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September-October 2018 – Vol. 26, No. 5

Smartcaster: 35 Years of Dedicated Service to Radio

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Critical Content for Radio

Cover Story – *by Peggy Stolly (page 6)*

35 Years of Service: *"SMARTS Broadcast Systems, a family-owned business, founded in 1983 by Jan and John Schad, has become a vital system to hundreds of small and medium market radio stations across the world."*

Chief Engineer – *by Scott Schmeling (page 10)*

An Olde but a Goodie: *"On my way out that Monday morning Keith called. He had found the problem! T3, the Driver Plate Transformer, had literally burned up! OK, we knew the problem, but how were we going to fix it?"*

FCC Focus – *by Gregg Skall (page 12)*

Political Advertising in the Mid-Terms: *"With the nation now only weeks away from what is possibly the most important mid-term federal election in the last half century, the political advertising climate is sure to get more and more furious. So, this would be a good time to review a few important principles important to broadcast licensees."*

Tools of the Trade – *by Jim Turvaville (page 34)*

Don't Fear the 45: *"The standard for all modular connectors has the center pair in the group to be the first pair, with the second pair split on either side. In a 4-pin connector, this means all of the pins are used for the 2 pair – in the 8-pin connector of subject today (the RJ45) the wiring scheme maintains this standard for the first 2 pairs, with the addition of 2 more pairs matched together ..."*

Gear Guide – *Equipment for Radio (page 46)*

AM & VU – A Two-Fer Review: *"Jim Wood has created a new product ... it's a new AM Audio processsor which leaves the older designs of his former 222 and 235 in the dust."*

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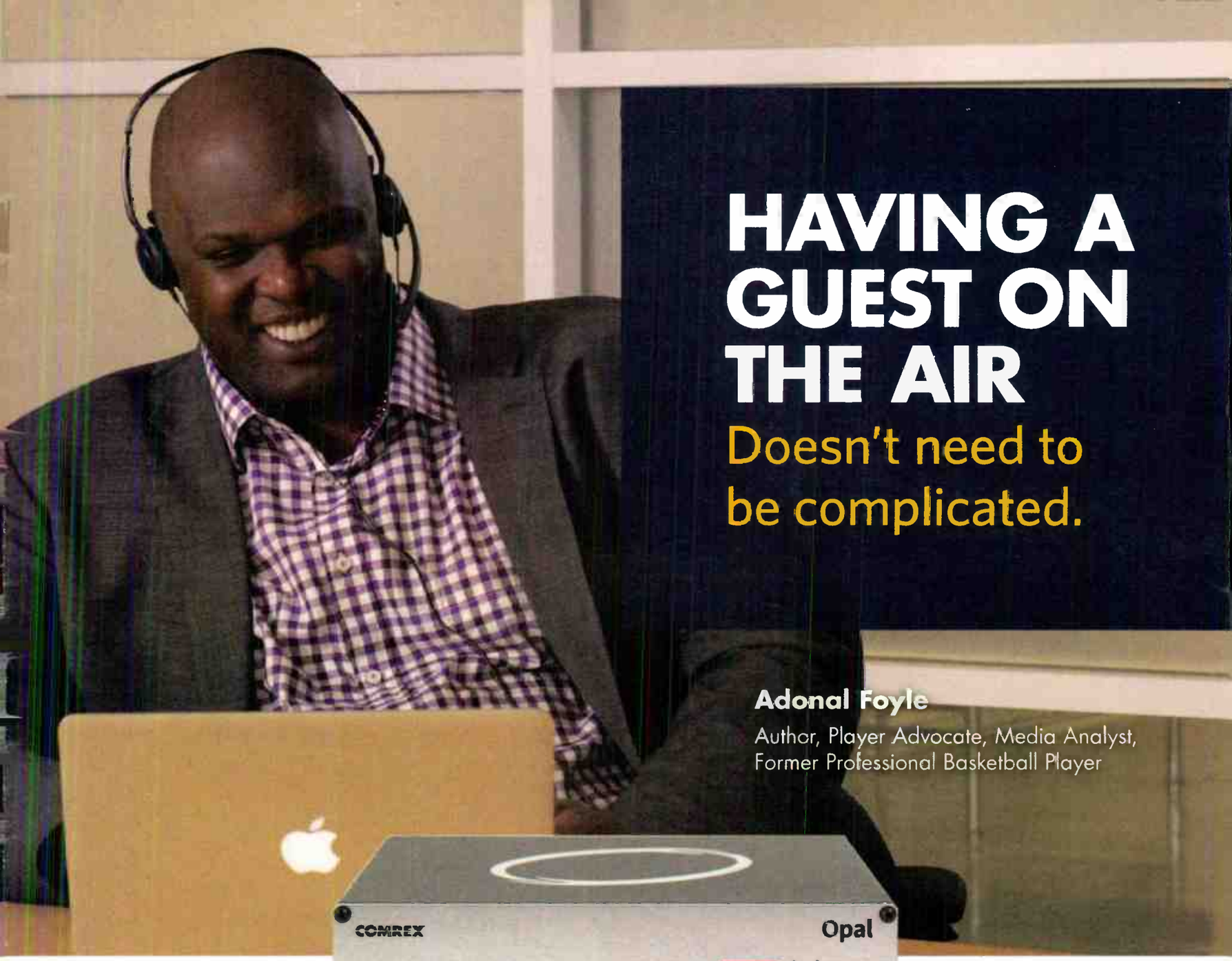

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Cover Story

Smartcaster: 35 Years of Family, Innovation, and Dedicated Service to the Radio Industry

by Peggy Stolley, Smarts Marketing Coordinator & John Schad III, Design and Development

SMARTS Broadcast Systems, a family-owned business founded in 1983 by Jan and John Schad, has become a vital system to hundreds of small and medium market radio stations across the world. To the people at SMARTS, those stations are part of a network of extended family members, and they work to maintain and nurture those close relationships.

The company's headquarters, still located in Emmetsburg Iowa, where the Schad family owned the local radio station until 1989, contain offices for support, development, sales, marketing, and management. A second building hosts the manufacturing and shipping facilities, and virtual locations exist in Minnesota, Nebraska, Texas, South Dakota and California. The majority of that staff has worked in radio, sales, traffic, on-air, remotes, engineering, and management. Their hands-on experience in the industry guides the development of the product-responding to customer requests, and even anticipating their needs.

SMARTS Broadcast Systems has multiple products to service small and medium market stations. The company started with traffic and billing software, and has grown to include automation service products as well.

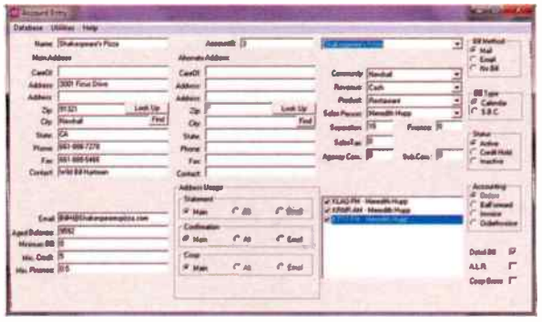
SMARTS was originally an acronym for Small Market Accounts Receivable & Traffic System. John Schad was the inventor of that system, and contributed to the creation of an entirely new industry. Using his wits, experience, and self-taught programming skills, he began using a TRS80 computer with 8 inch floppy disks. No one told him he couldn't do it, and if they had, he wouldn't have listened anyway.

The TRS-80 Computer

There have been many versions since those earlier years, moving to DOS on 5-inch floppy disks, then 3.5-inch, hard drives and Windows operating systems. They learned a few things along the way and hired new programmers to replace John in developing the software, as he concentrated on growing the business and industry. Jan stayed on, overseeing the product and guiding its development, eventually leading to Second Generation, or the "SecGen" program. It is impossible to talk about SecGen without talking about its main designer, founder, and first operator, Jan Schad

SecGen included innovations such as the ability to enter orders across multiple stations simultaneously, timesavers like managing carts and cuts prior to order entry, and EDI for Agencies built into the program. Jan's mission was to make the job of a traffic operator a true 9 to 5 job. Every update, and every new feature was measured against that vision. Jan passed away in 2016, and her legacy continues on in the rest of the staff.

Technology had advanced to where audio could be recorded and played back from a hard drive. This technology enticed John to purchase an audio card from Antex Electronics, and turn his family's dining room into a computer factory and laboratory. He began working on an automation system that eventually became the Smartcaster, helping to invent yet another industry. It takes a special person to be able to create something from nothing, and that defines John, always creating, always innovating.



SecGen Screen Shot

Smartcasters are still present in stations, allowing small market stations the ability to automate. Like most industries, technology allowed radio to grow into new territories, which meant SMARTS's customers needed new systems with new programming, so development started on a new product to help those stations grow and serve their customers.

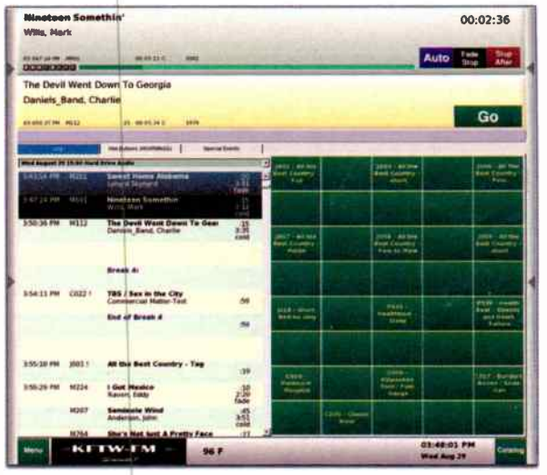
Enter Skylla.

Skylla, in its early days, didn't actually have a name and started as a brainstorm. The programming team was faced with a decision that would shape the direction of the company, and therefore is one of the most pivotal decisions in company history.

At the time of Skylla's creation, there were two options for programming, Windows or Linux. Windows had several operating systems (NT, Windows 98 and 2000, ME, and XP was in the works.) However, each Windows choice was limited in some way and required the user to give up some control of the machine. Linux on the other hand allowed complete control of the operating system and hardware, which meant a machine could be dedicated solely to operating a radio station. The system wouldn't be affected by mandatory updates from Windows, and it meant SMARTS could eliminate any unpleasant surprises.

Development jumpstarted when SMARTS purchased On Air Digital in Dallas, TX. (The UDS II people) This company already had a Linux audio engine that was a perfect fit. Smartcaster products were adjusted to use the audio engine, and simultaneous development began on a whole new automation system. The knowledge, skill, and perspective of the new programming staff was extensive, varied, and extremely valuable. The programmers had designed and developed multiple automation systems that were currently on the market. They shared a goal to merge all of those products and perspectives into a new, modern product that ran radio stations. They lovingly referred to the project as "Penultimate Digital Magic Caster," or "PDMC." It remained PDMC until just before its official release in late 2007 when Jan & John named it Skylla, after the multi-headed sea monster in Greek Mythology.

They felt the description fit the system and its ability to run multiple stations at once.



Skylla Split View Screen Shot

Problems with the telephone industry sparked the development of SkyllaPad as a reliable control interface. SkyllaPad offers complete remote access of the radio station – no one needed in the studio – and can use any audio source. This break from dependency of the telephone was a big step forward for broadcasting remotes.

Skylla Demo/Test Station

Today, development focuses on security and web-interfacing, issues relevant to broadcasters everywhere.

Once a customer is part of the SMARTS family, the relationships continue to build with the outstanding support department. One of the best qualities seen in the support staff isn't even part of the SMARTS training, but rather intrinsically present in each person, and that is their passion to assist the customer, and help find solutions to whatever the customer is experiencing. The staff is spread across multiple states, but every morning they meet in person and on a conference call to discuss any issues or questions that occurred the previous day. They work together to troubleshoot and assist each other. The group in Emmetsburg is a close-knit group that spend time together outside of work as well, which means that brainstorms may occur at anytime, day or night, to the benefit of the customer. When you get one of them, you get all of them, and as they all are personally vested in the company, they take care of the customer. After all, they're family. – *Radio Guide* –

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Studio Site

Talk Show 101 – *Part 2*

What's the "Delay" in Doing Talk Radio?

by George Zahn

In the last Issue of Radio Guide, we discussed some of the basics of making your station more locally interactive by adding basic talk and discussion shows. If there's a degree of guilt as to whether you're adequately fulfilling your local quarterly issues duties, there are some fairly simply ways to start creating locally responsive talk programs with content from newsmakers.

An easy, no-frills way to produce local content is to simply have more local PSAs and community stories done by your live or voice-over staff. You can add local guests by recording interviews that can be edited (if need be) for airplay. This can be done with any set of microphones in your studio, or taking a portable recorder (digital units from Marantz, Sony, Zoom, or Tascam, to name a few) into the field. Portable recorders can start as low as about $40 for pretty basic dictation-quality gear, although the units that have slightly better built-in microphones can start at about $100.

Zoom H4n Pro Digtal Recorder

Recording digitally to an flash recorder, via a USB microphone computer interface, or even to a CD recorder, will allow the digital signal to be edited on any of the many digital editing choices – from the free Audacity software to basic buyout suites from providers such as NCH or even the higher end purchase or monthly subscription product from companies such as Adobe and its Audition program. Since you're recording and editing voice, you can even conserve digital space by recording in a higher quality mp3 mode as opposed to the full fidelity WAV format.

If you want to allow your host and guest(s) to interact with the community in a talk show format, you can do that with minimal expense and maximum control by having questions e-mailed or texted to the station for the host. The host "filters" the questions and reads them to the guest (if appropriate) so you don't have to worry about pranksters or trolls on the phone.

