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September-October 2016 – Vol. 24, No. 5

New “Systems Alert Monitor” Keeps Station Personnel Informed

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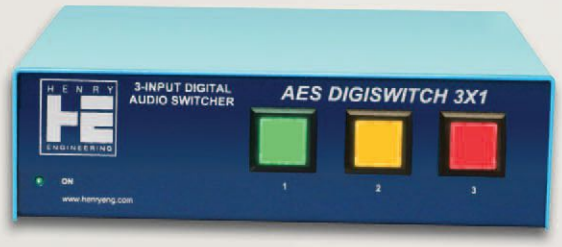

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Cover Story

New "Systems Alert Monitor" Keeps Station Personnel Informed

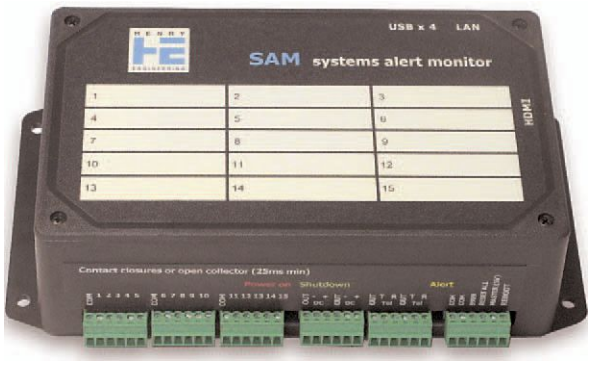
by Hank Landsberg - Henry Engineering

For many years, one component of a typical radio station studio was some kind of "alert box:" a device that could let the DJ or board operator know that "something important" was happening. Important things like the station was off the air, or the audio failed, or an EAS message was received, or the request line was ringing, or there was someone at the door after-hours. In the days of "one station, one air studio," the DJ might be alerted with something as simple as a light bulb or a buzzer in the studio.

Then consolidation took over, and suddenly we had large studio complexes housing multiple radio stations with dozens of studios. Instead of having to watch over one air signal, there were several, with lots of parameters and conditions for personnel to monitor – multiple transmitters, program streams, phone lines, STLs, and so on. Many stations used fixed-message visual alert devices, but even the multiple-message units were less than ideal where equipment and systems were often changed or updated. Either you didn't have enough messages, or it was difficult to change the message when the equipment or systems being monitored was changed. In today's world, nothing stays the same for very long!

It was time to retire the old "light bulb alert box." What is needed for today's studio complex is a device that (a) can monitor lots of gear simultaneously, (b) provides easy-to-see visual alerts when there's something that needs attention, (c) can be easily updated as monitoring needs change, and (d) can provide multiple ways of alerting personnel.

With these goals in mind, we created a new way to keep a watchful eye on your station and its hardware. It's the new Systems Alert Monitor, a video-based device that monitors up to 15 status inputs, and provides an instant visual, audible, and/or email indication if anything goes wrong or needs attention by station personnel.



The SAM Status Interface Unit

The Systems Alert Monitor (SAM) consists of a Status Interface Unit which generates "alert" text messages that are displayed on a video monitor. Because the system is software-based, the text of the alert messages can be easily changed or reconfigured as necessary.

SAM's Status Interface Unit has 15 "Alert" inputs for monitoring your facilities equipment and systems. The Alert inputs can be wired to virtually anything that provides some kind of status or fault signal. For example, the station air monitor would provide a fault signal if the carrier goes off the air. A silence-sensor would provide a fault signal if the station lost audio or lost a channel. EAS receivers provide an output when an EAS message is received. Or your transmitter remote control system would generate an alarm output if the transmission line has an excessive SWR condition.

The SAM Main Screen

There could be other situations that a DJ should know about – the Request Line is ringing, or there's someone at the back door. All of these situations can be monitored by SAM, which will display text messages on a video monitor that's easily seen by the DJ or board operator on duty.

All of SAM's Alert inputs should be isolated "dry" GPI contact closures; this is fairly common with professional broadcast gear. But there could be instances where some equipment provides a DC voltage instead of a contact closure. For this reason, SAM includes two Input Isolator circuits that can accept a DC voltage or any connection that isn't truly isolated. In addition, SAM also includes two Ring Detectors that will sense ringing on a standard POTS phone line. These would be used to trigger a SAM alert when the line rings, e.g., for Listener Lines or for that call from the PD on his hotline.

The beauty of SAM is its ease of setup. It can be customized for each installation by the user, in a matter of a few minutes. By using a standard PC keyboard and mouse (SAM has 4 USB ports), SAM's Alert messages can be programmed for each of the 15 Alert inputs. On the right is the Edit Screen where each Alert message is set up: ➔

For each Alert message, the user can enter the desired text and the textbox color. Each message also has an associated Display Time, to determines how long each message is displayed before it is automatically cancelled. (It's also possible to set a message to stay on-screen permanently, until it's manually reset.)

For each Alert, there are two checkboxes to enable optional functions: Audio and Email. By checking the Audio box, an audio message will play when the visual alert appears on-screen. SAM is supplied with a few dozen "stock" audio messages, although you can use any mp3 audio file and link it to any Alert.

If you check the Email checkbox, SAM will send you an email when that Alert is triggered. Just connect SAM to your LAN and email will be sent using SMTP protocol.

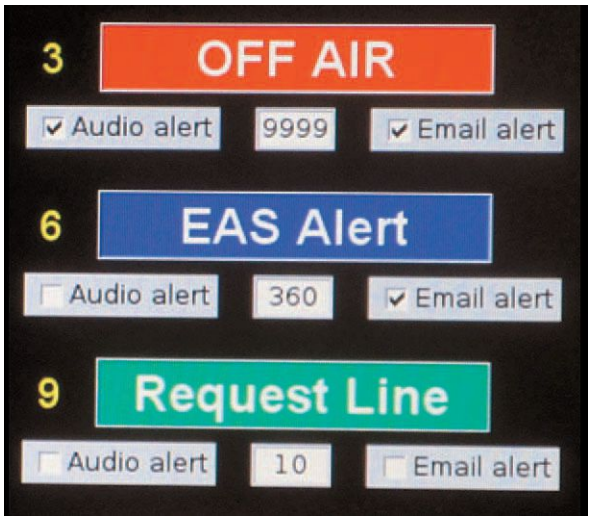
Once the Setup is complete, SAM is started and it begins to scan all 15 Alert inputs. When an Alert is triggered, the text message flashes several times on the video screen, then it stays "solid-on" until the specified Display Time has lapsed. An audio message will play and/or Email message will be sent if these options were selected for that specific Alert input. Each Alert input can have these options selected if it's appropriate for that message.

If no Alerts inputs are active the screen will be blank. SAM can optionally display your station logo if you load a jpeg logo file via a USB thumb drive. This is also how you'd install mp3 files for customized audio alerts.

If anything needs to be changed or updated, it's a simple as running the Setup screen again and changing the message text, colors, and Alert options as needed.

In most installations, SAM's Status Interface Unit will be located wherever there is access to your monitored gears' status/fault wiring – in the rack room or engineering shop. SAMs video output is then fed to a monitor(s) in your studio(s). SAMs video output is HDMI (720p), so any inexpensive monitor or TV with an HDMI input can be used. If your facility already has in-house video distribution it can be used to distribute SAM's video.

If you don't have any video distribution infrastructure, HDMI cabling can be used. In most cases the maximum suggested HDMI cable length is up to (about) 100 feet, depending upon the quality of the cable. For installations where the SAM interface unit must be more than 100 feet from the video monitor, we suggest using an inexpensive HDMI-to-Cat5 converter, and running Cat5 or Cat6 cabling between the two. This arrangement often allows cable runs in excess of 300 feet of Cat5/Cat6 cable. For installations where a SAM unit needs to feed multiple video monitors (e.g., to several studios), use an HDMI-to-Cat5 converter that has multiple Cat5 outputs. These video interface units are commonly available from commercial video suppliers and broadcast video vendors.



The SAM Edit Screen

The Systems Alert Monitor is ideal for use in studios, transmitter plants, or any control facility. It's an effective way to monitor multiple systems simultaneously and notify personnel of important system status or priority situations. It is available from any Henry Engineering dealer; the list price is $695 (video monitor not included). SAM will begin shipping in early November.

For more information, contact Hank Landsberg at Henry Engineering: 562-493-3589, or visit www.henryeng.com

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Studio Site

Expedition on Exhibition

New Remote Mixers Taking Advantage of HD Voice

by George Zahn

Taking Advantage of HD Voice

It's been rolling out slowly over the last few years in the U.S., but HD Voice is now finally being touted in some American markets by cell phone companies. Here's the idea, after which we'll explain how some companies are moving forward to exploit this for live broadcasts. HD Voice works in a way like other codec devices, but without the major outlay of funds for the encoder and decoder.

When it functions well, HD Voice will allow up to 7 kHz of audio bandwidth to pass through a phone line that normally only passes about 3 kHz. In effect, the HD Voice phone will compress the 7000 Hz of frequency response into the passable spectrum of a digital cell phone call (similar to a Codec). A caller on the receiving end, if they have a compatible phone, will hear the fuller frequency response.

Manufacturers indicate that if the caller or call receiver is on a incompatible phone, the whole call will simply default to standard digital call bandwidth. rather than adjusting or creating incomplete encoding or decoding. Another advantage is that HD Voice can handle background noise much better.

Watch Me "Nay Nay"

A while back, there were "nay-sayers" who felt that it would take years for U.S. mobile phone companies to start touting or offering HD Voice. The networks were so busy building their 4G networks that the AMR-WB codec which worked with the older 3G system was ignored. There were alternative ways of utilizing HD Voice but the iPhone 5 didn't support one of them. A good portion of the market influence still rests with the iPhone.

Now it appears that HD Voice will become a new marketing feature, and broadcasters may be able to take better advantage, both on new regular iPhones or Android smart phones. 4G LTE networks are opening up the HD Voice possibilities for VoLTE (Voice Over LTE). It's coming more quickly now, and some companies are looking to capitalize.

For the long-timers reading now, you'll remember the "Ma Bell" dedicated equalized lines that are basically point to point, but can yield various frequency ranges from roughly 5 kHz, to 7.5 kHz, and all the way up to 15 kHz. The lower frequency response (5k) is more than passable for high school sports and promotional voice-only work, 15 kHz (usually a stereo conditioned pair for FM stations) could allow you to mix and broadcast live music from the venue back to the station. 7.5 kHz was a barely passable option for music (you lose most of the harmonics), but in some areas, that's all you could get, depending on the circuits available and routing.

"Frequency Asked Questions"

Imagine going out and using a cell phone to call back to the station and get something other than the robotic garbled voice quality that comes through most digital cell calls today. Instead you can almost do a monaural music broadcast with HD Voice. Please keep in mind it is called HD Voice and no one is touting this as a replacement for a 15 kHz equalized line – but at 7 kHz of bandwidth, it should yield better than average quality on voice with improved definition and minimal background noise.

One of the companies jumping into the fray stateside, started marketing in Europe in 2012. At NAB 2016, GlenSound made a splash with its Expedition U.S. Broadcaster's Mobile Phone. It does not use IP connections and operates as a standard dial-up cell phone. It operates on 4G LTE, 3G UMTS, and 2G GSM networks. HD Voice has been rolled out in more than a few dozen countries, so they've had a chance to develop the technology.

GlenSound Expedition
Broadcaster's 4G Mobile Phone

Will it take off in the U.S.? Some companies are betting so, and the iPhone 6 can now enable HD Voice. You should see new ads marketing HD Voice in the highly competitive wireless network market. British-based GlenSound once offered a European-friendly model of the Expedition, and now has rolled out a U.S. Version. It claims that the phone does not incur data rates and is made as a standard call, and if the station has an end receiver that decodes in HD Voice, you can achieve the 7 kHz "holy grail."

The catch? As with a more thorough codec, you need the receive unit GS-MP1005 HD at the station to guarantee the widest possible frequency range, and GlenSound claims there are no call drops as can happen in IP or data packet calls. They tout little delay, unlike some codec connections, which might prohibit talk give-and-take between the studio and remote site. Distribution of the newer Expedition U.S. model appears to still be through the Glensound's UK headquarters.

Expedition GS-MP1005 HD Studio Unit

Small Box – Decent Features

The Expedition weighs in at about 1.5 pounds and measures roughly 4"x 2" x 3" with two switchable balanced XLR mic/line inputs with 48V phantom power for condenser microphones. There are 2 headphone outputs, controlled by one pot, and an XLR line out as well. The entire unit runs off of 6 AAA batteries or can plug in with AC. The low battery indicator flashes at 30 minutes of battery life left. SIM card access is under the battery pack. The unit has adjustable output compression and background noise rejection controls.

GlenSound appears to be marketing the Expedition to the U.S, with this new model release, but it also makes and distributes some other units such as the GS-MP1004 Broadcaster's Cell Phone/Mixer and the Recce HD 3 input model, both of which appear more geared to Euro markets at this time.

Expedition - I/O Panel

Information, Please?

The GlenSound unit is presented as another option in the soon to be expanding HD Voice remote broadcast market. Since it us very new, I'd welcome feedback (no pun intended) from anyone who's used one of the GlenSound units. There are some other options in the U.S. Market, but it's important to investigate how the unit works. Is it a full codec unit, can it do HD Voice, or is it geared to a POTS (Plain Old Telephone Service) connection?

Here are some other phone devices, resources and apps to explore. One place to see providers offering HD Voice is the Global Mobile Suppliers Association at www.gsacom.com. You can read more about GSA, LTE and G5 among other topics, including many whitepapers on the technology.

Among the many phone and cell interfaces are a number of cell phone audio interfaces by JK Audio, including Voice Over Internet Protocol (VOIP) and Audio Over Internet protocol (AOIP) hybrid units and RemoteMix units which now tout HD Voice compatibility. The JK BlueDriver F3 has Female XLR which can plug a pro microphone into the a Bluetooth audio connection to your cell phone or you can split audio to a Bluetooth headphone.

Conex makes the FlipJack FJ 700 which includes a 4 input switchable mic/line mixer that can feed a cell phone and an external recorder simultaneously and also has a landline jack as well. It can run an 3 AA batteries or external power. There's also the less robust 2 input FJ 500 model.

If you like browsing apps, Tie-Line has an app that ranges from free to a full feature paid version. Report-IT allows for live, 15 kHz 2-way interviews. You can store, edit and playback audio or go live. You can also connect a professional microphone for better quality voice recording/remote. Even with the "Lite" version of the app, there can be charges for extended use and limits on the number of reports. The pro version is pricier but has many "limitless" threshold features.

