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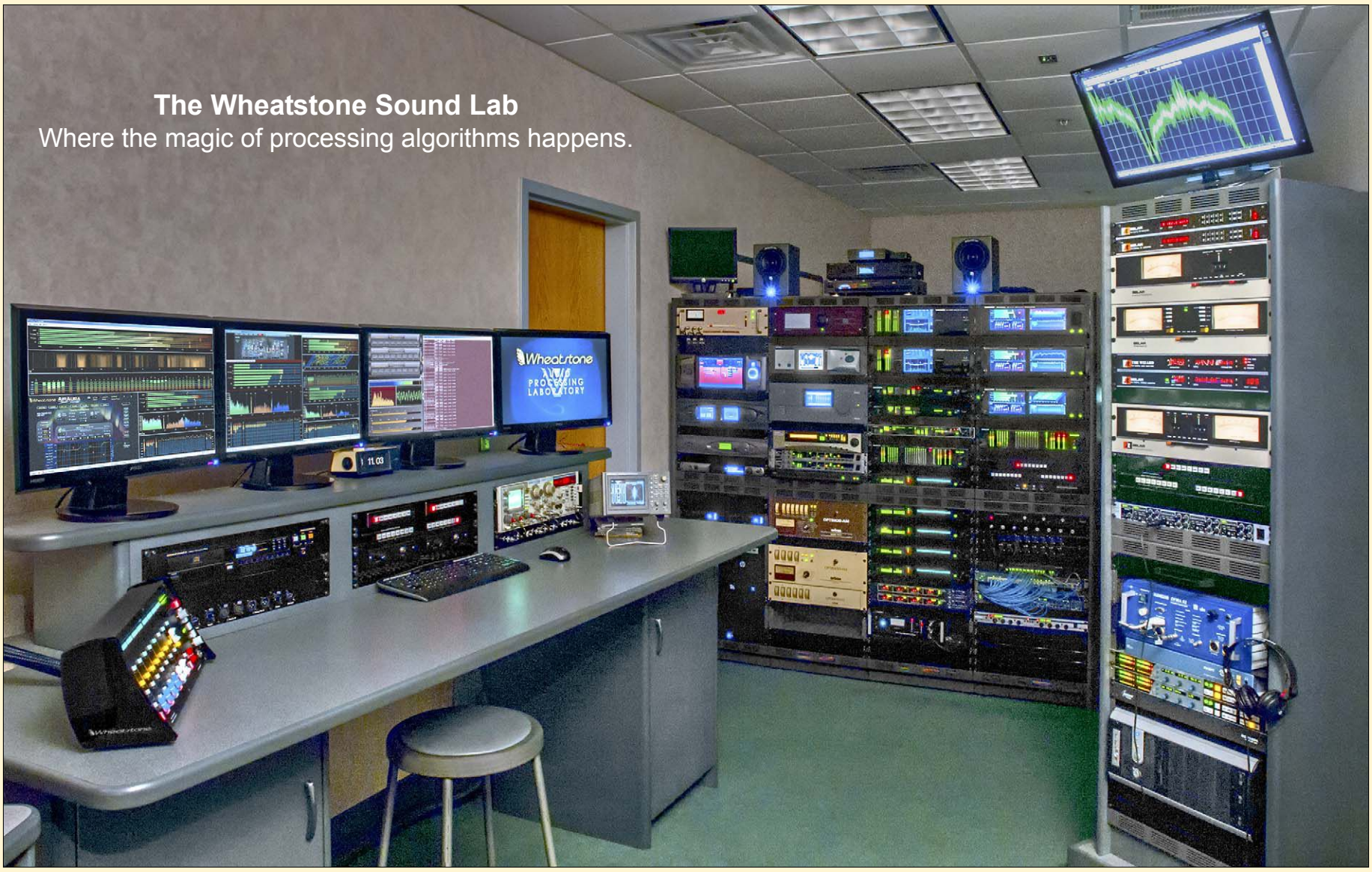
May-June 2013 – Vol. 21, No. 3

What You Need to Know About Processing Voice Talent



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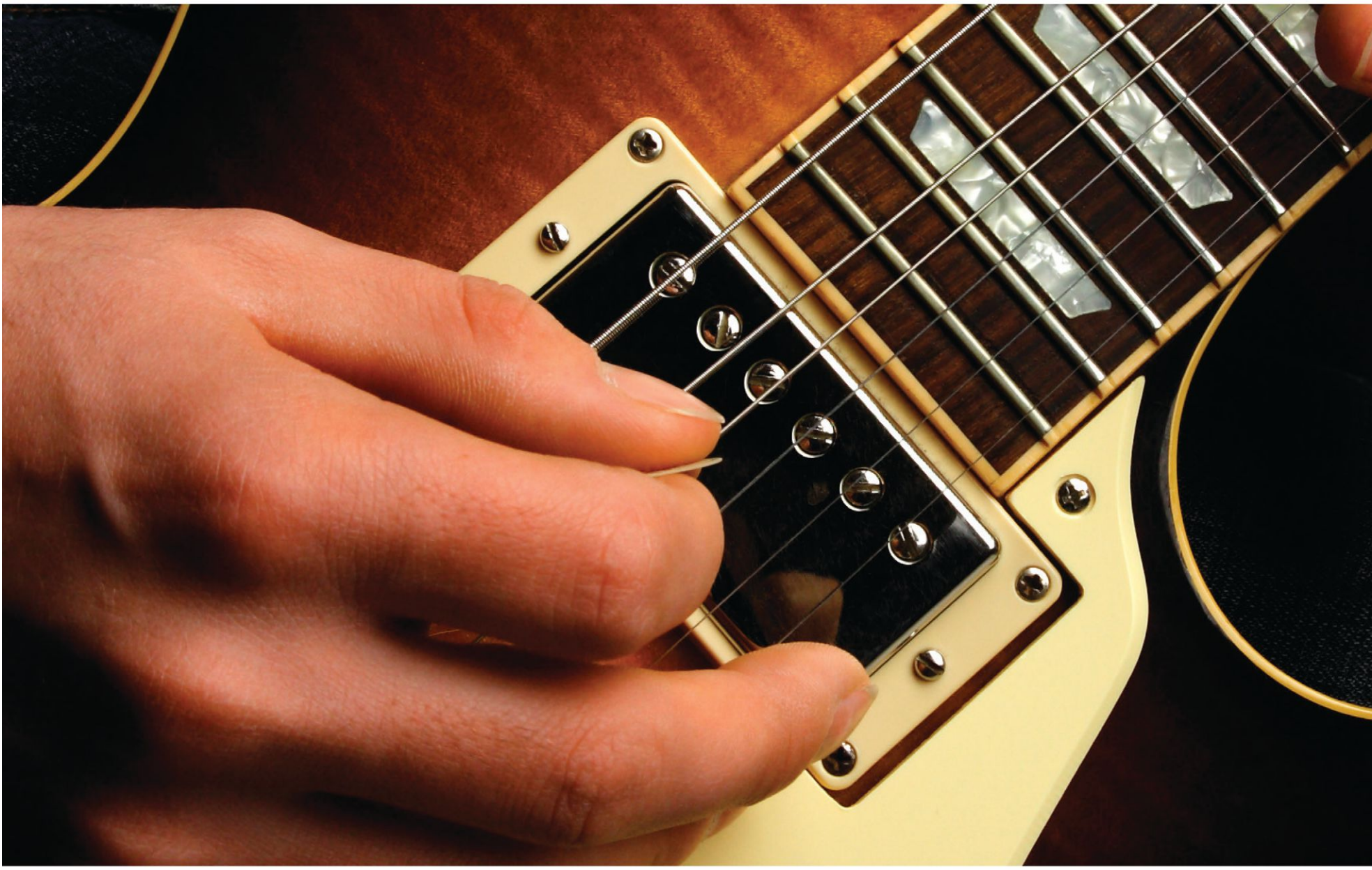

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Radio Guide, ISSN 1061-7027, is published bi-monthly, six times a year, by Media Magazines Inc., PO Box 20975, Sedona, AZ 86341. Radio Guide is copyright 2013, Media Magazines Inc., and may not be copied, reproduced, or stored in any format, without the written permission of the publisher.

