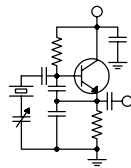


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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A Change in Thinking

One would have to live in a cave somewhere to be unaware of the recession now underway in the United States and worldwide. I would venture to say that every person reading these pages knows someone who has lost a job or been forced to take a compensation cut due to the faltering economy.

Most people I know have made adjustments in the way they spend money, hanging onto their disposable income rather than continuing in their regular spending habits. This, of course, further serves to slow the economy and deepen the recession, but who can argue that it is wise to hang onto one's cash in uncertain economic times?

The radio and television industries have not been immune to the effects of the recession. The travails of the auto industry in particular have been felt in secular radio and television, where auto ads account for a large share of overall revenues. In the last month, we have seen layoffs at Clear Channel and other large groups. Other groups have imposed pay cuts on their employees, and at least one television group has forced a one-week furlough on all of its employees. Many of the larger groups have announced that they will not be sending their people to the NAB convention next month. What does that portend for the smaller groups and individual stations? The convention floor may be a quiet place come April.

These are indeed tough times, and tough times require a change in our thinking.

All our chief engineers are aware of certain cost-cutting measures that we have put into place of late. Most of this is common sense stuff – watching auto mileage, consolidating trips to the transmitter site, limiting discretionary spending and the like. Some of the changes, however, require a fundamental change in the way we think and operate.

In recent years, we have found it more

economical in terms of both time and money to either treat certain items as disposable or send them to the factory or a repair center when they break. Indeed it made a lot of sense in many cases, especially when an item could be repaired at the factory for a few hundred dollars as opposed to taking the time and expending the effort to troubleshoot the device locally, order parts and repair it in the station shop. Given the current economic situation, all that has changed, and if you think about it, this represents a return to the roots of radio engineering.

Newcomers to our industry, those who have joined our ranks in, say, the past ten or so years, would likely be surprised to find that in the “old days,” broadcast engineers repaired *everything* themselves. Each station or cluster had an engineering shop with a complement of test equipment – multimeter, oscilloscope, signal generator, distortion analyzer, RF detector probe, wattmeter, dummy load, transistor tester, capacitor checker, etc. When a piece of gear went on the fritz, it would go on the bench and the station engineer would troubleshoot it and make repairs. Returning a device to the factory for repair was a rare event, reserved for only the most severe damage or perplexing cases.

Engineers were well trained in troubleshooting techniques, and they became intimately familiar with most of the equipment in their stations, studio and transmitter. After awhile, we learned the “personalities” of the various pieces of equipment; we knew what the likely failure modes were and how to deal with them both in terms of preventive maintenance and repair.

For example, old guys like me will remember the ITC 3D “triple-decker” cart machine. This beast, which probably weighed 20 pounds, was in its day the staple of the radio station studio. Jocks loved them because they were compact (so to speak),

they were tough and they were easy to use. But they required a good bit of maintenance. There were a couple of common failure modes. One was running through cue tones (i.e. the cart would not stop at the end of the cut but would play the next cut on the cartridge or replay the cut just played). Another was dropping of audio channels. Both failures had the same cause – intermittent potentiometers. We knew that when a deck started running through cue tones, we had to pull out the cue card and clean or replace the 1 kHz tone sensitivity potentiometer. When it lost a channel, we pulled the audio card and cleaned or replaced the audio level pot.

In the 15 or more years that we used the ITC 3D cart machine, I never returned one to the factory for repair; they were always repaired in the station shop. The same can be said of just about any other piece of equipment.

Even in the CD age, we all got pretty good at replacing the laser and bearings in the Denon DN951/961 CD player.

However, as equipment got more and more complex and built on microprocessor/DSP architecture, we got away from in-house repair. Admittedly we were a little afraid of such equipment, not really understanding its inner workings in anything more than a general sense. The manufacturers no doubt recognized this and capitalized on it, setting up their repair depots to not only take care of their customers but also to generate new revenue. Busy broadcast engineers, many responsible for two, three or more stations, eagerly took advantage of this, getting into the habit of sending their equipment in for repair rather than dealing with it in the field.

Now, as the economy continues to tighten, we are going to have to again become self-sufficient. We will have to get back in the habit of troubleshooting and repairing things ourselves whenever possible. For some, that will mean dusting off long-unused troubleshooting skills. For others, it will mean developing those skills.

Of course we know that some things are simply not field repairable, and many devices are not component-level repairable. But there are savings to be realized in replacing a module or subassembly in the field. At the very least, we will save the expense of shipping the equipment to the manufacturer and back.

So... get that workbench cleared off. It's not a storage place, and it's not an extension of your desk. Put a fresh set of batteries in that multimeter and calibrate your scope probes. In the coming months and years, you're going to need all that stuff again.

A Vexing Problem

You'll read in Bill Agresta's column herein about a vexing problem we have been having with the KBRT Nautel XL-12 main transmitter. Without going into a bunch of details that will be repeated later, the original problem was believed to be the control board, and Nautel sent a replacement. Bill installed the new board and the transmitter ran fine... for a few days. Then, it went down and would not come back up. The red "shutback" alarm was lit, which can indicate anything from a VSWR problem to an open interlock. Bill spent several days troubleshooting the transmitter by phone with Nautel, even replacing several ICs. Finally, out of altitude, airspeed and ideas, I headed to Catalina Island to have a look at it myself.

Bill and I spent several hours going through the transmitter, starting with power supply voltages and working our way through various signals on the control board. I eventually zeroed in on a signal called "Xmtr Fault +," which would trigger the "shutback" alarm and keep the transmitter from coming on. Tracing the signal from its source at U1, the signal was a logic low, which is normal.

Following the signal through the several pages of the schematic, I found a point where it connected to an inverter. The input to the inverter was a logic high. How could that be? An ohmmeter check between the last point where the signal was normal (low) and the input to the inverter showed an open. We pulled the control board out, benched it and located/repared a cold solder joint on the IC socket. For what it's worth, the joint looked okay – it was a perfect solder joint, except for the infinite resistance that is!