If you're looking for POTS Codec options, they include the TieLine i-Mix G3 Mixer/Codec which has been a favorite of sports remote broadcasters and has many uses For some standard connections, Marti also offers the GX 500 Mixer with Phone interface. There is much to explore and doing some homework will help you make the best choices. Keep in mind, that on all of the units we discuss, that until HD Voice is more universal, calls between cell carriers may default back to standard 3 kHz bandwidth.

What's your favorite and reliable mode of remote broadcasting? Have you tried devices with HD Voice? Let me know and we can discuss more in a future article.

George Zahn is a Peabody Award winning radio producer and Station Manager for WMKV-FM at Maple Knoll Communities in Springdale, Ohio. He is a regular contributor to ***Radio Guide*** *and welcomes your feedback. Share your stories with others by sending ideas and comments to: gzahn@mkcommunities.org*

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Power Principles

National Electric Code – *Part 2*

by Mike Hendrickson

In this article I'm going to go into more depth on some parts of the Code. The purpose is to give you some insight into the Code and its applications. I'm not encouraging any broadcast engineer to act as an electrician. But, by having a basic knowledge of the Code, it will help you determine the most efficient system, as well as a safe system.

Chapter 2 of the NEC is titled "Wiring and Protection." Article 200 of this chapter details the use and identification of Grounded Conductors. The engineer needs to understand the difference between a "grounded" (neutral) conductor and an "equipment grounding" conductor and/or a "grounding electrode" conductor. These three definitions will be found in section 100 under definitions. A very simple explanation is that the grounded conductor is the neutral of the electrical system. The equipment grounding conductor and the grounding electrode conductor are the conductors that, under normal conditions, *do not* conduct electricity, but are intended to provide a low resistance path for fault conditions.

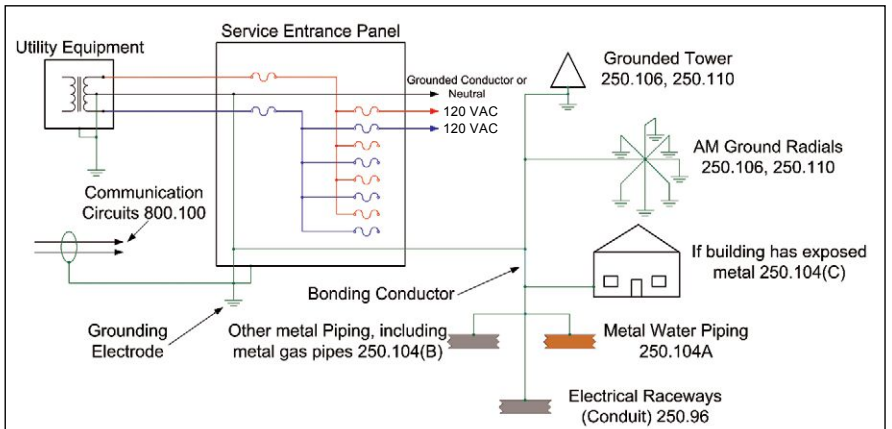

Figure 1

Article 250 of the Code contains information and requirements for grounding and bonding of electrical installations. The Code requires that all grounds, with some exceptions as specified in the Code, must be bonded together. If the building uses a metal structure that could be energized by an electrical fault, the structure must be bonded to the grounding electrode conductor. If there is a tower present and/or AM ground radial system at the site that is grounded, the Code requires the tower grounding and AM ground radial system be bonded to the grounding electrode conductor. The Code details the type of grounding and bonding materials that may be used. The code also details the actual connection to "earth." **(Fig. 1)**

One area that should be familiar to the broadcast engineer concerns conductor sizing. Chapter 3, Wiring Methods and Materials, contains information regarding conductor ampacity (current carrying capacity). Table 310.15(B)(16) details the size of the conductors based on whether it is copper or aluminum, and the insulation type at an ambient temperature of 30 deg. C. (86 deg. F). The table shows that, for identically sized and type conductors, the ampacity ratings change because of the insulation type.

Many high power FM transmitters will have a power draw of around 100 Amps. According to the Code this will require a minimum conductor size of a #3 AWG copper conductor with THHN insulation. THHN insulation is good up to a conductor temperature of 90 deg. C. (194 deg. F) This means that the Code permits the use of a conductor that will increase to a temperature of 194 degrees F.

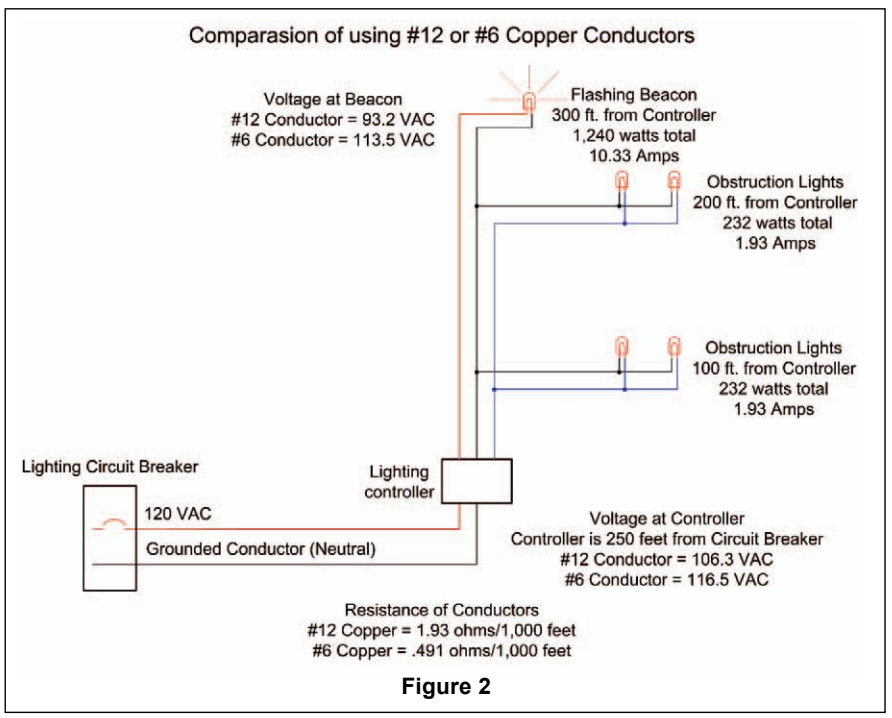

Figure 2

Compare this to a conductor with TW insulation. The conductor size must be increased to a #1 AWG copper conductor to keep from overheating the insulation. This is because TW insulation is only good to 60 deg. C (140 deg F).

Now let's look at what will happen if we use the number #3 conductor versus the #1 conductor. To keep things simple I am assuming that the transmitter room is kept at or under the ambient temperature of 86 degrees F. If the temperature is above 86 degrees, a correction factor must be used to derate the ampacity of the conductor as detailed in the Code. Assume that the length of a single conductor from the power source to the transmitter is 30 feet. From table 8, chapter 9 of the Code we can obtain the DC resistance of the conductors. A #3 conductor has a DC resistance of 0.245 Ohms per 1,000 feet. A #1 conductor has a resistance of 0.154 Ohms per 1,000 feet. Thirty feet of a #3 conductor will have 0.00735 Ohms of resistance. A thirty foot length of a #1 conductor will have 0.00462 ohms resistance. From Ohm's law this means, with 100 Amps of current, the voltage drop will be 0.735 volts for the #3 conductor and 0.462 volts for the #1 conductor. The power loss in the conductors will correspondingly be 73.5 Watts and 46.2 Watts. This means that in one year the #3 conductor will consume about 644 kilowatt hours of electricity compared to about 405 kilowatt hours for the #1 conductor. Remember, this is in one conductor. The transmitter will have either two or three conductors and each will have the same amount of loss.

The power loss in the conductor affects the transmitter site operation is several ways. The loss is heat and contributes to the temperature rise in the room or building. This will add to the cooling requirements of the installation. The smaller size conductor will cause a voltage sag as the power of the transmitter is increased. For AM transmitters a smaller size conductor may result in a transmitter input voltage that varies greatly with modulation.

Another example concerns tower lights. A few years ago I encountered a tower site where the owner claimed to have never needed to replace the light bulbs. At first I doubted him, but upon further investigation I discovered that what he was telling me was true.

The tower was about 300 feet high. There was a beacon at the top and two sets of two obstruction lights. It was located 250 feet from the transmitter building. The lighting conductor size was #12 AWG copper. The tower lighting controller and flasher were located on the tower. The beacon had two bulbs, each rated at 620 Watts and the obstruction light bulbs were each rated at 116 Watts. The rated power consumption for the tower lighting was 1,704 Watts. At the nominal line voltage of 120 Volts the total current draw was 14.2 Amps. According to the NEC, the #12 is permissible to use, but in this case, the voltage at the beacon was 93.2 Volts due to the resistance in the conductor. When this wire was changed to #6 copper conductor, the voltage was 113.5 Volts. **(Fig. 2)**

In Minnesota and many other states, the installation of low voltage wiring, communications wiring, and fiber optic wiring must be done either by a person that is licensed by the state or under the direct supervision of a person that is licensed. Electrical work that requires an electrical permit may be inspected by an electrical inspector. If the inspector finds out that the low voltage and communications work was done by an unlicensed person there may be legal problems. It is entirely possible that the person that did the work will receive a cease and desist order from the state. Ignorance of the state and/or local laws regarding electrical work and licensing, including low voltage and communications, is not an excuse!

In September, the 2017 Code was published – this is the most recent version of the National Electric Code. Please remember that this does not mean that it has been adopted by the authorities that have jurisdiction. You must check with your local or state authorities to find out if it has been adopted. This article is based on the 2017 Code.

There is an on-line version of the NEC. You will need to register with the National Fire Protection Association to use it, but the site is free. Go to the National Fire Protection Association web site for more information – www.nfpa.org

Hendrickson, CPBE, CBNT is the retired Chief Engineer of American Public Media Group. He has been involved in Broadcast Engineering since 1969. Over this time period he has been involved with all aspects of broadcast engineering from the technical to the budgeting. He may be reached at: mikehlakeville@gmail.com

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Satellite Made Easy

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Small Market Guide

Building An Even Bigger Dummy Load

by Roger Paskvan

Well, the residents in Small Marketville are making noise again. Thank you for all the emails and phone calls. Looks like there is an apparent interest or desire for dry 5 kW AM transmitter dummy loads, and it sounds like most of you don't want to spend $4,000 for a new one. The water cooled dummy loads are much cheaper but how many tower sites have available running water?

Yes, the short comings of the first dummy load project *(Radio guide, July/August-2016)* was the fact that, with over 2000 Watts there, was the potential for arcing which limited it's power capability, even though the resistors would handle much more power. I tried my prototype at 5000 Watts and it did arc, damaging a few substrate resistors. However, the inexpensive load worked well under 2 kW. So in answer to your inquires, let's see if we can build a bigger dummy load but keep the costs to a minimum.

Looking at the problem, we needed bigger resistors to handle that much power. Checking the prices on Non-Inductive resistors solidifies why the commercial loads are so very expensive. Okay, so what are our needs and limitations for an economical 5000 Watt dummy load?

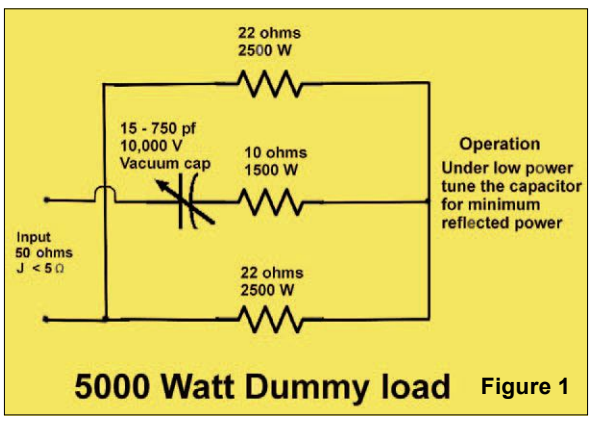
1. Capabilities of handling 5000 Watts of power.
2. A means of dissipating a lot of heat.
3. Limited frequency range, 0.5-1.7 MHz.
4. Price cap – say around $700 in parts.
5. Simple to build for any tech minded person.

Background

In my research, the staggering limitation of all dummy loads is the very expensive non-inductive resistors. Also, these non-inductive resistors do not come in very high values of wattage. Their advantage is most of them work well into the VHF range. In our case we only want a 5000 Watt dummy load for AM band transmitters, which limits the bandwidth to 1.7 MHz. That's almost like DC in today's modern electronic world. Why can't we utilize standard wire wound resistors? They are big inductors to RF and everyone says they will not work. Looking on the Internet, these wire wound resistors come in some big power ratings up to 2500 Watts, that sell in the $200 range. These are the load resistors utilized in elevator motors and industrial controls.

Using a VNA (vector network analyzer), I measured some of these resistors for their inductive value and, yes, they are real good inductors besides heat sinkers. So what if there was a way to remove the inductive reactance effect. Could regular, cheap power resistors be utilized as a dummy load? I did some experimenting and was very pleased with the results. Yes, by cancelling out the reactance of the standard large power resistors, it is possible to provide a resistive load at the expense of frequency and bandwidth. Thinking about this, most small market stations are on one AM channel and that is the only frequency of interest. For those users that travel to many different AM stations, some means of tuning has to be provided.

So the story begins – a frequency tunable dummy load that utilizes off the shelf large high power resistors and dissipates 5000 Watts, costing under $700. It was a tall order but here are the details:



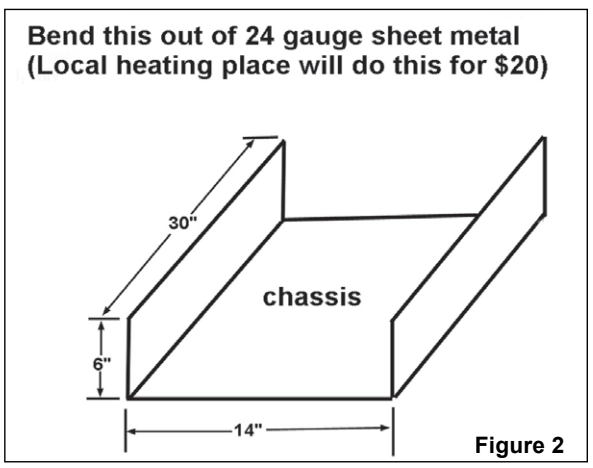
Referring to the schematic in **Figure 1**, Large power resistors were selected to form a series RCL circuit resonant at the broadcast channel of interest. You would think that removing all the reactance would leave only resistance, but the equations make 50 Ohms by a combination of resistance, capacitive reactance and the inductive reactance on the resistors. I experimented with various values of resistors and settled for the values indicated, since this combination formed the cleanest RCL 50 Ohm impedance component.

