

Radio Guide

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Analog vs Digital: Hidden Studio Expenses



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Radio Guide

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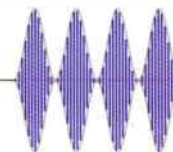
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Analog vs Digital: Hidden Studio Expenses

by Dee McVicker

By some strange twist of new economics, the price tag on a printer is usually less than the cartridges that go in it. You can walk out of Best Buy with a new printer under one arm and a small bag of ink cartridges hanging from the other, and I'd bet dollars to donuts that those ink cartridges cost you more than the printer itself.

In much the same way, incidental expenses can overrun a new studio project. It's easy to compare the features and costs of equipment and lose sight entirely of what it actually takes to get that gear in and functioning. Too often broadcasters rule out an IP audio networked studio because it adds more items like network switches onto the capital expenditure side. But, in fact, those very switches can save their equivalent or more on the incidental expense side.

The irony is that you could end up settling for less and paying more, just as the cheapest printer isn't always the most affordable option if you have to pony up more for ink cartridges over the long run.

Below are a few hidden or unexpected expenses Wheatstone field and sales engineers suggest you consider before starting a studio project.

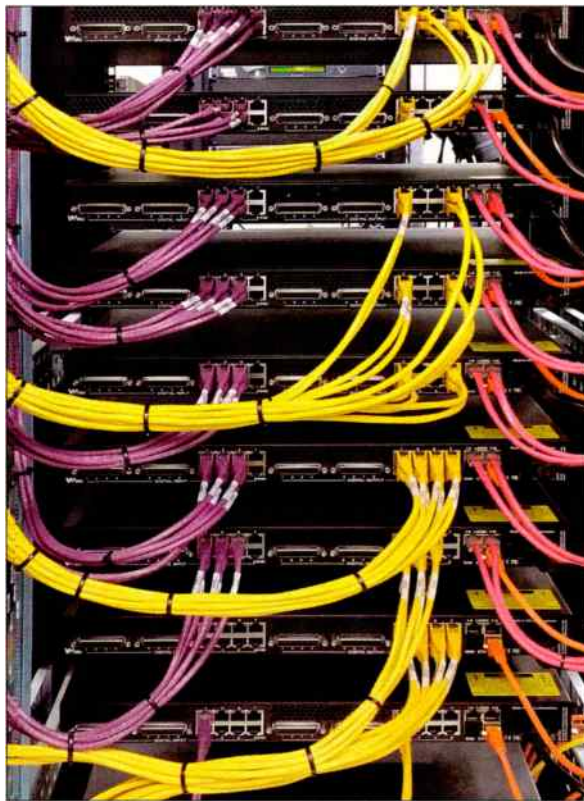


Beware of Wire Creep!

Wire Creep: Cabling and wiring costs can creep up on you, especially if you haven't thought beyond the sticker price of a console. A standalone digital or analog audio console will always require more in wiring than an IP audio console. Expect to pay roughly \$2,300 to \$3,000 fixed cost to connect up to a prewired standalone console compared to less than \$350 for an IP routed audio console. That's \$2,300 to \$3,000 for AES audio cabling with the necessary punch blocks, versus \$350 at the most for inexpensive, off-the-shelf CAT cable (even with adapter and interconnects) to route audio and control into and out of an IP audio network console.

Soundcards – the Real Math: It costs around \$2,500 for a soundcard. But did you know that there are also hidden costs associated with soundcards? And, that the soundcard you purchased a year or two ago can continue to cost you

money? Setting aside the cost of the soundcard itself, as well as a few hundred more for the wiring kit and break out box (not to mention the labor to put it all together), the next big cost is what you will interface to that soundcard. If it's an analog console, a soundcard will chew up two or three faders and the equivalent in physical inputs on the console. If it's an IP audio network, you can add the cost of an I/O access unit – at \$2,000 to \$3,000 a pop – to get the audio into the system. Compare that to an IP audio driver which costs a couple hundred bucks and requires a single port on the Cisco network switch to bring that audio into the network. One broadcast group we know of saved more than \$200,000 by going with IP audio drivers instead of soundcards for a new buildout!



Which would you rather wire up and maintain – the point-to-point copper runs shown at the left, or the CAT-6 equipment rack above? Both carry roughly the same amount of data.

Smart DIY Networking: Specialized tools and supplies like crimpers, solder and connectors can add up quickly, particularly if you have to fly in a technician or two to use them. You might be able to drastically cut those expenses by going with AoIP and doing the majority of system setup yourself. Later, you can always bring in a technician or integrator for the final commissioning. If you can rack up an Ethernet switch and plug in a cable, you can probably set up an IP audio network without much incident – or incidental expense.

Staging it Elsewhere: Another alternative to flying in a crew and paying their expenses is to have the AoIP factory do the setup and testing for you at their plant. This can be a more affordable option, especially for larger systems. For example, here at Wheatstone we can set up and commission entire IP audio networks for our customers; complete with GPI/O triggers, machine starts and

stops, and hardware layout and configuration. Entire systems arrive at their destination plug-in ready, and even the final setup can be done remotely by on-line factory technicians. Once it's all plugged in and powered up, additional necessary changes can be done in software with a series of mouse clicks.

Sharing is Saving: Look for value add and dual purposes for every resource you add to the studio. For example, having a stereo multiband processor built into network I/O units saves at least \$500 to \$1,000, which is what you would pay for the equivalent in an outboard processor. AGC, EQ/dynamics and compressor processing built into the I/O units means you can improve remote audio quality and process satellite feeds without paying one additional penny in hardware. If the units also include auxiliary stereo mixers (as most WheatNet-IP units do), these can serve as an emergency intercom system among many other duties. These kinds of savings are in addition to the usual cost reduction you can expect by sharing resources across the network, which in itself can eliminate the expense of having to buy extra codecs, tuners and storage devices.

Unnecessary Obsolescence Costs: Before you strip your studios down to the studs and order all new gear, take stock of what you have. If you have a trusty analog console and it works, modernize it by connecting it up to the IP audio network. We've hooked up plenty of our analog consoles to WheatNet-IP audio networks. All it takes is an I/O unit and some CAT6 cable to get audio and logic in and out of the network.

Software as Hardware: You can feasibly create an entire virtual news desk on a tablet. Gone are the bulky news workstations of the past, which means less furniture, smaller studios and smaller real estate needed overall, which is where some of the bigger cost savings can be realized. Virtual development tools like Wheatstone's ScreenBuilder let you create virtual interfaces, mixers and control panels into the network now or for adding on later. The cost savings? Virtually, unlimited.

Opportunity Costs: Lost opportunity is a huge expense guzzler if you consider that what you lay down in studio infrastructure now is going to be what your future capabilities ride on later. For example, consider integrating your VoIP phone system directly into your plant's IP audio network – eliminating telephone hybrids and other interfaces – and creating the opportunity to work faster with less hands-on control of talk shows. Another network opportunity is building in the capability of long distance control and audio distribution, eliminating the barriers to shared studio operation and programming between facilities in separate locations. Being able to do the most basic of studio functions at a distance – like turn on a mic or press a play button from 1,000 miles away – can be a game changer, because it makes it possible to share operations between sister facilities in different locations, or switch local audio from a Network Operation Center halfway across the globe. At the very least, it means you no longer have to pay a technician on the weekend to sit at the studio and press that button for talent out at a stadium or at a concert venue.

When starting a studio project, it's important to look at *all* the costs involved. What often tips the scales on the capital expenditure side can, in fact, save expenses on the other side and therefore reduce costs overall. It's important to weigh your options before committing funds and time to any studio project – be it large or small.

Dee McVicker is affiliated with Wheatstone, which makes complete studio systems including consoles, control surfaces, peripheral elements and WheatNet-IP audio networking.

To learn more about the topics covered in this article, click on the link: <http://wheatstone.com/hidden-expenses>

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Studio Site

It's In the Bag!

Get better programming and please your sponsors!

by George Zahn

We've all seen the Mary Poppins magic bag from which she pulls everything from an umbrella to a coat rack. Listen up, radio folks! Ms. Poppins has nothing on me. Forget about spoons full of sugar – this is a sweet studio in a bag!

My station, WMKV, has developed a "portable studio" that can allow us to record interviews just about anywhere with minimal setup time. It's always on standby and ready to roll, and we can even do recording in areas without electricity.

This concept started years ago when I realized WMKV had some opportunities to get important interviews and access to places on short notice. We just had to gather gear for a small off-site interview space. Sure, a handheld digital recorder works for one-on-one interviews, but having multiple mics helped tremendously for three and four person conversations.

We started with a few mics and mic stands and a mixer in a collapsible roll around case you might see used by exhibitors bringing table setups and giveaways to a convention. The weight of the gear broke the bottom of the case after about ten uses. It wasn't as big a deal years ago, since we used the setup a few times a year at most. I duct taped the rig bottom and limped along to a few events, and it looked hideous.



The portable studio in use at MCM CPAs and Advisors, with hosts Crystal Faulkner and Tom Cooney (3 mics shown).

Since then, our station has developed a weekly show with the world renowned Cincinnati Museum Center, and we also do ten recorded BusinessWise short form programs a week with MCM CPAs and Advisors (hosts

Crystal Faulkner and Tom Cooney) with local, regional, and national business figures in downtown Cincinnati.

Many of the major figures coming to Museum Center and MCM we likely would have lost if the only option was for them to come to our suburban studios. It also made sense that by occasionally going to Cincinnati Museum Center, I could record two to five interviews at a sitting since the people I needed to interview were there on site. It was a nice complement to some guests coming to our studio.

The goal was to create something that would record effectively at a low cost, with durability being the key. It was silly to dismantle equipment from our studio for such a task and who wants \$350 microphones getting lugged on the road. Durability and availability on a regular basis, or at a moment's notice, was also vital. We needed something better than a kit that was falling apart.

I started with my own equipment and found a bag that worked for me. I bought a soft-sided Voyager rolling tool bag for \$30 at a local hardware store. I'm now three years into using the bag 50 to 70 times a year and it still works well. The roller isn't the smoothest, but the material is tough and it holds up. The bag measures 20 inches wide by 14 inches tall by 10 inches deep and it has an extendable handle and rollers. It's made to handle heavy tools so it pretty well tolerates the contents of my portable studio.



The Studio in a Bag!

More on specific equipment later, but I carry four microphones and sturdy desk stands, a five-microphone mixer, an old Zoom H2 digital recorder, a small headphone amp, headphones for monitoring, a 10-foot power cord with three outlets and an extra AC breakout with USB ports for charging. I also have five mic cables, power supplies for the Zoom, board and headphone amp, and an assortment of audio cables and adapters for most any occasion.

As you'll see, the equipment in my kit is generally very affordable making replacements relatively cheap since the equipment gets more wear and tear than our nicer in-house studio gear. You will likely have other preferences, so choose accordingly if assembling your own. Here's what's in my kit.

I carry four Audio-Technica M8000 dynamic super cardioid mics (about \$60-70 each) and Atlas weighted

mic desk stands. I like the M8000 as a nice quality but expendable microphone with a nice tight pickup pattern. Dynamic mics are the most durable, and these have nice high frequency response for voice – and the price is right. The desk stands add most of the weight. You can experiment with lighter stands, but I like the steadiness of the basic heavy based stands.

My console is a Behringer MXB1002 (about \$120), which can operate on AC (which I normally use), but can also run for a few hours on three 9-Volt batteries in a pinch. The mic pre-amps are nice and quiet and the S/N ratio for the mixer is good. More on stowing the board in the bag coming up.

What really makes this doable is the digital recorder which can run on AC or two AA batteries. Trying to fit a clunky old cassette or digital recorder in the kit wouldn't work, but the smaller digital recorders today are wonderful. I record from the main output of the Behringer into the line input of the Zoom and get decent results. Most digital recorders are well under \$200.

Monitoring from the Zoom's headphone output is pretty low volume, so I send the Zoom's audio output to a small headphone amp to allow me to better monitor my audio. The amp was about \$30. I use some Sony cans at about \$20.

A note on recording to portable digital recorders. It's good to experiment with calibrating levels between the mixer and the recorder. Some portable digital recorders have automatic level control settings which can over compress or distort if you overload the analog input. I record conservative levels and boost levels when I pull the audio into my computer to edit or master.

Another note on weight distribution. When carrying four heavy mic stands, I keep two basses to the right and two to the left in the case. It helps the case roll better. Also, when loading, I place the stands and mics near the bottom of the case, then use the cabling as a pad on top of them, with the mixer on the very top. Be careful not to put anything, especially anything heavy, on top of the mixer knobs as they may be the most fragile part of your portable studio.

The devices in your kit will get a bit more wear if you use it often. Many digital recorders finalize their recording at power down. Make sure you have your digital recorder turned off before "tossing" it in the case. Jarring some older Zooms before turning them off can cause loss of data.

I find that with the portable studio, the bigger challenge is not the quality of the equipment but finding the best place or location to record to avoid outside sounds or too much reverberation. There's no crime in saying you're "on location," but studio quality interviews should sound as close to studio quality as possible.

Does every station need a portable studio? Probably not, depending on your format and staff size. But if you can monetize something this inexpensive, not counting the human resource or mileage reimbursements, it might open a whole new programming or income source for your station. It may also give a valuable backup mini studio in a pinch, if you need to do emergency broadcasts away from your main studios. Everything's in the bag already!

