Radio Guide

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Digital Issue Now On-Line

March-April 2016 – Vol. 24, No. 2

Studio Trends

As networked technology advances, more and more power and features can fit into smaller studio environments.

WE WROTE THE BOOK ON COOL AUDIO SOLUTIONS...

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noun

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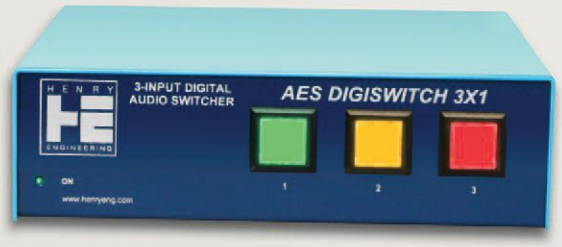

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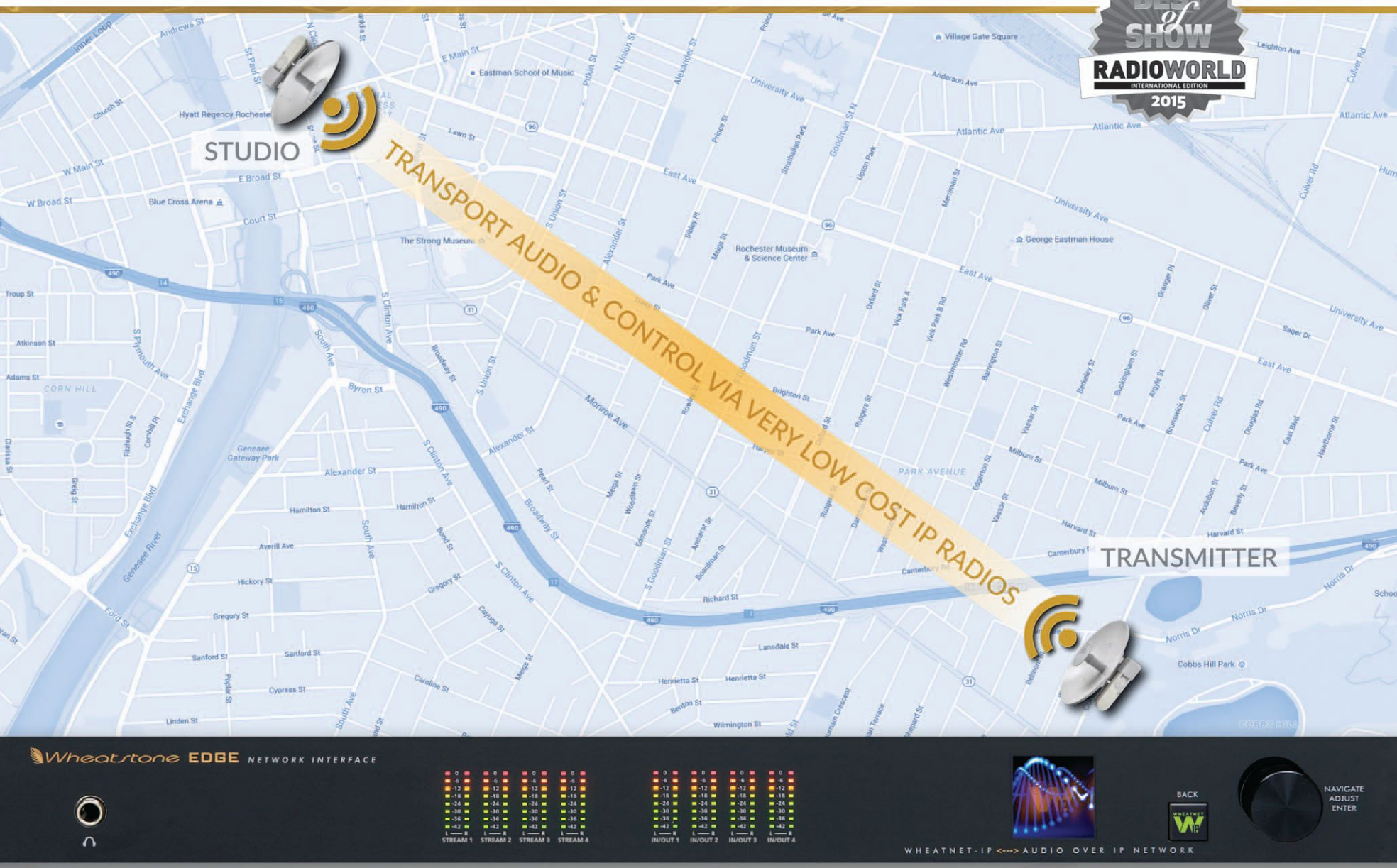

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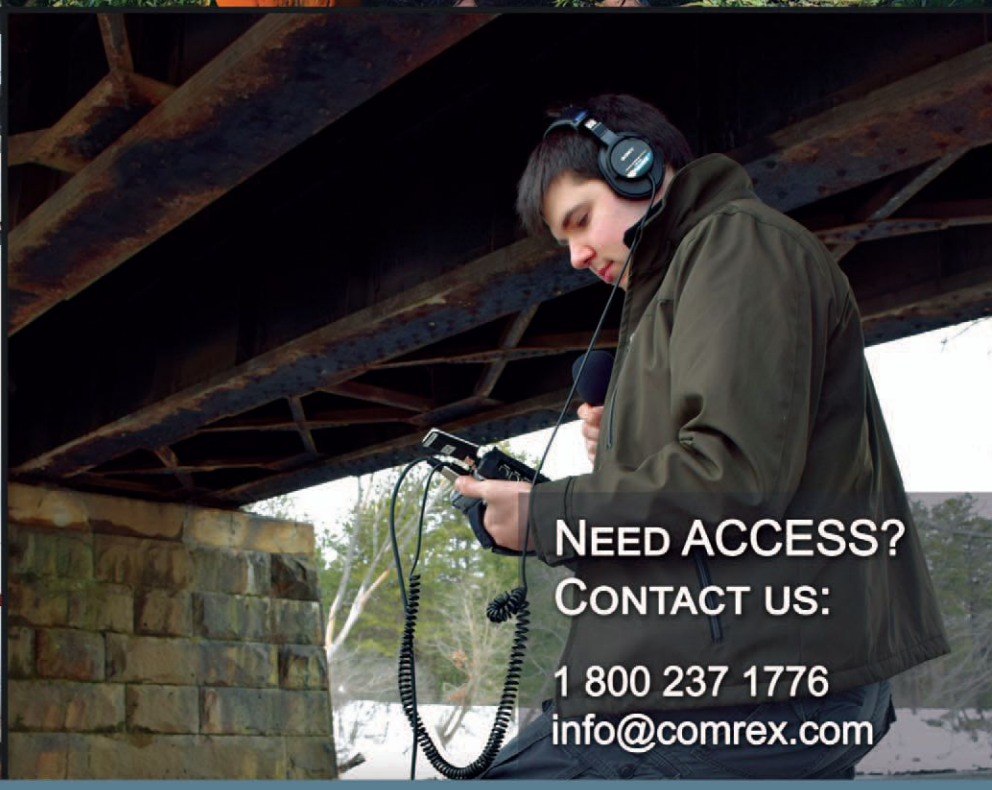

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Studio Trends

– by Dee McVicker –

No one wants to be the person who missed the memo on digital and built the last analog studio.

It's important to keep an eye on what's trending. Tracking trends is more important now that broadcasters are being asked to outfit studios based on tomorrow's technology paid for in yesterday's dollar.

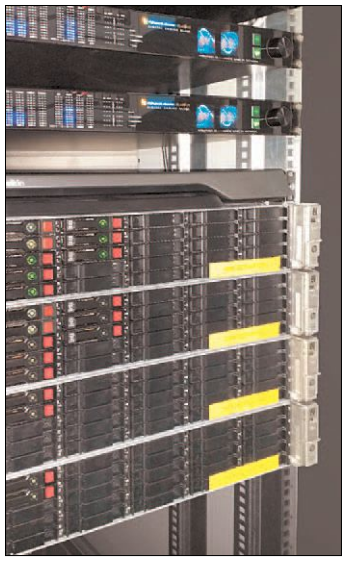
The good thing about being in the audio network and console business is that we get to tour more than our share of broadcast studios from all over. This gives us an up-close look at the technology and trends shaping the future of broadcast.

Here are just a few of the trends we've noticed in our travels lately.

Less Studio Space: It's not unusual to see broadcast facilities scaled down – a great deal, in fact. WGN-AM cut its studio space in half when it moved from the first floor up to the seventh floor of the Tribune Tower in Chicago. Gone were the multi-pair audio cables and the racks and racks of DAs and relays. All replaced by Cat6 cable, thanks to IP audio routing and control.

Virtualized Automation: Broadcasters are operating multiple stations through one server in a virtualized environment run by networked IP audio systems. Using thin technology and integrating audio drivers and control, broadcasters can save the cost and hassle of hardware such as audio cards, logic boards and PCs located in the on-air studios. Instead, thin clients snap onto the back of each studio's monitor and connect to a virtualized server in the server room that handles all the automation for each studio.

Technology Integration: Studios are becoming one seamless environment, integrating IP audio networking with codecs, delay units, and video and audio automation systems. For example, IP audio network integration with recording/editing systems such as VoxPro makes it so much easier to do live telephone editing, on the fly, with audio and control all on one network.

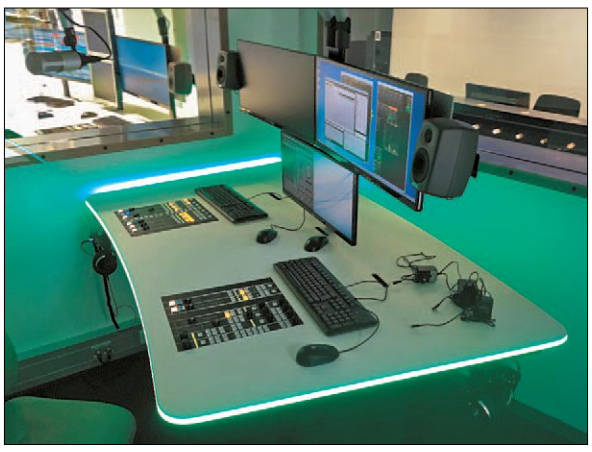


Centralized RCS Zetta automation for four studios running in a virtualized environment with WheatNet-IP audio networking.

Camera Automation: More and more on-air studios have a camera or two to run show video out to YouTube or other social media. We've noticed that many of the larger studios have fulltime video editors onsite at the studio, while others are taking advantage of automation software to run those cameras. For example, multiCAM and Zenon Media All in One visual automation can be integrated with the IP audio network to switch the camera to the host or guest position in the studio whenever a mic is turned on.

More Control: Broadcasters are gaining more control over time and resources. IP networked talent stations are one example of how, in one sitting position, broadcasters can control mic on/off, talkback, muting, source selection and headphone amp all through an Ethernet cable.

Hear No, See No Equipment Racks: We can't remember the last time we saw a large equipment cabinet or rack in a new studio. Those big cabinets that used to store all those wires underneath studio furniture are relics. These days, computers are centrally located, desktops are less cluttered and cabinets for gear are smaller – if at all. The studio architecture is much more open. There are actually places to put your feet while sitting down to a console without bumping into gear underneath.



Modern studios are more open and less cluttered. With the proliferation of video streaming, lighting is often integral to the design scheme.

Speaking of Feet, Talent Are Using Theirs More: Talent are no longer confined to one studio, or even the studio facility. Mix-minus, bus minuses, mic presets and even video can follow talent no matter where they are located, thanks again to audio networking. For example, in WGN-AM's new facility, radio personality Roe Conn might walk into Studio A on the seventh floor and sit at the console there one day, or sit street-side in Studio D on the first floor the next. Or, he could report in from some remote location. It's all up in the air.

Showcase Looks: With so many morning shows now syndicating with the local TV station, broadcasters are sprucing up the studio. They're recessing monitors, lowering mic booms and adding polish and better lighting throughout.

Signs of the Times: Signage in studios is one of the biggest trends going, according to Wheatstone's Jay Tyler, who has been in thousands of broadcast studios in his 20+ years with the company. He's seeing more and more clocks with metering on the wall, video feeds of talent shown in the lobby, and music playout schedules from the automation showing up around the studio. All this visualization is made possible because of the easy IP routing of media and data throughout the facility. Tight integration of AoIP systems with virtual clocks (such as VClock by Voceware) helps, too.

Soundcards Are Out: "That soundcard that fit your 10-year-old computer doesn't fit the newer computers," says Tyler. Broadcasters are going with audio driver systems with built-in control instead, especially in a virtualized environment where stacking a server with multiple audio cards and logic boards is not an option. Fully integrated control and audio driver systems offer the bi-directional control needed for remote starts/stops, channel on/off, etc.

Energy Efficiency is In: "You can plug in an electric space heater and it's going to use more juice than a big pile of Wheaty gear," comments Tyler.

Production in a Box: The production studio has seen the most changes. "Here, you're likely to see a creative guy that sits at the computer all day," says Vince Fiola with Studio Technology, which builds studio furniture. As a result, production studios have become more computer workstation centric with more compact, more capable IP consoles or control surfaces. These newer surfaces are often more computer friendly by providing console control and programming on a display monitor. Some even come with USB connectivity and/or Bluetooth compatibility for integration with production studios.