To get 5000 Watts, I had to parallel the 22 ohm resistors to reduce their inductance to a manageable value that would resonate inside of the broadcast band. Adding in-series resistors to make 50 Ohms made the inductance too high to work and didn't satisfy the series RCL requirements for a 50 Ohm match. The resistors are 2500 Watts each added to a 10 ohm resistor at 1500 Watts. The capacitor is a HV vacuum variable rated at 10 Amps and 5000 Volts.

Yes, you're saying economical with vacuum caps? Well, economical with Ebay parts. There are a ton of Ebay Russian military vacuum capacitors available in many ranges, usually less than $100 each. So what we are doing is making the power resistors work as double duty. We will utilize standard wire wound resistors and take advantage of their coil inductance to make a series RCL circuit that will resonate in the broadcast band, dissipating 5000 Watts in the process. We have basically nulled out the very problem of utilizing wire wound resistors in RF applications by taking advantage of their own "limiting factor," inductance.

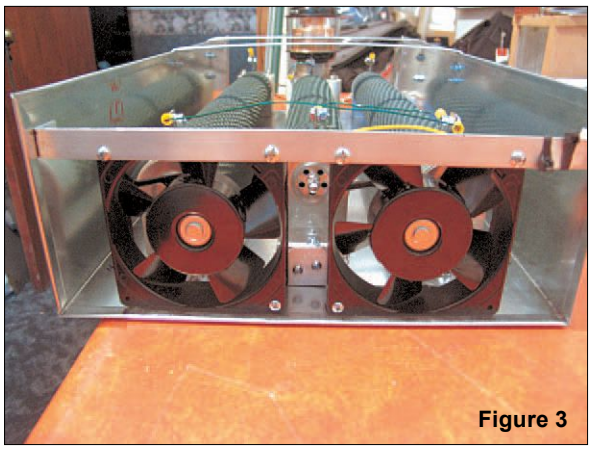
Building the Dummy Load

1. Order the parts from the sources listed in the parts list on page 42. These power resistors will amaze you – I had never seen a 24 inch, two inch diameter resistor before. These resistors are available from Ebay vendors under the manufacturer TE Connectivity, and come in various large sizes. The high power Russian vacuum variable was listed under vacuum capacitors. I found one for $89 that did the trick with flying colors, and tuned the entire broadcast band. Buy the capacitor with the mounting straps usually listed separately, otherwise you will have to fabricate some external copper mounting straps held with hose clamps to make connections to the capacitor. The fans are high volume CFM, four inch square fans that run on 120V. They pass a lot of CFM air over the resistors.



2. Looking at **Figure 2**, obtain a 26" x 30" 24 gauge piece of sheet metal and bend it to the shape shown. I had my local heating guy do a great job for $20. This will become the chassis for your dummy load. You will need a few aluminum straps across the ends to give the chassis rigidity.

3. Mark and drill the holes for mounting the three resistors and the two fans on the rear end. See **Figure 3.**



The fans are in parallel and a small lamp cord powers these externally. In the front center, mount your vacuum capacitor on four ceramic stand offs. Most radio stations have ceramic standoffs in the junk box or you can find them on Ebay. I also utilized two standoffs for the main connection terminals. The wiring was completed using solid #14, for form and rigidity. Refer again to the drawing of **Figure 3** above, and **Figure 4 on page 42** for placement.

4. Once you have completed the construction, the dummy load can be tested and put on your broadcast channel with a VNA, adjusting the variable capacitor for resonance and minimum SWR or return loss. (Refer to **Figure 5 on page 42**). Note the SWR is very low and the impedance is a good 50 Ohm match. The unit exhibits a real good match considering the crude components.

Operation

In practice a VNA is really not needed to resonate the capacitor. Connect the load to your transmitter and reduce the power to several hundred Watts.

(Continued on Page 42)

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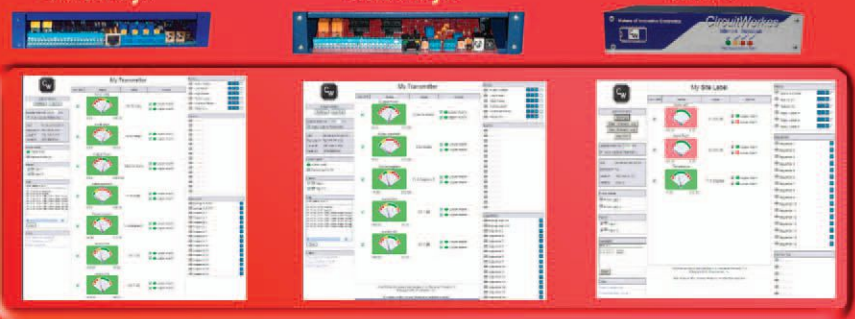
SiteSentry4 SiteSentry2 WAM-2



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FCC Focus

- *Updated Commission Registration System (CORES)*
- *FCC Regulatory Fees and Penalties*
- *Political Ad Scenarios*
- *Public File Availability*

by Peter Gutmann

It's been a rather quiet summer at the FCC for radio. Of course, for those fearing more intensive regulation, things could be far worse. Industry attention has been focused on the incentive auction, which is largely irrelevant for radio, other than to stir up pangs of deep jealousy of our video colleagues, who have been given to fantasizing all the wondrous things they would do with the millions of dollars that the initial forecasts predicted would fall into their proverbial laps. If only our radio spectrum had comparable value ...

By the time this is published, the FCC is supposed to have implemented an updated CORES (**CO**mmission **RE**gistration **S**ystem) with enhanced security provisions. The new system will require the designation of a single User Registrar who will be the only person able to apply for or make any changes in the FCC Registration Number (FRN) required for access and filing, or to associate an FRN with a facility (such as after a license assignment).

The last thing most of us need is yet another complex password to remember. Yet the registration will require an email address, a security question (and answer, of course) plus a password of 12 to 15 characters, which must include at least three of the following: an upper-case letter, a lower-case letter, a number and a punctuation mark or special character.

Is this a solution in search of a problem, somewhat akin to the rush to require strict voter identification despite a near-complete absence of any incidences of voter fraud? Among the hundreds of thousands of filings of applications, reports and payments through the Commission's on-line CDBS system in the 15 years since the advent of CORES, there have been no reported instances of unauthorized access, much less any significant mischief caused by interlopers. Indeed, one might suspect that it is another instance of placing a significant burden upon the industry in order to save a far lesser drain on FCC resources – in this case the occasional nuisance of dealing with parties needing to reset an FRN password. (Remember the days before on-line fee payments when all applications with filing fees had to be messengered to a lockbox bank in Pittsburgh just so that the FCC could spare the need for its employees in Washington to receive them with accompanying checks?)

Yet there still will need to be a demand for FCC staff to override the system. It does not take a vast stretch of imagination to envision situations in which the new system might fail. Each FRN is to be controlled by a single registered user, such as an attorney, engineer or staff member. But what happens if/when that user is no longer available, whether through a voluntary or involuntary departure, retirement, impairment or even a vengeful refusal, or if the password is lost? It's bad enough now when an FRN password is changed and those needing to use it (ahem – like your attorney) aren't advised. Clearly FCC staff will have to intervene when the system needs to be accessed in the absence of the authorized user or password.

It would seem that a more thoughtful approach would be to adopt the system currently used when requesting a new or changed call sign. Once a call sign application is submitted on-line, the FCC sends notification to the affected parties well in advance of the effective date. In that way, if I were to request that your station's call sign be changed without your permission, you would be notified and have plenty of time to countermand my request before any change became effective. Here, all the Commission would need to do would be to send an email to the licensees or permittees of the affected stations, who would then know that an FRN change was being made. In the extremely rare instance of a bogus filing, the affected parties could take appropriate action before any significant damage could be done.

Otherwise, not much has changed in recent weeks. So perhaps it's opportune to run down a few miscellaneous questions that seem to keep coming up.

Is there any way I can get out of running national EAS tests?

No! Until early 2012 the FCC allowed stations to request an exemption from participating in national-level EAS alerts. (Actually, the exemption didn't amount to much, as all it allowed an exempt station to do was to decline to broadcast the audio portion of any presidential emergency message. Thus stations with the exemption still had to comply with all of the equipment and other operating requirements.) But that was eliminated with the transition to CAP protocol. Now all stations are required to fully participate in national-level EAS activations and tests.

Our FCC regulatory fees really soared this year so I didn't pay them. What do I do now?

Oh, boy ... This could get really serious! In addition to assessing 25% late-payment penalties plus interest plus processing fees, the FCC is getting tough with delinquent licensees/permittees. After 120 days it may send the debt for collection over to the Treasury Department, which can be more difficult to deal with than the FCC, and it has even started to cancel authorizations and dismiss applications for seriously delinquent parties. In the meantime, the FCC imposes "red light" status, meaning that it will not process any but emergency applications and requests for relief until the debt is paid in full. It may be too late for this year, but in the future you can get a far lower interest rate from anyone but your local back-alley loan shark – even the high rates imposed upon credit card balances beat the FCC's surcharges.

That said, there is a route to relief. Until the debt goes to Treasury the FCC often is able to work out a monthly payment plan, although it will include all the extra penalties, fees and interest and can require a hefty down payment. But at least once a payment plan is in place the "red light" will provisionally be turned off – so long as you don't default.

We're non-commercial. One of our major donors wants us to air an opinion piece he wrote. Should we?

That sounds perilously close to "pay for play" (that is, a paid commercial spot) and you might be hard-pressed to defend the practice from an assumption that in essence he paid you to run his piece. Of course, if you happen to agree with his position, you could run your own opinion as an editorial, which even non-commercial stations are able to do. And there's no requirement of offering time for opposing viewpoints to a station editorial (although many stations will want to do so anyway, so as to project an image of balance). If your donor really wants to go on the air himself, you can include him in a forum with others.

We got a threatening letter from a group opposed to an opinion spot we are airing and demanding that we stop. What should we do?

If the spot qualifies as a "use" you have no choice but to air it as is (and in exchange you are not liable for libel and slander). Otherwise, the FCC gives you a lot of latitude here. The operative standard is only that stations should not engage in a "knowing presentation" of perpetrating a deception upon the audience, either by creating a deliberately fraudulent ad or by awareness of final governmental action involving the advertisement in question.

Even so, you might consider notifying the sponsor of the objections and requesting a response with some justification for the claims in the spot. Then use your judgment, keeping in mind that the FCC will respect your decision so long as the matters at least are reasonably open to debate. And feel free to put on your sales hat and suggest that the opponents buy their own ads to air their views.

A federal campaign wants to buy a long segment of time that will disrupt our schedule and alienate listeners. Can I refuse?

Probably not. The FCC has recognized a station's right to preserve its format, but that really only applies to ads incompatible with strict time blocks (such as TV prime time, where a 12-minute buy could blow out an entire 30-minute show). Having to rearrange a music or talk format on radio probably wouldn't rise to a similar level of disruption.

In light of all the nasty negative campaigning, can I require that ads be positive?

Sorry, but you know the answer to that one – if it's a use, then you can't censor it. But you can preface or follow political spots with a neutral disclaimer, so long as you do the same with all ads by opposing candidates.

Can I at least insist that candidates "stand by their ad?"

The requirement of a candidate saying "I'm Bob Jones and I approve this ad" only applies to federal candidate advertising, and even then only to uses.

If I already put my public file on-line, can I prevent folks from coming into our station?

Members of the public still have the right to see your paper file of letters and emails from the public, which still must be kept and made available for public inspection. Although there is near-universal support for eliminating that last vestige of the paper files, it remains on the books for now. And unless you have already transferred your entire political file for the two-year retention period to the FCC's on-line database (and are maintaining it on-line with all new required materials), then you must make it, too, available locally.

Peter Gutmann is a partner in the Washington, DC office of the law firm of Womble Carlyle Sandridge & Rice, LLP. He specializes in broadcast regulation and transactions. His email address is: pgutmann@wcsr.com

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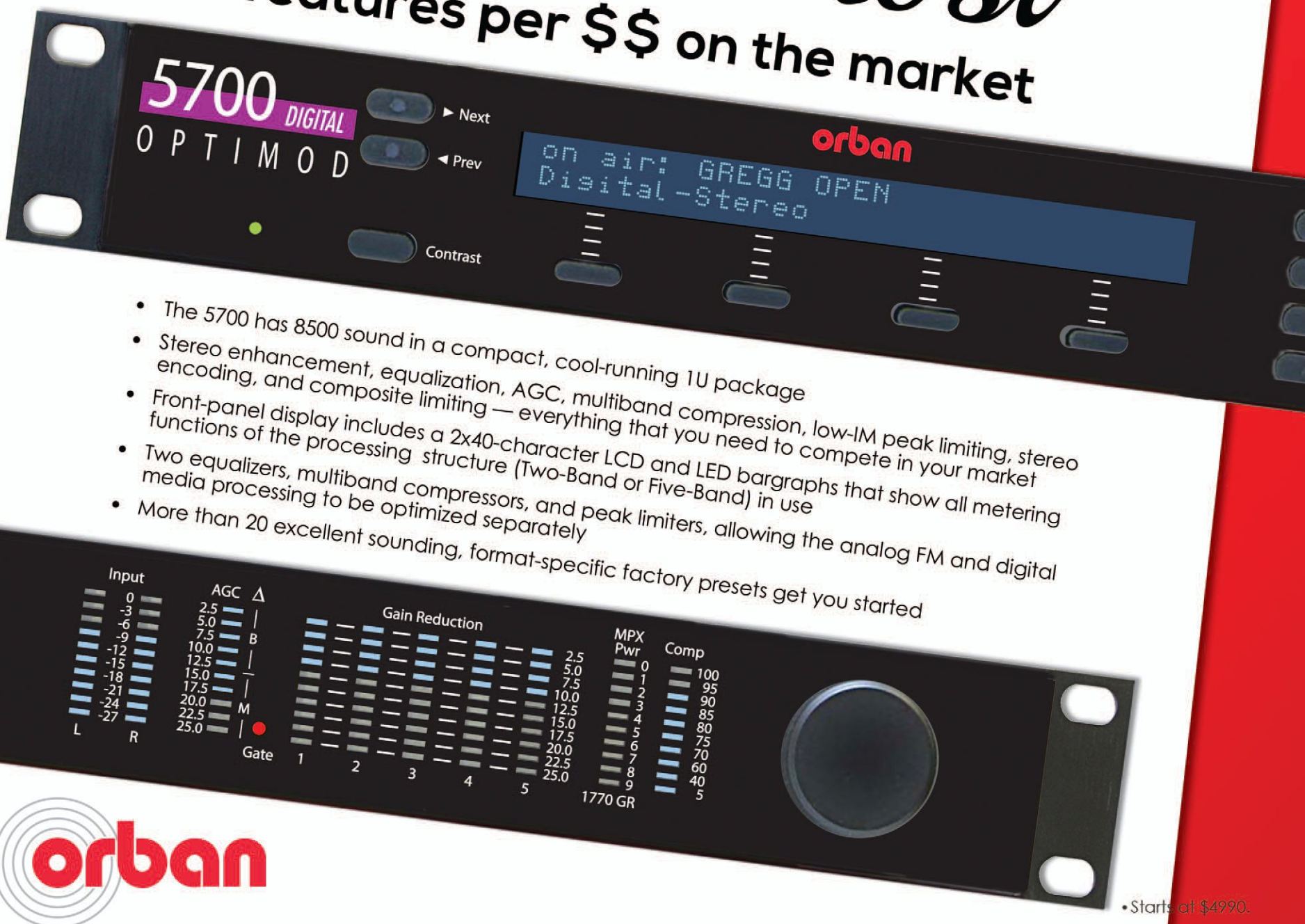

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Chief Engineer

Microphone Processors & Feed to Phone Hybrid

by Scott Schmeling

I had a situation recently that I would like to share with you. A "simple" change of equipment that presented a rather unique problem solving challenge.