Is your station using a portable studio? Let me know your stories or preferences!

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

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Tower Topics

Can Lightning Really be Prevented With Point Dissipation?

by Ron Nott

The Storage and Discharge of Electricity

More than two and a half centuries ago, the Leyden jar was invented. If you search its history, you will find that in most illustrations and photos, a round knob is affixed to the top terminal. Why the round knob?

This construction comes from the work of early experimenters who charged the Leyden jar with static electricity, which was high voltage and low current. The underlying principle is the same as when you shuffle across a carpet and touch a doorknob. The voltage can be as high as 35,000 Volts, but only a few microamperes of current are created – or you would be dead.

Experimenters of the eighteenth century learned that if a sharp, pointed wire were placed as the top terminal of a Leyden jar, the charge would rapidly dissipate into the air. But if a round knob were placed on the jar or the wire, the charge would be retained for much longer. Understanding the reason why this works will lead us to a better understanding of how to protect equipment from lightning.

Ben Franklin observed that a silent current flowed into the air above a sharp wire which led to his lightning rod. Seemed like a great idea, but why did it not work? It did work, but had limited capacity.

A single sharp point has a maximum current value that can flow from it. But when many points are placed in parallel with the *correct geometry*, the capacity is increased enormously.

Dealing With Lightning

As a thunderstorm approaches, the electric field between earth and cloud begins to increase. *This* is the time to begin to discharge this field. If the voltage can somehow be held to a value below that which is necessary to initiate a lightning strike, there will not be a strike.

A single lightning rod placed atop a tall structure will begin to discharge the field, but once its current capacity is exceeded, it may initiate an upward streamer that can cause a strike. If the goal is to *prevent* a strike and/or equipment damage at a location, the lightning rod may be the wrong approach.

You can find information on the Internet stating that a dissipation system will not work, the writers often assuming that the field contains too much energy. However, a properly designed system does not wait for the field energy to reach this large value – it begins to dissipate the field *before* the buildup can reach the value necessary to initiate a strike.

Energy Potential

We measure the energy contained in a lightning strike in Coulombs. Estimates from most lightning strikes range from 1 to about 50 Coulombs, but in the most extreme cases

may reach 300 Coulombs. Typical is probably 5 to 10 Coulombs.

What is a Coulomb? It is a *quantity* of electrical charge consisting of a current flow of one Ampere past a point for one second. Since electric current consists of electron flow, the number of electrons in one Coulomb is approximately 6.25×10 to the 14th power. This is a very big number, but it is a *finite number*.

As an example, suppose we have a 120 Watt light bulb which, when connected to a 120 Volt AC power source would have a flow of one Ampere through it. This means that in one second, one Coulomb of electrons would flow through it. In 30 seconds, 30 Coulombs would flow through it.

Damage Point

If a lightning strike of 30 Coulombs occurs, why does it do so much damage? Simply because it occurs in such a short time period.

A typical strike happens in only 20 to 50 microseconds. If the same energy discharge could be spread out over even a few minutes, there would be no damage. This is how and why multiple point dissipation works, by discharging the same energy into the air over a longer time frame than lightning does.

You can find information on the Internet stating that the energy in a lightning strike can light a 100 Watt bulb for a long period of time, but this assumes millions of Volts at one Ampere, which is just not the case. The reason why is that a Coulomb is a finite number of electrons and multiplying 10 million Volts times one Ampere does not result in 10 million Watts.

Discharge Points

An important point to remember is that as the electric field builds prior to a storm, it builds not just on the top of a tower, but from the ground up.

This means that while the top of a tall structure should be protected, the sides also need protection as side strikes may occur including those on guy wires. A Rule of Thumb is that dissipaters should project from the sides of the structure about every 200 feet to adequately discharge the structure.

Anecdotal Evidence

While some may discount the value of anecdotes, many are of great value at times. Here is one.

About 20 years ago, a dissipation system was installed on a tall TV transmission tower (more than 1,000 tall). After one

thunderstorm season, the chief engineer called with a complaint. He said that the system had eliminated lightning damage to his site, but then asked if it possibly could have helped his competitor stations as well because their lightning damage had also been eliminated.

It turned out that several tall towers were located in an east-west row and his was the farthest west. The prevailing winds at that site during storms are from the west. I explained that the dissipater points generate plasma and, as a result, an ion cloud was carried downwind and apparently protected the towers to the east.



The GS-3: Different adaptations of multiple point dissipaters.

The engineer was not pleased to hear this (one must assume there were hard feelings between the stations) and asked what he could do. I told him the only solution that would protect him and remove protection from his neighbors would be for him to move his tower downwind from the others – and this, of course, was not acceptable. The competitors were happy, though.

Dealing With AM Antenna Guy Wires

You may have been near an AM transmitter site when lightning struck some distance away. If so, you heard crackling, like popcorn popping. This is because each segment of guy wire between insulators takes on a charge like a capacitor floating in air. A lightning strike nearby causes them to discharge across the insulators which causes the crackling sound.

Many years ago when guy wires were terminated with Crosby clips instead of modern preforms, an old tower erector told me that when he put together segmented guys for an AM station, he would use 10 or 12 excess guy wires at each insulator. Then before they were hoisted up, he would flare the excess lengths outward so that they could dissipate the charge into the air. It worked very well. No popcorn sounds were heard.

Down in the tropics of southern Mexico, another AM station had a terrible time with this problem. We fabricated some 42 small dissipaters that were attached to the guys adjacent to the insulators. This solved the problem completely.

However, please note that you cannot get American tower climbers to trolley down the guys to install dissipaters on them; OSHA would likely frown on such activity. Nevertheless, several more Mexican stations have used this same solution with success.

Safe Release of Energy

So after all this rambling, it can be seen that the science is there to greatly decrease damage from lightning. The reason that lightning does damage is not because it has massive energy, but that the energy is released in such a short period of time.

How energy is released is the key. We all use gasoline in our vehicles and prolong the release over a relatively long period. But a gallon of gasoline evaporated in a container that also has the proper quantity of air can result in a rapid, powerful, and damaging explosion.

Without doubt, there are those who will always believe that nothing can be done to prevent lightning damage. But those with open minds, willing to pursue the facts of how charge transfer by point dissipation works will realize that, with proper design and application, it can decrease damage from 95 to 99 percent.

Gila-Stat, Eagles Nest, and GS-2 are available at Nott Ltd. Call: 505-327-5646 or visit: www.nottltd.com



Gila-Stat w/ Multiple points can dissipate larger charges.



The Eagle's Nest, intended for tall towers. The points are bent, on site, to make shipping and installation easier.



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Cough. Drop.



Studio guests are only human. And humans cough. They cough and clear their throats and sniff and snort. Not the most pleasant experience for your listeners. If you tell your guests to turn their heads and cough, they might misunderstand. Besides, it really doesn't help that much.

Cure this with the Guest Gizmo. It has a cough drop (ahem) button built right in. Your guest feels the need to make disgusting noise and pushes the button until the urge has passed. You'll want one at every guest microphone position. The cough button is a necessary tool.

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You know those cool new mic arms with the built-in LED tallies? They're all the rage. Problem is lighting them up. Guest Gizmo to the rescue again. Hook up your mic arm to the logic port and the button changes from cough to on/off/cough and drives the red light whenever the mic is hot. Cool?

We're not done. The best part is how it mounts in your studio furniture. It drops into a 2 3/4 inch grommet hole. That's right. A quick trip to the hardware store for a hole saw, and you're ready for business. No router required. And at only \$179 (SRP), you can afford a gizmo for every guest.

No guests? No problem. Angry Audio has all kinds of gadgets and gizmos for tackling all kinds of tasks. So let's get at it. Those problems aren't going to solve themselves.



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Big Changes Coming to the FCC Registration System

by Gregg P. Skall – Womble Bond Dickinson (US) LLP

Nearly every broadcaster who has done business with the FCC is familiar with the FRN. Since 2000, anyone doing business with the Commission is required to first obtain a unique identifying number through the FCC Commission Registration System, known as CORES, called an FCC Registration Number or FRN.

An FRN is required to submit or file applications, remit payments to the Commission and conduct many other types of business. As a part of the Commission's effort to reform and transform itself into a "model of excellence" in government, the new CORES system is designed to implement many of the privacy and security goals the Commission laid out in its 2010 Notice of Proposed Rule Making; specifically, to strengthen the security of FCC records, make CORES more user-friendly and improve the Commission compliance with various statutes that govern debt collection and the collection of personal information. The changes are significant and everyone who does business with the FCC must become familiar with them.

The new system allows users to employ a single FRN that, at their discretion, may be linked to subsidiary or associated accounts of associates and consultants. This system will facilitate a regulated entity to identify multiple points of contact that can access the system on its behalf. It is designed to accommodate many of the FCC's exceptions to the requirement that entities and individuals provide their taxpayer identification number (TIN), but will require all FRN holders to establish and use email addresses, a user name and password for their CORES login procedures.

Fortunately, or unfortunately, the transition has not been easy and the FCC has had problems rolling it out. Initially, the changes were to take effect on or about September 1, 2016. That date was postponed and the new effective date was to be March 1, 2019. However, with the new CORES system still not yet fully implemented, FCC staff reports that the new system is still not completely ready for a mandatory cutover, and intends to issue a public notice in the next few days, sometime before April 15, establishing a new date for the mandatory cutover. When the changes do become mandatory, the changes will:

- Require existing and new users to designate a user-specific ID (username) to access FCC registration numbers (FRNs) and related records.
- Allow registrants to establish multiple usernames for each FRN with different levels of access. By default, the first user establishing access to an existing FRN will be granted administrative responsibilities over the account and will have the ability to limit the level of access for other users.
- Require users to provide a valid e-mail address for on-line access to the system.
- Establish password-recovery security questions specific to each user.

The FCC also has forms for those without an email address. Users can register for an FRN, or update an FRN, by printing an FCC Form 160 (CORES Registration Form) or 161 (CORES Update/Change Forms) obtained from the FCC's **Forms** – www.fcc.gov/licensing-databases/forms

The Commission provides more details, at its CORES website: **FCC Registration - Commission Registration System** – www.fcc.gov/licensing-databases/fcc-registration-commission-registration-system

including guidance for how to register a new username account, register for a new FRN and, importantly, how to associate a username with an existing FRN. The new CORES system is accessed through the bullets under "Updated CORES System." Additional functions are available to reset a password, approve or reject an FRN association request (access request), update FRN information, check on a red light alert;

and establish different levels of user access. It also maintains a CORES Q&A webpage which can be found at: **CORES Q&A** – www.fcc.gov/licensing-databases/fcc-registration-system-cores/fcc-cores-pilot-program

Once the Legacy CORES System is retired, the only way to utilize the FCC on-line filing and payment systems will be through an FCC username account in the updated CORES system. Any individual can go to **CORES Registration** – apps2.fcc.gov/fccUserReg/pages/login.htm to register a username or to obtain or reset a forgotten username and create a password.

A good source is **CORES What You Need to Know** – apps2.fcc.gov/fccUserReg/pages/know.html –or- **FCC Registration Help** – apps.fcc.gov/cores/publicHome.do?help=true

That latter page contains a series of links, each of which provides written instructions to navigate the various functions of the new CORES system. Remember, once you have established your username and password, the most important function is to associate with the needed FRN. Instructions are provided on that page. Once your username is associated with the needed FRN and the administrator has granted the necessary access, it will no longer be necessary to login to the user account by the FRN and password. When a new user requests FRN access through the updated CORES system, a request is automatically sent to the FRN administrator for association approval. If an FRN administrator has not yet been associated with the FRN, the request will get an error message and someone with that FRN and password access must log into the new system and become the administrator and grant access.

Skill with the Updated CORES System will become critically important when multiple parties must access an FRN to prepare and file forms or perform other functions for a Commission licensee. Problems frequently occur when a consultant, engineer or attorney, who does not know the current password, finds a way to change the password without notifying all others who need access. This has resulted in sometimes frantic attempts to find the new password in order to meet a filing deadline. The new system will solve that problem! Everyone working on a matter requiring an FRN will have to request and be granted access to their own username, deleting a requirement that each person have access to the FRN password. The full system of instructions is also available to be downloaded as a PDF file at the Commission Registration System CORES help page.

The bottom-line is that sometime in the Spring or Summer of 2019, the FCC will transition to the mandatory CORES password system. It behooves all engineers, lawyers, broadcasters and their employees who do business with the FCC to become familiar with the new system, establish their own username and password and request necessary association with appropriate FRNs, so they are ready when the Updated CORES system becomes mandatory.

Is CBD Oil Advertising Really Here?

by Gregg P. Skall & Bob Silverman
Womble Bond Dickinson (US) LLP

We've been getting a lot of calls lately from broadcasters asking about cannabidiol (or CBD) oil. Besieged over the last several years with pleas by marijuana dispensaries for advertising, many a broadcaster believes the **2018 Farm Bill** – www.congress.gov/115/bills/hr2/BILLS-115hr2enr.pdf (the Agricultural Improvement Act of 2018) is the saving grace by which they will now be able to lawfully advertise a lawful cannabis product.