Fixing the solder joint cleared the "shutback" alarm and the transmitter came up normally. But the story doesn't end there. I'll let Bill tell the rest.

But it did feel good to get my hands inside a transmitter again!

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

Hello to all from Western New York! Undoubtedly, the one thing that is on everyone's mind these days is the current state of our nation's economy. While some areas have been hit harder than others with businesses closing, home foreclosures and bankruptcies (both personal and corporate), there are areas of the country that have not yet felt the pinch of a declining economy.

I was recently talking with a friend who lives in western Kentucky who owns several AM and FM stations. He stated that they have not seen any decline in the local economy in Western Kentucky, and his advertising base has actually grown since the fourth quarter of last year. I'm relatively sure that those businesses operating in western Kentucky don't have a mystical business plan unlike the remainder of the country, and it will only be a matter of time before the economic crunch hits – and it will hit.

Making the news recently (and it was no surprise to me) was a story that Sirius XM Radio had been working with advisers, preparing for a possible Chapter 11 bankruptcy filing. Had Liberty Media not stepped in and acquired 40 percent of Sirius XM stock, the CEO of Sirius XM and his advisory staff were preparing to file the second largest bankruptcy so far this year. The deal totaled \$530 million dollars, with \$250 million immediately funded with cash.

Now I'm no financial guru, but how can you justify the purchase of a company whose stock fell from \$3.94 a share to \$0.31 cents per share and has subscribers canceling their service at record pace? I have been keeping tabs recently on what Sirius XM subscribers have been talking about on various blog sites, and one fact is clear: the restructuring and elimination of some programming on satellite radio has left listeners frustrated to the point of discontinuing satellite service altogether. It would be

nice if somehow we could convert these listeners over to free HD Radio, and that has been suggested on some of the blogs, but the final consensus is that the type of programming that ex-Sirius XM listeners are looking for is just not available on terrestrial radio, HD or otherwise. Satellite radio subscribers are mostly tuning in for the *content* of programming, not for audio quality reasons. The content mentioned includes the likes of Stern, Opie & Anthony and Bubba the Love Sponge, show hosts and content that do not belong on any commercial radio station.



**WDCX – Buffalo, WDCX-AM /
WLGZ – Rochester**

At the beginning of February, we finally got the opportunity to replace the damaged coax on the WDCX-AM STL receive antenna. On Sunday, February 1st, Don Boye of Western Tower Service and his helper met me at the transmitter site to remove the old coax, and plans were to rig the tower for hoisting up the new 7/8" foam coax. Cutting the old coax off of the tower was no problem. However the winds started kicking up to around 35 mph, eliminating the chance to hoist the new cable. Don returned the next day and was able to get the coax installed without incident.

I inspected the pieces of old coax as they came off of the tower and readily saw why the coax had filled with water. The ground kits used were the old flat braided copper type, which over time would soak up water and begin to rot. At each location where the ground kit was installed, I found tiny holes in the outer conductor where the copper jacket had corroded, allowing the water to seep in. The new grounding kits do not use the braided copper strapping; instead using a #6 stranded copper wire with a plastic outer jacket covering the wire. This will practically eliminate moisture from getting to the

outer conductor of the coax via seepage.

Last month, I reported on interference WDCX was receiving from a new Canadian station that signed on in Kitchener, Ontario on 99.5 MHz. One listener in particular who was receiving the interference from CKKW came to Buffalo and purchased a new JVC-HD radio receiver and had it installed in his car. We had hoped that he would be able to receive the WDCX HD-R signal in those areas where CKKW was causing the most interference. However, our HD signal is just not strong enough to be received in that area. I suspect that because we are using our auxiliary antenna to broadcast the HD-1 and HD-2 signals coupled with the fact that the aux antenna is located at the halfway point of our 425-foot tower, there is just not enough signal strength towards the northwest quadrant of our coverage area for the HD signal to be received. At some point in the future, we will purchase a hybrid transmitter, such as the Nautel NV-40, and broadcast our analog and digital signals on the main 10-bay ERI antenna. This should greatly increase our digital coverage area, especially in the Canadian market and to the east of Buffalo, towards Rochester.

I got a good chuckle out of the picture that Stephen Poole had in last month's "News from the South", a picture showing the "No Salvage Value" sign attached to the *outside* of the chain-link fencing with wire ties. In this neck of the woods, you would find the sign had been sold to the scrap metal dealers about five minutes after you hung it up, or it would be proudly hung up on someone's bedroom wall! I've had to replace signage twice at the WDCX transmitter site before I realized that these signs are collectible items to drunks and college students (maybe they are one in the same) and should not be attached to the *outside* of the fence. I guess if you're from a place called Pumpkin Center, Alabama, the thieves haven't quite 'figgered' this out yet! Perhaps too much heat and sun?

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!

Tom Gardull is on vacation this month. The Motown Update will return next month.

News From The South

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

As I write this, it's late February in Birmingham, which has been like January for temperatures and like March for wind. As my fingers strike the keys, in fact, one of our satellite feeds is popping because of the gusty wind; Jimmy has gone to check (and tighten, if need be) the dish. I can't recall when it has been so windy and stormy here in February – cold, windy and wet.

WXJC Base Impedance Matrix

We took the base impedance matrix measurements at the WXJC (850 AM) site in Tarrant in February. After several false

starts, mostly due to the unpredictable weather (and an SD-31 that insisted on overloading if I held my mouth the wrong way), we finally got a set of usable numbers. Cris did the preliminaries for the model and said everything looked great... and then I noticed that the neutral on the lighting choke at tower #2 had been left connected during the measurements. That would have changed the figures just enough to make a difference, undoing all of Cris's hard work. Gulp.

