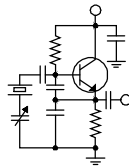


# The Local Oscillator



*The Newsletter of Crawford Broadcasting Company Corporate Engineering*

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## Translator Update

It seems like translators are all I ever think about anymore, which is weird since until early this year, I didn't think of translators much at all!

I would say that this is just a season of and to some degree it is of but the reality is that translators are now part of our corporate topography; we'll be dealing with them from here on, always looking for more and for opportunities to improve on what we already have.

The last week in April we got the Birmingham translator on the air. This is the third of the original four grants, 250 watts ERP at 143 meters on 95.3 MHz.

We brought the Wireless Infrastructure Services tower crew in from Corona, California the last week of the month and they got the antenna and line up on the Red Mountain tower in no time. Stephen and his crew already had everything else ready to go, so as soon as he had everything connected I filed the license application and we began operation under program test authority.

It's too soon at this writing to tell you what the coverage is. It should be fairly good, but the core market in Birmingham sits in an ocean of 100 kW signals that are sited along the spine of Red Mountain from southwest to northeast right through the middle of the city. I suspect that we'll find coverage highly dependent on individual receivers. Those that do a good job of rejecting second-adjacent channel signals will do well; others, not so much. Hopefully we'll have a good handle on it for next month.

We still await FCC grant of our applications in San Diego. Those apps were filed really late, as in late March, so they are at the bottom of the pile. Hopefully we'll get grants this month.

KBRT's translator installation is moving right along. The weatherproof, temperature-controlled cabinet from Kintronic Laboratories has

been installed in the tower #1 base enclosure as can be seen in the photo below. Fred Folmer and Todd Stickler got power run to the cabinet. Now we have to run two other conduits with fiber-optic cables to the cabinet. The antenna, coax and isocoupler are on the tower. I plan to be there the 11<sup>th</sup> of this month to wrap all this up.



**KBRT transmitter engineer Fred Folmer with the temperature-controlled, weatherproof translator cabinet at tower #1.**

Detroit's new translator went on the air earlier this month, right before NAB. It's doing about what we thought it would, with some interference coming in from across the border in Leamington, Ontario.

We continue to tweak the Denver signals. Clearly we need some vertically-polarized signal on 95.3 MHz. The H-only signal does well into vehicles with embedded window antennas and antennas that slant (such as the short rubber duck antennas that are prevalent on many new cars these days). It doesn't do well at all into cars with vertical whip antennas. We're working on a couple of different solutions, both short and long term.

The Denver 100.7 signal should be a lot better than it is. I am suspicious of the antenna, a

broadband stainless steel CP dipole. It's been my experience that very broadband antennas tend to be that way because of resistance, and I suspect that the losses in the antenna in use are significant. I would very much like to move into a brass/copper tuned CP antenna, such as the ERI 100A or PSI FMT-1A. That's on my short list.

We're also dealing with some internet and network issues at the Lookout Mountain site. While we might move into a Part 101 microwave link to that site at some point, for now the internet provides the STL path. We've had one codec failure and had to install Surestream licenses on four other codecs to get path redundancy and error correction. More on that from Amanda in her column below.

Finally, we are working with another translator licensee at the site. We think that their transmitter is making some IM product with our 95.3 MHz signal being one contributor. We have our transmitter heavily filtered, but theirs is only nominally filtered. I borrowed a set of cavities and tuned them up as a pass/reject filter. We hope to install them as a test later this month and if they do the job, we'll order a custom pass/reject filter for the other station. That's our responsibility as the newcomer to the site.

#### **NAB 2016**

This year's NAB convention is in the record books. There were a reported 103,000 in attendance and I think I bumped into 102,999 of them. It was four days of long days, short nights and sore feet. I was very glad to get home.

We had a great time visiting with our favorite vendors and manufacturers as well as colleagues. There were two hot topics on the radio show floor: AM improvement and translators.

Just about everyone I talked to expressed an opinion on the proposals that were floated by the FCC and others introduced in comments and reply comments. Everyone I talked to on the topic expressed a desire to see skywave service protection for class A stations go away. Opinions on what the remaining class A protections should be varied, but all seemed to agree that we have a serious noise issue that's (a) not going to go away, and (b) must be overcome with additional power.

On the noise issue (and speaking specifically about nighttime interference), Gary Cavell used a great analogy of a room that is initially quiet and easy to converse in but as it fills up and other conversations begin to fill the air, becomes increasingly more difficult for individuals to be heard and understood. I agree that we're in a very crowded room with not only a lot of conversations (radio signals) but also with a vacuum cleaner, a blender and a table saw running. It takes a loud voice to be heard over all that racket, and even then the communication distance will be short.