Software Flexibility: Virtual console control and other software apps are making studios much more flexible. For example, says Tyler, "With our new Screen Builder app and a terminal, I can replace a whole intercom panel with a soft panel. I can build intercoms and talkbacks and mix minuses and on the fly mixes with a software application where I used to pay thousands of dollars in hardware."

This example of the ScreenBuilder app shows how faders, meters, labels, buttons, clocks, timers and other widgets can be connected to devices and network interface points and arranged on-screen to perform functions remotely.

IP Radios: By putting up an IP microwave link from the studio to the transmitter or translator site, the site becomes part of the studio network. Wheatstone recently introduced the EDGE network unit for this purpose. IP radio and antenna systems start at a few hundred dollars and are available for the unlicensed 5.8 GHz band as well as frequencies in the Part 101 band (usually 6 GHz or 11 GHz).

Neat Break Rooms: Actually, we have seen a few interesting break rooms in our travels but we're still looking for the ultimate break room that has bubble chairs, beer on tap, a wine rack maybe, and air hockey table and gaming workstation. We'll let you know when we find it!

Dee McVicker has been following broadcasting for more than 20 years, most recently as a part of Wheatstone's marketing team.

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Studio Site

Off With Their Heads!

Changeable Mic Capsule Recorder Among Latest News Recorders

by George Zahn

It has been many issues since we took a look at the field recorders available for news and interview coverage. I recently looked across the selection of what was available, and happily, it seems that prices on such devices have remained reasonable or gone down. We'll look at some of the recent standards, and at one of the newer European remote recording, all-in-one microphone/recorders that offers more than you might have ever considered for news gathering.

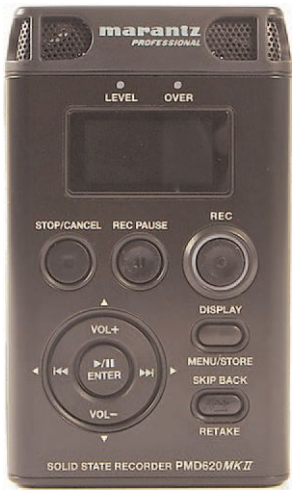
First of all, we've come so far from the ElectroVoice 635A omnidirectional plugged into our trusty Marantz cassette recorder, or even the same-sized flash recorders of several years ago. Now we have very reliable, hand held all-in-one recorders which incorporate one or more microphones, which allow for stereo and multi-track recording if desired.

"Out Standing" in the Field

Here's some of what you'll likely find on most base portable field recorders: Digital Recording (minimally WAV or MP3) onto media such as SDHC card (generally you can get a minimum of several hours on even an 8 GB card), 2 to 4 built-in microphones allowing for varying recording patterns, the ability to connect an external microphone via at least a mini jack, Line Input, Headphone Output for monitoring, and the ability to operate via batteries or AC with an adapter – and a USB interface for easier transfer of audio into digital editors.

Higher end units will offer quieter balanced microphone inputs, speakers for easier monitoring, some editing functions, and as we'll discover, some even have interchangeable microphone capsules.

Anyone who remembers the durability of the old Marantz recorders might like to know that the old shoulder strap model (roughly 11 inches by 8 inches by 3 inches) that many of us used has been miniaturized and microphones built in to a hand-held device. Marantz offers two models: the **Marantz PMD620 MkII** (list $499) with stereo built-in microphones and on-board simple cut-and-paste editing. You can connect an external microphone, but only via a mini jack.



The more expensive option (list $799) features two XLR inputs (line or mic switchable with phantom power for condenser mics), a built-in speaker (ala the old Marantz recorders), and even one S/PDIF digital input. The unit also offers some additional editing features.

Zoom-Topia

For those who need to record on more of a budget, one possibility is a Zoom recorder. Zoom is out of Japan and is also known for guitar and bass effects processors. Zoom offers a fairly wide range of hand-held digital recorders starting at a list of under $150. On the lowest tier is the no-frills Zoom H1, a basic pocket-sized stereo recorder with 2 built in microphones. For more creativity, Zoom offers other models ranging up to a list of $499 and the H6 which has 4 balanced XLR mic inputs (or you can use the five built-in microphones for even Middle-Side microphone technique for music or nat sound).

In full disclosure, I have used the **Zoom H2 Recorder** for my station and I have a few important observations. First, the built-in microphones on my units are nice and bright, but not very hearty on lower frequencies. Also, I suggest using a windscreen if doing interviews, to avoid popping P's. I also find that the mic levels can be fairly low, but fortunately it's a nice quiet device. It's a pretty good return on a small investment for ease and flexibility of remote recording, as are most of these devices.

The Tascam At Hand

In the same basic price range are portable devices from Tascam, including the stereo microphone **Tascam DR-05** which I've seen advertised under $100. Tascam also offers a WiFi model, the DR-44WL which allows you to send files with or without a USB cable. Sony also has a wide range of products in the field all the way up to the $999 list PCM-D100 which offers premium microphone elements. Roland offers a variety of recorders as well, including the R-05.

The bottom line is that if you've been using a small dictation recorder with a tiny condenser mic for news gathering, there are some tremendous, and more importantly, affordable options out there. Most of the aforementioned units are rectangular in shape and most fit easily in your hand.

A drawback of some models is the fact that the actual device can feel very light and cheap because the cases are made basically of plastic. For that same reason, having a decent padded carry case is also advised. While some stations may treat these almost as disposable devices, you still don't want an abused or improperly-stored recorder to fail in mid-recording for lack of common sense storage of the unit.

Curious Yellowtec

In researching this story, I stumbled along a company out of Germany named Yellowtec, and they've taken this to a new technical level, with a bit more cost as well. While some of the previously cited units have built-in mics or XLR connectors to allow multiple mic connections, Yellowtec takes a page from the premium old Schoeps Colette system microphone book.

From a sheer fascination standpoint, the Yellowtec iXm microphone/recorder looks pretty much like a standard microphone. On the handle are start and stop buttons which must be hit in sequence to avoid accidental stopping of the recording. It has dual battery capability, offering an internal rechargeable battery and the ability to add AA batteries. It records to an SDHC card which fits in the handle.

It's the only "system" microphone for news gathering that I've seen. You can buy different pickup capsules including cardioid, supercardioid, and ominidirectional pickup patterns. You simply screw a new capsule head on and you have a different pick up pattern. While I have not worked with one, I've seen a few video demos, and frankly the LEA feature, which purports to give perfect levels, sounds like a severe limiter. I contacted YellowTec to ascertain if their built-in LEA digital signal processor that claims to "provide perfect levels, every time" was adjustable, but received no response on that or other questions, including how widely they are being used in broadcast in the United States.

Beyer's Market

The Yellowtec base bundle of either cardioid or supercardioid models lists at about $790. Additional capsules list for $185 for the basic heads to $445 for premium heads which are made by Beyer Dynamic. The mic can also utilize a Toshiba Flash Air wireless SD card to transfer audio to your iPhone or iPad via WiFi.

The other option beyond these newer generation field recorders is to utilize the built-in or outboard microphone for your smart phone and use editing apps to do some basic cut and paste. Of course, almost all of the recorders we've discussed here will also allow an external an microphone to be attached so you can use the device as a simple flash recording device.

Almost every week, our station uses the Zoom H2 just as a recorder. We record interviews with various business leaders at a local accounting firm conference room. We take the output from an external mixer into the line level input of the Zoom. A word of caution: it is always best to experiment when interconnecting the mixer and digital recorder to see how they interact and which compression or limiter settings (if any) you would need to use on the recorder options menu. In places where I cannot set up the mixer and better microphones, I have used the built-in Zoom mics for field interview recording and some very basic extraneous sound capture, and it is more than passable.

The argument could well be made that, for simple voice work, how meticulous does the recorder need to be? If you are an arts or documentary producer, needing precision of natural sound or "B roll" secondary music recording and wide frequency range audio, excellent frequency response and better mic elements would obviously be preferred. If you are simply needing a quick voice recorder, most of these models, even the basic ones, will outdo a standard dictation recorder and will run circles around most standard built-in smart phone microphones.

Another nice factor in flash recorders is the fact that there are really no moving parts – hence no wow and flutter a la old cassette recorders. The unit is basically a low noise device, unless extra noise is added through the built-in or external mic preamps. You can always carry extra data cards, which are inexpensive, to ensure you have enough record time. Many of the units also allow you to mix and match WAV and MP3 settings on the same card, since each recorded file is stored separately on the card.

A few of the higher end manufacturers may offer "Try It" programs, but for many stations, it's a matter of getting engineering input from other who have used the recorders. Remember, if you're spending under $150 for a device with 2 or 4 microphones, those mics are not likely going to be the quality of a far more expensive unit. As with all of us either in management or engineering, it's a trade off of quality and cost. For simple voice work, the basic units we've discussed will do quite well. For meticulous natural sound or music recording to accompany a story, the better units may worth the investment.

If you've had experience with field recorders, please share your stories with me.

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*

Emergency Prep

Getting the Message Out

NPAS and NAAD For EAS Users

by Ed Czarnecki

Just as American broadcasters are getting used to CAP and IPAWS enhancements to the EAS, Canada has rolled out its national alerting system, with stations now required to participate. Ed Czarnecki explains what the Canadians are doing and how it compares to the U.S. EAS. The majority of Canadian broadcasters have just joined the "EAS club," so to speak.

The System is Up and Running

It is called the National Public Alerting System (NPAS)./ As of this past March 31st, most Canadian broadcasters are now required to broadcast information alerts during emergencies.

Harkening back to the June 30, 2012 CAP deadline imposed by the FCC, the Canadian regulator – the Canadian Radio-Television and Telecommunications Commission (CRTC) – decided that it now was time to finally require broadcast emergency alerts from that country's CAP system.

Similarly, just as there was a lag between the deployment of IPAWS and the FCC order for broadcasters to implement CAP, the Canadian decision came more than four years after the CRTC granted Pelmorex a license to operate the CAP alert system accessible to local officials and broadcasters during an emergency.

Sound familiar? Well, there are similarities – and major differences – between the U.S. and Canadian approaches to "EAS." As one of the primary providers of EAS gear in Canada – the DASDEC CAP-CP – we have come to learn and appreciate the different features between these two national alerting capabilities.

Let us first take a look at how the Canadian alert system evolved.

A Slow Start

Until now, Canada had never deployed a national alert and warning capability. The dialogue to create an alerting system really began in earnest after a tragic 1987 tornado event. But even that catalyst did not spur immediate action.

Throughout, Canadian authorities had been hoping that industry would come together to voluntarily develop a national alerting capability.

Finally, twenty years later – in 2007 – Canadian regulators finally warned the Canadian broadcasting industry that if it did not come together to build and operate a national emergency alert system by March 2009, the CRTC would designate somebody to build it and "ensure the system is funded by the industry." It took a few more years, but the CRTC finally made that mandatory determination in 2014.

Evolution of NAAD

Unlike in the U.S., the Canadian version of IPAWS was initiated and developed by private industry.

Pelmorex – a Canadian company operating the Weather Network and other weather-related content and technology – operates the Canadian "National Alert Aggregation & Dissemination" (NAAD) System. The CRTC gave approval to Pelmorex's system in 2009, and again in 2011, hoping that broadcasters would voluntarily use the system.

In 2014, the CRTC decided that they had waited long enough and removed the "voluntary" part from the conversation.

The CRTC issued notice that most stations, including cable and satellite companies, terrestrial radio and over-the-air television stations, and video-on-demand services, had until March 31, 2015 to enforce the new requirements. Campus, community-based, and Native broadcasters have an additional year – until March 31, 2016.

Comparing NAAD and IPAWS

Like IPAWS, the Pelmorex NAAD system provides a secure platform for the collection and distribution of emergency alerts from authorized government agencies.

But while the IPAWS initiative has been primarily government organized and operated in the U.S., a great deal of the initiative for developing the Canadian alert system has come from the private sector, particularly from Pelmorex, which is operating the Canadian version of the "alert aggregator."

In the U.S., IPAWS is an Internet-based system. The Pelmorex system supplies transport via Internet and Ku/C-band satellite. At least during the initial rollout, the majority of broadcasters appear to be relying on the Internet feed.

Those alerts can then be picked-up and distributed by so called Last Mile Distributors (LMDs – what we would call "EAS Participants" in the U.S.), as well as mobile operators, ISPs, or anyone else that wants to pick up and distribute the alerts. As in the U.S., thus far the majority of alerts are weather related, provided by Environment Canada.

Some Key Differences

Although both the FEMA's IPAWS and the Canadian NAAD system are based on CAP, there are two key differences – the Canadian CAP profile (or format) is very different than that used by the U.S. IPAWS system, and there is no broadcast or daisy-chain EAS in Canada. Canada is CAP-only, with no need for AM/FM/WX radio monitoring.

Another difference: the U.S. relies on FIPS codes, Canada utilizes their Standard Geographic Classification (SGC) codes. This permits much more carefully and accurately defined alert areas, although the use of the SGC codes has created some interoperability challenges for middleware that do not readily accept these Canadian SGC geocodes.

And during the message composition phase, while IPAWS relies on CAP tools that state and local authorities obtain themselves (so long as they are IPAWS conformant), the Canadian NAAD system provides its own alert authoring tools for use by provincial and local authorities.

This shared alert authoring capability has streamlined training and operation of alerting capabilities by local Canadian authorities.

SAME, Plus

Many Canadian alert event types map directly to U.S. SAME EAS codes.

However, with 154 event types, Canada has a significantly larger list of emergency events – about triple that of the U.S. – and these events can get very specific, including a meteorite warning, blood supply warning, iceberg, or heating oil supply warning.

