L, which of course is the schematic representation for a coil, actually stands for "Lossy." Sarcastic though it may sound, it really is true. By contrast, a Litz wire coil is relatively un-lossy.

You can still get Litz wire in bulk, of course, including on E-bay, and if you have a Harris MW series transmitter which has blown a filter coil, you can get the Litz wire which is specified for that component and rewind the coil to repair the filter. Give yourself a couple of days to do it, and a lot of patience. My friend Len Watson has done it. The result worked well.

Now, for this month's question: Given two FM antennas, one of which is half wave spaced and eight bays, and one of which is four bays and full-wave spaced, which one has the greater gain? Answer next month.

"Fox Hunt!" Follow-up

A couple of months back I chronicled our exploits as we set out to track down a source of intermittent but severe interference to the WSRB STL. For those who need a re-hash, we discovered that the source was emanating from a point some six miles from the Lansing transmitter site, and not only right in line with our receive dish beam but co-planar to boot! I was able to get hold of Jim Smith, the head of the communications department of the site owner, Northern Indiana Public Service Co. (NIPSCO). Jim was very cooperative and actually sent a crew out to document the problem (oh, you bet they saw it!). Further, he put me in touch with the technician for the main lessee of the cellular facility on site, who in turn put me in touch with all the other users of the cellular site, all of whom were cooperative as they could be. Several of them even let us come out to the site on a recent midnight with our own spectrum analyzer to check out the situation for ourselves. And we found... nothing. No spurs at that point. Nothing out of the ordinary. It was the wrong time of the day to see the problem, but at least we got to look.

I should mention here that of all the carriers operating on that site, only Nextel is operating anywhere near our STL frequency, in the 900 MHz range. Everyone else is operating up around the 1800-1900 MHz range. But Nextel is not the only *cellular* carrier operating in our frequency neighborhood. There is AT&T, operating in the 800 MHz range, but we have no clue as to where their local site is in relation to the NIPSCO site.

Fast forward to a couple of weeks after we made contact with NIPSCO regarding this situation: the interference stopped. And it apparently has yet to come back. And nobody contacted us about it. A few days after the test with our spectrum analyzer at the NIPSCO site, we set the SpecAn up at Lansing again and spent a couple of days looking at it while trying to get other work done there. Realizing that this was a huge waste of time, I decided that there had to be a better way.

There's a point here if you'll follow along: When I was a kid, I wasn't allowed to have a bicycle of my own because I was deemed by my overly-protective parents to be too irresponsible to ride one *and* survive. My sister, two years younger than I was, got one first. Until a few years ago, I wasn't allowed to have a spectrum analyzer to use because my previous employers either didn't have the money for one or figured that I was too irresponsible to use one. All my friends who had spectrum analyzers were, and are, incredibly protective of them. What is it? Do they take life insurance policies out on them or somethin'?

Well, when I finally did get one to use, back when Crawford Chicago Operations went to HD Radio. I was hesitant for awhile to use it very much because, frankly, I was afraid I'd hurt it. With this recent instance of STL interference, I've *had* to learn how to use it, and I have. A major epiphany was finding the 'peak hold' function. That alone is a God-send. With that, walk-away monitoring is easy. What with that, and daily checking, I've seen no evidence of interference to our STL signal on the analyzer in well over a week (as this is being written). I've finally turned the SpecAn off and put it away.

So, what happened? Having dealt with the phone company for around 40 years, it's easy to speculate about this and still be reasonably accurate. I can tell you with certainty that the more things change, including the name on the phone company, the more things stay the same. In this case, the rule is, "The phone company may tell you that your complaint is full of hot air (or whatever), then they'll go find the problem on their turf, fix it, never tell you that they did, or that there even *was* a problem." I'm sure that's what happened here. I'm just as certain that they had a few more clues than the ones I gave them to figure it out. I can also say without fear of reproach that technicians from the competing cellular phone companies talk to each other. As I mentioned earlier, I got the contact information for them all, from a tech at just one of those companies. Just as in broadcasting (or broadcasting as it used to be) stations may compete in sales and other areas, but the techs keep in touch with each other.