I learned a lot about translator antennas and equipment at the show. Mike Bach of Kathrein was gracious enough to give me a good bit of his time, explaining various antennas and schemes and telling me what can and can't be done.

At the end of the show, I felt like I knew a lot more than I did at the start. It was very much worth attending, but I'm sure glad it's over until next April.

#### **PPM Encoding/EAS Issue**

We noticed in Chicago recently that we have not been receiving EAS tests from the LP-2 station in northwest Indiana. Rick Sewell opened a dialogue with the engineer for that group and found that they had indeed been sending the tests right on time every week but other stations were not decoding them.

They have been in communication with Sage, even sending them logger recordings of the EAS tests. Sage was able to decode them without issues at the factory, so the results of that are inconclusive.

Sage reportedly mentioned that they were aware of some issue with the new Nielsen PPM algorithm interfering with EAS tones. The Indiana CE noted that the issue started coincident with the encoder software upgrade the week of November 10, 2015.

While these good folks and the people at Sage continue to investigate, I wonder if any of our readers have experienced anything similar. Drop me or Rick an email and let us know. Rick's email is [rsewell@crawfordbroadcasting.com](mailto:rsewell@crawfordbroadcasting.com).

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**The Motown Update**

by

**Joseph M. Huk, Jr.**

**P.E., CPBE, CBNT**

**Chief Engineer, CBC – Detroit**

**The WEXL Translator Project**

Our WEXL-AM, W244DL FM translator is on the air! This installation uses two Kathrein log periodic antennas. The power is divided, phased and applied to one log periodic oriented for vertical polarization and another log periodic oriented to create the horizontal polarization component. The net result is a circularly polarized signal. The antenna system is mounted on a 15-foot pole and oriented at 350 degrees True per our construction permit.

We made third-order IM product measurements and the results showed that our installation is very clean spectrally. Listening tests have determined that our coverage is generally within the 70 dBu contour or city grade. Our coverage is directional and reaches part of Detroit and some northern suburbs. The channel is mainly plagued by co-channel interference from a Canadian broadcaster CHYR-FM on 96.7 MHz.

Cris and I have been looking into ways to improve coverage using the current channel. Doing the trigonometry, we determined that moving the main beam or bore site of the antenna pattern to the edge of 70 dBu would require less than a degree of beam tilt. This beam tilt augmentation was considered but it was determined that the vertical pattern of the antenna, in the horizontal plane, was quiet broad and would not have produced a noticeable improvement given the cost.

Some concern arose with the ordered position of the two log periodic elements of the antenna system. In all of the sketches from the manufacturer except one, it showed that the vertical log antenna was mounted on top and the horizontal log on the bottom. We were assured by Mike Bach, systems engineer at Kathrein, that the order of the mounting orientation would not affect the radiation characteristics of the antenna system. In conclusion, we are considering other options to improve our coverage. At least now we have an 8FM Band presence for our gospel station, WEXL-AM, and it should attract new listeners that we would have not

had otherwise.

**NAB Convention**

In preparing for the NAB convention, I was looking to solve some issues with a project we were working on at our Detroit stations. Our general manager Frank Franciosi and operations manager Vito Faletti were looking for a way carry out some remote broadcasts without using all of our sophisticated Telos road equipment. Sometimes, our crew likes to travel light. Therefore, I thought of some of the videos I viewed by Kirk Harnack that showed a utility called Luci Live

(<http://www.luci.eu>) that could be used to encode a stream back to your station using the Telos Z/IP.

Since we are only interested in streaming, we chose purchasing the Luci Lite product which only streams using a G722 codec. Luci Live, the full product, also doubles as a recording application. Kirk's videos are quite informative and provide the knowledge to port forward your router, setup the Z/IP One, and make a connection. When Vito and I started performing the initial testing, we found that audio was plagued by digital artifacts. We heard a clicking noise with a rhythm or cadence on both ends of the link. When I met Kirk at the show, he gave me some guidance for troubleshooting the issue. He suggested the following:

- Connect to the Luci Live test server in Amsterdam. If it works properly, then it could be an issue on the Telos Z/IP end.
- Consider that Android products can vary in operating system and architecture.
- iPhone or Apple products are more standardized and should perform well under most circumstances.
- Check to make sure your Telos Z/IP is using the latest software!

In my case, I am using an LG-G2 Android-based phone. Later that night I tested Luci Lite with the test server in Amsterdam. It worked perfectly! The next day I walked back to the booth and



connected to Kirk's Telos Z/IP at his house and again no issues! The Telos Z/IP at our plant was using firmware revision 1.8. I checked with the Telos web site and the software revised to version 3.0. Subsequently, I VNCed into a machine at our plant from the convention floor and updated the software. Steve Cuchetti, our audio engineer back in Detroit, and I conducted some tests. I am happy to say that the issue was resolved.