We'll have to repeat the measurements. If you haven't done this yet, let me warn you: it takes longer than you might think. Plan on at least a full day of



work, once you include driving time, getting the equipment into place and all the other stuff that's required to do it correctly. All towers must either be floated (if they're electrically short) or shorted (if not). Ours are 109 electrical degrees, so we have to float them. Either way, that takes time. You'll also (obviously) be totally off the air during the measurements, so you have to plan the project for a time that won't affect revenue.

When you start floating the towers, you'll remind yourself of (and in some cases, discover, if you weren't the one who did it!) the "gitterdones" that have accumulated over the years. It's not a simple matter of just pulling a J-plug or disconnecting some screws. For example, we have our tower light feeds running through the copper tubes to the tower bases, where they're brought out in junction boxes for the run up each tower. We don't use static drains, either. The neutral on each lighting choke serves that purpose admirably. But, this means that all tower lighting has to be carefully disconnected and tidied up in a way that won't affect the measurements. At #2, we'd disconnected all the wiring, but overlooked the little strap from the output to the neutral tab on the choke. Oops!

We think we may be onto something here, though. I've reported in past issues that our nighttime pattern has been intermittently high at some monitor points (and consistently high at one). We've been under an STA for some time while I've been looking for a source of re-radiation. The chokes looked okay, and when I tested them last year, they checked okay. But we may have had more than one problem: the lightning storms were really severe last fall and we discovered, after we disconnected the chokes at towers #1 and #3, that the antenna monitor readings dramatically changed. We decided to replace all of them. And that leads me to ...

Rewinding the Lighting Chokes

We were inspired by John White's article in last month's *Local Oscillator*. The fact that he got such a good result, balanced against the current price of lighting chokes (about 20% beyond outrageous), decided us to save the company a ton of money and follow John's lead. The old phenolic cores of the original chokes weren't worth re-using, so we decided to wind new ones on 3" PVC pipe sections.

We're using #12 wire because we still use incandescent beacons at the tops of our towers, which draw a lot of current. This is standard THHN insulated wire, which reduces the turns per inch (from 10 to 8.5), so we added a couple of extra inches to the coil length. We also expected to gain some

inductance because the 3-inch pipe was slightly smaller in diameter than the original (approximately 3.5"). My goal was to get as high a reactance at 850 kHz as was feasible, balanced against wire losses and physical size restraints. The first one (shown in the pictures) gave me about 3,000 ohms of X_L at our operating frequency, which was considerably better than the originals! John, you might be onto something here...



Jimmy prepares the choke to receive two more windings.

The photo above shows Jimmy working on our first choke. Since we were doing more than one, it was worth the time and effort to build a jig out of 2x4 lumber. Jimmy used a cordless drill to turn the PVC; my job was to hold the wire tight and guide it into a neat loop with a pair of gloves. In the picture, we've just finished the first winding and Jimmy is getting ready for the next one. Figure 2 shows the completed choke with capacitors attached.



Not bad for a first attempt!

More Thoughts on HD

Warning: this actually qualifies as a rant. I still love HD Radio and greatly prefer it to analog. As I've said here many times in the past, just getting rid of the multipath on FM makes it worth the trouble, as far as I'm concerned. It's still worth moving the entire industry, AM and FM, to HD-R because we can operate at much lower power, too. That not only saves money, it'll make us "greener."

But I can't ignore the fact that it took years for it to finally be approved and implemented. Adoption rates continue to languish, too. Unless and until the FCC finally just requires it – which will kill marginal stations that are already struggling financially – I don't see HD-R becoming ubiquitous anytime soon. I'm just being honest. The blame game has been played *ad nauseum* and you can point to any number of reasons for this. I'll focus on two key factors, at least to my way of thinking: first, because it's so blamed expensive, and second, by the time that it was introduced, traditional radio was already becoming "yesterday's news" as far as young listeners (who drive technology purchases) were concerned.

Given the expense, with the economy in the doldrums, only a blind optimist would assume that small and medium-market stations will jump on the bandwagon in 2009 and 2010. They're going to be concerned with just staying in business. Realistically, then, we're looking at a continued very slow adoption rate for HD-R, which in turn is going to slow the appearance of new HD-R receivers. (And vice-versa – it's a classic "chicken or egg" situation.)

Now for the second thing: why did it take years? Hey, a lot of it was the FCC's usual glacial slowness. But iBiquity shares the blame, too. They'll think I'm picking on them, but I'm not, because they are by no means the only one guilty of this. In fairness, at the time that the company was formed and they started development, they were using the same model that most high-tech companies have relied on over the years: develop, release, patent and/or copyright to prevent others from using it without paying a fee, and then charge through the nose for each use. (Including receivers. The radio manufacturers have to license the technology, too, and it's not cheap. Did you know that?)

Given that business model, the only way iBiquity can satisfy their investors is if they can keep generating new revenue off of licensing. I don't think iBiquity is in financial trouble, but the current economy makes one wonder: what if they were to go under? What if stations and manufacturers say,

"Forget this, we just need to stay alive and work on things that make money now." Already-slow sales would grind to a halt and iBiquity would be in deep trouble. What would happen to HD-R then?

It's too late to change it now, but if iBiquity had been willing to open the source from the start and to permit the community to help develop it, we would have had HD-R a lot sooner. I wouldn't have complained if they'd even used an open source codec/container (such as Ogg-Vorbis) with a proprietary carrier scheme. They'd charge for the carrier technology, but not the data. Yes, that means that stations would pay (and possibly pay more), but receiver manufacturers would be far more likely to embrace it. "Yeah, why not? Samsung and Sony can make inexpensive chips and we'll just stick 'em in and see what happens ..."

Being a big booster of open source development, I can ponder "what ifs," can't I? What if iBiquity had said, "Here's what the carrier(s) will look like and here's where the data should go. The community can come up with a codec and container for the audio and data"? I believe we'd have had HD-R much, much sooner. We would continue to reap benefits, too, because we'd also be able to expand and extend it ourselves.