Here is what happened. The 2018 Farm Bill did create a new regulatory regime for the production and sale of "hemp" and hemp products, which previously had been prohibited or heavily re-

stricted under federal law. As broadcasters repeatedly have been told, the Controlled Substances Act (CSA) prohibits the possession, manufacture, and distribution of anything meeting the definition of "marijuana." Because hemp and marijuana both derive from the Cannabis Sativa species of the Cannabis family they do share certain similarities. However, due to each plant's biological structure, they have several very distinct and crucial differences. The hemp plant is claimed to have less than 0.3% tetrahydrocannabinol (or THC). That 0.3% THC claim is important.

Before the 2018 Farm Bill, virtually *all* parts of the Cannabis plant, and almost anything containing a compound derived from the plant were deemed to be marijuana except for certain limited "industrial hemp" programs carved out in 2014. As a Class I prohibited controlled substance, anything containing a compound derived from the plant was deemed to be marijuana, and therefore advertising its sale was tantamount to advertising for the sale of an illegal product.

The 2018 Farm Bill now exempts "hemp" from the definition of marijuana, including any part, extract or derivative of the Cannabis plant. But the THC concentration has to be 0.3% or less dry weight. This new definition is consistent with the "industrial hemp" definition adopted in 2014.

So, under the 2018 Farm Bill's legalization of hemp, a CBD product previously considered marijuana may no longer violate the CSA, provided it contains under 0.3% THC, and this still leaves questions, since it is not clear that hemp is capable of sourcing commercially viable amounts of CBD consistent with Justice Department drug enforcement guidelines as U.S. Department of Justice has taken the position that CBD can only be produced in commercial quantities from the parts of the plant that cannot reliably be determined to contain less than 0.3% THC. Accordingly, it is unclear to what extent compliant hemp-derived CBD oil can or will actually be produced commercially. If the product has more than 0.3% THC, it remains unlawful under the U.S. Department of Justice guidelines and advertising it would likewise be unlawful.

The problems don't stop with the Justice Department. CBD retailers may make health claims and include CBD in foods. The FDA has concluded that THC and CBD products are excluded from the definition of dietary supplements. Therefore, it is unlawful to introduce CBD into the food supply, or to market it as a dietary supplement and the FDA has cracked down on dozens of companies selling CBD products on-line for making unsupported health claims.

Further, the FDA regulates CBD as a prescription drug. Notably, the FDA did recently approve a prescription drug for certain epileptic seizures called Epidiolex, the main ingredient of which is CBD. Given FDA regulation and the potential to be marketed as supplements, food products or prescription drugs, broadcasters should be very wary of CBD advertisements that make or hint at unapproved health claims.

The 2018 Farm Bill also established a regulatory scheme whereby states and tribal governments may become the primary regulators over hemp production once their regulatory plans have received approval. If the state plan does not receive USDA approval, production may proceed only under a federal regulatory scheme, and a federal scheme has yet to be developed by the USDA.

Recently, the National Association of Cannabis Business (NACB) released a voluntary national standard for advertising, comparable to the standards used in the alcohol industry.

The NACB voluntary standards instruct members to: (1) pledge not to buy advertising that specifically targets persons located outside the licensing state, (2) require any ad buyer to "utilize a method of age affirmation" to prevent ads from targeting anyone under 21 years of age, and (3) prohibit any false or misleading ads.

If, despite the foregoing risks, broadcasters still choose to accept CBD product advertisements on their station, it would be wise to obtain a certification from the advertiser that the CBD oil product contains less than 0.3% THC, do not allow health claims and follow the NACB guidelines.

Gregg Skall is a partner of the law firm Womble Bond Dickinson (US) LLP. He frequently lectures on FCC rules and regulations, represents several state broadcaster associations and individual broadcasters and other parties before the Federal Communications Commission in their commercial business dealings.

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World Radio History

Time Delay Relay Saves Trips to the Transmitter Site

by Michael Bradford

I know you've heard this before, but it truly was "A cold and rainy night." My friend and fellow Engineer was at a station in Midland, Michigan when his cell-phone jangled with an alert of "no audio" from another transmitter site about 150 miles to the south. The remote control indicated that the transmitter was on-line and doing fine, but no audio was making it the listeners. My friend told me this particular transmitter has had this issue for some time and it has baffled the manufacturer's engineers. It seems the only cure is to travel to the site and manually disconnect the primary AC input to the transmitter for about 10 seconds ... then turn the power back on. As the transmitter goes through its start-up routine and back to full power, magically the audio returns.

It was a nasty night and the Midland transmitter site needed continued attention. As I live about 45 minutes from the transmitter site, I offered to take the short ride and effect the AC re-boot. As the afternoon had been rather boring, this little nighttime adventure was a nice break. The first thing I did, of course, was grab my insulated coffee mug that fit the pickup holder perfectly and filled 'er up in the kitchen before I even hit the door. I always keep a supply of protein bars and dried fruit in the truck as my sugar level drops now and then and I need a little boost. I like Girl Scout shortbread cookies because they store nicely and kick in quickly if needed. The truck's door panels have handy holders for beverages and bottled water is always at hand.

It was a very cold and rainy and the driveway to the transmitter site had a film of ice. When I got out to open the combination lock at the gate, of course I stepped right through the ice on a puddle and ice-cold water filled my shoe. Arriving at the entrance gate I found the padlock unresponsive to the entry code. As luck would have it, I had some lubricating/ice melt spray handy, but after a quick shot, the lock remained frozen shut and refused to budge. Desperate times call for desperate actions, so I went back to the truck and grabbed my coffee mug. I opened the lid a crack and dribbled hot coffee over the frozen padlock. Bingo! In a moment it responded to the entry digits and popped right open.

The driveway is at least 300 feet long and there was a skin of ice over the entire length. I inched along and pulled up to the transmitter building front entrance. The motion-detector front light came on and this door lock was quick to open. Excellent; I would have coffee enough for a warm-up later. It was bright and warm inside the transmitter building with everything humming along as expected. I noticed that the transmitter front panel was blank and I wondered if this had anything to do with the loss of audio. I called my fellow Engineer to discuss this blank display panel and determine the next step. He told me that the front panel display had gone funky in the past and had to be replaced. He now turns that front panel power "off" when he's not there to save that expensive large display from premature failure.

I opened the transmitter front door and found a little pushbutton power switch for the display panel, right behind it, mounted on the display circuit board. I turned the display power back "on" and found no alarms – all the parameters on the display appeared normal – with the exception of no audio showing on the bar-graph or external modulation monitor. The external audio processor's bar-graph audio metering showed stereo input and output audio. I grabbed my old "Butt Set" monitor from the truck and unplugged the XLR output plugs from the processor and confirmed good audio levels were on both right and left channel outputs.

By this time, I received a phone call from my engineering friend from his location near Midland, confirming that I made it to the site in the rain and ice. As I talked with him, I was instructed to go to the wall behind the transmitter ... locate the proper disconnect switch panel ... turn the power off for 10 seconds ... then turn it back on. The transmitter slowly came back to life and, sure enough, after a quick "return to life" start-up sequence, the transmitter was back to full power. I noticed the front panel display now showed audio levels, which were confirmed by the modulation monitor located in the adjacent rack cabinet.

I asked my engineer friend if there was any way to save future on-site trips for a similar alert and he said, "No." I asked him if he would like a device to eliminate future trips for such a loss of audio until a real fix is found? He said, "Yes!"

I thought about the whole sequence while driving home and when I got back, I sat down with a fresh cup of coffee, my note pad and laptop to find a solution that was reasonably priced and provided reliable operation. I decided this "device" needed an adjustable time delay to offer at least the desired 10 seconds delay, an interface to the 240 VAC single-phase primary power for the transmitter and a separate interface with the remote control.

This remote control responds to touch-tones from the cellular network. The one thing that affects any cell-phone-based remote control is that most "phones" don't provide sustained touch-tone duration. You get a short tone-burst and that's it. Most remote controls recognize this feature and compensate for it. I wanted to eliminate any latency between the remote control and the required 10 second delay so I choose a one-shot time delay relay to provide the disconnect to the transmitter. This delay relay only requires a leading-edge 0.1 second signal to activate the

delay. I also used a 12 VDC relay between the time delay relay and the remote control circuitry for isolation of operating voltages.

I settled on the Littelfuse Model TDUS, single-shot timer relay (Figure 1) as it offers a small footprint, ease of installation and selectable time delay should the need arise to change the 10 second delay. I selected a DPDT relay with 40 Amp contacts for the primary power interrupt and a DPDT 12 VDC relay to isolate the 120/240 VAC circuits from the 12 VDC remote control circuits.

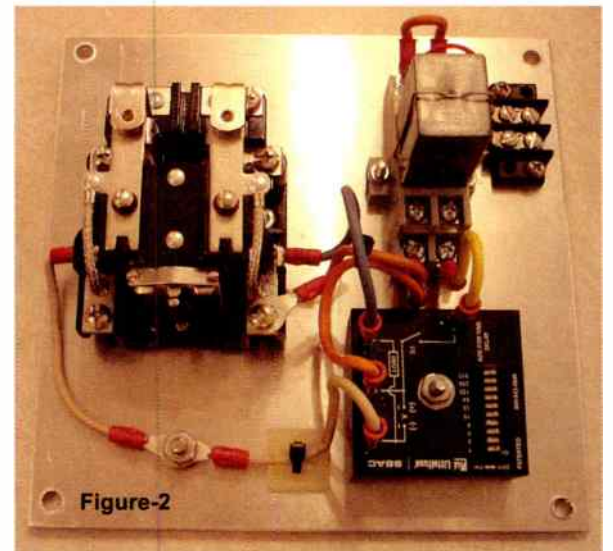


Figure-2 is a picture of the finished sub-chassis. Please note the chassis stud; this provides a 120 VAC feed for the coil and TDUS relay voltage when coupled with a connection to one leg of the incoming 240 VAC. Notice the 12 VDC relay in the upper right-hand corner; I jump the two NO contacts together so that the 120 VAC connections are on the same side of the relay. This scheme shortens the wire length and somewhat isolates the 120 VAC from the 12 VDC relay connections.

I received the parts from Digi-Key, Grainger Electric in Lansing, and Standard Electric here in Jackson a few days later. I decided to mount these components on a nice aluminum sub-chassis to help protect the components from damage during the mounting of the metal enclosure. The sub-chassis mounts inside a NEMA approved metal enclosure atop 1/2-inch nylon stand-offs. This allows the sub-chassis to be removed to mount the enclosure to the wall and punch-out the cable entrance holes without damage to the sub-chassis.

Operation is straight-forward: The large DPDT relay normally closed contacts normally provide the power to the transmitter. When a remote control command closes the 12 VDC relay, its NO contacts trigger the 10 second TDUS3000A one-shot relay; this relay turns the primary 240 VAC relay "on" momentarily, which actually turns the transmitter "off" for the duration. At the end of the 10 second delay, the one-shot relay opens, the primary power relay return to "normal" and routes the 240 VAC to the transmitter, which goes through its start-up regimen. Depending on how fast you can dial the remote control, you can have the audio back in less than 2 minutes. Sure beats a 1.5 hour round-trip. I have faith that a solution will be found for the nuisance loss of audio in this transmitter. Meanwhile my Engineer friend and I can spend extra time sharing War Stories over a cup of coffee.

Michael Bradford began his career at WCCW in 1962, A CPBE since 1984, and currently a contract engineer, you may reach him at: mbradford@triton.net

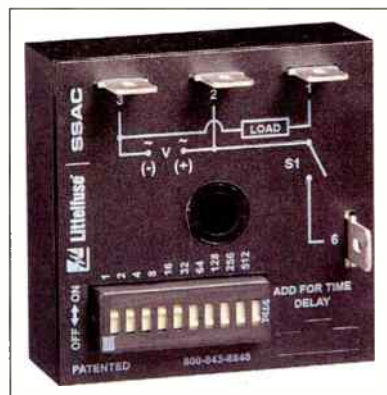


Figure 1 – Littelfuse Model TDUS single-shot timer.

This delay relay only requires a leading-edge 0.1 second signal to activate the



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Transmitter Site

A Dirty Box Causes Cellular Interference

by Gary Minker

Over the years of hunting various kinds of interference, I've run into many types of proud Engineers who really do keep a tidy ship, and try very hard to keep a neat transmitter site with that tidy transmitter that anyone's mother could be proud to show off, both inside and out. This is refreshing compared to the grungy, filthy, slimy RF generators that many of today's contract care sites sport.

In the usual world, this kind of filth in a transmitter is only detrimental to the health of the one stuck with repairing the infested beast. But now and then, these dirty birdies create dirty birdies and these birdies show up at un-wanted places in the spectrum at both even and odd harmonics of the base carrier.

Since I work for a wide range of three-letter acronyms with guns, various public safety organizations, and piles of Cellular carriers, I get the call now and then to assist with a hunt for "Red October" that has popped up in the middle of someone's favorite band – and I don't mean Led Zeppelin.

The Federal Communication Commission developed rules back around 1934 that prohibit the generation of interfering signals to other types of licensed, un-licensed and machine devices. These noises can be generated by a host of maladies but the one that no one suspects is *dirt*. Let's face it, dirt has been around for billions of years. It is way smarter than we are. Only a few of us remember when dirt was new, but we have all seen dirt in its non-native settings where it does not belong. One of these places is inside the transmitter.