Phoning It In

Of course if you want to be more daring and actually place live callers on the air with your host and/or guests, you'll need some tech to make that happen. There will likely be times in which you may have an interview with a guest in another city, or through a logistical complication, even a local guest may need to appear via phone. Many a station has had to interview a guest stuck in traffic who was scheduled live in the studio.

If you want to put callers on the air, a telephone hybrid interface is very important. This device can be moderately expensive and a number are made by Comrex, Telos, Broadcast Tools and JK Audio, among others. We've mentioned that many consoles have a Mix Minus feature which allows for a console MIX feed of audio down the phone line to a guest and/or callers, MINUS the original caller and guest audio. Some phone hybrid units that allow for a "guest" line and caller lines together will divvy up audio and make sure that the guest and caller(s) can hear each other along with the audio that comes from your console (in-studio host or guests/music/themes, etc.)

Comrex VH2 Two-Line VoIP Hybrid

Depending on the complexity of the telephone hybrid, your costs for a single phone line can run from a few hundred dollars to well over a thousand dollars for larger multi-phone line systems. Some news rooms have one of the single phone line hybrids to allow a newsperson to interview one phone guest at a time. If you want live on-air interaction between callers, the multi-line hybrid is almost a must.

Let's discuss Mix Minus. Many standard broadcast consoles have a Mix Minus feature or can be assigned for Mix Minus. But what happens if you need more than one Mix Minus feed – in other words, what if, on the same show at the same time, you had three guests, one on a phone line, one on ISDN, and one on a CODEC? This occurred when I worked with the late master engineer Jay Crawford at a station here in Cincinnati.

A Cincinnati 3-Way

Our election coverage one evening had an ISDN line dedicated for state election reports from the capitol. We had reports for our county local board of elections coming in via a Comrex frequency extender CODEC unit and various outlying county reporters calling in on our phone lines. Jay Crawford actually fabricated a 3-way Mix Minus that allowed the correspondents on all three sources to hear the console Mix Minus plus the other two reporter sources at any given time. It was a flawless thing of beauty in a two rack space panel. I wish he had committed the schematics to paper!

To broadcast veterans, you well know that once you put callers on air, unpredictable things can be uttered and, despite safe harbor establishment in late night hours, who wants the headaches of a caller or guest (or even sometimes an accident by the host) saying something that could put a license in jeopardy. This is where the broadcast delay becomes a necessity for live talk shows.

I remember the first profanity delay I saw in the 70s that involved a looped tape system with two reel-to-reel decks – one recording and one playing back. In between was a system of poles through which the audio tape loop was threaded. Machine one recorded the audio as it was happening in the studio. The tape went through spindles that ran the tape through about 45 inches in length to the play head of deck two, which at 7.5 inches per second, resulted in a about a six second delay as it played back to air. If someone cursed, we simply turned the caller down and switched from the 6 second playback to real time and eventually went back to the tape playback about 7 or so seconds later.

Better Oscillate Than Never

Digital profanity broadcast delay units have come a long way since then, and now feature at least 8 seconds of delay with variable settings. The earliest digital delays were largely mono devices, but stereo units have become standard. The digital unit fits in a single rack space. Program audio passes through the device, and depending on how quickly you want to build up delay, the unit can digitally oscillate the audio to slow it down slightly until the delay time is reached. It's far more seamless to simply let the delay unit just expand any pause slightly as it builds delay. You can combine the effects as well, but eight seconds can be built up quickly with little audible effect.

Once the unit has built up delay, simply hitting the DUMP (or similar) button will delete the last eight to ninety-nine seconds (different makes/models have variable and adjustable delay times) and return to real time and the unit starts to rebuild. "Sneeze" buttons on some units can allow for shorter dumps of just a few seconds. Among the most notable makers are Eventide, 25-Seven, and in the U.K., Sonifex also makes and markets units. The cost will generally run between $1,500 and $4,000 but can save tremendously on legal fees if you do live talk programming and avert just one complaint.

Adding any profanity protection is only as good as the person operating it. This is one of the most critical aspects of Talk Radio 101. Since this is a technical column, we've obviously centered on equipment, but if you are seriously interested in doing talk radio on your station, I'd be remiss if I did not include the human factor. It is vitally important to vet and have faith in the on-air personality and how well he/she can handle volatile situations. Although unlikely, even the most innocuous topic can blow up and require a decision to be made in just a matter of seconds.

If it's a talk show without phone caller interaction, it's a good idea to be aware of who your guests are. Know broadcast rules on everything from hot button local topics to active/inactive status of political candidates. Establish a set of guidelines, and know that it will likely evolve. Do you need a producer – somebody to help prepare the host with questions and do basic research and line up guests? The producer can also end up being the board operator for the talk show, if the host is not, and may give another level of judgment at the DUMP button.

If you're doing call-in shows, do you need a screener – a person to answer the phone and try to deflect callers that may well be off topic, or may cause problems for the guest or host? Often the producer may be able to do that as well.

Talk shows can be a great addition to your lineup if the right equipment, right people and right approach converge. Let me know some of the fun and new ways that you're doing talk radio!

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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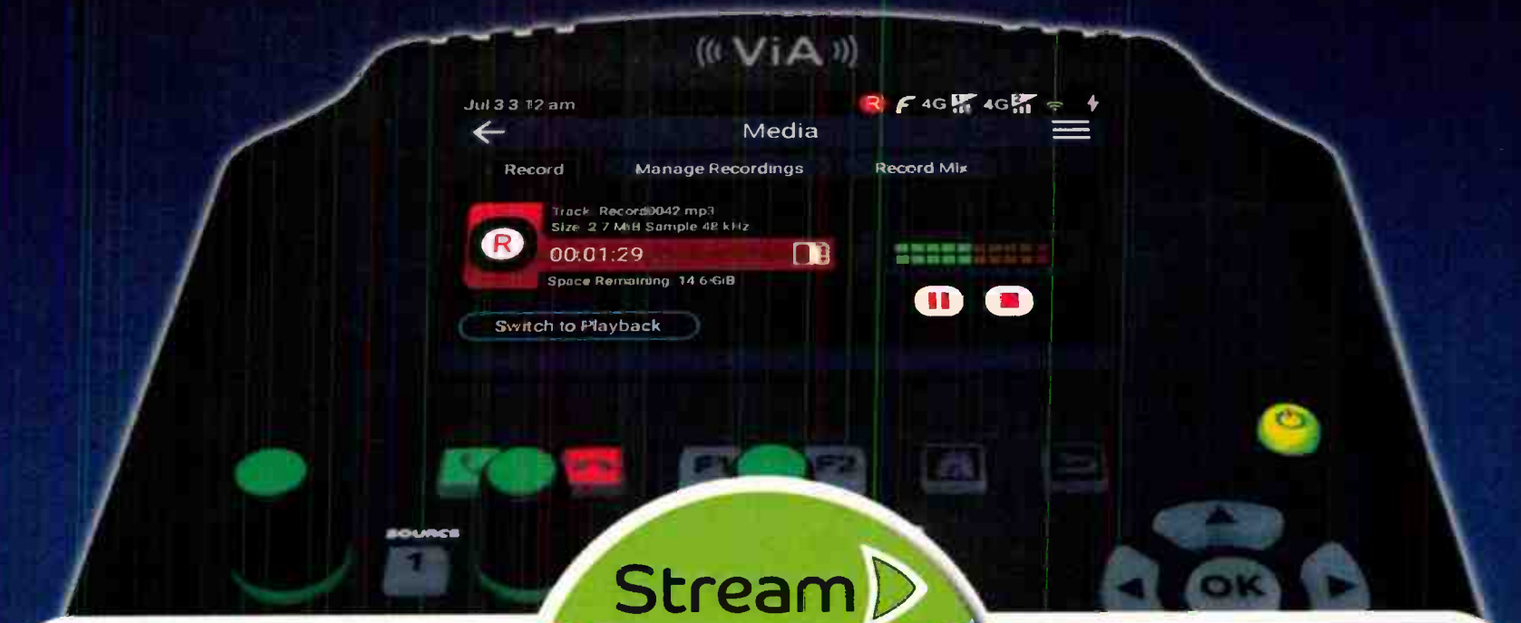

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World Radio History

Chief Engineer

An Oldie but a Goodie

by Scott Schmeling

First, a quick look back. Or as Paul Harvey used to say, "Over my shoulder a backward glance."

I got a couple e-mails after last issue's article. One was from Ron Wood, a friend and retired engineer from E. F. Johnson Company. Many AM phasors and ATU's probably have Johnson RF contactors and coils inside.

Ron said, *"Your Standards article reminded me of what dBs are referenced to. In RF we always used 0 dBm as our reference which is 1 mw in 50 Ohms.*

"Seems your number of +4 dB needs a reference of Volts or Watts into an impedance, since dB is just a measurement between two points with neither point 'tied down.'"

Thanks Ron. This could be another complete article! Currently audio console VU meters are set to 0 when the output is +4 dBu (or 1.228 Volts). This assumes a 600 Ohm load. So, yes, I should have said +4 dBu. I was just using the "generic" 0 dB reading on the VU meter. Thanks for catching that Ron.

I also heard from Dean Sorenson. Dean purchased the other AM in the market in the mid 70's when I was working at KSDR in Watertown, South Dakota.

Dean said, *"Last evening I finished reading the most recent edition of the Radio Guide. While I'm no longer active, day to day, in our beloved radio business, I love to keep in touch. And the Radio Guide is one of my favorite periodicals to follow the biz."*

Great to hear from you both! I've often said that once radio gets in your blood it becomes a part of you forever. Now on to new business.

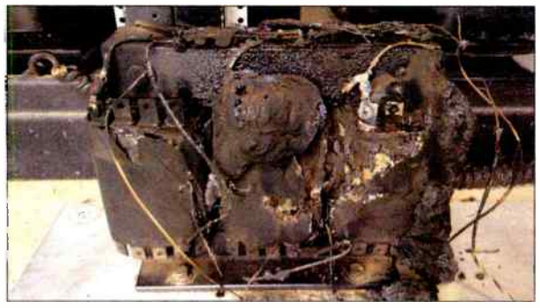
We have a mix of old and new transmitters. One is an "Oldie but a Goodie!" It's a Collins 831G-1, serial number 140. I'm trying to find out when it was manufactured. In fact, in Dean Sorenson's e-mail, he also said (regarding this transmitter), *"Hope you get the Collins 831G-1 running smoothly. Probably was sold in your area by Jim Littlejohn. Are you old enough to remember Jim? He was the Collins/Rockwell/Continental Sales guy out of Minneapolis. He died in about 1984. Jim was a gem of a gentleman, who always brought some new information/ assistance when he made a sales call on us."*

As a matter of fact, Dean, I think Jim *did* originally sell this transmitter. I found some archival documentation from Jim in the manual binder. The transmitter had originally been at "Cities 97" in Minneapolis ... but I digress.

We do have a Collins 831G-1. It's an excellent design that's been around for decades. The Collins 831 eventually became the Continental 816. Chances are that many of you have one of these in your "collection."

A few Sundays ago Operations Manager (and frequent assistant) Keith Wright went out to check building air intake filters. It was a 90+ degree day and getting pretty hot inside. While he was there he installed new driver tubes. A few hours later the transmitter shut down. Keith went out to check and the first thing he noticed was soot on the driver tubes! He connected the exciter to the antenna and we planned a visit for the next day.

On my way out that Monday morning Keith called. He had found the problem! T3, the Driver Plate Transformer had literally burned up! OK, we knew the problem, but how were we going to fix it?



T3 Driver Plate Transformer Burnout

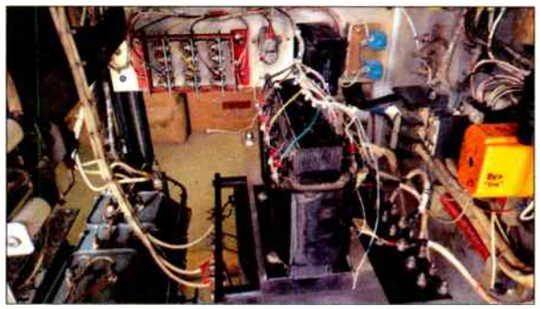
We had been talking for some time about replacing this transmitter. It's just that when it is working, it works *great!* But recognizing it's time might be over, I started checking on replacement options. Until we got the directive: "Fix it as cheap as you can!"

I mentioned earlier that this transmitter (whether an 831 or an 816) has been in use for decades. That means there are lots of "retired" rigs around. In fact, *We* have two 816's. One has been decommissioned and being "parted out." So we started checking to see what was, or might have been, damaged.

We knew T3 had to be replaced. All the smoke leaked out and it didn't work anymore (engineering humor)! T3 feeds A10, the 2000 Volt driver power supply. The choke on A10 was bulging. We also noticed one of the primary wires to T1 (plate transformer) had literally burned open. On the bleeder resistor panel, one of the resistors sort of sparkled when the transmitter was on and when the caps were discharging!

I had my "shopping list." The next day I went to visit the 816 "U-Pull-It parts yard!" It proved to be a very worthwhile trip. I pulled everything on my list and headed back to the 831.

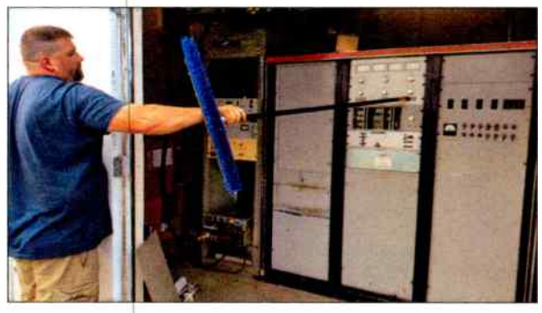
First things first – we pulled the burned-out T3 and the charred and melted wiring that ran above it and replaced it with the harvested T3. The replacement A10 supply went in too. Cabling was spliced and cable ties pulled it all together. After the bleeder resistor was replaced we took a good look to be sure everything was tight and got ready to fire it up.