Here's a likely scenario: A complaint comes in from someone like us who has a serious interference issue. Suddenly, someone else in maintenance for one of the companies remembers that there was/is a performance issue with something on the site in question. It's been noted that something there is not right, and the symptoms are consistent with those of the interference which has been reported. A technician is dispatched to the site with replacement parts and maybe a spectrum analyzer. The tech sniffs around, and sure enough, an RF module is found that's performing way out of spec. The offending unit is swapped out for a new one. Bingo! System performance comes back up to snuff, and the intermittent spurious emissions, a.k.a. interference issues, vanish. And no one tells anyone about it. Official finding: It never happened.

That's not quite enough to satisfy us. The spectrum analyzer spent a couple of weeks, 24/7, in 'peak hold' mode, and each work day the trace was photographed, the peak hold reset, and the trace intensity was reset to zero. In the future, we'll check for interference for a day or two at a time on an occasional basis. If 'weeds' instead of 'grass' are seen on the spectrum analyzer again, then I'll start screaming again. It's no less than Cris expects of me... and all of us who are confronted with the same issue.

Bubba Electrical Installers Strike Again! (with a major transmitter failure thrown in for good measure...)

A year or so ago I read with much interest and amusement the story from Stephen Poole about how the local electricians over at Bubba's Electrical in Birmingham had miswired all of the disconnects at one of his transmitter sites such that, when the disconnect was disconnected, the fuses remained connected to the hot side of the line. Everyone who does this sort of work knows, or should know, that as a rule, disconnects are set up for the hot side to be wired at the top of the disconnect with the load side wired onto the bottom, right? (Well, just take my word for it if you don't believe me). Anyway, I read Stephen's story with what I have to admit was a smidgen of smugness, thinking that I wouldn't have any such problem. Heh, heh, heh!

Transmitter service disconnect wired "upside down" – don't touch those fuses!

My crew and I were in a departmental meeting the other day when the announcer on duty at Power 92, our big station, ran in with the news that Power was down. James and I immediately whipped out our PDAs and tried to bring the main rig back up. Nope. Time to go to the backup rig. It's at moments like these that I am so glad that we exercise our backup rigs regularly. With the backup safely on the air, James, Brian and I headed out to the site to see what was what.

"What was what" was the AC power to the main transmitter driver rack was down. That was a new one on me. Now, I have a little game that I like to play, namely, "Let's see how far we can go with troubleshooting before we scream uncle and call the factory customer service folks." Ready? Go!

First observation: Neither the exciter nor the driver was on at all. Second observation: A voltmeter check revealed all of 55 volts going to the AC quick-connect wiring strip in the driver cabinet, instead of the expected 210.

Third: Next stop, the schematic. Now, finding and following the BE FM30T schematic takes some time, as do most transmitter schematics, because the schematic for the main part of the transmitter, not counting the driver, exciter or control box, is not in one huge sheet, but rather is scattered across about four pages which are kind of buried in the middle of the book. And, you really have to know where to look in order to find the parts which could be causing trouble. You learn to label the lines connecting the various parts just so you can keep track of what you're looking for. Lesson: I cannot recommend highly enough, that any engineer who wants to keep in the game when an emergency repair is called for must study the layout of the service manual *before* it's crunch time, with the goal of memorizing it's organization. This is especially true with the BE books, since in the case of the FM-30T, that particular manual is divided into separate sections for driver (the exciter has its own book), final tube, regulated supply, and control box. Yes, the final tube has its own instruction manual. If you have to be told that, you really need to learn the manual. Point is, the organization of the manual is not readily apparent when you first open the book.

Fourth observation: we found out that there are a few terminals on those strips which are wired *on the supply side* of the control relay; the rest are on the load side. That pretty much pointed to the source of the problem. But as a part of the process, we also checked the voltage going all the way back to the wall disconnect. And that's where we discovered the wiring problem. When we saw it, we looked at each other with disbelief. With the disconnect shut off, we were able to take voltage readings on what we'd thought would be the cold (floating) side of the fuses. Ooops! (See the photo)

This mistake occurred at the factory where the modular transmitter building was manufactured, since we had specified the addition of those disconnects when placing the order some seven years ago. Needless to say, the manufacturer is now out of business. However, the load sides of the disconnects were wired after the building was on site. So why, oh why, didn't the electricians who installed that load side AC wiring *not* see that mistake? (A fact which makes our local guys complicit in this, I might add). Needless to say, the phone calls went out immediately to both our electricians and to Cris ("You are having that situation made right, ASAP, aren't you?" Response: "Is the Pope a Catholic?") As I write this, the chief electrician for our electrician shop has already been out, evaluated the situation, and will have an estimate for us in the morning. Don't tell our program director this, but Power 92 will have to go down completely for about five hours overnight for this corrective surgery.