We had replaced the console in one of our studios a few years ago. The "old" console only had one microphone input, so to accommodate two (or more) mic's, a little mixer (Shure SM268) had been added. For whatever reason, when the new console was installed we kept the mixer in place and added a mic processor (dBx 286A). The output of the mixer (set to mic level) fed the input to the processor. The output on this processor is at line level and fed both the console *and* a "Send" input to the phone hybrid. This station pre-records nearly all of their phone bits and by having the mic processor output feed the hybrid it was very easy to do "hands-free" answering and recording.

A few months ago, the output of the mixer became quite noisy and had some DC riding on the audio. The quick fix was to replace the mixer. We had been talking about putting in individual mic processors, but for now, a different mixer it was. A slightly older SM-267 mixer was installed. That did the trick – the noise was gone and the mic audio was nice and clean. You would have thought that would have been the end of it. But for some reason, they were still hearing "something" bad on the mic's. Again, we discussed installing individual mic processors.

OK, let me pause the story here for a second. Remember that the output of the processor is feeding *both* the console and a Send input to the hybrid – that's easy with one processor. The output plug simply had two Belden 9451 cables soldered to it. One went to the punch blocks for the console input and the other went to the hybrid – easy peasy.

Mixer, Hybrid, and Processor Setup

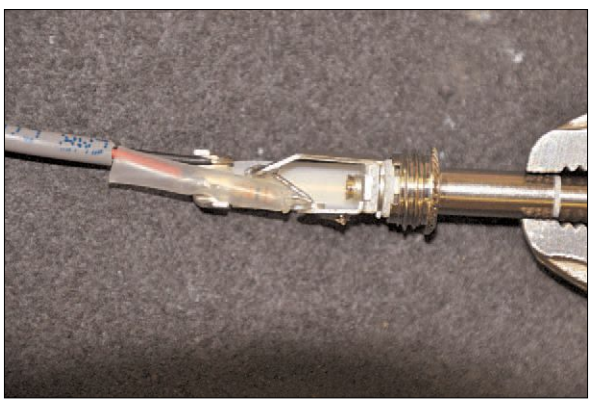
If I'm going to install additional processors, and they all need to feed the console *and* the hybrid, I also have to have some degree of isolation. Otherwise, *all* of the mic's would be feeding the console *all the time,* whether their channel is on or off – that's not good! It was time to put the thinking cap on!

What I needed was some type of isolation between the outputs of the three processors. I *could* have done something similar to the way it was. Wire the outputs to feed the console but, instead of also feeding the hybrid directly, I could feed to the inputs of that mixer. Except, I wanted the mixer for the two guest microphones. And, besides, most on-air people these days tend to be fairly non-technical, so I wanted the feed to the telephone to be as simple as possible.

Taking a look at the back panel and block diagram in the manual of the mic processor, I noticed an Insert jack. It's a Tip-Ring-Sleeve jack designed to allow the user to send to external components such as equalizers. The mic preamp output is on the Tip and the Ring and goes back to the processor circuits. This is good, except plugging a plug into the Insert jack internally disconnects the audio to those processor circuits.

However, think about this: the jack has an internal connection between tip and ring that is broken when a plug is inserted. I can restore that connection simply by putting a jumper between tip and ring on the plug. It's so simple!

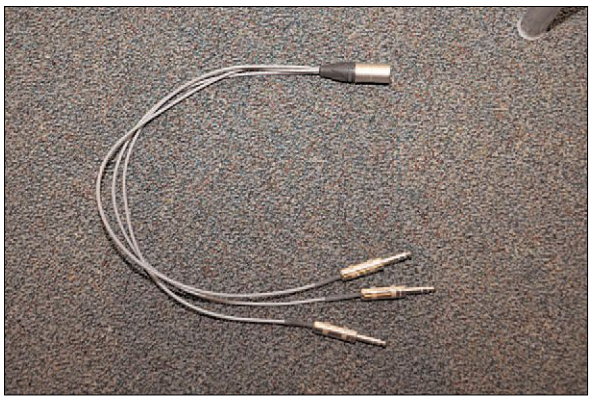
For the isolation between processors, I simply soldered a 10K resistor to the tip connection of each plug. The other end of the resistor is soldered to the red wire in some Belden 9451. The 9451 from each of the three plugs is wired to a single XLR-male connector that plugs into the Send port of the hybrid. I chose 10K resistors because that's the value commonly used in an audio mixer's summing network. There, all it should take is a little level adjustment and I should have audio from all three mic processors feeding the hybrid but with enough isolation (thanks to the 10K resistors) that there should be no crosstalk between microphones. OK, now we have a plan!



A 10K Resistor in Each Plug

Three new dBx 286S microphone processors were installed after I made the above mentioned "summing network cable." Installation was "smooth as glass" thanks to the fact all of the inputs to the console appeared on the punch blocks. A big difference was noticed quite literally during the first talk set the next morning!

Regarding the summing cable, although the T-R-S and XLR connectors are normally used for balanced circuits, the in and out at the Insert jack are un-balanced. I could have used single-conductor shielded, but I have so much Belden 4951 that I decided to use that. I just soldered the black and shield to the Sleeve (ground) on the 1/4-inch and wired the XLR in the conventional manner with shield to 1, red (hot) to 2, and black to 3. The black wire is at ground, making it an un-balanced circuit. When we plugged it in to the hybrid's Send input the level just needed to be boosted a little because of the loss from the 10K summing resistors.



The Summing Network Cable

Also, when wiring the 1/4-inch connectors, I slid a piece of (somewhat) clear heatshrink over the red wire and resistor to protect it from shorting to ground.

When I install a console, I wire *all* of the inputs and outputs to punch blocks whether they are used or not. Change is inevitable and having everything appear on the punch blocks makes that change so much easier.

For microphone inputs, if there is going to be a processor (and there almost always is) I configure the channel for straight mic in on the A input and mic processor on the B input. This gives a bit of a backup in that, if the processor fails, I can go to the A input and still have working microphone audio.

The dBx 286A has been replaced with the 286S. Outwardly, the A has a black front panel while the S has a metallic (silver-ish) panel. They are essentially the same processor, re-tooled for many surface mount components. I like these processors because they are easy to set up, they sound great and they are "reasonably priced." They have an 80 Hertz High Pass roll-off switch to help filter out room noise, and they include phantom power if you need it. It also includes a gated downward expansion that allows you to essentially mute the audio when no one is talking. The 286S specifically notes RF Filtering in the block diagram. I don't know if this was added or if it was also in the 286A, but this installation is in a fairly high RF area and I had *no* problems!

I don't use *any* of the De-Essser function. It's good for live sound, but in the radio environment all it seems to do is give everyone a lisp, and that's not good. And the Low and High "Detail" settings should be used sparingly. It's easy to misinterpret them as an add/subtract setting, but 0 is fully CCW. These controls *add* high frequency and low frequency boost.

There's a very informative video showing how to set the processor up specifically for studio voice (radio) as opposed to live sound (stage). I'm sure your favorite search engine can take you to it. Also, I just read recently that this processor was designed by Robert Orban of Optimod fame. Now I like it even more!

The last thing I did was put a security cover over the three processors. I know, it only takes a screw driver to take it off, but it does prevent accidental bumping of the knobs and like any lock – it keeps an honest person honest. Since installing the processors, I have had *no* complaints and many words of thanks.

That's going to do it for now. Until next time ... keep it between 90 and 105!

Scott Schmeling is the Chief Engineer for Minnesota Valley Broadcasting. You may email him at: scottschmeling@radiomankato.com

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Mike Callaghan - KIIS FM (retired)

"Hey, Mike! When you finish working with that headphone amp, you might want to take a look at the remote control. The transmitter output's only about 40%."

When you hear something like that, the importance of the headphone amplifier pales into insignificance. A station running at 40% power somehow seems more important. So I looked at the remote control and sure enough, the plate voltage was a little bit high. But the plate current and output power were both way low.

This had happened before. When you have an older transmitter, you learn the secrets it has hidden, and you develop a kind of sense about what might be wrong. When the power suddenly makes a step change all at once, (as opposed to dropping off over a month or so), you know something has changed abruptly. This abrupt change had happened before and I had a pretty good idea what had broken. I went and found my best helper, Jerry Burnham, and told him what had happened. After explaining what I'd seen, we agreed that we probably had a bad capacitor in the grid circuit of our venerable RCA BTF-10E1 transmitter.

RCA BTF-10 FM Transmitter
Photo from www.RadioBrandy.com

In the RCA, there are four, 500 pF ceramic coupling capacitors. They are mounted between metal plates around the grid ring of the 4CX10,000D transmitting tube. The way the capacitors are made is interesting. The capacitors are cup-shaped on the top and the bottom, and there are studs welded into the center of the cups – at least in theory. In reality, the machine that makes them always displaces the studs slightly off-center, and this causes a problem. When the capacitors are secured to the parallel metal plates in the transmitter, there's hardly any slop in the mounting holes. So when the screws are tightened down, it puts a sideways stress on the mounting studs if they're not centered – which they're not, most of the time. This stress, combined with the vibration from the cooling blower, will eventually cause the weld on the studs to fracture. And this fracture disconnects the capacitor from the grid circuit.

The Problem Capacitor

The open connection detunes the grid, causing a big drop in grid drive and power output. Nonetheless, Jerry and I drove to Mt. Wilson to check and verify our suspicions. Sure enough, when we took the tuning cranks and checked the grid tuning, we found it was way off and that we couldn't bring it back into resonance. With this verification, I called RCA and ordered two more capacitors for Delta-Dash delivery. With no backup transmitter, the station would have to run at low power until the parts arrived.

A few hours later, I had the two boxes with the new capacitors in hand. The very first step was to open them up and see how far off-center the studs are. The easiest way to tell is to screw a threaded stud into one of the studs on the capacitor and chuck the other end in a drill. Then you spin it and see how much "wobble" you get from the other side of the capacitor. If it's outrageous, you don't use the part. If it's not too bad, you hope for the best and install it into the transmitter. In this case, the wobble was definitely there, but it wasn't as bad as some others we had used. Checking the other capacitor, it was way off, so I decided to go with the "good" one.

I had already told the program director we'd need to go off the air for a while after midnight. He was pushing to wait until 3:00 a.m., but I was able to remind him that we didn't really know how long it would take, and I knew he didn't want to take a chance on the repairs lasting until morning drive, did he? He begrudingly agreed on 1:00 a.m., so that's when we had the jock sign off and we pulled the switch.

Luckily, you can make this repair without pulling the tube. It involves loosening the two screws on the upper deckplate and the screws going into the grid ring. That gives you access to the front two capacitors. If they're both intact, you move ahead to the rear deckplate and the rear capacitors. One of the four had better be broken or the problem could be a lot larger than you bargained for. In this particular case, it was the right rear capacitor that had snapped off the stud. So now you have to get under the socket shelf and take out the screw holding the lower stud in place. And make darned sure you don't drop the screw down into the blower – then you'd get to *really* take things apart! The screws have slotted heads so this is a precarious operation. The trick is to get it loose enough that you can unscrew it with your fingers while you grasp it.

Fortunately, it went well and I got it out without an issue. Once it was free, I could reach in and take the two pieces of the capacitor out. Looking at it, there's not much to see. Just the snapped-off stud and the dimple where it had been "welded" to the capacitor. Now I had to take the screw I'd just removed and stick it back up through the hole in the socket shelf. Once it was through the hole, I slipped the locknut back over it and held it in place while I screwed the new capacitor back onto the screw. It's tempting to twist the capacitor down tight to secure it instead of tightening the screw from the bottom, but this puts stress on the weld. So you get under the shelf and tighten it up from the bottom with a screwdriver. It's a pain, but it's the right way.

Once that was tight, we got to put the upper deckplate in and secure it back to the grid ring and the old and new capacitors again. Finally the screws were all secure and we were ready to try it on the air. The broken capacitor in it's two pieces laid on the workbench as silent testimony to a bad mechanical design. The tube cavity was buttoned up, the cabinet secured, and the filaments turned on. Once the transmitter was warmed up, the plates were turned on, and the grid retuned. The transmitter was happy and back on the air. All was well.

Move ahead two years. This time, we had another RCA as a backup transmitter, just like the first. It was connected to a second antenna, a lot further down the tower than the main antenna.

Guess what happens? We snapped off another grid capacitor. Again we found the grid way out of tune, and it could not be brought into resonance. So we called RCA – two more capacitors, please! We picked them up at the airport and drove to the mountain. Relieved that it will be so easy this time, I opened the box to take out the capacitor. Out slides something I've never seen before! It's a capacitor all right, but it's an entirely different shape and size than what we've always used. Along with the new capacitor, there's a slip of paper. It says: *"This is a replacement for RCA Part # 3010665. It has the same part number to keep our inventory straight. In order to use in place of the earlier version, you must also order adapter # 3010666. We are sorry for any inconvenience."* What was this? We just paid Delta Dash to bring us a part we desperately needed, with the very same part number we've always used, and we needed to do it all again to get an *adapter?*"

The guy sitting at the parts desk was barely awake when we called back. "What is this? We ordered capacitors part # 3010665 and you send us a different part that needs an adapter?" He said, "Uh, wait a minute, let me look it up. Oh, yeah. We ran out of the other part so we made a substitution. They were supposed to tell you when you ordered it again." Finally, RCA sent the adapters for the new capacitors and they got installed. Once again we were back on at full power.