T3 Replacement Transformer

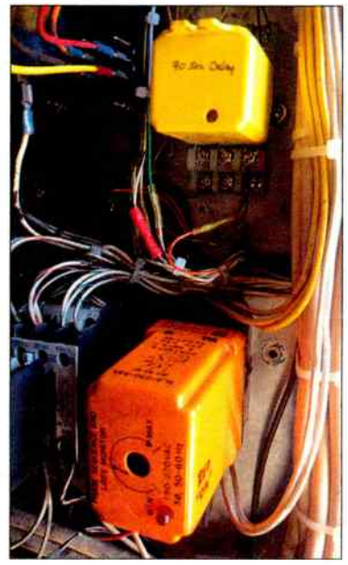
We didn't know what else may have been damaged because we hadn't been able to apply power. When Keith "cautiously" pressed the PLATE ON button ... nothing happened! Back to circuit tracing.

We found three, 350 Amp fuses in series with the SCR's that control source voltage to the three power supplies. One of them was open. Unfortunately, that fuse is *not* used in the 816! We ordered a replacement and after installing it ... hit the button again. This time we had PLATE voltage, but *no* driver voltage! Through a process of lifting wires to isolate legs of the circuit, we determined one of the filter caps for the driver supply was shorted. Another trip to "U-Pull-It!"

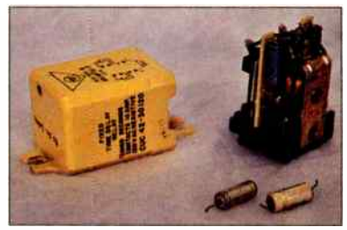


Keith Wright Cautiously Pressing PLATE ON

Let me mention one other thing about this transmitter. When it was built, some of the relays that were used had tabs on each end of the plastic case for mounting to the chassis. Over time, some of the tabs had broken and two relays were quite literally hanging by their wires. Some time ago I had ordered sockets and relays to replace them. This was the perfect time to take care of that. One of those relays is the 120 second time-delay relay. It prevents the plate voltage from being applied until 120 seconds *after* the filament voltage has been turned on.



The time-delay relay apparently had stopped delaying. This relay was no longer available, but it is repairable. Inside the time delay relay there's a circuit board with two capacitors, a couple resistors and a transistor. I checked the caps – they were bad (no surprise!). With new caps the relay had a delay again, though only 90 seconds ... but that's enough. For *that* relay I cut the mounting tabs off and moved the wiring to a socket.



Also, some time ago – for reasons I won't go into here – I installed another 3-phase monitor relay in line with the blower relay. If we drop a leg of the 3-phase the blower stops and the transmitter shuts down.

After all this, we hit the button and ... everything came up just like it should!

This really is a great sounding rig and its working just like it should – again!

Until next time ... Keep it between 90 and 105!

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

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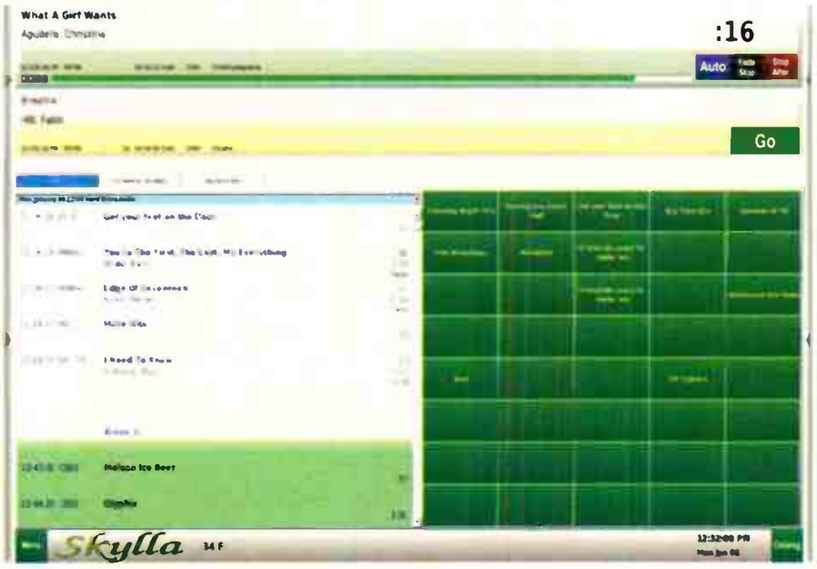
Skylla



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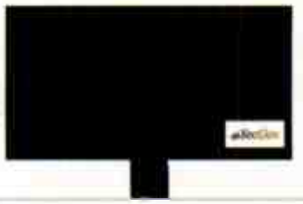

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SecGen, the second generation of our original Smarts program, lets you define the setup by matching the program to your station's formats and breaks. Combined with the ability for single user, multi user, and remote user, SecGen can be customized to fit your needs.

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FCC Focus

Political Advertising in the 2018 Mid-Terms

Some Important Last Minute Thoughts

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

With the nation now only weeks away from what is possibly the most important mid-term federal election in the last half century, the political advertising climate is sure to get more and more furious. So, this would be a good time to review a few important principles important to broadcast licensees. Chief among them are issues connected to the FCC sponsorship identification rules. The "dark money" in political broadcasting is now overwhelming and with last-minute robust campaigning, broadcasters are often confronted by "exuberant" time buyers who are ready to reassure the broadcaster that they really don't need the sponsorship information required by the FCC rules. This is especially true with respect to issue advertisers.

Issue Ads

§73.1212, the sponsorship identification rules requires that when an announcement contains political matter or the discussion of a controversial issue of public importance, it is the broadcaster's responsibility, in addition to making sponsorship identification in the spot, to obtain and place in its public file a list of the chief executive officers or members of the executive committee or board of directors of the entity paying for the ad. Section 315 of the Communications Act, states that when a message relates to any political matter of national importance, including a legally qualified candidate; any election to Federal office; or a national legislative issue of public importance, a complete record must be included in the public file.

This is important. Now that station public files are available online from the FCC server, public interest groups and issue opponents are examining them carefully; some have filed complaints with the FCC. Be sure to get all the information that you need from time buyers and be prepared to get it into the public file. Under FCC rules, that means immediately – and immediately means within 24 hours.

Candidate Ads

While we're talking about the political file, broadcasters must make sure to have candidate advertising information up to date. §73.3526 requires that the file contain all requests for specific schedules of advertising time by candidates and some issue advertisers, as well as the final dispositions or "deals" with the political advertiser.

Materials relating your negotiations are not required to be included; just the final disposition. The description of the disposition should include when the advertising actually aired, including if the advertising was preempted, and the timing of any make-goods of preempted time, as well as credits or rebates provided to the advertiser.

Verifying Candidate Ad Sponsorship ID

Recognizing that broadcasters may not have enough time to preview the ad and still meet the candidate's requested timing, the FCC allows the licensee to air the ad once without being subjected to liability for not having proper sponsorship ID. This identification requirement exception applies only to ads for political candidates – and not for political issues or other types of ads. After that, it's your responsibility to make sure the ad carries a proper sponsorship ID, even if you have to add it and run it over a portion of the spot. Remember, a proper sponsorship ID, political or otherwise, must use the "paid by" or "sponsored by" language of the FCC rule.

Election Weekend Sales

Given the heated exchanges we can expect in this mid-term, it's predictable that there could be strong demand for access the weekend before the election. The fury of last minute attack and response political advertising will increase at a frenzied pace. The weekend before the election will be particularly important to the candidates. Typically, they will be cutting new spots daily. They will want access to stations to place them. The question arises, must a station provide access to political time buyers in the weekend before the election? What about election day itself? Does the station have to accept new orders for candidate advertising on election day?

Like most other political time buying scenarios, these situations have also arisen, been argued and settled by the FCC staff. During the 1990 election there was some confusion as to whether station personnel must be available to process orders for political time on the weekend before the election. Clarifying this requirement, the Commission stated that if a station had taken an order from any commercial advertiser on a weekend, even once during the previous year, then it must be available to sell time to political advertisers on the weekend before the election.

However, the broadcaster is not required to provide any services to the political advertiser/time-buyer that are more extensive than the range of services previously provided to any commercial advertiser. For example, if access had been given to the commercial advertiser only to deliver or change copy, then those are the only services that need be afforded to candidates. If a station can prove that it has not sold time on weekends during the past year, it can justify a refusal to sell time to political candidates on the weekend before the election. However, a station that has done this just once for a favored advertiser (such as for a store running a holiday promotion or a movie premiere), must be prepared to process political advertising requests on the weekend before the election.

Note: the equal opportunities doctrine does not apply to this type of station service. That doctrine applies only to a candidate's actual response to a prior "use" (or appearance) on the station by an opposing candidate for the same office; not to the sale or use of facilities of the licensee. Remember, however, that a station cannot discriminate between candidates., Thus, even if it has not taken an order from any commercial advertiser on a weekend during the previous year, if the station offers weekend sales opportunities to one candidate, the station must also accept weekend sales from all opposing candidates for the same office.

What About Election Day Itself?

Election day, however, is treated differently. The Commission allows each station to adopt its own policy regarding whether it will or will not accept new candidate advertisements on election day, even from those seeking federal elective office who are otherwise entitled to reasonable access under section 312(a)(7) of the Communications Act. Here too, however, the station cannot discriminate, and if it decides to take a new Election Day order from a candidate, it must also take new orders from all opposing candidates for the same office. For federal office candidates, the station's policy must apply to all federal candidates equally, that is; once any federal candidate is allowed to purchase advertising on Election Day, then all federal candidates must be afforded such access as well.

A Short Refresher on Equal Opportunities

The Equal Opportunities doctrine is found in §315 of the Communications Act. The doctrine requires a broadcaster to treat all legally qualified candidates for the same office alike. A broadcaster may make no discrimination in charges, practices, regulations, facilities or services rendered among legally qualified candidates for a particular office. This applies to the availability of broadcast time, the use of production facilities, the extension of credit, and the application of technical requirements.

Equal opportunity does not mean an identical segment of broadcast time. When an opposing candidate requests an equal opportunity, the licensee must consider the daypart concerned, the length of the time segment, and the desirability of the particular broadcast time (including adjacency to popular programs). The station is not required to afford an opposing candidate an opportunity to appear on the same program, or even at the same time of day or the same day of the week, as long as the time segments offered are reasonably comparable.

The mechanics of working out equal opportunities is a matter the FCC normally leaves to the station and the candidates involved, within that framework of the general principles.

Requests for Equal Opportunities: A right to equal opportunities does not arise automatically, but only upon proper request. The request must be made by a candidate or by an authorized representative and not by a political party or special interest group. All equal opportunity requests must be for a "use" by the candidate.

Seven Day Rule: A request for equal opportunities must be made within seven days of an opposing candidate's prior use. Thus, if Candidate A "uses" a broadcast facility on October 5, 10, 15, 20 and 25, Candidate B's request for equal opportunities on October 26 will only cover Candidate A's uses of October 20 and 25; Candidate B lost his right to request equal opportunities to Candidate A's first three uses by waiting more than seven days after the use had occurred. Further equal opportunity rights do not attach to the reply "use."

A station is under no obligation to advise a candidate of a use by an opposing candidate – even when a use occurs toward the very end of a campaign. However, upon inquiry from a legally-qualified candidate, the station must provide the candidate with the facts relative to opposing candidates' requests, including the time sold and the changes made. This may be done by referring the candidate (or his or her representative) to the station's online political file.

Prior Requests for Expected Uses: Requests made before an opponent's use must be honored only if directed to a specific future use known at the time of the request. However, when a candidate will use a station according to a fixed and continuing pattern (such as a spot in the 7:00 p.m. news every Monday), then a single request from a legally qualified opposing candidate for equal opportunities will apply not only to the first candidate's uses during the preceding seven days but for all subsequent scheduled uses as well under the same "buy."

This column is provided for general information purposes only and should not be relied upon as legal advice pertaining to any specific factual situation. Legal decisions should be made only after proper consultation with a legal professional of your choosing.

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.

Prior to private practice, Mr. Skall served as the Chief Counsel for the National Telecommunications and Information Administration and General Counsel to the White House Office of Telecommunications Policy.

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DARC-Virt 12 (list price $4,900) (PC not included)

World Radio History

Transmitter Site

Rebuilding a DA Tuning House

by Bob Reite, CBT

It is quite evident that this ATU enclosure was in bad need of replacement. Even if it had been deemed repairable, it certainly did not meet today's standards for public exposure to radio frequency energy. Although the fence and lattice work did prevent contact with the series fed tower and feed, it was possible to get too close to the feed. If one leaned on the front cover, one would exceed the public exposure limits because of radiation from the ATU coils.

It was decided to build a proper tuning house where one could be inside, and out of the elements, when working on the somewhat complex ATU. The station is a four tower DA with different patterns for day and night. Each ATU has a contactor for changing ATU components for day and night patterns.

The next decision to make was how, or if, to keep the station on the air. One possibility was to put the station in non-directional mode, with tower three as the radiator and towers one, two and four detuned. We would have had to take the detuning inductor off of the ATU panel and jury rig it onto tower two. The other choice was to take the AM station totally off the air during the rebuild. Sadly, very few people listened to the AM station, preferring the FM translator. It was determined that we could get the rebuild done within ten days and this particular translator had no license requirement to be shut off if the AM was shut off, as long as it did not exceed ten days.

We investigated getting a small prefab building, but a local carpenter gave us a bid for our 5 x 6 x 8 building that was lower than the cost of a prefab. Even better, it would be possible for him to build around the incoming transmission line, sample line, power line and control lines.

