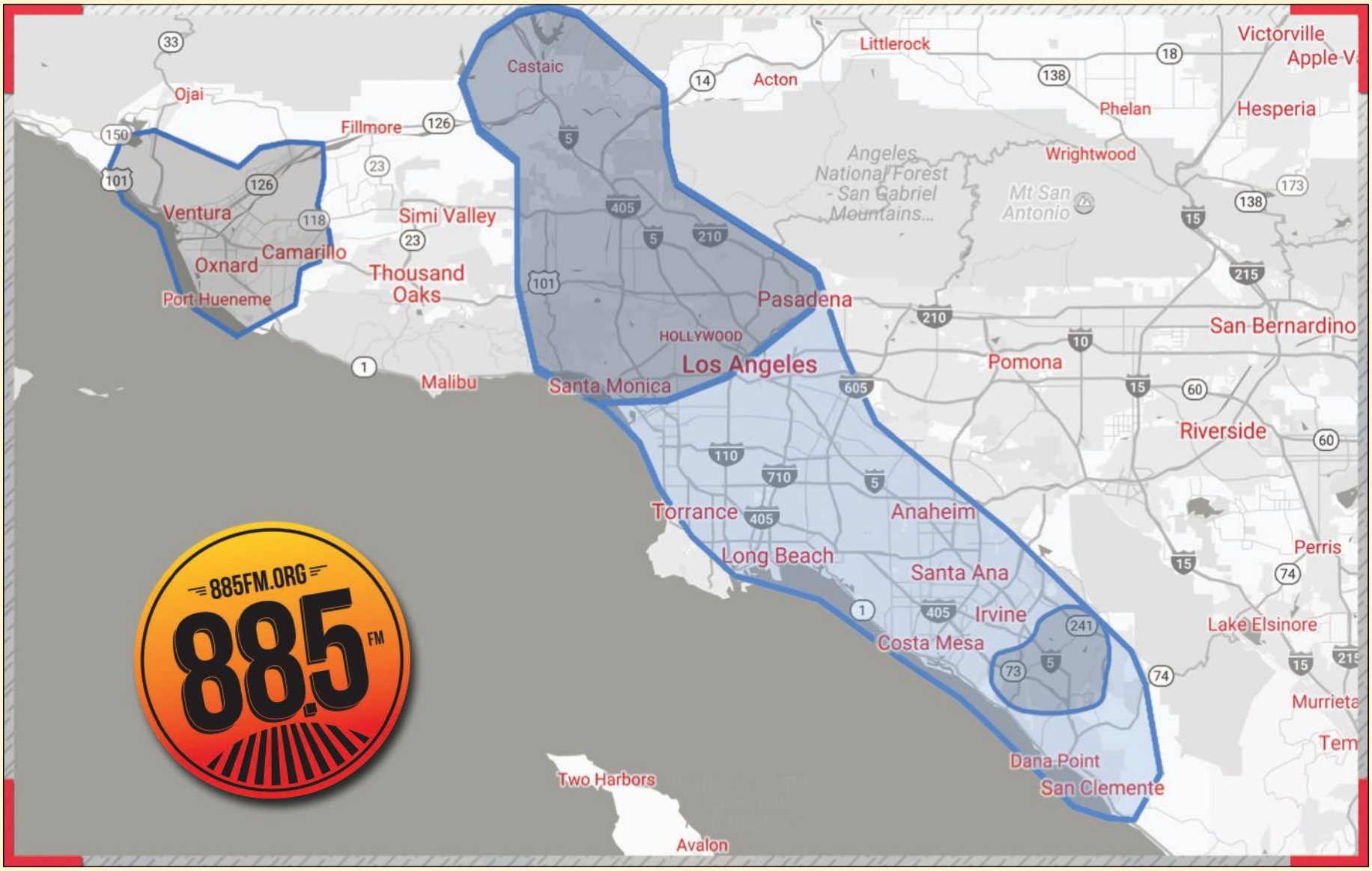
Radio Guide

www.radio-guide.com

Digital Issue Now On-Line

November-December 2017 – Vol. 25, No. 6

Optimizing Audio for HD Radio™



DON'T YOU WISH DRAFT PICKS WERE THIS EASY TO CHOOSE?

If you're calling the game, Henry's got the winning solution for complete control from the announcer's chair! Use Talent Pod to give your announcer personal control of his mic and headphones. Or choose the new Sports Pod to add Duplex Intercom and Remote Mic Control. Mix-and-match 'em to pitch the perfect game!

WE BUILD SOLUTIONS. **DIGITAL SOLUTIONS. ANALOG SOLUTIONS. FUNCTIONAL. RELIABLE. AFFORDABLE.**

HENRY ENGINEERING

Visit www.henryeng.com for all of Henry's solutions!

Henry Engineering • NEW Phone: 562.493.3589 • email: Info@henryeng.com

Meet the Coupe We Never Built

Well worth the wait, DMX packs a ton of power into a small frame. For its engine, we chose a high-performance Wheatstone power plant that utilizes WheatNet-IP to give you options beyond anything we've done before.

Operation is smooth and construction is aircraft grade. It's the command surface that can be your standalone console or direct your entire network. Fast, flexible, formidable. V-8 or 16 input models, both surprisingly affordable.

DMX

ITS TIME HAS COME

PRE.COM/DMX

PACIFIC RESEARCH & ENGINEERING

for more information, please contact us: phone 1.252.638-7000 | pre.com | sales@pre.com

Radio Guide

Contents

November-December 2017

Radio Guide
Volume 25 – Issue 6

Radio Guide Website: **www.radio-guide.com**
Classified Ads: **www.radio-classifieds.com**

PO Box 20975, Sedona, AZ 86341
Phone: 928-284-3700 • Fax: 866-728-5764
Ray Topp *(publisher & editor)* – radio@rconnect.com

In This Issue

Critical Content for Radio

Cover Story – *by Mike Pappas (page 6)*

Optimizing Audio for HD Radio™: *"Problems exist with lossy compressed audio sources like HD Radio and low bit rate streams. If you want to link multiple transmitters to create a single frequency network (SFN), you need to provide some precise processing for the SFN and external reference lock – typically to GPS."*

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

Christmas Potpourri: *"Have you had any experience with ferrite "donuts?" We have installed a number of Nautel transmitters and Nautel strongly believes in them. They supply them with the transmitter and "strongly suggest" (require?) that they be installed on the power lines, control lines, audio lines, and RF output."*

Telephone Topics – *by Tom Hartnett (page 14)*

Studio Telephones Jump to the Web: *"An entire industry has emerged to solve the "bad phone" sound problem, including analog frequency extenders, ISDN, and IP codecs. These solutions are great, but they require custom hardware on both ends of the connection ..."*

Transmitter Site – *by Tommy Gray (page 26)*

Transmitter Site Basics Refresher: *"Around the time that we start getting nights that are at, or near freezing, and days that are still relatively mild, you might run into a situation where your AC units start to freeze up on you, and require you to travel to the sites to thaw them out."*

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

An STL Story: *"The NiCom TSL 910 transmitter and matching RSL 900 receiver can be purchased as a pair for just under $3,000 which seems to be a very competitive price."*

HAVING A GUEST ON THE AIR

Doesn't need to be complicated.

Adonal Foyle

Author, Player Advocate, Media Analyst,
Former Professional Basketball Player

Quality Interviews, Simple Setup

For more information, visit www.comrex.com/opal/video

USA DESIGNED BUILT

Contact Us Today to Learn More

1-800-237-1776 | www.comrex.com

COMREX

Cover Story

Optimizing Audio for HD Radio™

by Mike Pappas, VP Business Development, Orban Labs

HD Radio™ offers stations new opportunities to reach a diverse audience in their listening areas, with the ability to deliver multiple programs from a single transmitted signal. A big challenge in reaching listeners with an HD Radio signal is the quality of the audio that is reaching their ears. Problems exist with lossy compressed audio sources like HD Radio and low bit rate streams. If you want to link multiple transmitters to create a single frequency network (SFN), you need to provide some precise processing for the SFN and external reference lock – typically to GPS. And, there is the time alignment issue if you are running HD Radio, where diversity delay monitoring and correction of the diversity delay timing of analog and digital streams becomes critical during the blend from analog to digital.

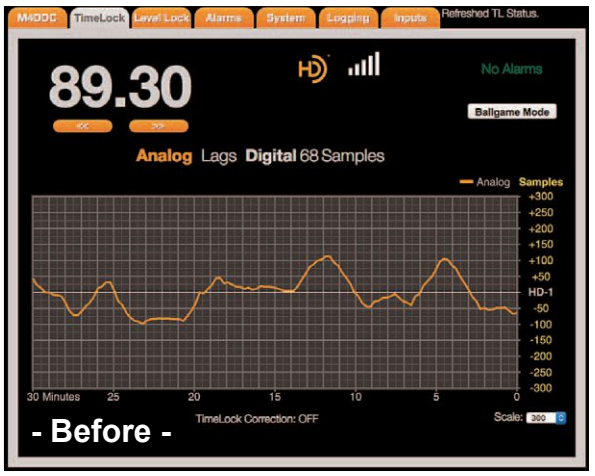
Orban's acquisition by DaySequerra in 2016 brought a new level of synergy to our engineering team. We were able to combine the industry's best minds in broadcast audio processing with the best minds in audio signal management. In my not-so-humble opinion, the results have been stellar. We now offer new ways to manage the audio signal from the time it enters your studio until the time it reaches the listener – all with the goal of making your station sound better than anyone else on the dial.

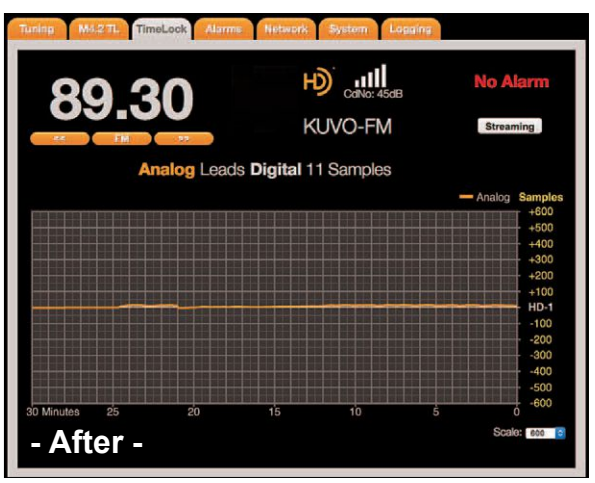
Correcting Issues With Your Source Material

One of the first problems you'll encounter with any digital audio broadcasting is the use of lossy compressed sources. From cellphones to MP3 files, at some point these sources are going to end up on the air, and with multiple lossy encode/decode cycles they're not going to sound good. It's hard to expect great sound at the HD Radio receiver when the audio going into the transmitter is lacking depth or is loaded with compression artifacts. We consider using highly compressed source material in your final transmission to be almost the same as ordering a pizza, throwing the pizza in the garbage, and eating the box it came in. With any lossy codec, you're throwing away 90% to 95% of the content of the original source material!

Once you understand what gets removed with lossy codecs and how they treat the audio, you can start looking at what you can do to try to restore what's been discarded. Typical codecs reduce stereo width, but because most listeners are on earbuds/headphones they won't notice. But run that audio through a couple encode/decode cycles on the way to an HD Radio receiver and the stereo soundstage becomes very, very narrow. The issue is how to restore the stereo width without making the vocals too wide. And, there are other deleterious effects with lossy codecs that result in lifeless/flat sounding audio. We recently addressed this with the release of our patented psychoacoustic engine, Xponential Loudness, which addresses lost dynamics, restores image width, reduces codec artifacts, and improves listenability without creating more problems than it resolves. We have it on the air at the largest SFN on the planet, KCSN/KSBR in LA, and their PD and CE say they are knocked out with the audio quality.

DaySequerra started preconditioning audio prior to streaming back in 2007. In our early studies, it became apparent that if you dynamically removed material that you knew the codec would misbehave with, you could significantly improve the audio at the listeners' end. Codecs have become much better in the last 8 or 9 years, but they aren't perfect (and they never will be) and preconditioning is still a valid method for significantly improving streaming audio quality. We have found that if you precondition and then post process with Xponential Loudness, you can make very low bit rate sources sound amazing. We have been testing 48 kbps streaming with codec preconditioning on the front-end; with Xponential Loudness on the back-end, and it gives you the equivalent audio performance of a 256 kbps stream.





As part of your HD content, you may also need to create a stereo image from mono source material. Drawing on DaySequerra's experience in making live 5.1 HDTV shows, Orban recently released its iMix Mono2Stereo. This is a high performance audio decorrelator that takes any type of mono source material, from cylinder recordings to commercial content, and makes it into a compelling stereo source. You can hear it in action on almost any NFL, MLB and NBA broadcast today, where it is used on mono sources such as hand held cameras to make stereo, where you can't put it into the center channel because it creates intelligibility issues with the commentary.

Handling Diversity Delay

Diversity delay is the amount of program audio delay required to be inserted into the analog program stream (MPS, or Main Program Service) in order to match the inherent delay of the HD Radio HD1 program. This delay is typically about 8 seconds but can be as high as 10 seconds, depending upon the HD Radio data payload – and it can drift. Failure to maintain alignment can degrade the user experience when the radio blends from analog to digital or when the signal requires the radio to go back to analog from digital. You would think that this problem would have been tamed by now, but when we look at markets with our new Market Area Monitor we find that about 40% of all stations broadcasting HD Radio are out of alignment, some by upwards of 1,000 samples. Virtually all air processors made by Omnia, Orban or Wheatstone are capable of taking delay correction vectors from external monitoring devices, making automatic diversity delay alignment easy. This also applies to exciters made by Nautel, GatesAir and BE. The NRSC just released a free paper that covers all of this and best practices; NRSC-G-203 is a "must read" for anyone involved in HD Radio broadcasting.

Processing for HD SFN's

Orban is currently participating in an extensive test of an HD Radio Single Frequency Network (SFN) at KCSN/KSBR in California. Covering markets from Santa Clarita to San Clemente, this SFN encompasses the largest radio market in the USA, and it is at present the largest digital SFN in the world. The system includes an Optimod 8700i located at the studio in Northridge driving three Nautel transmitters, via a Gates Air Intraplex®, and uses the Optimod's 192/24 Digital MPX output locked to a GPS-based 10 MHz reference. The 8700i includes a built-in RDS encoder and can also incorporate external SCA generators into the digital composite output. With the critical timing needed for an HD SFN, having everything available in one output signal has been highly useful in this project.

Quantifying HD Radio Coverage

We are currently working with a company that is developing software that integrates with our MAM3 receivers; this allows precision drive studies of HD Radio coverage and quantifies the amount of overlap that occurring and how it is impacting the HD Radio signal. We expect that the KCSN/KSBR SFN measurements will be made in late February/early March and we should have results to share at the NAB Show in April. But, at the end of the day, they have added 8.5 Million potential listeners to their station's eclectic AAA format, making it one of the largest audience expansions in Public Radio history.

Regardless of the final transmitter being used for HD Radio broadcasts, the ultimate quality depends on the input to the exciter. Processing and preconditioning shouldn't be an afterthought. And monitoring diversity alignment and automatically correcting for drift are part and parcel of being on the air with HD Radio.

We at Orban are excited to be in the forefront of processing for HD Radio broadcasts and think this is a significant step forward for over-the-air broadcasting. Still skeptical? If you think there aren't enough HD Radios in the field to worry about, here's an interesting tidbit: 86% of all new automobiles sold in 2016 had HD Radios in them – that's over 17M new HD Radio listeners. Add that to all the previous HD Radio equipped cars, along with statistics showing how much radio listening is done in cars, and you have a substantial target market. *– Radio Guide –*

MAKING DIGITAL RADIO
EASIER & AFFORDABLE

HD MULTICAST+ Importer/Exporter

Simple all-in-one solution. Cuts costs by 50%* compared to prior equipment.

HD MULTICAST+ Importer

NEW Importer with higher performance

NV^LT Series

Now upgradable to **HD Radio**

VS Series

HD PowerBoost!™ now included in VSHD

2017 BEST of SHOW Radio

Nautel Innovation: Learn about Nautel's latest developments including seamless handoff **HD Single Frequency Networks** at **www.nautel.com/hd**

HD Radio® Digital AM & FM

* For domestic USA deployments of the Multicast+ Importer/Exporter. For international customers please contact your Nautel representative.

nautel.com

nautel

Studio Site

Ten New Year's Resolutions

A Wide Range of Improvements "Yule" Love

by George Zahn

I know many of us have quit making New Year's resolutions – sometimes the demands and behavioral changes can be so overwhelming that we're defeated before pen hits paper. Instead of swearing to slim down by Spring, or weaning ourselves from any habit from cigarettes to candy, let's look at some very doable (and several very inexpensive) changes to our studios that can be made as we approach 2018.

Let's start with some relatively inexpensive fixes that might just make the New Year a bit brighter. We've explored a few of these concepts in past articles and will likely deal with some of these moving into future issues. A few of these minor changes I've made recently at my station, and many were long overdue. They were situations we had all come to "live with."

Little Changes Can Mean A Lot

1. Simple studio accessories that we see every day, can sometimes send the wrong message to guests on-air. Have you just come to accept the faded or discolored (and sometimes disgusting) windscreens on your microphones. This is a quick and cheap spruce up, and it may well be worth experimenting with some cheaper windscreens that replace the original manufacturers recommended models at a lower price. A clean new screen may not necessarily perform any better, but changing them out can improve appearance.

Other simple improvements can be investing in some new shock mounts or better booms in your studio. While not a quantum change, these can improve sound at least a bit, and potentially improve sight lines during interviews or panel discussions.

2. If you're happy with your on-air microphones, that's fantastic, but some managers and engineers are always looking for improvement. As a rule, you get what you pay for, and I'd be hard pressed to be convinced to swap out my Sennheiser MD 421 microphones for our studio work. Others will swear by their Shure model SM 7B, ElectroVoice RE 20, or a wide variety of other models that populate studios. It can be very subjective.

MD 421

But do you have a remote recording kit? Our station actually has a rather large rolling "mobile studio" – our version of Mary Poppins' "magic bag." It's a heavy duty tool bag on wheels that can hold a few extension cords, 4 desk stands and microphones, mic and other audio cables, a Behringer 1002B mixer, a headphone, and a old Zoom H2 portable digital recorder. We use the kit several times a month to do interviews around town, and quite honestly we were happy to just be able to record in the field, so the mics used were whatever we had around the station, since they were lugged and piled in the bag.