One of my concerns is that we have many clients that buy time on our station that use Zip One and Zephyr IP equipment. Therefore, we are currently testing the software to ensure that both the audio and GPIO (General Purpose Input Output) telemetry is working. One of our top talk show hosts, Bob Dutko, does a show from home using the Z/IP One, and uses the GPIO feature to control the dump button to our delay line back at the studio. There is no option for failure regarding this feature. Kirk mentioned that there is a cable called "Miki" on the Luci Live web site that will allow you to connect an external microphone and headphones to your mobile device or smart phone. You also have an option to make your own cable, but please note that wiring between Apple and Android products is different (see below).



| Pin Number | Pin Name | Description (may be empty) | Pin Number | Pin Name | Description |
|------------|----------|----------------------------|------------|----------|-------------|
| 1          | Tip      | Left audio                 | 1          | Left     | Audio Left  |
| 2          | Ring     | Right audio                | 2          | Right    | Audio Right |
| 3          | Ring     | Common/Ground              | 3          | Mic      | Mic         |
| 4          | Sleeve   | Microphone                 | 4          | Ground   | Ground      |

### Telos Omnia 11 Upgrade

One of the highlights of the NAB show was the unveiling of the new Omnia.11 upgrade. It essentially provides you with a new processor if you already own one. The upgrade is in the \$1,000 price range and delivers not only on maintaining high average modulation but can give you a transparent, clean, air sound too. Many of the audible artifacts in the current software have been eliminated in this product reboot.

In auditioning the audio during the show, I found that the Telos crew relentlessly listens to various pieces of program material and constantly finds fixes or reworks for audio artifacts and ways to

provide the best sound reproduction given a wide range of program material variation. I believe this is a renaissance for the Omnia.11 and demonstrates the commitment of the Telos alliance to their customers and existing product line. I can't wait to report out when audio processing guru, Brian Kerkan, demos the upgrade at our Detroit station. Stay tuned!

### Stereo Tools

At the Stereo Tools booth, I was very impressed with software-based audio processor that utilizes a 192 kHz sample rate sound card to generate an MPX or baseband. Many of the digital audio processing features you find in higher end processors were available in this product. The software could run on a dedicated PC with quad core I5 processor. This product could also be used for stream casting too.

There are many default presents included in the package to suit most applications. This processor also possesses a feature to make up for lossless program material. If your audio library is composed of MP3s, for example, their algorithm will attempt to replace missing bits.

One of the demos they performed was very impressive. On the fly, the processor fixed some distorted program material with its un-clip feature. It was amazing. At the \$400 price point, this processor could provide a powerful backup or main processor in any market!

### Tie Line VIA Product

While this product is still in development, it is a codec that would suit the most diehard remote broadcaster. The product may not be for everyone, it is like the "Swiss army knife" of remote codecs. If you wish to get on the air with Tieline's proprietary codec or even an MP3 stream, this box can do it. It not only works with IP but also with POTS lines. It even has a built-in mixer!

In the coming months, John Lackness is going to let us kick the tires on the device. At Crawford, we embrace all technologies and this product appeals to my belief that all products have their unique features that make them stand out by themselves. However, this product celebrates interoperability with other codec systems which I find very refreshing.

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. Best regards.

**News from the South**  
by  
**Stephen Poole, CBRE, AMD**  
**Chief Engineer, CBC–Alabama**

Greetings from sunny Alabama, where the weather has actually been half decent for a while. A little rain, a few storms, but nothing too bad. I even managed to get some flowers transplanted in the front yard, so I have Done Yard Work. I must be a suburbanite.

A few years ago, Sandy insisted that we buy a Stargazer Day Lily. “They smell so good!” she promised. Well, just as beauty is in the eye of the beholder, smell is apparently in the nose of the be-sniffer. To me, the odor was not unlike that of toxic waste. But she loved it and that was good enough.

Enough jabber. We’ve been busy and busier this past month. I’ll let the pictures do most of the talking.

**Out With The Old ...**

WYDE-FM was scheduled to receive its new Nautel GV40 in mid-April, and we had a lot of prep work to do. The first step was to move the old Continental 816-R4 out of WDJC’s building on Red Mountain and into storage. To do that, we built a ramp out of 2x6 lumber and OSB. The ramp worked



**Figure 1 - Our high-tech, home-built ramp under construction.**

fine, but man, those transmitters are heavy! After a good bit of pushing and shoving and squeezing, we managed to honk the thing into the old building on Red Mountain, leaving a nice big space in the new

building for a replacement transmitter.