Radio Waves

by Ray Topp – Publisher

In This Issue

• In the *Cover Story,* Steve Dove, "Minister of Algorithms" at Wheatstone, explains the important areas of focus, when processing voice audio.

• In *Studio Site,* George Zahn describes the primary instruments for capturing that voice, calling out some old favorites and a few "newcomers," from the various microphone families.

• In this issue's installment of *Technical Management,* Mike Callaghan gives you some powerful tools to help solve communication problems at your stations.

• Radio contests can be a source of frustration and legal pitfalls. Peter Gutmann lays out some Q&A to help you run your contests properly.

• Why "re-invent the wheel." Tech tips can save you money – also time and hassle. Chris Tarr reveals a few tips that he's accumulated over time, in *Tips From the Field.*

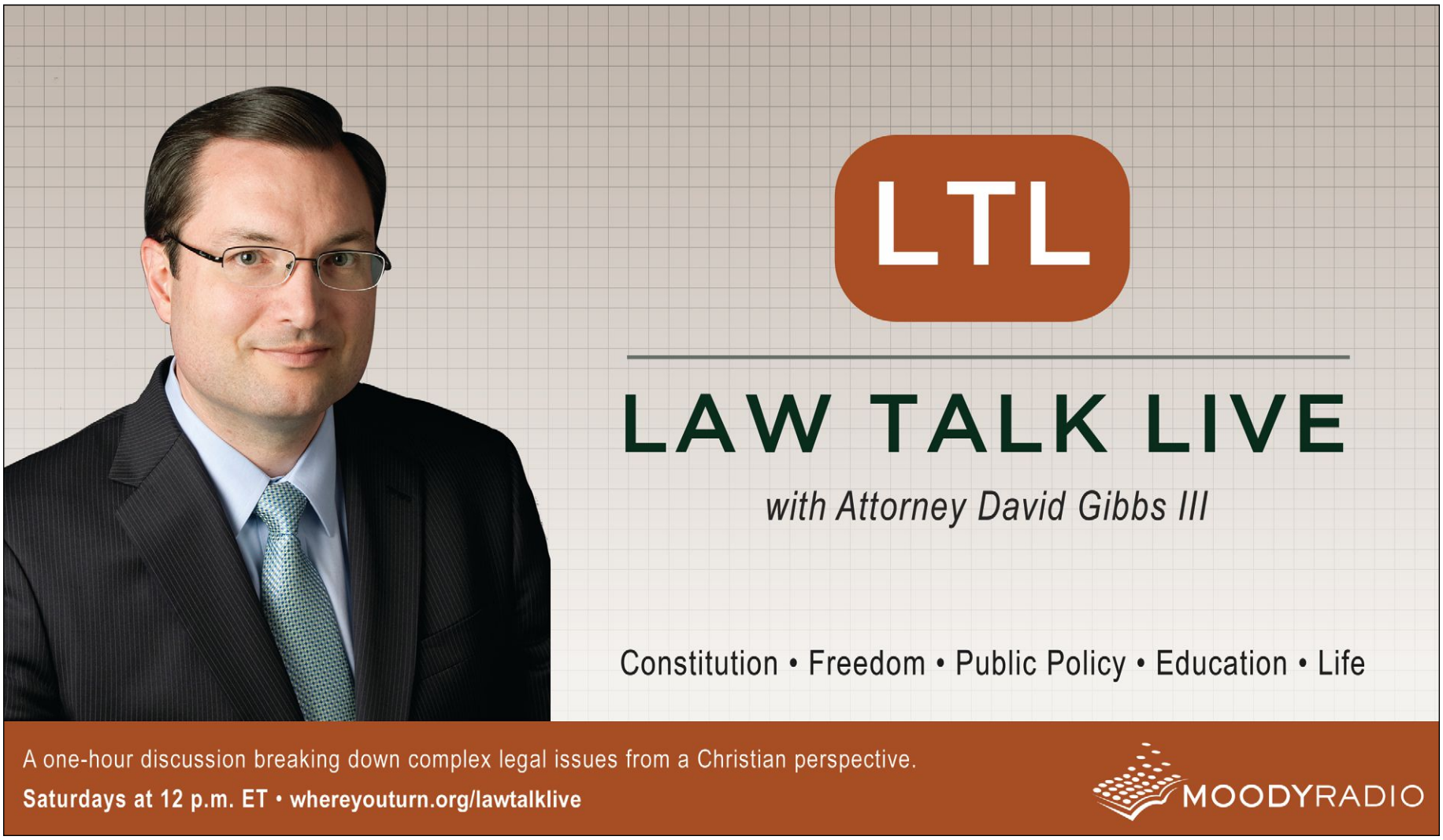
• In Mike Callaghan's *State of the Station,* he identifies the important areas you need to check at your facilities – *before* the FCC inspector arrives.

• Scott Schmeling guides us through rough Spring weather, in *Chief Engineer.* When you go from 18" of wet snow, to 100 degrees in just twelve days, ice comes calling.

• In *Translator Topics*, Jim Turvaville joins ***Radio Guide*** to explain some of the recent history of translators, and gives us insight into what's on the horizon.

• Leo Ashcraft says that "the doctor is never right." In this case, he could be right. Check out *Operations Guide.*

– Ray Topp, Publisher



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Cover Story

What You Need to Know About Processing Voice Talent

by Steve Dove – Wheatstone Corp.

Steve Dove is Minister of Algorithms at Wheatstone Corporation. He has designed professional audio products for a very, very long time; from tubes to FPGAs, analogue to digital, vintage to emulating vintage. Years spent zooming the world with rock bands have lent him hard appreciation for what works in the real world and the fine art of sonics.

Steve Dove

The microphone processor has long been important, but in recent years it has become vital. Mainly it's the recent trend of referencing audio to 0 dBfs (the maximum signal level available in a digital system) rather than nominal 0 dB VU. Most popular music CDs and almost all download releases are "normalized" or processed so that their highest peaks are at 0 dBfs, if not squashed and clipped to blazes, up against that limit. An announcer's voice, following on after this, can seem quite out of place – almost muted by comparison.