It was most important that the ATU panel go back in the same position as it formerly occupied relative to the tower and transmission lines, so that the phase relation would not change. While the carpenter was there, we had him build a new fence further away from the tower and totally enclosing the tuning house.

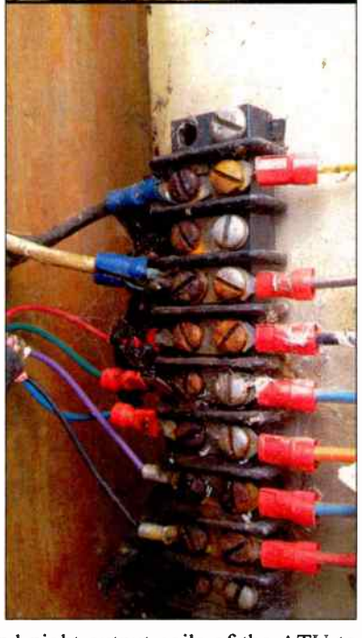
Before construction began, I had to get the sample system working 100% so that I could compare before and after the ATU rebuild. The station chief operator was complaining of "flaky" readings on tower one. Checking the sample loop, I found this badly cracked feed-through for the sample line. It leaked water so badly that the center conductor had corroded away on the UHF male connector and the dielectric of the cable was soaking wet. I replaced the cable from the tower to the barrel connection at the tuning unit as well as the connector and feed through.

A quick tip: When you are doing tower work like this, hang your bucket under what you are working on, so that if you drop one of the 4-40 screws that holds the feed through to the sample loop, it will fall into the bucket instead of to the ground never to be seen again!

Once I had a sample system I could trust, I took a set of reference readings, then when the weather forecast called for at least a week without rain, construction began. Everyone was warned to be careful while digging post holes, so as not to cut any ground wires.

It was decided not to put a concrete pad down, but to use crushed stone for the foundation to try to make things easier for the day that the ground system needs to be replaced.

While the carpenter was doing his thing, I made repairs to the ATU, replacing this terminal strip that had gotten soaking wet, for one thing.



We were able to put the ATU back such that the RF transmission line, power and control circuits hooked right back up perfectly – but we had to shorten the feed to the tower. However having taken a set of antenna monitor readings before construction began, I was able to adjust both day and night output coils of the ATU to make up for the somewhat lower inductance of the tower feed loop, adjusting for the same phase as before.

While I probably could have "gotten away" with leaving it alone, as the phase had only changed two degrees, I'm a real believer of "exchange, don't rearrange" when working with directional AM stations.

Bob Reite operates his contract engineering firm, Telecentral Electronics, Inc. servicing radio stations in Pennsylvania and New York state and may be contacted at br@telcen.com

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Basic Computer Hardware Maintenance

by Chris Ark

Starting my career as an audio engineer I had no idea I would become a broadcast engineer. As a broadcast engineer with zero experience, I didn't know I would have to become an IT "professional." With almost every bit of broadcast technology being connected to a computer or being a computer itself, a broadcast engineer must possess basic IT and computers skills to survive. But what are the basics? I found that, at the very least, you must be able to troubleshoot and maintain a simple computer. This article is intended to give the young engineer some basic food for thought when performing hardware maintenance on a Windows "client" computer. Before performing any kind of maintenance on a computer, there are few pre-maintenance items on my checklist.

Backup Local User Documents:

If documents aren't already being backed up to a server or NAS (network attached storage), take the time to backup local Microsoft Office documents, audio files, video files, etc. This can be a life saver in the event you accidentally delete user data or damage the hard drive. Do yourself a favor and sit down with the end user so they can show you where every single file is located. Remember, we're human and *will* make mistakes. Just be prepared and have files backed up.

Create a System Restore Point:

What is a System Restore point? A system restore point is a snapshot of your computers critical system files, installed applications, settings, and windows registry, taken at a specific point in time. If a program or operating system stops functioning properly after an update or for "no apparent reason," a restore point allows you to restore the computer's system back to a point in time when it was working properly. This can help you if you're doing file cleanup and accidentally delete a file that is critical to the operation of a piece of software or operating system. By default, the Windows automatic system restore point feature is disabled. Be sure to enable or verify that the feature is enabled. Once enabled, restore points are created automatically (frequency depends on the version of OS). In addition, system restore points can be automatically created by specific events such as updating device drivers, installing Windows updates, and even executing a restore point. Even if restore points are present, when working a on a computer for the first time, I create a new restore point ensuring it's as current as possible. An important note is that a system restore point *does not* backup documents. If you accidentally delete a file(s), a system restore point will not help you.

Create a System Image:

A system image is an exact copy of a computer's hard drive. This image contains the operating system and updates, installed programs and, unlike a restore point, it contains all personal files. When opening a computer for hardware maintenance, I always create system image. If you zap the hard drive with electrostatic or damage a mechanical component of the drive, you want to be able to restore the computer back to its original state as soon as possible. To help prevent electrostatic damage, wear an ESD strap (electrostatic discharge strap) when working inside the box or handling hardware components.

It's worth noting that a Windows created system image should only be used to restore the computer in which it derived from. It's hardware specific and every computer has a unique SID (security identifier). In a network environment, having multiple computers with the same SID can create issues. It's possible change the SID manually but it is not a simple task. If you are deploying a fleet of computers and want to update and install programs on one computer, create a system image, then install that image on other computers, I recommend using **Symantec Ghost** software. Among the countless features, Symantec Ghost has "DeployAnywhere" technology that helps avoid the pitfalls of trying to use one image on multiple computes across a range of different hardware.

Now it's time to go inside the box ...

Random Access Modules (RAM)

RAM is the hardware in a computer that stores data, programs, and parts of the OS that are being used at that moment, so the computer's processors can retrieve that information quickly. Its important that the RAM module pins make good contact with the motherboard. When performing general maintenance, I like to remove the RAM modules and inspect the pins for oxidization. The contact pins should have a shiny gold look to them. If they look dingy and dull, gently clean the pins with a #2 pencil eraser. Be sure to remove the loose eraser debris before reseating the module. When reseating the module, note the location of the notch on the RAM's PCB (Printed Circuit Board). This notch is there to ensure the correct orientation of the module when installing. Firmly press down on both sides of the module and it should snap in to place.

Cleaning the pins and reseating the modules is the same approach I take when RAM failure occurs. Depending on the type of computer, you have you will be notified of a RAM failure by a series of beeps or a number combination illuminated on the front of the computer – oh, and the computer won't boot up! Remember that oxidization prevents the flow of electrons and with the constant vibration of a computer, the modules can wiggle loose and have a less than ideal connection.

When replacing RAM modules, be sure you're ordering modules that are compatible with your motherboard. You can verify the model needed by looking at the existing RAM modules, downloading a memory advisor tool such as **CPU-Z**, or go to **crucial.com**. I like crutial.com because their website has a function that scans the RAM modules and lists compatible models. Also, be sure to install new RAM modules in matched pairs. Mis-matched modules can prevent the computer from booting. If it does boot, it can act erratic or constantly crash.

Hard Drive Health

Hard drives are one of the most important components of a computer and are the most susceptible to failure. This very article is recently recovered from a failed SSD that tested good not two days before its demise. Keeping an eye on hard drive health is critically important. Hard drive failures come in two forms, physical and logical. With HDD's (Hard Disk Drives), physical mechanical failures occur with the read/write heads and arms, spindle, actuators etc. These parts break down over time like parts on a vehicle. Symptoms of physical failures are noises such as clicks, scratching, and grinding coming from the hard drive. Logical failures occur when sectors of the platter (magnetic storage medium for HHD's) or nonvolatile memory (storage medium for SSD's – Solid State Drive) become corrupt or fail altogether. Logical failures manifest themselves by way of preventing the operating system from loading properly, frequent error messages and crashes when running software, problems writing or loading files, or files missing all together.

Windows has a hard drive health check function called S.M.A.R.T (Self-Monitoring Analysis & Reporting Technology). To access, pull up the command prompt and enter the following, "WMIC → DISKDRIVE GET STATUS". The drive will be analyzed and will be given a pass (OK) / fail (Pred Fail). This is a generic report that only tells you if the hard drive is a few breaths away from failure. I recommend using a freeware called **CrystalDiskInfo** that performs a comprehensive scan and provides a detailed report of your hard drive. It even has an email notification feature that alerts you when errors occur. No matter the software used to analyze hard drives, if they come back anything but passing 100%, I would change the hard drive ASAP.

Checking for Bad Capacitors

Bad electrolytic capacitors can make your computer do funny things. Bad cap's on a motherboard can make your computer randomly restart and bad caps on a power supply could prevent the computer from powering up all together. Bad capacitors can show themselves in a few different forms. Bulging (pregnant), sitting crooked, or have brownish crust. You can replace them if you have the proper tools (soldering iron with fine tip, solder sucker, solder wick, maybe some PCB cleaner) Depending on your soldering skills, budget, and how valuable your time is, you maybe be better off getting a replacement MOBO (mother board).

Dust Mitigation

Removing dust from your computer is important. Dust prevents components from breathing and keeping cool, ultimately reducing their lifespan. This is often overlooked or put off entirely. There are two schools of thought here, blowing or vacuuming. I prefer to blow dust out with compressed air and not use a vacuum to blow dust out. The nozzle and hose of a vacuum can create an electrostatic charge and discharge on to sensitive components. You may also get too close to the components and physically knock them around. There are vacuums on the market built for cleaning computers but I wouldn't take my chances. Proponents of vacuuming say that blowing dust out introduces dust in to places that it wasn't located before. Although I can't say that's incorrect, I'll take my chances blowing dust out of the computer rather than the more likely situation of electrostatic or physical damage caused by a vacuum. It may be worth stating that you shouldn't have any exposed mother board sockets or data connectors when performing dust mitigation.

In my next article we'll discuss basic OS maintenance.

This article is dedicated to Robert Reymont. Without him, I wouldn't know what broadcasting engineering was.

If you have any questions, please feel free to contact me on my website CRAAudio.com. Chris Ark, CBT

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Tower Topics

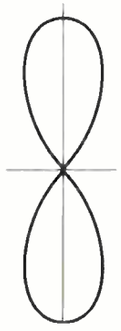
Matching Networks for Two AM Towers

by John L. Marcon, CBRE CBTE 8VSB Specialist

We have seen from the last edition that an L network can be used to match a single tower to a 50 Ohm transmission line. In reality, most AM stations have multiple towers. The usual arrangement is to have a phasing equipment to provide the proper phase, the right power and the proper impedance match for each tower.

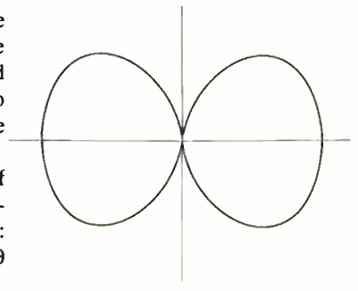
An understanding of how the matching is done is important and it is better to start on a simpler system like a two-tower network with a simple signal pattern. Signal patterns are shaped by a number of different factors. For example, consider a two-tower system 180 degrees apart, shown below.

The two towers have the same current magnitude, and the same phase angle of zero. The signal from A, once it arrives at B, is 180°out of phase with B and the signals will cancel. On the other hand, the signal from B is also 180° out of phase once it arrives at A and will also cancel. We say therefore that there is minimum signal towards the left or right. However, they are both in phase with the up and down signals. The pattern would look like this:



The shape is a slim figure "8" and perpendicular to the two towers. For the figure below, tower A phase is changed from 0 to 180 degrees.

The signal from A will be 360 degrees when it arrives at tower B and the two signals are in phase. Same is true for the signal from B to A. This means that the left to right signal is at maximum. However, the up and down signals are out of phase and yields an entirely different result. The pattern is shown below:



It is still a figure 8 but it is along the line of the towers and it is fat compared to the figure 8 on the first example.

The shape of these patterns is governed by the formula:

$E = \cos[(S/2)\sin\theta + \phi/2]$

Where: S = tower spacing in degrees

ϕ = Phase difference in degrees

θ = Horizontal direction

θ = 0 is perpendicular to the line of towers

This is the equation for general horizontal radiation pattern for two towers fed with equal current. There are many other possible combinations of tower spacing and phase difference between the currents of a two-tower array that will produce different patterns but they are beyond the scope of this article. However, the *Reference Data for Radio Engineers, 9th Edition* listed them all on Chapter 32 pages 32-33, Fig 57.

For our sample array, let us say we consider a cardioid pattern. Two towers will be of the same current magnitude, with one current lagging by 90 degrees, and the two towers are quarter wavelength apart. The two towers will also be quarter wave high.

The next step is to find the tower impedance. We already have this value from last time and it is 37 +j25. It will be the same for both towers.

This is followed by finding the Mutual impedance between the two towers. Much like two coils that are adjacent to each other having mutual inductance, towers that are close by also have mutual impedance. Unfortunately, this is difficult to compute. Remember that we need to get both the R and the imaginary part jX. The mutual impedance equation for the resistance R alone has 12 terms. A computer program is actually used for resolving the equations for mutual impedance. Fortunately, there are graphs that shows mutual impedance of two towers with certain height and spacing. An example of this is shown in **Figure 6 > > > > >**

Mutual impedance of two monopoles. From ELECTROMAGNETIC WAVES AND RADIATING SYSTEMS by Edward C Jordan, Prentice Hall, May 1955.

As we can see, because they are 90 degrees apart and 90 degrees high, the mutual impedance Zm of our tower is 25/-35°. Converting this to rectangular form, Zm = 25* cos (-35) + j 25*sin (-35) or Zm = 21 -j14.