Back to the transmitter repair: James, Brian

and I found the defective control contactor on the schematic in a reasonable amount of time. Now it was time to look for it in the transmitter. We found it, all right—right in the middle of the front wall of the power supply/high voltage cabinet. This is one part of the transmitter which is very hard to get to. Nothing in that part of the rig had ever been serviced, and for the most part, none of it needed to be..... until now. But, with 210 volts going into the relay and only 55 volts coming out, we knew that we had our suspect. A call to BE got the new contactor ordered. Then, with the rig down, we did the big cleanout, part one. During that time, James found a filter that we didn't know was there before, under the driver cage. It had been there for seven years and was indescribable in its grossness. I swear that thing had the AIDS and the flu virus in it.

After I'd ordered the part, Warren gave me something of a tongue-lashing because I'd ordered the contactor from the OEM rather than a parts house like Newark or Mouser. He reasoned that it would have been a lot less expensive to go that route. My response was that I was more concerned about the relay installing properly, since it had to fit in exactly as had the old one. Well, keep reading.

The next day the contactor arrived before I did. Warren scooped it up in a flash and headed to the site at full speed to install it. By the time James and I arrived at Burnham, the front side of the power supply cabinet had been removed, and Warren had the job well on its way to completion. James and I took advantage of the absence of that front panel to embark on transmitter cleaning, part two. Meanwhile, Warren discovered that the new contactor did not use all of the same kind of quick connect devices that the old one did, so wouldn't you know… the wiring had to be modified. That meant that we could have gotten the less expensive device from Newark or whomever, and it would probably have worked out just as well. Even so, when we fired the rig up and put it on the air, it worked perfectly from the first second. The digital rig, which operates at 65% power when the backup rig is on the air, was put back on full power. I texted the folks who needed to know that we were back to normal, and we got kudos texted back to us from all of them.

Before leaving, I took one more maintenance set of readings on the BE and found something else to fix. The hour meter reading showed almost 21,000. Hmm, that reading had been the same for awhile. A quick 'in-head' calculation revealed that the actual 'on' hours of the transmitter was something around 77,000. Uh, oh, apparently it's long past time to replace the elapsed time meter. This time, I checked the part's price with both BE (well over $400) and with Newark ($146). Newark has the part, all right, it's just not shown in their paper catalog. Never mind; the POR is filed and a new, less costly elapsed-time meter will be in the FM-30T shortly. Just add 77,000 hours and stir.

The Hackers are Getting Sneakier

I recently got an email from GoDaddy.com – or so I thought. This thing looked authentic enough to be scary in that it looked like an order confirmation. However, two red flags were raised by it. First, the email was sent to me but addressed to Amanda Alexander out in Denver. Neither one of us has, or is supposed to have, any dealings with GoDaddy within this company. The only ones who are include the IT manager, our DOE, and our CFO. Period.

I called Amanda. She knew nothing about any of it. Next call, Larry Foltran in Detroit. He asked me to forward the email to him. I did. He never got it. *It wouldn't forward!* So, I printed out that email and faxed it to him. He did a little snooping. Bingo! A blog from a lady named Denise Richardson told the entire story. I read it and froze a little inside.

This fake email looked real enough to snare anyone except the most unwary. Now, it helped that I wasn't supposed to get any email like this, which got my curiosity going, as you just read. But, even though we are all told that we are not to open emails that we aren't quite expecting from folks we don't know, there is still a very good possibility that we all could be ensnared. For instance, I occasionally get unexpected emails from UPS, with the prerequisite tracking number, informing me of a shipment coming in. I've noticed that UPS is notorious for *not* including the name of the shipper in those emails. What if, instead, the email was a fake? Click on the "tracking number" and you now have a virus on your hands and on your hard drive.

I know the operational definition of "hell." It's when you can't trust *anything*. Are we headed there with these cyber-monsters? Hopefully, Larry Foltran will have more to say on this.