I actually lucked into quite a find. At a sale a few months ago, I invested in a pair of Audio Technica M8000 hypercardioid dynamics at half price, figuring they'd be at least a minor upgrade over three of the "catch as catch can" mics in our bag. For less than $50 each (sale price), I found some durable mics with a really desirable pickup pattern and nice crispness, making our mic capabilities for remote recording much better. I actually A-B compared the mics with the cardioid Sennheisers in the studio, and considering the significant price difference, the D8000 models were more than acceptable for voice-only field work.

Getting Unracked

3. Another quick and fairly simple New Year change is to clean up your studio rack space. How many devices have been sitting in your rack, unused for years? You can save power and let your important equipment "breathe" a bit more with increased ventilation space in your rack room or studio.

4. Perhaps freeing up some rack space can allow for a more revolutionary approach to recording devices. If you are not currently recording directly into a digital audio workstation in your studio, you may be laying audio down on a recordable CD or other device. While this item would not fall under a cheap fix, considering flash memory recorders in your studio will help keep you ahead of the curve as recordable CD media options seem to be slowly dwindling.

Removable flash memory cards can make audio portable and expedite getting studio audio to a digital audio workstation in another room or office. The largest consideration is weighing the higher cost of the new flash memory recording units against future years of buying more blank recordable CDs.

5. Speaking of recorders, if your news department is still using "strap over the shoulder" bulky recorders (even if they have flash memory), it may time to check the wide range of ultra portable hand-held recorders which range from around $100 to much higher levels. Even the most basic pro portable recorders offer line or external microphone inputs to allow you options beyond the built-in microphones on the unit.

Recycle Your Old Computer

6. And as we address digital audio workstations, one way of potentially increasing productivity is to turn that old laptop or desktop computer into an extra workstation. There are costs, of course, to adding editing software licenses, but even in a pinch, open source free software Audacity installed on your computer beats a blank. You'll invest more keystrokes to do most editing in Audacity, but it's still a viable option. Do you have an intern and want them to hone their editing skills? Turn 'em loose with some audio and Audacity on an old computer at a desk, and see what develops.

7. Should you have some budget flexibility, upgrading or having enough professional audio licensing software licenses is important. If your station has been working with Audacity or another free piece of software, it might be worth sampling a trial version of some of the paid software editors to see if there's enough upside to buy new software.

Most paid software, including Adobe Audition, WavePad, Pro Tools, and many others, will have more of the important functions and ease of use than you might have imagined. One important trade-off to consider is the type of license. Some software is cloud based and you can subscribe monthly to the service and you get standard updates. Some software offers a lower one-time price, but you may not get any new updates. It's important to check the details before making a purchase.

8. Amps and monitors can be expensive upgrades, but what your talent hears can affect how they're communicating and performing. One station I worked at supplied a new set of decent headphones to each on-air employee every few years. The individual headphones became the responsibility of each employee. If they broke a set, they were responsible for replacing their own set after that.

Protect Your System

I saved two biggies for the end. These may be the least sexy changes you could make, but they could be among the most valuable considerations to your daily operation.

9. How old are the hard drives in your audio delivery system for music, spots, interviews, and other content? Also, are they backed up or mirrored in any way. Please remember that if you're using any kind of digital delivery, your on-air/streaming service is only as solid as your hard drives and hardware.

As a rule at our station, we operate on a shoestring much of the time, but when hard drives in our audio system hit three years old, we start looking at budgeting to replace the drives by the time they hit five years of continuous operation. We're a pretty small operation, but we have one main studio, three small extra studios, and one office workstation that each have their own hard drives. Additionally, we have the central server. We generally change all at the same interval.

If you're sitting on four- to five-year old hard drives, you are on borrowed time. Mind you, we consider changing the actual mainframe hardware every seven to nine years or so depending on budgets. Upgrading to new hard drives will generally give you far more peace of mind.

While working on hard drive changes, it's a great time to examine the RAM capacity of your hardware for each workstation. If you're running a proprietary audio distribution system, it's very good to have discussion with the company before upgrading your hardware operating system. Backing up data before making any of these changes is a must. Tech support fees can be a good investment when making these changes.

Will updating drives and memory change your on-air sound? Not really, but it keeps you on the air, which is the bottom line.

10. In case you missed many stories over recent years of stations being hijacked by hackers, my final suggestion for 2018 is to make sure that you are not one of those stations which has its primary audio distribution system on the same computer that accesses the Internet. Isolating your primary audio distribution is an absolute must.

Utilizing any other computer to give your on-air staff internet access beats having your "bread and butter" audio delivery system vulnerable to a hacker. Here's the other catch. Even though you may pay someone to release the lock they place on your computer which is keeping you off the air, there's no guarantee that the criminal who hacked your system will ever really release the lock. In fact, some who may claim to have the "keys" to unlock your computer may well be a middle agent and have no means of releasing your system, leaving you financially short and still with no audio delivery.

Think of it. Isn't a basic computer sitting around your office, or available for maybe $300, a good insurance policy to give your on-air staff access to the internet without risking your most valuable asset, your on-air sound?

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*

When you compare ViA with competing remote codecs the choice is clear...

ViA delivers #MoreOptions over IP, ISDN and POTS.

- Full duplex stereo program plus separate full duplex IFB communications
- 5 input digital mixer and configurable matrix router (3 XLR inputs, plus stereo analog line in, or stereo digital in/out)
- Built-in dual band Wi-Fi with integrated web-browser
- Dual LAN & USB ports & optional ISDN, POTS or LTE modules
- Schedule, dial, manage & hangup connections automatically
- Adjustable input EQ & compression, plus AGC limiting
- 6.5 hours of power with one internal battery
- Restrict user access to settings with Admin & Basic modes

Wi-Fi Built-in

Join the #ViARevolution

ViA

www.tieline.com/videos

Tieline®
The Codec Company

317-845-8000 | sales@tieline.com | tieline.com

Chief Engineer

Christmas Potpourri

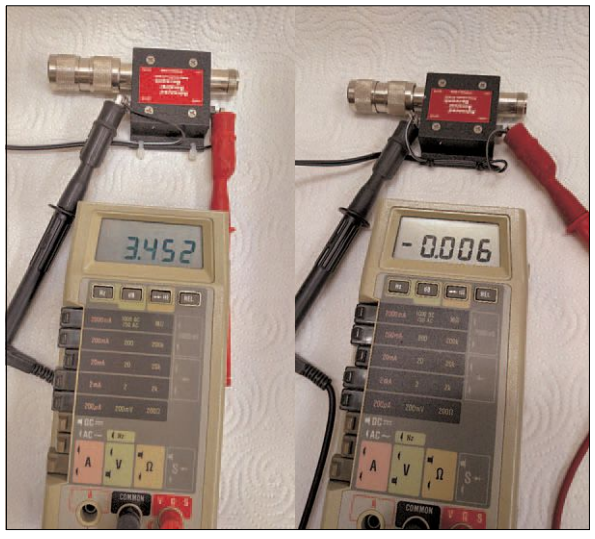
by Scott Schmeling

Christmas is just around the corner and 2017 is almost over. I hope it's been a great year for you and that 2018 is even better.

This article is a "Christmas Potpourri" of sorts – a collection of tips and tricks that I hope you will find helpful.

Twice in the last few months, I've had problems with STL's. One is an analog Marti STL-10 used as a hop in an ICR and the other is a Moseley 6000 series with the digital encoder/decoder. In both cases, signal strength was OK, but the Marti system had what I was told was "static" (it's only used for a church service) and the Moseley showed lots of errors and audio muting. In both systems, there is an Advanced Receiver Research RF preamp on the receive antenna input. (Is any of this sounding familiar? I wrote about this in 2015.)

You've heard the expression, "can't see the forest for the trees?" Well, I have to admit, it wasn't until I was away from both sites, and not even *thinking* about them, that something "popped into my head." AC ripple on the DC power supply for these amps can cause noise in the form of a 60 Hertz hum in the analog and data errors in the digital. A quick check confirmed about 3.5 volts of ripple. With the supplies replaced the problems were gone!



High AC Ripple **Low AC Ripple**

If you don't carry a 'scope with you, you can look for ripple with your digital multi-meter. Put the probes on the + and ground terminals. You can look at DC voltage as usual, but if you switch the meter to AC, you can see the AC ripple voltage riding on the DC. Naturally, the AC reading should be way down close to zero.

How many of you have had to trace through a tangle of power cords to identify the cord or "wall wart" in question? We've been working on a project at one of our transmitter sites for the last few weeks. One rack had three such wall warts. If you have a label maker, simply print out a label for the supply or power cord and stick it on. Once you've done that, it's easy to tell exactly what each cord and supply are for. And speaking of power cords – they're *always* too long! Something else I like to do is cut the cord to a good length to reach the power receptacle. Then I install a new plug. This does a good job of eliminating much of that cord-tangle.

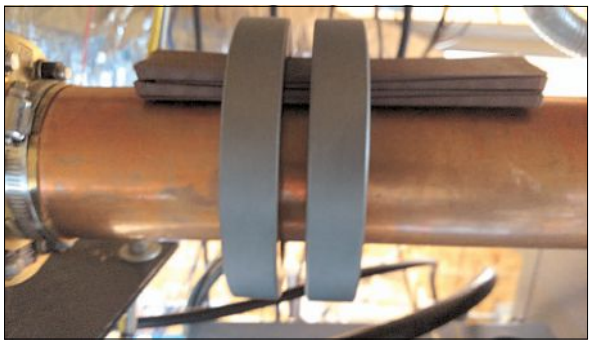
You and I deal with cords (power cords, mic cords, etc.) all the time and we *know* how to handle them. How many times has a co-worker come to you with a laptop power cord, with bare wire showing, wanting you to tape it up? You and I know this is caused by the cord being wound too tightly, putting a hard bend and unnecessary stress on it.

In some cases I have been able to put a couple cable-ties around the supply and cords. It makes for a neater package, detangles the cord, prevents some of that stress, and helps delay the need to replace the supply.

Have you had any experience with ferrite "donuts?" We have installed a number of Nautel transmitters and Nautel strongly believes in them. They supply them with the transmitter and "strongly suggest" (require?) that they be installed on the power lines, control lines, audio lines, and RF output. In the first three, the cables can be routed through the donuts, but not so with the RF outputs. (Ever try to bend 3" rigid line!) I honestly don't know how important it is to have the donut centered around the line, but I imagine they are more effective that way.

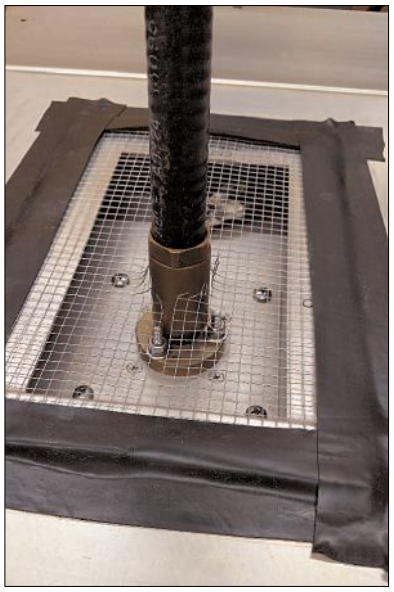
To center vertical lines in the donuts I put a cable tie around the line but I don't completely tighten it yet. Then I get three more ties ready by running them under the previously installed tie. Next, I position the donut at the first tie and tighten the other three to hold the ferrite in position. For horizontal lines (3" rigid for example) I like to position composite shims on the top side of the line in such a way as to center the line in the ferrite.

Most of my transmitter sites are out in the country and keeping mice *out* is a challenge. If they get inside the equipment they can cause *major* problems!



Composite shims center the line.

Such was the case with a Nautel ND5 AM transmitter. There is a rather large opening in the top of the transmitter for the RF output. And three small coax cables are routed just inside the top. Mice got in and apparently enjoyed munching on the coax. After replacing the cables and thoroughly cleaning inside the transmitter, I used some hardware cloth to cover that opening. Hardware cloth is like a very coarse screen. The grids are small enough to keep mice out, but air can still flow freely. So far the transmitter remains mouse-free!



Most satellite dishes have a cover over the feedhorn. Unfortunately, those covers eventually break down and fall off. That's when wasps and hornets discover what a great place it is to build a nest! Needless to say, we've discovered *many* nests when we investigate signal loss. To keep wasps and hornets out, you can cover the feedhorn with fiberglass window screen material. Trim it to size and secure it with cable ties (they're good for so much more than just cable!) The screen also allows air to flow and prevents condensation.

A screen keeps the wasps out.

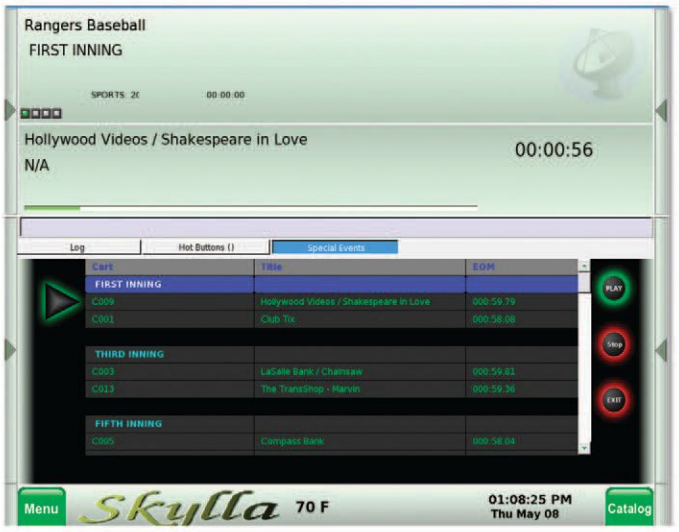
One last thing ... winter is coming. Get your sites ready for it. Plug up any holes that shouldn't be there. Depending on the opening, I like either spray foam or duct seal. And check all your air filters and exhaust fans. It can make a huge difference.

Have a very Merry Christmas, and until next year — keep it between 90 and 105!

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

Skylla Automates Baseball - Flawlessly

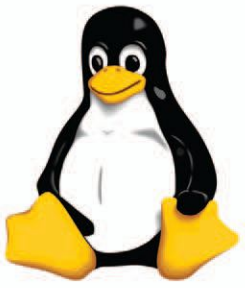
- Rain Delays - No Problem!
- Games After Midnight - No Problem!
- Local Games - No Problem!



Whether you need network sports automation with full walkaway, or just a better way to broadcast your local games, we've got you covered.

We were the first company to automate satellite feeds in 1989 ... and today, we still lead the field with the best walkaway automation for sports.

Our unique sublog system allows you to schedule and forget each game ... when the closures fire, the ballgame starts. You can relax and have a hot dog.



Automation That Is Bullet Proof

Our Linux operating system was built to do one thing: run your audio. You'll find that Skylla takes you to a whole new level of reliability. You'll get better security. You'll get better support - because we built your system, took a picture of it, and then installed it for you. There will be no surprise operating system updates. Rather, we'll have your back ... 24/7/365. We will solve problems for you.

"Making a four-station investment in Skylla was one of the best decisions I've made in 36 years of small market ownership. Our stations sound better, Skylla support is outstanding and I consume a lot less Rolaids than before making the change. My only regret is not doing business with Smarts many, many years sooner than I did."

- Roger Utnehmer, Nicolet Broadcasting, Sturgeon Bay, WI

SMARTS Broadcast Systems

1-800-747-6278

www.SmartsBroadcast.com

FCC Focus

Towers Revisited
New Developments in Non-Competes

by Gregg P. Skall – Womble Carlyle Sandridge & Rice, LLP

Towers Revisited

Last spring, in the March-April 2017 edition of *Radio Guide,* I declared 2017 to be the *Year of the Towers.* Tower issues are coming to the forefront for nearly every communications service, and FM radio is certainly not left out. FM radio is implicated primarily because of the TV repack; a consequence of the FCC's television incentive reverse auction.

While many radio licensees are well aware of the repack's impact on FM radio, just as many seem to have given little thought to the problems they themselves may face. FM radio repack issues were addressed in a session at the 2017 NAB Radio show by Dave Siegler from COX Media and Jim Stenberg from American Tower. They led an insightful session and delivered a strong wake-up call. That session validated my prediction with specifics worthy of notice by every radio broadcaster.

The most important message from that session: *Get an offsite AUX now!*

The TV repack tower problem focuses on FM stations that share a tower with a television facility. To complete the repack, many television stations will be required to move to a different location on the same tower or to a different tower or replace an existing antenna with another of lower frequency. In many cases, this will require a co-located FM station to move or be off the air for an extended time period.

Even if a move or extended off-air time period is not required, collocated station will, at times, be required to power down or cease transmission altogether to provide for the RF safety of the tower workers. Assuming a station will not want to leave its audience hanging during reduced power or dark periods, it is imperative to have an adequate auxiliary site to provide continuity of service. For radio operators, that means that you must know your tower! As Dave Siegler reminded us, know your tower means knowing whether there are TV antennas on it and whether they are to be repacked! It also means making sure there is a recent RF exposure study of it.

You can find out more about the repacked channel assignments and the effect on a particular channel in your area at the new NAB website: **www.rabbitears.info**. As of March of this year, there were approximately 2,100 U.S. licensed television stations, of which 957 – nearly one-half – must be repacked. According to FCC and Antenna Structure Registration System Data, 1,153 towers in the U.S. have co-located FM and TV stations and some 2,368 FM radio stations and translators may be impacted by the repack. American Tower's Jim Stenberg reported that very few of those FM stations have auxiliaries on different towers. FM translators are not given the option by the FCC to have an auxiliary site.

It bears emphasis that repacking these TV stations will have significant effects. As reported above, many will need to switch out existing antennas for heavier and larger ones, and many will also need transmission line changes. To accommodate this, it is expected that a significant number of towers will require structural improvements that will further prolong the construction time period. Compounding the problem, tower structural standards have changed. When structural modifications are necessary, the tower will likely become subject to newer and more stringent standards than when first built. This can complicate and prolong the time period required for adjustments to reposition tower tenants and protect tower workers, consequently extending the time of reduced power or silent status of FM stations. Abandoned antennas and feed lines will also need to be removed in order to increase tower capacity. All of this will be even more complex and time consuming on towers that are home to multiple antenna moves.

So, what's a prudent FM licensee to do? Required to undergo these "inconveniences" to accommodate the repack, how will a station be reimbursed and compensated for the cost and inconvenience of physically moving its own antenna or for the loss of revenue occasioned by reduced power or suspended operation? Addressing this problem, the Commission stated that it will consider claims from a station that makes changes required to accommodate the repack of another station only to the extent required by a contractual obligation entered into on or before June 2, 2014. Accordingly, once it is determined that an FM station will be impacted by the repack, it is critical to examine its tower lease to determine whether reimbursement is required for changes required to accommodate changes of a tower co-tenant. If such a contractual indemnification cannot be found, as of this writing the station is not eligible for FCC reimbursement.