Compounding this is the main air-chain processor sitting ahead of the transmitter, which is generally set up (in a music format) to be optimized for music with secondary regard for voice, or the excruciations of highly bit-reduced streaming. Here are a few pointers for processing voice talent.

Start With Headroom

The simple act of just terminating a microphone is anything but simple, given the wide variety of types in use. Sufficient signal headroom needs to be available to encompass all that lovely processing you'll be doing. At Wheatstone, we thought this was so important that we designed our new M4 (four channel, IP networked mic processor) with 32 dB of input headroom, which is comparable to the best recording consoles.

Phase Reversal and Rotation

The absolute polarity (in-phase, or out-of-phase) of an announcer's microphone can make a huge difference to how he sounds in his headphones (if not to air). In a multi-mic environment, switching the phases of the various microphones can mitigate cross-coupling coloration.

An effective old trick is to displace the relative phases of a voice's fundamental frequency and early harmonics, which can radically reduce the natural asymmetry, and thereby decrease the peak-to-average ratio. Best done ahead of all else, this leads to a more "compact" signal of higher average power. Less amplitude, more power; life is good.

Pass On the Noise

Common unwanted noises are structure-borne impacts (footfalls) from elsewhere in the building, and AC rumble. Here, a high-pass filter is invaluable, set as high in frequency as possible without impacting voice quality. The fundamental frequency of even a "Monster Truck" voice rarely gets below 70Hz, so there is a lot of room to maneuver.

A low-pass filter can be helpful for reducing annoying high-frequency noises, such as lighting-fixture switching supplies and TV/computer line whistles, but the sonic penalty of a low-pass filter is far more severe.

In development of the M1, M2 and M4 we found that ultimately steep but low 'Q' 24dB/octave filters for the high-pass and low-pass afforded excellent noise rejection yet with little sonic "smearing."

Some Gating is a Good Thing

Gating is an automatic means of opening a microphone to air solely in response to someone speaking into it. Room noise (AC, etc.) can be suppressed when no speech is present, which also can help with cross-coloration in a multi-mic environment, and acts also as a basic auto-mixer. It is amazing how little attenuation "depth" is needed to make a big improvement – just a very few dB – which is why we add fine precision control to our processors.

Additionally, the sidechain of the Wheatstone processor's gate is tuned for voices, reducing false triggering – in particular, table and microphone "bumps" won't wake up the gate.

Don't Try to EQ Out Sibilance

Put a naturally sibilant voice in front of a bright-as-a-laser condenser microphone and things get scary. A de-esser looks at the spectrum where "esses" are typically found (6kHz-ish) and reduces the level if it "sees" excess energy there. Just the "esses" are constrained, all else left alone. A conventional equalizer would just make everything dull. Unlike most de-essers, Wheatstone's only attenuates the selected "ess" region, not the whole spectrum, making its action much less obvious.

Power to Equalization

Twofold uses; tonal correction, and artistic effect. Almost without exception, directional microphones suffer from a pesky laws-of-physics thing called "proximity effect." Figure-eight microphones are the worst, but common cardioids aren't far behind. This is a tilting up of the low-frequency response of the microphone as one gets closer to it, which becomes seriously over-boomy at extreme. At less than a foot away from voice, most microphones are well into proximity effect. A good approach is to use a low-frequency shelving equalization section to correct for this, rather than a low-pass filter, which is generally too precipitous.

A high-frequency shelving cut does wonders for excessively bright microphones (budget condensers in particular). But don't rule out parametric, or sweepable bell-shaped equalization sections, for correcting tonality issues. That nasty high-mid "articulation" peak, from which many microphones suffer, is dealt with handsomely by a shallow broad bell cut.

The shelving sections we've designed in our mic processors are a mathematically exact emulation of the classic (1950s) Baxandall tone-control circuit, but with modern twists. The turnover frequencies are continuously variable, allowing fine-tuning of proximity-effect reduction at the low frequency end, and choice of "air" (extreme high frequencies) EQ or more aggressive "presence" EQ (high mids), or anything in between.

Two, fully parametric sections permit more surgical sonic control. They are internally more complex than "cookbook" variants, and afford responses more apt to use, than what is easy to provide. The key to the equalizer overall is that through carefully chosen defaults, response "shapes," and sonic characteristics, things just fall to hand nicely and do just what the operator wants with minimum effort, rather than having to fight for it.

There are no rules for "artistic" EQ. Whatever sounds right, *is* right. Just remember, other people have to listen to this thing, too.

Basic Compression Sense

Similar to equalization, compression is a basic but powerful tool, that has both technical uses and artistic effect. The primary "formal" usage is to maintain a consistent output for the variety of voices out there, different excitement levels, and poor microphone technique. For this Automatic Gain Control (AGC) type of usage, fairly long attack and release times (in the low hundreds of milliseconds) are a good starting point, with a ratio steeper than 3:1. The output level is set to match the facility level structure.

Artistically, more aggressive settings (shorter attack and release times, and deeper gain-reduction) imbue a heightened sense of urgency, weight (and yes, loudness) to the voice, whilst controlling the output level more tightly. Most announcers L-O-V-E compression!

Underlying all our mic processors' compressors is a slow-rate AGC, which allows the section to happily perform both level-correction and more rapid compression effects simultaneously. The sidechain is subtly filtered to avoid pumping and other sonic undesirables. This all came out of our original design challenge to make "the most analogue-sounding digital compressor possible."

Peak limiting is a common overload protection tool. The M4 trades some of its huge headroom to afford a "brickwall" look-ahead style or, alternatively, a slightly more relaxed, latency-free limiter. While not intended for effect, it does withstand abuse nicely, and indeed, using the twitching of the limiter indicator as a sign that "you're there!" is quite valid.

Final Thoughts on Digital Processors

Today's digital processing adds a few new considerations. One is latency. An unfortunate aspect of digital systems is that delays are endemic and cumulative. Minimizing delay is vital, especially where talent is concerned. Delay in their headphones leads to perceived sonic coloration; obviously the microphone processor should be as quick as possible. For this reason, we run our mic processors' A/D converters and processing itself at 96 kHz (or 88.2 kHz in a 44.1 kHz context). This super-rate halves the conversion times – the major source of latency in a processor – shaving a big chunk off the delay.

The calculations for, and accuracy of, digital filters in the top octave (say 10 kHz up) also can be problematic, taking some questionable heroics to beat into acceptable shape. This is why, for our mic processors, we run the EQ at 96 kHz, which effectively blows right past the problem (the nettlesome top-octave is now in inaudible-land) and the subsequent reduction to 48 kHz does not meaningfully affect the now wholly accurate EQ characteristics.

Accurate dynamics behavior must also be taken into consideration in today's digital processors. Particularly with peak-sensing detectors, such as in limiters or fast compressors, certain spot frequencies (sub-multiples of the sample rate) can suffer serious detection inaccuracies. Running these dynamics at a super-rate forces the worst of these "black holes" an octave up, and generally out of harm's way, with any remaining stragglers far easier to contain.