All things considered, the BTF-10E1 was a pretty good transmitter. We only had a few problems with it, in the 25 years it was on the air. It would go through a tube every few years, but we made it a point to try and keep getting the same tubes rebuilt again and again. We did nothing special for filament management, just turned it up until a new tube made power and a little bit higher, and they'd run until the tube started to get soft. We replaced the main RCA with a Nautel FM-10 in 1998 and replaced the second RCA with another FM-10 a few years later. We sold the original RCA on Ebay for $ 2,000 in 1999. It went somewhere in the far East. Wherever it went, I hope they have plenty of grid capacitors on the shelf.

Mike Callaghan was formerly the Chief Engineer at KIIS-FM in Los Angeles, CA. His email is: rg@mike.fm

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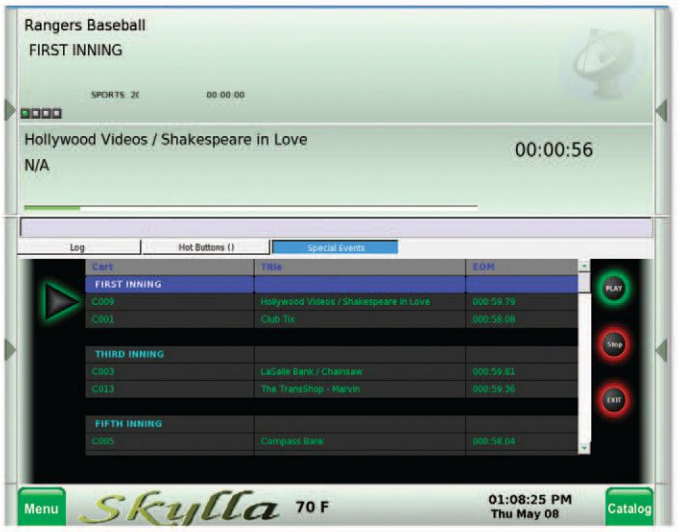

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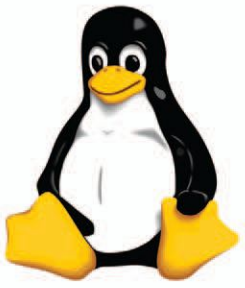

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Engineering Perspective

My Pet Peeves

by Jim Turvaville

Every Engineer should come out of the workshop every now and then and hang around the office – and not just to see if there are donuts in the conference room. Often it is important to get a little bit of feedback from the rest of the staff; it could really come in handy when you are asking for that Cap Ex project to be considered or the boss to pay your way to the next NAB show. Being away from a staff on a daily basis as a member, I get a little bit of an outside looking in perspective when I visit stations these days. I just spent a week with a staff who had never met me, and I got some interesting comments about their perception of the technical staff – some of it justified, and some not so much. But it got me to thinking about that, and thought I'd share some thoughts on a few hypothetical things one might think about to manage some of the "pet peeves" of the rest of the staff.

Messy and Confusing

The number one comment heard about the Engineer at most stations is that he only makes things messy and more confusing. And that is from people who have never seen the server room or tower site. This is – as expected – most predominantly heard from the females in the office who probably practice saying those things at home to other males. But there is a basis for this comment, and it can be addressed and at least minimized. As a simple general rule, always go out of your way to clean up your own space, and to clean up after yourself when you are in someone else's (ie studio and office) space. And that, *"why must I have to put up with all those wires"* comment can be at least partially addressed if one only takes the time and a little bit of effort.

There is nothing that can be done about needing wires to make things work – in fact, that's probably the first thing that I happen to love about being an Engineer. I love to play with wires, and there are not very many problems that can't be solved by just the addition of a few more of them. But there is certainly something you can do that will make those lovely wires more palatable to the rest of the world. Ideal wire management is expensive, especially when multiplied by the number of people on the staff; and you should use it when the budget allows. But that $9 roll of Velcro from Harbor Freight will go a long way toward making some manageability out of those necessary wires. Add in a couple of Command Strip adhesive hooks and that myriad of wires on the receptionist's desk can, at the very least, be straight, neat and orderly. Most all Engineers are conscious about how that equipment rack is wired; the same has to go for the office as well. As for things being confusing, that brings us to the next item.

Communication

I've said it a thousand times, and even had it on a sign in my office at one time – *"Communication is our business. It is not, however, our Company Policy."* As funny as that can be, it can also sadly be quite true when it comes to Engineering folks communicating with the rest of the staff. I know, we all became an Engineer simply because we were bad at communicating, and at one time we might have gotten away with that kind of secluded existence. But in the lean & mean, slim & trim, budget cutting, we-wear-lots-of-hats world of Radio these days, it is even more important for the tech guys to learn more about how to play well with others. This area of communication is probably the fastest way to cut down on some office complaints.

It's common for the staff to not know what the Engineer does, so just politely accept that and always assume they do not know anything when you are communicating. We may be the last bastion of mystery in this industry – keep the mystery up, but learn to talk to the staff about what you do in terms they can understand. Primarily, don't use any acronyms; while we live for them, the rest of the world does not think in letter combinations. Even POP3, DNS, STL, FTP, AD, TCP/IP or DHCP which "everyone" uses every day, and should know, should be avoided. Yeah, they all use those things, but have no clue what they are called – so do the same and use street language when discussing your technical needs. Everyone want to know the bottom line – how will what you are doing affect me? Skip most of the technical details and cut to the chase with simple language. If you work all night, a simple, *"I had to replace the cable to the system that carries our audio to the tower and that*

(Continued on Page 22)

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My Pet Peeves

– Continued from Page 20 –

needed to be done at midnight. Everything is fine now but I'll be late coming in the office," will let most know and understand why you did not come to work when they did. And, *"You know we have bought new servers for our email, so in order to get them on line and everyone not lose any of their email or productivity, we will be moving everything this Saturday night. When you leave on Friday please turn off your computer and on Monday expect it to take a few more minutes than normal for your email to open up. If you have problems after about 5 minutes just let me know and I'll look at it for you,"* says all that the average staffer needs to know, without talking down to them or boring them with useless tech details. And be sure you are there on Monday and available to look at things for them. After a few successful times like that, people will think you are the magicians that you really are around the station.

Number Crunchers

Having first hand interaction with the Accounting folks (my bride) I would be remiss by not making some comment about keeping them happy; at least on the professional side of things. And it's no secret the main pet peeve of the Accounting department is, *"why do you spend SO much money?"* And while it's usually not really true that the technical folks spend more money than the rest of the departments, we do tend to do it in larger chunks than others. Promotions can spend a few thousand on banners, bumper stickers and balloons and have a warehouse of stuff to show for it. We spend $30,000 on a transmitter that fits in a rack the size of a trash compactor. Somehow – they just don't understand the difference ... but I digress.

More than the quantity of spending the money, I think Accounting really wants us to be better at the C-word (you know, *Communication*) about how and when we spend it. If it's in the budget, be sure they know you are spending something already budgeted and approved for purchase – no matter how much it is going to cost. If it's not in the budget, be sure they know the importance of making the expenditure and that your (and their) boss is aware. And go out of your way to let them know, long before those invoices start popping up in the mail, what they expect. I've been guilty many times of exaggerating the cost of a project just to keep the Accountants happier when the bills come due for less. It's the Engineer Scott principle of *"always multiply the time required to complete a job by THREE in order to maintain your reputation as a miracle worker,"* taken with a little artistic license as needed.

And please keep those receipts – I mean keep them for everything, even if you don't think you'll need them. Come up with a system to save every receipt in a handy place (I use the zip pocket on the back of my Daytimer book where I log miles and expenses.) and turn them in to the number's gurus when they need them, or even a little before. Make it a personal habit to *never* spend money without telling them – it might be easier to get forgiveness instead of permission, but you just can't hide from those invoices each month and they need to know about it from you before that happens. If you do this for a few months, you'll get a reputation of being the one that makes their life easier, and maybe they'll start picking on Programming instead of you.

In the 21st century version of this business, we all fell in love with at an early age, much of what we came here for is long gone. But one of the greatest rewards of working in Radio engineering in my career has been the people; people of all types and backgrounds, with as quirky a personality as I have, but in their own little world in this industry. And getting along with them, learning how to make their job easier while doing your own, and working together to make the magic that is our day to day jobs, is amazing. Keep that alive.

Jim "Turbo" Turvaville is semi- retired from 38 years in full-time Radio Engineering and lives in Rural Wheeler County Texas in a "tiny house" where he maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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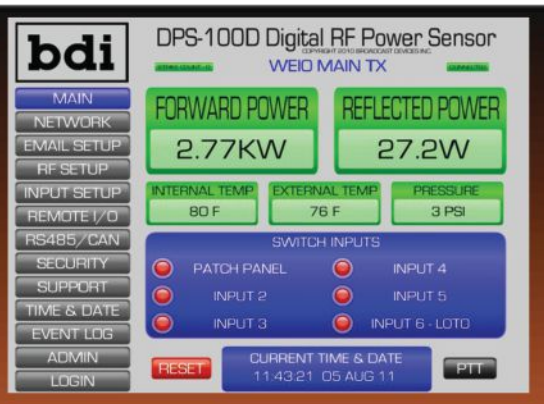

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Transmitter Site

Resurrecting the Beast!

Salvaging That Old Transmitter

by Tommy Gray – CPBE CBNE

I am sure you have probably heard someone call an aging transmitter a "Beast." Many times that moniker was justly earned by all the problems the thing had caused in the past. Most folks have at least one or more horror stories about dealing with old transmitters and the grief they had caused. These days there are a lot of transmitters that find themselves relegated to a spot in the corner, collecting dust, or at best just an occasional use as a backup or auxiliary transmitter. This can be due to the fact that it is just no longer reliable in some cases. In others, maybe it is because the manufacturer has gone out of business (sad to say) or possibly original parts are no longer available.

In some cases however, the thing is a decent box, but possibly just too complicated for the person responsible to keep it running and, rather than to keep calling in outside help, it was retired. Now mind you, I have retired my share of transmitters that frankly deserved it, and probably deserved being dropped off a tall cliff! If you have been in the business for a number of years you have probably been stuck working on a transmitter that was not a good one when brand new, and after many years of hard use, was even worse, and deserved to be put out to pasture. I have also, as have many of you, seen perfectly good transmitters trashed by someone who got a new one and did not care what happened to the old one.

If the old transmitter is a decent design and parts are still available, it can allow you to do maintenance at a decent hour and keep your station running and sounding good, while you have time to do preventive or necessary repairs to your primary transmitter. One other thing to consider here is that even new transmitters require updates, etc., and then what do you do? Do you go off the air to install that latest firmware update, or do PM? Or, do you fire up the old standby, and stay on and sounding good? Well, the solution is pretty obvious here. If you have an old transmitter and it is not totally trashed out, fix it and put it to good use.

What to Do?

Start by giving it a good inspection and a thorough cleaning. Tighten up all the wires, clean up any edge card connectors and sockets. Next, I usually will try to turn it on at low power to see if it might run. If it does, I stop there and continue to clean everything up. Don't be concerned if it will not run at 100%. Reduced power when your main is down, is a lot better than no signal at all! You may say, "I have a solid state transmitter that will run with a module or two down." Well, we had one a couple of years ago that, even though it was a well built site and well grounded, took a massive hit that even the best sites could not have survived, and it lost every module in the transmitter! It was eventually retired and replaced, as the damage was too extensive and expensive. We ran for several weeks on a backup transmitter, and the station stayed on the air, covering its city of license with good signal. *(Don't forget to file for an STA if you are going to be at reduced power for longer than the rules allow.)*

You will probably not use your emergency backup very much, even when it's working, so you have to head off the inevitable corrosion that comes from sitting idle. One thing I use to keep down corrosion and to make connectors function well is to use a product called "CramolinTM." It is one of the best things I gave seen to clean connectors, switches, contacts, etc. At one time it had to be ordered through the manufacturer, Caig Laboratories, but I have more recently found it through Radio Shack™.

Next, you probably need to disassemble tuning networks, especially those with sliding contacts, and clean up all the silver plated parts. I like to use a product called "Tarn-XTM" to clean the tuning controls and finger stock, etc. I will however warn you to be very careful, as old contacts that have had a lot of use (and heat) will more than likely be very brittle and easily broken. Finally use a little light machine oil on tuning screws, etc., as well.

Document It!

Here is a trick I use to save me a lot of grief later. I take tons of high resolution pictures of every last nut, bolt, and wire, so that later I know where they went. You can always use the pictures to prove the condition things were in when you started.

One example of how this helped me was when I was called in to change out a tube socket in a transmitter that had a lot of problems. The station owner was a rather grumpy guy who did not trust anyone, and since I was from out of town, he trusted me even less. I started by taking pictures of everything before I touched the transmitter. I then removed the tube socket, started assembling the new one as many parts had to be removed from the old one, and put on the new

(Continued on Page 28)

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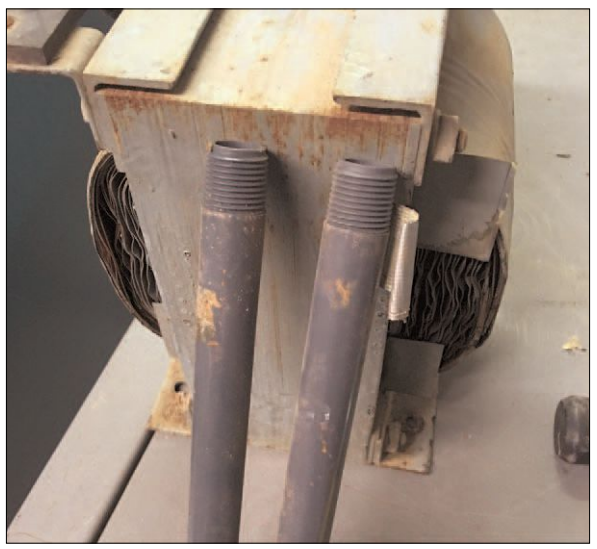
Resurrecting the Beast!