Understanding this situation and oversight, several members of Congress have introduced legislation to reimburse broadcast radio stations for costs incurred as a result from reorganization of broadcast television spectrum in the repack. Examples include Congressman Flores' H.R.3685, the Radio Consumer Protection Act and Congressman Pallone's H.R.3347, the Viewer Protection Act of 2017. However, it is way too early to predict how successful those efforts will be.

Of course, for many, we still have some time. The repack is to be accomplished in 10 phases. Phase 1 is to be completed next November. The tenth and final phase is not to be completed until July of 2020. But, given the scarcity of tower crews, equipment and other resources, it is not clear there will be sufficient capability to meet the TV repack schedules, much less the requirements of radio stations that must make changes to accommodate it. The consequence of failing to meet the deadline date is a mandatory cessation of operations until the new facilities can be completed. You can find out what phase your county and state are in, and what stations are affected at the NAB's new repack website **www.tvanswers.org**.

If it looks like your station will be affected, now is the time to begin discussions with the tower owner and all other stations on the tower and make sure you have or will get an auxiliary site for your station should it be needed. American Tower's Jim Stenberg's admonition is, "make sure you evaluate opportunities for temporary or auxiliary operation on the same tower or, if necessary on a separate tower and evaluate the coverage effects from these operations." And finally, be prepared to deal with the tower structural and reloading requirements of ANSI/TIA-222 Rev-G.

New Developments in Non-Competes

In an industry so focused on the development and promotion of personalities, talent non-competition agreements can be critical. This is a field that is tricky and always changing. It pays to stay up on new developments. A recent article in a legal publication brought my attention to several new developments that are worthy of broadcasters attention. While many of these new developments are specific to the state in which the case arose, they reflect general principles often relied upon in all states and therefore sew a cautionary tale worth hearing.

Nevada Law Allows Judges to Blue-Pencil

Employers may be pleased with a new Nevada statute that empowers judges to analyze a noncompetition agreement and fix them when they might otherwise be required to be nullified. Under the law, Nevada judges can "blue-pencil" or tweak provisions which otherwise could not pass muster for being too inclusive. However, the court's revisions must cause the limitations contained in the covenant as to time, geographical area and scope of activity to be restrained to be reasonable and the restraint may not be greater than necessary for the protection of the employer for whose benefit the restraint is imposed. As in most other states, even the Nevada court blue-penciled revisions must protect something of value, and not restrain the employee more than is necessary for the necessary purpose, or impose an "undue hardship." Further, employers cannot enforce non-competes against a laid-off worker unless they still pay his or her salaries and benefits.

LinkedIn Invitations Don't Violate Non-solicitation (take me along) Agreements

An Illinois appeals court recently held an email "connect" request on job networking site LinkedIn, sent to former colleagues did not violate a non-solicitation agreement, equating the emails to generic invitations to connect, rather than attempts to solicit former co-workers. The court held it's the content of the communications that matters, not the medium used to communicate it. "There are certain features about LinkedIn that are going to send out this blast as soon as you update your status, but what's really the difference between that and your new employer buying an ad on cranes ... announcing that you've arrived?" The court left open the question of whether a different, possibly more specific agreement, could restrict a former worker's use of social media. The court speculated that "digital social media is still an area that the courts have not caught up with, that the law is trailing behind the tech," and more developments will likely come.

Difficulty Enforcing Non-Solicitation Clauses

Last June, in a case captioned *In re: Document Technologies Litigation,* U.S. District Judge Jed Rakoff held that four sales executives who left their firm could not be barred from working for a competitor, holding a non-solicitation agreement blocking them from soliciting colleagues to jump ship with them failed New York's test for reasonableness.

In a broad and far reaching opinion, the court held that an employer cannot prevent an employee from "preparing to compete" after the period of the non-compete, because restraining such acts "would have the effect of extending the term of the covenant." The court also held that a restrictive covenant could not prevent at-will employees, who have yet to accept an offer of new employment, from "inducing" or even "encouraging" their coworkers to leave with them. Such a covenant is reasonable only if it: (1) is limited to protecting legitimate business interests of the employer, (2) does not impose an undue hardship, and (3) is not injurious to the public."

The case is a reminder that such post-employment non-competes and non-solicitation restrictive agreements must be based on something truly unique and valuable, and will not survive if they simply restrict an employee's post-employment behavior.

These cases point out the necessity for well-crafted non-compete agreements, and the need for specific legal advice for entering into, relying upon, and interpreting, non-compete agreements. In other words, cutting and pasting from a non-compete agreement used by another broadcaster in another state or from years ago may save pennies in legal fees but later incur substantial costs when new developments or dissimilarities in state law impact its enforceability.

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 Carlyle Sandridge & Rice, LLC. 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.

ARRAKIS SYSTEMS INC.

All Arrakis consoles now have AoIP !

For more than 35 years,
Arrakis Systems has led the way
with ground breaking innovations in Radio.
Now with SIMPLE-IP, all Arrakis consoles can
be linked with the World Standard DANTE AoIP
protocol for less than $1,000 per studio.
Visit our website today !!!

ARC-8
only $849

ARC-10
from $1,699

ARC-15
from $3,799

MARC-15
from $5,499

Digilink-Xtreme

SIMPLE-IP

ACCENT furniture

Digilink-HD

www.arrakis-systems.com

970.461.0730

Telephone Topics

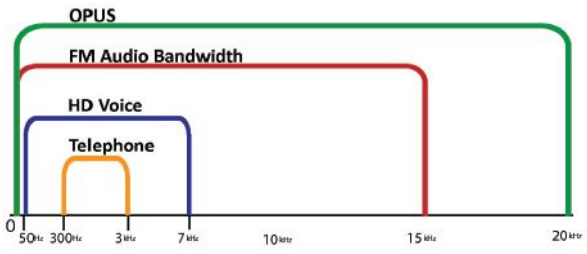
Studio Telephones Jump to the Web

by Tom Hartnett – Technical Director Comrex

Broadcasters need phones. Phones are the ultimate way of sharing the experience of listeners, expert guests, athletes and politicians by putting their calls on-air. But with all of the advancements in technology and voice transmission, what would be defined as a phone today? Is it the thin, tinny sound of POTS (Plain Old Telephone System) phones we've had for a hundred years? Is it the unintelligible, muffled sound of a mobile phone? Maybe it's an app running on a smartphone? Is it that fancy new VoIP handset in your office? Or is it the web browser on your computer?

The answer is yes to all of the above. The modern studio needs to be equipped to handle as many of these "phones" as possible because there are distinct advantages to each. Most of all, there are new ways that eliminate the old fashioned "POTS" sound, while keeping the experience simple enough for anyone to use.

The POTS phone system is built on legacy. Decisions made by telecom engineers decades ago define the technical parameters of the POTS system today. Those decisions were based on intelligibility rather than voice quality. And until recently, the goal of wireless phone companies was to make voice calls sound only as good as POTS calls. And most of the time they failed at even that low benchmark.



With regard to broadcast, the technology focused on send/receive audio separation with digital hybrids, along with some basic filtering and level control. While this is important to make on-air phone calls as clean as possible, it never addressed the real issue of audio bandwidth. The dismal frequency response delivered by phones limits the quality so much that voices are often indistinguishable, and sibilance and bass completely removed.

As broadcasters, we know this all too well. An entire industry has emerged to solve the "bad phone" sound problem, including analog frequency extenders, ISDN, and IP codecs. These solutions are great, but they require custom hardware on both ends of the connection, so they're not usually useful in putting the mayor or quarterback on-air from a home or office in good quality.

Mobile phone companies have more recently come to realize that they no longer need to support only legacy telephone sound. Mobile-to-mobile calls are increasingly processed using wideband audio encoders, doubling the audio bandwidth of calls. If you haven't yet experienced an "HD Voice" or "Advanced Calling" connection, you're in for a treat. The added fidelity can restore quite a lot of nuance to the caller's voice, making calls much less fatiguing. Unfortunately, this is strictly a mobile-to-mobile enhancement. Any mobile calls bridged to the POTS (or VoIP or ISDN) network are transcoded down to telephone quality, so there's not yet any elegant way to take advantage of this on your studio calls.

Internet telephony, and Voice-over-IP in particular, is quickly growing to compete with POTS. Chances are that shiny, new desk phone in your office is VoIP-based, even if your office's phone infrastructure isn't (yet). As homes and businesses make the migration to lower cost VoIP services, calls that touch the POTS system will become fewer. And VoIP-to-VoIP calls can already benefit from wideband audio encoders like G.722 and Opus, as these are being built into most new VoIP phones.

In fact, this is how pro-grade audio hardware IP codecs interwork with apps like Luci Live and Linphone. The apps simply emulate a VoIP phone in software (e.g. on a smartphone using a 4G or Wi-fi connection) and the IP codec hardware emulates a wideband VoIP phone as well. As shown in the next figure, calls are usually made directly between the VoIP devices, rather than through a service provider, but the principle is the same, and wideband encoders are deployed on each end of the call.

But this requires some expert technical knowledge on each end of the call, something that's usually in short supply. Apps like Skype and Facetime can make things easier, but they still require the user to install and use something possibly unfamiliar. And bridging that audio in and out of your console isn't always the slickest arrangement, not even considering the upkeep of the PCs required to receive the calls.

One of the newest and hottest technologies for web-based calling (both video and audio only) is probably already designed into the web browser you use daily. It's called WebRTC, and it's built to compete with apps like Skype and Facetime for computer-to-computer calling (along with smartphones and tablets). But unlike those proprietary apps, WebRTC is wide open technically, and has been designed into Chrome, Firefox, Opera and Microsoft Edge already. The last holdout, Apple, finally caved and added it into Safari for OSX and iOS. So it's universal, doesn't require any installation, and it's extremely simple for the user.

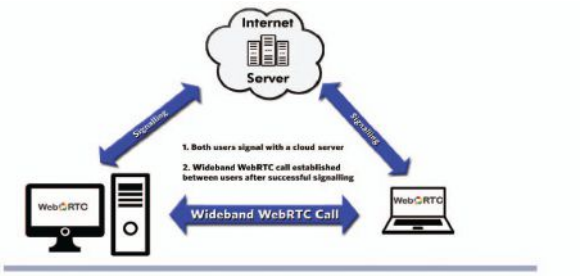
For those of us concerned primarily with audio, WebRTC offers some really great features. The default encoder used for calls is Opus, which is state-of-the-art for web audio applications. It offers a wide array of bandwidth options (including 48 kHz sampling rate wideband) and is very adaptable to network conditions. It also has very low delay for interactivity. And because it's freely licensed, it can be added to products and applications easily. While WebRTC was designed as a video communication tool, audio-only calling is easily supported.

Some broadcasters are already using WebRTC, perhaps without knowledge of the underlying tech. Web-based subscription remote broadcast services like ipDTL and Callme.fm are WebRTC services.

These and other WebRTC services require two clients, connected together by a cloud server as shown in the first scenario in the next figure. Each client signals to the server, using a web browser via a URL link. The server negotiates the call between the clients, and web audio begins to flow directly between them (when possible). If firewalls or routers prevent direct connection, WebRTC can handle a range of traversal options, including proxying the media between the clients.

This is a great solution, but still requires PC hardware on the studio side (to host the browser), as well as a cloud server. Also, connections need to be initiated from each end. It can be made simpler.

What if we take one of the clients and the server, and combine them into the same hardware? Add professional audio I/O and a way to filter incoming calls, and the system becomes more of a web gateway for callers on browsers. This would dramatically simplify the experience for the caller, as they would simply need to click a link in order to make a connection to the studio from any browser.



Among other things, this would remove any issues with firewalls and routers, because the installer of the gateway can be sure of an open connection (via DMZ or port forwarding) on their end. Since the caller side is always outgoing, there's no need for any fancy NAT traversal techniques on their end, and the media will always flow point-to-point.

This is the format taken by the Comrex Opal Web Audio gateway. Once installed at the studio side, it acts as a normal Internet web server, delivering a "landing page" to anyone who is authorized to make calls to it.

The web page delivered by the Opal server contains Javascript that runs on the browser and handshakes back to the WebRTC media server contained in the Opal. Once the "Connect" button is pressed, the Javascript activates the audio encoding software already contained in the browser, and makes a duplex connection back to the Opal box.

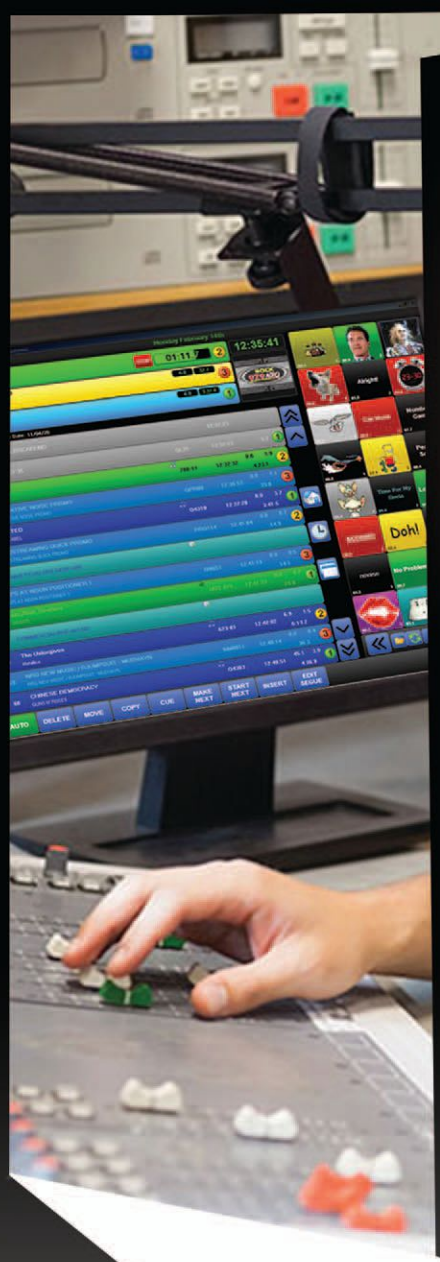
The real beauty of a system like this is caller simplicity. It's really important for non-technical VIP callers to be able to make the call to the studio right, the first time, without installing anything or changing any settings.

Opal calls can be placed by clicking a URL link. Caller links are created by the Opal gateway on request. This "invite" link also contains information about the caller's name and which of the two Opal audio ports the call will appear on. The caller can receive this invite via text or email, or it can be published if widespread availability is desired. Connections are literally a single click of the link from any compatible browser. Invites can be disabled and erased by studio staff anytime.

Mobile phone browsers are starting to support WebRTC as well. In these early days, however, WebRTC implementations in mobile browsers can be hit-or-miss, so Opal has the option of linking incoming callers directly to the iTunes or Android Play app stores, where they can download a free Opal app with much higher reliability on smartphones.

The radio industry is changing, but so is the telephone industry. With easy access to the web in our offices and in our pockets, there's fewer reasons to air poor quality telephone calls for any length of time, especially guests who will be on-air for more than a few seconds. New technical tools like Comrex Opal can replace the tinny sound of phone calls, and bring an ease-of-use factor never had with web audio before. *– Radio Guide –*

Open the door to *your* possibilities!



Powerful, state-of the-art automation with the flexibility to grow with you...

- The power of OPX in one stand-alone computer
- Easy to learn
- The power to handle the largest audio libraries
- Satellite and live programming
- Additional stations
- Remote voicetracking
- Remote control

OPX ONE

Call (888) 274-8721

(888) BSI-USA-1

or email us at sales@bsiusa.com

What Happened to My Station?

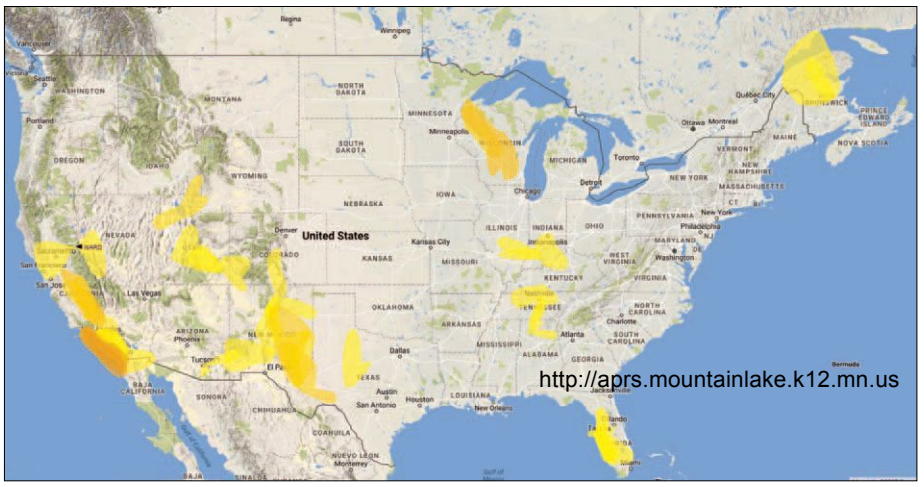
by Steve Callahan

It's been good season for tropospheric ducting along the New England shore. You might not be familiar with the term "tropospheric ducting," but you just might have experienced it and not known why.

We're all familiar with the way that AM signals bounce at night and come down far from their point of origin. Anyone who has listened to the big 50,000 Watt clear channel AMs knows the thrill of hearing a distant AM on a regular radio. I was once surprised to hear WBZ from Boston while in a traffic jam one night in Atlanta, Georgia. An AM station's "skywave" component reflects off the ionosphere as it cools down at night and the usually transparent-to-AM layer turns reflective and the AM signal comes back to earth far from it's transmitter. Frequency and tower height influence the degree of skywave along with seasonal differences and weather conditions.

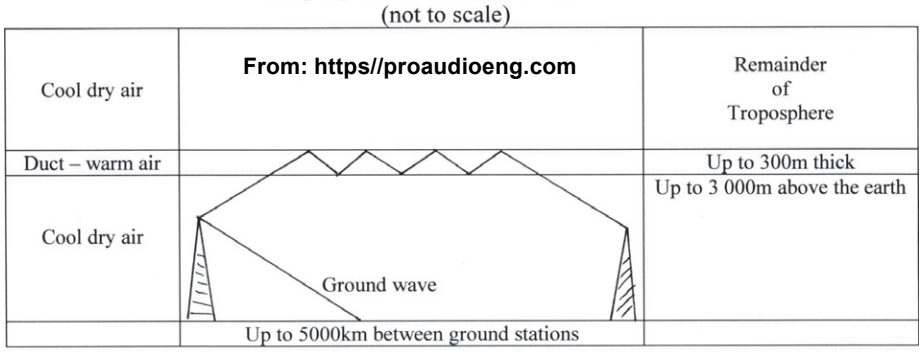
FM also is also subject to a temporary weather condition that can and does send an FM signal far from home. Tropospheric Ducting is a condition when a layer of air is sandwiched between two layers of air that are at a different temperature than the center of the sandwich. The FM signal gets into the center of the sandwich and is "ducted" or channeled long distances from its usual service area.