Next to be determined is the operating impedance of each tower. In the single tower matching with the "L" filter, the operating impedance is the self-impedance of the tower. In this case, the operating impedance is the self-impedance plus the mutual impedance from the other tower. If there are more than two towers, then the operating impedance is the self-impedance plus the mutual impedances from all the other towers. In equation form:

Z1 = Zself + (I2/I1)*M12 + (I3/I2) *M13 + (I4/I1)*M14 + ...

Where: Z1 = operating impedance of tower 1

Zself = Self impedance of tower 1

I1, I2, I3, I4 = currents in towers 1,2,3, 4 and ...

M12 .M13, M14 = mutual impedance between tower 1 and 2,3, 4 ...

In our case, the operating impedance = Zself +(I2/I1) *M12

If we come back to the required current and phase between the two towers, I1 = 1/90° and I2 = 1/0°. In rectangular form, I1 =1*cos90 +j*1*sin 90 or I1=+j. On the other hand, I2 = 1*cos0 +j*1*sin0, I2 = 1. Dividing I1/I2 = j/1 = j. Thus, I1= jI2.

Let Z1 = operating impedance of tower 1:

Substituting I1 with jI2,

Z1 = 37+j25 + (I2/jI2) *(21-j14) = 37+j25 + (-j) *(21-j14) = 37+j25 -j21-14

Z1= 23+j4

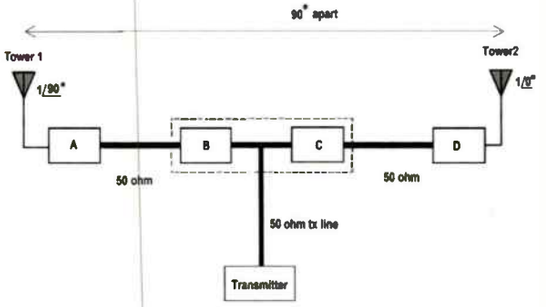
On the other hand, Let Z2 = operating impedance of tower 2:

Z2= 37+j25 + (jI2/I2) *(21-j14) = 37+j25 + (j) *(21-j14) = 37+j25 +j21+14

Z2= 51 +j46

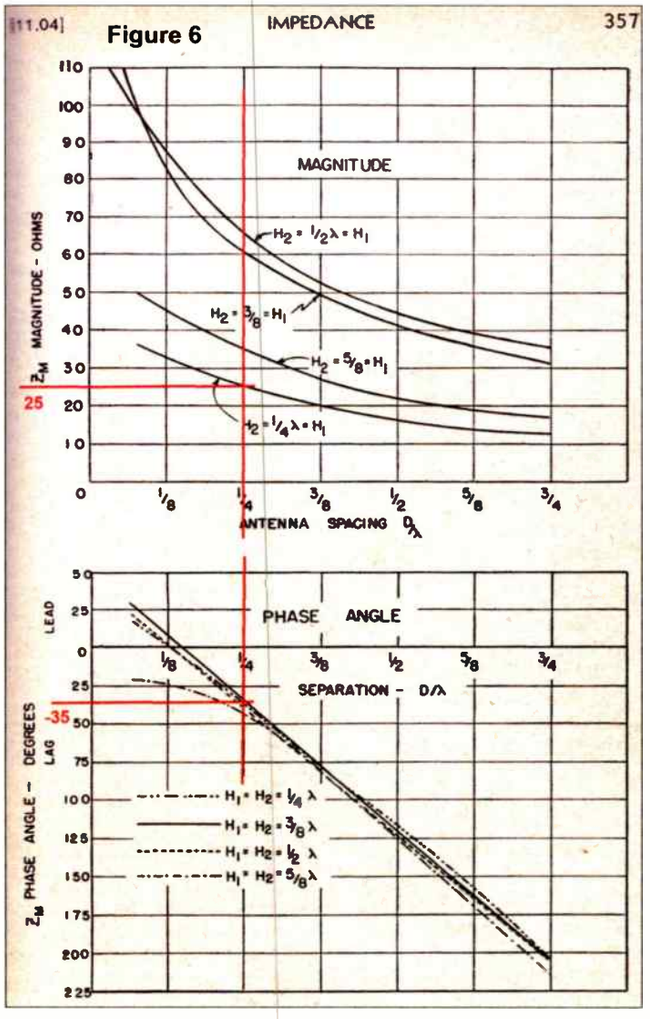
Matching Networks

We are now ready to design the matching networks. The diagram is shown below:



Block diagram of the entire system.

Match network B and C can be co-located in one room or box. Match network A and D will match antennas 1 and 2 with each of their 50 Ohm transmission line at their inputs. The inputs of matching network B and C when connected parallel must be equal to 50 Ohms. The relationship between the common point resistance and power is given by the formula:



The mutual impedance (referred to the current loops) between monopole antennas of equal height.

Rb = (PT/Pb) *50

where: Rb = resistance of network B input

Pb= power to the network B

PT= total power

Pb is also the power going into the tower and can be expressed as Pb= $I1^2$*R1.

Thus, Rb = (PT/ ($I1^2$*R1)) *50 and Rc = (PT/ ($I2^2$*R2)) *50

(Continued on Page 20)

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World Radio History

Matching Networks

– Continued from Page 18 –

If we divide Rb by Rc, PT and the 50 will cancel out, I1 and I2 will also cancel out because they are equal and the terms will simplify to:

Rb/Rc = (1/R1)/(1/R2) or Rb/Rc = R2/R1. R2 and R1 are the resistive part of the operating impedance of the towers: R1 = 23, R2 = 51

Thus, Rb/Rc = 51/23. Rb and Rc can also be expressed as: 50=Rb*Rc/(Rc+Rb). Solving for Rb and Rc, Rb = 161 Ohms and Rc = 73 Ohms.

Match Network A

Ra input of 50 Ohms will be matched to tower 1 impedance Z1= 23+j4 using an L section. Four possible solutions:

Network 1 and 2: Xp = +j46 and Xs = -j25, -j46 and j25. Phase shift A= 47°

Network 3 and 4: +j48 and -j25, -j48 and j25. We choose -j48 and +j25. But there is the +j4 already from the tower, so L = -j35 Xp and +j25 Xs.

Match Network B and C

We will again use an L network for B and C. Network B and C will match 161 and 73 Ohms respectively to their respective 50 Ohm transmission lines.

For Match network B with 161 Ohms input:

Network 1 and 2: +j108 Xp and -j75Xs, -j108 and +j75

Network 3 and 4: j0 and -j75, -j0 and +j75 .We choose j75. Phase shift B=56°

For Match network C with 73 Ohms input:

Network 1 and 2: +j108 Xp and -j34Xs, -j108 and +j34

Network 3 and 4: j0 and -j34, -j0 and +j34 .We choose j34. Phase shift C=34°

Match Network D

For Network D, we will use a T section to control the phase shift of the system once all the parts are installed. Remember that the phase shifts from the transmitter to tower 1 must be 90 degrees ahead from the cumulative phase shifts from the transmitter to Tower 2.

There is also the phase shift due to the lines, which in this case will be an assumed number. When we choose the actual frequency and the type of transmission line, then this phase shift can be determined. We will assume that the phase shift from A to B transmission line is 40° and from C to D = 50°. We can now express in equation form all the phase shifts needed so that tower 1 will lead by 90°:

(B to tower 1) + TL p.s. + 90° = (C to tower 2) + TL p.s.

A+B +40°+90° = C+D+ 50°

47+56+40+90 = 34+D+50

D =149°

To double check: transmitter to tower 1 = 47+56+40 = 143°

Transmitter to tower 2 = 34+149+50= 233°

All the phase shifts make the signal from the transmitter lag (negative) by the time it gets to the towers. The phase shifts become -143° and -233°. Thus, tower 1 phase shift is ahead by +90°.

For a T section:

$Z1 = -j\,(R1\cos C - \sqrt{R1 * R2})/\sin C)$

$Z2 = -j\,(R2\cos C - \sqrt{R1 * R2})/\sin C)$

$Zp = -j\,(\sqrt{R1 * R2})/\sin C$

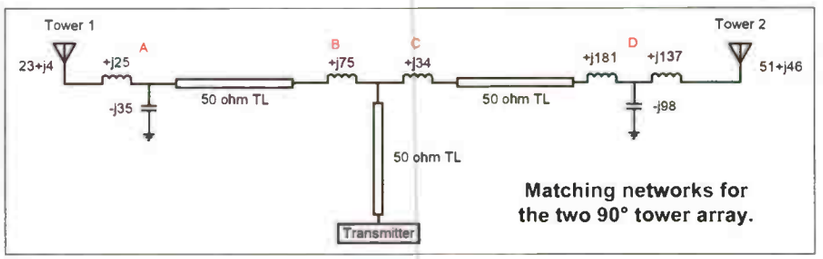
R1>R2

Z1 is near R1 and Z2 is near R2

R1= 51 ohms and R2 = 50 Ohms (transmission line). Phase shift D = 149°. Solving for the network,

Z1=j183, Z2 = j181 and ZP =-j98. But there is already +j46 from the tower so Z1 = +j137

The whole diagram is shown below.



Matching networks for the two 90° tower array.

Matching in two tower or multitower systems can be complicated and it is advantageous for the station engineer to have some knowledge on how it was designed. The actual values of the tower currents and phases are important as these determine the integrity of the pattern and more importantly the nulls that protect the other surrounding stations.

References:

1. Jordan, E.C. (May 1955). Electromagnetic Waves and Radiating Systems. New York: Prentice Hall

2. Entz, L. (1988). Multi-tower Patterns and Matching

John L. Marcon, CBTE CBRE 8VSB Specialist, is the Chief Engineer for Victory Television Network (VTN) in Arkansas, with international experience in both Radio and Television Broadcast, and has an Electronics Teaching background.

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World Radio History

Tech Tips

by Bob Burnham

Punch Block Tips

The "66" style punch block has been a staple in broadcast studios for decades.

Once upon a time someone thought that by borrowing them from the telephone industry, we would save time and space constructing studios, rather than using those cumbersome barrier strips. They were right.

Contortions-R-Us

But who among us has not spent hours with our bodies jammed inside studio furniture adding wires to a block bolted in a place apparently selected by a sadist (or some chiropractor's marketing agent)?

When designing and installing the many studios at Specs Howard School in Southfield, Michigan, there were three factors that I kept in mind:

1. Efficiency (and comfort) during the installation process, especially since for the most part, it was a one-man task for me.

2. Ease of maintenance, and adaptable to future changes.

3. Reliable, yet reasonable in cost.

A Better Way

The most popular punch block version, manufactured by Siemon, can be mounted directly, or with a mounting bracket that allows the wiring to be fed through the sides underneath the block. I strongly recommend using the bracket. Sheet metal screws can be used to secure the block to the bracket. The key here is the block is *removable* from the bracket.

By leaving plenty of service loop for *all* cabling, the block can be physically removed and placed on a horizontal surface for future work.

Pre-wiring a block as much as possible is actually the most desirable way to it. Since studios often were in use the day before – or even the very day I planned a console upgrade – I had to make very efficient use of the time I spent in the studio. Many blocks were pre-wired on my desk or workbench before they even went into a studio.

Using a punch tool for an extended period is faster and much less stressful in a comfortable environment, or at least having the ability to punch it on a horizontal surface.

Documentation As Your Go

With a brand new block, the *first* thing to do is to get out your Sharpie® and number the block on both sides – even if you know you are only going to use half the terminals.

It reduces the chance of errors and makes it easier should any extra terminal connections be needed in the future.

Obviously, the next step is to prepare a wire chart identifying which wire goes to which punch block number. Some like to number the wires themselves, using various types of labels and/or shrink-wrap.

Some Additional Tips

1. Punch grounds individually rather than tying them to an external strap. This minimizes the chances of ground loops, and if any occur it is very easy to lift grounds at the block.

2. Keep a second punch tool with a dull blade handy should the ground wires have a tendency to break during the wiring process; it is faster than trying to adjust the impact on the tool between punches.

3. Use block mounting brackets so that the cabling can be neatly routed *under* the block when mounted. A sheet metal screw at the top and bottom will secure the block to the mounting.

4. The surplus cable can be neatly bundled with cable ties and loosely hung nearby should the block need to be removed again. Use cable tie anchors secured with a small sheet metal screw to secure surplus cabling.

5. The Siemens part number for the standard "66" block is 66B3-50; the mounting bracket is S66-B6, These very low cost items should be available from your favorite supplier or broadcast vendor.

Planning ahead this way, you can build and wire punch blocks in such a way as to make things much easier for you on that day when you will need to work on them again. – *Radio Guide* –

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Speaking of necessities, every guest needs headphones. Which is why the Guest Gizmo provides a stereo headphone amplifier with volume control. Your guest can adjust headphone levels to personal taste (that human thing again). And the Guest Gizmo amp has the power to drive just about anything, even those big cans so beloved in radio.

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World Radio History

Addressing Remote Broadcast Success

by Wiely Boswell

All remote radio and TV broadcast units now typically depend on cellular Internet data. Very sophisticated devices now can combine data streams from multiple cell providers. They use multiple devices such as 4G USB plugs/jetpacks simultaneously to increase bandwidth required by video backpacks. All this is great until the stadium or street fills up with thousands of people wanting to send photos. Cellular capacity can not handle the data. It is not economical to build capacity for this situation that occurs infrequently. When they know it is going to be a huge event where their service will be strained they will bring in the cell sites on wheels (COWS), the portable cell sites that keep the service somewhat available.