– Continued from Page 26 –

one. At one point in our project, we were having trouble finding where all the screws went, and finally were one nut and one washer short. We searched everywhere, and since I had laid everything out on a clean white towel, I knew that it must not have been there to start with. The owner started complaining that we had lost parts out of his transmitter and started giving us grief. I pulled out the pictures and zoomed into the socket before it was removed from the transmitter and guess what? They were not there to start with, and had been left out by the last guy who had been in there! He backed off, egg on face, and left us alone the rest of the night! *(And yes, I replaced the missing items!)*

Check It All Out

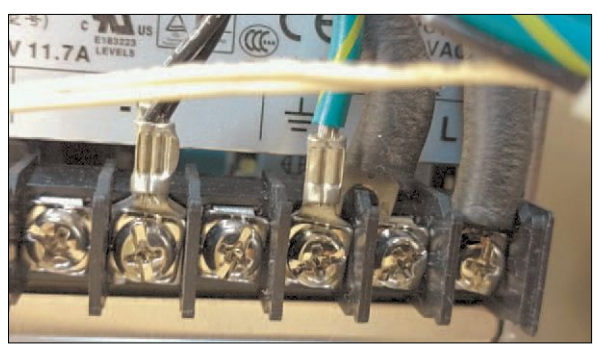
I always inspect everything in the old transmitter to make sure that someone else had not patched up things that should have been fixed. These things have a way of coming back to bite you in the posterior later, just when you don't need it to happen. We recently had a tower crew working on replacing a set of aging strobe lights with some nice new LED lighting. At several points in the project the station went on the backup transmitter for a while, as we keep it patched onto the backup antenna so all anyone had to do was just turn it on and it was good to go. After about an hour or so of running, a horrible burning smell started coming from the transmitter (A 30+ year old unit we kept for backup service). I came in later and found that it had a plate choke that was burning up, and needed replacing. Upon closer inspection, I found that it had shorted to the case many years before, and had been insulated from the chassis with a couple of pieces of PVC pipe to keep the transmitter on the air. The choke's location in the chassis made it impossible to see, unless you actually removed the parts that were in between it and the back of the box. Once we gained access, we saw the pipe. Now there is no telling how many of us have done something like this to get back on the air in a pinch. However, never coming back to replace it allowed the already dying choke to fail on us at a bad time!



You can see in the picture above, the two plastic pipes that had been in that transmitter for at least 15 or more years, as we have been maintaining this station for at least that long, and never had need to take it apart to find them! This was someone's quick fix that came back to haunt us even though a previous engineer had "fixed" it.

The Fix

Speaking of "fixing" things, just this past week I was helping an engineer friend out in central Texas, repair a nice late model, solid state HD transmitter. He had just received an exciter back from the manufacturer who had repaired it. When we powered it up, one of the two exciter fuses popped but the exciter came up and worked, and the transmitter came up at full power! Immediately I knew we had a weird problem. It took a bit for me to remember that this particular brand of transmitter used a 240 Volt exciter that would work on anything from about 100-240 VAC. We put the old exciter back in, which also would run on a wide range of voltages from 100-240 VAC, and the replacement fuse held. The problem had to be in the new exciter. It was obvious that it was running off one side and ground. Out of time, we left the spare in place until my friend could either work on the unit or send it back to the factory who had just kept it for weeks, and sent it back with a problem. The next day I got a text with a picture of the new power supply the factory had installed.



See if you can spot the problem in the picture above. It was not visible without taking things apart, as there was a cover over the terminals. Well, not even the factory is immune to a slip up every now and then!

Tommy Gray is President/CEO of "Broadcast Engineering & Technology LLC", a Consulting and Contract Engineering Firm with offices in the Houston, TX area, and North LA area. www.BEandT.com

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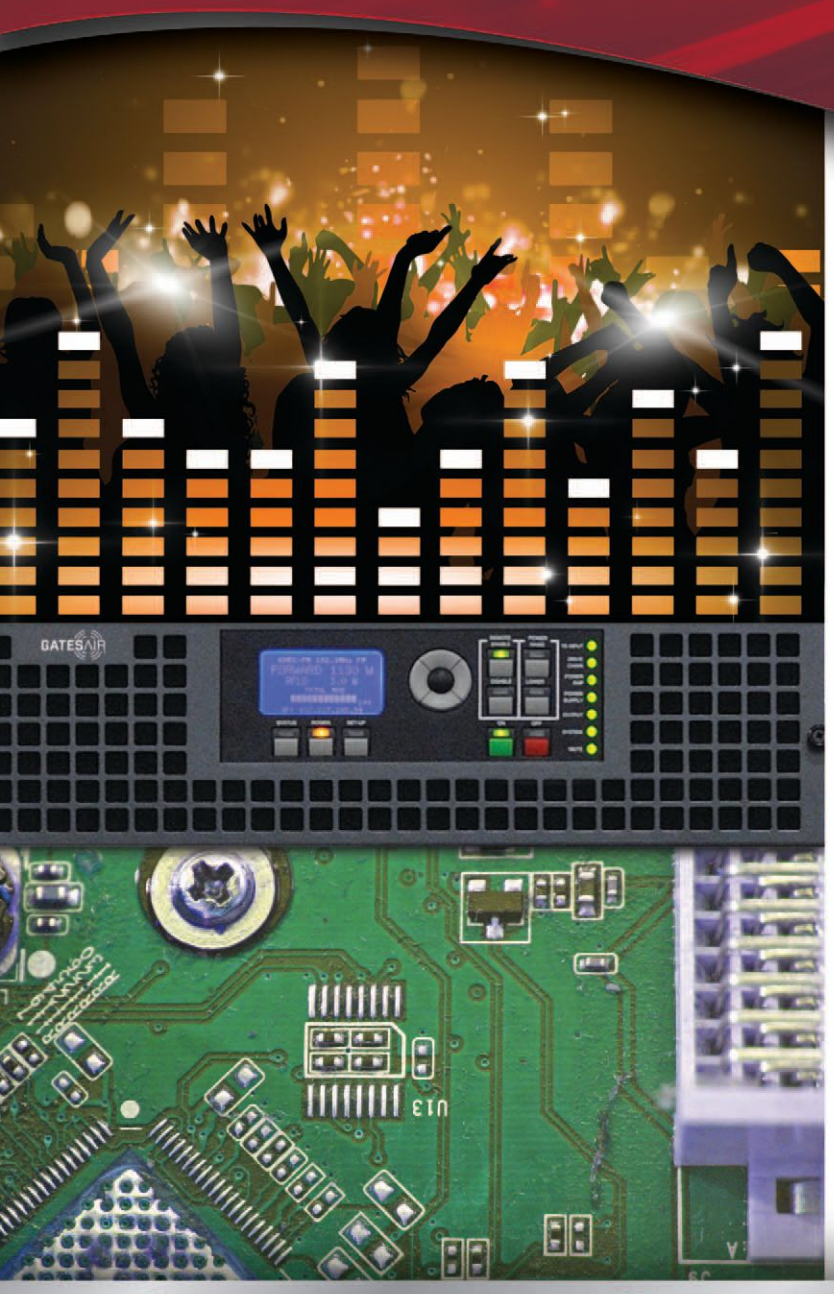

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Facility Focus

Watts to Save

by Rolin Lintag

A major area where the Engineering Department can save the station on expenses is on its electric bill.

In fact, this is a big opportunity that engineers should grab by the horn and show the GM that your department can also contribute to the income side of the business. Remember: money saved is money earned.

Understand Your Bill

Periodically, you should look at and understand the electric power bill, both for the transmitter site as well as the studio and offices. Start by getting in touch with the electric company and get the rate schedules being used for your facilities.

Aside from the correct account number and details like that, there are a few parts of the bill with which you should be familiar.

• The energy in kilowatt hours (kWh - the power consumed by the facilities during the last billing period.)

• Any "demand charge" – for the capacity required by the facilities for that billing period. This varies according to how energy is used, and will be explained later on in this article.

• Exactly what pecific rate plan under which you are operating.

• The rate tiers – what happens to the rates as power consumption goes up.

Check Your Rate

Remember, the power company has multiple rates – everyone does not pay the same rate. This means that changes in your consumption (whether up or down) may place you on a different rate structure – and the power company does not always tell you that another rate might be more advantageous.

Many stations have found conversion to solid state transmitters made a big difference in site electrical costs. In addition to savings from more efficient transmitters, the reduction in heat load often brings additional savings from reduced air conditioning. (Interestingly, at some sites, the lack of exhausted transmitter heat in winter may spotlight the need to better weatherproof the building!)

TV Can Save a Lot

Television facilities, in particular, found the change to digital transmitter equipment lowered the facility power consumption.

For example, a station using 217 kVA (kilovolt/Amperes) before – and charged under the Large User Rate – may now have lowered consumption down to 80 kVA where it may be possible to change the rate charge to General Usage Rate. These are actual figures, by the way, from one of our facilities.

Using the power company's Rate Schedules, check to see if your present usage is already on the proper Rate. If not, then it is time to ask the utility company to adjust your rate accordingly.

Table 1. Sample Rates

	General	Large
	51 to 150kVA	Over 150 kVA
Service Availability Charge	$32	$60
Summer rate Demand	12.46	13.65
Winter rate Demand	6.88	7.4
Usage in kWh	0.033	0.033

Using the Rate Schedule of an actual power company as an example on **Table 1**, we can compute for the difference on the bill, applying both rates as shown on **Table 2** (on page 32).

You might want to take note in **Table 2** that the usage, of 103,920 kWh during the simulcast of analog/DTV operation, dropped to 45,480 kWh when the analog was retired. Thus there was an immediate savings in the power bill even using the Large Service rate.

However, an additional of $126 per month was realized by just applying the correct General Service rate. This is $1,512 in annual savings by just getting the correct rate applied to the bill. It may not look like much as far as the station earnings is concerned, but think of it as a tax refund and it will suddenly look like something worth the effort.

Of course, if you are in an area where the electrical rates are more like the national average of 10 cents or so per kWh, savings now jump past $4,500 a year – not too shabby at all.

(Continued on Page 32)

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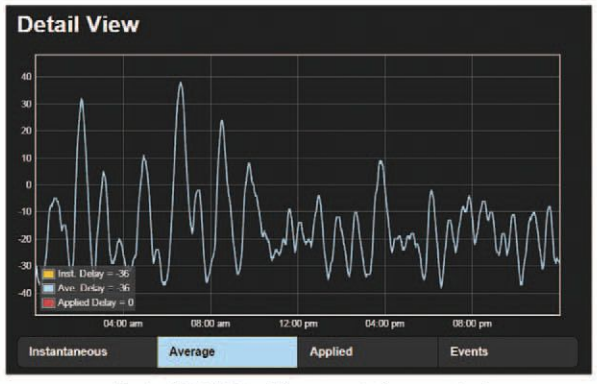
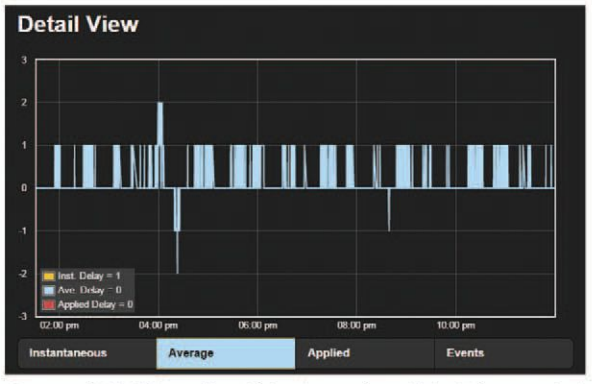


Typical FM/HD1 drift over a 24 hour period.



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Watts to Save

– Continued from Page 30 –

So, you see why it is important to be sure your rate reflects the current load. After all, why pay higher rates than you should be charged for?

Demand Need Not Be So Demanding

Electric utilities determine the peak usage of your facility usually by measuring the 15-minute period of highest usage. This is the basis for the Demand Charge.

Table 2. Difference due to Rate Change

Usage (kWh)	Demand (kW)	General Service	Large Service	Savings/month	Annual Savings
		(51 to 150kVA)	(150kVA and above)		
103,920	217		$6,451		
45,480	80	$2,527	$2,653	$126	$1,512

The Demand Charge part of the bill may cost as much as 40% of your bill so it is important to seek ways to lower this.

Suppose the biggest loads in your facility are a 10 kW transmitter and two units of 15-ton HVAC. There is not much you can do but run the 10 kW transmitter as scheduled to be on the air. But both of the two HVAC units need not work at the same time for the same 15 minutes, or more.

If both HVAC units do work at the same time for 15 minutes or more, the facility Demand Charge goes up.

Similarly, testing your auxiliary transmitter can be quite expensive. A 50 kW auxiliary transmitter, for instance, will almost certainly push you over into a higher rate bracket. Stations that must deal with this situation quickly learn to start and transfer to the generator before starting the auxiliary transmitter. (Of course, you now may need to deal with clean air regulations.)

You will need to experiment on this at your facility to find what settings work best, depending on the various loads and time of the year. It is simply the responsible way of managing the transmitter site.

Avoid Power Factor Charges

By the way, some electric utilities are now penalizing users if the power factor is less than 0.96. There is usually a graduated scale where additional charges are added on your bill depending on how bad the power factor is measured.

It is better to invest a few thousand dollars on correction capacitors to bring up the power factor to 0.98 than to pay for the penalty. Any money spent on fines or penalties is definitely a waste.

Efficiency Check

Efficiency is the key word here. Careful design of the transmitter building is important. Always think of the big picture.

For example, all too often, HVAC requirements are calculated considering the transmitter heat alone. It is entirely possible that half of the cooling requirement is from heat seeping through the building roof and the walls, particularly during summer.

This brings to mind things like indoor power controllers for the tower light system. Make sure to account for such cooling need in the facility design and use only energy efficient equipment.

Energy Saved Is Money Earned

One area where attention to energy conservation is usually left out is heat insulation of the ceiling and walls.

It is understandable that transmitter buildings have so much ceiling-mounted hardware like filters, cable trays and waveguides that it makes it harder to place heat insulation on the high ceiling. However, these ceilings and walls contribute a lot to the HVAC requirements and should be considered in the facility design.

Install automatic door closers on all doors to keep them closed. This is a cheap and simple way to keep cool air inside the building. Plug all openings and other measures to keep cool air inside the building.

Similarly, in winter without the large heat discharge from tube transmitters, you might need to invest in room heaters if the building is not properly insulated, running up the power bill.

This time, the automatic door closers and other measures will keep the heat inside – better for you and the transmission system.

If all of us watch the Watts we use and save, we not only will save the station from unnecessary expense but have done the planet a favor as well.

Rolin Lintag is Asst. Chief Engineer for KRON4 in San Francisco, California.

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Tech Management

Are You a Teacher *and* An Engineer?

by Steve Callahan

As you probably already know, I've owned my own radio station for many years and I've also been, in one form or another, responsible for the technical operations at many other people's radio stations. I like to say that I've been on both sides of the checkbook when it comes to radio station management and engineering.

It's an undisputable fact that the roles in today's radio station have changed a lot in recent years and will continue to change in the immediate future. I've had the privilege of working for some excellent managers who've expressed an interest in technical excellence, and then I've worked with some other managers who had no interest at all in even knowing where the transmitter sites were located. Congratulations if you work for the former, and if you work for the latter, this article is for you.

Recently, a good friend, whom I've worked with for over 30 years, retired and passed the baton of management of a station along to a new manager. My friend had always taken a keen interest in the technical side of the operation and I can't remember the time when he didn't work right along side me when he needed a new studio built or moved.