WDJC’s original main transmitter had been moved to WYDE-FM in Cullman when we installed the GV40 at Red Mountain last year. After a great deal of pondering and calculating, we decided that it would be best to put WDJC’s current aux, an 816-R4, into storage. Those Continentals were great transmitters in their day, but this was the older model with tube drivers. Too temperamental and cantankerous.

We only used the ramp once, for this particular transmitter move. I considered taking it to Cullman, but the compound at WYDE-FM is much larger, with more than enough room for a forklift.



**Figure 2 - WDJC’s old Continental, finally retired after many years of service.**

### ... In With The New

WYDE-FM's new transmitter arrived on Monday, April 18th and we got to work. First, we moved WDJC's former BE FM-30T out of the building to make room for the new Nautel. We were assisted in this by several hard-working employees, including Leland Whaley, station manager for 101.1 FM. Danny Dalton, who has helped us many times in the past, brought his big trailer and tractor with forks, which made the job a lot easier.



**Figure 3 - The WYDE FM compound. The FM 30 is visible in the doorway; Danny Dalton's tractor and forklift are off to the right.**

Once we had the new Nautel in the building, Danny loaded up and ferried the BE back to Red Mountain, where another crew was waiting to move it into WDJC's building. Todd and I worked at getting the new Nautel on air.

### ... And A New Translator

I included a picture of the equipment for this in last month's *Local Oscillator*. This is paired with 1260 AM.

We used Wireless Infrastructure Services from Corona, CA to do the tower work this time. We've had good service from them in the past, so even though it costs to bring them across country, we felt that it was well worth it.

We had two big projects and one if you can get to it. First, we wanted to mount the translator antenna, shown in Figure 6. Second, we wanted to repair WXJC's Dragonwave link, which has been down for several months now. Finally, if they had time, we wanted to convert the Trango at WYDE AM (1260) from copper Ethernet to fiber.

Tuesday, April 26th, we started work and by mid-afternoon, the translator antenna, a five-element Yagi, had been mounted on the tower. We had no



**Figure 4 - Station Manager Leland Whaley is impressed with the GV40.**

reflected power; so far, so good. Cris then gave me a checklist to run through, so I took our analyzer up to Red Mountain and did several tests, with particular emphasis on possible third-order products. I built a line tap so that I could sample the actual signal going up (and coming down!) the tower. Everything looked nice and clean, so Cris filed the Form 350 and we fired her up.

How does it sound? Pretty good, but let's be realistic: these things really are squeezed into place nowadays. Cris had to use a shoehorn and a prybar to get this one into Birmingham. This translator operates at 95.3 MHz and we have second adjacencies at 94.9 and 95.7. The latter is a 100,000 watter, so there is interference and overloading on some radios (such as the one in my Ford Fusion. Grrrr).

For processing, as mentioned last time, we're using Wheatstone's FM55 processor, which for my money is the best in its price range. I've still got some tweaking to do, but so far, so good. The multipath correction in that processor is phenomenal.



**Finally: The Data Links**

The next day, we attacked 850ø Dragonwave, which had been working very intermittently and with a terrible RSSI. The øCalifornia Gangö as we call them checked everything thoroughly and suspected that maybe the dish had been misaligned. By mid-day on Wednesday the 27th, it was pretty clear that, yep, the dish at Red

**Figure 5 - This is Todd's third transmitter move in two weeks! No wonder he looks dazed.**

Mountain had been peaked onto a side lobe. (Whimper.) They did their usual painstakingly-accurate job of tweaking; the end result was an RSSI that was within 2-3db of what Cris had originally predicted a couple of years ago. Hoo-ah!

Finally, on 1260ø Trango link, we were able to get the fiber and the power cable in place, but we were thwarted by something silly: we were short one SFP module. We honestly didnø know if WIS would be able to get to this (frankly, I doubted it), so we had planned to use our spare network switch in the unlikely event that they were. Unfortunately, the

spare SFP module that we had didnø work properly. Weøre going to need a new spare network switch, anyway, so weøll order some spare SFP modules while weøre at it. Everything else is in place, so we should be up and running again in short order.

In the meantime, 1260 is rebroadcasting its new translator! Howø that for thinkingø?

All in all, it has been a busy, but very good, April, thank the Lord. My compliments again to the øCalifornia Gangö Chris and Gil with Wireless Infrastructure Services. Special thanks goes to those members of our staff who volunteered to help, including Jean, our new office manager, and Leland, the Station Manager for WYDE. Jessica Borklund, Brittany Conger, Justin Brown and Russell Wall also pitched in, especially at Red Mountain, freeing Todd and me to work on the new transmitter in Cullman. Jack and Todd did their usual great jobs, as did Danny Dalton with his big trailer and tractor.