Tropospheric ducting is very temporary, only an hour or two at a time, and can be somewhat expected during the right weather conditions. My experience is that it is more common along the shoreline.



U.S Map Showing Areas of Tropospheric Ducting

Tropospheric Ducting – Simplified
(not to scale)



I was once at small FM station on Cape Cod repairing a transmitter and the work took longer than I had expected. It was after dark by the time I turned the transmitter back on, checked the meter readings, buttoned up the transmitter building and headed home. I had the newly repaired station on my car radio and just a few miles down the road, the programming of the station suddenly changed. I was now hearing a New Hampshire station on the same frequency! I thought, "Drat! – that repair didn't last long. So I did a quick U-turn and headed back to the transmitter as fast as I could. As I threw open the transmitter building's door, I saw that all of the transmitter readings were normal and just as I had left them. As I tried to drive home the second time here was no sign of the New Hampshire station and I was left scratching my head.

Years later I was working at a high powered FM station on a mountain top in Maine. I had spent most of the day working on the site and I was quite pleased that my efforts resulted in a successful conclusion. I got in my car, drove down the mountain and headed home. I was listening to the station in my car and about 45 minutes from the transmitter site the programming suddenly changed. Now I was listening to a Cape Cod FM station which I knew was almost three hours away! I remembered back to my first experience on Cape Cod and as I drove south, the Maine station's signal came back and all sounded as it should.

I was Director of Engineering for a small FM station in Rhode Island when I got a call that some of our loyal listeners along the southern shore were asking why we had suddenly changed our format to country. I quickly spun the dial of my car radio to our frequency and, yes indeed, there was full-stereo, boot-scootin, country music coming out of my speakers. When the song ended, there was a commercial spot for a car dealer in Ocala, Florida. Tropospheric ducting strikes again! Within an hour, the Florida FM signal faded away and our local signal returned. During my tenure in Rhode Island it was not unusual to have a couple of tropospheric ducting episodes a summer. Usually a co-channel FM signal from the top of the Empire State Building in New York City was the ducted-in culprit and it left as quickly as it arrived. My clue in Rhode Island was if there was heavy sea fog in the early morning along the southern coast, conditions were right for some tropospheric ducting that day.

Just last month, another Rhode Island FM station called me to ask if there was a reason why their signal just got noisy and their listeners were complaining. You guessed it – there was heavy sea fog that morning and another co-channel FM station was being ducted into Rhode Island. In less than an hour, the fog lifted and their signal returned to normal.

Shortly after that, an old friend of mine called and asked if there was any reason why a Rhode Island station's air signal would be coming out of his station's off-air studio speakers in Portland, Maine that morning. I told him that it was most likely some co-channel tropospheric ducting along the Maine coast or the Rhode Island coast and it would go away in an hour so. My friend was greatly relieved and said he would pass the information along to his anxious station manager.

My experience is that tropospheric ducting affects co-channel stations, which are stations on the same frequency, and the signal that is negatively affected could be the offending signal another day. There is a website (**www.dxinfocenter.com/tropo.eur.html**) that tries to predict when weather conditions are right for tropospheric ducting. The condition will dissipate as soon as the weather changes. My advice is, if this happens to your station, first, try to calm down your general manager, explain to any of your listeners who call in that it is an occasional, natural occurrence which will go away soon. Then you can sit back, relax, and revel in what the mixing of weather, temperature and frequency modulation can do.

In my previous *Radio Guide* column, I shared a "brain-twister" problem at a radio station that had me puzzled for a few weeks. The night pattern at this AM station would go out of tolerance intermittently. There were separate day and night antenna tuning units at this three tower array. All of the indoor components looked or tested OK. There were separate day and night transmission lines and the base current at one of the night towers would go to near zero during these episodes. The problem was very intermittent and seemed to happen more during rainy weather. The important clue was the weather. Could it be a component that was outside in the weather?

The grounding for each of the antenna tuning units had its own copper strap to ground. In this station, the ground strap exited the top of the ATU panel, went through at the top of the concrete block wall and curled back onto the roof. It wasn't easily noticed unless you had a reason to get a ladder and climb onto the roof off the ATU building. One day, just after a rain, I was between the tower and the ATU building and I thought I heard the ATU "singing" with the AM modulation, which is not all that unusual, but I also heard some arcing – which *is* unusual. I got a ladder, climbed onto the ATU roof, and found that the ground strap for that tower's night ATU was loose and had been arcing – a lot.

A few minutes with a torch and some silver solder and the problem hasn't reappeared.

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

From analog FM to **best-in-class HD Radio** on **your schedule** and **budget**

Transition to superior digital with exceptional ease and affordability

Flexiva™ Gen4 Exgine HD Radio Solution

- High-efficiency transmitters with industry-leading performance, compliance
- End-to-end management for multichannel program transport and delivery
- Industry's most advanced quality and diagnostics with robust Flexiva exciters

CREATE | TRANSPORT | TRANSMIT TELEVISION | TRANSMIT RADIO

95 YEARS
GATESAIR
Since 1922

Connecting What's Next

www.gatesair.com

Since 1922, GatesAir has remained the industry's most trusted supplier for the over-the-air TV and radio networks worldwide. World-class engineering and industry-leading innovation marry outstanding performance with the industry's highest reliability and operational efficiency. Our impeccable sales and service bring it all together for our valued customers.

Made in USA

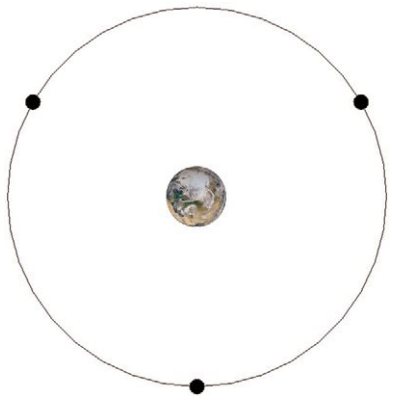
Satellite Guide

Satellite History

by Mike Hendrickson

Many of us do not realize how dramatically the broadcast industry has changed since the advent of satellite communications. It's hard to believe that, prior to communication satellites, it would take minimum of many hours, if not days, for video information to travel from one continent to another. Live audio between continents was dependent upon the limited bandwidth communications of either undersea cables or shortwave radio stations. Within the United States, radio and television stations were dependent upon various telephone companies for the delivery of live programming.

The idea of a communications satellite originated in 1945 by scientist and science fiction writer Arthur Clarke. In the February, 1945, issue of Wireless World, Clarke had a letter to editor published with the title of *Peacetime Uses of the V2* (The V2 was a rocket developed by the Germans during World War II.). One paragraph of the letter states, "An 'artificial satellite' at the correct distance from the earth would make one revolution every 24 hours; i.e., it would remain stationary above the same spot and would be within optical range of nearly half the earth's surface. Three repeater stations, 120 degrees apart in the correct orbit, could give television and microwave coverage to the entire planet. I'm afraid this isn't going to be of the slightest use to our post-war planners, but I think it is the ultimate solution to the problem."



The original concept by Arthur Clark had three space stations in orbit around the Earth. The spacing between the stations would be 120 degrees. The three stations would cover all of the Earth's surface except for the polar regions. This view is from above the North Pole.

Later in 1945, Clarke privately circulated a proposal entitled, *The Space Station: Its Radio Applications.* A copy of that article is now in the National Air and Space Museum, Washington, DC. It was reprinted in *Spaceflight, March, 1968.*

One of the early project's of NASA in the late 1950s was Project Echo. This was the launch of passive satellites designed to relay communications signals from one point on the Earth's surface to another point. The satellites were giant metalized balloons placed in low earth orbit. The first, Echo 1, launched on May 13, 1960, failed when the launch vehicle failed to place it in orbit. A second attempt, Echo 1A, was launched successfully. On August 12, 1960, Echo 1A was used to relay a microwave transmission from the Jet Propulsion Laboratory in Pasadena, California to the Bell Laboratories in New Jersey

Echo 2, the last of the balloons of Project Echo, was a 135 ft. balloon launched on January 25, 1964. Both Echo 1A and Echo 2 were used in a series of passive communications experiments and studies. One item of note is that the large horn antenna constructed by Bell Laboratories for Project Echo was later used to discover the cosmic microwave background radiation resulting in a Nobel Prize for Arno Penzias and Robert Wilson.

Bell Laboratories horn antenna. This antenna was built for the purpose of using the Echo satellites for communication relays. Later it was used in the discovery of cosmic background.

In 1962, the first active communications satellite, Telstar 1, was placed in a low earth orbit. Telstar 1 was owned by AT&T and was part of an international agreement between AT&T, NASA, Bell Telephone Laboratories, the General Post Office (United Kingdom), and the National Posts, Telegraphs, and Telephone (France). One technology problem that had to be overcome was the conversion of the television signal between the U.S. standard of 525 lines and the BBC standard of 405 lines. The equipment required to do the conversion filled an entire room.

This satellite relayed the first publicly broadcast live transatlantic television feed on July 23, 1962 at 3 p.m. EDT. The broadcast was shown in Europe by Eurovision and in North America by NBC, CBS, ABC, and the CBC. The broadcast was to have been remarks by President John Kennedy, but the signal was acquired early so the engineers filled in the time with the first live transatlantic broadcast of a baseball game. Another first occurred when Telstar 1 relayed a telephone call and fax.

Telstar 1 was also a victim of the Cold War. The day before the launch of Telstar 1, the U.S. conducted a high altitude test of a nuclear bomb. The electromagnetic pulse (EMP) from the bomb energized the Van Allen belt where the satellite orbited. The increased radiation, along with a later Soviet test, damaged Telstar.

On December 13, 1962, Relay 1 was launched into low Earth orbit. Relay 1 was used to transmit the first television program between the United States and Japan. This was a prerecorded program by President John Kennedy scheduled to be broadcast on November 22, 1963. Instead, there was a live announcement of the assassination of President Kennedy.

Syncom 2, launched in 1963, was the first geosynchronous satellite. Syncom 3, launched in 1964 was the first geostationary satellite. Relay 1 was used in tandem with Syncom 3 to relay coverage of the 1964 Summer Olympics from Tokyo to the United States and then to Europe.

Comsat was responsible for the launching of Early Bird, in 1965, known officially as Intelsat 1. Early Bird was the first commercial satellite in a Geostationary Orbit. Early Bird was active from 1965 until January, 1969. It was briefly reactivated in 1990 to celebrate its 25th launch anniversary. It remains in orbit.

There are three general types of orbits used by communications satellites. A Geosynchronous Orbit (GSO) is an orbit around Earth of a satellite with an orbital period of one day. The synchronization of the Earth's rotation and the orbital period means that for an observer on the Earth's surface the satellite returns to the same location in the sky once every day. The satellite will track a figure eight pattern in the sky.

There is a special case of the GSO called the Geostationary Orbit. This orbit is directly over the equator. Satellites in this orbit appear to be stationary in the sky. The Geostationary Orbit is the orbit used by most modern communications satellites. The Geostationary Orbit is also called the Clarke Orbit in honor of Arthur Clarke.

Another type of orbit that is also used for communications satellites is the Molniya orbit. This is a highly elliptical orbit with an orbital period of one half day. The inclination of the orbit is 63.4 degrees. Because the apogee is over the northern hemisphere, the Russian Federation, as well as northern Europe and Canada have excellent visibility of the satellites.

Communication satellites are also placed in low Earth orbit. These satellites are typically used for satellite telephone, data, and similar types of communications.

All of the early communication satellites were equipped with just one or two transponders capable of relaying communications. These satellites were research and proof of concept devices. One of the primary driving forces for the communications satellites was the need by the Department of Defense for better communications.

It's interesting to read about some of the technical specifications of the early communications satellites. Echo 1, the balloon, had a launch mass of 66 kg (146 lb). Early Bird had a launch mass of 68 kg. Early Bird was capable of relaying 240 telephone type circuits or one TV channel. The design life was 18 months. Today, communication satellites easily mass over 2,000 kg and are capable of dozens of TV channels and tens of thousands of narrow bandwidth communications channels. The design life of today's satellite is typically 15 years.

Echo 2 Ground Testing

I have a few personal notes of interest regarding the beginning of the communications satellite era. As a kid, I remember going out into our backyard in rural Minnesota to watch Echo 1A track across the evening sky. Echo 1A was large and along with its reflective surface, it was easily visible from the ground.

I was able to see one of the first communications satellite receive antennas located in Minnesota at Maple Lake. This was an 11.2 meter (37 ft.) dish that I believe was manufactured by Scientific Atlanta. The dish was used to receive HBO from the Canadian communications satellite Anik 1. The HBO signal was then sent to the General Television cable systems in St. Cloud and Fridley, a suburb of the Twin Cities. The dish was installed during the summer of 1976. The cost in 1976 was $140,000 and the weight of the dish was about 14,000 pounds.

I have an editorial comment about this subject as well. The next time you wonder what good has NASA done, think of our business and how it has changed because of the efforts of NASA. Until next time, happy engineering.

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

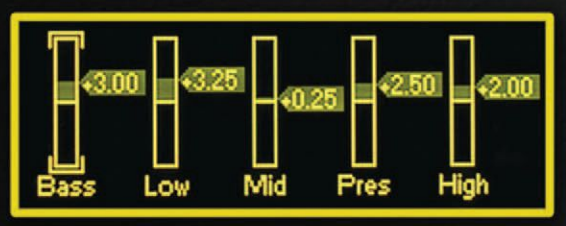
Control Your Sonic Signature

NEW FEATURES

719 DAVID IV
FM/HD BROADCAST PROCESSOR

Features

- Streamlined 4th Generation DSP-based audio processor
- Precision FM Stereo generator with dual outputs, internal metering of your RDS/RDBS subcarrier
- 5 Bands of Dynamic Range Compression and "Graphic EQ"
- 25 factory presets and 20 customizable presets
- Network / remote controllable



5 Bands

Low Latency 3.9ms

25 Presets

2012 PICK HIT Radio

Award Winning

Remote Network Interface

Rear Panel

MADE IN U.S.A.

3 year WARRANTY

CE

INOVONICS BROADCAST
Better Radio Since 1972
sales@inovonicsbroadcast.com
phone: 831-458-0552

Tips From the Field

Just A Bit ... Unconventional

by Jim Turvaville

As I was leaving the Tractor Supply store, it suddenly dawned on me that what I was doing might be considered just a bit unconventional to many of my peers. I guess when one stays out of the mainstream of any industry too long, we tend to become a bit introverted and forget some of the day-to-day struggles faced by our contemporaries. Having been over three years now since leaving the daily grind, I may be guilty of becoming just a bit comfortable in a slower pace and having much fewer resources on which I can rely.

But having fewer resources is not unique to my situation; I know firsthand that many of my fellow Engineers struggle with limited resources for their routine work. So let me share just a few of the more unconventional things I find myself doing on a regular basis, and maybe you can find some ideas to help out in your operations.

Looking around my transmitter plant, I find a few things which may peak your interest. First, that trip to Tractor Supply was to pick up a Stall Mat, which they had on sale. For the less agriculture minded, a Stall Mat is nothing but a solid rubber mat, made from recycled tires. Used in horse stalls to pad the floor and aid in easy clean up, they come in 1/2 and 3/4-inch thickness in sizes up to 4 ft by 6 ft. I will caution you – that large size in the 3/4-inch thickness is really heavy and bulky to maneuver, it certainly will not just slide around once you put it down somewhere. I have a section of it on the ground in front of my transmitter shack door, to keep the weeds and stickers from growing up there and being a nuisance in accessing the door. Putting some it around my HVAC outdoor condenser unit also keeps the weeds and grass from causing a problem with its performance. A section of it on the floor in front of the rack, makes for a comfortable base on which to stand for long periods of time as may be needed. I even have cut it to size in my truck and it certainly keeps my tool boxes and bags from sliding around, and provides protection to the floor like nothing else ever invented.

I also note that my use of welding cable for main grounding might be a bit unusual. As we are all aware, we use the flat copper strap for grounding because of the "skin effect" that RF has in a conductor and flat copper strap has a lot of surface area. I have used welding cable in many situations where it was just not practical to get a flat strap to physically fit, and it has performed quite admirably. The 4-0 size cable is usually composed of about 2,100 interleaved 30-gauge conductors; and while the math does not truly equal that of flat copper strap, there is certainly a lot of surface area in all of those wires. If you're in a situation where running flat strap just is not a practicality, the use of welding cable might be an answer. As a bonus, the welding shop will usually crimp those connectors on the end for you with their high dollar tools giving you a ready-made attachment point.

Speaking of grounding, let me share with you how I have my tower grounded, which I have found to be less than typical. I can, however, say with certainty that I have survived two very typically stormy West Texas summers with zero issues related to lightning. The tower itself has a bonded copper ground wire off each leg, to an 8 ft ground rod a few feet away; the building is circled with that ground lead with an 8 ft ground rod at each corner; all of which then goes inside the building at 2 points to a ring around all of the equipment. That configuration is probably not usual, and I copied that from many nice cell sites I've visited through the years. However, I have a grounding method for my tower that has proven to be extremely effective which I took from an old AM engineer who was relating the problems of older series fed towers being unstable in their base impedance due to rust. Since the AM tower is the radiator, those tower section joints becoming rusty means they do not retain the electrical bond, and as weather conditions change, so does the impedance of the tower.

(Continued on Page 22)

M4.2 TIMELOCK™

Your Most Cost Effective Time Alignment Option!

List Price: $1800

- ✔ Reports HD Radio® Analog/Digital Time Alignment Problems
- ✔ Remotely Monitor and Log Diversity Delay
- ✔ Now Streams TimeLock™ Correction Vectors to your Orban, Omnia and Wheatstone Audio Processors, along with GatesAir HDE-200 and Nautel Exciters

Want a single box Correction? Check out our M4DDC TimeLock.