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Studio Site

Microphones: Old Favorites and New Challengers

George Zahn

There may be no more polarizing (pun intended) issue when it comes to our basic studio needs than the primary studio microphone. Engineers, managers and talent have gone to battle over which microphone gives the best audio reproduction, the warmest voice, the most clarity, and sometimes the least processing needed. In this issue, I'm not aiming to sway you to a particular microphone, but I am hoping to raise awareness for stations that really don't care what microphone is "representing" their on-air sound. We'll look at some of the long-standing studio microphones, some possible new challengers, and finally I hope to learn what our readers are using in their studios.

First, a review of some past topics on microphones covered in ***Radio Guide***. The selection and use of microphones is highly subjective. Ask five radio professionals and you might just get six or seven opinions. Microphones are indeed a key signature of our individual or station's on-air sound. All microphones are not "created equal," and "using what we've always used" is not always the best argument for keeping what's been in our studios for the last ten or fifteen years.

If you do, or don't, buy into any of the above arguments, I'd love to get a dialogue started on microphones and what works for you and your facility. Whether your station is a small one in a rural town or a boomer that serves several states, your budget may determine how selective you can be about what microphones you're using. Other considerations are the variety of voice talent you have and what your goal for on-air sound might be.

Most stations choose to utilize the same brand and model of microphones throughout their facility – be it two studios or a dozen studios. The goal is for consistency of sound, no matter in which studio the voice was recorded. Let's look at some of the most ubiquitous microphones in broadcast studios today. Many of these have been standards, in one version or a slight variation, for some time. These are not implicit endorsements by me of any of these mics, and I stick by my assertion that, "beauty is in the ear of the beholder!"

Grab a Grenade?

Any of us who has worked for more than a few stations has likely encountered the ElectroVoice RE20 or RE 27. The RE20, a large diaphragm cardioid dynamic, reminds me in appearance of a German WWII hand grenade, and it runs about $400-500 on the market. The RE27 is a similar model with a higher performance – and about twice the price tag. Whether listeners know it or not, they've heard the RE20 countless times, especially for stations and networks with extensive talk programming.

EV RE-20

One tale out of school: I had worked for about 25 years for an FM station where we had, at one point, used a Neumann U87 ($2000 plus) as our air-studio microphone. We were so spoiled. All other talk mics in the plant were Sennheiser MD421's (about $380-450). When the station moved to new studios with new consoles, we had phantom power issues with the U87 and switched to a 421 for our main announce mic. The Station Manager had heard about the RE20 and how widely used it was, and invested in one as a way to do a simple A/B test in the air studio.

Within five days, there was a revolt by the on-air staff, which didn't really mind the switch from U87 to 421, but *definitely* didn't like the overall sound of the RE20 by comparison. I bring this up, not to dissuade you from considering the RE20 but to prove my point that people do hear a difference. Since at least some of us have the proverbial "faces for radio," we don't worry so much about visual aesthetics. No one objecting to the mic change said anything about ease of use or physical appearance of the mic. It was all about the sound. The RE20's went into our music recording mic arsenal, as solid and excellent kick drum microphones.

Sennheiser MD-421

One of the other staple microphone manufacturers for air studio work is Shure. The Shure SM5B is another large diaphragm, cardioid dynamic that was common in air studios, especially in AM stations. You've likely seen one – it looks like a CONTAC cold capsule on steroids, when shrouded in its mega-windscreen. It had decent frequency response, and some have called it one of the best vocal mics ever. Its yoke-style mount made it easy to mount from booms, and the thick windscreen made it ideal for field and TV studio work. The mic's legendary side rejection helped to make it popular for TV since it almost mimicked a more narrow supercardioid pattern.

Shure SM-5B

The Shure SM5B (please note this is *not* an SM58, but a 5 followed by the letter B) was succeeded by the slightly lower profile Shure SM7B microphone, also still used widely today. At about $350, this dynamic cardioid is also a very popular option – sans the amphetamine-shaped wind screen. The price point and very basic design allows stations to add multiple mics on a budget.

More Shure Things

Before we leave Shure, I do want to mention the Shure SM58 (about $110) or the Shure SM58 Beta ($160-180). These generally handheld microphones are workhorses that are incredibly rugged cardioid dynamics. While they're a staple of most road kits for music and field recording, some smaller stations have used the durability and the price point as a deciding factor in switching station-wide to Shure 58s. From discussion with others in the field and from personal field experience, the consensus I've found is that the better performance and crisper sound of the Beta version makes the slightly higher price well worth it. These are no-frill mics, no bass roll off feature, and it takes "working the mic" to get desired results.

Shure SM-58

So far, I haven't really addressed a good cardioid condenser microphone option for air studio work. Most stations can't afford the aforementioned U87 for a single mic – much less equipping the whole facility with them. But about nine years ago, Neumann made a foray into the radio broadcast field with its small but mighty BCM104. It's a relatively diminutive mic, but the diaphragm is likely the largest part of it. If you, like me, don't have the deepest bass voice, you can really play the proximity effect to create extra warmth. The cost is still higher than most dynamics, at about $850-1000, but Neumann has also created a dynamic version of the 104, the BCM705 that is about $650-750.

Back to dynamics for a moment, I did mention the Sennheiser MD421 earlier, and for some stations, that has become a broadcast standard as well. This is one of the more versatile microphones that can be taken from the studio and used in music applications. As with most of the $300 and up mics, it has bass roll-off settings to help with battling proximity effect. This is the exaggeration of bass frequencies from working very close to the microphone. In some cases, the extra bass is not needed or wanted, and the bass roll-off can attenuate the bass below set frequencies.

What's New?

There are new challengers on the horizon and in some studios already. Some of the microphones that might not have the long legacy of the mics cited so far, include the dynamic microphones Rode Broadcaster in the $400-500 range, and the Heil Sound PR40 (approximately $350-500), plus higher-end condensers Neumann TLM103 (about $2000) and one of the top of Audio Technica's line, the AT5040 which can dwarf the price of many other condensers at about $3000.

Heil PR-40

Many of these upper end studio mics also find their way into recording studio settings and it may not be uncommon for some previously "recording studio only" mics to end up in our air studio. It would be interesting to see how many stations may be using vocal or instrument microphones such as Beyer Dynamic M130 (a ribbon mic starting at about $700), Sennheiser MD441(a supercardioid dynamic at about $800), the Blue Microphones Bluebird (cardioid condenser in the $300 range) for their announcers.

AKG also makes a wide array of condenser mics made for music recording, including the switchable pattern AKG C414 at about $1100, the C214 at about $400-500, and the C3000 at about $300-400. Sennheiser also has the MK4 condenser ($300-400) to name just a few of the option.

There are also some "budget" versions of air studio mics. ElectroVoice has the RE320 (a little cousin of the RE20 in the $300 range), an Audio Technica AT 4040 cardioid condenser (about $300-400) and the AT 2020 cardioid condenser in the $100 range (suggested for semi-pro use by some sources), to enumerate a few.

Are any of the above mics in your inventory? If not, share with us some of the creative mic choices, due to desired sound or budget, that help you get the job done! Does your station use different mics for different talent, and does it create consistency issues with the on-air sound of processing? As always, your input helps us all learn more!