"Broadcast Now!"

Given the unique range of Canadian alerts, their CAP profile has another useful feature – Canadian CAP messages include a "broadcast immediate" parameter.

This is basically a flag within the message that indicates that the alert is intended for immediate broadcast transmission. This flag overrides several filters and automatically forwards the alert.

This "broadcast immediate" feature has removed a lot of the discussion about what types of alert event types (EAS codes) that a broadcaster can or should autoforward: most Canadian entities have opted to simply forward only the "broadcast immediate" messages.

Multilingual Platform

The Canadian alert system differs from the one in the U.S. in language support. The Canadian alert system was designed to be bilingual from the start. Alerts contain both English and French messages and broadcasters can choose to air either or both languages (depending on the stations primary audiences).

Canada also has a set of fairly detailed "Common Look and Feel" (CLF) requirements for broadcasters.

For radio stations, this mainly involves a unique Canadian alert tone – and an eight second two-tone blast – and the bilingual alert requirements. For television broadcasters, the CLF requirements add a number of other display specifications, including the color of the scroll, font, the exact placement of the crawl on screen, and how fast the crawl should run.

Receiver Specs

Another major difference in the NPAS from the EAS is that there are no specific EAS equipment requirements in Canada – no EAS equipment certification, and no equipment inspections. The Canadian regulator has basically indicated the desired end-result and has let industry itself figure out how to get the job done.

Thankfully, a few EAS manufacturers, like Digital Alert Systems, stepped up to provide solutions to meet Canadian requirements.

In addition to EAS-type equipment, a handful of LMDs have also been looking at building their own home-brewed technical solutions to monitoring, authenticating, filtering and forwarding Canadian alerts.

The jury is still out on these self-built solutions. However, several Canadian operators quickly discovered that the total cost to build and maintain their own CAP system was greater than the price of just buying a Canadian-compliant NAAD unit.

When Government Steps Aside

Without a long series of extensive government requirements, companies like Digital Alert Systems are able to tailor software to the specific operating requirements of Canada and still provide an extremely cost-effective option to meet these CRTC requirements.

Many middleware solutions are not capable of supporting Canadian geolocation codes, emergency event types, or able to provide more than just the basic mandated features, but because of the versatility of the DASDEC, we were able to offer an interoperability solution between the embedded plant and new Canadian alerting requirements.

As one example, the DASDEC has a CAP-CP software module that adds comprehensive support for Canadian Common Look and Feel audio and video requirements to the basic CRTC compliance. The sister unit for cable and IPTV goes several steps farther and adds a number of solutions that help meet very complex challenges for Canadian cable operations, many of whom have existing plants that do not natively support Canadian alert information.

Furthermore, as the Canadian NPAS system gains experience, future software and firmware changes will be easily incorporated to the receivers.

The author is Senior Director for Strategy and Global Government Affairs with Digital Alert Systems, one of the major EAS providers in the U.S. and Canada, and also serves on the Canadian Common Look and Feel Committee. Contact him at: ed.czarnecki@monroe-electronics.com

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Tips From the Field

The Colors of the Rainbow

by Jim Turvaville

I've been building a couple of studios again for friends and clients and thought I'd share some organizational tips that I find myself using which may be informative. Specifically, I find myself falling back on color-coding wires and cables as I'm organizing and installing gear. As one of the older generation of tech types, some of this may be really new to younger readers – if so, enjoy a history lesson.

From my days in Elementary School, in the early 1970's when I first was introduced to electronics, I quickly discovered there was a "color code" which was used for some components that held the numeric value of such. Commonly called the "Resistor Color Code," as it was, and is, used primarily with resistors, but also for some capacitors and inductors, the code followed a color sequence which related to numbers which would be used to indicate the specific electronic value and tolerance of the component. This component color code had been developed in the 1920's by the Radio Manufacturer's Association (now a part of the Electronic Industries Alliance – aka "EIA") because little bands of colored paint could easily and cheaply be printed on the components of the time. It goes without saying, that in the 1920's every electronic part was bigger than it is now, so that it was not as impractical as it would seem in modern times. The system worked fairly well until component sizes began to get smaller with advances in technology, and more color-blind individuals became engineers – not to mention heat and aging of the component would often make it difficult to distinguish Orange from Red, for example. While most 1/4 Watt, 1/2 Watt, and larger resistors still come with this color-band code on them, I've not ran into capacitors having a color code on them since working on an RCA BTA-1R1 or a Gates BC-250GY.

The original basic color code with associated numeric values is shown here:

Colors	Numbers
	Black= 0
	Brown= 1
	Red= 2
	Orange= 3
	Yellow= 4
	Green= 5
	Blue= 6
	Violet= 7
	Grey= 8
	White= 9

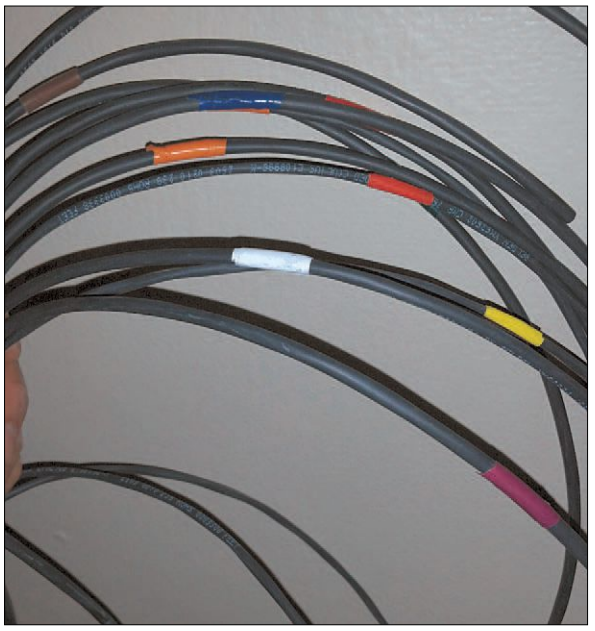
The colors are sorted roughly in the order of the visible light spectrum (with some artistic license) to come up with 10 values. Basically it is "Rainbow" ordered by intensity in the middle of the list as: Red (2), Orange (3), Yellow (4), Green (5), Blue (6), and Violet (7). Then the others are: Black (0) which has no energy, Brown (1) has a little more; then on the other end of the spectrum, White (9) has all energy (the combination of all visible colors), and Grey (8) is like White, but just a bit less intense. Together, they make up 10 colors which can be used for a logical method of annotation. There are a variety of Mnemonics that have been used through the ages to remember this color sequence – some of them antiquated, some on the adult side, and some just plain silly. One can research *"List of electronic color code mnemonics"* on-line and spend a great deal of time and some laughter along the way. However helpful those mnemonics may have been decades ago, having recited the color code to myself so many times I no longer have the need for the memory aids and rattle off the color list in my brain.

It might be noted that another color-code scheme which I learned almost immediately in my Radio career is the *25-Pair Telephone Cable Code*. If it becomes a necessity, I can fumble my way through the 5 base color sequence of White, Red, Black, Yellow and Violet; a color sequence rarely seen in our day-to-day work. However the minor sequence of Blue, Orange, Green, Brown and Slate (Gray) is at least 80% in front of us at all times when dealing with CAT5 cables these days, as those 4 pairs we punch down all the time come from that original 5 pair initial sequence in a 25-pair Telco cable. But with that older 10-digit color code so ingrained in my brain, and with the availability of at least 9 of those 10 colors in Scotch 33 tape, I still fall back on that code when organizing studio and transmitter site wires. On rare occasions I can find Scotch 33 Gray tape and I generally stock up when that happens.

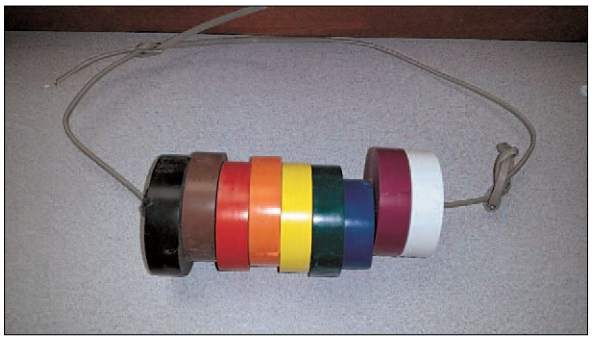
In a small wiring environment like a control rack at a tower, the number of cables to be differentiated is sufficiently small as to permit the resistor code marking method. For instance, I have found myself using short runs of 4-conductor with shield, 22 AWG cable – like Belden 8723 – for transmitter control and metering, making the single tape color stripe ideal for quick designation. Even sorting out CAT5 cables can be efficiently achieved with single color markings for a specific location like a single rack at a tower.

My current project is a small, single studio station setup with one rack located 15 feet from the studio countertop and equipment. Running 2-inch PVC conduit up the wall and across the ceiling into the rack let me pull everything needed between the two locations at once – sorted by wire type and sub-sorted by single color stripe. With less than 10 each of Belden 8451 single pair cable, Belden 8723 two-pair cable, CAT5 cable for IP devices, and CAT3 cable for desk phones, I was able to efficiently distinguish individual contents of the bundle at a single glance with ease.

In this same facility, the coax runs to the roof, just 10 feet above, had a similar notation scenario. With 4 runs of RG-6Q coax and 2 runs of RG-213 coax, simple color marking on each end with a single tape stripe made for quick identification and connection. I do tend to start with Red in the sequence when using Black coax cables; just because a Black stripe would be effectively no stripe at all (which can be used as one of a set of 10 cables) and the Brown is a challenge to see in the sometime less than desired lighting behind equipment racks. So Red, Orange, Yellow, Green, Blue, and Violet become my favored color sequence when only half a dozen or so cables are in play.



Obviously, if one is designing a very large complex, simple color coding will be an accompaniment to a numbering scheme. In one facility, we had a number of multi-pair cables which were physically numbered on the individual pairs – specifically the GEPCO GA61824, but several manufacturers offer a similar product. So individual pairs being already numbered, we only needed a scheme to mark the 24-pair cables themselves, and the basic resistor color scheme was ideal. Having only 8 cables to mark, we did not run out of single color designations; but could have easily added a digit by a second band if needed.



As mentioned, I make every attempt to carry the full complement of colored tapes in a quality brand (usually Scotch 33) so the marking can last in weather and UV exposed areas. Most of the big box home improvement places keep the Scotch brand electrical tape, though you may have to shop around or visit a true Electrical Supply House to find all of the colors to complete your set. It is surely worth the effort to be able to quickly and easily mark your work for not only your benefit, but to that next Engineer who will certainly come along one day to follow your footsteps at that location.

Jim "Turbo" Turvaville is semi- retired from 38 years in full-time Radio Engineering and 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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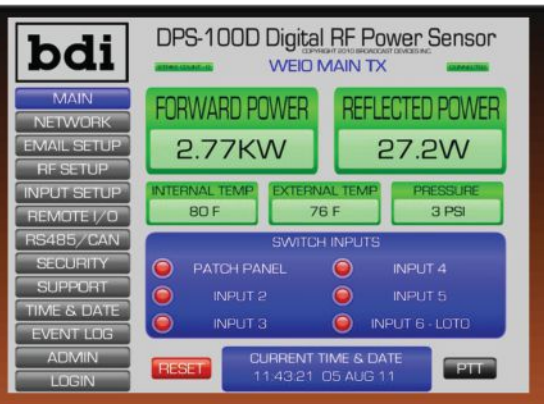

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FCC Focus

Political Spots Q&A

by Peter Gutmann

As this is being written (in mid-March), we're being convulsed by the most partisan election year in memory (and mine goes back to JFK/Nixon). Radio promises to be a prime platform for political advertising as the primaries progress, and even more so as the general election approaches. So a reminder of political broadcasting requirements seems apt.

Hopefully you already know the basics, so instead of yet another primer let's do a Q-and-A focusing on some aspects raised by the intense emotions already unleashed.

Political positions have become so extreme that I can't stand the thought of [insert your most hated candidate] polluting our station's airwaves and subjecting our listeners to his/her toxic rants. What can I do to keep him/her off?

For a federal candidate (president, vice-president, U.S. senator, U.S. representative) – not much. Otherwise, it's up to you, but you must afford similar access to all legally-qualified opponents (that is, candidates for the same office in the general election, but only within the same party for a primary nomination).

So I can keep non-federal candidates off completely?

Yes. But two cautions. First, once you allow one candidate on, then you must afford equal opportunities to all of his/her legally-qualified opponents. And, second, by essentially telling candidates that they're too unimportant to appear on your station you may be paving the way toward an adversarial relationship for the future.

Conversely, can I give candidates I favor special access to our station?

Sure – there are other ways to give exposure to politicians and their views. Genuine news reports and interviews, some debates, and appearances on certain regularly-scheduled programs all can be exempt from equal opportunities if handled properly. The key is that the content is truly beyond any candidate's control and that a station's overall coverage is not designed to favor a particular candidate.

Can I at least control the amount and timing of political ads?

Not for federal candidates, whose strategies and demands take precedence over broadcaster convenience. But all others can be limited, restricted or denied altogether (subject to equal opportunity rights).

How about issue ads? Can I run just the ones I agree with?

Yes. Issue ads do not trigger access or equal opportunity requirements, so you can be selective. They also are not entitled to special political rates, so you can charge them whatever the market will bear (even premium prices that discourage them), but you may have to weather a political storm of bad publicity.

Can I deny access to "fringe" candidates?