DaySequerra

www.daysequerra.com

Just A Bit Unconventional

– Continued from Page 20 –

The old solution was to actually climb the tower and spot weld the sections together to solidify that bond. His solution was just to run a single contiguous run of ground cable from top to bottom of the tower, bonding it along the way at several foot intervals; this made the tower structure appear as one complete conductor. I copied that same idea, attaching my lightning rod at the top of my tower not only to the tower itself, but to a single continuous run of ground cable all the way to the base and attached to my ground ring. While my tower is not rusted, it's also not new – so as it ages I should not expect to see any variation in how that lightning rod is seeing ground.

I have LED lighting in my transmitter building – not from being green-conscious, but for the unique functionality. And by LED lighting, I mean the 12 Volt light bar accessories from the off-road vehicle department at my local Harbor Freight and similar stores. They come in a variety of sizes from a few inches to a couple of feet in length, with a neat mounting bracket that I can affix to just about any flat surface – and are then fully adjustable to direct the light just where I need it. The bonus of running off 12 Volts is that I can use an old spare power supply and power them all easily, or could run off a battery if needed in an emergency, when I have a portable generator running just my transmitter and rack and the room lighting might not work. Being LED, I do not expect to have to replace them any time soon, and they put off next to zero heat so I can work close to them without fear of a surface burn.

My equipment rack at the tower also has an older UPS unit from the studio which was upgraded to a larger model. Being a few years old, the battery pack has quickly reached the point of needing to be replaced, but the inverter and charging system was still in fine working order. Taking out the old battery packs, I found they were assembled to make a 24 volt charging system for the unit. Extending the leads out of the box and attaching them to an external battery pack, made from four 6-volt golf cart batteries, gave me back the full function of the unit. The load capacity of the unit does not change – 1,500 VA is still the max it will source – but run time varies based on the size of the batteries. While the original battery pack gave me about 10 minutes of run time, I can now get over an hour at full load from the external battery pack. This configuration is not usually desirable in a studio or office environment, but at a tower site having open batteries and wiring is not at all unusual.

Use of PVC pipe and fittings is not uncommon these days, but this resource is often overlooked in our Engineering world. The 2-hole PVC pipe clamps work really well in wire organization, much like the common D-Ring but at a fraction of the cost. A length of appropriately sized PVC with a cap on each end can hold tools, parts and even documentation in a water-tight situation. I have cut sections of 2" PVC and used them as wire chases by cutting each end at a 45-degree angle and drilling a mounting hole. Running these inside racks and under counters makes a quick way to organize wires without need for constant bundling. The length is limited to a couple of feet at a time, but that also allows for break out of wires for various connection needs. Even at a tower site, good wire organization pays off when you're troubleshooting or changing out equipment.

Finally, I have several of the LED outdoor light units which have the solar cell to charge during the daytime and then illuminate dimly at night until a motion sensor in them kicks it on full brightness. These are the $10 Chinese version which I bought on a whim, figuring I had little to lose if they failed out of the box. I've been pleased they have lasted a couple of years and are really handy when I have to make the rare night time trek to the tower. Even the $1 solar lights made for your home landscape can come in handy placed at strategic places around your tower site path – and after all, if they go out you've only spent $1. While they are not bright enough to actually illuminate the path, having them as path markers most often makes them just as valuable.

Often it takes stepping back and thinking more out of the box, but there are lots of economical ways to accomplish a task when resources are limited. Happy shopping!

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.

Broadcasters General Store

Family Owned & Operated Since 1979 | 352-622-7700 www.BGS.cc

Transparent Switching

Universal 4.1 MLR Switcher

The Universal 4.1 MLR is a transparent four input, one output switcher/router with mechanical latching relays designed to pass AES or stereo balanced signals. The Universal 4.1 MLR is perfect for all types of passive signal switching via front panel controls, contact closures or logic remote control. Each input features stereo Neutrik "Combo" XLR, 1/4" T/R/S and StudioHub+ RJ45's connectors.

BROADCAST tools
PROBLEM SOLVED
www.broadcasttools.com
Designed, Assembled, and Tested in Washington State, USA.

Industry Leaders in Design and Integration

We provide the highest quality in studio design and integration.

Custom furniture • Full integration services • RF services

GRAHAM STUDIOS
Broadcast Furniture
(866) 481-6696 • graham-studios.com

Xenirad Inc.
Broadcast Engineering
(304) 416-3269 • xenirad.com

SECOND OPINION COMMUNICATIONS, INC.
(815) 222-3556 • secondopinioncomm.com

INOVONICS BROADCAST

For Challenging Reception Scenarios

AARON 650
FM REBROADCAST / TRANSLATOR RECEIVER

- Unique Software Defined Radio (SDR) front-end
- Unparalleled sensitivity, selectivity, and RF shielding
- Total control over bandwidth blend & multi-path mitigation with Manual Reception Processing
- Built-in Band Scanner™ and MPX, FFT
- No Dead Air—audio failover to SD Card or Web Stream
- Dynamic Web Interface for remote control & monitoring

Telos Omnia A Telos Company 25 seven AXIA LINEAR ACOUSTIC

The Forever Console...Wheatstone LXE

Adapt to new technology, new techniques, and new work-flows with LXE. Completely configure/reconfigure your console – every button, knob, and display on the surface is fully programmable using our intuitive ConsoleBuilder™ GUI/scripting interface.

With ScreenBuilder™LXE, you can design dynamic custom touchscreen interfaces to augment LXE's extensive screen set. Beautiful to see and use.

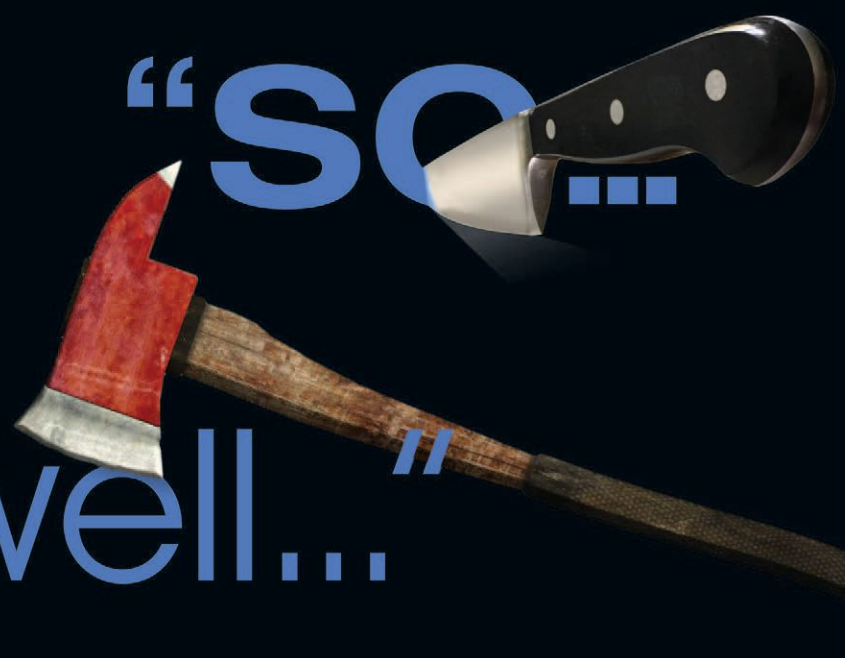
Need more input faders? Enable up to four layers to double/ triple/quadruple the number (up to 32) in the same footprint.

LXE is built to last in every way.

Learn more: wheatstone.com/lxe

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

phone 1.252.638-7000 | wheatstone.com | sales@wheatstone.com



VoxPro7 Kills Dead Air

No matter how concise your callers are, you're going to get words that slow your show down. Let VoxPro7 be your hit man.

Research shows that tighter programming dramatically retains listeners. Retained listeners = higher ratings. Download our free white paper, “*The Business Case for VoxPro*” at **voxpro.wheatstone.com**

Speed To Air

VoxPro's software tools let you edit, remove silence, re-record your voice, add effects, and be ready to go...in seconds.

Obsessive Organization

Hot buttons put a library of clips and tracks at your fingertips. Have your entire LIVE show programmed before you even start.

Creative Controller

With VoxPro hardware, you control every aspect of the software. Designed and laid out for maximum speed and agility.

VOX 7 PRO

RECORD/EDIT/PLAYBACK AUDIO LIVE, IN REAL-TIME, ON THE AIR

2017 BEST of SHOW RADIOWORLD

Wheatstone

BROADCAST AUDIO PERFECTIONISTS®

phone 1.252.638-7000 | wheatstone.com | sales@wheatstone.com

Transmitter Site

Transmitter Site Basics Refresher

A brief refresher course for transmitter site maintenance.

by Tommy Gray – CPBE, CBNE

This is the tine of year when we usually are in a frantic rush to winterize our sites so that we can stay warm for the season, and not have to make too may trips "Dashing through the snow!" I realize that for many of you in the northern areas, winter has already hit, and you have had to put some projects on hold until next spring. For others, this may be a time of doing a few last things in preparation for inclement weather. Regardless of which group you are in, a few of the more mundane things we do are however vitally important to keeping us on the air and legal. In this issue I am going to touch on a couple of the things we need to do from time to time at our sites.

Air Conditioner Maintenance

Now this may seem odd to mention, with regard to cold weather preparation, but it is very important and needs to be mentioned. Around the time that we start getting nights that are at, or near freezing, and days that are still relatively mild, you might run into a situation where your AC units start to freeze up on you, and require you to travel to the sites to thaw them out. There is a very good reason this happens and it has nothing to do with whether or not your units are functioning properly. If you have added A/C to your sites since last winter you might be especially vulnerable to the problem.

Here is the reason why. A/C units usually have fans that start up on the outside units, immediately when the units turn on and start the compressor. This is not a problem in normal warm weather. However, when it is cold outside and the units start up, and the outside fans turn on right away, the condenser can freeze up into a ball of ice! The explanation for this is that the head pressure on the compressor needs time to build up, and the coils need time to warm up before being hit with the frigid air. The way to accomplish this is with a simple piece of equipment that any reputable A/C guy is familiar with. They used to be called "Ambient Air Sensors." Most of the time now, I have heard them called a "Fan Switch." Some are a relay that is controlled by the air temperature and will not let the condenser fan turn on until the air around it has reached a certain temperature. Once the predetermined temp has been reached, the fan turns on, and everything continues to operates normally. Should the temp once again drop below the set point, the fans will stay off once again until things are OK. This keeps the unit from freezing up and killing all the A/C in your transmitter building, thus causing you a trip out to the site.

The second thing I mentioned is a simple relay that has to time out before the fan turns on. They are usually set for a minute or two so that they will accomplish the same purpose. I however favor the temperature controlled unit as it is in my opinion a much better solution. It can cycle while the compressor stays on. The fan switch many times (depending upon the design) can sometimes stay on until the unit cycles off before restarting, and can still freeze up. (One note here is that I have seem some that monitor head pressure as well as temp).

Transmitter Power Metering, Etc.

Recently, on some of our broadcast forums, there has been a lot of talk about power meters, etc., and how to calibrate them. You can see all kinds of ideas as to how to do it but, friends, there is basically only one way to do it right that I know of, and that has been used for years. That method is what I am going to talk about for a bit.

To accurately calibrate a transmitter power meter you *must* have a "dummy load" of a purely resistive 50 Ohms to run the transmitter into. The load cannot be reactive in any way, which eliminates *all* transmission systems found at broadcast transmitter sites. In the real world, there is no "exactly" 50 Ohm transmission system at a transmitter site. That is why we have reflected power monotoring systems. These enable us to measure the VSWR (Voltage Standing Wave Ratio) of the system to assure that the transmitter sees as "close" to a pure 50 Ohms as possible. Things like the antenna and plumbing, transmission line length and connectors, any relays, switches, etc., all contribute to the mismatch. Though all these components have negligible quantities of mismatch, put them all together and you can come up with a significant amount. Usually this total mismatch is compensated for by adjustments near or in the antenna. Some antenna manufacturers will place tuning slugs on the center conductor of the line somewhere below

(Continued on Page 28)

AES67 Livewire+

This Is Virtual Radio

Meet Axia IP-Tablet

You've heard about it. You've read about it. Now it's time to really think about it. IP-Tablet software virtualizes monitoring and control of broadcast gear, putting your favorite console functions at your fingertips while lessening the need for physical equipment.

Virtual Radio, Your Way

Control networked HTML5 gear, your Axia Fusion console, Omnia processors, Telos phone systems, and more. Access the internal mixer in your xNode or design layouts of Axia Pathfinder buttons. Customize to your heart's content.

Connect to More

Designed by Livewire® partner IP-Studio, IP-Tablet is testament to the power of the Livewire network. With more than 70,000 connected devices and 100-plus partners, Livewire lets you Connect to More.

(352) 622-7700 | BGS.cc | TelosAlliance.com/Axia/IP-Tablet

Broadcasters General Store

AXIA® THE TELOS ALLIANCE

Transmitter Site

– Continued from Page 26 –

the antenna, at a place where a field engineer determines by using test equipment that can generate plots that will show them where to place the matching device and what values to use. Many times it is by trial and error and can take days to accomplish on a large system. This process is even more complicated where two or more stations are sharing a common antenna.

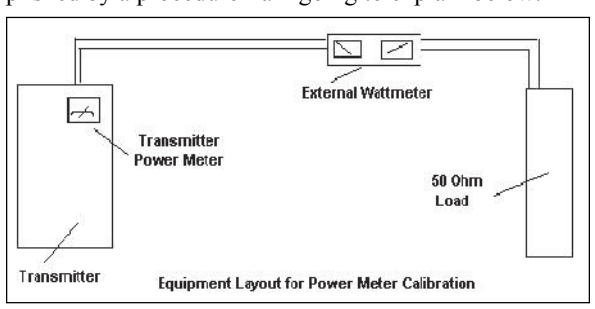
Some antennas have an adjustable matching device in the antenna itself. These are easy to adjust, and can be tuned with either very low amounts of RF fed into them while observing a VSWR meter, or by using test equipment while a tower crewman adjusts the matcher. Consult with your tower crew as to what is acceptable with them. Regardless of the method, the antenna requires some tuning to compensate for the mismatch, and to try to bring everything as close to 50 Ohms as possible, with the given equipment in the system.

I have personally seen systems where the overall mismatch was finally very tiny and almost non-inductive. I have also seen others where there was a level of mismatch that I would not have wanted in my station! These figures are evident the first time you start up the transmitter. A low level of VSWR is a very good thing. High levels are *not!* Running a system with too much VSWR will cause early tube or power amp failure, burned up components and generally will not provide long term reliability. This brings us to the bottom line with regard to meter calibration.

The manufacturer calibrated your power meter into what I can guarantee you was a pure 50 Ohm load. The meters were adjusted to match a calibrated external power meter of known accuracy. Simply connecting the same transmitter to a coax at a transmitter site and turning it on *will not* give you the same reading and *will not* give you an accurate power output. Why? There is inductance in your system and it is *not* a pure 50 Ohm impedance. In most cases VSWR will cause the meter to read higher than it really is, as there is an (for lack fo a scientific term) additive effect with the Forward and Reflected power. You don't know what you have regardless of what the meter is reading. With a very low total VSWR in your system, the reading will be closer to correct than it will be with a higher level.

How Do I Know For Sure?

The way you can be assured that you have as close to an accurate system as you can get in the field is accomplished by a procedure I am going to explain below.



The drawing above shows a "simplified layout" for doing a power meter calibration. Again, you *cannot* assure accuracy unless both the external meter and the load are accurate. One note here is that if you do not have a permanently connected dummy load, such as through a coax switch, you will need to connect the load at the point where your antenna feed line normally connects to the transmitter. The individual setup will be determined by what you have in your system.

You will need a few pieces of documentation to perform the procedure. First you will need to know your licensed TPO (Transmitter Power Output). This is determined by the class of station and the licensed ERP (Effective radiated Power), length of coax, losses in the system, and a lot of other factors. Sometimes this is found on your station authorization but not always. If you have to calculate it, there are software programs available at some of the antenna manufacturer's websites that will help you to determine what your TPO is, given your licensed ERP.

1. Turn your transmitter on and make sure there is no bad mismatch (caused by bad connections, etc.).

2. Run it at licensed transmitter power output into the load. Ignore your transmitter meter for now and use the external meter to determine how much power you are running. Adjust for 100% output with no audio into the transmitter.

3. Once the external meter says you are at full power, adjust the calibration controls on your transmitter so that your Forward and Reflected meters read the same thing that the external meters do. The external will be in Watts, and your transmitter may be in percent, but you will adjust for 100% at the correct wattage regardless of the type of meter on your transmitter.

4. Once adjusted, shut down and go back on the antenna and adjust output power to 100% by your transmitter meter without touching the calibration controls.

This is the "Old Fashioned, Tried and True" method of calibrating a transmitter power meter.

Space limits me from going into more detail but maybe in a future issue. Enjoy the Season!

More Next Time!

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

Sicon-8 Internet & Voice Remote Control

The CircuitWerkes Sicon-8 Remote Monitor & Control

- Uses Dial-up, Internet Web server or free Sicontroller Software!
- 8 channels of metering, status and control (expandable to 32) and up to 5 alarms per channel.
- No accessories necessary to control your site right out of the box.
- Auto-ranging, auto-calibrating meters make setup a snap.
- Includes: Function scheduler, auto-logging & alarm reporting.

Internal Web Server

Free Sicontroller Software

The Sicon-8 lets you control your site via Internet with its internal Web server, via telephone, auto-answering cell phone or with our free software. Setup is a breeze using the Sicontroller software that also includes scripting, e-mail alerts, multi-site management, virtual metering & much more!

Web-Based Remote Controls w/Streaming Audio Option

Introducing the SiteSentry4 (4 channel remote control), SiteSentry2 (2 channel remote control) & WAM-2 audio monitor

- Web enabled remote controls with 6 relay outputs & 2 status inputs on all units.
- All units detect Stereo or Dual Mono Silence (independantly adjustable channels).
- User-programmed relays (DPDT) close automatically or via Web control
- All products include onboard temperature sensor
- Internal logging with onboard e-mailing.
- Supports DDNS services and Netbios names
- Upgradable firmware. Keep your product current with downloadable updates!
- Streaming audio option encodes Ogg-Vorbis & decodes mp3 or Ogg-Vorbis.

SiteSentry4 SiteSentry2 WAM-2

Remote Broadcasting Solutions

Discover more online at www.circuitwerkes.com

MicTel Mic/Line to Telephone Interface

- Outputs & Inputs for telephone handset, cellular phone or balanced line level at up to +10dBm.
- Operates up to 36+ hours on two 9V alkaline batteries.
- High quality, user-switchable, internal limiter prevents clipping.
- External power input with silent, auto-switching battery backup.
- Individual gain controls for send, receive & headphones levels.