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

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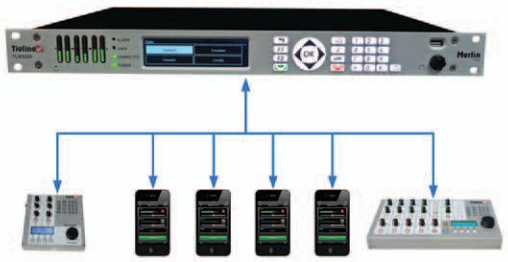

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Tech Management

Blasting Through Communication Problems

by Mike Callaghan

Last time we talked about common communication issues in radio. Here are some ways to avoid those issues and enlighten your workmates more easily.

Meetings

We've all been in staff meetings where the topic under discussion wanders all over the map, and decisions are shelved because the right people are missing or they're not prepared to discuss what needs to be settled. At the end of these no-host gatherings, little, if anything, has been accomplished. But at least we can say we had a meeting. That should count for something, right?

Radio staff meetings should take a lesson from the meetings contractors and building owners have during a project. There's an agenda – old business comes first, and then new business. A secretary takes notes, and when the meeting ends, all the participants get copies of what was said and what was decided. Tasks are assigned and deadlines are clearly defined.

If food is served, the meeting stops while it's eaten. Then the plates are gathered up, and the meeting starts again – very little time is wasted. At the end of the meeting, each task has been clearly defined, and everyone knows who is responsible for each part of the endeavor.

If a last minute change is imperative, everyone who was at the meeting gets advised, with an e-mail and a voice-mail or a phone call. Both request acknowledgment by a return message. If it doesn't appear, the sender keeps trying until the word does get delivered. If there were 15 people at the meeting, 15 people need to be contacted, one way or another.

For a major station event, a quick gathering the day before will insure nothing has slipped through the cracks and that everyone is sharing the same agenda.

And finally, after the event is over and complete, a post-mortem will uncover the rough spots and allow corrections for the next endeavor. Remember that we learn from our mistakes; don't let this opportunity slip by without dissecting the flaws. Point out what went really well and give credit for jobs well done. Recognize the strong and weak points and explore the reasons for each. By fine-tuning the skillsets involved, future events can only get better from this strategy. Take notes at this gathering and send them around as well.

Persuading vs Commanding

Persuasion is a powerful communication tool. It's better to persuade someone to share your line of thinking than to just tell them how you want something done and leave it at that. Even better, a convert to your way of thinking will be more aggressive in following the steps you outline, than if they disagree but still proceed only because they answer to you. There are two classic types of management: Type "A" is used where workers are relatively unskilled, and are motivated by a fear of losing their jobs. This is what some might use when they're running an assembly line, where workers aren't encouraged to make suggestions, or to participate in decisions or constructive thinking.

In broadcasting, type "B" management works better. We're part of a team with a common goal, and any ideas we can contribute are appreciated and encouraged. We exchange ideas, fine tune and respect each others thinking, and work as a group to get the job done the best way possible. We embrace and appreciate the synergism of different ideas coming together. While this would never work on an assembly line, we in radio like to think of ourselves as creative. Creativity is a necessary and fundamental part of putting radio programs together.

Proposing ideas

There are a variety of ways to introduce ideas you have to help things along. The way you get the ball rolling can make a huge difference.

Here's an example: Suppose you've thought of a new way to do something repetitious, like dubbing agency spots into the automation system. It's easier for you and should save effort for other people as well. But your boss, a traditionalist, likes to do it the old way, and convincing him will be an uphill sell.

Make a list of the advantages your idea provides. When you talk it over with him, leave out at least the most important advantage. Then steer him to it, so he'll think of it on his own. When he stumbles across that point, he'll think it was his discovery. Now he'll be a stronger advocate for you than if you gave him every detail.

Persuasion is also a great tool for those who help you. Rather than just ordering your associates to do a job a certain way, take the time to explain why your way is preferable to other ways they might like. Again, this brings an advocate to your way of thinking and provides a united front to getting the task done.

It helps to remember the ways your favorite teachers used to imbed ideas and concepts into your mind – use these same methods with other people. We all get to be teachers now and then, and you do your peers a huge favor when your tools provide "Aha" moments for them to recall.

Know Yourself

If you have a hair-trigger temper, you'd be wise to learn ways to absorb bad news slowly, rather than rushing to overcome the bad news in haste. Acting impulsively, without thinking things through, can cause many more problems than it corrects.

An example is the board-op who starts the backup transmitter when he hears dead air without looking at the VU meters to see if anything's leaving the studio. In one case, this led to a very crispy and ruined dummy load before the episode was over.

Another example: I once worked for a manager that chided me for not running to fix a simultaneous microwave and telco problem. With both of them down, we had no way to get a program on the air. The point was, what good would running do? Because he was in a panic, he expected the same of everyone else. The logical response of troubleshooting the link, and also calling telco, got things going as quickly as possible.

Writing Reports

Doing reports effectively, depends on who it's for. Your program director cares nothing about the technical details of how you dealt with a problem. He just wants to know if it can be kept from happening again, and if he can help make that happen. Your supervisor, on the other hand, *does* want details of parts that failed, costs, delivery, and time needed to repair. If you think a report to a technically novice manager is too complex, run it by a non-technical friend and see if they get the gist. If they have problems with it, chances are your manager will as well.

Delivering Bad News

If you have to say something bad about someone, try to convey it in person. Using email for this leaves a "time bomb" that could be devastating in the wrong hands. You can never really patch things up, after you've written a derogatory email and sent it. You can't know how far it will go. In times past, it could be torn up or burned, and you could start the relationship over. Not any more. The best paper shredder in the world can't repair someone's feelings when their weaknesses are spread around the world.

Email Replys

Speaking of email, what do you do when you send a message posing a question and never get an answer? When you corner the recipient after it's too late, they look you straight in the eye and say "I never got it!" There are ways around this annoyance.

1. When you send the question, cc: other people. Even though you address just one person, copying others will make them aware a question's been asked, and they'll be anticipating the answer along with you. When the person you need the answer from sees that others know you're waiting, they'll be much more likely to pay attention and deal with it. You've basically removed their excuse to avoid you.

2. If the question is about spending money, and it's for something you need, use reverse logic – "Unless you tell me not to, I'll place the order in the morning." If you don't get an answer, there's a de facto approval on your side.

3. Ask your boss. Some managers just don't want responsibility. They'll dodge questions, avoid you in the hallway, and just make it hard for you when you need their advice or counsel. If this sounds all too familiar, bring your own manager into the loop, and let him take charge. If he's the problem, find the person who's asking for the project, and have them do the pushing. You shouldn't have to be the only person in the parade when someone's blocking progress.

Avoid the rumor mill. Radio stations are full of rumors. Intrigue is everywhere, from the front office to the people in traffic. 95% of the rumors you hear are empty facts, and people's careers have been derailed by false information.

If you stay out of the game, you'll lose nothing and gain admiration. If someone wants to tell you a secret, refuse the offer and change the topic. And – I know you know this already – if a friend does want advice and asks you something in confidence, never, *ever* share the information with anyone.

Finally, remember that simple answers are usually the best answers. Using a paragraph to answer a yes or no query gives people a better chance to misinterpret what you are trying to say. If you can't provide the "yes" or "no" they're looking for, explain the reason as simply as you can. Keeping close to the subject is usually appreciated. Things today are complicated enough without making them worse!