On an eerily related note, I'm told by one of my cyber vendors that there are whole universities in China which are dedicated to waging a mild form of cyber-warfare against us and other non-Chinese countries in the world with the idea of totally disrupting the Internet on which we're so dependent in case they ever decide to go to war against us. The part that makes me nervous is the words "whole universities." Is this all that so many people have to

do with their time, just learn how to destroy? And to top it all off, a cyber-newsletter called Docu-Crunch suggests in a very recent issue that our Anti-Virus software is falling short of fully protecting our data and us from such cyber-attacks.

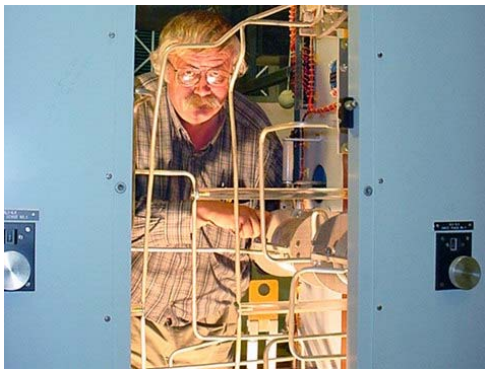
How I wish that there were a way to trace such malware back to its sources. Forget using such information to lambaste these monsters in the media or any such which. If we had a way of tracing such stuff back to their origins, then there could be a way of launching a counter-attack against *them.* Now, are they teaching any of that sort of stuff on our side? Do you see where the needs are for more of our workers who are now out of work? Do you think that the present regime in Washington is going to do anything about this?

Enough ramblings for this month. I hope you enjoyed it, and I hope to have enough material next month to keep you all amused. Blessings!

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

Last month I ended with, "To be continued." Little did I know just how 'continued' that could be! You might recall that I was putting together a streaming encoder. I had received the new riser and installed the two audio cards. Finally. That should be the end of it, no?



No. Not hardly the end at all. The network connection was not being recognized. The activity lights on the computer and router indicated a valid connection. Todd Dixon and I went through all kinds of setting changes to no good end. We tried to default to DHCP… still nothing.

So I had to start dividing and eliminating some of the possibilities. One possibility was the network cable and connection. Fortunately I had the computer on a roll-around cart, so I rolled it out to another computer location, disconnected the cable from the working computer and connected it to the encoder. Still nothing.

So I knew it was not the network connection. The connectivity lights told me that but this test proved it. So it was back to settings and configurations. Todd and I had tried many things with no results. We never saw an error message to give us a clue... only the message that the cable was unplugged even though it was plugged in.

The only conclusion is the computer isn't seeing the network controller hardware, so it was back to the people at Dell. They asked for the service tag number, which I have written down this time. I gave the number and heard, "That's not a valid number." "That's the number I gave just days ago, I say." "That's not a valid number" I hear again. So ring off, go check it again. Yupp I have it correct.

Second call almost the same as the first. I give the number and hear "that's not a valid number". I give the number again, slowly and hear, "That's not a valid number, I need the other number that is the *service tag* number." So I ring off again, and get the other number, all the while wondering how it is that there are two numbers that are the one and only true service tag number.

Call three. The Dell help desk wanted to try many of the same things Todd and I had already done. One new thing was to boot in "safe mode" with networking enabled. That worked and the network connected. Cool! It's not hardware!

To make a long story short, I uninstalled the sound cards and tried installing them in different orders. That isolated the problem to one card… and led to yet another support call. This one went something like this…

Me: Installing the card kills the network connection.

Support: What is the registration number?

Me: I don't have one.

Support: It's registered on the network when the card is installed.

Now by this time I am thinking… Hello, didn't I just say installing the card kills the network

connection??? So followed some assertive discussion with support, the result being that possible the driver was the problem. They would email me a link. HUH?! Didn't I just say…? Oh never mind!

I uninstalled the cards yet again. After poking around the website for the card (on another computer!) I found in an obscure place a page that talked about various versions of Windows. On a wild chance, I clicked the link. That took me to a survey. But down at the bottom is a question about the operating system. I click and nothing but red asterisks everywhere. So I answered the survey questions:

1) Do I record drums or piccolos?

…

99) Would I like them to make new products to record Piccolos or Zithers?

All very highly relevant questions. Next I clicked the link and was offered an option of Windows XP-SP3. Progress. I download.

Looking at the filename in Windows Explorer I noted that it was an EXE figured it was a self-extracting compressed file. Well it wasn't. It was an installer. Stop, put the card in and start again. The new installer worked!!!