While modern day solid state transmitters, operating in class A, AB, AB2, and other limited applications, are generally more immune to generating trash for any reason, it is the venerable class C operation of both solid state and vacuum devices that cause these issues. Sometimes it almost seems that a Class C operation's primary purpose is to generate harmonic trash in both the even and odd registers, and that the primary output of the desired frequency is an accident. However, we still love our class C boxes. The containment of these errant generations of harmonic garbage is the key to successful operation in the eyes of the FCC. Today, there are people in the spectrum forest to hear the tree fall – where previously, who cared if there was a noise in the 710 MHz or 1750 MHz bands. These days someone is listening everywhere, where heretofore harmonic blobs went un-noticed.

Ignorance Be No More

Our old friend dirt is the path to ruin, where conveying harmonic trash is concerned. While a transmitter may seem pretty clean by anyone's standard, it is dirt, and primarily high carbon content dust or soot, that is the worst enemy along with tarnish and corrosion. A transmitter can have multiple paths for leaking stray harmonic trash RF from the most un-seemly places.

Mechanical

Panel covers, loose hardware, screws, nuts & bolts, and worse yet rivets, are horrible offenders. Transmitters should be thoroughly inspected for mechanical integrity at least twice per year. Loose hardware not only leaks stray RF it can cause burning, arcing, fire and the eventual destruction of your money tree.

Tarnish

What is tarnish? This dull and unsightly discoloration of metal is a chemical reaction between the moisture in the air, dirt and the metal involved. This discoloration involves crystalline formations and when electricity is applied, bad things happen, that range from the generation of more errant electrical trash to fire, and from previous articles, we all know that fire is "inspirational."

Dirt

In its simplest form, dirt in transmitters manifests itself as a high carbon, soot like substance. While having an inherently high basic resistance to the flow of electricity while dry, this carbon is a fantastic conductor when either damp, or encroached by a high enough voltage. Aside from the inspirational fire that erupts while conducting massive amounts of electrical plasma due to an arc, these carbon paths also guide harmonic trash out of containment boxes, cavities, or other sources of high powered RF. Carbon-infested high voltage wiring, such as the B+ lead, bias voltage and sample sensing wires, along with coax and insulated tuning rods, all conduct harmonic trash out of the cavity. Another dirty culprit is the dual capacitor and choke bypass set up on high voltage wiring. Dirt on the capacitors, and standoffs are notorious for allowing harmonic trash to exit the building, along with a bad Elvis impersonation.

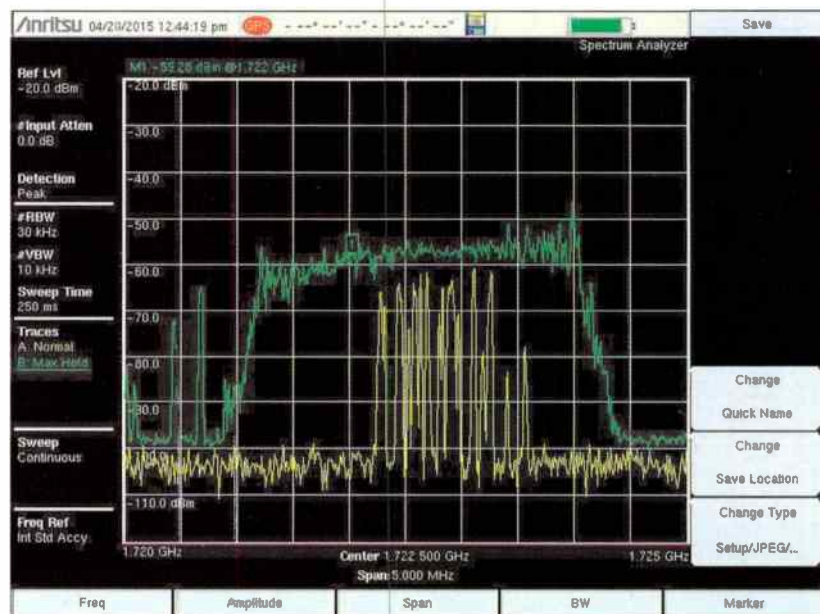
Un-Terminated Sample Portals

Most Engineers are so used to looking at un-terminated sample portals on line sections and coaxial connections, for things like modulation monitors, that we just gloss over them and ignore them. This is not a good thing to do. These open portals are very high impedance avenues for leakage of all manner of trash.

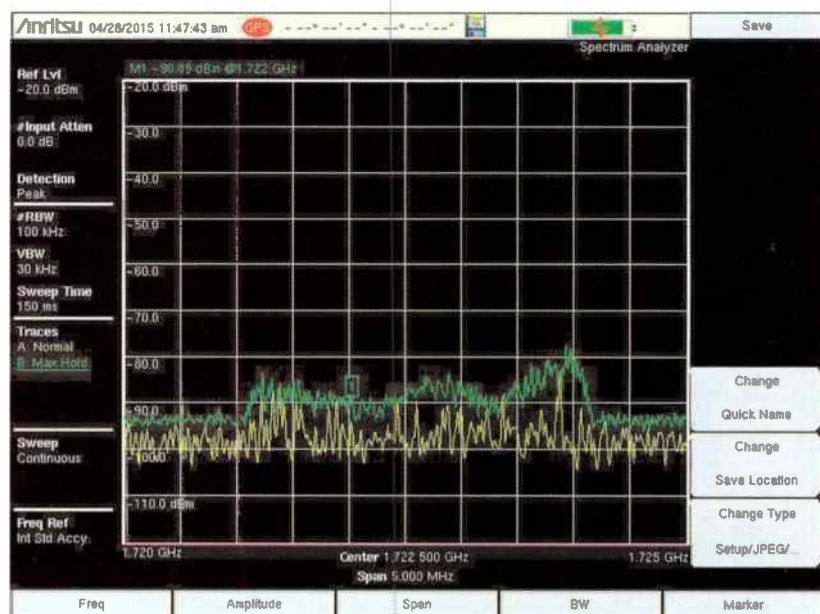
Install some cheap 2 Watt terminations on them. Do not install shorts or shorted connectors on these abandoned or un-used portals – other malicious activities can occur that could be stinkers to trace out.

The spectrum analyzer traces shown here are before cleaning and after cleaning, along with a good mechanical inspection and tightening session. The local Cellular carrier was eternally grateful after this three-hour clean up. When faced with changes in the radiated noise levels such as these, even 10 to 20 dB of change when plugged in to the free space loss Friis Equation makes all the difference in the world.

Admittedly, changes of this magnitude are not the norm but this does show how a good cleaning and mechanical inspection can make a substantial difference. While the rules of the Communications Act of 1934 are still very valid today, do not get sucked in to the notion that just because your transmitter output up the stack conforms to the -80 dB down from main carrier, you are safe. The Commission wants all parties to have skin in the game to peacefully co-exist in this tree falling forest. Violations of the cabinet radiation standards from various other sections of the CFR Federal Code, such as Industrial-Medical-Scientific (ISM), can trip you up.



Before Cleaning, Tightening and Installing Terminations



After Cleaning, Tightening and Installing Terminations

If your licensed facility is interfering with another licensed facility, you need to hope it is not Federal, Municipal, Life-Safety, or Law Enforcement, and even then the Commission wants everyone to work toward viable solutions. Digging in your heels *will* earn you a citation and likely for multiple issues. Fortunately they can't cite you for being stupid but they will find half a dozen other things to ruin your day, if you and the complainant don't get on.

Gary Minker owns Radio Works R.F. Consulting. Email him at: gary@RadioWorksRFConsulting.com or call 561-346-8494. Find Gary on the web at www.RadioWorksRFConsulting.com

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World Radio History

CAT Cabling and Proper Application

by Chris Ark – CBT

This is a refresher on CAT cabling and proper application. There are best practices I constantly see ignored in broadcast facilities, both small and large. In this article we'll discuss cable fire rating, conductor composition, shielding, and more.

Cable Fire Ratings

When choosing the type of CAT cable to purchase, consider the location of the installation. The NEC (National Electric Code – Chapter 8 / Article 800) outlines where certain types of cabling can be installed. This determination is based off the cable's fire resistance rating. Not all outer jackets of CAT cables have the same chemical makeup. These materials burn differently and emit different types and amounts of toxic fumes. There's no difference in the telecommunication properties of the cable themselves but is just referring to the chemical composition of the jacket itself.

Plenum (CMP)

Plenum is the highest rated CAT cable and is intended for installation where environmental air and HVAC infrastructure is located. Plenum cable is self-extinguishing and is rated to not propagate flames more than five feet past the initial point of ignition. Since this cabling is co-located with environmental air and HVAC, we want as little toxic fumes emitted as possible, so it doesn't enter and contaminate the air in other sections of the facility. Plenum cable is the costliest but is permitted for installation anywhere CM or CMR is allowed.

Riser (CMR)

Riser cabling is intended for installation in vertical shafts or conduits of commercial structures. The fire rating of CMR cabling is intended to help prevent the spreading of fire from one floor to another. Riser cable has a fire rating slightly less than CMP but can be installed anywhere communications multipurpose (CM) cabling is permitted.

Multipurpose (CM)

Multipurpose CAT cabling can be installed anywhere cable fire restrictions aren't imposed. You will find this type of cabling installed in ground level commercial buildings and residential settings. CM CAT cable is the most cost effective but holds the lowest fire rating.

Stranded vs Solid Core

When talking about stranded vs solid cables, we're referring to the number of individual conductors contained within the twisted pair's insulating jackets. Each cable type is intended for a specific installation location. These installations practices should be followed for maximum throughput of your network.

Stranded

Stranded cables are made up of several small wires that compose "one" over-all conductor. Having several smaller conductors bonded together allows for more flexibility, making stranded wire a better choice for situations where the cable is being moved around. This may include laptop setups, patch cables, or ad hoc networks. Attenuation is much greater in stranded cabling so you would want to keep it to a minimum within your network.

Solid

Solid cables are made up of one conductor. Solid cables are less flexible and are prone to breaking when bent too many times. They are best used for permanent installations such as runs to and from MDF/ IDF patch panels and wall jacks. Solid cabling is also easier to punch down. Compared to stranded cabling, there is less attenuation in solid cable making it more desirable where large amounts of cabling that is being installed.



To Shield or Not to Shield

There are two types of CAT cabling, UTP (Unshielded Twisted Pair) and STP (Shielded Twisted Pair). Each type has a place within our network, but careful consideration is needed when figuring out what type to install where.

When EMI (Electromagnetic Interference) is introduced into a conductor, it disrupts the normal flow of electrons. Data can become corrupt, equipment can act erratically, or not work all together. We use shielded cabling to minimize the amount of EMI introduced into conductors. The shielding absorbs the EMI and prevents it from entering the cables conductors. With STP, there are two types of shielding, foil and braided. Some situations call for single-shielded (foil or braided) and others require double-shielded (both foil and braided). Here are a few scenarios to consider.

CAT cable co-located with electrical cabling can be problematic. Even with low considerations of electrical cabling comes a magnetic field. Although small, that magnetic field can introduce itself into the cable and disrupt the low voltage running through the CAT's twisted pairs. In commercial environments, with florescent lighting installed in suspended ceilings, single-shielded cabling should work just fine to mitigate EMI. Please note that before installing low voltage cabling (telecom cable) with high voltage cabling (electrical), be sure to consult your local municipalities building codes.

In high EMI environments like an antenna farm, I install double-shielded cabling. There is a high probability that radiation from other sites will spill over in to your building and get in to your cabling. Although I have seen single-shielded cabling work in that environment, I would install double-shielded CAT cabling for two reasons. First, if another station's transmitter TPO (transmitter power output) is raised for whatever reason, that extra gain could be enough to push EMI in to your cabling. That's a factor that you have no

control over. The second reason is that I don't want to chew up my CapEx (capital expense) having to purchase CAT cable twice because single-shielded wasn't enough to fight the good fight. Installing double-shielded CAT cable is especially beneficial at AM transmitter sites. AM frequencies are much stronger than FM, so it takes very little ERP (effected radiated power) to wreak havoc.

UTP (Unshielded Twisted Pair) CAT cable is a brief topic. In commercial settings, UTP cabling is commonly found in patch bays, server racks, or cross connecting desk computers to an RJ45 keystone. There is little to no EMI in those locations so there really isn't a need to spend the extra money on STP cabling.

Termination

The biggest issue I had when terminating a CAT cable was making sure each conductor was making contact with the pins. A tool and connector called EZ RJ45 solved this issue. An EZ RJ45 connector allows you to pass the conductors all the way through the connector insuring that the conductors are going to make contact with the pins. When crimping down, the tool has a blade that sheers off the wire coming out of the end of the connector. The crimping tool also has the A/B color codes engraved on the side!



PSA: Be aware that some manufactures bond their pairs together. You need a special tool to separate the pairs before you can place them into the connector. I don't know who the sick individual was that thought this was a good idea, but this is awful to work with. There may have been a logical reason for this, but no amount of logic can undo the amount of frustration of having to work with this in the field. You've been warned!