Mike Callaghan is the Chief Engineer at KIIS-FM in Los Angeles, CA. His email is: mc@amandfm.com

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Auxiliary Services

Radio That Reads

by Steve Callahan

I was thinking the other day about the progression of technologies, and how it has affected what we do and how we do it. Some of you fondly remember carts, 45 RPM records and open reel recording tape. Here's one example of how the progression of technology has helped a radio reading service expand their capability to serve the print handicapped.

I've had the privilege of working with the fine folks at the Talking Information Center, a radio reading service for the blind, headquartered in Marshfield, Massachusetts. Thirty years ago we needed to get our subcarrier audio reading service to other FM stations across Massachusetts. This was in the days when our only option was to daisy-chain the stations with off-air relays. It was also in the days when the FM band was not as crowded as it is today.

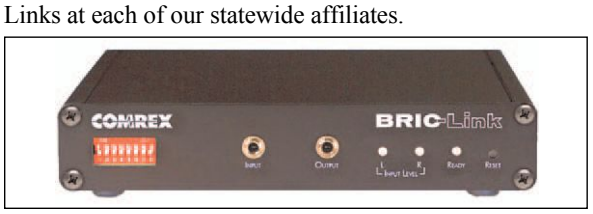
I recall one relay we did to get out to Worcester, the second largest city in Massachusetts. We had been successful in an off-air relay from Marshfield, south of Boston, to the transmitter site of WERS, the Emerson College station, in downtown Boston – but it was a challenge to snag WERS in Worcester, some 40 miles to the east.

It took some fancy antenna twisting on the roof of a building and a very selective receiver to get a signal that was listenable. Quite frequently, the main-to-sub bleed, and adverse weather conditions, made the twice-relayed signal just plain horrendous. We used off-air relays for ten years but it kept us from extending the reading service audio westward until we found a better way.

We were fortunate to have WFXT-TV in Boston offer us the use of their SAP (subsidiary audio program) and that gave us a major step forward in technology. Having a SAP meant we could reliably expand to SCA's in other parts of the state, and an extra bonus was we were now available in each of the 151 cable headends across the state and offered the service as background audio on many local PEG (public, education, government) channels. We used the SAP for almost 10 years, but it was one-way and we needed more.

We had developed local affiliates who wanted to share their own regionally produced programming statewide, so we needed a way for them to send their programming back to the Network Operations Center in Marshfield. Enter our good friends at Comrex, just up the road in Devens, Massachusetts. We utilized their EuroNexus and DS-0 telephone circuits to deliver bi-directional audio to the ever-growing list of statewide affiliates, and also receive live audio back from them. An extra bonus was contact closures that could be triggered from Marshfield to start recorded programming at each affiliate.

We utilized the DS-0 circuits for many years until a new technology appeared on the horizon – the Internet. The cost of the DS-0 circuits had gotten very expensive and now we had Internet-based options to relay our programming – not just state-wide, but nationally and internationally. Comrex once again came through for us, and we installed their BricLinks at each of our statewide affiliates.



When 16 other radio reading services across the country told us that they would have to curtail services because of budget cuts, we offered each of them our programming free, and provided a Barix Exstreamer to help them continue to serve the print handicapped in their states. We continue to use this transmission system today and will until the next breakthrough appears on the horizon.

The Barix Exstreamer

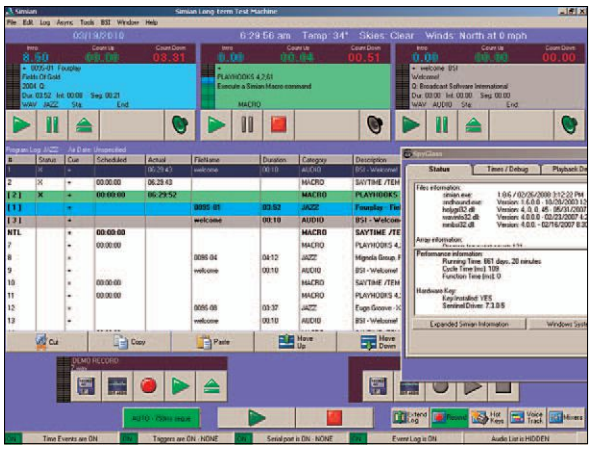
Adapting to new transmission methods over the years was just one part of the technology puzzle. As the Talking Information Center started, we used tape-based recording equipment like cassettes and open reel tapes. Producing and airing of recorded programming was limited by the time and effort it took to get it ready for airing. Volunteers would record on cassettes and the cassettes would be dubbed real-time onto 10.5 inch reels of tape for automated playback on over a dozen Otari ARS-1000 machines. We all remember how you had to clean tape heads, replace worn tape and wait for the inevitable capstan belt to break in the Otari play-only machines.

In the mid 70's I had met with a part-time radio engineer who said he had developed a way to record audio onto a computer and then play it back. I thought it would b a great idea if it worked, so I went to his station for a demo. It took two full racks of equipment and the recording was just a minute long, but it worked. I was convinced that day that recording tape's days were numbered.

Back at the reading service, we had gotten used to the tape-based system because there was no alternative at the time. When we heard about the Instant Replay from 360 Systems, we replaced out tape-based automation system with them. The D-net networking capability made it possible for volunteers to record their programs and send them directly to the on-air machine for airing. Being able to use the Instant Replay's playlist feature, gave us the automation capability we needed to play program after program in a string. They were certainly a time-saver and we watched the cassette and reel to reel machines eventually disappear from the studios much like the turntables had done years before.

We used the Instant Replays for many years, but we now needed to produce multiple Internet steams to reach our Massachusetts-based listeners, who wanted to hear their local newspapers, and our national audience who needed national and generic publications. We were also looking for ways to back up our streams and provide more dependable programming to our affiliates.

We now turned to BSI and their Simian automation software. Simian allowed us to generate multiple programming streams and to manage their content and playout. What would have taken minutes with the Instant Replays, and hours with the tape systems, took seconds with Simian.



BSI Simian Automation

We also developed a mirrored server and could provide a backup stream that would automatically switch on air after two minutes of silence from the main server. This new system gave us the capability to dependably program twenty-four hours a day with minimal operator intervention.

Over the years, we have tried just about every subcarrier generator and receiver that was ever produced. Years ago we standardized on Modulation Sciences Sidekick subcarrier generator because it has proved itself in some rather harsh transmitter sites.

Modulation Sciences SideKick

As for subcarrier receivers, we had standardized on Compol receivers which were manufactured just over the border in New Hampshire. They produced a fine receiver exactly to our specifications, but like many SCA receiver companies before them, they went out of business due to a very narrow market of radio reading services and foreign language services. Today we look to Asia for a good quality and cost effective portable receiver. We have also embraced multiple Internet streams and podcasting as another way to reach tomorrow's listeners today. Our wall of national awards shows that the Talking Information Center produces the quality and consistency of programs that our listeners expect.

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The Talking Information Center has always been a very rewarding experience for me. If your station is affiliated with a reading service, stop in someday and volunteer your time and talent. They always need readers, but they really need your technical expertise and I know they will appreciate your help and guidance as they also maneuver the maze of new technologies.