All the experiences with support prompts me to think about how we look to the public. One consumer talk show host often refers to "Customer no Service." All those support rules, the need for tag and registration numbers created major problems with getting on with the job.

In contrast, with Liquid Compass I was given a contact who addressed my questions and assisted with making progress.

Translating to our industry: Does the signal our listeners hear convey the image of service with a smile or does our audience hear "Customer no Service?" Just a thought.

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

Here we are in July already, meaning that we have less than a month until The Big Move.

As the time approaches and we consider all the logistics of this huge undertaking, we decided to move the engineering office and shop a week before the studios. This way we will have all our resources in place at the new studios and I can focus solely on getting the studios up and running when we move them.

Things in June went much slower at the new leasehold. Most of the work that needed to be done was done in May. We have been working on making the cables for the production rooms. Now we have to make cables for the talk studios.

We have been in the process of getting the STL links up and running, starting with the link to the Ruby Hill site (KLDC). We had our regular tower contractor, GRB Construction, climb the tower at KLZ to take down our backup Canopy system. We then took that to the new leasehold at Pavilion Towers and mounted it on the roof. We found another spare unit at the KLZ transmitter site where we store all our extra equipment and set that up on the roof at Ruby Hill.

Because there is a clear line-of-sight between the Ruby Hill site and Pavillion Towers (you can see the building some seven miles away from ground level at Ruby), we thought this would be an easy task – point the Ruby Canopy at the Pavilion Towers and vise-versa – but it was not to be. We would get good RSSI at one end, then go to the other end and have bad RSSI (low or no signal). We could never get them to lock on each other. We tried frequency after frequency and nothing.

At the end of day one of this process, we went to the Ruby Hill site and found the power supply to the Canopy extremely hot. I decided to compare the feel of it with the power supply there for the Canopy the station is currently using. Something was definitely wrong. We ended up getting another

Canopy and power supply and replacing what was there. It turns out the Canopy "backhaul" unit we were using was bad and had likely been bad in the box for years, probably something that was lightning damaged and replaced but not marked as bad (there's a lesson here somewhere!). We plugged in the replacement, configured it, and BAM! LOCK! The RSSI was even great. We tweaked it in as high as we could get it. We've had a solidly locked signal now for several weeks.

The hot weather finally arrived in Colorado in June. While we have not hit 100 degrees yet, we have definitely hit the 90s several times. It was on one of the first of the hot days that the trouble began.

A couple years ago I decided to write a script for AutoPilot so I'd know when the KLTT building temperature got too hot. The text arrived on the June 7th telling me it was above 85 degrees. The 85 degrees was the back room, which should be the cooler of the two rooms – the ND-50 draws intake air from the rear and all the exhaust heat goes into the front room. This generally adds about ten degrees to the temperature read in the back. So it was about 95 degrees in that front room, cooking all our equipment.

I immediately turned the transmitter to low power (10 kW), which caused the temperature to drop dramatically within the hour. We went out there and found the A/C unit was frozen. I called Choice Mechanical and they got out there, did their work and called me to say it was working. Good… great! I don't have to worry about this anymore.

But the next day… another AutoPilot text came in: "KLTT Building Temperature is above 85 degrees." They said they fixed it! I called Choice again and the guy got out there. Did a lot of work and said it was fixed. Again.

The next day, the same thing happened. It was like "Ground Hog Day"! They always seemed to find a different problem. While all this was going on, we also realized our backup A/C unit wasn't working. Typically, when it gets above a certain temperature, it senses the primary unit isn't cooling and will switch over. Well, it was switching over but wasn't cooling.

We had a weekend of cooler, wet weather and the building temperature stayed in the 70s as it should. I thought maybe Choice had fixed the problem. But the night of the 12th I got a text, "KLTT Building Temperature is above 85 degrees." Okay, by this point I was getting ready to call a different company because Choice was obviously not getting it right. Choice got out there that Tuesday and found the issue wasn't with them.

The KLTT backup A/C unit coil is all beat to "hail"

You see, that Saturday and Sunday, it was wet. I kept getting alarms telling me KLTT had been switched to low power (an external protective circuit does this at the first hint of lightning). It would then go back to high power after a few minutes of no further hits. This pattern repeated itself all day long. This told me that it was most likely windy out there since the weather didn't look severe. I was partly wrong. While it was extremely windy, I believe a strong storm cell moved through. The wind blew the front cover off the main A/C unit and it landed in the antenna field behind the building, exposing the unit to the outside elements. Another thing Choice found was that the backup unit was dead. It had hailed tremendously and the condenser coil now looks like I took a hammer to it and just kept beating it.