I'd like to credit my friend's interest in the technical side of radio business to my encouragement over the years, but he and I both got our start many years ago in what seemed like a very different radio business. Yes, "Mom and Pop" station owners are gone and the "Market Manager" has taken their place. Your new manager has most likely come up through the ranks of the sales department and he or she understands the radio business from that perspective. Their job has always been to generate a positive cash flow and to achieve revenue projections, and they now carry that motivation into their new role as the general manager of all the station's operations.

The fellow who took over from my retired friend didn't come up in the radio business. He came from a totally different business where he was the general manager and was responsible for keeping that business profitable. Quite understandably, his first days on the job focused on learning the profit-generating aspects of station operation as they related to his past experience. My first job was to earn his trust and to slowly educate him to the way a radio station's technical needs were the same as the needs of the business he had just come from.

I once had a station manager say, "I make the money and you spend it." I guess that was the way he had grown to see the hierarchy in that radio station, so I thought the words would have been wasted on him if I said that the efforts of the most productive salesperson, the most talented production person, the most connected promotion person, or the best on-air personality, would be wasted without the all important on-air signal that results from a well built and maintained radio station.

Recently, I spoke with a long time engineering friend who has worked for a station for many years. The station's transmitter needed a new plate transformer and, even if you could find someone to make a new one, it would be very expensive – it would have taken a lot of time and the shipping cost for that behemoth would have broken the bank account. However, my engineering friend found a nearby station that was "parting out" the exact same model of transmitter and the plate transformer was still there. He took the initiative to get a helper with a truck, a come-along winch and some rollers, and he spent the better part of two days disconnecting the plate transformer, getting it out of that building and into the borrowed truck, transporting it to its new home and then getting it into the building and connecting it up. His immediate gratification came when he hit the plate on button and the transmitter came back to life immediately. The old plate transformer then became a doorstop.

You might be thinking that for taking the initiative to find the needed part and for saving the station a lot of money, that he would have been handsomely rewarded in some way. Well, you'd be wrong. That station manager gave my friend a $25 restaurant gift card.

That one example shows a lack of communication on both the manager and the engineer's part. My friend the

(Continued on Page 36)

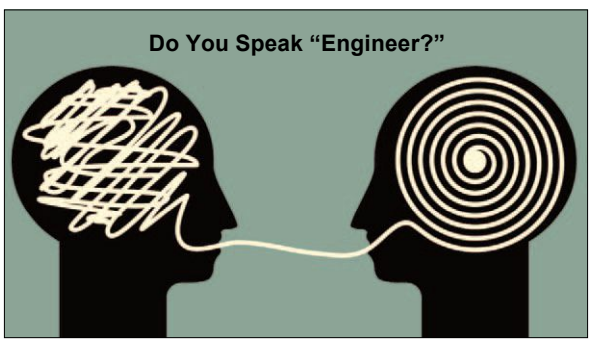
Are You a Teacher *and* An Engineer?

– Continued from Page 34 –

engineer should have fully informed the manager of the consequences of having a plate transformer that spewed sparks and flames from the windings, how long the station would have to be off the air, along with the anticipated costs of getting a new transformer built to spec and then shipped across the country. The manager should have acknowledged that he understood the problem and its associated costs and asked what, if any, his options were. My friend should have fully informed the manager that he could have saved him a ton of money and a lot of off-air time if they had used his professional connections to get the used transformer, with him personally transporting it to the station in need. The manager should have then compensated the engineer in a manner that truly reflected his appreciation of the initiative and back-breaking labor in solving the problem in a very cost-effective manner.

My friend acknowledges that he's the only one to blame in allowing the management at that particular station to take advantage of his talents and skills. However, it doesn't have to continue that way. There are several things you can do right now to better educate your manager, to shine the light on the ways you fulfill an important and cost-saving role.

1. Develop Trust. A new or old manager needs to develop trust with his or her department heads. The formal definition of management is "getting things done through people" and trust is a crucial part of that. Do what you say that you'll do, and be where you say you'll be – at the time that you say you'll be there. Don't make promises you can't keep but keep the ones you do make.



2. Don't Speak "Engineer." If you only tell a manager that the transmitter's "IPA has high VSWR" and that you need an unknown amount of money to fix it, then you are bound to see that all-to-familiar blank stare followed by a request to defer that expense until a later date.

3. Educate Your Manager. Clean up the transmitter site and bring him or her to it, to show them the fruits of your labors. If the tower needs painting, bring them out to the tower to see the flaking paint. Save the cost estimates for tower painting until you get back to the office and the time is right. It's a good idea to slightly over-estimate a project cost because it's always better to come in under budget rather than over budget.

4. Blow Your Own Horn. At budget time, make sure your manager knows how much money you saved the station last week, month or year. Explain why your participation in SBE yields benefits for you and for the station through networking with other area engineers.

So, be a teacher and an engineer, and remember what Red Green always said, "We're all in this together!"

Steve Callahan, CBRE, AMD, is the owner of WVBF, Middleboro, Mass. Email at: wvbf1530@yahoo.com

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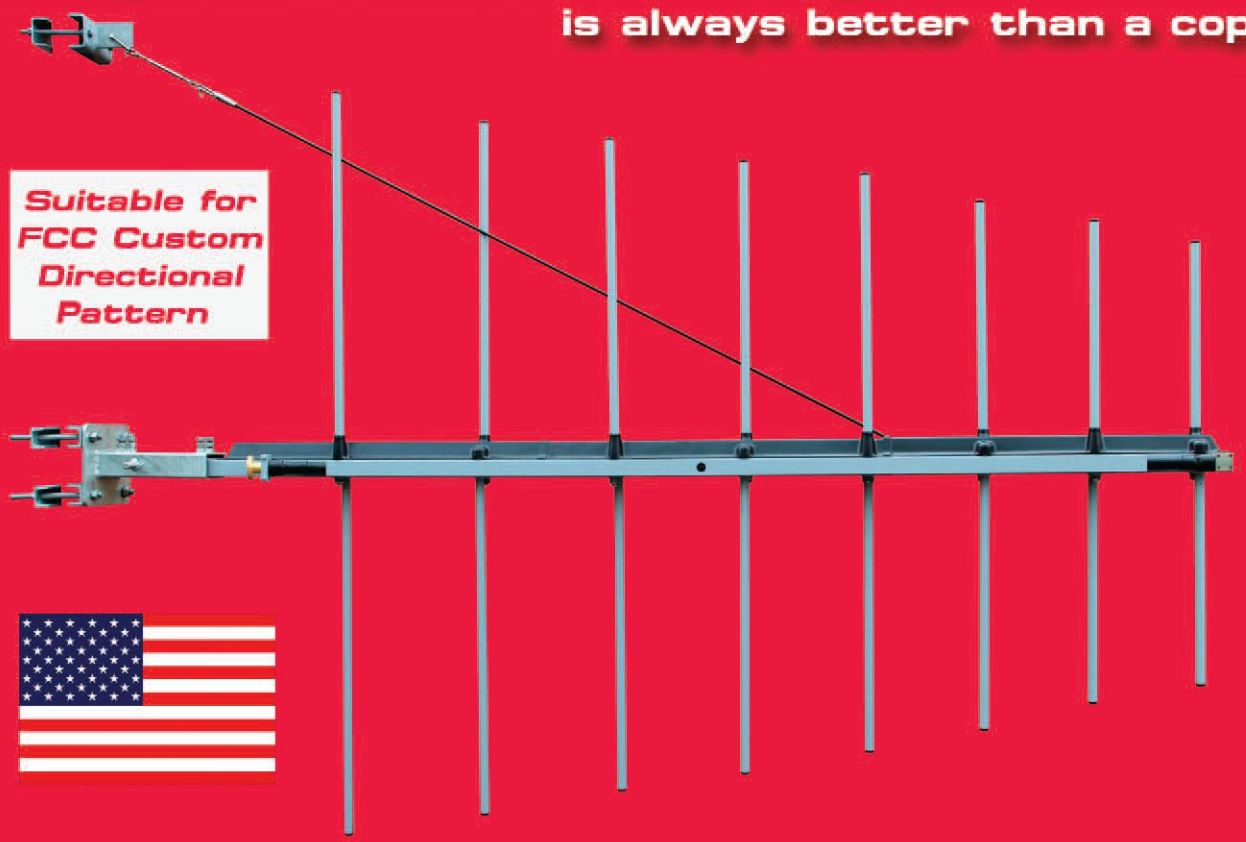

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Tips From the Field

Monitoring Tower Lights and Other Things

by Clay Freinwald

Monitoring of tower light operation has always been a chore for the station engineer. If you are fortunate to have a modern tower light controller, this job is made easy, because the newer units have alarm contacts that can be connected to the station's remote control system. However, many times the need arises to be able to monitor tower lights where these systems are not available.

Seeing The Lights

Back in the 60's I created a tower light monitor so the station's announcer could observe the operation from the studio. This was a rather simple device consisting of a home-brew current transformer driving a VU meter. If the meter deflected to 100%, all the lamps were on.

When that station moved its transmitter to a new location, things got a bit more tricky. In this case I generated a DC voltage proportional to the tower light current and supplied that to the remote control system. The announcer, at sunset, would "dial-up" the tower light function on the remote control and, again look for the deflecting meter.

With the newer remote control systems and their status indicators I have moved toward translating tower light currents into simple tower light fail/status indications. They then can be used to toggle status inputs on remote control systems that will call and alert me about any tower light failure – in addition to being able to monitor currents when I wish to do so.

Construction a Tower Light Monitor

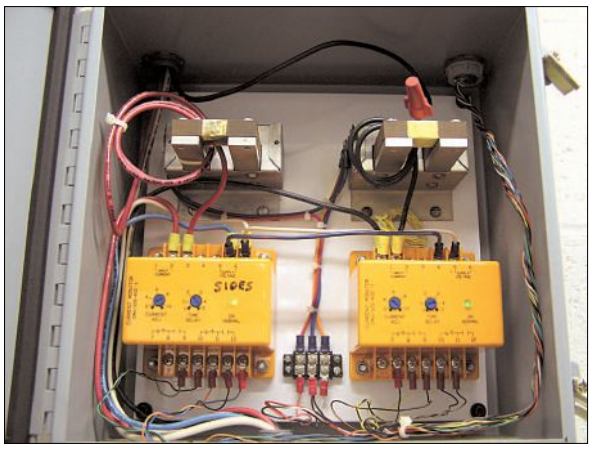
Making an effective tower light monitor is not that hard. I installed the following one at a site here in Seattle.

In this case, I am monitoring a tower that has one set of sidelights and one beacon. To accomplish this task, I have re-used a couple of old, trusty Moseley current sensors, as well as two current monitors (Diversified Electronics CMU-120-ASE-1) www.marshbellofram.com/diversified-electronics

The current monitors outputs, in this case DC, are simply connected to the facilities remote control system metering inputs and calibrated so that a "100" reading is equal to "all lights are operational."

The sidelight current sensor has its threshold adjusted so that a failure of any one of the two sidelights will cause the device to toggle. The beacon sensor is adjusted so that it will toggle should the operating current fall below the operation point. The beacon sensor delay is adjusted to ignore the flash rate.

The remote control system is programmed to check the tower lights after dark and, via a macro, look for the status indications from the two devices, if they are not there, it reports an alarm condition.



Two current sensors and two current monitors provide full monitoring for the tower lights.

Changing to LEDs

When I first built this monitor, the tower lights were incandescent. However, they were later changed to LEDs.

This change required that I increase the number of turns on the primary of the current transformers to obtain the desired DC voltage to make the remote control systems happy. The current sensors were changed to lower current ranges – both sensors are now one Ampere models.

Multiple Towers

Another application for the current monitors is at an AM array where two of the four towers have obstruction lights, but no beacons.

(Continued on Page 40)

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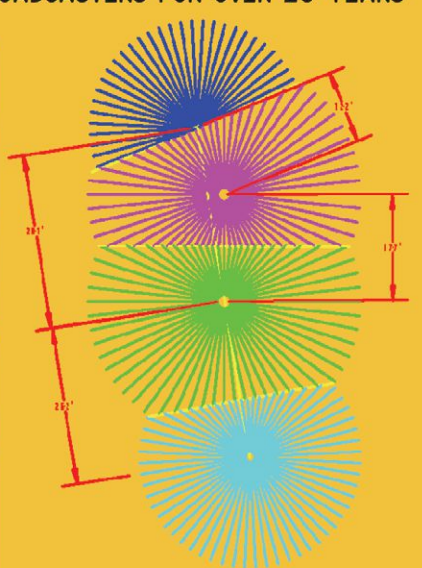

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Tips From the Field

– Continued from Page 38 –

In this case the tower lights are two sidelight size fixtures at the top being fed via an Austin-Ring transformer. The same current monitor, as used at the other site, is employed on the primary of the tower transformer. Its trip-point is adjusted to show a failure of either of the two lamp assemblies. The unit's relay output is connected to the stations remote control system where it is automatically checked, after dark, to make sure that the lights are on.

As at the other site, these lamps were incandescent and we were concerned that changing to LEDs would compromise the ability of the current sensor to determine whether or not one lamp had failed – especially when you consider that the load to the Austin transformer is a fraction of the normal primary current. Nevertheless, the system has been working just fine for years.

Even More Lights

In this situation it was necessary to monitor the currents of a tower that had two beacons and six sidelights. This site was only used for RPU and had a dial-up remote control system. We wanted to be able to know if the tower lights were off when they were supposed to be on.

To accomplish this we again called upon the trusty Diversified Electronics current sensors, one on the beacon circuit and the other on the sidelight circuit. In this case, the supply voltage to the sensors was supplied by a separate photocell assembly. This device, purchased at a local electrical supply house, was designed to turn on lights after dark; in our application, it supplied power to the sensors.

The photocell was positioned so that it would enable the sensors a few minutes after the tower lights had come on. The sensors, in turn, were connected to the remote control system and would issue a "tower light failure alarm" should the lights be off when they were supposed to be on.

Useful For Many Projects

These current monitors are very handy devices for monitoring a number of things at remote sites in addition to tower lights. They can be used to monitor such other consumers of electrons as antenna heaters, interior transmitter building lights (to log when the facility has been visited), or ventilation equipment etc. They are wonderful tools.

If you need a current transformer, you may not need to go out and purchase one. In the past I have looked under the bench and often found a suitable filament transformer whose secondary can handle the required current I wish to monitor.

Placing the secondary in series with the load will produce a voltage on the primary proportional to the load current. The problem is, you need a pretty large transformer if you are monitoring a large load. I have been known to take a transformer apart by removing its secondary and winding a few turns of wire in its place, but this is time consuming etc.

A "New" Parts Source

A solution jumped out at me a number of years ago in the form of a two-pole phonograph motor. (From that remark you can tell it was indeed a long time ago.) Thankfully they are still making a number of devices with these simple motors.