Thereø always more to do, but we made great progress in April. Until next time, keep praying for this nation!



**Figure 6 - The California Crew mounting the translator antenna at Red Mountain.**

### The Chicago Chronicles

by

**Rick Sewell, CSRE, CBNT, AMD**  
**Engineering Manager, CBC–Chicago**

The proverbial school of hard knocks is a difficult teacher, but it's often a very effective one. I try to anticipate what will go wrong with our facilities before it happens so we can be prepared should it actually happen. In reality, I take an approach that it is not an if/then scenario but when.

Just two months into my current posting, we had one of those scenarios. Thunderstorms with tornadoes and all the other associated bad stuff came through and most of our sites wound up losing power, ending up on their generators. This included the studios.

Having a generator stop working during a power outage at a transmitter site is bad. Unless you have an alternate site, you have a station off the air until power is restored or you get the generator repaired. Have this happen at the studio with four stations and you now have four stations off the air. This is exactly what occurred that night. Fortunately, the alarm cleared on the generator once an engineer was present to manually clear the alarm and get the generator up again and running. We ended up with all four stations being off air between 35 and 55 minutes.

However, the thought sure came to mind that what if this wasn't a simple clearing of the alarm? What if we had to wait for a generator tech to come out and repair the generator? We could be off for an extended amount of time. I placed on my long-term to-do list something that would play audio in the event of an emergency such as a studio generator failure.

There were certainly a lot of priorities that needed to be addressed when I first arrived here, so it would be a while before I got to this project. However, I really didn't expect to not have it in place before 2015 was over, but that is what happened. So my 2016 new year's resolution was to get this done at

every site.

We already had something in place at WYRB before I got here with a 360 Digicart player.

This was put in place because of the difficulties the station had with its T1 lines, which experienced regular outages. Even though it was designed to cover that problem, it would also cover any emergency that would cause audio to not make it from the studio to the transmitter site.

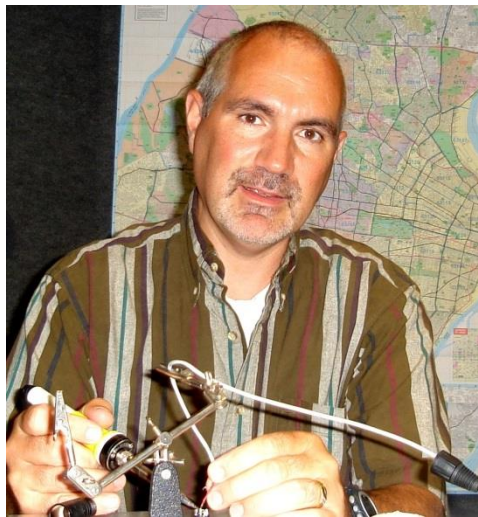
With three other sites still subject to those kind of long outages, we needed something that we could use with the existing infrastructure. The cost of the 360 was relatively high for a piece of equipment that would barely be used and in reality you

hope to never use.

I know some of the transmitters now have the ability to play audio on their own when they don't have audio present on their normal input. That is great. My one problem with that, in a very highly competitive PPM market like the one I find myself, Chicago, is that you don't have PPM encoding on the air when the transmitter is playing its own tunes. My philosophy is, if you don't have PPM you might as well turn the transmitter off.

As stated, I wanted to use existing infrastructure as much as possible to keep the cost of the project at a minimum. The three sites had some things in common. They each have two STL paths. Both STL paths have AES digital outputs which we use for the audio chain. They also have analog outputs which we were not using.

We use a four-port Videoquip AES switcher to select which STL ends up on the air. This left us with a couple of ports open to use for a backup audio player. The four-port switcher feeds the PPM encoder before being distributed to the audio processing. So this setup will keep PPM going even in the event of an emergency.



The AES switcher's logic control circuits are wired to the remote control at each site, which is a Burk ARC Plus Touch. The remote controls are capable of running pre-programmed scripts and even have virtual channel capabilities, which would give us great flexibility for automatic switching to and from the backup audio player.

We opted to use a Denon DN-501C as the backup player at each site. It has a CD player built in but that was not what interested me in the product. It also has a USB port built in as well. It is capable of playing various file types, including .wav and .mp3. With thumb drives increasing in storage space while decreasing in cost, there was no reason to not use .wav files to keep the quality high. In truth, using .wav files, if this player ever ends up on the air it will probably sound better than the normal audio, since it is not compressed or being transmitted through an audio codec. We created an eight-hour file on the thumb drive with music, station imaging and legal IDs, which hopefully will give us plenty of time to fix whatever is causing the issue.