Well, the primary unit was obviously fixed this time, right? Nope. The next day I got an alarm and Choice went out and "fixed" it. I gave them one more chance. I got an alarm a few days later. My dad had looked at the unit and found it was sucking in tons of air (literally – when he opened the filter cover on the outside of the unit, the vacuum wouldn't let him pull it off the unit). However, in the building, very little air was coming out. We called Choice and told them this, insisting that there was some problem with the ductwork, either a damper improperly closed or something. They came out and did some digging around, or more like climbing. The tech found the duct work above the ceiling in the front room had come apart, so all the supply air was being dumped into the plenum above the ceiling, essentially cooling nothing of value. He fixed it and we have not had a problem now in more than a week. The temps have been rather warm still, so we should notice pretty quickly if there is a problem.

Now the problem is how to fix the backup unit. We are waiting on Choice to get back to us with info on that so we can decide if it is worth it or not to fix the unit. We may let Keith Peterson take a shot at bending out all the fins with a putty knife. It can probably be done, but it will take some patience. That's probably a project for fall (no way I would sit on that rooftop for hours on end in the heat of summer!).

In the midst of all this I was dealing with two tower light problems. The first one wasn't as severe as the other. Tower 1 at KLTT seemed to have a faulty photocell. The lights stayed on all the time. They were operating as they should, minus the going off in the daytime. So this wasn't a humungous priority. I had to wait to fix it anyway because of all the rain. That tower is in what we call "the swamp" at KLTT. It is in a wetland, complete with reeds and cattails where water stands just about all the time that it's above freezing. With all the rain, I had no doubt I would need waders just to get to the tower. I put that off until things dried up some.

Then I got another alarm telling me KLVZ Tower 3 was not working. I drove out and checked and none of the lights were on. Either a bad fuse or a bad photocell. A few days later I got a couple of photocells and first started off at KLVZ. I replaced the bad one and the lights started working, then headed to KLTT and waded through the water to Tower 1. I replaced that photocell and all is well now at both sites.

I did find in one of my night trips to KLTT that one level of sidelights was out on Tower 3. This was the second time this had happened in the last month. Instead of replacing the bulbs, we have submitted a POR to get LED fixtures for the final two towers at KLTT. The two south towers already have LED marker fixtures.

I hope you will be reading an account of The Big Move in next month's issue of *The Local* Oscillator, but with The Big Move coming toward the end of this month writing that account might prove to be difficult. I look forward to working closely with Stephen, Art, Robert and the other locals that will be helping us out. Until next time… whenever that is… that's all folks!

Digital Diary
by
Larry Foltran
Corporate Website & Information Technology Coordinator

Two Boots on One Foot

Getting MS Flight Simulator (MSFS) to run perfectly and realistically has essentially become more of a pastime than actually completing flights in the game. I probably could have my private pilot's license by now considering the time, effort, and money I've spent on the computer equipment, peripheral devices and other software to get things running just right, but that's a completely different topic. It seems as if every time I pick up a new tidbit on either the inner workings of MSFS, Windows 7 or the computer hardware itself, I know I'll be spending some quality time tweaking my PC rather than hand flying an ILS approach in extreme weather conditions.

The latest bit of information I received was via an online chat with a friend and ex-coworker of mine who now works for a guy named Bill at a very large software development company located in Seattle. Feel free to fill in the blanks. During our brief chat, he set me straight on how the Windows OS utilizes the PCs installed RAM. Before I get too deep into this, let's back up a bit.

Most users know that the Windows OS comes in several different flavors: Home Premium, Professional, Ultimate, Uber-mega version…you get the picture. The vast majority of casual users probably don't know that there are two more options when selecting the OS and that's whether to use the 32-bit or 64-bit version. Each has its own set of limitations, mostly related to usable

RAM. As far back as Windows 2000, the 32-bit version could only "see" 4GB of RAM. Even though the OS could see the 4GB of RAM, only a portion of that RAM could be utilized, typically 3.2GB or less. With the introduction of Windows XP and their 64-bit version, computers could utilize the full 4GB of RAM or more when necessary. In the past, the downside related to using a 64-bit OS was compatibility issues with either software or sometimes hardware. Within the last few years, both hardware and software developers have been jumping onboard the 64-bit band wagon, ensuring compatibility of the more robust RAM usage.