To date, I'm basically limited to kludging around with ID3 code to create custom Program Associated Data (PAD). Whoopee. The rest of it remains sealed under the concrete-and-steel lid of the classic "closed source" proprietary business model. From iBiquity's point of view, if any improvements are to be made to HD-R, they will decide what those improvements will be and they will release them when they're ready (...and of course, then charge as many different entities as possible for it, thank you very much).

What if I could come up with a better way to deliver mobile text data? From what I understand of the HD-R system (which ain't much, given that iBiquity still refuses to release all technical details of how it actually works), there's plenty of room there for new services. How about mobile traffic data, up to the second, that would target a Tom Tom GPS? How about up-to-the-minute stock reports, or local news, on a subscriber basis? Great ideas, but they're all dependent upon iBiquity developing them... and *then* convincing manufacturers to pay them for the privilege of building equipment that will support it...

What if we could go to the manufacturers and say, "All you have to do is build a digital receiver with a standard API, a standard interface, and flash program memory to which we can download whatever we want. And you don't have to pay

licensing fees.” Come up with a secure way to flash the program into someone’s radio and we’d be good to go. The bit transfer rate would be relatively low, but if we’d tell the customer to be patient and leave the radio on for a few hours while we send the update to them, we could deliver custom programming to each individual radio. (For a fee. To subscribers. Are you listening?)

But how likely is this? Not very, and it’s probably too late now, anyway. I still love HD-R and I’ll still work to ensure that our HD-R signals sound as good as possible. But honestly, the really radical and new services aren’t going to be delivered by us. They come via smart young programmers who are streaming onto wireless networks. I can see the day coming when we’ll get more listeners on portable 3G devices than we will with HD receivers. No, that’s not going to happen overnight; you can’t cheat physics and the wireless providers are learning the hard way that it’s not easy to get reliable, high-speed bandwidth over a wide area (regardless of the claims being made for WiMAX). They’re running up against the same problems that we’ve been dealing with for years, whether it’s trying to punch a hole in a hill with a line-of-sight signal or overcoming man-made interference.

But just because something is difficult doesn’t mean it’s impossible. I think the problems

will be worked out and eventually, there will be high-speed wireless service over the majority of the United States. We need to plan for that now. One important way is simply put: *don’t ignore your streaming audio*. Even if you only have 30-40 listeners at a time, it’s worth it. Put a good audio processor on it, monitor it for problems and make it work. Make it sound great. Consider it a test bed and a learning experience. The skills (and new approaches!) that we perfect there may become critically useful in the years to come, especially if WiMAX (or whatever replaces it) eventually takes off.

Nothing that I said above should mislead you: I’m still very positive about radio as a medium. In a bad economy, we should be reminding advertisers that we’re a bargain, a great way to reach a lot of people for a great price. If we do our jobs correctly – focusing on personalities and programming, instead of just bulk signal delivery or serving as a wireless jukebox – we have nothing to fear from streaming radio stations. My attitude is, if we do it right, once streaming does go wireless and nationwide, we will be in an ideal position to use it, because we’ve already got the studios, the talent and the skills. We have nothing to fear from some kid running Shoutcast from his basement!

Until next time!

Gateway Adventures

By

**Rick Sewell, CBRE
Chief Engineer, CBC–St. Louis**

The downturn in the economy dominates the headlines. You can't get away from it. It seems like every day we read about another set of layoffs in the radio industry. I think almost all of us have been affected by the impact of the sluggish economy.

I have also had to adjust recently as I have taken on the duties of the KJSL Chief Board Operator along with my regular duties as Chief Engineer for both KJSL and KSTL. It's not like I was totally unfamiliar with the duties of the Chief Board Operator because over the last four years, this position has turned over numerous times.

During the time between hires, I filled in for this position while maintaining my engineering responsibilities. Also, when they hired someone new, I trained them for the position. In fact, it seemed like as soon as I got someone finally up to speed, we would end up having to look for someone new. So for the past four years I have been very involved with this position.

I find the key to being able to do this is to not have the perspective of having to work harder. It may sound like a cliché, but you really need to work *smarter*. I remember from a business class that I had in college an adage that said, "Work expands so as to fulfill the time allotted it."

I have found this to be true in my career, and I have worked in many different roles at different radio stations over the last 25 years – including

management. I know this will sound a bit arrogant, but I have often wondered why it takes some individuals so long to get their job done.

Of course there are the people that are just time wasters, and that's a whole different story. But what I see very often is a person who is a very hard worker but they seem to take a long time in getting things done. What I have often noticed is that sometimes this kind of person invents work to do.

One of the things they often are loath to do is taking time to do things that will create time for them. They may acknowledge that if they do "y," it will in the long run

make doing "x" easier and quicker. They are just too busy to get around to doing "y," and maybe they'll do it when things slow down, which for a person like this never happens.

This is where working smarter comes in. You take the time to make time. You are always looking for ways to do things better and faster. I am not only doing this for myself, but I am looking at the whole operations department for what we can do to make it more efficient and cost effective in this time of lower revenues.

This is the reality many of us face in this current climate, whether it's the engineering department or operations management. I am hoping in the coming months to share ideas that I or others at the St. Louis operation have come up with to cut costs.



Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Santa Catalina Island!

I recently wrote an article for a pro-audio group discussing the benefits of using digital technology to gain a boost in our declining economy. As this new technology continues to make things smaller, lighter, more efficient and better sounding, it can cut your operating costs by making it possible to save on trucking, labor and energy while at the same time providing a better product to your clients.

As with many great things, however, there is a flip side to this technology. We have been dealing with such an issue these past couple weeks here at the KBRT transmitter plant with our four-year-old Nautel XL12 transmitter. As transmitters evolve, each new model seems to incorporate more and more digital technology, making them easier to operate, maintain and, when necessary, repair. The troublesome issue, however, is the increasing complexity of such designs and the situation created when these diagnostic indicators fail, especially if they become intermittent, as has happened in our XL12.