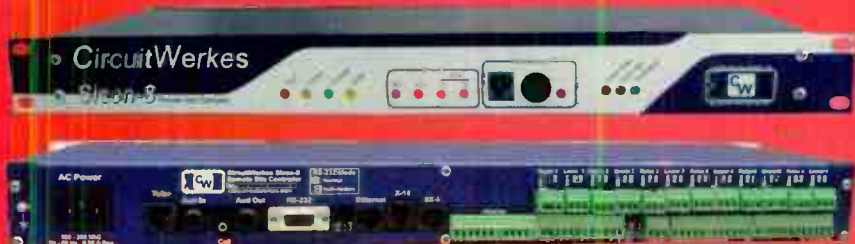


Building for the now or for the future?

It's easy to go with the most cost-effective cabling solution when budgeting for CapEx projects. At the time of buildout, your AoIP or file network may not require the throughput of 1 or 10 Gbps. But as technology advances minute by minute, day by day, we're already behind. If you're going through the headache of installing new cabling, future-proof your facility the best you can. Ask yourself, is CAT 5E all we need, or will there be a need for CAT 6/7 in the near future? Talk with your DOE and GM to see how they envision the future of your broadcast environment five years from now.

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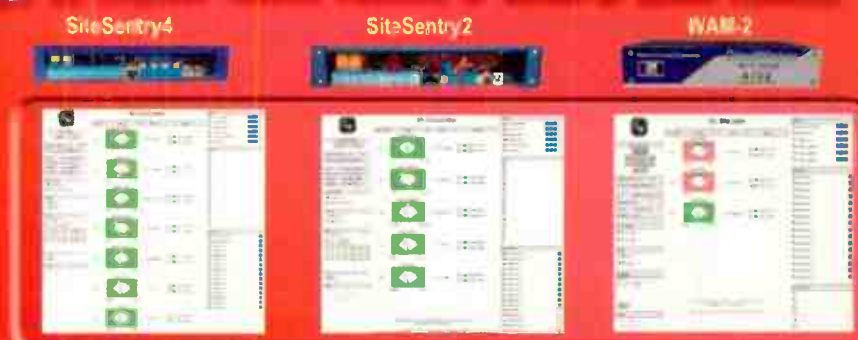
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Big Picture Dreaming

by Sam Wallington

Maybe this never happened to you, but I remember many times, especially in elementary school, where my eyes would wander to the windows. Upon discovering beautiful weather out there (finally, after a long winter), I would start thinking about things I would rather be doing – outside. Usually, my musings would end in a few minutes and I would try to force myself to pay attention. Occasionally, however, my mind would stay outside a little too long, and my reverie would end with the teacher's clear call to attention ... sigh.

I write this article on a beautiful spring day, which perhaps reminded me of the dreariness of long winter days at my school desk, starting and ending each day in the dark. Once spring finally came, most of my classmates and I were eager to get outside and take advantage of the fresh air and reasonable temperatures. Though many in my classes would have preferred team sports, my interests ran to other things (perhaps because of my nerd leanings). In any case, most of us would have preferred something new to the schoolwork we were required to do.

Strangely, I find I have the opposite problem now. Maybe you have the same challenge. Now I want to continue working on the stuff I have been working on for years instead of doing something new. Apparently, I

would rather have the predictability of familiarity than the challenge (and possibly joy) of change.

Working on a large project until it is done is not the problem I am talking about. A studio or station construction project can easily stretch into months or even a year or two, depending on complexity (and the pleasures of zoning and permitting). Though those things can take a long time, they are worthy pursuits and should not be abandoned mid-course.

The concern is my tendency to work on things which should no longer be my job. More than a decade ago, I hired someone to run a portion of my department. After a few weeks getting their bearings, they took over most of the work. And yet, because I happen to know a lot about certain parts of the radio business, I still jump into email threads and stuff myself into hallway conversations, just because I know something about the topic.

What creates the temptation to jump in? Do I honestly believe my co-workers do not know what they are doing? Of course not. Am I convinced they have missed the point or never learned the processes or equipment? No, I do not think so. Alas, I suspect the reason is a combination of my "know-it-all-ness" and an ongoing, if misplaced, desire for recognition.

Daydreaming and fantasies can be wonderful things. Dreaming about an upcoming vacation, planning for career growth, or even wishing things would go your way, can all be positive and help us face life's challenges. My problem is that I sometimes let dreaming slide into a fantasy about others holding me in awe. "Wow!" they say in my fantasy, "What an amazing guy! He must know everything!" I am not sure, because I am afraid to look too closely, but I suspect my fantasy includes people making subtle, subconscious bows to my brilliance, whether diverting their eyes or saluting as I walk by or just a look of admiration. If my boss features in the fantasy, there might even be the desire for financial rewards for my brilliance.

What a joke! The recognized reality is that I am just like everyone else. I am good at some things, bad at some things, and get an average grade on the rest. There might even be a thing or two I am really quite good at (it ain't grammar, or I would have said, "at which I am quite good"!).

Is it possible that we hang on to our old job or old responsibilities because we are afraid? Afraid of becoming irrelevant, afraid of being dis-respected, or just afraid of aging? Maybe, because we were good enough at those old responsibilities to be promoted, we feel we can only be successful at those things for which we were rewarded.

Whatever the reason, I continue to "help" others with their jobs by jumping in, micromanaging, questioning unimportant decisions, nagging – this habit forms quite a list.

Instead of doing those things, which waste both my time and the team's time, I should be working on my "new" job, the job I was promoted into. Included in my

(Continued on Page 22)

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Big Picture Dreaming

– Continued from Page 20 –

real job is growing my team's skills, broadening my strategic view, and changing some of the ways I think. My actions in micromanaging and so on cause me to tell the lie that I am doing my job, but I am just doing my old job differently.

Though I hope it is not, there is another possibility why I continue to involve myself in things which are not my job: My ego. Is it possible I think my knowledge, or that I bring so much value, is such that no one could accomplish anything if I am not driving every detail? I hope it is not true for you or me yet, even if it is, those desires can be satisfied more effectively by making a change of approach.

What if I could behave more strategically? Instead of focusing on one situation or one problem, I could focus on a pattern or a plan. For example, if a station went off the air because no one had changed the transmitter air filters, I could micromanage by building a massive infrastructure to assure every air filter gets changed like clockwork. We could buy and install airflow sensors, temperature probes, and sophisticated monitoring systems. We could add daily or weekly reports, and weekly or monthly inspections. We could have an all-hands-on-deck required training session and force the reading of book-like epistles on the importance of clean airflow.

Experts could be brought in to train the proper procedures for cleaning or replacing filters. But all those efforts, while they might accomplish the goal of "No Air Filter Left Behind," create tons of bureaucracy and waste time and money. Instead, what if I simply asked why the filter was not changed? Was it really missing knowledge or concern? Or was it a team with so much to do they did not have time to check the filter? If busyness was the problem, my micromanaging as described above would have made the problem much worse.

Driving to a site and changing the filters is relatively easy. Investigating why the filters were missed, as well as how best to prevent a recurrence, is hard. Maybe laziness is one of the reasons I am reticent to give up my old responsibilities. But if I am willing to do the hard work, the results can be amazing. Maybe the filters were missed because no one knew we had the budget to buy new ones. Maybe the problem came up because no one ever taught the team how to manage time or to prioritize. Maybe we need to hire an additional team member. Perhaps the reality is even more interesting than those possibilities!

Personally, I work best when I am given a clear goal, a few boundaries or guard rails (what things are off limits), and the freedom to reach the goal. It seems most people would prefer such a working environment! As an example, imagine you have been asked to deliver a package to a building across town. If you are told it needs to be there by tomorrow at 10 a.m., it is fragile, and the budget is \$25, you should have everything you need to make an effective plan and take care of the need. The efficiency of such an approach is so much better than having a rigorous micromanagement program in which each tiny decision needs to be reviewed and approved (Fed-Ex, truck – or bicycle? Main Street or back street?


You or someone else? Phone ahead or just go?). Perhaps a dumb example, yet the truth is I can easily create something as annoyingly complex instead of simply asking my team to build a station according to the FCC Construction Permit, by next March, for \$100,000 or less, and to come to me if they get stuck.

Another way I can be more strategic is to get out of today. If I think about life 90 days (or more) into the future, I can set better goals and work with the team to reach those goals. If I am stuck on today's problems, the entire team will have to react to problems rather than plan for them. I would rather plan than have everything be a surprise!

Thinking and acting strategically brings several advantages. By looking at long-term costs and benefits and at big-picture solutions, our organizations can be far more efficient. If ego or career growth is a concern, raising the entire team's skills and productivity makes us look better than solving one or two little problems (while creating six others).

Today, I invite you to join me in consciously stopping ourselves from doing other people's jobs – especially those of our teams – and from thinking only about today's challenges. I recently taped a note to my computer monitor which says, "What does the team need to know so I do not need to step in?" This question is helping me find out the "why" behind problems and look for a long-term solution. Ultimately, dreaming about what we could accomplish in the next quarter or two is a lot better than the team staring out of the windows wishing.

Sam Wallington is VP of Operations and Engineering for Educational Media Foundation, and has 36 years of experience in broadcast engineering. He can be reached at swallington@kloveair1.com



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Maintenance Guide

Keep It Clean

by Steve Callahan

OK, I admit it. I do like a clean transmitter site. I personally take pride that a station manager or station owner can visit any of my transmitter sites at any time and will find them all clean, orderly and everything working as it should. Now I know that's not always a goal that can be achieved at every transmitter site, but why do some sites have to look like an indoor landfill?

I was recently called to a transmitter site which had an AM and FM in a small concrete block building. There were three FM transmitters and two AM transmitters in this building, but only one AM and one FM transmitter were working. The others were in various states of non-repair and were missing components. I also had to climb over the pile of trash and empty pizza boxes just to get into the building to assess the problem.

Realistically, as professionals, why do we have leave our working conditions like that? I'm sure that those pizza boxes didn't walk out to that tower site by themselves. Would it have taken a lot of energy to merely pick up the trash and dispose of it properly? Why encourage unwanted rodents and critters to move in and further contaminate the equipment?

I've see quite a few transmitter sites and I frequently see equipment that, at one time, cost the station a lot of money and is now relegated to the bottom-less pit known as the transmitter site. I can't count how many

old free-standing Xerox photocopiers and ancient phone systems I've see taking up valuable space at tower sites. Those copiers and phones will never make the trek back to the studios. Why keep them, other than they once cost a lot of money?



A Chronology of Consoles

One excuse I've heard is that the equipment was saved and stored because someone would get around to fixing it someday. You and I both know with our busy schedules that a "someday" repair will never come. Another excuse I've heard is that someone will surely

want that old piece of equipment, so I'll sell it on E-Bay ... someday.

At one site, I took great pleasure in disposing of at least thirty ITC Series 99 cart machines. Yes, I know how much they cost back in the late 70's. However, they were all in various states of disrepair and were taking up valuable shelf space – and just try to buy a new tape cartridge today. Another site has become the repository for the station's bookkeeping records from the beginning of time to the present.



It would make a great door stop!

Take a hard look around. Will you ever fix that Tapecaster cart machine that's been on the floor for decades? Even if you have the time and the parts, what are you going to use it for other than a door stop? How about that Otari MTR-10 taking up space in the corner? I sold two very needy Otari's to a collector from New Jersey. He drove all the way to Massachusetts to pick

(Continued on Page 28)



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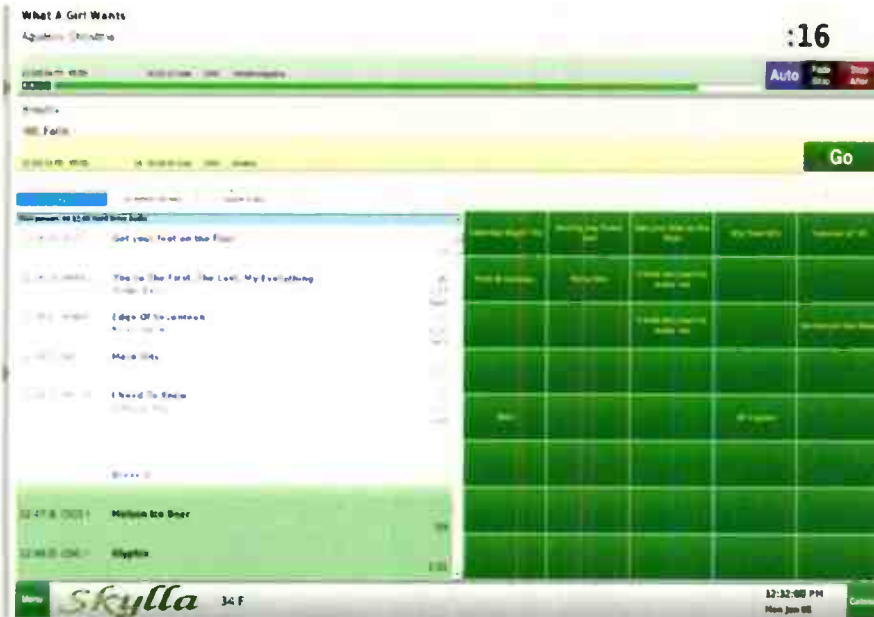
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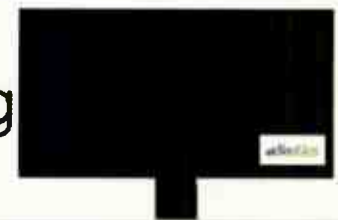
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SMARTS
Broadcast Systems

Keep It Clean

— Continued from Page 26 —

them up and he paid cash for them. Look around and pull out the spare parts for old equipment that used to be in the building but is no longer there. Why keep those parts around taking up space? Give them away or just take a deep breath and throw them out.