All legally-qualified federal candidates are entitled to access. All other legally-qualified candidates are entitled to equal opportunities, so you can refuse to sell time to non-federal fringe candidates only if you also keep all their legally-qualified opponents off as well. Write-in candidates present special issues to determine their legal qualifications – better discuss them with your lawyer.

Even if I have to run a political spot, what if I find its content offensive?

A "use" (in which a candidate's voice appears and is identifiable) cannot be censored in any way. Hopefully, candidates would have enough sense not to offend a station's listeners, but that's their choice. In exchange, stations are exempt from liability for the content of uses. Note that candidates nearly always ensure that their spots qualify as uses so as to benefit from lowest unit charges (although non-uses can be used strategically to escape triggering equal opportunities).

What if a candidate curses or runs an audio clip of an opponent cursing? Do I have to run that?

That's one of the few gray areas due to conflicting laws. While you can't censor a use, the Communications Act criminalizes the broadcast of "obscene, indecent or profane language." Few verbal utterances would be considered obscene. Mere indecency or profanity is allowed only within the safe harbor of 10:00 p.m. to 6:00 a.m. If confronted with such a situation, you'd better call your lawyer.

Is an attack ad featuring an opponent in an unflattering role still a "use?"

No – a disparaging appearance does not trigger a use. But unauthorized appearances of a candidate's voice in a non-exempt program can be uses that would entitle opponents to equal opportunities. Note that if a candidate includes in his own spot an opponent's unflattering remark (perhaps to mock it), then the spot remains a use by the advertising candidate.

Is a spot still a "use" if it is sponsored by an ostensibly independent party?

All that is required to qualify is that a spot include an identifiable, non-disparaging appearance by a candidate. If it meets that qualification, then it is considered a use. Even so, it must bear proper sponsor identification. But if an ad is not authorized by a candidate, then it does not qualify for lowest unit charges.

What if I am sure that a purported "fact" in a legally-qualified candidate's attack ad is false? Do I still have to run it?

Sorry, but if it qualifies as a use then you have no choice but to run it as is – and you have no obligation to investigate its accuracy. But you *are* liable for the content of issue ads and other non-uses.

What if an opponent threatens to sue us if we don't stop running an ad?

If it's a use then they have no legal ground on which to prevent you from running it, and you are exempt from liability for airing it. But for spots that don't qualify as uses – even for federal candidates – you have no obligation to run them, to make equal opportunities available to opponents, or to honor comparable or lowest unit rates. And if you do run such spots, then you could be held responsible for their content.

A political sponsor wants to soften the tag to refer to the spot as being "presented by," "made possible by" or "made available by." Is that OK?

No! The phrases "paid for by" or "sponsored by" are mandatory – no hedging!

Do the "stand by your ad" provisions (requiring that candidates identify themselves and state that they approve a message) apply to all political ads?

No. This requirement is part of the 2002 Bipartisan Campaign Reform Act and only applies to federal candidates. However, several states have adopted similar requirements, which apply to all candidates running for office within those states, including local and municipal races. So check with your local broadcaster association or secretary of state to determine if these or other requirements apply.

In light of all the PAC and Super-PAC money being spent, how do I know who the real sponsors are? Do I have a duty to investigate?

Unless you have strong evidence of falsity, you are entitled to rely on the information you are required to obtain before accepting a political buy. Remember that this includes written disclosure of the name of the person purchasing the time, the name, address and phone number of a contact person for the purchaser, and a list of the purchaser's chief executive officers or members of the executive committee or board of directors. All this information must be kept in your public inspection file for two years.

How about sponsor names that I suspect might be false or that sound deceptive?

Here, too, for the limited purpose of political sponsorship IDs, you can rely on the representations of the buyer – unless you are sure that the name is false. Of course, if you are suspicious about purported sponsorship then you could conduct an investigation and report the results as a news story.

I feel badly for a candidate who lacks the money for an effective radio campaign. Can I give her free spots?

Sure, but then you have to give equivalent free time upon request to all of her legally-qualified opponents. Plus the value of the spots counts as a campaign contribution that may exceed legal limits.

How about if I just sell deeply-discounted political spots to a candidate?

Not a great idea, as the discounted rate could become your lowest unit rate that then would apply to all political sales for the same class of time, even retroactively.

How can I prevent listeners from associating a political spot with our views?

You can preface a political spot with a disclaimer, but then you must run similar disclaimers consistently for all other political spots.

I feel very strongly about this election, in which so much is at stake. How do I make my views known?

Although you are required to be even-handed with respect to political ads, you are free to editorialize, as the fairness doctrine is long gone and unlikely to be revived – and certainly not for this election cycle. Of course, you risk alienating listeners and businesses that hold opposing views. Even so, broadcasters who relish their roles as journalists and opinion leaders will not hesitate to air their views.

And speaking of political record-keeping, please bear in mind that even once radio public inspection files transition to the FCC server, stations still will need to upload to the FCC server all new political file materials on at least a daily basis. Licensees also will have to keep local back-up copies of their complete public political file, either in paper or electronic form, to be made available only during such (hopefully rare) times as the Commission's online file is unavailable. And all political public file materials in existence as of the date when a station transitions to the FCC's electronic filing system will have to be kept in the local public file for the rest of their two-year retention period.

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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Transmitter Site

New Transmitter? New Opportunities!

by Chris Tarr

In the past year, I've been involved with a few transmitter installations, taking place at sites where the backup transmitter gets moved out, a new one put in it's place as a main, and the main transmitter gets retired to backup duty.

I get excited every time one of these kinds of projects come up. Why? Well, not just because I get to play with new gear (that's always a benefit!) but also because it's a chance to wipe the slate clean at a site and do things over. Chances are that if you have a main and backup transmitter old enough for retirement, you're probably dealing with years and years of wiring and equipment changes, and it's probably not always neat. We all know that temporary patches often become permanent fixes.

So, I typically approach this type of project as more than simply dropping in a new box. I plan on removing all the wiring (remote controls, etc) and gear that is no longer used, and start over fresh.

Unpacking a New Nautel Transmitter

I know that the temptation is to leave the current transmitter control and telemetry as-is, but resist that urge. Cabling is inexpensive, especially if you can get away with category cable, and let's be honest – one of the first things you'll want to do once the new rig is on the air is to clean and rehab the former main in order to insure reliable backup operation. Look at the entire system as a rebuild.

Using Cat Cable

I tend to use category cable for control and wiring – you can get cable with shielding and ground, and again, it's easy to get, and easy to work with. The best part is that if you have the time, you can install RJ-45 "harnesses" at both the transmitter and remote control, and simply run a few terminated category cables between the two. If anything ever happens to the cable, just unplug and replace it. There is an additional benefit in that it will make everything look much cleaner. In fact, you could take it even further and install RJ-45 patch bays in your rack for all the interconnections. Things become even simpler then – if you wire the remote controls and telemetry in a similar fashion, troubleshooting remote controls is as simple as flipping the Cat cables around and testing the functions. Chances are, you'll be wiring other things in the room with category cable, so why not keep it simple?

Move On to Electrical

You'll likely need an electrician to come in and do some changes for you. Yes, there are a lot of folks who can "DIY," but if the electrical fails and the insurance company comes calling, I'd much rather be able to point to the licensed electrician than to myself! So take that time to grab your label maker and label the circuit ID's on all the outlets. How many times did you need to cut the power to a box, yet you really weren't sure what else was going to shut down when you did? This eliminates the guess work. Oh yeah, while electrician is there, make sure he checks the building and equipment's electrical ground. It's better to pay the electrician to fix it while he's there, rather than wait for the magic smoke to get out!

Out With the Old Spare

On to HVAC

Whether you're drawing outside air for cooling, or using an HVAC system, now is the time to evaluate your options. If you're having to change intakes, try and get something that uses deeper pleated filters. Those filters are more expensive, but have a lot more surface area and require less changes. A side benefit is that the size pretty much requires you to get a pleated filter rather than a cheap fiberglass one. That should cut down on the amount of maintenance you need to do.

Labeling and Documentation

That's a big one for me! We now travel to many sites, and often back each other up. How many times have you gotten to a site only to find that you have to spend 10-15 minutes just trying to sort out what does what, and what goes where. Label makers are inexpensive, and worth their weight in gold. I label everything – expected values on meters, IP addresses of gear, normal positions of switches ... you get the drift.

If you can walk into a site, and figure the work flows almost immediately, you've done a great job. It seems elementary, but when you're at a rarely-visited site at 3:00 a.m., you'll appreciate the effort. That applies to documentation as well. Document the wiring schemes for your transmitter and remote. Document any "features" you may have added. Document IP addresses and passwords to routers and other devices. Keep all of that with the transmitter documentation.

By the way, if you have a site in a rural location, *do not* keep it in a filing cabinet! You'd be surprised how many times I've gone to a site only to find out that the documentation is now a mouse nest. Keep it in a "lock and lock" style plastic container. That will keep out any rodents. Also, bonus points if you keep all of that information electronically as well!

Finally, look at the layout of the building. Chances are you won't be able to move the current main transmitter, but if you're going to have to change the wiring and HVAC for a new transmitter, look to see if there's a better place to put it, or a different way to orient it. At a site I'm working on now, I'm actually going to flip the direction of the transmitter so that the new one faces the other way. After years of changes in the building, there is much more area behind the current transmitter, and the new one requires a lot more access in the front than the old one – so it makes more sense to "flip it" around. Perhaps there's an entirely different place that makes more sense – other than physical constraints, nothing says you have to stay within the lines on this.

A Good Spare – and a New Main

The Physical Plant

Be sure to measure everything twice. You'll likely need to get one transmitter out and another in. Things may have changed that make that project difficult. In one recent case for me, I had two transmitters side-by-side in a very small building. The transmitter closest to the door was staying, while the one farthest away had to go. If I wanted to use that door, I would have had to move out both transmitters and put the old and new back in. That would have obviously resulted in some off-air time.

So, as part of the project, I had a new door put in on the other side of the building, closest to the transmitter being removed. Not only did that make removing and replacing the transmitter much easier, it also allows me to "open up" the building when working, giving me more space, and offering a nice breeze in the summer. Again, one of those things that was on a wish-list that I was able to do, thanks to a new transmitter.

Getting new gear is always exciting. You have the opportunity to upgrade older devices, and often get great new features and added reliability. However it can also be like throwing on shiny new wheels on a beat up 30 year old car. The wheels look nice, but nobody really wants to deal with the car itself! Look at this as the perfect opportunity to give your site a much-needed facelift and a chance to start over with a clean slate. Being able to rid yourself of some of the old baggage will allow you to walk away from the project with a smile, and the confidence of knowing that you've left the site with it well positioned for years to come!

Christopher Tarr holds the CSRE, CBNE, and DRB certifications from the Society of Broadcast Engineers, and is the Director of Engineering for Entercom's Wisconsin stations. He can be reached at chris@tarr.cc

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Antenna Topics

An Emergency Antenna

A Description of Components & Procedure

by Mike Hendrickson

After reading the last issue of *Radio Guide*, Jay Underdown, Spectrum Resources Consulting, LLC, reminded me that most two-way radio shops maintain a supply of 7/8" and 1-5/8" Heliax. It is worth your time to maintain a cordial relationship with your local shop. They may be able to help you out in the event of a transmission system failure.

In my last article I gave a short description on how to make an emergency antenna out of a multi-section or multi-bay ERI antenna. In this article I'm going to go into more detail about the ERI antenna. This description is a "layman's" description of the antenna. The description and explanation is for a single bay, high power ERI "Roto-Tiller" antenna. It is based on my experience with the antenna plus conversations over the years with the good support people at ERI. This article is not meant to be a definitive essay on ERI antennas.

The single bay antenna is the building block that is used to build multi-bay antennas. The single bay antenna is composed of the actual radiating elements, an impedance transformer, a "T-block," a matching section, and, depending upon the exact model of the antenna, the DC shorting stub. **(Figure 1)**

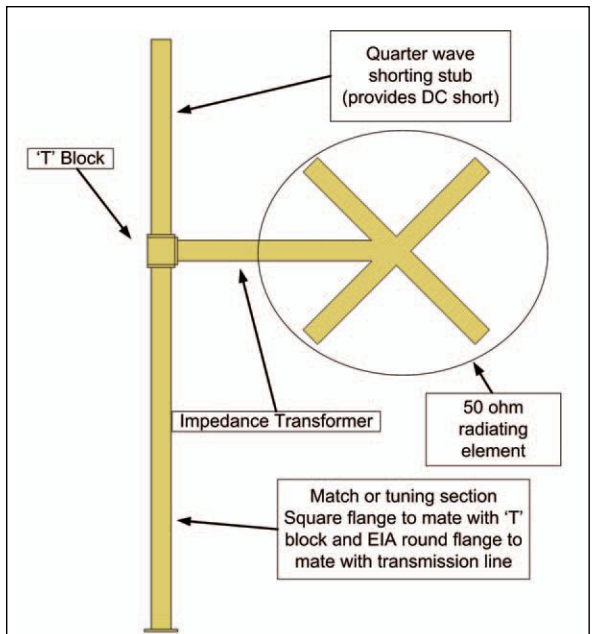


Fig. 1 Single Bay Side View (not to scale)

Between the T-block and the actual radiating elements is a transmission line "Tee." **(Figure 2)** This Tee is composed of about 28 inches of 3-1/8" line for the base of the Tee. The top of the Tee is about 14 inches long. The base of the Tee utilizes a square flange to connect to the T-block. The arms of the Tee use round flanges to connect to the radiating elements. The 28 inch length of transmission line comprising the base of the Tee is an impedance transformer. The input to the center conductor, at the top of the Tee, has an impedance of 50 Ohms. Since this is a single bay antenna, there is no need to change the input impedance, so the center conductor of the base of the Tee is a standard length of 3-1/8" inner conductor. If this bay were to be used in a multi-bay antenna, the impedance of the bay would need to be changed to another value by using a different sized center conductor in the Tee.