I have been experiencing issues with our XL12 for quite a while where it literally develops a mind of its own, switching power levels, exciters and even switching itself on and off for no apparent reason. These issues have continued to grow worse until finally, Nautel suggested we replace the main control board. We did, and upon doing so, the transmitter ran for a few hours and then went into shutback mode and would not reset no matter what I did. We replaced the main control IC (U1) and encountered even more issues. The first IC I installed burned up. Then, upon installing the second, we popped the fuse to the 8-volt power supply. I replaced the fuse to the power supply but still, no matter what I did, the transmitter would not come out of the shutback mode.

With Nautel running out of options, Cris decided to fly out to give me a much-needed hand. The first day we dug into the control board and

eventually, he found a well-hidden cold solder joint. Fixing that cleared the shutback issue, so now we knew that this new board had some other issues

besides those I had already been dealing with. After that repair, we moved on to calibrate the meters, RF power limiter and the exciters. By the end of the day, the transmitter seemed to be working well. I took Cris down the hill to a hotel and drove back up to the plant and called it a night.

The following morning, I got up and fired up the transmitter, feeling great that it

was now back in operation. Everything appeared to be operating as it should. At 6:45, I went in to switch it to high power and again observed it operating within parameters. With operations running well, I went in to take a quick shower before going down to meet Cris for breakfast. I no sooner got into the shower and the studio called, saying that the transmitter power was jumping all over the place. Quickly grabbing a towel, out I ran into the transmitter room to find the XL12 back playing its old game as it had with the previous control board installed. I fired up our auxiliary Nautel ND10 transmitter and drove down to pick up Cris.

When we got to the plant, Cris got discovered that all the power level settings had changed. He reset them and fired the transmitter back up and then – thank God he got to see it for himself – it went nuts!

For no apparent reason, it changed exciters, power settings and all the settings levels changed. The part of this whole situation I am growing more and more frustrated with is the fact that our alarms LEDs seem to be flashing around with no logical explanation. Those things I had grown to like about this transmitter, those diagnostic helpers I have come to rely on, now seem to only be a confusing deterrent!

Cris came up with several good analogies of what the problem might be, but there always seemed to be that one other part of the problem that just would not line up. As the situation now stands, we



may have several different intermittent issues playing off of each other making this a very tough situation to resolve.

As the Internet has now become part of our daily lives, many within our company have created accounts on Facebook.com. Seeing the great potential for improved communication, I asked the gurus at Facebook to create a Crawford Broadcasting Company network for us. I invite you all to come and visit with us there on Facebook and experience what a great tool it can be. Look me up and if you need any

help joining the network, drop me a message and I will be glad to send you detailed instructions so you can get set up on the Crawford Broadcasting Company network.

It's very late now and with all the transmitter issues I have been dealing with, I am now officially exhausted and well beyond normal brain fade so...

Until next month, the Lord bless you and keep you; the Lord make his face shine upon you and be gracious to you; the Lord turn his face toward you and give you peace.

The Chicago Chronicles

By

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

Devotion to Accuracy Department

Those of you who read last month's *Local Oscillator* noticed something of a disconnect between Tom Gardull's column on dealing with the situation of communications between iBiquity, Nautel, BE, and RCS, and my account. To set the record straight, it is generally Tom's habit to write his article on the last day or two before the deadline, which often is a good thing, because the latest possible information then goes to press. On the other hand, I tend to start my *LO* writing earlier in the month (this part is being written on January 30, the day the *February* issue came out), which is why I tend to write more.

The thing is, what I write tends to become old news in a rapidly developing or changing situation, and that's exactly what occurred here. As of about a week before the deadline, when I wrote that piece, there was no indication of any of our vendors talking to each other about some very serious technical issues which affected our ability to properly serve the public, and being that this sort of thing has been pandemic in the past, this caused a rising level of frustration within me. That resulted in my rant of January. With the digital/software age in full force, interdependence and communications between manufacturers has to become more the norm, and the attitude which says, "It's not our problem," may just be the one which loses the race in the long term. Word about that sort of thing does get around. A

word to the wise.

Gee, how'd that get to be so much fun?

Ever get into a situation where you were rather forced to jump in on a situation and do something you hadn't done before... which gave you a lot of angst beforehand but which, by the time you got through it, turned out to be a lot more satisfying an experience than you thought it would be? That happened to us this month – not once but twice – and the reason is “the great economic cut-back.”

Layoffs, pay reductions, and reductions in the use of outside vendors are the norm of the day, and although we've not yet experienced the first two, we're spending a lot less money on outside vendors than we were, and we here at the local level are watching our bucks like hawks.

For instance, when one of our vendors recently sent us a repair bill for a major subsystem of something like \$11,500, I flipped out (I won't even tell you what Cris said!) and went on the warpath with the vendor. Turns out that the job was not only overpriced but somewhat botched, and by the time it was over, we'd been assessed for many more hours than we were supposed to be by 'blue book' standards, and even worse, by a series of 'service persons' who in at least one case had no clue, no equipment and no software to do the job at all. But it was the parts bill that really hurt, since we *knew* that not all those parts were needed to fix the problem at



hand.

Since the nature of this equipment is such that we could not possibly know all of its ins and outs, the local vendor may have considered us to be easy marks. I don't know and I don't care. What I started out doing was calling not the vendor but the equipment's manufacturer, and laid the whole story on them. I also sent them the original vendor's invoice for the repair. Their CSD guy went into our system via modem and took a look around, fixing things in software as he went. He was the one who actually got our system working again. Then he got back with me and told me that about half the parts in there didn't need replacement. Armed with that, I confronted the local vendor. To their credit, they got to the point and got their service manager interested. Turns out that their one really competent service guy on this system went out on vacation right in the middle of the job and a much less competent dude went in and, not knowing what he was doing, ran up the bill. And this wasn't the guy I mentioned earlier!

When all was said and done, the bill had been knocked down twice, from \$11,500 to \$5600 and finally to a little over \$3700, which was more like it. The lesson is clear: don't take the vendor's word alone for a repair cost unless the job's been done before at a similar price. Get the manufacturer involved if need be. Don't take anything for granted. And don't stop screaming. And that brings us back to our real story.