The Denon player also includes logic inputs and outputs. We would only use the start input to get the player going. There are a lot of other options that could be used in other applications, but we only needed to remote start the device when it was needed. With this wired to one of the command functions of the remote control and the AES digital output wired to the AES switcher, we were already capable of manually starting and switching to the Denon backup audio player. We just needed to dial into the remote control to make it happen.

However, I wanted to take it a step further. I wanted to have this automated so that when we are in the crisis moment, it will come on automatically, and once audio is restored, it will switch back to the normal STL pathway. The ARC Plus Touch has a lot of capability with scripting and virtual channels that would work great for handling the automation. We just needed to give the unit indication of when both STL paths are silent.

This is where we put to use the unused analog outputs on the STL equipment. We purchased the Radio Design Labs ACR2 Audio Control Units to wire to the analog outputs of the STL equipment. The ACR2 has a couple of relays that will close when they get silence on the audio input. You can vary the time it takes to close the relay from between five to fifty seconds of silence.

We tied the output of the relays to status inputs on the remote control. Thus giving the remote control input of the status of audio on each STL pathway. The goal here being that if both STL paths

are silent for a certain amount of time it would automatically start the backup player and simultaneously move the AES switcher to the port where the backup player ends up on the air. I also wanted it to do the opposite when audio was restored for a certain amount of time. In this instance, I chose it to have at least one minute of solid studio audio before switching back. I didn't want intermittent audio on the STL equipment to have constant switching back and forth between normal audio and the backup player.

What I did with the two status inputs was to create a virtual status channel that combined the two into one channel. When both status inputs get a closure from their associated ACR2, the virtual channel would then come on and serve as a trigger to start a macro that performed the startup and switching to the backup audio.

I wanted a longer time period than the maximum fifty seconds the ACR2 units would provide, so I gave the virtual channel a setting of 90-seconds silent before it did the final switching. In all, if we have two minutes of silence on both STLs, the switch will occur. I chose this long a time period because I am considering this as a catastrophe player, not something that would cover your run of the mill, 20-seconds of studio silence. Since we are requiring at least one minute of solid normal audio before it switches back, if you used it to cover short silences, you would have that awkward return where the first minute of normal audio would not make it on the air and you would be jumping from the middle of one piece of audio into the middle of another piece of audio. This is going to happen with this system, but you wouldn't want it to happen for a normal short studio silence. That should happen at the studio and preferably on the control room mixer, so you can have a smooth transition back to normal audio.

There are probably several ways you could accomplish the wait for one minute of solid audio with the capabilities of the ARC Plus Touch. You could create a second virtual channel using the same status channels and then select "alarm when off" and launch a macro to switch back to normal audio. I chose to use the same macro that I used to switch over to the backup player. In the macro shown below after switching to and starting up the Denon player, the macro will send a text message to engineering to let us know that this has occurred. It then will go into a one-minute loop where it checks for silence on the virtual channel every ten seconds. If at any ten-second interval in the loop it finds silence, it will start the loop over again. Thus creating a scheme where it has to have a solid, one minute of audio before it

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switches back to normal audio. This is to prevent the flopping back and forth with intermittent audio on the STL equipment.

1 : Raise "Denon Audio" on site "WPWX-Burnham" for [default]

2 : Lower "Denon Start" on site "WPWX-Burnham" for [default]

3 : Send email message "Denon Player now on air at WPWX transmitter site." to email list "Eng Text"

4 : Wait for 00:00:10

5 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

6 : Wait for 00:00:10

7 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

8 : Wait for 00:00:10

9 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

10 : Wait for 00:00:10

11 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

12 : Wait for 00:00:10

13 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

14 : Wait for 00:00:10

15 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

16 : Wait for 00:00:10

17 : If status of "Least one feed ok / Dual STL Silence" on site "WPWX-Burnham" = "Dual STL Silence", goto line 4

18 : Raise "StarLink On" on site "WPWX-Burnham" for [default]

19 : Wait for 00:10:01

20 : End macro

We wired this up first at the WPWX transmitter site. We bypassed the audio switching so that we could actually simulate a dual STL silence to see if it all worked out exactly as planned. We did have a few adjustments to make in the macro and timing, but it worked. Then when audio was restored to the STL equipment, it switched back after one minute.

We still have two more transmitter sites to go, but our most important site is ready if for any reason we can't get audio to the site. While we may not be making money directly while this backup player is on air, we hopefully will keep our listeners happy and most importantly the audio is PPM encoded so we don't lose any precious metering.

Here's the great part, using current infrastructure we accomplished this for less than \$500 a site.