The good news is their bearings wear out and usually the motor, or the whole device, is discarded. (I have a box of them in the garage with my private stock.) You then remove the armature and its bearing retaining bracket and presto – you have a dandy current transformer.

Repurposing an old motor as a current transformer.

All you need to do is thread a turn or two of your current carrying conductor through the generous hole where the armature was and you are in business. By making one primary turn and measuring the voltage on the secondary you can determine the ratio, you simply add primary turns until you get the voltage you want. Then add a diode and a capacitor to get the 2 to 4 Volts of DC your remote control system likes to see.

Clay Freinwald has long been an important part of the engineering community in the Seattle market and, among other things, has spearheaded the SBE EAS activities. You can reach Clay at k7cr@blarg.net

Building a Dummy Load

– Continued from Page 12 –

Now, select reflected power on your transmitter output meter, and adjust the series vacuum capacitor for minimum reflected power. This will be resonance on your broadcast channel. Now you can raise the power to 5000 watts. After a few minutes, the resistors will get warm but the fans will provide adequate cooling. These resistors are rated at 6000 Watts combined, and are made to take that kind of punishment. You now have a functioning inexpensive dummy load.

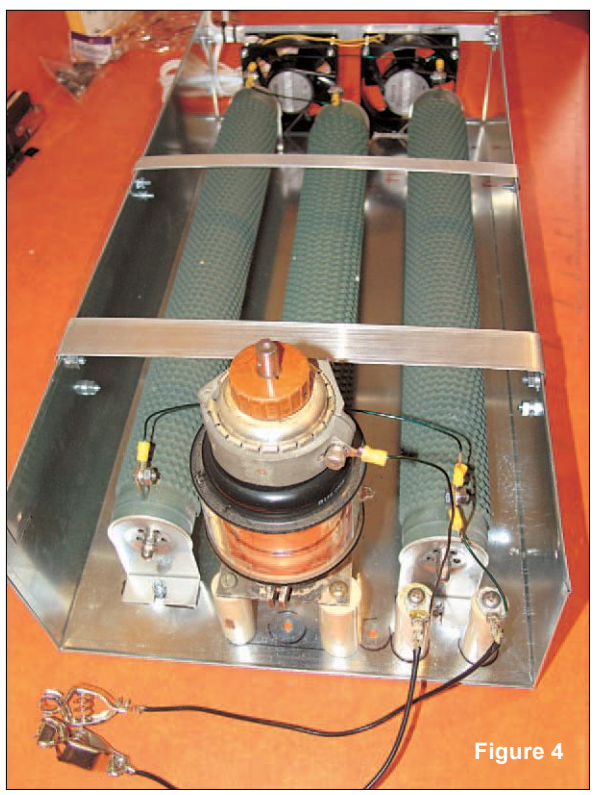


Figure 4

This is a worthy construction project that takes advantage of the very property, inductance, that limits us from utilizing standard resistors in RF applications. Not counting construction time, this project will provide you with a useable 5000 Watt dummy load at a cost bordering $700.

Roger Paskvan is a Professor of Mass Communications at Bemidji State University, Bemidji, MN. You may contact him at: rpaskvan@bemidjistate.edu

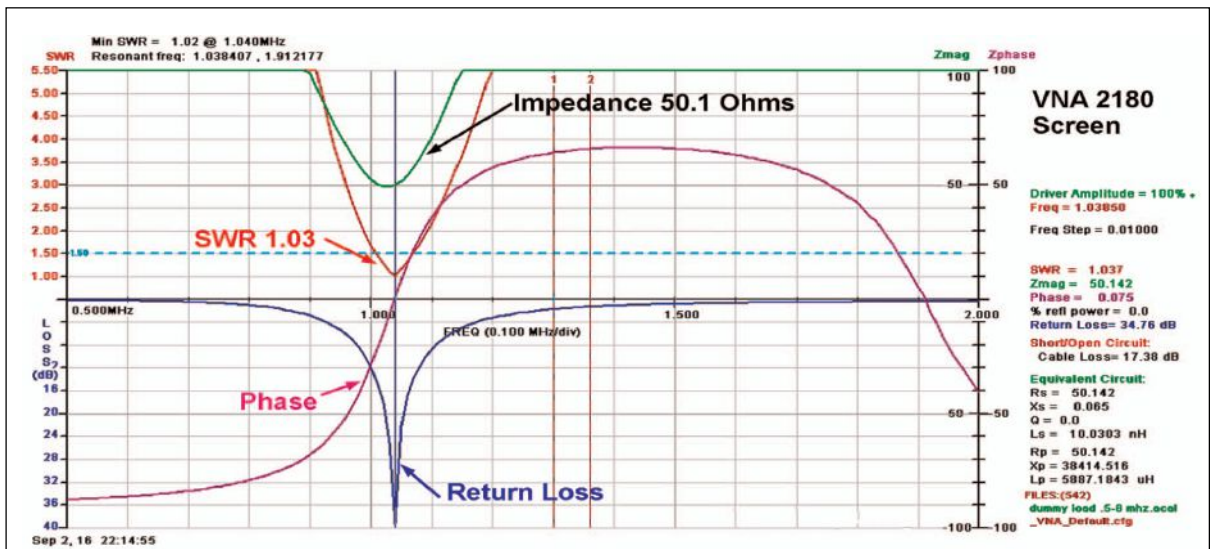
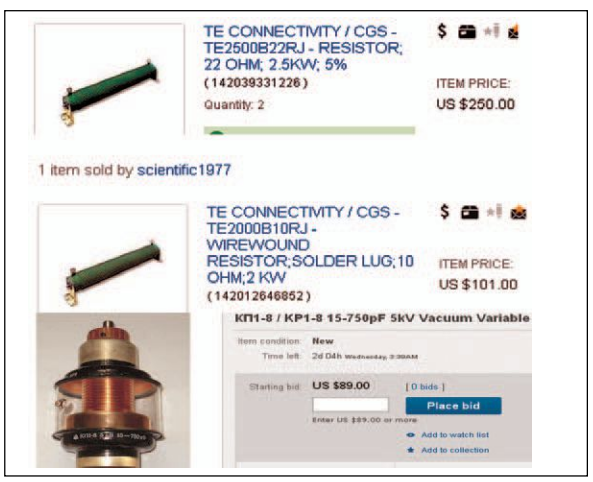


Figure 5 – Variable Frequency Dummy Load [test frequency 1040 kHz]



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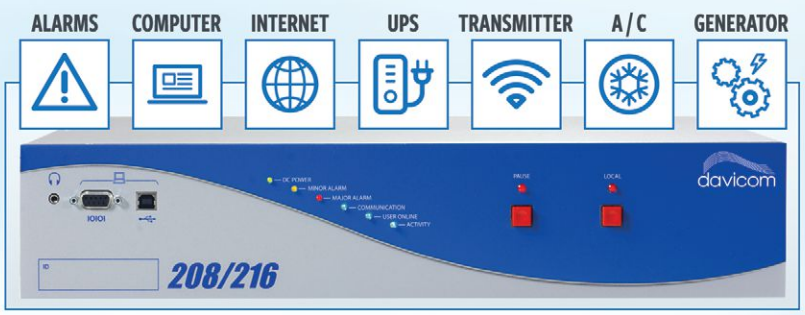

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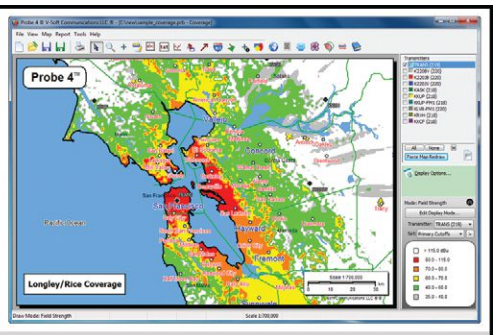

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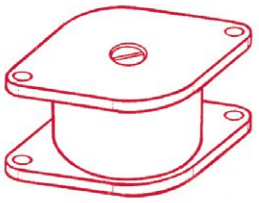

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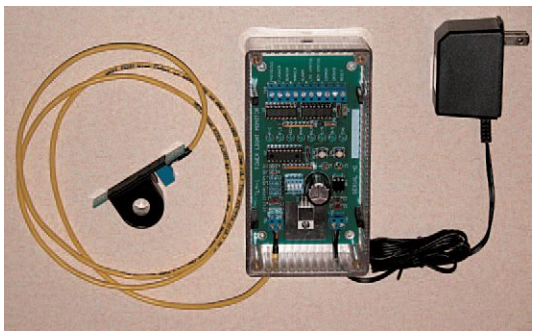

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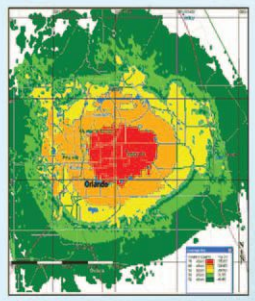

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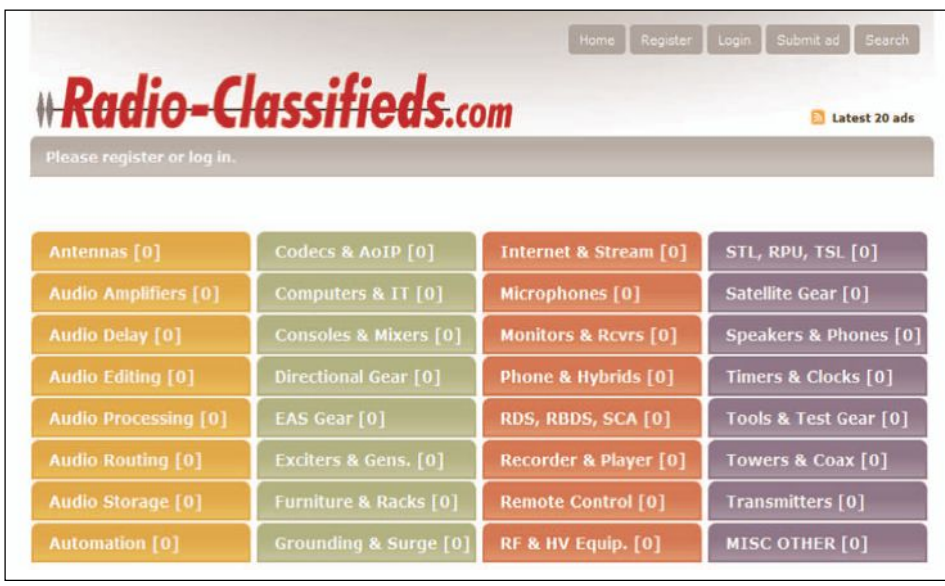

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DaySequerra - Elenos - Inovonics

DaySequerra – TimeLock Series 2

The new M4 TimeLock Series 2, and M4 TimeLock DDC Series 2, offer greater versatility in identifying and synchronizing diversity delay in HD Radio™ broadcasts.

Diversity delay is the program audio delay inserted into the analog program stream (MPS, or Main Program Service) in order to match the inherent delay of the HD Radio HD1 program.

The original DaySequerra TimeLock™ algorithm, used in the M4 and M4.2 products, measures the time alignment of the MPS and HD-1 streams with accuracy to one audio sample. The company's new TimeLock algorithm maintains this precision with the added capability of working under the most adverse conditions, including situations where an FM station is operating in mono on the legacy analog side and in stereo on the HD Radio side.

Delay capability in the new TimeLock M4 DDC Series 2 is doubled to + 7 seconds, for a greater range of diversity delay correction even with extremely high HD Radio data payloads.

In addition, full SNMP support on both products allows broadcasters to create their own monitoring software, or integrate other monitoring systems.

The M4 TimeLock is compatible with multiple Orban, Omnia, and Wheatstone processors as well as GatesAir HDE200 exporter and the Nautel Exporter Plus.

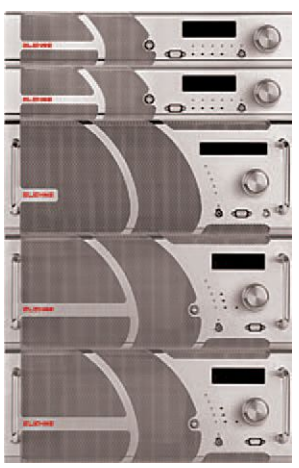
The company is offering a free update to the Series 2 algorithm for all existing M4 TimeLock and M4DDC units.

For more information: **www.daysequerra.com**

Elenos – Indium ET1000 FM Transmitter

The ET1000 consists of 2, 5 kW power amplifiers and is available in single or dual exciters – all mounted in 20RU.

The Indium FM Transmitter line has been designed to guarantee the maximum performance and operation while lowering operational costs through energy saving technology.



The ET Indium High Power transmitters achieve levels of overall electrical efficiency unseen in the market today, while also providing an extremely high operational performance under extreme environmental conditions (high external temperatures, poorly adjusted antenna, fluctuations in the network).

The great efficiency of the RF amplifiers, modulator, combiner and power supplies has also allowed a noticeable reduction in operating temperature, system weight and size.

The resulting advantages are substantial: easier installation, and lowered transportation, rack space and energy costs.

For more information about Elenos transmitters, ranging in power levels from 150 W to 60 kW, contact 305 Broadcast, an Elenos Company, at +1-855-305-3058

For more information: **www.elenos.com**

Inovonics – 525N AM Modulation Monitor

Inovonics has announced the new 525N AM Modulation Monitor with Network Interface. The 525N is a third-generation product and successor to the popular 525 AM Modulation Monitor currently in production. Now with IP connectivity, the 525N offers a Full Web Interface giving total remote control of all setup parameters, metering, alarms, with logging, and streamed audio monitoring.

"By adding IP connectivity to the popular 525 AM Mod Monitor, we have added new life and functionality to a workhorse in the radio broadcast industry," says Ben Barber, President and CEO.

IP connectivity with full SNMP support gives the user total access to the 525N from any computer, tablet or mobile device. Setup, metering, alarms and audio monitoring are all available from the remote monitoring point.

Although the 525N maintains full wideband response for measurement, it features user-selectable audio-monitor cutoff characteristics to mitigate noise or to simulate the response of consumer radios. A proprietary phase-locked synchronous detector provides precise demodulation, rejects interference, and recovers only the AM component of HD Radio™ "hybrid digital" transmissions. The 525N is also compatible with power-saving MDCL operation.

The 525N is available with a suggested retail price of $2,750.

For more information: **www.inovonicsbroadcast.com**

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October 12-14, 2016
Hartford Marriot Downtown, Hartford, CT
http://bts.ieee.org/broadcastsymposium/

Ohio Broadcast Engineering Conference
October 27, 2016
Columbus, Ohio
http://oab.org/engineering/obec/

2017 CES Conference
January 5-8, 2017
Convention Center – Las Vegas, Nevada
www.ces2017.org

2017 NRB Convention
February 27- March 2, 2017
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