When the regular semi-annual PM work was done on our generators this time around, our oldest one, out at Kirkland (WYRB – Rockford), was examined by the service man and found to be in real need of serious work: engine block heater, battery, coolant and coolant hoses, a tune up (which it had never had in 18 years!) and a new exercise clock. That wasn't the killer. The estimate was – \$3100! And there would be a three week wait since the field service department was booked that far in advance. So, Cris and I assessed the situation and decided to “roll our own.” Off I went in search of parts.

The first surprise was a pleasant one: our local Cummins dealer really did have the best prices on a lot of stuff. I got the battery, engine block heater, anti-freeze and heater hoses there because they had the best prices. Other stuff I got elsewhere: the plugs, wires, cap and rotor at NAPA, and (surprise!), we needed a new starter. The old one had died trying to start an untuned engine. And, even with a higher price, not only didn't Cummins have one that old, their supplier didn't have one either. I went to the local Ford dealer, and they didn't have one since this was in *industrial grade* Ford engine, but they knew of

a local shop which did nothing but engine electrical parts. Sure enough, they had the starter at a price which was one-third of what we would have been charged otherwise.

Enter now our landlord at Kirkland, Steve. Our site is on his farm, so he lives close by. He saw me out there working on the generator on a cold day, so he came over to help. Armed with that, we made short work of the starter and the tune-up. The block heater took longer because we had to fight leaking anti-freeze to get the job done. Once I got all the parts in, the gen still wouldn't start, so Steve took over, found the (minor) problem, and the leak in the block heater hose, and within a half hour, the gen was happily running again. The cost? Less than \$700 for the whole thing, battery, block heater, hoses, anti-freeze, starter, tune-up parts and Steve.

Now, there's a sense of satisfaction.

AES/EBU Mystery

That little rant I started in the first section leads almost directly into this one, and for this, I'm going to need some help from you readers out there. The question is, “Why is this happening?”

As many of you know, we have a twin pair of radio stations which almost entirely simulcast on the same frequency, and which for years we've struggled to keep synchronous. Recently, we've had to deal with some weird problems centered around the AES/EBU audio on a T-1.

WSRB in Lansing receives its programming from the studio over a microwave STL. Heretofore, this has never been an analog path. For years we've used a Moseley PCL/DSP6000 system as the STL. Once at Lansing, the signal is split up, one part going to the Lansing transmitter and the other part hopping aboard a Harris Intraplex and a T-1 line to go to our Kirkland transmitter site, some 80 miles away. In between the 6000, the StarLink, or the ISDN and the Intraplex, there is an Arbitron PPM box for each, then a Videoquip AES switcher, which selects one of the three sources, followed by a Videoquip AES Distribution Amp, which sends the switcher output to the Kirkland Intraplex, the local Intraplex, and a monitoring setup. All items in the chain are allegedly transparent, and I truly believe that to be the case.

Note that the sampling rate, due to the limitations of the T-1 system and the Intraplex in Synchroncast mode, is limited to 32 kB/sec. That is a large limitation to swallow, but because we've been committed here to keeping conversions of any kind to a minimum, we've dutifully set all of our system, after the Wheatstone console system, to 32 kB. The Wheatstone being set to 44.1, there is indeed one and

only one digital rate conversion there. We also have a conversion from digital to analog and back due to our use of the older-style Prophet ACU-1 switchers, but this is about to be corrected with new Broadcast Tools switchers coming on line shortly (a required Prophet software update is imminent, and indeed, may be complete by the time you read this). In any event, the problems which we are experiencing are not caused at the studio end. We're certain that the issues are all at the Lansing- to-Kirkland path, and nowhere else.

If the StarLink is in the system, even operating at 32 kB sampling, the audio at Kirkland is clean. If the ISDN system, which though digital, has only an analog audio output, is run through an A-to-D converter sampling at 32 kB, the audio at Kirkland is clean. If the Moseley 6000 is fed analog into an A-to-D converter at the same 32 kB sampling rate, the audio is clean. But put the digital output of the 6000 into the Intraplex, and the audio at the Kirkland end is muddy – no frequency response above about 3 kHz. You don't really want to think about the ramifications of that, but I wish that someone would just tell me why. After all, the 6000 decoder has an AES audio jack on it, and its output should be, as advertised, AES audio.

The only clue I seem to have is that the 6000 is running with APT-X digital companding to keep the RF bandwidth to within the legal half megahertz channel bandwidth. The digital companding is 4:1, and that may have something to do with it, but so far no one's been able to give me any answers, including both Moseley and Intraplex. Neither manufacturer is blaming the other, to their credit. Both are just

saying, "I don't know."

So I now appeal to you, the wizards of digital audio, and you know who you are out there: Just what *is* going on here?

PAD/PSD Data from CD Players

While I'm in 'begging for information' mode, I've got another one for you. I'm trying to find, so far unsuccessfully, a CD player which will provide an output, either with Ethernet or on a plain old-fashioned serial port, title and artist data for songs being played off of CD.

At the present state of the art, this just can't be rocket science. As Exhibit One, I give you the Denon DN-C640 CD player, which will do some really wondrous things of which I've never thought a CD player to be capable. But it won't spit out PAD data from its Ethernet port, as a menu item or as a default. Someone over in Denon's design department missed the boat big time here.

This is really frustrating because we're trying to get our music mixes to be audio-streaming-eligible (i.e., legal), and at the present time we can't do it because the mixes come in on CD, and even if the titles and artists of the songs are present on the CD, it doesn't have a place to come out of the CD player, with the possible exception of the readout, and frankly that isn't helpful. So, I turn to you the readers to help me out here. Can the DN-C640 be made to spit out a songs' information, or is there another machine which can fill the bill?

Somebody, somewhere, just has to know.
Until next month...