So the first thing is delay with these portable codecs. The required encode/decode process is going to put in some small delay. While there will be some path delay, the big delay comes from buffering. The nature of 4G Internet data transmission can be bursty transmission that will drop the stream. So to have a good, consistent audio or video flow, the data gets backed up in a buffer that can "play" back out even while data is interrupted occasionally. The larger the buffer, the more tolerant the stream is to dropouts. The encoding algorithm of the codec can be dynamic to handle data slow-downs.

The result is that video will loose resolution or audio quality can be degraded. A stream that you can trust does not have dropouts, as you would expect from a hard wired Internet connection. Little or no drop outs allow you to use an algorithm that does not use a large buffer and thus less delay.

One remote I was part of had quite a setup of antennas on a stand and the way I understood it, the system had a way to "reach out" to cell sites that were the next cell away, that a normal cell phone would not reach. It is a very expensive system that does obtain knowledge of sites around it and has a way to force connections to these further away cells. Again, very expensive, but it has to work.

I attended the Alabama Broadcasters Association convention recently and ran into an associate from north Alabama that has done an amazing thing that has been needed for a long time. His company has worked a deal with Verizon to be able to obtain cellular data priority that allows a remote broadcast to stay up in a crowd. Josh Bohn of Bohn Broadcast Services (bohnbroadcast.com) has worked on this data plan for well over a year.

First responders and government agencies have had this Wireless Priority Service (WPS) feature for years now and they have priority over normal callers. It is said not to drop a lower class call in progress. With data it is a quality of service (QOS) class that is associated with the EID of the device. This new broadcast device plan is for 4G LTE data. It will not be a part of any Verizon business package you may currently have. It is also related to the Telecommunications Service Priority (TSP) and Government Emergency Telecommunications Service (GETS). Users have higher priority levels that are very hard to be able to obtain. GETS is in effect all the time, not just during a disaster or other major event that impacts landlines.

MaxxKonnect Wireless, Using Verizon 4G LTE

A new offering, MaxxKonnect Wireless, using Verizon 4G LTE, has an activation fee, a per month cost plus data usage cost. This 4G LTE connection can be a replacement for an RF STL when used with streaming encoder and decoder boxes. This is also needed for remote sites with no Internet service. Open STL frequencies are becoming rare and you may also be paying tower rent for a 900 MHz antenna on one or both ends. Extreme distance or line of sight blockage may make an STL or a Ubiquity WiFi shot not be possible. You might even need a backup STL while waiting on a feed line or antenna repairs.

(Continued on Page 28)

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World Radio History

Addressing Remote Broadcast Success

– Continued from Page 26 –

The MaxxKonnect system features a static IP with no port blocking and no throttle back of speed. An optional router is available with integrated cell modem, allowing a hardwire connection (bridge mode). There is no long term contract or cancellation fee, which is a good way to test the service in your area. The router is really nice with good features. It would also be a way to get other monitor and control systems fed to the Internet. RDS data could also be sent to an RDS encoder at the transmitter site.

LTE data is becoming the backup of choice over T-1 lines or DSL for businesses. Security is also a concern and is now possible over LTE with AES, IPSec, and other encryption methods. Software management can track, control, and manage large network outages, and give the cloud based portal view, and of the entire regional network – in easy to use graphics. All LTE modems (which include a remote control tunnel to cell site) and routers can be monitored and controlled in a customer friendly screen.

One large scale vendor of this technology is Accelerated, a subsidiary of Digi International, using Accelerated's software and modems. All equipment must meet Verizons' Open Development Verizon Private Networking certification. Other Carriers such as AT&T also are offering dedicated services. AT&T's enterprise data priority plan is called Dynamic Traffic Management.

It just gets harder to keep up with advances in wireless data. You can just look at your wireless router with a ten fold or more increase in throughput in the last five years. Now 5G is on the way with network capacity that can support private networking. There are now lots of 22 GHz point-to-point radios in the cellular backbone with large bandwidth to support 5G LTE and the new "smart cells." The goal is to expand services.

Verizon is after what they see as a new expanding data service. They call it Unified Communications and Collaboration as a Service, UCCaaS. Other high end data services are getting ready to be the choice for backup "land line" Internet service w/ LTE data. "Differentiated Service" is another buzzword that is said to address availability and priority. Cisco has a Jabber Application with packet marking to allow private networking. Another description is Mobile Private Networking – MPN when selling such applications.

When 5G LTE does come out it will be great for a while until everyone starts using it. No doubt 3G will not be available much longer after 5G comes out and it will be a big push to get everyone using newer technology, while having to support the old technology.

From a local perspective this network management is complicated and is a large scale model. A lot of us are just trying to get LTE data to be there in demanding situations, so a simple plan like MaxxKonnect is more the ticket. When data does drop it is hard to tell where the issue is coming from, so do not let the studio Internet get overloaded either. (No streaming movies in control room during remotes is a good idea!)

Accelerated 6350-SR LTE Router

A backup system is always a safe plan – back to the plain old telephone land line (POTS) if you can get one. Tieline and Comrex offer dial-up as an option, so be sure to have whatever cords are needed, like a long phone cable and have the studio number in system memory dial. Go thru all menu options and be ready to set things up.

Digital codecs do have some really good options such as vendor supported servers that allow a multicast remote session. It can be a very nice application for a small network distributing football games.

Remotes have come a long way and you have to keep up with technology, especially IT connections. This priority LTE service is just the thing. It hopefully will not get to the point, if you want data priority, they could charge per gigabit based on network congestion at the time. You now can pay for privileges like taking the fast lane in Washington DC with the time of day toll rates based on traffic congestion conditions!

Wiely Boswell is Chief Engineer of Faith Broadcasting, Montgomery, AL; CBRE,CBNE, and SBE 118 Chairman. He may be contacted at: Wiely@faithradio.org

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World Radio History

Tech Topics

Frustration

by Steve Callahan

Over 20 years ago, when I built my AM station, I did all the work myself. Looking back, it was probably not a good idea to take on such a project without any additional help at all, but I was young and foolish. I built the transmitter site by myself and built the studio site by myself. I had made a big publicity push in the local newspaper, saying that the new radio station would debut on the air with a live remote broadcast of a big fund-raising auction for the local Rotary Club. I thought that would get my new local radio station some attention and also help a very worthy local charity.

The clock was ticking down to auction day and my first indication that my debut might not work out was that the tower crew arrived on site a week later than they had promised. I had the tower on the ground but I needed them to stack the steel and do the ground system.

Up to this point I was very busy with all the facets that needed to be handled when you start a new business, and especially a new radio station. I had installed the satellite dish that was going to be the way we got our music. I was hiring the two employees who would be on-air with me. I was searching for a salesperson that would help me market the station. However, I was procrastinating about getting the STL up and operational. It seemed that something else always distracted me from that STL.

I had a microwave antenna on the newly built tower but I needed to get the studio side antenna mounted and working. Fortunately, the distance from the studio to the transmitter was only about 2 miles and it would shoot right up a railroad bed – so I didn't have any fear about Fresnel clearance. However, the STL got pushed back further and further as more and more unfinished details came out of the woodwork.

Finally, on the day before the debut, I had to get that STL up and working. There was a rickety old, 50 foot, two-way radio tower at the studio site which had I planned to use for the STL. It was not a lot of fun climbing that old tower, in the dark, with a Scala paraflector on my back. The tower was indeed shaking as much as I was. However, I did get the antenna mounted and pointed in the right direction up the railroad track. Then I had to run a messenger wire to carry the coax between the two way tower and the new studio building.

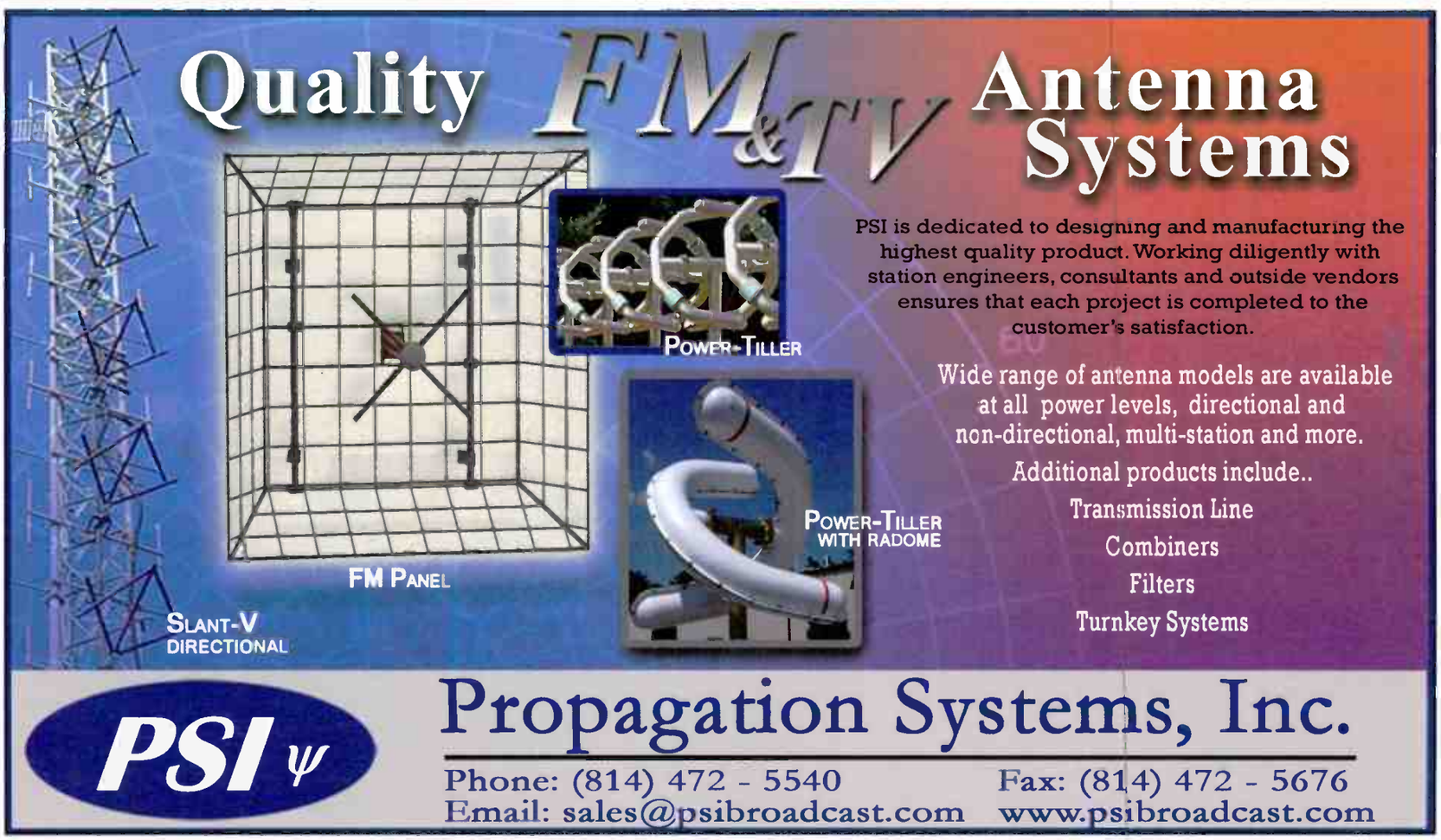
Around 5:00 a.m. on the day of the debut, I finally finished the last coax connector and then hooked up the STL transmitter. As I flicked the switch to ON, I was more than happy when I saw that we had plenty of STL signal and the studio to transmitter link did indeed work. At 8:00 a.m. we signed on the air and started the remote broadcast of the Rotary Club auction. All's well that ended well but not without bringing down a lot of unnecessary frustration on myself.

Fast forward to the present day. Recently, I got a call to an FM station that was having transmitter problems. The symptom was that the transmitter would turn on but would immediately shutdown with a high temperature fault. What made it even more interesting is that this was a backup transmitter that wasn't on air at the time and was stone cold when the high temperature fault occurred. I was dealing with a Gates 10 Z transmitter of recent vintage which is a very well engineered transmitter.

A quick check of the very extensive diagnostics of the transmitter showed that this 10 kilowatt transmitter has four Z planes, or four divisions of the power amplifiers. When I checked the individual Z plane temperatures with the transmitter off, I saw that the temperatures for the B, C and D planes were all around 19 degrees centigrade. However, the A plane was showing 150 degrees centigrade on one power module. The quick and easy way to see if it's a power module problem is to flip the power amplifier upside down, and if the problem moved to the A plane, then it was in the module. Unfortunately, the high temperature reading didn't move to the adjacent plane, so the problem was most likely with the RF ISO module.

I took a quick look at the instruction manual and saw that there was an RF ISO module for each of the four Z

(Continued on Page 32)



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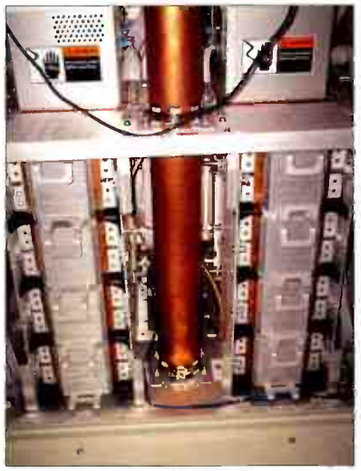
World Radio History

Frustration

– Continued from Page 30 –

planes and the module for the B plane was in a rather inaccessible location. The book said it was necessary to remove the output filter of the transmitter up through the top of the transmitter and then remove the bad module from the back of the transmitter which was in a tight space between the Z planes. The book also said it was a 10 minute job. After I stopped laughing, I started the procedure which involved taking the forward and reverse power cables off of the directional coupler. Next came the bolts which fastened the top of the filter to the top of the transmitter. Then I had to break the three inch coax hard line connection at the top of the external wattmeter. The next step was to remove the two clamps that held the filter in the transmitter. I took pictures, made diagrams and marked the position of the output filter.