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**The Portland Report**  
by  
**John White, CBRE**  
Chief Engineer, CBC–Portland

Last month, two technical issues stepped up front and center. For some time, I have had a rare audio leakage problem from 1640 showing up in the Bridge-IT codec audio. The problem was clearly RF feed through, and the air staff was ready to take alternate steps. Just the same, the problem was irritating and elusive.

Apparently bashful as well, as the problem hid in the presence of the engineer  $\acute{o}$  until recently, that is, when the problem became obvious and did not go away.

I had connected a mix-minus feed to the Bridge-IT a few weeks earlier. Disconnecting it did not correct the problem. Grounding and audio changes made no difference. Chokes on the power supply made no change either. The problem persisted when the Bridge-IT was connected or disconnected. No change.

the problem cleared. Winding the cable into a choke made no difference. When connected, the network connection was just fine, which indicated the interference was a common mode problem.

A while back, I recall that Cris had commented about choke beads as a good fix for common mode problems. I had made the same observation, so I searched for a CAT-5/6 filter at the Sandman filter page and ordered one. Once it arrived and was installed, the problem was fixed. Sandman makes a variety of filters for phone, handset, and

CAT-5/6 configurations. The filters are offered with several different frequency ranges and are very effective.

Later in the month, the HD signal failed. A quick check found the HD exciter with all red lights and lots of reported errors. The HD exporter, a Nautel Exporter Plus, was showing all red lights and an öinitializingö message which never cleared.

A call to Nautel support suggested the problem may be a chip, although further discussion revealed other possible problems, and the Nautel technician suggested that I check to determine if the CPU fan was running. It was, and while inside the unit I noticed bulging tops on some of the electrolytic (see Figure 1). That's a good indication of problems, and when Nautel support asked about caps, that clinched the diagnosis. Figure 2 shows the CPU board, the defective component locations are circled.

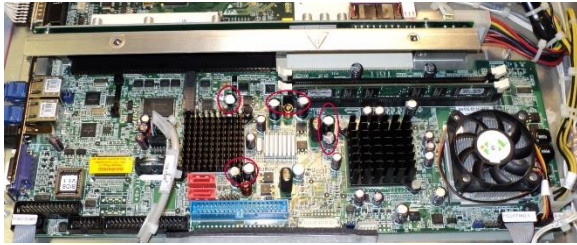
The bad components are located on the CPU board provided by a third party. I have seen this kind of problem frequently in the past and it's generally caused by a poor component choice. In this application, the capacitors are located near switching components and inductors, suggesting the capacitors are part of inverter circuits.

The first step was to determine the specifications of the components. The capacitors were a KZG series type capacitor, which is a high ripple current, low effective series resistance (ESR) capacitor. Other specifications indicate a 105 degree



**Figure 1 – Bulging electrolytics**

Finally, I disconnected the network feed and



**Figure 2 - Exporter CPU board.**

Celsius life of 1,000 hours. Obviously, not a good component choice for a tight space and elevated temperature environment. Keeping in mind component availability, I chose a Panasonic EEU series capacitor. This component has a low ESR rating and a 105 degree C life of 10,000 hours.

Replacing components on a high-density lead free PCB is not for the faint of heart. Proper tools are required, along with some unconventional techniques. An anti-static environment is required to protect ESD sensitive parts.



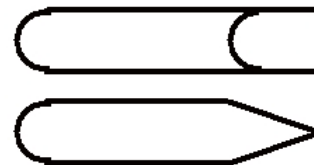
**Figure 3 – Pin drill.**

The board is RHoS compliant, so the solder used for any repairs must be a tin, copper and silver solder. The solder iron must have an 800 degree tip which is clean with minimal solder coating. The objective is to get heat quickly on the capacitor connection to remove the old defective component. This requires both gentle mechanical treatment of the board with a minimum heating damage.

The old capacitor itself can be used as a lever to extract each connection wire from its through-hole in the circuit board. Push the top of the old capacitor in line with the plane of the component leads while heating one connection from beneath. With care, the capacitor can be rocked while heating

alternate connections to remove the component lead from the board. Don't be surprised when one of the capacitor breaks free of the old overheated capacitor.

With luck, most holes will have minimal residual solder filling the through-hole connection. One tip is that absent some very elegant soldering equipment, sucking solder from the hole will be futile. Do not use any more solder on the iron tip than is needed to transfer heat to the joint and that can reduce solder debris remaining in the mounting hole.



**Chisel Point  
Wire Drill**

**Figure 4 – Profile of wire “drill.”**

With care, when the old component is removed, even plugged holes will have a dimple indicating the proper hole location. If the hole is mostly open, a short piece of capacitor lead wire can be used to clear the hole. The wire is a soft material which is somewhat harder than the solder and at the same time soft enough to minimize damage to the through-hole plating.