The Portland Report

By

John White, CBRE

Chief Engineer, CBC-Portland

I had thought this month's column would be a winter storm wrap-up, a past tense review of what had happened. Then at press time – winter storm alert, snow expected with accumulations up to two inches exposed at higher elevations. Chains required by the city of Portland.

That requirement for chains is overkill, but then Portland is not known for its response to winter storms. This winter season has been an intense one both in number and duration of events. We've had lots of large limbs lost from the Douglas fir and deciduous trees at Mt. Scott.

The snow and ice accumulation caused a fair bit of damage at the Mt Scott communication installations for the season. At the Ridge View tower farm (1,000 feet from KKPZ), the Clackamas County tower detuning skirt suffered extensive ice fall damage. The commoning ring and drape wire attachment brackets sheared. Inspecting the damage gives ample demonstration to safety considerations – one's head and body is the loser in a contest with falling ice. The skirt is now repaired and the detuning readjusted.

KKPZ has also suffered ice-fall damage. In our case, the tower1 feed skirt and the communications tower detuning skirt survived just fine. The building roof, however, did not – it suffered several penetrations. That repair is underway.

Heads up for those who are using ABC satellite program distribution via StarGuide receivers. ABC is in the process of changing out the StarGuide to a new receiver.

The new receiver is the XDS satellite receiver made by X-Digital Systems. It will phase

out and ultimately replace the StarGuide receivers currently in use. The conversion process is underway and as of the end of 2008, some of the larger users were successfully converted. The remainder of the programming will be converted during 2009.

The XDS receiver has a number of new features and some down sides for remote transmitter installations.

The receiver requires a full-time Internet connection so that it can communicate with our Network Operations Center (NOC). The XDS receiver uses the same satellite, same transponder, and same connections as StarGuide.



**Rocky Mountain Ramblings
The Denver Report**

by

**Amanda Alexander, CBT
Chief Engineer, CBC - Denver**

Breaker breaker...

Last month started off with a problem with the main transmitter circuit breaker at 50 kW KLTT.

The station went off the air several times, always in the afternoon between 2:30 and 4:00.

The board op would log onto the Burk Autopilot computer and see the transmitter was at 0%. He tried to bring it back up, and... nothing. It stayed at 0%. The first time I saw this I was baffled.

I put the auxiliary transmitter on so we would be on the air while I tried to figure out what was wrong with the ND-50. If it were a power outage, there's no way the aux transmitter would be on.

My dad and I took a drive to the transmitter that first evening and found the main breaker for the ND-50 transmitter tripped. We turned it back on and the transmitter came up perfectly. We had seen several power company trucks driving around the area and figured it was a brown-out or surge that caused the breaker to pop. We were wrong. On several afternoons thereafter, the breaker tripped again. We would make trips out there to reset it, find everything to be okay and be on our way. We even measured the AC current to the transmitter and found it to be normal at about 96 amps per leg.

On February 2, after resetting the tripped breaker, the transmitter would not come on. The symptom was a missing phase to the transmitter. After confirming that all three phases were feeding the transmitter power connection point, we looked at the AC wiring in the transmitter itself. We made several continuity measurements and finally found a problem with one of the two 75-amp three-pole breakers on the transmitter itself. One pole of one breaker was open, and the connection to that pole was loose, very loose. The hardware and lug was black as can be. We wired the transmitter up to run on the one breaker, at quarter power. We got the new breaker in a couple of days later and installed it. We were hoping we had fixed the problem.

Finally, on Saturday, the 7th of February, I

was at the Colorado Garden and Home Show with no car. My parents and I had driven with friends to the show. I got a call from our board op telling me the



KLTT was on the aux transmitter because the main would not respond again. I sent Keith out there to fix the problem. Sure enough, the main breaker was tripped. Keith reset it and the transmitter came back on normally. A few hours later, Julie, the station manager for KLTT, called me and told me we were off the air again. I sent Keith out again to reset the

breaker. That night, after I had gotten home, I called an electrical service company to come out and take a look at it.

On the following Monday morning, the electrician came out bright and early and began looking into the problem. We shut off power to the building between programs and he removed the troublesome breaker from the panel. He found that much like the breaker on the ND-50, there was a loose connection on one phase. He cleaned up the connection and tightened everything down really good. Evidently the Allen screw securing the phase wire to the breaker hadn't been sufficiently tightened when the breaker was installed, and over the subsequent 13 years, heat produced oxidation that produced resistance that produced more heat. That heat was causing a thermal trip of the breaker after several hours of operation with 100 amps of current each day.

At this writing, it's been almost three weeks since the repair, and so far, it seems to be holding. We have officially called this problem "fixed."

Fun with PPM

I received the Arbitron PPM encoders for the four Denver stations at the beginning of last month. The process of installing the encoders was rather simple. The way we have things set up in Denver, the Eventide delay units are always in line

with STL audio. If the audio feeding the delays is encoded, everything going on the air is encoded. This means the backup and the main encoders can both be at the studios, in line with each other. This made the process so much easier than what Arbitron had envisioned, with the backup encoders at the transmitter sites. I made the proper AES cables for the main encoders and then made connections for the backups and hooked everything up.

Next was the task of figuring out where we could hook the monitors up. I brainstormed with my dad and we both agreed to put them in the studios. We have Day Sequerra HD Radio tuners in the four studios providing off-air monitoring, so we found a way to hook the encoding monitors directly to their analog outputs.



PPM Encoders for KLZ

Wireless Woes

In last month's column, I mentioned the project I had for the wireless Ethernet around here. Well, I'm still working on that. I brought in a Linksys wireless router we had used at my home for awhile but was no longer needed. I set it up with the help of Stephen, only to hit a roadblock. Stephen dug further into why I could not access the Internet and as it turns out, it's the web server. The way it was set up would prove to make setting up the router even more complicated. Todd and Stephen told me to download a program, if I chose, and I could use the old mail server that is no longer in use and create a new web server. I downloaded IPCop and am in the process of testing the server. I am in search of a hub. I hope to finish this up early this month. It seems that every time I get time to work on it, something else comes up.

Flasher!