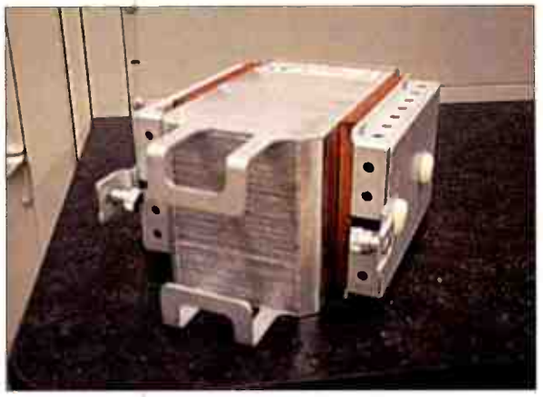
Output filter before removal.

Although this was a solid state transmitter, I couldn't help recall the horror stories of station engineers replacing tube sockets, thinking that they could remember where all the parts went after disassembly.

After output filter removal.

Finally, I got the filter loose and, while standing on top of the transmitter, I lifted it out and clear of the cabinet. Then I loosened the four screws that held the module into the Z plane and removed the two ribbon cables from the module, noting where each one went. Out came the old module and in went the new module. Then I reassembled the transmitter by sliding the filter back down into the transmitter, connecting the coax, reinstalling the clamps and all cables.

I felt pretty happy with the repair up to this point. It hadn't taken 10 minutes but it hadn't taken all night either. However, the proof of the repair rested with whether or not the transmitter would start. When I reached for the HIGH power button ... nothing happened.



Individual Power Module

I checked and rechecked all of my work and I couldn't find anything wrong. I then went back to the manual and re-read the instructions and saw a reference to another part of the manual. Seems there are jumpers in the module which tell the transmitter controller which Z plane it's in and I hadn't seen the jumpers. So once again, I went through the procedure to remove the filter up through the cabinet, and I once again removed the module – this time I saw the jumpers and I set them like the jumpers in the bad module. Once again, I reassembled the transmitter hoping that it was for the last time. When the HIGH power button was pushed, I held my breath and ... we had full power!

Epilog: That same transmitter now needs a new module for Z plane D, but I'm pretty sure I can replace it in my sleep.

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

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World Radio History

Tools of the Trade

Don't Fear the 45

by Jim Turvaville

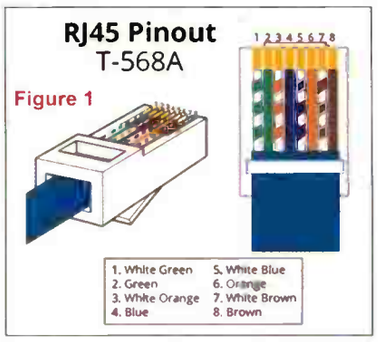
It's the connector of choice for the I.T. world, and is finding more and more places in the radio engineering world every day. Affordable, versatile and occasionally daunting – it's the handy RJ-45 connector. I want to go over a bit of history, and maybe help remove some of the roadblocks that engineers run into regarding its use.

The entire line of Registered Jack – "RJ" – connectors was developed in the 70's by the Bell System under direction of the FCC to develop a standard for the interconnection between telephone company equipment and customer equipment. They were all based on the newly created modular connectors which were gradually replacing the hard-wired or large protective coupler connected phones in everyone's home. By the 1980's, the specifications for the RJ connectors became FCC law as the U.S. Telephone industry was opened to more competition outside the Bell system. In 2001 the FCC delegated the responsibility for standardizing connectors to a new private industry organization, the Administrative Council for Terminal Attachments (ACTA) and removed those specifications from Part 68 Section F of the FCC rules. The ACTA generates its recommendations for terminal attachments from the standards published by the engineering committees of the Telecommunications Industry Association (TIA). ACTA and TIA jointly published a standard called TIA/EIA-IS-968 which contained the information that was formerly in the CFR.

The current version of that standard, called TIA-968-A, specifies the modular connectors characteristics at length, but *not* the actual wiring of the connector. That leaves a lot of flexibility in how the connectors are used, and is the reason that they have become so popular in areas outside the direct Telecommunications and Information Technology industry. That allows us to have a myriad of uses for the small and affordable modular connectors in our studio and audio, with some variations in the wiring schemes for various uses.

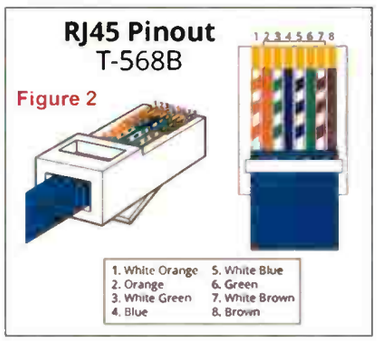
The standard for all modular connectors has the center pair in the group to be the first pair, with the second pair split on either side. In a 4-pin connector, this means all of the pins are used for the 2 pair – in the 8-pin connector of subject today (the RJ45) the wiring scheme maintains this standard for the first 2 pairs, with the addition of 2 more pairs matched together (not split) on each side. That is shown in **Figure 1** with the pairs in order being colored Blue, Orange, Green and Brown.

The connector has a "key" so you always know how to count the pins and be sure you put the wires in the correct direction. For most all crimp tools, the key goes down, and that also allows you to see the wires clearly inside the connector. In this figure, you see that the pinout is noted as "T-568A", which means it follows the IEC standard for wiring 100-ohm balanced twisted pair cabling.



There are two versions of the RJ45 wiring scheme, designated "A" and "B," to know which color code is being used. The other scheme is as shown in **Figure 2**.

The only variation between "A" and "B" is the exchange of the second and third pairs. This differentiation is necessary to keep the cabling in correct relationship to "transmit" and "receive" for the data connections. As long as both ends of the cable are wired to the *same* protocol – either "A" or "B" – then you have a "straight through" cable and the data flows unencumbered. Wiring one end "A" and the other end "B" gives you a "crossover" or a "null modem" cable, as the TX and RX pairs are reversed. I carry a crossover cable in my tool bag, and it has saved me many times when I had an IP based piece of gear with a bad static IP address which could not



(Continued on Page 36)

It's Time to Get Into the Mix

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Don't Fear the 45

– Continued from Page 34 –

be accessed by an internal network. Simply plug the crossover cable between the device and your laptop, manually set your computer IP configuration to match that of the device, and you can connect normally and reset the device network parameters to the desired network settings.

Most every patch cable you buy these days is wired with the T-568B standard, while patch panels and wall jacks usually have both color schemes denoted for your choice of punching. Speaking from experience, if you have a crew working together on a project be sure that you communicate well ahead of time which standard will be used on each end of the home runs. I've only had to learn that the hard way one time, when the IT guy wired all the wall jacks in the office to "B" and I had punched the patch panel in the back to "A."

In the past decade, the use of the modular connector for audio has rapidly increased, and in my years of experience it has certainly found a place of convenience and reliability. I have recently installed several consoles in studios which use the RJ connectors for inputs, and find them handy and efficient. The most recent one was in my own station, and was an Arrakis console with this wiring scheme for audio **(Figure 3)**.

In my case, the console was attaching to standard 22-gauge audio cables, so I used standard CAT5 patch cables (with the shielded wire) and attached them to an audio punch block with the CAT5 on one side and the audio cables on the other. For several of my input sources, I cut the CAT5 cable and soldered on the appropriate XLR connector and had a customized cable for my use. If you use a shielded CAT5 with the shielded connector, you can carry the ground shield of the audio all the way through the chain efficiently.

EIA/TIA 568B WIRING STANDARD COLORS

PIN	Wire Color	Audio
1	White w/Orange Stripe	Left (+)
2	Orange w/White Stripe	Left (-)
3	White w/Green Stripe	Right (+)
4	Blue w/White Stripe	Ground
5	White w/Blue Stripe	
6	Green w/White Stripe	Right (-)
7	White w/Brown Stripe	
8	Brown w/White Stripe	

Figure 3

One important difference between CAT5 or CAT6 cables is solid versus stranded wire inside. The home run cables which go from wall plates to patch panels are always run using the solid conductor wire. It's cheap and punches at each end to the respective connector strips easily and securely. It is not, however, suited for patch cables between devices and wall jacks or patch panels; the wire will stress from repeated use and eventually make for bad connections. Instead, those patch cables are made with stranded wires which are just as easy to insert and crimp on the RJ connectors, and do not suffer from the mechanical stress of the solid wire. That stranded cable will not as easily punch onto the blocks for wall jacks or patch panels, but they do make for really nice hand soldering to audio connectors.

I've made a myriad of custom CAT to XLR, TRS, DB and other connectors which can be made to look professional and neat, and on a budget. Of course, if you are doing an entire project of multiple studios, then the pre-made kits of RJ adaptors are a life saver and highly recommended. But for just a couple of connectors, I prefer to roll my own.

No writing by me would be complete without a reminder to be organized. The effort it takes to create and maintain organization is exponentially rewarded by efficiency in your work, as well as minimizing being caught without needed supplies. I have a basic $8 organizer from the Seaside Package Discount store with the removable and rearrangeable compartments, which I have customized for my RJ and Coax tools and supplies.

I have several of these compartmentalized boxes with different themes; this is just one of those which I carry in my truck. This lets me keep those specialty tools – stripping and crimping – as well as related connectors and adaptors all in one place, handy to carry to the work site and always see when I'm running low on things.

As the great American poet Bob Dylan said in 1963, "the times, they are a changin'" and the RJ connector is certainly here to stay. We'd best learn to appreciate it and work with it along the way.

Jim "Turbo" Turvaville is semi- retired from 39 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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World Radio History

Engineering Perspective

Staying Ahead

by Sam Wallington

My head was going to explode if one more person gave me something to do! I was drowning! FCC applications to file, software bugs to fix, temporary fixes threatening to fall apart, people waiting (and waiting) for stuff I had promised to deliver, write, print, fix, build, design. I was stressed out of my mind (maybe literally!), angry at everyone (because everyone wanted something else from me), and so very tired. And I have only mentioned work! I also had my wonderful bride who was mostly being ignored, church responsibilities at which I was failing ... in short, I was just done. Overcooked even!

Taking a printout of my to-do list, which contained well over 500 mostly overdue items, I plopped on the couch in my boss' office and asked for help. He did two things – one annoying, and one very helpful. After listening to my tale of woe, he thought for a while, then said he agreed I had too many important things on my list and I could not do it alone. Now the annoying part: He said, "Go hire someone to help!" While I appreciated the offer and what it cost, it annoyed me because it added *another* to-do to my list!

Fortunately, after he helped me prioritize my to-do list, he also gave me some advice which still resonates today. He told me it was only realistic to try to get three to five things done every day. Of course, he meant larger things (not "sit down at desk, sip coffee ..."), but I had no idea limiting my output was a thing. I had been approaching the problem more like: "do everything you can possibly cram into the day – probably 50 to 100 things." I would do those 50 or 100 things, but often did not pay much attention to their importance, just the size of them and how loudly they were screaming at me. I was essentially working on them in random order.

He went on to describe the importance of stopping to think at least once per day: *What is the most important thing I could be doing right now? What will have the most impact? What are things only I can do, and what could I delegate to someone else?* Thinking this way can help generate a list of a three to five "big rocks" (to borrow from Stephen Covey) to tackle today.

We worked together to create a list of a few key items for the day (one of which was starting the process of hiring help) and I left his office with a tiny taste of relief in my mouth. Really? I could ignore most of my list today? Amazing!

Priorities

Later, he gave me more insight by sharing his list of priorities. It went like this:

1. God
2. FCC/Legal
3. Listeners
4. Donors (for commercial stations, this would be "Advertisers")
5. Everything else

Oftentimes multiple things seem to be very urgent, and it is quite difficult to tease apart which is most important, and which is secondary. Having a values-based list like the one he shared is incredibly useful in making the call. For example, an Engineer for a four-station cluster had some simultaneous problems:

- A leaky faucet.
- One station off air.
- A broken copier.
- One station operating at 112% power.
- A phone system problem (dropping some calls).
- Distortion on the DJ's microphone .

Which would you work on first, and why?

Here is the order I would use: Reduce power on the 112% station, get the other station back on air, fix the distortion, fix the phone system and copier, and finally fix the faucet. Why? FCC/Legal is first after God, because without being legal, the entire existence of the station(s) is at risk. Listeners are next, so the focus then shifts to the off-air situation, then the microphone. Donors/Advertisers will need the phones and copier to work, so they are next, and finally, we can get to the faucet. You and I both know we would likely do some delegation and apply some Band-Aids along the way (perhaps the DJ can use the guest mic for a while, maybe a nearby office supply place can temporarily substitute for the broken copier...).

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World Radio History

fuhgeddaboudit!

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Streamlined Radio Automation

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E-Mail

If there is one invention which is simultaneously an incredible blessing and a terrible curse, it is email! According to one study published in early 2017, businesses and consumers send and receive over 269 billion emails per day! Wow – over 3 million emails per second! A 2014 version of the study states that an average office worker received 121 emails a day and sends around 40 business emails daily, which means for every email you send, you will receive three! Alas, the to do list grows while we muck through email.

Overcoming the email beast is a challenge, but it can be done. It involves a few key principles, which, if applied consistently, will help make email more of a blessing than a curse. Those principles are: create boundaries for email, keep the inbox empty (at least daily), and then work only on your priorities.

Boundaries for email are important, so I have set some expectations with my team: Do not use email for crisis communication (instead call, text, or talk face-to-face). No email response should be expected in less than one business day. Finally, if an email goes back and forth more than twice, get up or call and talk instead. It will save many emails and much time.