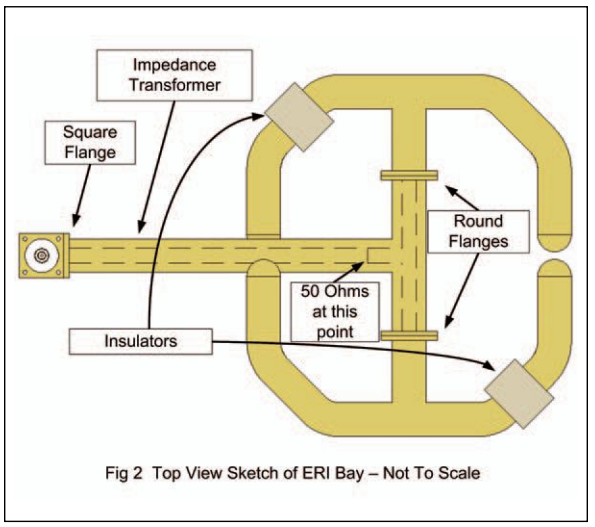
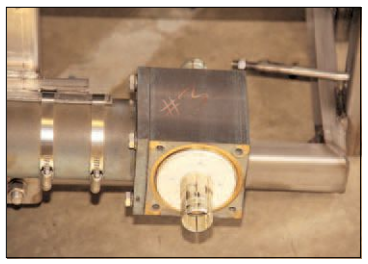


Fig 2 Top View Sketch of ERI Bay – Not To Scale

Connected to the top of the T-block is a DC shorting stub for lightning protection *(see Figure 1)*. This is a length of transmission line that is 1/4 wavelength long. One end of the line has the center conductor shorted to the outer conductor to form a short. The other end has a square flange to connect to the T-block. At the operating frequency, the 1/4 wavelength shorting stub appears to be an open at the T-block. At twice the operating frequency (or the second harmonic), the shorting stub is now a half wavelength in length. This means that the impedance at one end of a half wavelength transmission line is present at the other end of the line and is shorting out the second harmonic. This may help to reduce second harmonic radiation from the radio station.



A "T" block on the end of an ERI antenna bay.

Connected to the bottom of the T-block is the matching section *(see Figure 1)*. The matching section is a standard 3-1/8" transmission line used to transition between the square flange of the T-block and the round EIA flange on the transmission line. The matching section is also used to fine tune the input impedance of the antenna to match the transmission line.

In a perfect world, the antenna would have no need of the impedance matching, but the antenna is mounted on a metal structure that is probably different from the structure used at the factory to support the antenna while being tuned. This different structure will affect the factory tuning of the antenna.

The matching section accomplishes the tuning of the antenna by placing Steatite slugs at a location on the standard 3-1/8" center conductor. The slugs tune the antenna by acting as capacitors. They are placed at a location in the matching section determined by the antenna's impedance at the station's operating frequency.

If you have some type of a failure in your transmission system, you may be able to utilize a single bay from a multi-bay antenna as an emergency antenna. You will need a length of standard 3-1/8" center conductor to replace the center conductor of the impedance transformer in the base of the Tee of the bay. Carefully remove the T-block from the end of the bay. After the T-block is removed, pull out the center conductor of the impedance transformer. Cut the center conductor of the standard 3-1/8" line to the same exact length as the center conductor of the impedance transformer. Insert this center conductor into the base of the Tee. Be sure the center conductor properly mates with the bullet at the Tee. Reattach the T-block to the bay. If the T-block does not have the DC shorting stub installed on it, move the shorting stub from the bay it is installed on to this bay. If the antenna does not have a shorting stub, use the T-block with the end cap from the top bay of the antenna. This T-block will have an "L" center conductor.

If the matching section for the antenna is okay, use it as a transition between the square flange of the T-block and the round EIA flange of the transmission line. Remove the center conductor of the matching section. Before removing the tuning slugs from the center conductor, make an exact measurement of the location of the tuning slugs as well as the thickness of the slugs. You will need these measurements when the antenna is repaired so you can reinstall the tuning slugs in the correct location. Remove the tuning slugs. Reinstall the center conductor into the matching section. Be sure to cap the ends of the matching section when hoisting it to the antenna so the center conductor does not drop out.

This photo shows the "Tee" section between the radiating arms of the bay. The base of the Tee is an impedance transformer.

As an alternative to removing the slugs from the center conductor, you can use a length of standard 3-1/8" center conductor that is the same length as the center conductor with the tuning slugs. The reason for not using the tuning slugs is that the antenna's impedance will have changed. The single bay will be a nominal 50 ohms. (Of course, the slugs can be reused to tune this emergency antenna if there is a need.)

If the matching section is damaged you should be able to mate the T-block to the round EIA flange on the end of the transmission line, but only two bolt holes will line up. Or you can use an inner bay line and a field flange to make a new match section that will transition between the square flange and the EIA flange. This will require the purchase of a new inner bay line to replace the line that has been cannibalized for the matching section.

The use of any emergency antenna, reconfiguration of an antenna, or change of an antenna from the original design is done at your own risk. If there is any question about an ERI antenna, the reader is strongly advised to consult ERI. If your antenna is damaged be sure to work with ERI. ERI has all of the original design information for the antennas they manufacture for each radio station.

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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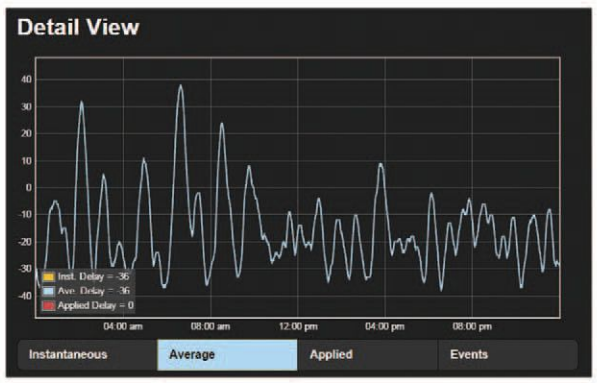
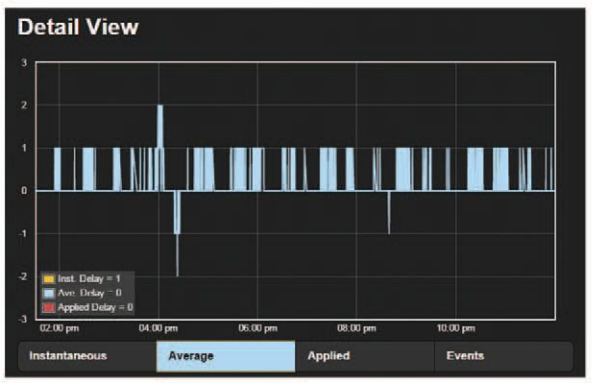


Typical FM/HD1 drift over a 24 hour period.



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INOVONICS BROADCAST

Radio Report

Jim Gorman – Inventor and Innovator

by Steve Callahan

I don't know too many inventors and innovators, but I do know Jim Gorman of Gorman Redlich Manufacturing Company. Just when I thought I knew all about Jim, I picked up the telephone and chatted with him to learn more interesting facts about the man I call, "The Boss with the Hot Sauce." Call him, and ask him what that really means – he'll be glad to tell you!

I first met Jim Gorman at the NAB Radio Show in the convention center in New Orleans. It wasn't hard to find Jim at his booth, and he had all of his products on display – he was very anxious to chat with anyone who approached his booth. At that time, in my official capacity as Director of Engineering for a family-owned, New England-based broadcasting group, I had bought a half-dozen Gorman Redlich EAS encoder/decoders for the group. I was extremely pleased with how easy they were to set up. They worked as they should, were dependable, and had many features that I didn't know of initially, but came to depend on, and I wanted to tell him just that.

Jim has been to more than his fair share of trade shows and he's very approachable. If you have a question about EAS, he's your man. Over the years, I have owned one of every product Gorman Redlich Manufacturing has built and marketed. When I took over the technical responsibility of an LPTV, my first call was to Jim to get his EAS character generator. It had all the features I was looking for, and more, to get the LPTV up and running. When I needed an AM antenna phase monitor, again, the call went out to Jim Gorman and in less than a week I had one at my door. I have installed many of his CAP decoders in tandem with his EAS encoder/decoders and they are a cost-effective option to scrapping a perfectly good encoder/decoder. You'll see one of his weather radios in my rack and it just works and works and works.

When I asked him for an interview for this story, we talked about a wide range of all things EAS. However, my first question was, "Exactly who is this mysterious Mr. Redlich?" Jim revealed that Bob Redlich was his former partner, and a professor at Ohio State University, when they both started the company in 1972. However, in 1979, Jim bought out his partner but kept the company name because banks and customers had come to know it as Gorman Redlich Manufacturing.

Jim Gorman graduated from the Brooklyn Technical High School and then went on to earn a Masters Degree in Electrical Engineering from Ohio University in Athens, Ohio. While at Ohio University, taking courses toward his doctorate, he and Bob started the company to invent and manufacture crystal oscillators for aircraft visual omni-range transmitters – their first official product.

Shortly after, the Federal Communications Commission called and asked Jim if he could mass produce EBS or Emergency Broadcast System equipment, the predecessor to EAS. Of course, Jim said he could and in two weeks he came up with a prototype and priced it to sell at only $200. At the time, McMartin was the only other manufacturer of EBS equipment, so Jim's foray into the world of EBS started in a big way.

EAS-1 Encoder/Decoder

A few years later, in 1979, the National Weather Service called and asked if Gorman Redlich could manufacture a weather service receiver. Once again, an innovative product hit the market and has stayed there for many years.

CRW-S Weather Receiver

Jim's design for an AM antenna monitor came next and was very cost effective option to a much more expensive unit. Recently, a well-known AM consultant told me that he likes the Gorman Redlich antenna monitor because it's so well filtered, so as to make it the best antenna monitor to use in a diplex or triplexed array.

(Continued on Page 22)

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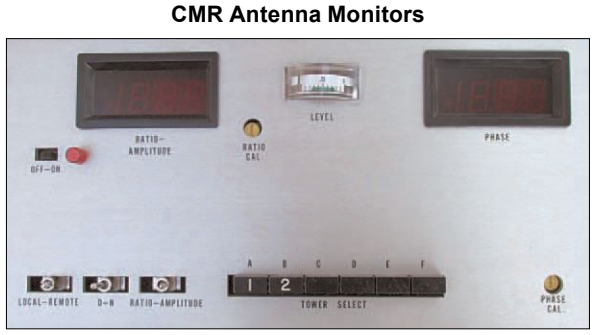
Jim Gorman
Inventor and Innovator

– Continued from Page 20 –

Jim also revealed to me that he is working on a modification of his original antenna monitor that will allow two directional stations in a diplex to share just one Gorman Redlich antenna monitor for both stations, thereby saving a considerable amount of money in a time when building AM directional arrays is already an expensive proposition.

CMR Antenna Monitors



There's been a lot of talk recently about the "six-zero" header codes that will be used by the federal government in future national tests. Once again, Jim Gorman is right on top of it and told me that he believes TFT encoders/decoders will receive the six- zero code as they are and that other manufacturer's units will receive the message if you tell it to accept the code for Washington, DC. If you have a Gorman Redlich unit, you can use the Washington, DC work-around or you can get a new EPROM from Jim which will accept the six-zero code. All three solutions are very cost-effective ways to avoid scrapping your existing operative EAS encoder/decoder.

CAP-DEC-1 CAP to EAS Converter

You would think that such an operation, with so many products, would require a large manufacturing facility with lots of employees. Well, the way to keep your selling price down is to keep your manufacturing costs down. Jim designs the circuit boards in Athens, Ohio, and then sends them out to be manufactured in Cincinnati, Ohio. He has the equipment cabinets manufactured in Baltimore, Ohio. Yes, I didn't know there was a Baltimore, Ohio either! All of the components come back to Jim in Athens for final assembly, testing, programming and shipping to his customers.

Jim shared with me some proposals he is writing for the FCC to better improve the EAS system. Recently, a nationally syndicated radio show aired a program that had within it some recorded EAS tones. This caused more than a lot of confusion across the country for broadcast stations and cable systems alike, and earned the licensee of the station originating the syndicated show a hefty FCC fine.

According to Jim, in this case, the EAS system codes didn't account for the message being outdated. However, the code string could be modified to add onto the end of the string a date code so that the message could be filtered, and aged-out EAS messages would not be relayed.

One problem that I have personally had with EAS reception is that a station I was monitoring would sometimes have very erratic RMT reception. I would receive their RWT with no problem, but not always receive their RMT. After some research, Jim learned that the more stringent filtering in his units would sometimes not decode the message encoded by other manufacturer's equipment – especially if the encoded message had 25 or 30 codes. The solution for this problem is simple – just use your local codes and your single state-wide code instead of every single individual code in your respective state. The Gorman Redlich filtering will dependably decode 5 or 6 codes instead of the larger amount of codes.

Aside from being focused on EAS all the time, I was curious as to what Jim did for fun these days. It seems he gave up playing softball six years ago when he was 73, but his seven granddaughters, with an eighth grandchild on the way, keep him more than busy when he's out of the shop.