Unattended Dial-Up Broadcasts with the DR-10

- The DR-10 is a Dial-Up remote control with balanced, telephone audio input & output that can control many automation systems or your audio console for unattended remote broadcasts.
- Our Silencer™ option removes control tones from the audio path.
- Use the DPDT relays to insert the phone audio directly into the program path when necessary, especially for emergencies.

TelTap Pocket-Sized Manual Telephone Coupler

- Can be used as a phone tap or a passive manual telephone coupler.
- Send or receive telephone audio.
- Compact size & low cost makes the TelTap a great addition to your remote kit for main or backup capabilities.

Lots More CircuitWerkes Problem Solvers

- Transcon-16 - Move up to 16 contact closures from room to room over an audio cable
- DT-232 - Turns DTMF sequences into user-programmed serial outputs & action steps.
- FSK Encoders, decoders, tranceivers and contact-to-FSK encoders/decoders.
- SUB-03 Subaudible tone decoder and SEN-6 Subaudible encoder.
- HC-3 telephone autocoupler and AC-12 rack of autocouplers
- DTMF-16 and DS-8 DTMF tone decoders.

Find Full product info & downloadable manuals online at www.circuitwerkes.com. 352-335-6555

Small Market Guide

The New Small Market Workplace

... or Am I Just "Blowing off Steam?"

by Roger Paskvan

What is happening to our broadcast field? Have you tried to hire anyone lately?

I talk with many owners and operators of radio stations and the theme seems to be loud and clear, "no one wants to work." They want a position with a check – and I'm not kidding.

What used to be a montage stream of eager beavers, ready to tackle the highest dam, has become a frustrating nightmare finding employees. If you are lucky enough to attract someone to your station, keeping them there is another challenge and a half. "When do I get my first raise?" I'm not making this up – that was on day two. What is happening here, why are we in this predicament?

These new millennial employees have a special set of rules that they seem to follow. In our baby boomer generation, we referred to this concept as me, me, and me first. Well the tarmac has changed in the HR department. I have had new employees leaving after one week – "this job is too hard." The current method of quitting has also turned viral. Apparently you now text your employer that you quit, therefore avoiding any confrontation. Another new stunt is to just not show up for work and, after a few days, the employer will figure it out. I even had one person that left all their personal things in their desk, not even picking up their last paycheck. Of course, they would not answer their phone or texts. They must have quit, right? This new generation of employees resorts to lying and game playing when something goes wrong at the station involving them. They are quick to blame others with little loyalty to fellow workers.

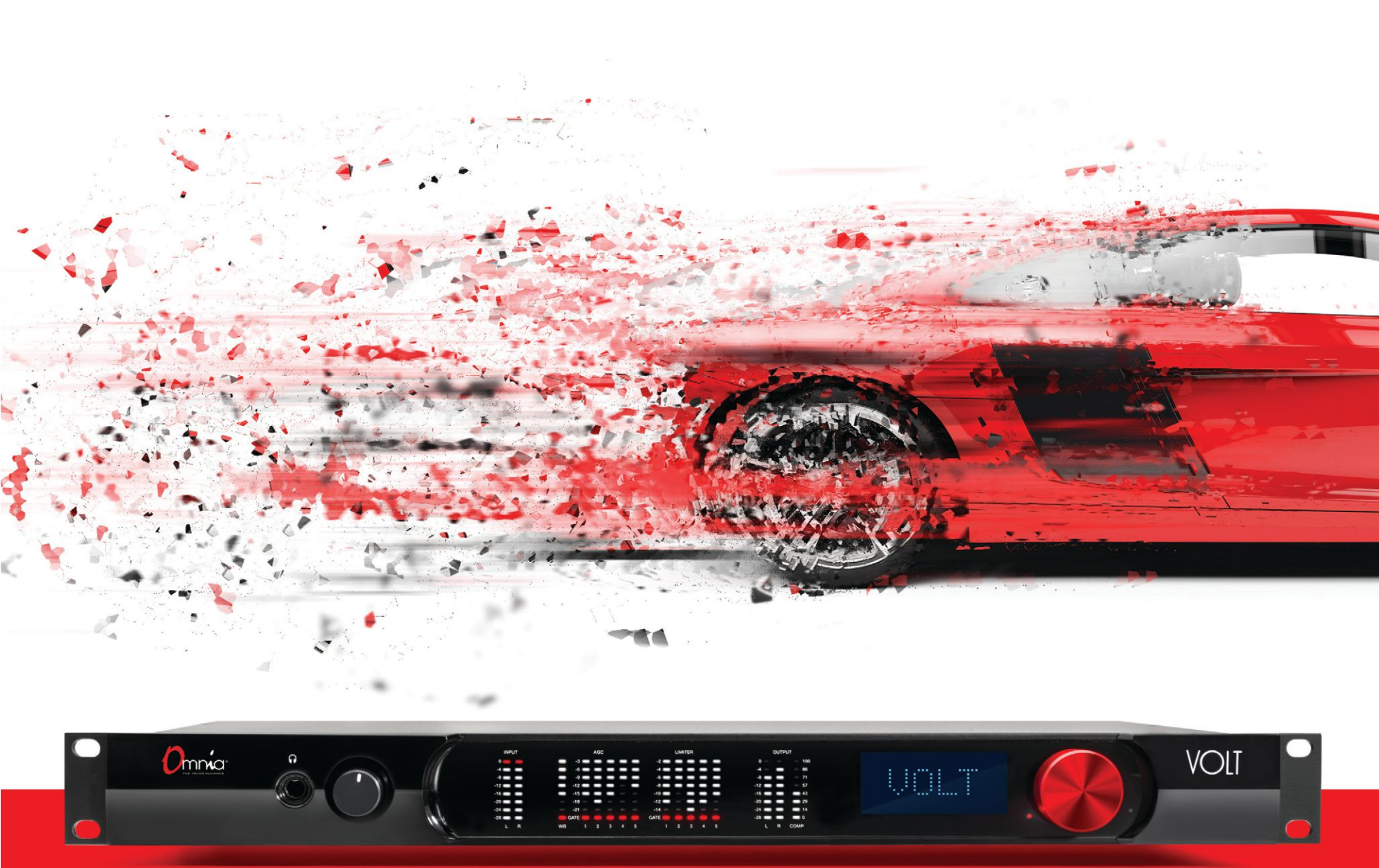
Most station owners agree that there is something wrong with the work ethics of the current crop of Millennials (those born between 1980 and 1996). These are the employees that are now answering your DJ job posting. My older employees put these new kids to shame in motivation, attitude, respect and plain work ethics. So I set out to research what is happening to our industry.

In a recent *New York Times* newspaper article, writer Mitchell Hartman explored whether or not there's actually anything to the stereotype that Millennials are as ill-prepared for the workplace as their employers claim they are, or if there's actually some other explanation. Hartman writes, "In surveys, middle-aged business owners and hiring managers say the new workers lack the attitudes and behaviors needed for job success. They don't have a strong work ethic, these reports say. They're not motivated and don't take the initiative. They're undependable and not committed to their employers. They need constant affirmation and expect rapid advancement."

Hartman went on to interview a number of people in this age group, who were asserting that Millennials are lazy. Does anybody other than a few disgruntled employers really believe that this generation is any different from previous ones? Yes! It turns out that Millennials are not just lazy, but are also self-loathing and quick to turn on each other. Hartman spoke to a few actual, real-life millennials, like Camille Perry, 26, of Portland, Oregon, who claims that her generation "has a poor work ethic." (Ms. Perry holds down two jobs.) And Hartman spoke to Claire Koerner, 21, a student at the University of Washington in Seattle, who says she, "sees a lot of students cheating their way through, just sliding by," and further notes that these students, "just aren't going to have the skills to work as hard as they're expected to.

This isn't just an issue of Millennials not being hard workers. This is an issue of how the idea of "work" has been transformed because of technological advancements. This is about a generation that can't rely on finding long-term employment and so instead works more than one job, or winds up working a full-time job while also attending school, and yet still gets told over and over again that they're not good enough, until they begin to believe that themselves.

(Continued on Page 32)



Leave Your Competitors in the Dust

Introducing VOLT, the hotrod new processor from Omnia that gives you more processing power and sonic performance in one rack unit than others give you in three. Sharing technological lineage with top-of-the-line Omnia products like the Omnia.11, VOLT drives you faster, with exciting sound that will take you from zero to *100* in seconds! In the race for electrifying, competitive, market-leading sound, VOLT puts the competition squarely in the rearview.

TelosAlliance.com/VOLT

Omnia®
THE TELOS ALLIANCE

– Continued from Page 30 –

Well, in this writer's opinion, Hartman paints a dismal future picture. Apparently he feels that employers, like radio station owners and operations managers, are the ones who must adapt or learn how to utilize the specific skill sets of the first generation Millennials. These non-eager beavers grew up with home computers, cell phones and high technology. They are the same people that used social media as teenagers, having Facebook/Twitter accounts before they got out of high school. What happened to just doing a good job with a lot of ambition and pride.

I do agree that the computer revolution has changed radio forever – no more board op jobs on weekends for new comers to get their start in broadcasting. This revelation is also the partial blame for this problem, in my opinion. Living in your parent's basement till you're 25, and never leaving the house thanks to your cell phone and laptop, produces employees that are self-centered and lack social skills. These skills came naturally to the baby boomers because they had to get out in order to survive. Even the Millennials that are utilizing the Internet and remote jobs at home are examples of trying to cope with the real world in "their terms."

Just the other day, a former marketing student of mine, who now works for the famous Mayo Clinic, told me that Mayo has made major changes in their HR department. The Mayo Clinic is outsourcing more and more paperwork. They are allowing new employees to work at home with quotas to meet and having better results. Yep, the Millennials are crawling back into their basements, their old comfort zone, and this new approach is apparently working.

I don't put down the fact that technology has transformed the workplace, but in our field of broadcasting, introverts that sit on a computer all day just won't make it in radio. Someone has to talk, greet and get out into the general public for any small market station to be effective in the marketplace. I've personally witnessed this millennial effect in our sales department. As the veteran account executives retire or leave, the new employees resist leaving the office. I have found that many of these "new" employees are more than happy to sit at their computer and do quotes all day. Now this wouldn't be bad but that's where they stop. The next stage of presenting this proposal to a client is reduced to emails or phone calls. Not in my book! We now send all the sales people out of the building from 9-3 every day. Millennials resist this effort until it comes down to, either sell or hand in your resignation. Yes, we go through a lot of new sales people until finally one comes along that wants to be a "real radio salesperson."

So, having stated the negatives, what can be done to solve this growing workplace problem in a constructive manner? Given, we are all stuck with a special kind of worker. Now, how can we motivate this new breed of radio employee? Bruce Mayhew of the Huffinton Post came up with some constructive ways of tackling this problem. He writes:

1. Make sure Millennials know the radio station's mission, vision and values. This provides meaning to the employee. All employees – but especially Millennials – are looking to take pride in their work as well as the station they work for. Sharing the station's value-based mission will help the individual employee be motivated and engaged.

2. Make sure you hire a Millennial whose interests and talents match the radio work. As they gain experience you might need to restructure their job to keep them engaged and learning new things. Learning motivates this new class of employee. A growing popular opportunity is to provide Millennials time to work on self-defined projects. This is good for the station and the employee since it helps the employee feel engaged.

3. Another must-have for Millennials is to offer "respectful" flexibility. Being able to work from home one day a week, or come in late/early, will be seen as a great motivator for many, and adds to their loyalty to your company. (Can't you see radio people taking advantage of this one?)

4. Millennials do better with regular evaluation and feedback; this helps keep them motivated and on the right path. You don't need to make a big deal about it, just let them know.

So in summary, treat Millennials like adults, but be sure they know this means taking responsibility for successes and failures. Work with them to identify goals, timelines and establish set times to mentor them. Remember their strengths are knowledge, not experience. This new type of employee is energetic, creative, technically savvy and has a fresh perspective. Give them goals and then come up with ideas on how they'll accomplish those goals. For those of you in small market radio, we have no choice but to adapt to the changing workplace.

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

Ref:

Iverson, Kirstin, *Millennials Found Lazy (Again)*. New York Times, March 27, 2014

Mayhew, Bruce, *How to Motivate Millennials*. Huffinton Post, June 8, 2014.

Maintenance Guide

Air Conditioning Principles and Maintenance

Part 2

by Wiely Boswell

I am picking up from the last article *(Radio Guide, Sep/Oct-2017, Page 34)* on how important filtering is to system performance. The outside condenser has no filter. It transfers heat with a lot of delicate aluminum fins connected to copper lines that are getting hot from compressed Freon (or cold in the case of a heat pump in heat mode). So no filter means routine coil inspection and possible cleaning. You need unobstructed air flow and a somewhat clean coil fin surface area.

The outside unit is exposed to the elements. The beach is an example of a rough environment where salt air causes fin corrosion and reduces heat transfer. This application requires units have a special coating on the fins to try to counter this salt air deterioration. Different methods of cleaning depend on the type of coil. A dirty coil with poor transfer will have higher running current and head pressure with lower efficiency.

In a special situation you need to have the outside condenser coil get hot. In an application such as a studio, where you are calling for cooling inside even when it is cold outside, you actually *need* it to heat up.

In this scenario, the inside coil can freeze up. A pressure sensor is added to the high side port that will turn off the condenser fan (outside) until a certain pressure is reached – so the compressor will start and run without the fan. When head pressure builds up, the fan cycles on (cut in), pressure then starts dropping, and the fan will then cut back off. The sensor has adjustments for cut-on pressure and cut-off pressure based on a differential. **Image 1** shows the sensor extension added to the high side port with new access port and pressure setting of 250 PSI cut-in and a differential of 50 PSI.

You can tell when an inside unit freezes up for whatever reason. Air flow inside will be restricted by a frozen coil to the point of no flow at all. You then need to cut cooling off and leave the inside fan running to melt the ice. This will put a real test on the condensate drain, with so much water as the ice melts, that you may need to watch it. Water can flood the inside unit and get the filter wet, which then may collapse. A typical service call would be "yep it's frozen" and the tech comes back in a couple of hours to begin testing after it thaws out.

Outdoor condenser coil cleaning can take a while, depending on how bad it is clogged. **(Image 2)**

Most coils are protected from external damage, from things like lawn equipment, by a vented cover which also prevents a simple light careful brushing and may need to be removed. To dissemble a typical unit, the fan shroud with motor and fan attached must be detached at the top. As you disassemble the unit, make note of where any *short* sheet metal screws are located. A long one put back in the wrong place will ruin your day.

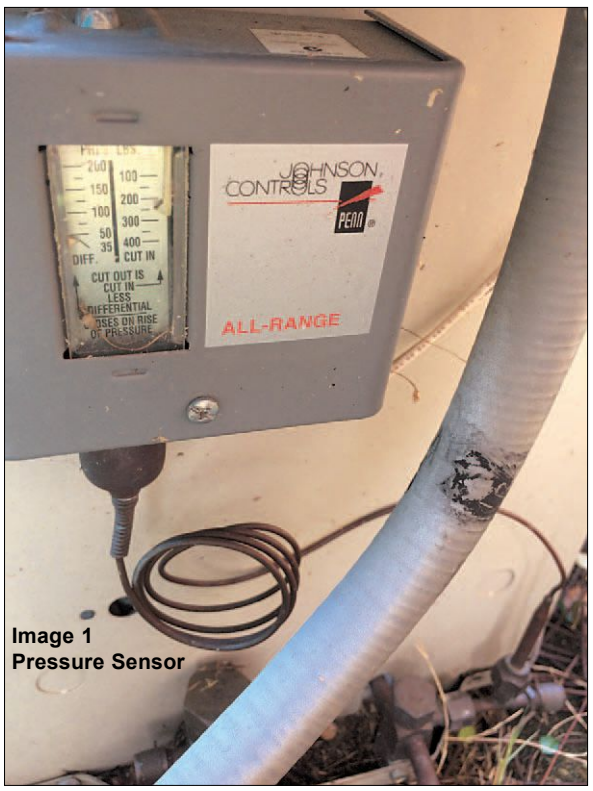
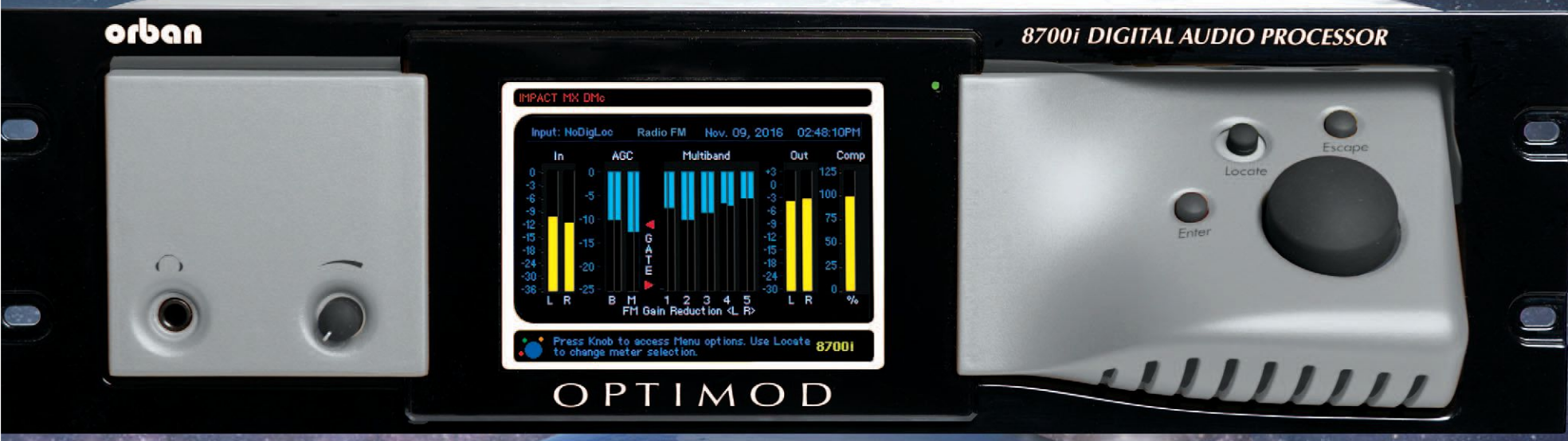


Image 1
Pressure Sensor

The bottom grill screws are next unscrewed to allow the protection cover to be removed. Note that this labor intensive disassembly is not required, but is thorough. It is the same procedure needed to change the fan motor. If you do pull the top without disconnecting the fan wiring you may be able to lay the fan shroud back on top of the coil directly, but just be careful.