Mount a short piece of component wire in a pin drill. Using a pair of diagonal cutters, clip the wire so the tip has a wedged shape chisel point at the tip. Don't worry if the tip wears quickly as the tip can easily be renewed. Use the pin drill to rotate the wire bit to remove solder debris. If the hole is fairly solidly obstructed, a number 72 drill bit can be used in the pin drill to create a small pilot hole. Care to protect the through hole plating is necessary. A pin drill with fabricated wire bit is shown in Figure 3.

These steps are labor / time intensive and require care. The replacement of the ECB costs \$1,300, so the repair is well worth the effort and time.

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

**Pirate!**

It's amazing how many pirate stations there are out there. Since we found out we were getting 95.3 FM here in Denver, we have already found we have two pirates. The first one we easily DFed as it was near the office. The second one, however, has proven to be a challenge. The signal covers an area north of Denver and is coming from a site near the CU-Boulder campus. We went out there and looked around for it and narrowed it down to a general area. We have since given it to the FCC in hopes they can do the rest of the legwork and find the culprit.



During the day, the Horizons were indicating thousands of dropped packets a second. We decided it was time to bring Comcast in on the problem.

They came out, replaced the modem and still packets were dropping. They have escalated the issue, whatever that means. Maybe they'll eventually find the problem. Until then we are using SureStream on the codecs, which maybe helps a little bit on a single internet circuit. If that doesn't work, we are also using the Tieline Bridge-IT as a backup to one of the stations. It seems to do a little better with its forward error correction.

**Internet Issues**

We brought 95.3 FM and 100.7 FM on air April 1. On April 2, I tuned in and found the stations sounded horrible! They were extremely choppy, both of them. We went to the site and didn't really find anything. The Horizon codecs were going in and out of alarm. After a reboot of both ends they fixed themselves. Two weeks later, the issue came back. This time a reboot did not work. We worked on it for a long time and could not get it to work. After a full day's work at the site, it cleared up.

**Coming Up**

Spring is finally here, although looking out my window as I write this, it looks like winter. Weeds are already starting to grow. I am hoping we can stay ahead of the growth this year. We have already planned on having one of our sites completely sprayed so no growth comes up this year. We are also hoping to make some improvements to our 95.3 signal. If all goes well this month we will soon have things working great at Lookout Mountain.

That about covers it for this month, so until next time! That's all folks!!!

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The Local Oscillator  
March 2016

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**KBRT • Costa Mesa - Los Angeles, CA**  
*740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1*  
**KNSN • San Diego, CA**  
*1240 kHz, 550W-U*  
**KCBC • Manteca - San Francisco, CA**  
*770 kHz, 50 kW-D/4.3 kW-N, DA-2*  
**KKPZ • Portland, OR**  
*1330 kHz, 5 kW-U, DA-1*  
**KLZ • Denver, CO**  
*560 kHz/100.3 MHz, 5 kW-U, DA-1*  
**KLDC • Brighton - Denver, CO**  
*1220 kHz/95.3 MHz, 660 W-D/11 W-N, ND*  
**KLTT • Commerce City - Denver, CO**  
*670 kHz, 50 kW-D/1.4 kW-N, DA-2*  
**KLVS • Denver, CO**  
*810 kHz, 2.2 kW-D/430 W-N, DA-2*  
**WDCX • Rochester, NY**  
*990 kHz, 5 kW-D/2.5 kW-N, DA-2*  
**WDCX-FM • Buffalo, NY**  
*99.5 MHz, 110 kW/195m AAT*  
**WDCZ • Buffalo, NY**  
*950 kHz, 5 kW-U, DA-1*  
**WDJC-FM • Birmingham, AL**  
*93.7 MHz, 100 kW/307m AAT*

**WEXL • Royal Oak - Detroit, MI**  
*1340 kHz/96.7 MHz, 1 kW-U, DA-D*  
**WRDT • Monroe - Detroit, MI**  
*560 kHz, 500 W-D/14 W-N, DA-D*  
**WMUZ • Detroit, MI**  
*103.5 MHz, 50 kW/150m AAT*  
**WPWX • Hammond - Chicago, IL**  
*92.3 MHz, 50 kW/150m AAT*  
**WSRB • Lansing - Chicago, IL**  
*106.3 MHz, 4.1 kW/120m AAT*  
**WYRB • Genoa - Rockford, IL**  
*106.3 MHz, 3.8 kW/126m AAT*  
**WYCA • Crete - Chicago, IL**  
*102.3 MHz, 1.05 kW/150m AAT*  
**WYDE • Birmingham, AL**  
*1260 kHz/95.3 MHz, 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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