An email inbox can only be described as a randomly sorted repository of things from various people and organizations. There is no practical way to prioritize inside an inbox (even marking emails with colored flags or the like do not solve the problem). The trick is to get emails out of the inbox and in to a system which allows prioritization and grouping. Following is a very quick look at getting to a consistently empty inbox:

1) Take an hour and go through the last few days of your inbox and move any important to-do emails to separate tasks or folders. Outlook for Windows lets you move them to your task list, for example. Google mail lets you apply a label, "moving" it out of your inbox. Other systems have similar tools.

2) Move everything (everything!) else from your inbox to some other folder (maybe called "old junk"). You will probably never look at it again, but it will feel good knowing you still have it "just in case." You can always go look at it, or sort it, if you get lonely for it – or maybe you will delete most or all of it!

3) Two or three times a day (no more), go through your inbox. If you can handle an email in just a minute or two (a quick reply or 30-second task), do it now and then delete the email. If you need more time, move it to your task list, prioritizing as you go. Do not get distracted by some big-deal email! Your only task for now (and it generally takes about 10 or 15 minutes) is solely to empty your inbox. Deal with each item now in a minute or two or move it to your task list.

4) Once the inbox is empty, close or minimize the inbox so you will not be distracted by new emails. Turn off the "toaster" function which beeps or "pops up" new emails on your screen too – you are no longer working on email, you are working on tasks and projects. Later you can check your inbox again, when you are done with the task(s) you are working on.

Tasks come from more than email; regardless of source, gather all your tasks into one prioritized task list. Then, work on the tasks only in priority order. I am frequently tempted to work on something just because it is quick and easy. The cool thing is it will be just as quick and easy after higher priorities. But if you do not prioritize, you have just re-created your inbox (and scraps of paper) in a different place. Prioritization translates to working only on the most important thing now – always!

Conclusion

We have discussed three keys to becoming unburied: 1) Plan to focus on only three to five big things per day, 2) Deal with the email beast, and 3) Work only within your priorities. There are perhaps thousands of books, websites, and seminars on time management, getting things accomplished, and the like, but (and here is the bad news) none of them will truly work unless you are willing to commit to change and put in the hard work to do so. From my own experience, I can say it will take time and effort!

One final thought: Never expect an empty to-do list. An empty to-do list comes just before your job is eliminated, because you are contributing nothing of value. For perspective, I currently have 388 things on my to-do list, some of which have been there for a long time. The point, however, is not an empty list. The point is to know exactly what to work on today, and which things to put off for another day. Such knowledge keeps overwhelm, worry, and guilt away.

Hopefully these ideas will help you avoid (or recover from) the nasty space of being behind in most things and having lots of people angry as a result.

Allow me to end with a question: What is the very most important thing you could be doing right now?

Sam Wallington is VP of Engineering for Educational Media Foundation, and has 34 years of experience in broadcast engineering. He can be reached at swallington@kloveair1.com

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Small Market Guide

The Importance of Promotions in Small Market Radio

by Roger Paskvan

The saga of promotions is a standard topic in all radio stations. Some say they can't exist without promotions and some don't do any, but somehow still survive. Some have the attitude, "I'm on the dial, what more do I need to do?" Well, the short answer is *"lots."*

In small market radio, promoting events that utilize radio is as important as being on the air – they go hand in hand. Most small town stations are competing with only the small town newspaper which, for the most part, is hanging-on for survival. Outside of grocery stores' coupons, radio beats all the other forms of advertising by its nature. It's mobile and gets to the tourists better than any other delivery medium. According to the RAB, 84% of the people listen to radio in their car.

In small markets, the community is everything and the public perception of your radio station is of utmost importance. In today's ever changing world, finding a safe place for your community's events can become a major challenge. The door is open for small market radio to fill in the gap like no other medium can.

Thinking that your market is small and everybody knows you, will not promote your radio business. Like the bigger major market cousins, we all must do promotions to keep us alive. As a matter of fact, promotions in smaller towns bring people together, providing that glue that attaches your call letters to the person, place or thing. Take advantage of your small market status and utilize this concept to your maximum benefit.

Small market promotions not only provide new listeners to your "hometown" radio station but the concept of bringing everyone together for an exciting event makes your business look good to that potential advertiser that may be on the fence. Right in front of their eyes, it is vivid to see such organization, community involvement and the power of radio in action.

Some small town radio stations do not want to do free promotions or giveaways since it uses up staff time and provides no revenue back to the station. This is so far from reality because raising money for a local hometown charity puts your radio colors on display. It may not bring in immediate dollar revenue but builds respect for your radio business, showing future advertisers that you care about the town's people. Publicly showing these potential clients what your radio station can do is the best sales pitch you can make. It may not show up in tonight's balance sheet but merchants, especially in smaller communities, respect those that help their community grow. Next week when your sales person approaches that local business, it's so much easier to get that signed contract. The conversation centers around, "Oh, you're the station that raised $10,000 for homeless children last week." They are more than happy to support your station out of respect.

At the same time, the unwritten popularity of your station grows. Many small market stations don't even have (Neilson/Arbitron) ratings, but the 4000 people that showed up for your charity promotion is a survey in itself. The ratings are self-induced and your station becomes the long term winner. So, let's make your small market radio station shine in your community. Promotions, promotions, promotions

If you're in a small market, take advantage of the situation you are in. Do as many promotions as you can to get your good name into the public. Community fund-raisers such as Halloween promotions, Toys for kids at Christmas, Ride for the troops, Boat and car shows, and charity fund-raisers, all bring the community together and make small town radio great.

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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1/4 - The Difference and Why It Is Important - *Tom Osenkowsky*
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	10.0 kW	1996	Nautel FM10 - *Solid State, Single Phase*
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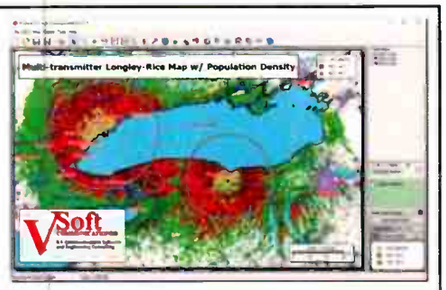

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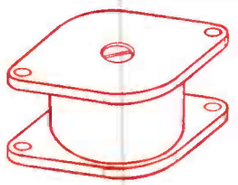

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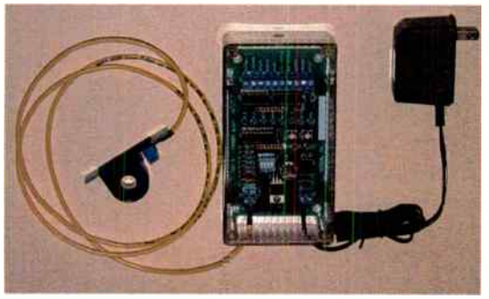

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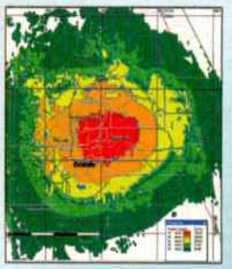

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Gear Guide

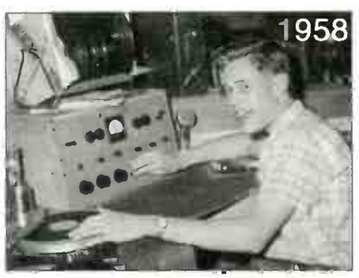
AM & VU

A Two-Fer Review

by Ron Erickson

Two reviews in one article, starting with a short back story. Many of us have experimented with 100 milliwatt AM transmitters which are legal without a license under FCC Rules Part 15. Heck, I could tell you names of at least a dozen radio pros that started with this little gem – The Knight Radio Broadcaster. Back in 1964, it sold for about $12.00. *(Photo at right.)*

Today, hobby broadcasters generally agree that the one built by Keith Hamilton – the "Rangemaster 1000" – yields the best coverage while staying legal under the Part 15.219 rule. Most everyone who has used one of these has also purchased an Inovonics Model 222 in order to process the audio with Positive Peak Modulation. This makes the audio envelope louder without distortion, therefore it more efficiently rides on the the tiny Part 15 AM carrier, hence better reception. With a good AM limiter to process the audio, your hobby radio signal can sound like a real AM station.



Back in 1958, Jim Wood caught the radio bug and we are so glad he did. He founded Inovonics and for 46 years has dedicated his electronic talents to making our business the best it can be. After stepping down from the day-to-day operations of Inovonics, he has kept busy with his new venture, "The Schlockwood Laboratory," described on his website as a "multidisciplinary research and development facility located in Brea, California."

Jim has created a new product specifically for the Hobby Radio market; it's a new AM Audio processsor which leaves the older designs of his former 222 and 235 in the dust. Tympany roll please ... Ladies and Gentlemen, introducing the Schlockwood SW200.

Schlockwood SW200 – LPAM Audio Processor

Even though it was designed for Part 15 AM hobby operations, The SW200 is more than adequate for any full power AM station. It interfaces easily with balanced studio-level program feeds and unbalanced consumer/semi-pro signal levels. Subsonic and RF filters guard against erratic operation from out-of-band program frequency components. Slow, "gain-riding" Gated-AGC normalizes average levels from diverse program sources. It has a choice of the established NRSC program pre-emphasis characteristic or a continuously-variable family of peaking curves. This small AM processor also features Three bands of multi-band, frequency-discriminate compression and limiting. This really optimizes program density. Want more? Okay, how about variable low- and high-frequency program equalization. And now for the "icing on the cake," so to speak – variable output asymmetry; up to +135% modulation for positive-going program peaks.

Interior view of the SW200.

Personally I wished it would have been built with rack ears, but then, I like rack mounted gear. An after market rack shelf will take care of my only complaint.

My conclusion? Priced at less than $500, this AM processor should be considered a valuable back up for corporate radio engineers to have on the shelf for an emergency situation. Not only because of the affordable price, but because it performs so darn well. Mr. Wood, you've done it again.

Yhe next subject in our two-fer review is the Magna Scientific VU Meter series built in the USA by GaD Electronics. These add-on meters are most useful since they all feature selectable modes; Loudness, Loudness + Peak and Loudness + Peak Hold. The three versions are as follows, BLUE V-A is the strictly analog balanced audio version, BLUE V-D has AES/EBU balanced and un-balanced inputs.

The BLUE V-E has 3G / HDI HD / SD SDI Embedded Audio. While I love old school big Simpson VU's, you can't beat the accuracy afforded by these LED meters. It's nice that they lined up the lights in a sweeping arc, harkening back to the swing of yesterday meters. An add-on, rack mounted meter like this could be oh so handy for many different applications.

Each version is packaged in a 1RU box and uses a common wall wart power supply. List pricing starts at $630.00 for the analog box, $655.00 for the AES/EBU model and $940.00 for the V-E model.

A demonstration may be seen on You Tube; https://www.youtube.com/watch?v=pwZm5HpLndc

It's difficult to show a 1RU product in a photo large enough to really see anything, so I'll show half the BLUE V-A rack.

Currently, these products I've reviewed today are not available through any of the large broadcast equipment dealers, but drop me a line and I can tell you where they can be found.

Special thanks to the several people who have sent me favorable comments. I continue to be available by phone at (541) 460-0249 or at ronerickson@gmx.com

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Final Stage

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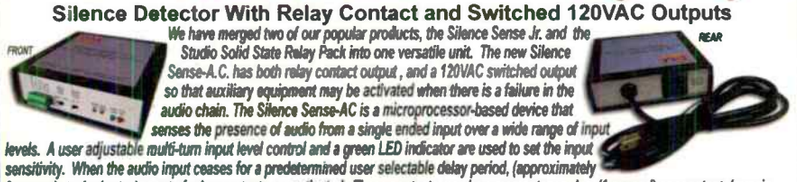

We have merged two of our popular products, the Silence Sense Jr. and the Studio Solid State Relay Pack into one versatile unit. The new Silence Sense-A.C. has both relay contact output, and a 120VAC switched output so that auxiliary equipment may be activated when there is a failure in the audio chain. The Silence Sense-AC is a microprocessor-based device that senses the presence of audio from a single ended input over a wide range of input levels. A user adjustable multi-turn input level control and a green LED indicator are used to set the input sensitivity. When the audio input ceases for a predetermined user selectable delay period, (approximately 6 seconds to 4 minutes), a set of relay contacts are activated. These contacts may be a momentary pulse, (1 second) or constant, (remain activated until the audio is re-established), depending on the front panel switch selection. An internal jumper may be moved to change the relay output from normally open to normally closed contacts. A red LED indicator signals when the preset no audio time period has been exceeded, and remains on until audio is firmly re-established. At the same time as the relay contacts are activated, 120VAC is applied to the AC output connector on the rear panel. This AC output is not subject to the momentary switch selection that controls the relay contacts, but remains ON until audio is detected and the device resets. Battery back-up (9V) is also provided to assure operation of the silence sense circuitry and the relay contact output if the AC power should fail. In addition, a set of input terminals are provided to activate the solid state relay remotely from user supplied normally open contacts, even when the power switch is in the off position, as long as AC input power is available.

MSRP $179.00

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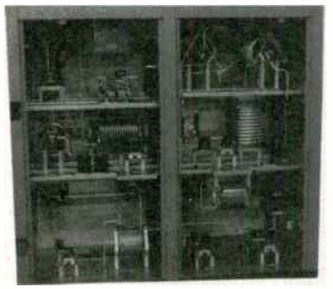

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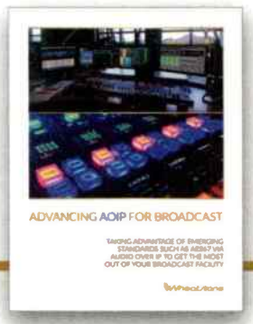

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