My last question to Jim was, who will eventually take over the successful manufacturing company that he's built over the decades? That was one question he didn't have an answer for.

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

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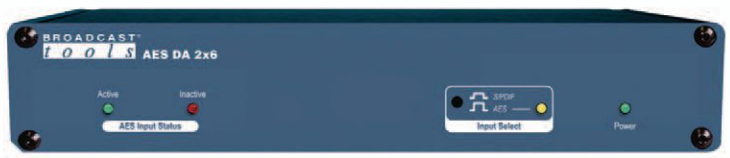

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MIDI and AES70?

AES70 was ratified on January 4 as a rudimentary control standard for audio IP networking. Whereas AES67 gave us a means to move audio signals from point A to point B regardless of audio network brand, AES70 now offers a basic control standard that we can use to add third-party devices to the WheatNet-IP audio network. Think MIDI, only for the broadcast world.

IP audio network manufacturers have spent a great deal of time, money, and energy developing fully realized solutions that handle intelligent audio transport and control. For example, our WheatNet-IP audio network is a complete studio environment with control surfaces, navigator software, button panels, widget GUIs, audio controllers, and more that interoperate behind the scenes in ways that would give a cellular phone network a run for its money. We can control anything, conditionally if necessary, from just about anywhere in the environment.

Read the rest of the story: INN33.wheatstone.com

Your IP Question Answered

Q: Why is a distributed network like the WheatNet-IP better for redundancy than a centralized system?

A: Centralizing network management is a single-point-of-failure waiting to happen, whereas distributing network resources to every IP point naturally builds in redundancy. If one part of the network fails for any reason, the rest can keep on functioning. Each IP connection point (or WheatNet-IP BLADE) stores the configuration of the entire network onboard, which means that failover is immediate. And because WheatNet-IP BLADEs talk to each other, adding additional BLADEs onto the network is plug-and-play for easy system expansion.

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That's what they're telling us. To wit: "I don't want to tell the world what we're doing, but I can tell you we're using one of your streaming presets as our starting point," said Cris Alexander, the DOE for Crawford Broadcasting. He's referring to our BLADE-3s, which serve as I/O connection points in the WheatNet-IP network but also happen to have powerful audio processing on board. Ever the budget-conscious engineer, Cris installed the BLADE-3s as part of the WheatNet-IP system (with E-6 control surfaces) and then assigned them double duty as the processing for web streams. He is using BLADE-3s for processing streams in five markets – Crawford's clusters in Denver, Detroit, Birmingham, Chicago and Los Angeles – for a total of 14 streams. We're talking a very diverse group of formats that range from talk to urban.

Read the rest of the story: INN33.wheatstone.com

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Internet IP and Telco Changes

It's Always Something

by Scott Schmeling

Well, most of the country has switched to Daylight Saving Time and spring is officially here. But you wouldn't know it by looking out my window today. Southern Minnesota is "enjoying" one (and hopefully) last blast of winter, complete with snow, icy roads, travel advisories, Winter Storm Warnings, and even school closings!

Yesterday it was 60 degrees and all the snow was gone. Today is a different story. But, being the optimists we are, we *know* any snow that falls this late is not going to last long. But enough about the weather ...

Before we jump into this edition's article, I'd like to turn the calendar back and share a few reader e-mails regarding two previous articles.

In the September/October 2015 edition of *Radio Guide* I mentioned adding a Radio Design Labs STA-1 "Electronic Transformer" to allow for a better input match and input level control. Bill Gellhaus, WMRG Studios, Inc., brought up a very good point:

"Have you ever measured the NOISE-to-signal ratio of an onboard sound 'card?' At one of the stations I was working for, the 'ambient' noise floor was between 50 & 60 dB out of a set of Dell computers. Between the power supply, processor and Video clock, and other RF trash, you don't stand a chance. Even a 'cheap' add on internal card has problems ...

"If you keep an eye on Musician Friend for their cheap deal of the day, you might find an Alesis iO Hub 2-Channel USB Audio Interface ($50.00) or something similar. Just something to think about."

Bill Gellhaus P.E. – WMRG Studios Inc.

Thank you Bill, good point. To be honest, I've never measured the on-board card's performance. In fact, I have been looking at a couple USB interfaces. The $50 option you mention is certainly affordable. You might still want to add the STA-1. Of course, if you don't mind spending somewhere between $700 and $2,000, you can install a truly professional card. They're designed for a +4 level and have balanced in/out, and they sound fantastic!

The January/February 2016 *Radio Guide, "Tower Down"* article brought a few e-mails. Ray Rising wrote:

"I enjoyed reading your article about the Tower Down. I used to maintain TV translators in Virginia (Minnesota), International Falls and Bemidji 50+ years ago in the winter and snow.

I now promote and install LPFM and short wave in Peru and Colombia, SA. These are for indigenous Christian groups that want to reach out to the local isolated areas."

Missionary Engineer – Ray Rising

Thank you, Ray. You're providing a much need service. I also heard from Paul Bittner. He talked about putting a couple towers up in Alaska and included this:

I have many towers – www.qth.com/w0aih.

Paul Bittner – Amateur Radio W0AIH

I clicked on Paul's link. He *does* have *many* towers! "The Farm" is located on 120 acres in West Central Wisconsin, just southeast of Eau Claire.It's pretty impressive. Thanks Paul.

And finally, David Sepulveda pointed out:

"You've probably already been notified that Mid December 2016 hasn't passed us by yet. Did this happen just this past December?"

Oops! That one got past the proof-reading staff. In the article I said it happened in mid-December 2016. You're right, David, I should have said it happened in mid-December 2015. This proves that it's difficult to proof-read your own writing.

OK, enough of the past. I had an *interesting* thing happen that I wanted to share with you.

Speed Change Ahead

One of our location managers e-mailed me to say they were going to change Internet and telephone providers. He gave me the date of the change and phone number for the new company. I called to verify the date and time, and noted it in my calendar – I figured this should be pretty simple.

When the tech arrived, I showed him where the telephone system controller and the cable modem and router were. We talked over a few things and he went to work. I'm not going to try to tell you the change went "smooth as silk." What fun would that be (and what are the chances)? But one very nice thing – he was bringing in optical fiber. With that, our Internet speed was bumped up to 100 meg up *and* down! I certainly don't have to tell you that faster is better!

(Continued on Page 28)

Sicon-8 Internet & Voice Remote Control

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– Continued from Page 26 –

Overall, I have to say the change actually did go quite well. Not perfect ... but well. I had to change the IP settings on the router and reboot it. We discovered the router was a little slow in handing out new addresses and, as a result, a few computers couldn't get on-line until they rebooted. (Telling them to reboot was infinitely easier than telling them to go to a command prompt and "do an ipconfig release and renew.") So far, so good.

One of the computers had a static IP address and was configured for remote access. Granted, this computer could still see everybody on the network and could print to network printers. What it couldn't do was go on-line *or* get e-mails! Yes, the address was in the proper range, but the DNS servers needed to be changed. And the remote user had to change her settings to the new IP.

Likewise, the DNS settings for the Tieline and Barix codecs needed to be corrected. I put new labels on the Tieline Field Units but, of course, the first time it was being used, they simply hit <Dial> and the unit called the last-used address. As soon as they called to say the remote couldn't connect I asked if they had dialed the new IP ... they hadn't!

Where's the Fax?

The next day, I just happened to be there and they said the fax wasn't working. Well, actually, they could receive faxes, but couldn't send them. I tried to send a test fax and, as expected, it failed. So I lifted the handset and tried again. After I dialed the number I heard a prompt to enter the long distance access code. That was why it wasn't working. All I had to do was call the new provider and have that requirement removed from the fax line.

That day I also noticed the EAS Endec had a flashing "Automatic" LED. After checking the manual, I changed the DNS settings there, too – then it was fine.

But the really interesting issue came to light the following Sunday. A church in a neighboring community connects with the Barix to broadcast their services. They had changed the "connect to" IP and I had been told they had tested successfully earlier in the week. But it didn't work on Sunday.

Barix Exstreamer 500

Let me pause a second here to say I haven't worked with the Barix product enough to be familiar with it. I had screen shots from the original setup, but unfortunately, I didn't have screen shots for all the screens I needed. Fortunately, Andrew from LineQ tech support was incredibly helpful. He couldn't remote in to the Barix, but he could talk Pastor Heidi and Andy (back at the station) through checking all of the necessary parameters.

Interestingly, everything was set correctly and *should* have worked. After all, it had worked properly *before* we changed our IP address. The Barix has a "Push-to-Talk" option. In that mode, it sits there idling until someone at the church flips the switch. We set it up in that mode originally so it wouldn't take up our bandwidth, back then we probably had something like 1 or 2 Meg service. When the church was connected, the Internet was slow.

I'm not a big believer in coincidence. In situations like this, where something had been working but stopped working after a change was made, I tend to look at what has changed. Well, Andrew was working with Heidi and Andy. He was able to connect with the studio, so he dug deeper into the unit at the church.

The "Push-to-Talk" switch is wired to a little green Phoenix connector. Andrew was able to talk them through jumpering the switch on the connector. As soon as that was done, the units connected to each other and church audio could be heard at the studio. Thank you Andrew! We decided that since we now had 100 Meg Internet service, it would be alright for the Barix to remain connected until I could replace the switch.

One more quick note regarding Barix: They have a configuration that uses two Barix Extreamer 500's set up as an IP STL. It can be set for various MPEG quality levels as well as PCM 48 kHz. It's a fairly inexpensive backup that could be used at any site with decent Internet service. I'm going to write more about this in a later article.

That's all for now ... I have some snow shoveling to do. 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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Engineering Perspective

Preventive Maintenance Principles to Think About

by Rolin Lintag

Most of us need to mentor upcoming broadcast engineers sometime in our careers. And as we do, we get into situations when we try to grab some explanations for things that are just common sense to us. Some of you may agree that what we call common sense may still need some elucidation in order to make our point understood.

Perhaps this short article can help.

Over the years, I have found that understanding principles can go a long way in understanding preventive and corrective maintenance tasks. It is our nature to ask the questions, "why" and "how." If that need is not filled, then expectedly, we just don't give our best effort. Although we realize and admit that full understanding is not a prerequisite to compliance, we still need to understand the rationale behind why and how things fail as they relate to maintenance. It helps to visit some Laws of nature, and a paradigm to problem solving, that we can practice in order to set us on our way to a good foundation in maintenance.

Law of Causality

Simply stated, every effect has a cause – *every* effect has a cause! By definition, a *cause* is that which produces an *effect*. A fuse does not just blow without a reason. If the effect is a blown fuse, then there should be a *cause* that blew the fuse. In this known universe (and the only one we have good reason to believe actually exists), every effect has a cause. If someone argues otherwise, then perhaps he has a different definition for cause and effect.

Before I move on, let me differentiate a few more words – *possible, probable,* and r*easonable.* Everything is possible (yes even the metaphysical) but what is the probability that it can happen? And is it reasonable to believe that it happens? Anyone can claim that a ghost blew the fuse. That is possible, but is it reasonable to believe so, for the purposes of maintenance? If a ghost can just blow up a fuse, then what kind of preventive measure do you think we can effectively implement? Some of us do not even have the stamina to go through that thinking exercise. We say that we have to think logically and find other *options* that we can reasonably believe blew the fuse. Is it more reasonable to think that it blew due to an overcurrent condition during a blackout? What is the probability that it blew after a thunderstorm?

This sounds like a waste of time to discuss, and best left to philosophers. But as engineers, we need to understand some really practical stuff like the validity of the expression, "Oh, it happened by chance!" Understanding the Law of Causality will lead us to the conclusion that *chance cannot cause an effect.* Why? Chance is a measure of probability – a mathematical measure. When someone says "It happened by chance," he does not scientifically mean that there is such a *cause* called *chance,* that produced the situation. What he actually meant is "It happened, but I don't know why and how." Chance did not *cause* that *effect*, as if some unknown force called "chance" blew the fuse.

Let me give an example. One technician claimed that, by chance, the vacuum tube just failed. I had to conduct an investigation and it puzzled me as to why a tube that was beyond its bath tub curve, properly tuned, and very conservatively used, would show symptoms that it suddenly became gassy. I had to see for myself how our technicians did the maintenance work and did a post mortem observation on the tube.

It turned out that the ceramic insulator had a small crack – one of our technicians did not take the extra care in the use of his screwdriver when working in the PA cabinet. Understanding the failure mode, and knowing *why* the vacuum tube failed, simply clarified the expression "It happened by chance." As you would suspect, chance had nothing to do, and can never possibly, nor reasonably *cause,* such an *effect*.

As engineers, we must train our minds to think in line with the Law of Causality.

The picture on the right shows the why and how, that a strong signal in good weather can suddenly become bad!

(Continued on Page 32)

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Preventive Maintenance Principles to Think About

– Continued from Page 30 –

Law of Increasing Entropy

The Second Law of Thermodynamics simply states that if you have a system that is isolated, any natural process in that system progresses in the direction of increasing disorder, or entropy, of the system. You will find many more difficult to understand definitions of this law, but I like the simpler ones – it has to be simple for me to be able to apply it in my thinking. Again, in this known universe that we have reason to believe actually exists, what we observe is that there is increasing disorder from the complex to the simpler systems. It is as if our universe was originally wound up like a spring and that spring is unwinding as time progresses. Any system (and equipment) starts from new, but starts to wind down as it ages in use.