Steve Callahan is the owner of WVBF, 1530 AM, Middleboro, Mass. and may be reached at wvbf1530@yahoo.com

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FCC Focus

Q&A on Contests

by Peter Gutmann

Recently the FCC has issued a number of fines to stations for improper contests, so it seems opportune to review some problem areas. Let's organize this as questions and answers. Go ahead and test yourself by trying to frame your answers before reading my comments.

Two preliminary considerations: First, it's important to emphasize that many contests pose specific issues that you should review with your communications counsel. Is it worth a bill for a fraction of an hour's work? Well, you know the saying about an ounce of prevention ...

Second, as a general guide, bear in mind the underlying principle of the FCC's contest rules – you must apprise potential entrants of what's involved and then conduct the contest consistent with their expectations. It's always helpful to put yourself in the place of your listeners (and not the brightest ones, either) to predict how they are likely to react to what they hear and what you and your staff do.

Q: Can I run the same contest on all my stations in a market? How about across several markets?

Sure – but make sure your plan is clear to listeners. A certain huge broadcaster ran afoul of this by failing to mention that it was running a contest nationally. This could be important to would-be entrants who might not be as enthused if they realized that their chance of winning a fabulous prize is one in several million rather than competing only with a local core.

Q: Do we have to broadcast all the contest terms and conditions, even if they are extensive?

No, but you can't get by with vague allusions and enticements. The FCC requires that all "material" contest terms be broadcast. These vary according to the nature of a given contest, but at minimum include how and when to enter, all eligibility restrictions, how winners will be selected and the nature, extent and value of prizes. The overriding rule is that you must disclose the factors that define how the contest will operate and that affect participation. In other words, will a listener hearing the "material terms" understand what she must do to enter, what she may win and how the winners will be determined? If any of that is unclear, then you are begging for complaints.

Q: Do we really have to broadcast the material terms every time we run a promo for the contest?

No, but they must be broadcast the first time the audience is told how to enter and must be also be broadcast "periodically" and disclosed in a "reasonable number of announcements" after that. Unfortunately, there is little FCC guidance as to what those admittedly vague terms mean. To make matters worse, the FCC has stated that, "in general, the time and manner of disclosure of the material terms of a contest are within the licensee's discretion." In other words: you decide what to do and we'll tell you if you turn out to be wrong. Perhaps the best way to approach this is: if a listener claims to have been duped, can you show that your disclosure was sufficiently clear and frequent?

Q: Do we really have to state restrictions that should be obvious, such as employees being ineligible?

The FCC does not consider any restrictions to be obvious. You may tend to assume that only licensed drivers could win a car or that only adults can attend an R-rated movie, but you must clearly disclose all eligibility restrictions for a specific contest.

Q: Can't we just tear through the disclosures like they do on credit ads?

That's risky – if a typical listener can't understand what you're saying, then a rushed announcement is a waste of time. The consideration here is more subjective than mere technical compliance with FTC credit disclosure laws – the key is whether your listeners can derive a fair understanding of the material contest terms.

Q: Can we refer listeners to our website for a complete list of contest rules?

Yes, so long as this supplements, rather than replaces, on-air announcements of all the material terms. But be sure that printed or on-line rules are consistent with the broadcast information. Thus, the complete rules cannot contradict the rules as broadcast – or a suggestion that would reasonably arise in the mind of a listener. In a recent case, the FCC noted that only the website had disclosed that all of the announced prizes would be awarded to a single winner. In that instance, the Commission felt that announcing multiple prizes would suggest that there would be multiple winners. If that was not the case, then it needed to be made clear, both on the website and on the air. And speaking of contradictions, be sure that your staff is fully aware of all the rules – a Seattle station was fined in part because a listener called in for more information but was not told by the promotions department rep that she could play only once every ten days.

Q: What if the contest is to be conducted entirely on our website?

The FCC rules apply to any contest promoted on a broadcast station, regardless of where it is held. Once a broadcast announcement is made it is not sufficient to rely on posting the material terms on a website where the contest is to be conducted.

Q: Can we refine the contest rules in light of evolving experience once the contest is underway?

Definitely not for material terms. In one case the original rules invited listeners to "enter as many times as you want" but after the station was flooded by entries from a single contestant it decided to impose limits and "clarified" that it had meant that each listener could enter each segment of an on-going contest. The FCC found this confusing as to a material term.

Q: How often does the FCC monitor stations to find out about improper contests?

Never. Problems only arise when listeners complain – either winners dissatisfied with their prize or entrants who feel that they were misled or cheated. But all it takes is one jaded listener to alert the FCC and launch an investigation.

Q: Can only listeners file contest-related complaints?

No – unlike petitions to deny, complaints can be filed by anyone. The FCC considers its contest rules as intended to protect the public, and so anyone can alert it to possible violations.

Q: We didn't intend to deceive anyone. Doesn't that count as a defense?

No. Back in 1976 the FCC clearly rejected consideration of intent. Rather, the FCC emphasized that it was concerned only with impact on the public. It went on to refuse to consider whether anyone actually had been deceived or injured, but rather with "the net impression if the announcement has a tendency to mislead the public." It cautioned, though, that evidence of deliberate deception or actual injury to the public, while not required to establish wrongdoing, could have a bearing on the severity of the sanction imposed – in this one case, renewal was denied.

Q: But so long as I settle with the complainant I'm OK, right?

Wrong! Once a complaint has been filed, the FCC takes over. If they feel that a contest may have been improperly conducted, they will investigate and take action. As with notices of technical violations, the FCC expects licensees to promptly remedy their derelictions – you don't get any points for that. And by all means, be careful in dealing with a frustrated winner or listener – any damage from an improperly-conducted contest can be aggravated by allegations of harassment.

Q: What if the prize we intended to award is no longer available? Can we make a substitution?

If the announced prize cannot be awarded, and if you are the sponsor or can be considered a co-sponsor of the contest, then you really have no choice. If a car goes out of production, a concert is cancelled or a celebrity becomes depressed and refuses to share that dinner he had promised, then you have to make a substitution. The key is providing a prize that will please the winner and is at least of equal value. If the prize was to have been a car, then a more expensive model should suffice. But if the prize was truly unique, like a one-on-one with a pop idol, then you may need to be more creative. Hopefully you can find something that will satisfy the winner.

Q: What if the winner is unreasonable?

Then you face a judgment call and may have to defend a complaint by demonstrating that the announced prize became genuinely unavailable through events you could not reasonably have forseen, and that you did everything within reason to provide an equivalent prize.

Q: What's the worst that could happen?

In theory, a license could be revoked or not renewed, but that's happened only once for contest problems alone – and that was in 1976. More likely is a $4,000 fine (subject to substantial increases for repeated violations, multiple stations or wealthy licensees). But that's not the real danger. In a recent case, in response to a May 2008 complaint, the FCC's Enforcement Bureau sent the licensee an inquiry letter in April 2009, issued a Notice of Apparent Liability in March 2010 and a Forfeiture Order only in March 2013. That's nearly five years just to reach a staff-level decision! An appeal to the full Commission will take yet longer. During that time, the station remains in legal limbo.