(Continued on Page 36)

THE BEST
Just Got Better



Orban Optimod 8700i

Win in Your Tough Competitive Environment

- Xponential Loudness™ brings hyper-compressed music back to life
- Digital MPX (DMPX) 384/192 kHz AES3 digital composite output
- Exclusive "Multipath Mitigator" phase corrector reduces multipath distortion
- Dante™ Audio-Over-IP Connectivity provides a dual-redundant Ethernet connection
- Dual redundant power supplies and safety bypass relays keep you on the air

Contact us today to schedule your FREE Demo and ask us about Orban's Trade-Up Program.

orban
www.orban.com

Year-End Promo Price $12,990

Promo ends 12/31/17 - regular price $14,990

CONTACT **SCMS** for **ORBAN** products

SCMS INC.
BROADCAST EQUIPMENT SOLUTIONS

18 reps across the U.S. and Latin America

Broadcast Equipment Solutions | 1-800-438-6040 | www.scmsinc.com

– Continued from Page 34 –

Lightly brush the fins in the correct direction as not to bend the fins and then spray down with a hose. A strong hose will bend fins if hit from the wrong angle.

They can also be sprayed with a foaming cleaner that gets deep in between the fins. You can tell how dense they are by the way water barely makes it thru the coil as you spray it. AC techs love to clean coils but rarely dissemble to clean. There are concerns about cleaners. Most are some what rough chemical cleaners that can cause serious premature corrosion damage. It can also take off a protective coating if present – so take appropriate precautions.

Image 2
Condenser

Cleaner can be applied by a spray can or a mixed solution in a garden sprayer. Check your type of cleaner carefully. A simple water-only hose down cleaning is always good, but after performing a chemical cleaning, a through wash is absolutely required – you must have a water supply. Cleaner can attack the heat transfer connection of the fin to the copper tubing that can make the coil useless. A typical heat transfer connection is made by the copper tubing being simply pressed through slightly smaller holes in the aluminum fins. Again, you can also strip a special corrosion inhibitor coating on the fins, if not aware. So use cleaners sparingly.

There is no filter over the condenser coil in a window unit either. A window unit has a single motor and the fan blows from inside the unit and out the back. The issue here is how do you even look at the coils, much less clean them from the inside. Sites with no water available will make it hard to clean them. The design can have an efficiency increase method which uses the condensate water run to the back of the unit. It is "distilled' water and the fan blade picks it up and slings it on the rear coil to help cool it off. Being distilled there is no evaporative mineral buildup.

What happened to our site was that water was being slung up at the same time a nearby farmer was plowing a dusty field. It coated the inside of the coil with mud and prevented coil air flow. If you pull the unit out of the case you may have restricted access to coil, even if you can barely even see it. I have also seen a new *non-energy saving* feature – a plug to drain water from bottom of unit so no water is left standing in the unit to help cool the coil.

If you are fortunate enough to have water, spray the rear of the unit occasionally to try to help keep it clean – it will be hard to get it clean all the way thru the dense fins. The unit should *not* be running, so the air flow will not compete with the water spray. Window units typically will not have a normal service schedule involved because you do not normally have ports to add or test Freon– you just pull it out and replace it. You try to get the same size unit and try not to have to replace the case, so that you may build it into the wall.

Two big 220 units are an economical redundancy plan. Window units now have electronics that include a built-in time delay. If you do not want a possible breaker trip or compressor thermal overload, a restart delay is required. To have the unit stop and then restart immediately, may have the compressor fail to start while still under high head pressure. If given a few minutes, the high and low side pressures will equalize. With this in mind, it does not want to start with liquid Freon in the bottom of the compressor either. Big central systems will incorporate compressor case heaters that will vaporize any liquid Freon in the bottom of the compressor. There will be cautions when starting a new unit, or after a prolonged power outage, to allow a few minutes for this heater to do its job. Keep in mind a heat pump in heat mode still has to pump Freon.

A heat pump is simply the unit working backwards. It uses a reversing valve to make the inside coil be the condenser – the high pressure side is inside. In this case the outside coil can freeze up and there is a "defrost" cycle that uses a heater to melt the ice or even reverses back to normal cycle to heat up the outside coil long enough to let coil thaw out.

What I learned here was a slow leak in the inside evaporator coil can become a fast leak when heating and the pressure has increased. Emergency heat from resistance heating is controlled at the thermostat. It can be manually turned on, or in a differential mode, by pushing up the temperature control to where unit heating comes on, and then pushing it past that by several degrees. They typically are large coils and have large circuit capacity feeding it thru contactors and will use lots of power. There are several safety high temperature shutdowns in the heater assembly.

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

AM Ground Systems Co.

www.amgroundsystems.com

1-877-766-2999

eng@amgroundsystems.com

PHYSICAL AM SITE SERVICES

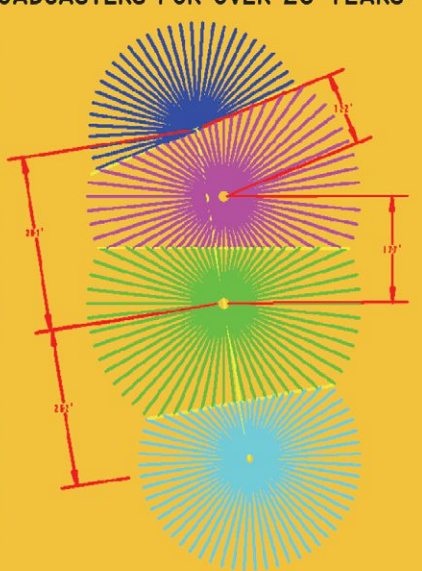
- CONSTRUCTION
- EVALUATION
- REPAIR
- SAMPLE, FEED & CONTROL LINE LOCATION, REPLACEMENT & REPAIR
- MOM MODELING PREPARATION WORK

SERVING THE TECHNICAL AND CONSTRUCTION NEEDS OF AM BROADCASTERS FOR OVER 25 YEARS

- Has your AM station lost coverage?
- Is your AM ground system over 30 years old?
- Has your ground system been damaged or vandalized?
- Base impedance or DA pattern unstable?
- Dramatic system or range changes in wet-to-dry conditions?

All of the above are indicators of hidden ground system problems that may be reducing your coverage.

SAMPLE TOROID RETROFIT SOLUTIONS AND SAMPLE LINE REPLACEMENT FOR METHOD-OF-MOMENTS DA PROOFING



Contact us today for a no obligation quote on any of our services.

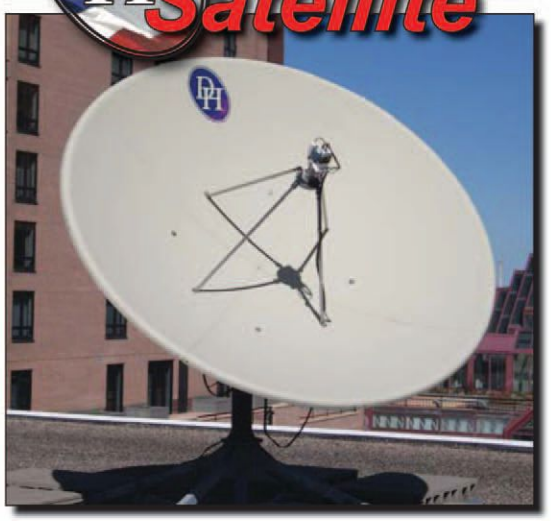
877-766-2999

eng@amgroundsystems.com

WE EASILY ACCOMMODATE COMPRESSED TIME-LINE PROJECTS.

Reliable, On-time Installation
Firm Quotes
Quality Workmanship

DH Satellite



DH 1-piece Antenna Sizes Available From .6m to 5.0m

DH Sectional Antennas Available:
1.8m ~ 2.4m ~ 2.7m ~ 3.0m
3.7m ~ 4.2m ~ 4.5m ~ 5.0m

Mount Options:
Fixed Az-El, Polor Tracking, Horizon to Horizon Tracking
Fixed & Dual-Powered Gibralter Az-El
Dual-Powered Gemini Az-El

For More Information: dhsat@mhtc.net

DH Is The Industry Standard!

For over 35 years, our 1-piece antenna has outperformed the rest! The 4-piece, 3.7m has the same accuracy because we use 8 computer generated templates and attach them to the back prior to cutting the antenna. This allows for ...

Superior Quality Quick Delivery
Easier Installs Cheaper Shipping
Fits Into Service Elevators For Roof Installs

Our New 4 or 8-Piece Freight "Shippable" Antenna

DHSatellite.com ~ 800-627-9443

Operations Guide

When GM Means "Good Manager"

by Jim Bender

It was the second meeting with the GM about the new studio construction. My partner and I had arrived at the architect's office exactly on time. This would be our first look at the "finished" architectural plans. From our position as engineers, we knew that these initial meetings would set the tone for the entire project.

A Rocky Start

The GM and the electrical contractor were a few minutes late. With introductions made and coffee poured, Dick and I studied the blueprints. We looked at the floor plan and then quickly flipped the sheets to the electrical design.

Unfortunately, it was obvious our architect had never designed a radio station – he had no idea about the electrical needs. It looked like the power company had brought in three-phase from the next street over – and they were serving us at 480 Volts. "Why?" we asked. *"The previous engineer said we needed it,"* we were told.

As far as we knew, there were no plans for any large transmitters at the new studios. "Is three-phase needed for the elevator?" we asked. *"No. The elevator can be ordered either single- or three-phase."* "What about the HVAC? Is there any advantage to running them on 480 Volt three-phase?" *"No. These units are small enough that they can be ordered either way."*

The Dance

We tried to explain that the radio station's electrical needs would not be much different from those of the retail store on the first floor. We had more rooms and more branch circuits, but the studios did not have any Magical Mystical Radio Machine that needed 480 Volts three-phase.

The architect said he was just following orders from "the previous engineer." This was beginning to sound like an indictment of the entire broadcast engineering profession. If allowed to continue, I could see that Dick and I would receive the same flaming brand as "the previous engineer." We could easily be perceived as pompous, whimsical know-it-alls, who really knew nothing, but simply wanted things our way.

As I considered how to salvage the meeting and maintain the dignity of the professional broadcast engineer, the GM appeared to be trying to save face in front of these other professionals by repeating the words of "the previous engineer." The general contractor was saying it did not matter, because the service conductors had already been run across the street. The architect was trying to find out if there should be other changes to his design assumptions because of "the new engineers."

Dick and I sat back and waited for the bedlam to die down.

Reversing Course

At that moment, we found out this GM was a Good Manager, because he immediately sensed that we were no longer making progress in the meeting.

Though he respected his general contractor, the architect, and the electrical contractor, he grasped an essential truth about the long-term welfare of his radio stations: These other professionals each had important roles to play in the construction of the new studios, but his engineering staff would be the ones taking the phone calls in the middle of the night. His engineers would also be the ones to take him into the future.

He resumed control of the meeting with a couple of hand gestures and indistinct sounds. Then, looking at us, he said, "I'll shut up now and you tell me how we're going to do this."

This was not the first time the Good Manager had said he "would shut up and listen," as we patiently told him how things were going to be. He already knew we did not raise questions just to badger the others and establish our turf. He also knew that when we brought questions, we also brought solutions.

For the duration of this project, in all of our dealings with the contractors, he firmly established the pecking order. The GM that is a Good Manager also brings Good Medicine.

The Growing Crisis

The process had started months earlier, when corporate had finally approved a major capital budget for new studios. I had worked in this facility in the seventies and eighties when it was a simple AM-FM combo under a different owner. Successive owners had added a third, fourth, and fifth station.

Several different contract engineers had dutifully stuffed the additional studios into any available space, even turning a hallway into a long, skinny studio. The News Guy had to walk through the hallway Alternative Studio to get to the Talk Studio. The Operator-on-Duty had to block the doorway to take meter readings. The Sales people could not all be in the building at the same time, because there were not enough desks or chairs.

At one time, engineering had a small room and workbench, but that floor space now held racks of satellite receivers, automation computers, servers, switches, and routers. The workbench and every other bit of floor space were used to store the remote kits and retired gear.

With the passage of time, the hodge-podge of equipment assembled from the previous owners was becoming a

(Continued on Page 40)

Kintronic Labs

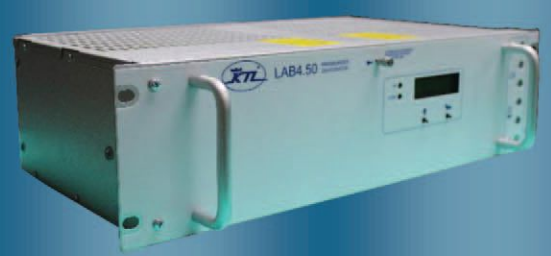
Solutions for FM Translator Installations on AM Towers

FM Combiners for 2 or more FM Translators on AM tower

Full line of Isocoils for co-locating 1 or more FM Translators on AM tower

Model FMC-1.5 Isocoupler for low-loss isolation solution

Introducing Two New Products



LAB4.50 Automatic Dehydrator
with 165,000 hour MTBF

10X the RF source power of the PowerAIM 120

PowerAIM 150 Antenna Analyzer
Much-improved features at a lower cost!

ADDRESS: P.O. Box 845, Bristol, TN 37621 PHONE: 1-423-878-3141 EMAIL: ktl@kintronic.com

---

Delivering total radio solutions for over 55 years.

Broadcast Electronics
4100 N 24th Street
Quincy, IL 62305

(217) 224-9600
www.bdcast.com

commotion
Social Media and Mobile Solutions for Radio

AudioVAULT FLEX
Flexible & Reliable Radio Automation

MARTI ELECTRONICS
Dependable STLs and RPUs

STX
Modern & Efficient FM Transmitters & Exciters

AudioVAULT Xpresso
Streamlined Radio Automation

– Continued from Page 38 –

maintenance nightmare. A production room had been built around an unbalanced, consumer-type console. Every new widget or change triggered other, cascading problems in the rest of the plant.

Return to the Scene

The enormous project to build new studios eventually defined itself into a long-term lease on the upper floor of a yet-to-be-built retail building on the busiest street in town. The immediate past contract engineer, now in another town over a hundred miles away, had given some general guidance to the architect but offered little in the way of planning, saying he was too busy to handle the project and suggesting they find someone else.

This presented the GM with two problems. First, and foremost, he needed someone to handle the day-to-day engineering needs of the cluster. Second, he needed someone to plan and manage this immense studio move project. The GM called Dick, and Dick called me.

Though we also were based more than a hundred miles away, we assured the GM that we would not let him down. I started making regular trips to keep the existing studios and transmitters on the air. Dick started working with the GM and Corporate on a detailed budget for the project. The project began moving along.

Mutual Respect

The engineer deserves the respect of the Good Manager for an important reason. As Dick put it in one of our early meetings, "I can talk into the microphone. I might not be as good as Mike in the Morning, but I could make the songs and commercials play, and give the time and temperature. I can sell radio ads. I might not be as good as Susie the Selling Machine, but I could visit clients and fill out sales orders and write ad copy.

"I can produce ads and promos. After all, I'm the one you call when you want to know how to do something with Adobe Audition. I can schedule commercials to play. Heck, I wrote one of the first commercial traffic programs to run on a computer. I don't like wearing a suit, but I could sit behind a big desk to hire and fire people. I may not be really good at any of these things, but I could do every one of your jobs. On the other hand, there isn't a single one of you that could do my job – even poorly."

The hush in the room was deafening. It was not that the jocks or the sales weasels were at a loss for words. Rather, they were all looking at the GM, who had an intense, penetrating look on his face, as one-by-one, he scanned the others at the table. They all respected the Good Manager – and it was obvious that the Good Manager respected the engineer.

At that meeting, a sense of order had been established. No one had to draw an organizational pyramid to show the chain of command. The importance of the engineer had been unambiguously settled for all to see.

Keeping It On the Air

If you are an engineer, you already know that normally no one else in the station knows how to keep the facility operating smoothly. If you are a Good Manager, you also know that your engineer is the one person who stands at the ready to take care of unexpected problems – he is often the only one who is watching out for the station licenses.

Indeed, since Deregulation, there are very few inside the radio station who know that the FCC still regulates this industry. Even if they are vaguely aware there are FCC Rules, most have no idea about what is regulated or how large the fines can be for non-compliance. When you mention "FCC fines," they think "the F-word," rather than "EAS log."

The GM also knows the engineer is the one to whom he can turn when the Escalade needs a jump start. In the same way he performs preventative maintenance to keep the stations on the air, the engineer always has a rig that starts – and he always has jumper cables at hand.

Nurturing the Engineer

We were well along in the construction of the new studios when the Good Manager told us he had found and hired an engineer for the cluster. It turned out that the new guy had worked in major markets and was happily looking forward to a little slower pace and a much better quality of life by moving to a small market.

Because the cluster had a Good Manager who understood the value of a good engineer, the new guy would be getting a good salary for the market size, but more importantly, the new guy would be getting a heap of respect.

By the way, if you are a manager with a fulltime engineer, do you give him the same consideration you would extend to your other department heads? Have you ever seen a Sales Manager make do with a hand-me-down metal desk from the Traffic Department? How long would you keep your new Operations Manager if he had to work with the server blowing papers around the closet you gave him for an office?

In the years that followed, we watched the new guy take on additional responsibilities and receive raises, privileges, and authority beyond that of the Sales Manager and Operations Manager. When he spoke, the Good Manager listened. The jocks and sales weasels trembled. He was a good engineer who worked for a Good Manager.

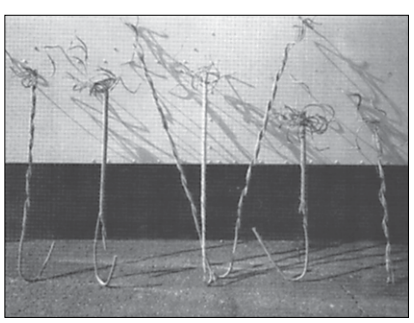
And of course, yes, the station prospered fiscally *and* was a good place to work. *– Radio Guide –*

Tower Topics

Tower Icing Problems – A Solution

by Jim Newbanks – IceKrackers

As many of us have found out over the years, that ice formed on the guy wires doesn't always simply drop off. Unfortunately, the cylinders of ice that form on the guy wires will release from the wire and slide very fast a few hundred feet down to the anchor point. These ice cylinders can be very large and heavy, and as they reach the anchor there is very little to stop them. When the ice hits the preformed grip, the ends of the grip can buckle. The result is the grip end will look like a 10 to 12 inch blossomed flower. When this occurs the guy wire is released and since the tower is already loaded with ice it could collapse.