This is why we have "PM," or preventive maintenance. PM is that effort, or input, to the system to keep it going. A broadcast transmitter will not operate forever, although some seem like they will. If that broadcast transmitter does not receive the necessary effort (PM), then its winding down will be sooner than later. We don't need a degree in science to understand and believe that this is the case. We just need to have eyes that see, and a mind that works to understand how nature around us operates. Everything deteriorates in time. (Apparently, even relationships begin to fail if not nurtured!). As an engineer, I find it difficult to believe that equipment will continue to work like new over the years, without the effort to maintain its like-new condition. Just when you think you have a well-designed transmitter building, nature has a way to make the roof leak, corrode metal joints, and send lightning to bust some parts. Good for us engineers, the Second Law of Thermodynamics provide us with some job security (Not!).

One GM told me that it is very hard to believe that we need to spend so much just to keep our broadcast equipment working. We are talking about a broadcast transmitter with serial number 3, and that the manufacturer closed down its business three years ago. I found myself wanting to give a lecture on the 2nd Law of Thermodynamics but, unfortunately, it would have done more good to my sanity than getting that budget we needed. Perhaps you have better luck that, by chance, your GM understands this law much better than others (I'm not speaking as an engineer here, just ranting). Many of you will agree with me that what we engineers call common sense is not so common to laymen, so arm yourselves with as much "explainin" as you can get hold of.

Occam's Razor

Merriam-Webster Definition of Occam's razor:

A scientific and philosophic rule that entities should not be multiplied unnecessarily, which is interpreted as requiring that the simplest of competing theories be preferred to the more complex, or that explanations of unknown phenomena be sought first in terms of known quantities.

Just what does William of Ockham (1285-1349) want to tell us engineers?

When we apply this paradigm, we get to the conclusion that, if the transmitter failed, assume the simple *causes* first. I have found this to be a powerful way of troubleshooting systems and equipment. You may want to apply this in other areas of knowledge and endeavor, as you wish, and it may work for you; but I prefer to use this on troubleshooting systems. Most of the times in my experience as a broadcast engineer, the simple reasons are usually the ones that cause the problem. However complex an FM broadcast transmitter may be, the most probable cause of problems are either the power supply or the control circuitry, or both. I'm not preaching we jump to this conclusion, prior to investigating the symptoms and understanding what is happening. I am just saying that before we jump to a conclusion requiring a PhD in EE to understand, let us check the voltages to the board first. Do not unnecessarily multiply complex causes to understand the failure modes of an equipment.

Albert Einstein once said "The incomprehensible fact about the universe is that it is comprehensible."

Rolin Lintag is the Assistant Chief Engineer for KRON 4 in San Francisco. There are so many things he tries to understand, so if he failed to explain things well enough to your satisfaction, or you simply do not agree with the laws he is ranting about here, please send him an email at rlintag@kron4.com

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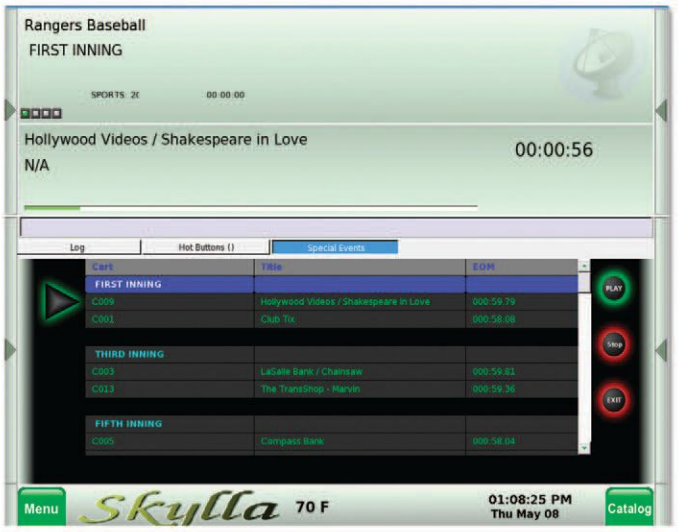

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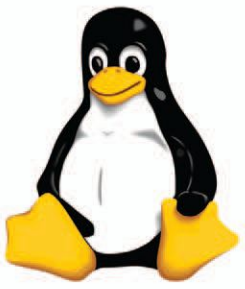

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Tech Management

Keeping it Simple

by Tommy Gray CPBE CBNE

Make It Understandable

"Geek Speak" as it is called, is defined as, *"A vernacular of casual English in textual or verbal form, blending highly grammatical English with technical jargon."* Your boss might define it as what you say when he asks you a technical question and you give an answer that no one but you can understand. Other engineers might simply define what you are doing as "blowing smoke." Sometimes we need to take a step back and listen to how we talk to folks who are not Engineers or IT people. *We* clearly understand what is being said, but they, simply put, "Don't have a clue" and it is not their fault.

I would imagine your Sales Manager could talk to you about AQH or CUME, and you might be just as confused. Or maybe your Accounting Manager might talk to you about Accrual, or maybe Appreciation (BTW, that does *not* mean that they like you), or Burden Rates, CAPM, Co-Mingling, etc. (and no, that one does not mean fraternizing!), and you think they mean one thing, but they actually mean something else. We need to cultivate the ability to explain things to people in a way that they can understand, without having had any formal training in your field. This is a courtesy to your listener.

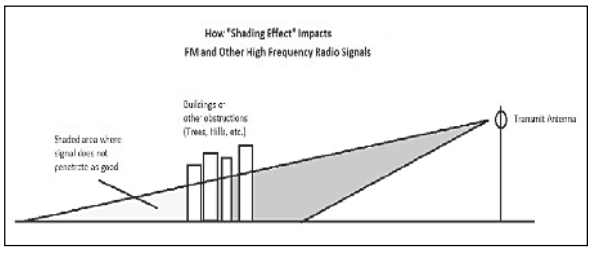
We have an on staff attorney here, and when she came on board she told us, "Treat me as if you were explaining things to your two year old child, when talking about technical things, because I am not a technical person, I am a legal person." Now don't get me wrong, she is a highly intelligent person and is well respected in her field, (as are most professionals around broadcast operations). But when it comes to technical things, she has no formal training in such matters and there is a lot she does not know as a result.

Having said all that, I want to share a few things with you to maybe help you be better understood by your staff and management, and that will help you to be better appreciated (Yes that *does* mean to be liked, so to speak). You know, I think some engineers take great pride in telling people technical things in ways that try to make themselves sound like experts in their field. That will make you about as popular as a transmission failure in the middle lane of a 7 lane freeway – at drive time on Friday afternoon!

Allow me to give you an example. I make an effort to try to explain technical things to the uninitiated in ways that they can better understand them. I have been in meetings and have had people look to me for the explanation, when the person talking might know more about the subject than I do. The reason is, that they know that, if given the chance, I will translate the "Geek Speak" into plain English, or at least try to.

Recently, a person who had very little technical knowledge was trying to explain multi-path to some folks in a meeting. Unfortunately, he was about as wrong as you can get. It was not his fault however as, somewhere down through the year, he had simply listened to others who did not know how to explain things, and he thought he knew what he was talking about. This prompted me to create a graphic that is about as basic as you can get. What he was actually talking about was shadow fading, or as we used to call it, "Shading Effect." When I put the explanation into a document with a simple graphic, it quickly spread to other departments and immediately people started thanking me for helping them to understand something they had wondered about for years.

It took me about 5 minutes (as is clearly evident when looking at it) to create the drawing, but it was worth a million bucks in helping others to understand. Here is what I created shown below:

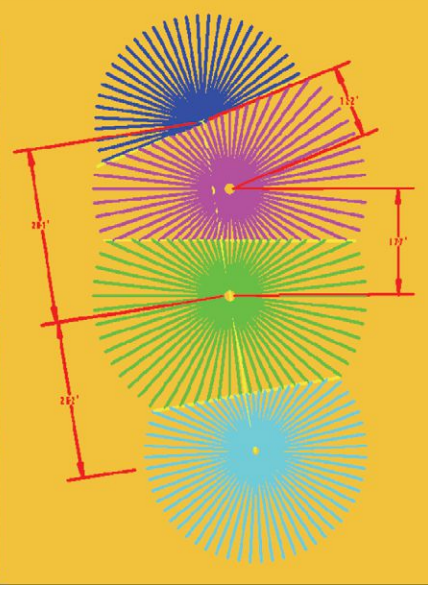


I realize that this a dirt simple little drawing, but as the old saying goes, "A picture is worth a thousand words." You might try it sometimes.

(Continued on Page 36)







Keeping it Simple

– Continued from Page 34 –

More Simple Things

There is an old saying, a college professor friend of mine used to use when explaining simple things. He would qualify what he was explaining in simple terms with the phrase: "Simple things from a simple mind." Now mind you this guy was a genius and had, by no means, a simple mind, but had a way of making everything very understandable. I have listened in awe as he would come up with the simplest explanation of something so complex we could never have grasped the concept. When he got through though, we felt like we totally knew what he was talking about.

Want to be appreciated in your field? Help folks to understand what you are talking about. For example, how many times have you talked to someone you were helping with a computer problem and said things like, "It has lost its IP address," or "I may have to use a packet sniffer to tell what is up." The person on the other end only knows that apparently something called IP got lost out of your computer and no one knows the address it went to, or you are going to have to sniff around and see if you can smell a problem! Sound silly? Ask them next time if they can explain back to you what it is that you are talking about.

You might be surprised that all those nods of understanding and smiles you got were really hidden behind thoughts of, "I don't have a clue what he is talking about but can't let on that I don't understand or he might think I am stupid." I can tell you that many times when you use Geek Speak, as soon as you clear the door, they are on the Internet searching for an explanation of what you meant.

Where I work, there is a phrase that gets a lot of use in meetings. It says, "Does that make sense?" What that says is, "Does everyone fully understand what was just said?" – giving the listener time to ask for clarification if necessary. You might try that one occasionally, after an explanation of something to a person who is not as technically astute as yourself.

Understanding Is a Good Thing

Going in another direction for a bit. OK, let's say it is time to put together annual budgets for your department. You list all the items you want to purchase for your station on your budget requests. You go to great pains to get accurate quotes, etc. But then you explain the need as something like, "improve data flow or signal-to-noise ratio of the STL chain, eliminate crosstalk," etc., your budget manager looks at these requests and does not think they are very important. After all, isn't our signal OK? Our STL doesn't need a new chain! The one we have has worked for 20 years just fine hasn't it? Isn't our data flowing? Why is eliminating that thing you are calling "Crosstalk" important? Doesn't sound too important to me! Get the point?

This year, why not try to explain. For example, *"Improve Data Flow: Our old network router that allows us to interface with the Internet has outlived its usefulness. It is very slow because when it was built, the network speeds were only 1/10 as fast as they are now. Even though we have High Speed Internet service in the building, you cannot get those faster speeds on your office computers because the router cannot handle them. A new one would greatly speed up our network and allow your Internet service to be "10 times" faster, all for a modest investment of a few hundred dollars for a new one that is compatible with the new data speeds we use today. On top of that, with a new router, we could finally have In-House WiFi!"*

I doubt there would be too many questions other than, "How soon can we get the WiFi installed, so I can Facebook© with the kids at lunch on my cell phone and not eat up my data plan?" Get the picture? It is much, much, easier to justify your Engineering Capital Expenditures which, BTW, are traditionally the largest in most Broadcast Operations, if you can give a good explanation as to what the benefits to the operation are, how it might enhance revenue, how it would improve the speed of getting work done, etc.

I stated that understanding is a good thing. It all starts with a good explanation. Make it concise, but make it understandable. (The fact that it would make your life easier is of little concern to the bottom line ... trust me). The very thing you have been trying to get for the last three years, but was turned down, might be easily obtained if you can answer these three simple questions:

1. What does it cost? (the first question you are going to have to answer)
2. What would it do to help us make more money?
3. Would it help us to get more work done faster, or improve our quality and reliability?

There are others. but these are the ones that most organizations are concerned with. Keep it simple, and make it understandable!

Tommy is the Senior Director of Broadcast Engineering and Technology at KSBJ Educational Foundation, Humble (Houston), Texas.

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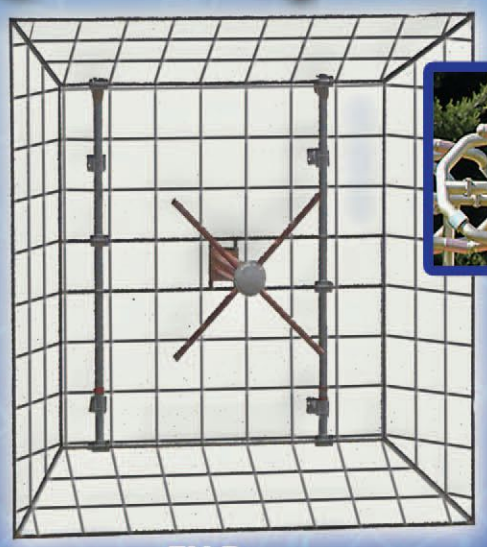

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Practical Engineering

Keeping Your Transmitter Cool and Other Handy Hints

by Mike Langner

In this time of reduced budgets and fewer resources for broadcast engineers, working "smarter, not harder" has become more important than ever. Here, gleaned from a 50+ year career in broadcast engineering, are handy hints from one of those "old guys who's seen it all."

Proper cooling is one of the keys to reliable transmitter site equipment operation. Therefore, it goes without saying that providing such cooling is a primary concern.