It always seems like promotional materials and supplies find their way out to the transmitter site to be stored there. I have a little rule-of-thumb that I use anytime I design a new radio station. Take a look at the storage space you have planned for the new facility, and then triple it. Sometimes the only viable option is to get a rental storage unit either by paying for it or trading for it. You do it for your surplus household possessions, why not for your mountain of promotional materials? Why work around boxes of station T-shirts or ball caps when they can be stored safely and are easily accessible by your promotional street teams at your local, neighborhood storage unit?

It's Spring and time to clean up your transmitter site. Take a look around with a big heavy duty contractor's trash bag in your hand. If you don't know what something is or what it goes to, throw it in the bag. If there is packing material or trash in front of you, throw it in the bag. It's funny how that new equipment in its original packing made it out to the site to get installed, but the box and packing material landed in the corner and is now the living quarters for a family of field mice.

Toss those now full trash bags in your vehicle and dispose of them properly. While you're at it, bring some new bulbs out to the transmitter site so you can finally replace those burned out bulbs you've been meaning to replace, instead of working in the dark or with a flash light. If there isn't a broom at the site, bring one of those out too. Bring along some spray foam to fill up the cracks and crevices that allow the critters in. Check your ASR tower registration sign and your FCC Facility sign to make sure they are still there. I visited one site recently where the signs are now considered targets for local BB gun aficionados.



Just take it to the transmitter.

One thing I've found to be especially handy is to have some basic tools at each tower site. I carry a collection of most-often used tools in my car but it's still handy to have some at each site. However, keep them secure by attaching a lockable tool box to your work bench using carriage bolts with the nut inside or

by lag screwing them to the floor. As a rule, don't leave anything unlocked at a tower site that can be used to cause damage like a bolt cutter or a sledge hammer. A locking cabinet will keep things secure and somewhat safe if an intruder breaks in.

At one site I used to work at, there was thick, green, gross shag carpeting on the floor that just had to go. Under the shag carpeting was ... cold patch asphalt paving material!

Yes, the material that they use to fix potholes in streets. Some previous station owner wanted to try to level out the floor so he or she must have gotten a great deal on paving material, tamped it down so it was somewhat level, and then put the shag carpeting over it. I took great pleasure in correcting that problem and laying down some proper vinyl floor tile which I washed and waxed a couple of times a year. I always got compliments from visitors on how good that room looked just because it had a shiny floor.

It seems like everyone has Internet access at the tower site so why not invest in some simple motion sensing Internet cameras? They are very inexpensive and can be programmed to record when they sense motion and then email you. You can put one camera outside in a location where the bad guys can't reach it and one inside where it gets a good look at their faces which would be invaluable in the event of a break in or outside vandalism.

Invest a few minutes of your time to pickup trash and sweep up. A clean transmitter site is definitely a happy transmitter site!

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

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World Radio History

Installing Linux for the Newbie

Getting Around the Windows Obsolescence Situation – Part Six

by Tommy Gray – CPBE, CBNE

Putting Linux to Work!

In our last issue we started the install of the Linux Mint Cinnamon operating system on our old Windows machine. If you have created your install disk (preferably on a flash drive) you have probably already started or maybe even finished your install. The install is very straightforward. There are a couple of things I need to mention to save you possible problems. Now I would greatly suggest that if you have a working copy of Windows you want to use going forward, that you have a fairly large hard drive (500 GB or more).

You don't need it to run Linux, but if you have a lot of files and/or programs on your current Windows install that you desire to keep, you may have a lot of space already used up on the drive. If that is the case, you might not have a lot of space for your new Linux computer. I can tell you from experience that you will like it so well that you will end up doing everything on it and you will regret not having a lot of available space for later on. You will find that there are very few programs you are using on Windows that there is not some kind of Linux equivalent available to use, once you get going.

It is by far much easier to add a large drive by cloning your current Windows disk onto a larger drive now, than having to deal with it later and having to jump through hoops to make it happen.

Going On With the Install

As I mentioned earlier, there are a couple of things I want to alert you to, with regard to the install.

First, when performing the install, you will be asked if you want to keep the current Windows operating system. If not, just tell the install to use the entire disk for Linux. If you are planning to keep it, then choose the option to "Install Alongside Windows." Then you will have to choose how much drive space you want to use for the Linux install. I usually take all the available space.

Secondly, at one point in your install, you will be asked if you want to install third party drivers. At this point I would suggest skipping that option. I have installed this OS on numerous computers and, so far, I have never needed to use it at all. Installing drivers later is easy, so it is not worth the hassle at this point. Once you have answered these questions and are going ahead with the install, everything will complete on its own.

You will, of course, have to tell the install your time zone, and choose a username and password. I *strongly* recommend using a password. One of the great things about Linux, and the main reason you do not need any kind of antivirus program, is that nothing can be installed on the computer without your password. It is a little bit of a hassle to have to enter it every time you update or install any software but it will pay off in the long run.

My oldest machine has been running for over 4 years and has never had any kind of malware get on it – and it does not have any kind of security app or antivirus programs on it. A word of warning here, is that you need to write down the password and or make sure you can remember it, because if you forget, you may have to reinstall to get back into your machine.

The machine will reboot at least one or more times, and load Linux before the install has completed. When you reboot, you will need to remove the flash drive you are installing from, but it will usually tell you during the reboot to remove it and then continue. It is a very user friendly install and does not take a computer Guru to perform. Once the install has completed, the OS will want to install the latest updates before it finishes. It may take some time, but when it finishes you are ready to go. You will see several icons in the tray – one of which will be the Update Manager. When you have available updates, a number or symbol will show up on it. Click on it and follow the update manager's instructions. Usually just click on "Install Updates."

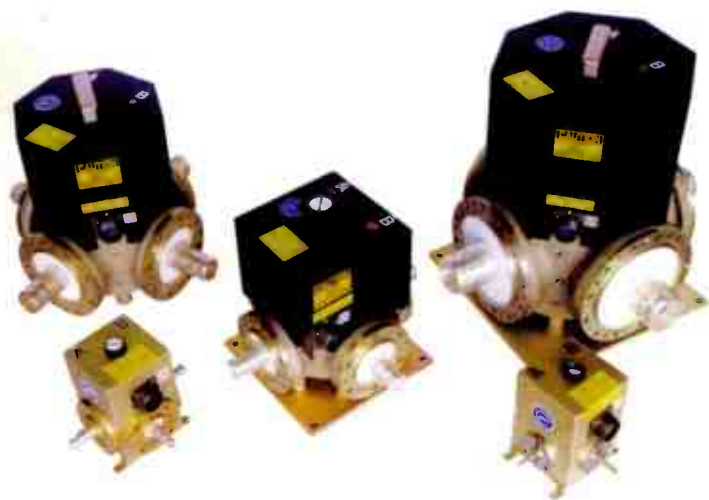
You will then be asked to enter your password and the update will take over and install on its own. You can keep working on most apps while the update is taking place. The really great thing about Linux is that you do not have to reboot your machine when the updates are installed. If you run into any problems, there is a real plethora of information on the Internet available. Simply search for whatever problem you are having – make sure you search for the problem on the Linux Mint Cinnamon OS. Almost anything you need to know about it is there for you to easily access. Everything from highly technical info to basic questions are there. Linux has come of age and this is "Not your father's Linux." I cannot tell you how many times

(Continued on Page 32)

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– Continued from Page 30 –

years ago, when Linux was in its infancy, that I have had to edit scripts and jump through hoops to get things to work. It is not that way anymore.

Dropbox Anyone?

When I complete an install I usually install my convenience apps, as I like to call them. I install Dropbox which most of us use. I use the version that works with the file manager. I simply drop my files into the Dropbox folder which can be found in your home folder, and they will be automatically copied into your Dropbox. When you update something in your Dropbox, either on-line or from another machine, your Linux machine will automatically be updated at the same time as usual with the program.

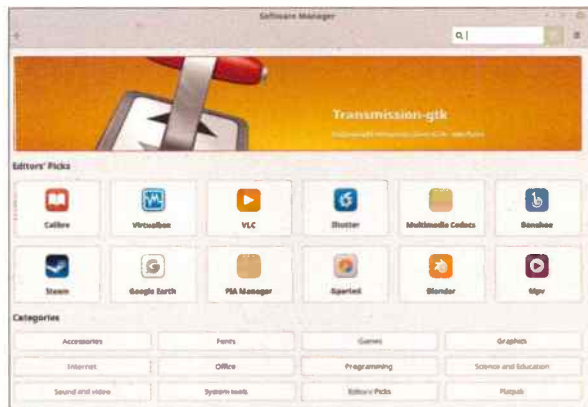
Your Dropbox install can be either performed in the Linux Mint Cinnamon software Manager app (which is in your list of programs) or you can also easily do it in a terminal from a command line if you prefer. Just do an Internet search for “Installing Dropbox in Linux Mint Cinnamon 19.1” (or whichever version you are installing).

To open the Software Manager, click on your Linux Programs icon on the lower left of the taskbar, and select <Administration><Software Manager>.

Software Defined Radio

Another app that I like to install on my machines is GQRX. GQRX, is an SDR (Software Defined Radio) app that works with most SDR hardware. I use it sometimes to monitor my radio stations that are within range. It gives you the typical Spectrum Analyzer type display most SDR

apps do, and is customized for your preferences very easily. Again, the Internet is loaded with info on it as well. A simple search will give you what you need. There is a great set of install instructions on-line that I prefer, rather than a simple Software Manager install, as it will install all your necessary USB drivers, etc., and you will get things running quickly with a few commands in a terminal.



The Linux Mint Cinnamon 19.1 Software Manager

HAM Radio Programming

CHIRP: A third app I usually use, since I am a Ham operator also, is the CHIRP program most HAMs are familiar with. This is a great utility to add programming for channels, frequencies, etc., into your radio from a computer, and not have to enter them manually, a command at a time. The Linux version works just like the Windows version. Getting it running on Linux was, for me, faster and easier than on Windows. Once again, a great set of install instructions are available on-line from a simple Internet search.

To Install CHIRP from a terminal (which I prefer) you open a terminal, and use the three commands. This is the

most bulletproof way I have found:

```
sudo apt-add-repository ppa:dansmith/chirp-snapshots
sudo apt-get update
sudo apt-get install chirp-daily
```

If you are unfamiliar with Linux, you may not understand the “sudo” at the beginning of the command. This is a “super user” (administrator) command and you will need to enter your password to allow the install to complete. Once installed, when you try to run it with your radio connected, and you encounter a problem, again go to your friendly Internet browser and search. You will find answers there.

Graphics Anyone?

GIMP Image Editor: If you have used Paint or any of the free Windows graphics programs, you will be right at home with this one. It is a “Photoshop” type of program that comes with Linux Mint Cinnamon. Simply install it from the Software Manager and it is ready to go. It will allow you to save your creations in many different file types. The learning curve for someone who is used to Photoshop will be very easy. If you are not familiar with graphics programs it will take a little longer – definitely a little longer than Windows Paint.

Well there is no more space available to continue this for this issue. I will put you onto several other great free programs next time. I will discuss the “Audacity Audio Editor” which many are using, as well as other great apps. Enjoy!

Tommy Gray is a semi-retired veteran broadcast engineer currently staying busy doing engineering in the gulf south, through “Broadcast Engineering & Technology LLC”, a Louisiana based Consulting and Contract Engineering Firm, serving the US. www.BEandT.com



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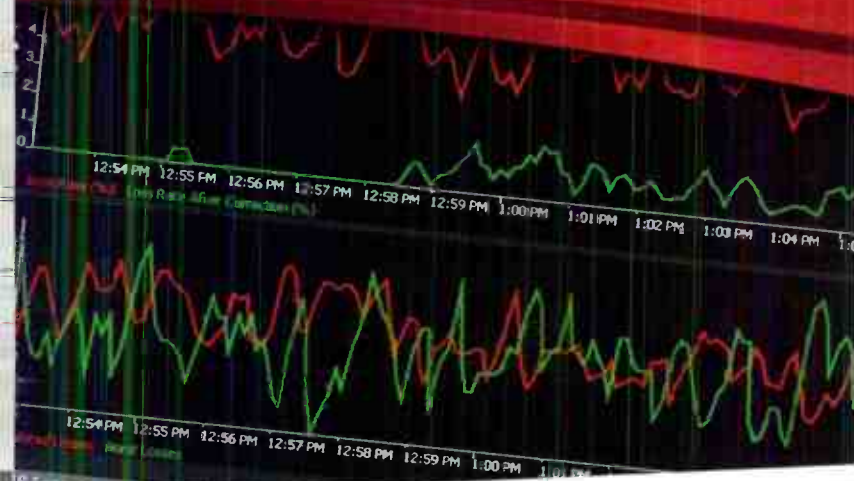
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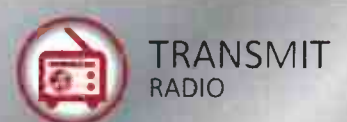
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Contact Considerations

More Power in Networking

by Jim Turvaille

In the fall of 2016, I wrote about the “Power of Networking” in our business. Not talking about those cool CAT cables and connectors, but rather the professional relationships which we develop through the years as we prod down this road in our radio engineering career. I cited several real world examples where being able to “phone a friend” saved the day for radio stations, even if it did not make anyone a millionaire. And those events are not extraordinary or unusual – in fact, hardly a week goes by that I am not on the giving or receiving end of a call to aid or get counsel from fellow engineers. If you do not have a professional network of peers, then let me start today by strongly encouraging you to find a way to do that – sooner rather than later; there’s not very many of us radio geeks left, not wearing the pine pajamas so we need to stick together as much as possible!