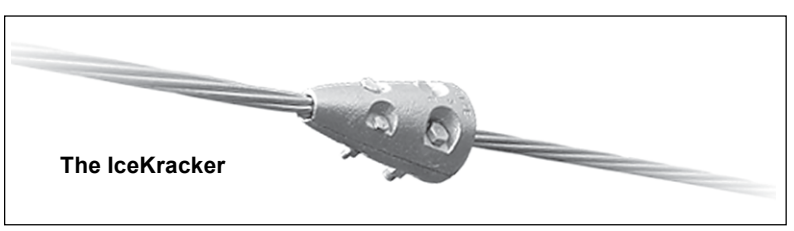


Damaged Preform Grips

Grip buckling has happened to one of my tower grips but fortunately it was partial and we had a crew on site to secure it before it released the guy wire. The weekend this happened three towers went down – one of those three was because of ice slide damage to the guy wire grip.

While a tower collapse is the most devastating of tower icing problems, there are other problems caused by ice slides. The ice slides can seriously damage or remove vibration dampeners used on larger guyed towers. The ones most easily damaged are the high frequency dampeners.

I came up with a design to safely stop this damage – the clips and clamps that are used by other designs are not secure enough to hold when hit by a large ice slide. Further, those clamps can nick the galvanizing on the guy wire and set up a point for rusting. The galvanizing coating is only just a few mils thick and should be protected.



The IceKracker

The length of the Ice Kracker® gives a large surface area for gripping the guy wire, for maximum resistance to movement. This is a primary feature, just like the pointed end which is just slightly larger than the guy wire. The Ice Kracker is a split cone with a center hole to match the guy wire diameter – the split cone shape makes for an easy installation. The Ice Kracker is usually installed 3 or 4 feet above the grips or dampeners. Most installations can be done using a ladder or step ladder. The cone is held around the wire by four bolts, is made of iron, and is galvanized for rust protection. I named it the Ice Kracker for a unique name, and it is patented and trademarked. The Ice Kracker is available for all sizes of guy wires.

There is one other issue to note about the use of Ice Krackers. Since many of us have also experienced problems of lightening, it is of great benefit to use the rear bolt to secure grounding cables for the tower. In that regard, I have seen grounding wires run perpendicular to the guy wire run. It is my belief that a lightening surge does not like to turn 90 degrees and for that reason I suggest that the ground cables run parallel to the guy wires. The ideal here would be to use one ground cable for each guy wire. If 4 to 6 ground rods were driven around the anchor and connected at the top by a loop of cable tying all of the rods together, the guy wire grounding cable could tie into this loop. I believe this system would be the most efficient way to protect a tower from lightening damage. Some areas of the country experience serious lightening damage and this would be a worthwhile expenditure. Some customers have come up with lug attachments on their own but we have supplied these as an accessory item if requested.

The average price to equip a tower with Ice Krackers is about $500. You could say it is cheap permanent protection for a tower.

For sizing information check our website icekrackers.com or if you want to discuss any of these issues you can call 800-747-8921, or email me at icekrackers@comcast.net.

Celebrating 35 Years of service to the broadcast community.

RF Specialties® Group

www.rfspecialties.com

Check our website for the office nearest you.

TRANSCOM CORPORATION

Serving the Broadcast Industry Since 1978

Visit our Website- www.fmamtv.com for updated listings
Send your e-mail requests to: transcom@fmamtv.com

Fine Used AM & FM Transmitters & New Equipment

AM	5 KW	2003	BE AM5E, solid-state
	10 KW	2001	Nautel XL12, solid-state
	60 KW	2007	Nautel XL60
FM	55 W	2000	Harris DIGIT CD
	3.5 KW	2000	Harris Z3.5CD, solid-state, single phase
	1.3-3KW	2006	Harris Z6HD-HD Tri-Mode, single phase
	5 KW	1988	BE FM5A
	10 KW	1988	BE FM10A, Dual 5 KW
	10 KW	2004	Harris Z10CD, solid-state
	10 KW	1996	Nautel FM10, solid-state
	35 KW	1993	Continental 816R5B
	35 KW	1991	BE FM35B

Retuning and testing available - Call or email for quote!

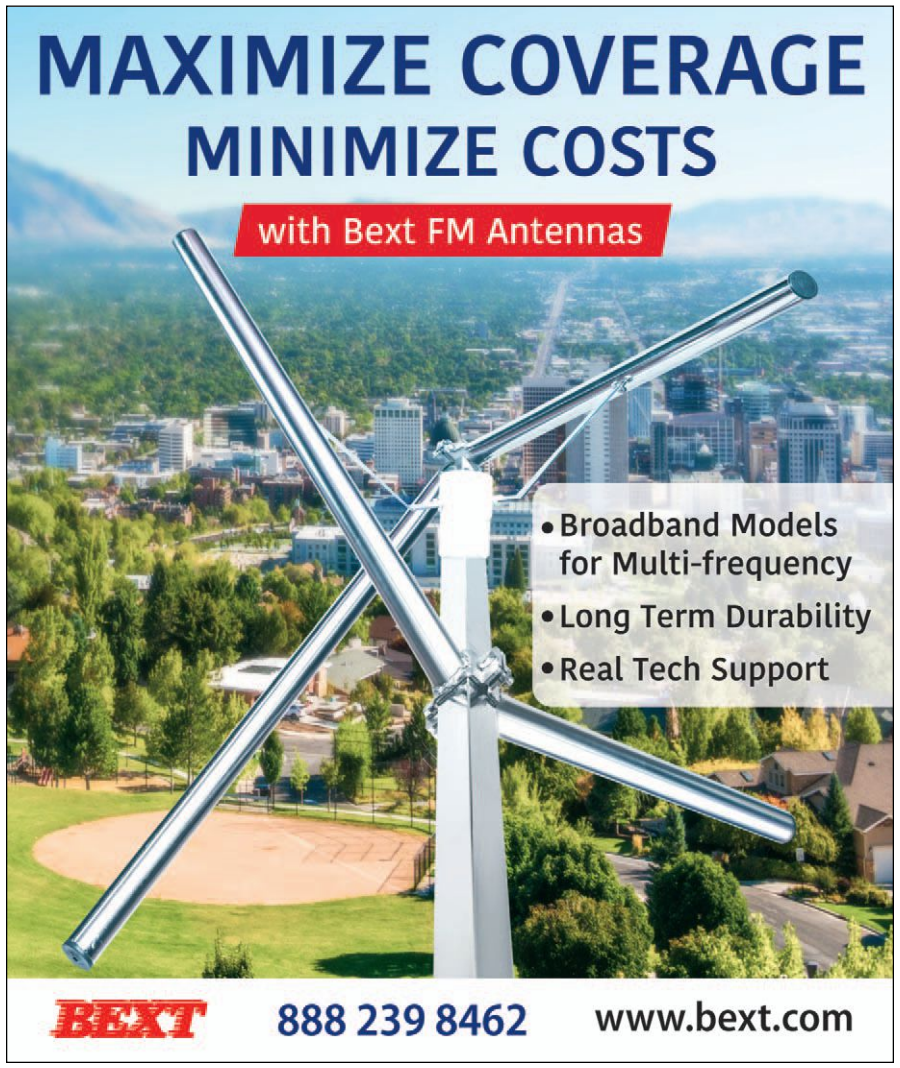
Miscellaneous Equipment

Used Misc. Equipment
Harris N + 1 Controller
Bird Model 8932, 10 kW air-cooled RF Load

Exciters
Harris DIGIT, Continental 802B
New 30W Synthesized

OMB STL systems for radio complete with antenna and cable for under $5,000.00!

2655 Philmont Ave., Suite 200, Huntingdon Valley, PA
800-441-8454 215-938-7304 Fax: 215-938-736



ECONCO

Rebuilt Power Tubes

Approximately One Half the Cost of New

3,000 Hour Unconditional Guarantee

Call for Your Quotation

ECONCO

Phone: 530-662-7553 • Fax: 530-666-7760
Toll Free: 800-532-6626
www.econco.com
1318 Commerce Ave, Woodland, CA 95776

Service Guide

Radio Equipment Products and Services

MOORETRONIX
BROADCAST & INDUSTRIAL ELECTRONICS

Our 17th Year

Our client list continues to grow.
Thank you for your confidence
and equipment purchases.

We Re-Condition

Pacific Recorders BMX I-II-III, AMX,
ABX and RMX, Stereo-Mixer and
Mixer News-Mixer products.

We Have

Replacement Wind Screens and Blast
Filters for the SM-5B microphone.

We Repair & Re-Crystal

STL Transmitters, STL Receivers,
and RPU equipment.

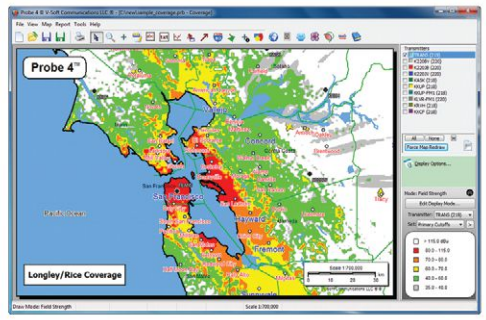
See the "News-Update" page at our website.

Tel: 800-300-0733 Fax: 231-924-7812
WWW.MOORETRONIX.COM
E-Mail us at: rrmoorejr@aol.com

V-Soft COMMUNICATIONS®
R.F. Communications Software and Engineering Consulting

The Leader in Broadcast Engineering Software!

- Create stunning "real-world" coverage maps, interference studies, and population reports with Probe 4™
- AM Pro 2™, used daily by FCC engineers, performs skywave and groundwave allocation studies and AM coverage mapping
- Find STL broadcast auxiliary and Part 101 microwave frequencies and generate PCN letters with Microwave Pro™
- Map FM stations and find upgrade possibilities using FCC minimum separations and contour-to-contour methods with FMCommander™



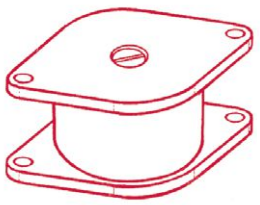
www.V-Soft.com - info@v-soft.com - 1-800-743-3684

Chris Scott & Associates
Visit our website
www.scott-inc.com

Ph: (270)781-5301
Fax: (270)781-1232
Bowling Green, Kentucky

AM-FM
Notch Filters

TRANSMITTING
CAPACITORS
MICA-VACUUM-CERAMIC



SURCOM ASSOCIATES, INC.
(760) 438-4420
LINK@SURCOM.COM

Doug Vernier
Telecommunications Consultants

- FCC Applications for AM, FM, TV, DTV, LPTV, STL
- Upgrade and Due Diligence Analysis
- Frequency Searches
- Site Relocations
- Propagation Prediction with Custom Mapping
- Demographic Analysis
- Directional Antenna Design

V-Soft COMMUNICATIONS®
We use V-Soft Software!
www.v-soft.com consulting@v-soft.com 800-743-3684

BESCO INTERNACIONAL

AM-FM
Transmitters

Pre-Owned – Tuned
and Tested to Your Frequency

www.Besco-Int.com
Rob Malany – Owner

321-960-4001 • sales@Besco-Int.com

M. Celenza
Communications Consultant

FM • LPFM • AM • DTV • STL • Translators

Preparation of Applications, Amendments,
Channel Studies, New Allocations, Relocations
Interference Studies, and Coverage Maps
We also repair broadcast equipment.

Call: 631-965-0816
41 Kathleen Crescent, Coram, NY 11727
celenzacommunications@verizon.net

WARNING

Wrong Safety Sign.
When Danger's inside,
Warning goes outside.

RFSigns.com
- ANSI Z535.2 Compliant
- Easy to order

Service Guide Radio Equipment Products and Services

Gear Guide

An STL Story

by Ron Erickson

Very few FM stations these days have a studio co-located with a transmitter site.

Even though today we seem to have more choices for delivering high quality audio from the studio to the transmitter, there are certain limitations and potential drawbacks that should cause you to pause and study the pros and cons before making that final decision.

In the good old days, we used to order non-loaded, 15 kHz equalized pairs from the phone company. Once set up and phase matched, the lines worked well and all you needed to do was pay the bill each month. Even if you wanted to order a pair of phone lines these days to transport your audio, it seems no one at the phone company knows what you're talking about.

There are quite a few Internet devices available that will either connect directly to each other or ones that require a server or fixed IP address. The thing they all seem to have in common is latency – a delay in the audio which varies from unit to unit. A station that is fully automated or satellite programmed has no problem with a slight delay between the studio and the air signal. Live air talent on the other hand will want to hear themselves back in the air monitor. The station I'm working with has live sports as well as live DJ's, so the latency issues have all but ruled out using the Internet. Looking at all of the choices available, the Oregon LPFM I'm working with decided to build a "tried and true" 950 MHz link.

A critical part of this decision is getting a path study done and identifying an available frequency. In this case, 950 MHz will work. There are things you need to know in advance of getting your path study done, like how tall your studio end tower needs to be to "see" the receiving antenna.

Once it is determined that you have a clear path for your STL signal to reach your transmitter site, you can shop for equipment. You can find several great products and famous brand names, but if you need to find the gear that lives where budget meets quality, you'll take a good look at the products built in San Diego by a company called NiCom. The NiCom TSL 910 transmitter and matching RSL 900 receiver can be purchased as a pair for just under $3,000 which seems to be a very competitive price. Some NiCom dealers will offer the pair for less.

The TSL 910 and RSL 900 are of course frequency agile with the transmitter adjustable 1 to 10 Watts. Need more power? For around $2,000 more, NiCom will add on an RF Amplifier capable of up to 100 Watts. NiCom has been building equipment for about twenty years and almost all of their gear boasts a three year warranty.

Comparing the NiCom BKP120 antenna to the "Brand M" unit, the price is roughly half, coming in at $510 list. There is a slight difference in gain – where the more famous brand has a 21.05 dbi gain, the BKP120 has 18.5 dbi gain.

The difference in gain was not a reason, in this case, to select the other brand.

NiCom packaged the antenna well for shipping and all of the hardware was included. Putting it together took a very short amount of time. Once the antennas were mounted at both locations, we adjusted each end for maximum gain.

One of the best things I like about using a 950 MHz STL, is being able to transmit the stereo composite signal. This allows you to have all of the audio processing at the studio end.

Of course a 950 MHz STL requires an FCC auxiliary license and filing for these is rather complicated. I recommend you use a qualified engineer or one of the companies that specialize in these license filings. Some of the companies that provide frequency coordination, notification and licensing assistance are (in no particular order) stllicense.com, rflicensing.com & comsearch.com.

The equipment selected from NiCom performs just as expected. If you ever require technical service, customer assistance is available by phone, (619) 671-9500.

Ron Erickson is a lifelong broadcaster, engineer and station consultant. Contact: ron.erickson@yahoo.com or 541-460-0249.

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

2018 CES Conference
January 9-12, 2018
Convention Center – Las Vegas, Nevada
www.ces.tech/Register-Plan.aspx

NATE Unite 2018
February 19-22, 2018
Nashville, Tennessee
https://natehome.com/annual-conference/nate-unite-2018

2018 NRB Convention
February 27- March 2, 2018
Nashville, Tennessee
www.nrbconvention.org

NAB 2018 Spring Convention
Convention Center – Las Vegas, Nevada
April 7-12, 2018
www.nabshow.com

Texas Association of Broadcsters (TAB)
August 1-2, 2018
Marriot Downtown, Austin, Texas
www.tab.org/convention-and-trade-show

NAB Radio Show
September 25-28, 2018
Orlando, Florida
www.radioshowweb.com

Radio Guide Advertiser Info – November-December 2017

Advertiser - Page	Website
Aldena - 32	www.aldena.it
Altronic - 28	www.altronic.com
AM Ground Systems - 37	www.amgroundsystems.com
Arrakis - 13	www.arrakis-systems.com
Axia - 27	www.telosalliance.com
Bay Country - 42	www.baycountry.com
BDR - 4	www.thebdr.net
BEXT - 43	www.bext.com
Bohn/Marti Repair.com - 46	www.martirepair.com
Broadcasters General Store - 23	www.bgs.cc
Broadcast Electronics - 39	www.bdcast.com
Broadcast Software Intl. - 15	www.bsiusa.com
CircuitWerkes - 29	www.circuitwerkes.com
Coaxial Dynamics - 41	www.coaxial.com
Comrex - 5	www.comrex.com
Davicom - 42	www.davicom.com
DaySequerra - 21	www.daysequerra.com
Dean Technology - 44	www.deantechnology.com
Deva - 38	www.devabroadcast.com
DH Satellite - 37	www.dhsatellite.com
DM Engineering - 47	www.dmengineering.com
Econco Tubes - 43	www.econco.com
Enco - 4	www.enco.com
ESE - 46	www.ese-web.com
GatesAir - 17	www.gatesair.com
Graham Studios - 46	www.graham-studios.com
Henry Engineering - 2	www.henryeng.com
Inovonics - 1, 19	www.inovon.com
Kintronic Labs - 39	www.kintronic.com
LBA - 26	www.lbagroup.com
Mega Industries/MCI - 20	www.mcibroadcast.com
Mooretronix - 44	www.mooretronix.com
Nautel - 7	www.nautel.com
OMB - 41	www.omb.com/en
Omnia - 31	www.telosalliance.com
Phasetek - 47	www.phasetekinc.com
ProAudio.com - 22	www.proaudio.com
Radio Systems - 40	www.radiosystems.com
RF Specialties - 43	www.rfspecialties.com
SCMS - 35	www.scmsinc.com
Shively - 36	www.shively.com
Smarts Broadcast Systems - 11	www.smartsbroadcast.com
Stackley Devices - 46	www.stackleydevices.com
Studio Items - 34	www.studioitems.com
Superior Broadcast - 47	superiorbroadcastproducts.com
Tieline - 9	www.tieline.com
Titus Labs - 30	www.tituslabs.com
Transcom - 43	www.fmamtv.com
Valcom - 33	www.valcom-guelph.com
Wheatstone - 3, 24, 25, 48	www.wheatstone.com

Map indicates the extended range from Wheatstone's processor with multipath control.

Great Sound Is Subjective
Increased Coverage is Measurable...

Scottie Rice, engineeer for KSDS in San Diego, shared his experience in putting a Wheatstone processor on the air in place of another top-of-the-line audio processor. He was able to increase the distance of his listening area substantially.

To see/read Scottie tell the whole story, go to
wheatstone.com/multipath

It's Time You Tried a Different Processor

wheatstone.com/processors

2017 BEST of SHOW RADIO WORLD
2017 BEST of SHOW TVTechnology
2017 BEST of SHOW Radio

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

phone 1.252.638-7000 | wheatstone.com | sales@wheatstone.com