The mechanical beacon flashers at KLTT are slowly becoming troublesome. A month or so ago, we had issues with one flasher out there. We took it down, I took it apart, cleaned and lubricated it. It's been working fine ever since.

A few weeks later, the flasher at tower two started getting cranky, sticking in either the on or off condition. We took it down, I cleaned it up, Keith put it back on the tower, and it worked okay. But the next night, it quit working again. We decided not to fight with it anymore and we installed a solid state flasher.

Last spring, we ordered and received solid-state flashers for all the KLTT towers, but we never got around to installing them, so the flashers sat in workshop.

My dad came with me out to the transmitter on the 20th because we were planning on heading home from there. It was an extremely windy day. Channel 7's weather center said that wind gusts were up to 60 mph with sustained winds at 20 mph. That's windy! Dad climbed the tower to take a look at how to install the new flasher. The idea was, he was going to take down the old flasher, and then have me up on the tower installing the new solid-state flasher with his instruction. What ended up happening was it was going to be so easy he just did it all himself and had me come up and he showed me what he did. We tested the flasher with the on/off switch and it worked, so we called it good.

That night, I got a Burk Alarm that the flasher was not working again. We assumed it was the same thing that had happened before, that the lights were on just not flashing, probably because the new solid state flasher had failed. We headed out there the following Monday morning and found that we were wrong. One of the factory crimps had come loose from one of the photocell wires, causing the tower lights to not work at all. We manually turned the tower lights on and left for the day. It was still rather dark, so there was no reason to hang out. I gave Keith the task of fixing this problem because he was going to be out at the site finishing up some other work anyway. Also, it would save the company some auto expense money for me. He started around 12:10 PM on the 23rd and by 12:30 he was finished. I have not gotten an alarm since.

On a related topic, something interesting I have never seen before is the Burk tower lamp failure alarm in the mornings. I don't yet have a clear understanding of Burk scripts. It's getting light earlier and earlier, and for some reason, the script is checking for tower light operation after there is sufficient light to turn the tower lights off (but before

power/pattern change). I'm going to have to do some research and see if I can figure out how to get this to stop. I don't want to get an alarm every morning telling me a tower light is out when it is already becoming day.

That about covers it for this month. I look forward to the opportunities I will get to learn more in the month of March, as well as getting many projects done around the studio and the transmitter sites.

Until next time... That's all folks!

Digital Diary
by
Larry Foltran
Corporate Website & Information Technology Coordinator

What's So Bad About My Keyboard and Mouse?

A few weeks back, my dad purchased one of those "fancy" ergonomic keyboards and I decided to



take it around the block on a test run. I'm happy to report that my hands didn't cramp up at all while using it, but I did have a headache afterwards from repeatedly banging my forehead on the desk each time I had to backspace because I hit the wrong key. Needless to say, when you're accustomed to the traditional keyboard, there is a learning curve involved while transitioning to something new.

That little adventure sparked some curiosity in me to find what kind of alternatives there are to the traditional keyboard and mouse. I was actually quite surprised to find that there is an option that caters to every person's specific taste in peripheral input devices.



One of the first interesting options I found



was the rubberized keyboard that can be rolled up and packed away. This seems like a perfect option for laptop users who can't stand using the smaller keyboard on their computer. Plug it into your USB slot and you're off. This could also be a great option for those who are messy eaters and drinkers while around the computer. Don't make me start naming names.

Another unique option I found was the Bluetooth-enabled laser virtual keyboard. This small unit actually projects the keys onto any surface (flat preferably) and is obviously portable. It also features a rechargeable battery that provides power to the unit. Talk about looking impressive as you pull this device out of your pocket next time you're at a coffee house working on your laptop. Just make sure to sit in a dark corner so you can actually see your keyboard. It also doubles as a MIB memory eraser!

I saw several other versions of keyboards while surfing around. Some were designed specifically for gaming and others were curved to eliminate the "praying mantis" position while typing. One keyboard was completely blank. That's right...no letters or numbers printed on it at all! As if I need more of a challenge.



I finally came across the king of all keyboards called the Optimus Maximus Keyboard. Priced at just under \$1600, this option features tiny OLED screens on each key which opens up tons of possibilities. It can be programmed to display upper case keys when shift is held down or even key animations when they're pressed. It even features various system monitoring keys that can display your CPU's temp (perfect when overclocking), network speed, and other system status related features. In my opinion, this is a great novelty item for the geek who has money to burn. Just keep the liquids far away from it because the investment is steep. For those messy eaters and drinkers, please refer back to the rubberized keyboard.



I also found some unique options in the mouse department. One mouse I found most intriguing is something called the gun mouse. Although primarily used for gaming, this device would really draw some attention next time you use your computer in public. I haven't been able to find this mouse at local computer stores, but I imagine it would take some getting used to. I also envision a lengthy explanation to the TSA agent next time you travel by air with this mouse in your computer bag.



The option that genuinely interested me is the flat mouse that can actually be stored in the ExpressCard slot on your computer. You know... that slot on the side of your laptop that is never used and probably still has the plastic insert that came from the factory. If nothing else, it could be a perfect spare option if you forget your traditional mouse at home and you really don't like using the touch pad. It also would be preferable over the gun mouse next time you find yourself at airport security.



Finally, for computer users who feel the keyboard and the mouse are a thing of the past, there is the Neural Impulse Actuator. This device is actually a head band that is worn... well... on your head. Marketed towards gamers, this device allows you to launch specific commands without lifting a finger. The sales information claims that, once trained, you can simply think the command and it will be triggered instantly. Seems like an interesting option, but I can see this being a bit frustrating to use. I don't think my brain can take it especially after using my dad's ergonomic keyboard for a little while. I think I'll just stick with my generic keyboard and mouse for now.

...until next month!

The Local Oscillator
March 2009

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

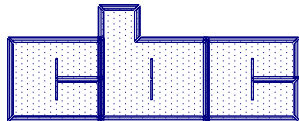
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND

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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