There are many resources to set up your network – the greatest in my life has been association with SBE. Their website offers tons of info on how they are organized and how to contact the various chapters and members across the country. Though I have previously served as a Chapter Chair for the SBE, I now do not live in a geographic area where I can actively participate in a Chapter. But I do keep my membership and certifica-

tion current and utilize their on-line resources for continuing education and participate in their live web events where possible. As well, there are several good on-line email list groups which give you some direct daily connection to fellow engineers. One which I remain active on is the CRTech group, and we have a chance to interact in person each year at the NAB show.

This brings me to the other way I retain contact with fellow engineers which I have made acquaintance through the decades – that annual NAB Show. As I was making my hotel reservations for Las Vegas last week, I realized that I have never expounded on the value that annual event has in my professional life. Through the years I have developed quite a habit of my arrival and departure, and base it on regular events which I do and in which I participate; it always ends up being much more monetary value than it costs, and it seems to always yield new relationships and peers to my network.

Going to the NAB show may really seem expensive at first glance. Airline flights (if you’re not geographically close to Las Vegas), hotel accommodations and show credentials and meals might really look like a huge cost. And there are those who wear suits and ties that do all of that “top notch” and do spend a ton of money doing

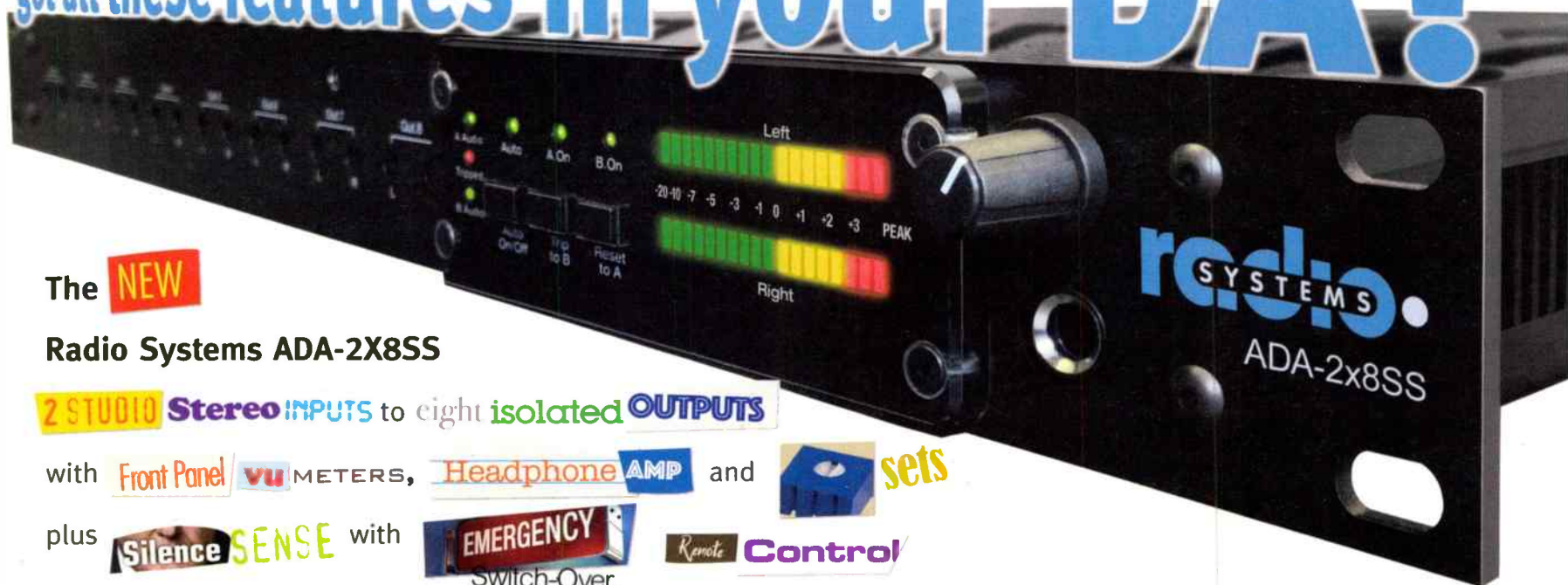
it; but that’s never been my luxury, so I’ve had to make it work on a real budget.

To that end, I first realized that my years in Corporate radio had created a frequent flyer account with one airline, which I still use in my most recent career activities. It’s 160 miles to the nearest airport now, so my flying plans are not nearly as frequent as before; but that account has retained its life and those points are still there for use some day. It’s not the points that really matter to me; it’s the fact of being registered with the airline that gets me access to their promotional emails, where I can find a special rate every now and then. And since the first quarter of the year is typically slow for airline sales, rarely a January rolls along which does not bring a great special on a flight to Las Vegas in April. I am usually able to book the round trip for well under \$300, as long as you can find a good special and book the travel for 45 or more days out. If you do not have a relationship with an airline, then I encourage you to do so – and if you live close to an airport which has several options for airline travel, then set up accounts with more than one. The Free Market Economy we enjoy in this nation can be to our advantage at times; this might be one of them.

Because I am semi-retired, and my station ownership role and affiliation with client stations is as it is, then actually having a formal membership to NAB is not something I have deemed of the value it costs. That is not true for many stations and many engineers, and I encourage you to check out the NAB and what they offer; if it does make sense for you then you should certainly consider joining their ranks. Since I am not an NAB member, I cannot take full advantage of the discounts they offer

(Continued on Page 36)

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More Power in Networking

– Continued from Page 34 –

their members for the NAB show. But if you create an account with the NAB Show website, not only do you then receive all of the updates on the show and its events, you can use their website for booking of hotel accommodations at the NAB non-member rate. I have found that rate is still less than most or all of the travel sites can get you when booking for the week of the NAB show. I've never had to pay more than \$90 a night for a hotel for the show, and those rooms are usually in walking distance to the Convention Center, or convenient to one of the bus stops for the NAB Show-provided shuttle service.

Once you are signed with the NAB Show website, you will get the chance to register for the NAB Show and get an Exhibits-Only pass for no cost. All of the vendors have them available, if you don't get an email offer then ask around and someone can give you a promotional code to sign up for a free pass. How you fill out that Show Registration is important – answer the questions carefully and completely, as this will trigger how they communicate with you in the future. For example, I always note that I am coming to the show to see Radio RF gear; so that information is passed to the appropriate vendors and I get invited to their booth, as well as some of their free seminars, training sessions, as well as social events happening around the show. Once you make some connections, you might find that you can go a couple of days without actually having to buy your own lunch.

If you get to go to the NAB Show, then I have a couple of recommendations from sheer experience of the 27 trips I've made. First and foremost, wear a comfortable pair of shoes! This is not the time to have a new shiny pair of shoes and get them broken in; the amount of walking, and time on your feet, required by the size and scope of the NAB Show will leave you with very sore and tired feet, and likely several blisters. And secondly, make a "dance card" ahead of time. In years gone by, that was physically the back of a business card with the days and times that I'll be there, with slots to fill in with notes. That is now a calendar in the smart phone, but it is extremely valuable to keep me lined out on where I should be at any given time.



In the rush of the crowd and the flurry of things going on, it's easy to forget where you are already committed to be at a particular time.

My biggest challenge is to adjust for the time zone difference – Nevada is actually in the Pacific Time Zone, so they are fully 2 time zone away from me in Texas, which really can mess with the brain if I'm not careful.

Part of the schedule I keep for the NAB Show is to plot ahead of time some of the vendors that I want to visit on the exposition floor. Being on the NAB Show email list also gives me some advance info of what they are bringing, as well as access to a map and even a smartphone app which can let me organize my time. I'm not as young as I used to be – as none of us are, to be exact – and I no longer have the energy to just "see everything" in the massive expo halls that make up the NAB Show. The organizers are good to group similar areas of technology close together, but I've also found some one-off exhibits in an unusual place. So reading the list and studying the map can often give you a chance to see things you might have ordinarily missed.

And finally, there are the non-show related opportunities to meet and network with your peers. The SBE always has an excellent meeting and social event, as do other organizations which are connected to members attending the show. Many law firms have off-site meet and greet locations, as well as many of the industry agencies and representatives. It is pretty easy to fill up that dance card really quick, and then have to learn to say "no" every now and then!

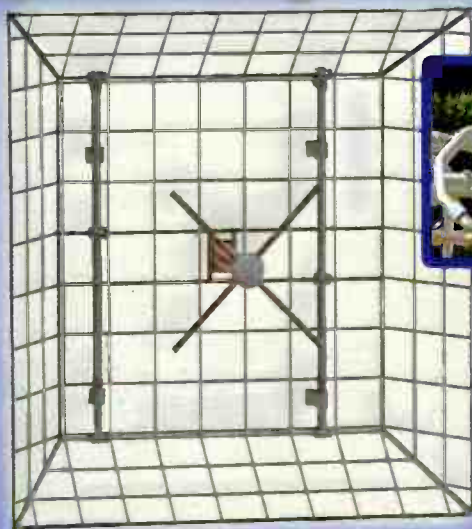
Since it's too late to consider the 2019 show, why not start now planning to be at NAB Show 2020? Get connected to some of the on-line resources and see if you can't be a part of a growing network of your peers. I hope to see you there.

Jim "Turbo" Turvaville is semi-retired from 40 years in full-time Radio Engineering and lives in Rural Wheeler County Texas in a tiny house where he maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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Nautel Transmitter Tips

This is the first in a series of what I hope will be an ongoing column that we're calling "Shop Talk."

If you have ever worked with, or met with, one or more engineers at a transmitter site, convention, luncheon, or just for coffee, you know there are some very interesting stories and bits of information you won't learn anywhere else. Let me encourage you to contact me with what you have learned, so others can benefit from your experience in this column.

This column will not be a gripe session about any company or individual, but rather a place where engineers can learn things they might not have learned before. I'm talking about the little surprises you have discovered while installing a piece of equipment, or maybe in the configuration process.

On more than one occasion, I have installed or repaired something and later learned from another engineer a better way. My response was usually: "I wish someone had told me about this before I got into this project. It would have been much easier."

You can also let me know about the little surprises that are part of a repair or installation process that no one told you about. Like when you installed that new Nautel transmitter and had to remove an RF module. Maybe one of those modules failed shortly after installation and you

couldn't remove it. Then you called tech support and the voice on the other end asked you: "Did you remove the shipping bolts?" Had you read the manual, or installed Nautel transmitters before, or listened to another engineer tell how he forgot to remove the shipping bolts, you would not have embarrassed yourself.

Just keep in mind that I enjoy a good story just like the next person, but this column, like all the rest in this publication, is all about education and information. I plan to cover a variety of short bits of information like Reader's Digest – but only for radio broadcasting engineers.

Here are some things I learned about Nautel transmitters that I don't think you will find in the manual, or in any webinar that they have on their site. But first I have to tell you that Nautel is one of my favorite transmitters, so whatever your take-away from this column, remember that I believe there are many good transmitters out there. If you give a transmitter regular maintenance, it will serve you well. I have heard other engineers talk about other brands favorably that I am not particularly fond of. Nautel just happens to be my favorite.

In the paragraphs that follow, you will get an idea of what I am looking for. Tell me your stories where you learned something useful.

We had just installed an NV 40 at one of our sites and things were going well. The engineering team worked hard to remove the old transmitter and put in our new one. It seemed like we were almost ready to call it a day when the new transmitter decided to shut down. One of the engineers turned the RF back on and the transmitter ran fine for about five minutes and quit. It was time to call tech support.

"Your transmission line or antenna might be at fault" said the technician, but that wasn't the problem. We had taken a lightning hit to the antenna a while back, had our tower crew repair the antenna and line, and then it was "swept" to make sure everything was in order. Time for more conversation with support.



After a while, we learned our front panel Liquid Crystal Display (LCD) was at fault. It seems that it is interactive somehow with the rest of the transmitter and will cause it to shut down if not functioning properly. Unplugging the LCD permitted us to turn on the RF and call it a day. The transmitter was operating like it should, and a new LCD screen was on its way.

Our new transmitter was on the air, so there was no rush to get a new screen. A couple of days later it arrived and I installed the new one and everything seemed fine.

Who would have guessed that a screen that displays voltage, current and other operating parameters could cause a transmitter to shut down? (Continued on Page 40)

It's Time to Get Into the Mix



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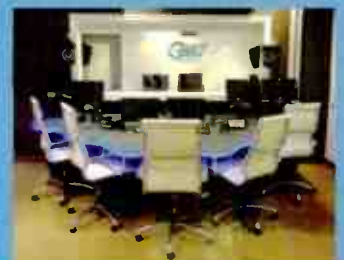
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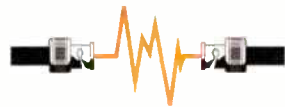
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Shop Talk

– Continued from Page 38 –



An important point I need to make before proceeding further in this article. All equipment manufacturers experience surprises like this now and then. This problem could have been the fault of the supplier that makes components for this display. There could have been any number of factors that “Murphy” could have brought into the situation to make this go the way it did. “Murphy,” by the way, is the mythical character that causes technical troubles for engineers.