But what if the cooling system fails? How can you know before damage occurs? Here is how.

A Cheap Overheat Alarm

For under $50, you can prevent thousands of dollars of damage and many hours of repair work resulting from an overheated transmitter room.

Start by purchasing two "line operated" thermostats from your local home improvement or electrical supply store. While you can adapt both the "heating" and the "cooling" types, the heating type adapts more quickly with fewer parts.

Set one of the thermostats at a temperature above your normal in the transmitter room – 90 degrees Fahrenheit, for example. Then set the other at a temperature beyond which you do not want the transmitter to stay on the air – or at least not without a drastic reduction in power output in order to avoid damage to your equipment – perhaps 100 degrees Fahrenheit.

Connect the first (90 degree) thermostat to a status alarm on your remote control. Set that channel to notify you if the alarm goes off. The second (100 degree) thermostat can, depending upon your choice (and transmitter capabilities), severely cut back the transmitter power or turn it completely off.

Of course, you should choose your own temperature settings based on your equipment and your building's ambient temperature.

This setup has worked well. Shortly after we installed thermostats at several remote sites, one site without redundant air coolers lost its cooling. A $20 thermostat saved a many thousand dollar, 6-month-old 20 kW FM transmitter from a "meltdown."

The Right Building Temperature

Now that we have protected the transmitter, we should turn our attention to keeping the transmitter from ever getting so hot we need an "over temperature shutoff."

One false economy practiced by too many stations is not having dual air conditioners (or ventilation fans). Dual – as in *two separate units*, not just one large single unit. More than one GM who ignored his engineer and, instead of dual units, bought one air handler, has ended up with a failed fan motor – and a toasty transmitter, before strange readings brought help.

Just as with the thermostat alarm we just discussed, set the two units at different temperatures. If the one fails for some reason, the other can take over. Rotating the "lead" unit will exercise both and lengthen service times.

For further backup, use that thermostat that signals a "hot building" via the remote control. Hook it up to an auxiliary blower to either bring more air into the building or suck more air out of it.

Avoiding Icing – Even in the Desert

On very humid days, those of us using refrigerated air to cool our buildings can find ourselves with air conditioners that have lots of cooling power but not a lot of airflow. What happens is the condenser can quickly "ice up," causing the air conditioner to be ineffective.

This is why you should never, never, never run your transmitter building air conditioner at "low fan speed." Instead, if it gets too cold in your building, raise the temperature setting. You can only violate this rule if your air conditioner has "freeze detection" on it – where, if the low pressure Freon line gets too low, the "cut-out" switch will cycle the compressor off until the high pressure side receives heat from the cold coils, something it cannot well do if the cold coils are covered with ice.

Can you roll your own ice sensor? Sure. Just as your transmitter likely has a "sail switch" after its blower, install one in the cold air discharge from your air conditioner. If the air conditioner ices up, the airflow stops. Your sail switch should turn the compressor off until airflow is fully re-established. *(Continued on Page 40)*

Keeping Your Transmitter Cool

– Continued from Page 38 –

In the better grade installations, these ice blockage sensor switches operate a timer. This way, the cold coils not only become free of ice , but a further time-determined interval is employed to make absolutely sure all the ice is gone and the Freon pressure in the air conditioner has equalized.

When the Power Goes Out

Many of us have experienced a remote site failure and, when the remote control/telemetry does not work, wondered if there is a complete power failure – or *exactly what has happened?* Well, here is how to end the wondering!

The easiest and most cost-effective way to get the information you need is to make sure the remote control is operating – so you do not need to go to the site to find out the situation. A UPS for the remote control is less than $100 and pays for itself almost immediately.

With an operating remote control, you quickly can determine if there is power from the utility – or the generator, if you have one.

Getting More Information

To get more detailed information on the power available, purchase an inexpensive 1.5 Volt DC "wall-wart" power supply from an electronics store or, if you wish, homebrew one. If you have three-phase power, get two or three, depending on how much you want to know about the power in your building.

Bring the output(s) from the 1.5 Volt power supplies to your remote control. Put each one on its own metering channel or use "Raise/Lower" on one channel to select which power supply your remote control reads. If you set full voltage from the power supplies to indicate normal power line voltage on your remote control, you will have inexpensive metering of your building power at your fingertips.

Want to know definitively if your building power is good but a breaker is blown? Put a power supply after the breaker. Now you can both check building power and learn if the breaker of interest has tripped.

Important note: Be sure that your 1.5 Volt power supply is "transformer isolated" in design so that the secondary is isolated from the mains supply. Some "switcher" supplies are marginal in their insolation. If there is any question, employ a low power-isolation transformer, or build your own power supply using a filament or other low voltage transformer.

Verifying and Timing an Outage

Sometimes it is helpful to know exactly when and how long an outage was. First, let us verify the outage:

Take a 120 or 240 Volt AC relay. Wire it with a pushbutton so that when you press the pushbutton, the relay pulls in and then is held in by running AC power through one of the Normally Open (closed when energized) contacts. The relay will happily stay engaged until a power outage of greater than about two-tenths of a second. When you return to the site to see if there indeed was an outage, just look to see if the relay has dropped out.

If you would like to get a little fancier, add tally lights to display the power condition. Even better, add a battery operated or AC-powered clock that has *hands on its face*. It will stop running when the power fails and indicate what time the lights went out.

Want more icing on the cake? Got one more relay? With a little logic, by hooking the second relay to the first, you can start a second clock that you have stopped at 12:00 – or one that defaults to 12:00 when powered up. Either way, you will have and indication of the elapsed time since power restoration.

Now you know:

1. That there was a power failure.
2. When it started.
3. How long power has been back on.

Any inexpensive travel clock should work in both applications. Almost all travel clocks run from a single 1.5 volt battery, so having your relay connect/disconnect a battery to each clock so that it starts, is a trivial job.

Here is a variation on the theme: while you have the first clock stop upon a power failure, the second clock keeps running through the power failure and stops *upon restoration of power*. The logic to do this is a bit different, but still simple.

Now you can directly read the time of the outage and the time of restoration. Both clocks in this version must "have hands" so that when they are stopped, they will "remember" the time at which they were stopped.

We have some more of these simple procedures and circuits to do other neat things around the facility and we will share some of them with you next time. You are also welcome to share your ideas with us!

Mike Langner was the Albuquerque market Chief Engineer for Citadel until his retirement. A lifelong Ham and former station owner, he continues to be active in the industry. Contact Mike at mlangner@swcp.com

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Small Market Guide

Is There a Generation Gap in Small Market Radio?

by Roger Paskvan

In small market radio stations, turnaround is lower due to many factors. Employees feel part of the community, and radio is that community element that cements the town together. Being part of this element provides a sense of belonging and tends to provide satisfaction in small town settings. In major markets this whole philosophy is transformed into a dog-eat-dog syndrome – whoever pays the most is the next stop!

Having been in radio for almost 42 years, I've seen changes that reflect the retention process of employees. It would seem that the older generation had more commitment to the job, and loyalty to the station, as a part of their professional life. Like the textbook saying, "radio becomes synonymous with the community after many years." The older generation would make themselves part of that phrase. Pride in doing the job right, respect for their employer, and commitment to the challenges became commonplace. This was what radio was all about back then. I even know announcers that wanted to be part of the team and volunteered for activities, remotes and live broadcasts just to help out. It was "real radio," and it was exciting as the day is long.

If you have owned a small market radio station for any length of time, I'm sure you have noticed changes in new employees, especially this past decade. Lately, there seems to be a new breed of entitlement attitude that comes with each new broadcast hire. "What's in it for me," dominates many new peoples' thoughts. "What can I get from this job for myself; I don't volunteer for anything unless there is a check attached to it; I don't do weekends; I've put in my shift, I don't need anymore time here; I'll only do paid remotes and no community charity work; I'm only using this job as a stepping stone!" I've heard it all.

Yes, I've noticed a dramatic difference in the new people coming into small market radio. It could be described as a "You owe me," attitude from day one. All that seems to matter to the new hire is, "How much do I get paid." Some new employees are not even interested in the company health policy or the retirement plan. I've been asked on multiple occasions, "Can you just put the money going to my healthcare into my paycheck?" Money, money, and how can I get more money, dominates the new age small market broadcast market employee. The old ideology of pride, being part of the greater good in the community seems to be gone. I even had a recent (now past) employee tell me "your lucky I came to work here."

So what is happening to our small town broadcast marketplace. Have the values changed? Is the mind set different? Was this attitude of entitlement always in the broadcast workplace and just finally caught up to small market stations? It has become a problem in the sense that this entitlement attitude directly conflicts with the values that made small market broadcasting special.

Possibly the acquisition of large broadcast chains under one roof has developed a business model where localism really doesn't exist anymore. Just the process of gobbling up many Ma and Pa radio stations in itself eliminates that small market concept ideology. Maybe this transforms down to current employees that see radio as a "job means to an end" rather than becoming part of that bigger picture – community and respect for that concept. I don't have answers but the small marketplace is definitely changing. Has it affected a town near you? Unfortunately it's coming your way!

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

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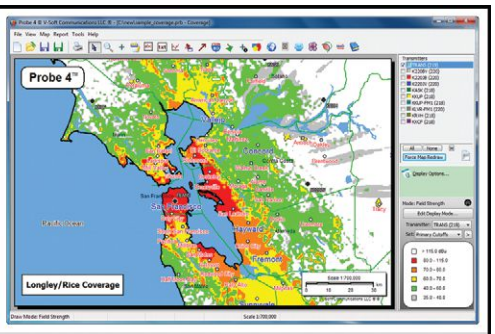

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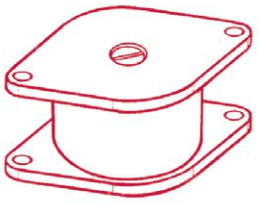

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Inovonics – SCMS – Stackley Devices

Inovonics – *INOmini RackPack*

Inovonics announces the INOmini RackPack Bundle, a new product concept that gives radio broadcasters greater flexibility to monitor their stations at reduced cost

Inovonics has unveiled a new product concept that allows broadcasters to combine a selection of its INOmini monitoring options for a customized solution that fits into a single 1U rack shelf. The RackPack gives greater flexibility to design the ideal monitoring solution and save on the overall cost by bundling the products. Users can choose from a wide variety of INOmini models for monitoring AM, FM, HD, AES, RDS, and Internet Radio.

The INOmini RackPack Bundle comes with three INOmini's or two 610 Internet Radio Monitors that are fully mounted in a 1U rack shelf with jumper power cables and one power supply. Includes printed User Manuals, 3-year Factory Warranty and Inovonics' Premiere after sales service.

For more information:
www.inovonicsbroadcast.com

SCMS – *dBbox2*

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Monitor AES/EBU balanced or unbalanced inputs using the built-in speaker or headphones. Meter using -18 dBFS, -20 dBFS, PPM or VU scale with stereo phase meter.

Analyze AES sample rate, status and data errors.

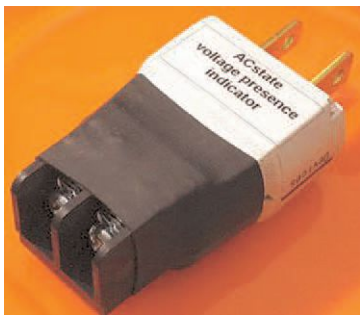
Generate steady tone, tone sweep, GLITS, EBU, left only, right only, on both analog and AES/EBU outputs. Tone frequency may be adjusted in third octave steps. Adjust Tone level from +10 to -60 dBu in 1dB steps.

The dBbox2 is exclusively distributed in the USA, Canada and Mexico by SCMS Inc

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

Stackley Devices – *ACstate*

ACstate is designed to plug directly into a standard 120V AC outlet and provide an output indication that is compatible with a low-voltage open-collector type interface. This allows remote AC voltage presence monitoring by data gathering equipment, such as status inputs of remote control equipment at a transmitter site.



ACstate provides galvanic isolation from the AC line. ACstate can be used in any location that is suitable for other types of electronic equipment, and the ACstate status output can interface to any open-collector type interface as long as the 25 VDC and 25 mA limit is not exceeded. Interface to your remote control system is via a 2-terminal screw down barrier strip and a single pair of wires. The open-collector output pulls low when the device is plugged into a normally operating 120V AC outlet.

ACstate should not be used around water or wet environments. The device draws approximately 10 mA from the AC line. Find more information at ACstate.com or stackleydevices.com

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

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

Email your dates and info to: ***radio@rconnect.com***

NAB 2016 Spring Convention
Convention Center – Las Vegas, Nevada
April 16-21, 2016
www.nabshow.com

Great Lakes Broadcasting Conference
May 2-3, 2016
Lansing, Michigan
http://michmab.com/ProgramsEvents/GreatLakesBroadcastingConferenceGLBC

Texas Association of Broadcasters (TAB)
August 10-11, 2016
Renaissance Austin Hotel
www.tab.org/convention-and-trade-show

NAB Radio Show
September 21-23, 2016
Nashville, Tennessee
www.radioshowweb.com

WBA Broadcasters Clinic
October 11-13, 2016
Madison Marriot West, Madison, Wisconsin
www.wi-broadcasters.org/2016-broadcasters-clinic/

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

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Audio Science - 31	www.audioscience.com
Bay Country - 4	www.baycountry.com
BEXT - 43	www.bext.com
Bohn/Marti Repair.com - 46	www.martirepair.com
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Broadcast Devices - 13	www.broadcast-devices.com
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