That brings me to the bit of information my friend shared with me. For quite some time, I was certain that the RAM limitation for each version of the OS was based on the amount of RAM modules, or sometimes referred to as memory strips, that are installed in the PC. Because my computer had 2 x 2GB RAM modules installed, I thought I was free and clear with the 32-bit OS. Wrong! Based on the information I was given, the RAM limitation for a 32-bit OS relates to all of physical RAM within the system. That means that my system equipped with 4GB of RAM modules and video cards with 1GB of RAM each, is actually a 6GB RAM system to the OS. Of that 6GB, I'm only getting about half the performance possible by using the 32-bit OS. That simply will not do!

Because you can't simply upgrade from a 32-bit OS to a 64-bit OS, I would need to perform a clean re-install of everything. Having just gone through that process several times in the last few months, that's one approach I really didn't want to take. Plus, some of my older video editing software is not 64-bit compatible. That lead me to option #2 and that was to create an extra partition on the HDD and create a dual boot environment. Although that works, I have seen reduced performance in the past when setting up that sort of environment. So after a few hours of pondering my next move, I came up with option #3. Install another 1TB HDD in the machine, install Win7 64-bit on that drive, and load only the RAM hogging software on the new drive. I could simply physically swap the drives in and out when needed. Yes it would be annoying going back and forth, but it would work.

For the sake of convenience, I began to do some research into creating a dual boot scenario using two separate drives, something I've never tried to do before and wasn't sure if it was possible to begin with. To my surprise and after hours of scouring the web, I discovered that it is possible and in fact quite easy to do.

Based on my research, MS introduced a feature in Windows Vista that automatically detects other operating systems installed on the PC when you try and install a new OS. The examples I found on the web related to users having Windows Vista on one HDD and then installing Windows 7 on a second HDD. I didn't see any references to installing a 32-bit version on one drive and a 64-bit on a second drive. I honestly didn't see a huge difference because they are considered different operating systems, but I had no way of knowing for sure aside from simply trying it. After cloning my original set-up, I decided to press forward and see what would happen.

I popped in my new 1TB SATA drive and powered up the machine to ensure the system would recognize it. Upon seeing that there were no problems there, I proceeded to install Windows 7 64-bit on the second drive, triple-checking that I selected the correct drive during the installation process. I was expecting the Win7 setup application to complain that there was another OS installed on the machine, but it didn't even blink. The computer also went through the normal reboot cycle during installation and booted right up to the 64-bit version without providing me with an option. That had me a bit worried. Once everything was stabilized and the install was complete, I shut everything down and braced myself for the unknown. As the computer powered up, I was greeted with the Windows Boot Manager screen which I was familiar with from having worked with partition based dual boot systems in the past. The only odd thing was that both options were listed simply as Windows 7. I selected the first option and up came the 64-bit version. Well that version obliviously worked, but where was my 32-bit version?

I again powered down the machine and booted up, this time selecting the second Windows 7 option. Sure enough, up came the 32-bit version which I welcomed with a short victory dance around my office area. After further inspection, I also saw that each OS loaded up its own installation drive as C and the second drive as either E or D, depending on the OS.

This setup now provides me with 2TB of total disk storage, the benefits of both a 32-bit and 64-bit OS in the same box, and no performance degradation of a partition based dual boot system. Can a computer geek ask for anything more? Well…I wouldn't mind another 4 GB of RAM, especially now that the 64-bit side of my PC can support it.

…until next month.

KBRT ▪ Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA
KCBC Riverbank - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1
KJSL St. Louis, MO
630 kHz, 5 kW-U, DA-2
KKPZ Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
KSTL St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND
WDCX Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDJC-FM Birmingham, AL
93.7 MHz, 100 kW/307m AAT

WEXL Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WLGZ-FM Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT
WRDT Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ Detroit, MI
103.5 MHz, 50 kW/150m AAT
WPWX Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB Genoa - Rockford, IL
106.3 MHz, 6 kW/65m 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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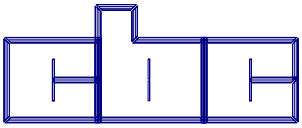

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