I continue to have great respect for the products that Nautel makes. We have purchased a few of their transmitters and love them. We have also purchased transmitters from one of their competitors and love those, too. We chose one over the other because one brand was a better fit for our requirements at the time.

Most of our new transmitter installations are trouble-free, but every once in a while, we have a minor surprise. It happens to us all, and most manufacturers do their best to keep this from occurring.

A lot of equipment manufacturers have manuals on line, on disk, and some offer no documentation. You are not likely to find our little surprises anywhere in a document. These are the bits of information I am hoping you will send in.

So back to our transmitter installation story. The LCD replacement made the transmitter happy – for a while. Again the transmitter shut down. Back on the phone, and Nautel said they would send another screen.

I disconnected the screen I had installed about fifteen minutes earlier and went home. A couple of days later another LCD screen arrived at the office and I headed out to the transmitter shack to install it.

After the second LCD screen went in, everything was fine. I called tech support, and he wanted to “dig a little deeper” into the logs to make certain we were good to go.

He had us swap com boards in the back of the transmitter and, along with tech support, we discovered a bad board. We returned the com boards to their original locations and the transmitter came up. Tech support ordered a new board for us and it was sent overnight.

Back to the transmitter. Replacing the com board was a fairly long process. If I remember correctly, it was about an hour later that the new board was fully installed and the transmitter was back on the air and running like a champ.

Again, I have to emphasize this kind of situation could have happened with any piece of equipment you purchase. It has happened to me a number of times before, and I understand there is always the “Murphy” factor to keep in the back of your mind. Mr. Murphy could visit your site and cause trouble, so you have to be patient and take precautions to eliminate as many surprises as you can. Allowing your blood pressure to rise only hurts you.

Thanks to Nautel, both the com board and the LCD were replaced, and that transmitter has been happy ever since.

By the way, that “com” board is a circuit board that is essentially a hub that talks to other areas of the transmitter,

to constantly monitor how your transmitter is operating. It was apparent that was the function because there were four Ethernet jacks spread out evenly across that board. There were a lot of screws that had to be removed to get that board out, and a number of connectors as well. One lesson in life I keep learning over and over again: it always takes longer than you think it will.

If you have never installed a modern solid state transmitter, you should know that a lot of what goes into today’s technology involves computers and communication nodes. There is a computer, or “controller” as most call it, that is the brains of your transmitter. We put those controllers on a UPS, so should we lose power, the transmitter will come back up in short order. Without a UPS, it could take thirty minutes for the controller to completely boot up and turn on your RF.

So there’s the story for this issue. I hope you have learned something. What’s your interesting and educational story? If you have some information that will help a fellow engineer, please, let me hear from you today. My email is stuzeneu@sbe.org

Steve Tuzeneu, CBT, is a staff engineer with the Bible Broadcasting Network in Charlotte, NC. He is a member of the SBE, and an extra class radio amateur.

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Small Market Guide

Send Cupid's Arrow Into Your Checkbook

by Roger Paskvan

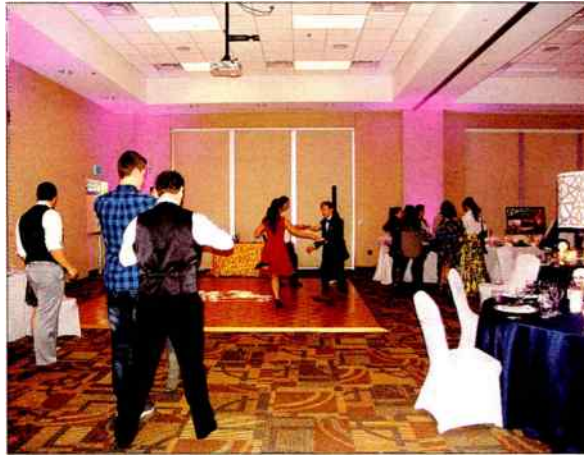
It goes without saying that all radio stations have a real rough time in those two months that follow Christmas. You hear this at every station – it's like the merchants crawled into their igloo, slammed the door and left the "go away" sign out! They spent all their money at Christmas, business is really bad, so let's wait it out.

This is the established standard in many markets and it usually hits small market radio worse. Smaller client bases, and more Ma and Pa stores, add to the January doldrums. This is a story of what one station did to solve this yearly problem and develop an opportunity into first quarter cash.

I have written in previous articles about doing promotions to counter this very syndrome. Many stations have an early indoor boat show that provides a family activity and an opportunity for merchants to show off the new marine boats. This article is about a near and dear to your heart, Valentine's Day bridal show.

Begin early, securing some major indoor area or large gym that can host the show. Contact all the bridal and related vendors in your coverage area. This is a large selection of your client base, including DJ services, tux rentals, caterers, wedding planners, food vendors and of course all the bridal shops in the surrounding coverage radius. Come up with an attractive package that includes booth space rental, an ad schedule, promotion materials and a campaign that will build momentum up to that big day, your bridal show, courtesy of radio station WXYZ.

Like any promotional event, you will get better with practice. Some vendors offer live dancing lessons, security services and vacation packages, tailor made for the new bride and groom. Other vendors offer turn-key weddings for a fixed price and not a dime more. The more excitement you can generate, the better the event and the lasting memories that participants take home.



On the day of the bridal show, have a concrete program, usually hosted by your local station jocks, promoting the events all day and being that outspoken voice that fires up the crowd. It's hard to resist a jock in a \$200 tux

at a wedding event. A bridal fashion show usually tops out the event and stimulates the glimmering new brides. It's all about pleasing the brides and providing a one stop shopping center for that wonderful day – their big wedding.



From a business angle, the station will look good to all that attend, and the merchants will be pleased at the big crop of participants eagerly looking at their products and services with, "I want this" written in their eyes. It's a great way to open up the month of February and turn another slow month into big dollars for the station, plus a hot-shot PR opportunity – "Look at what radio can do." This past year, our bridal show topped 400 brides and hosted close to 100 booth vendors. It's a golden opportunity just waiting to be tapped and February is the perfect month to host such an event. So, let's make your next first quarter positive at your small market station.

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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... edited by Barry Mishkind - the Eclectic Engineer

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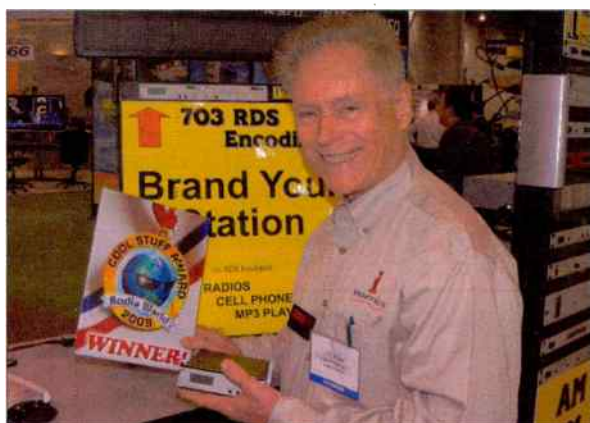
HONEY, I SHRUNK THE GEAR

by Ron Erickson

Inovonics INOmini Series

No one knows who first spoke the words, "That's cool, but can you make it smaller?" In Hollywood, we've seen a lot of shrinking over the years. Back in '57 we saw *The Incredible Shrinking Man*, and in 1966 it was *Fantastic Voyage*. Of course there is the, *Honey I Shrunk The ---* series, and one of my favorites, last year's film, *Ant Man & Wasp*.

When they shrink the size of a candy bar that costs the same, it's a bad thing, but shrinking equipment is a good thing. Buying products this way is more economical, since three units can mount side by side in one 19" rack space with all three powered by one AC source. At NAB this year we will no doubt see some items that have reduced in size.



Jim Wood at the 2009 NAB showing INOmini 703.

Inovonics introduced us to the smaller sized equipment back in 2009 with the Model 703 RDS Encoder. It was the first 1/3 rack size product, a series they called the "INOmini," and it grabbed a "Cool Stuff" Award at the NAB show that year. The Model 703 RDS Encoder is still available.

This year Inovonics is offering a huge upgrade for the INOmini line. In years past, when there was a firmware upgrade, you had to send your unit back to the company. Now, INOmini units will be able to be field updated.



Inovonics INOmini 703

Here is a quick listing of a few of the INOmini products according to the Inovonics website:

- 635 RDS/FM Site Streamer™ – a web-enabled FM receiver.
- 639 is an FM and FM/HD Radio™ receiver for off-air broadcast monitoring.
- 637 is a web-enabled AM receiver for remote signal monitoring.
- 638 is an HD Site Streamer™ which includes the Station Rotation™ feature. It permits monitoring of up to 30 station presets by "round robin" sequencing.
- 636 is a NOAA Weather Receiver, tunes to all seven frequencies, and responds to the 1050 Hz tone.
- 223 Multi-Mode Audio Processor. This replaced the old model 222 for AM NRSC compliance and now even more.



- 514 FM Multiplex Decoder – decodes base-band audio to AES or Left/Right Analog.
- 300 AES Distribution Amplifier – accepts any sampling rate, with three digital standard outputs.
- 402 RDS Sign Driver/Receiver – sends now playing text to a variety of large format LED signs.

Let's take a closer look at the INOmini model 673 RDS/FM Monitor. This is much more than just a monitor for your station. The INOmini 673 gives front-panel and remote alarm indications of program and RDS transmission errors. It can also deliver a high-quality audio feed for program distribution throughout the broadcast facility with adjustable analog and AES digital audio outputs.

The 673 comes ready for today's world market by extending the reception range down to 64 MHz. This makes the unit compatible in other countries, and if the FCC ever converts TV channels 5 and 6 to an expanded FM band. This INOmini packs a lot into its small size.

For example consider that all controls are at your fingers with the one knob, jog shuttle navigation. The easy-to-read large LCD display tells you everything.



Inovonics INOmini 673 – Front/Back

Check out the accurate, hi-res metering with the RF signal and audio levels displayed. From the rear you can connect to balanced right and left outputs – the AES-digital program outputs are available simultaneously with levels independent from one another. Flashing red front panel alarms and rear panel tally connection indicate loss of RDS, PI Error and low signal or program loss



Inovonics INOmini 673 – Red Error Condition

The only word that I can use for this unit is "impressive." I hope you'll be able to see all of the Inovonics gear at the NAB show, or you can always arrange for a free demo at your place. Call Inovonics to make those arrangements. By the way, AM stations can now enjoy many of the same features in the new INOmini 674, shown below.



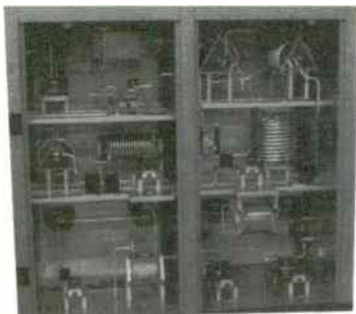
Ron Erickson is a regular reviewer for Radio Guide. He is also a broadcast consultant, engineer and air talent. You may contact him at 541-460-0249 or write ronerickson@gmx.com.

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FINAL STAGE



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The Radio Guide Event Register

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NAB 2019 Spring Convention

Convention Center – Las Vegas, Nevada
April 6-11, 2019
www.nabshow.com

Dayton Hamvention

May 17-19, 2019
Greene County Fairgrounds & Expo Center, Xenia, Ohio
<https://hamvention.org/>

Texas Association of Broadcasters (TAB)

August 7-9, 2019
JW Marriot Downtown, Austin, Texas
www.tab.org/convention-and-trade-show

NAB Radio Show

September 24-27, 2019
Hilton Anatole – Dallas, Texas
www.radioshowweb.com

WBA Broadcasters Clinic

October 15-17, 2019
Madison Marriot West – Madison, Wisconsin
www.wi-broadcasters.org/events/broadcasters-clinic-2/

Ohio Broadcast & Technology Conference

November 14, 2019
Columbus Convention Center – Columbus, Ohio
<https://oab.org/engineering/obmtc/>

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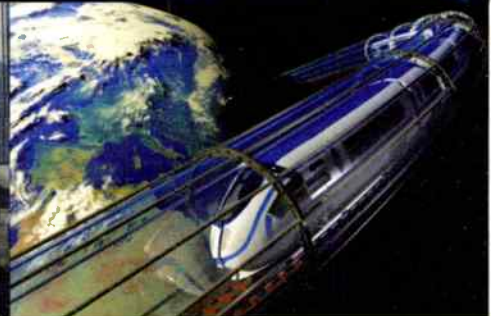
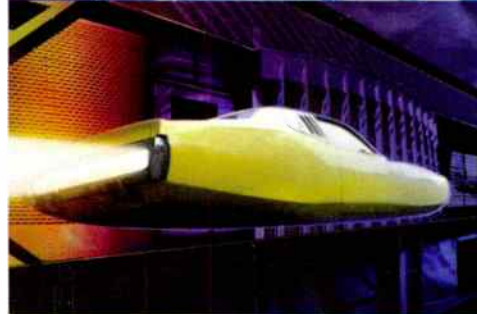
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