Q: We have clear contest rules but my staff got carried away. Why should I be held responsible?

OK, that's a trick question. Licensees are responsible for nearly everything even faintly related to their broadcast operations. But you knew that, right?

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

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Safety and Security

A regular column on protecting property and persons.

A.L.i.C.E. May Save Your Life

By Jeff Johnson, CPBE

Many public radio stations are owned by, and based in educational institutions. Broadcast studios have historically been targets of takeovers and hostage situations. More recently, tragic mass shooting incidents have been perpetrated in schools and universities.

Most stations have plans in place for emergencies such as fire, power outages, extreme weather or forced studio takeovers. What now to do when a shooter roams the halls? The author's employer, Northern Kentucky University, NKU, has implemented response training known as A.L.i.C.E, whic stands for Alert-Lockdown-Inform-Counter-Evacuate.

In response to recent national events, Northern Kentucky University is offering a new program to all faculty, staff, and students, to raise awareness and help prepare individuals on how to respond to a potentially violent encounter.

The A.L.i.C.E. program will empower and educate the NKU community on how to handle and survive a critical violent event on campus. The program provides a basic history of school shootings, the motivation of these offenders, and provides options on how to respond if a violent shooter enters your building, office, or classroom. These options include: how to lockdown and barricade, evacuate, and counterattack, depending on the dynamics of the situation. A discussion of how the university police will respond to such an incident will also be presented.

NKU radio broadcast network's studios are located in a campus classroom building. Our facilities include an audience broadcast studio, often filled with musicians, staff and visitors. Recently our entire staff was introduced to the A.L.i.C.E. protocols.

"The recent tragedy at Sandy Hook is bringing safety in public places, such as offices, malls and schools, into mainstream conversations. In response, Doctors Cheryl Jonson and Melissa Moon from the NKU Criminal Justice Department are partnering with NKU Police Chief Jason Willis, to offer A.L.i.C.E. training to faculty staff, and some students." – Matt Kelley, WNKU reporter

Alert

The need for *clear* information on PA system and social media, such as "Shooter in Landrum Hall, third floor!' – *not* something like 'Code 27!"

Lockdown

The author has worked for stations where the studios were isolated by glass doors with proximity card-key locks. Of course the glass may not eventually deter a shooter, but an intruder could not enter any area quickly at will, giving the staff time to escape or prepare.

NKU is implementing a campus-wide card-key system, which will allow campus-wide instantaneous lockdown. WNKU's studios will be further protected with this system.

In addition to ordinary security arrangements, you can implement such measures as locked doors – *without* windows. Don't let an attacker see what is behind a door!

Block doors with furniture. Cover windows in the door. Hold the door shut manually or lock it. Tie it shut with belts and neckties.

Information

Technology must be established so that, if possible, someone will be able to visually monitor some or all of the suspects, while simultaneously "informing" or communicating their whereabouts to everyone else in the building.

Counter or Evacuate

Contrary to previous lock-down situation drills, A.L.i.C.E. training encourages occupants to evacuate the building if possible, or barricade themselves into their offices, studios, and classrooms. Escape by other routes – a back door or windows. In a hostage situation, tie clothes together and climb down. Elegance is not an issue here! Or, as a last resort, you may decide to "counter" – fight back.

If a shooter enters the room, don't cower together in a corner – you will make a perfect target, and you may be dead.

Become moving targets. Throw something – anything – at the shooter. Motion and missiles will distract the shooter and could lessen casualties.

It's all about delaying, for as long as you can, the injury or death of as many people possible.

This may seem counter-intuitive – well, it is. It is intended to confound and confuse the shooter, since fighting back is the last thing expected. If you can't get away, you must be pro-active! While not always appropriate, it is a personal option if you feel your life is in immediate and unavoidable mortal danger.

How Did A.L.i.C.E. Get Started?

In 2000, Lisa Crane, a school principal, was faced with the constraints of an inadequate traditional "Lockdown" protocol, mirroring the dilemma encountered by educators across the nation. Her husband, Greg Crane, a police officer and SWAT member, recognized that students, staff and administrators were not safe and that stand-alone lockdown had fatal flaws. He, along with input from other experienced officers, developed the A.L.i.C.E. program for Lisa's school. He knew it had to be easily implemented and effective for citizens that would not have the time for practice, nor the ability to perform complicated fine-motor tasks while under severe stress. These strategies are common sense, just not common knowledge. *Source: Response Options web site.*

Arguments Against A.L.i.C.E.

A.L.i.C.E. training – teaching staff and students to attack armed gunmen – is "an overreaction and potentially dangerous," according to Dr. Stephen Brock of the National Association of School Psychologists.

The controversial issues rise over the "Counter" component to the approach, which advocates training occupants to try to "distract" and "confuse" armed suspects by throwing items, and attacking the armed intruder. Many educators, law enforcement officers, parents and school safety specialists, do not support this proposed approach for "training" students in Pre-K through Grade 12 school settings.

This question was posed to school safety expert, Ken Trump, by Fox News Channel producers in December of 2008 in response to a Massachusetts school district that was considering such training options with children as young as 10 years old. Ironically, the Texas school district that was one of the first, if not the first, to advance this concept, reversed its decision back in 2006 according to an AP report. – *Source: School Security*

A broadcast studio or office is a different environment. Even a college campus will be composed of more mature individuals – at least more likely to react in an adult manner.

"What has caused controversy is the idea students and staff are going to be attacking a shooter. People are jumping to conclusions. Ultimately, the countermeasures are used when there is nothing left to do.

"There's no way out. The bad guy is in the room. You have no choice but to try to save yourself. No one will ever encourage having anyone otherwise approach a man with a gun." – Excerpted and edited from Zanesville Times.

For more information refer to:

www.responseoptions.com/ALICE-Program.html

www.schoolsecurity.org/trends/students_fight_gunmen.html

Jeff Johnson may be reached at: jeff@rfproof.com

The content of this article is presented for information only, and is not meant to advocate any specific course of action, against an armed intruder, in any given situation.
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Tips From the Field

Tools, Ideas, and Shortcuts

by Chris Tarr

Over the years, I've run across little things that make the job a little easier. Maybe it's a tool, an idea, or little shortcut. Things that don't really warrant an entire article – until now! I'm going to use the space in this issue to cover some of these things – in no particular order, and totally at random. Some things you've probably heard, some maybe you haven't. If one of these things helps you, I've done my job!

Doomsday Audio

Most everyone has an old iPod sitting in a drawer with a dead or dying battery. Put it to use! Load some audio up and create a playlist from it. Take it out to the transmitter site and install a silence sensor with an audio switcher. Wire up the iPod into the "backup" channel, connect the power cord to your UPS, hit "play" and "repeat." Now you have emergency audio if your STL or studio gear fails – all for the cost of the silence sensor. I set up a system like this at a station, and the iPod is still dutifully rotating it's playlist a year later. They did happen to have an STL failure, and sure enough, the iPod audio kicked in and they were good until the system came back up. The only thing to remember is to freshen up the audio every so often.

Remote Access on a Variety of Devices

I wrote an article a while back about the Google Chromebook. It's a fantastic low power, low maintenance laptop. However it has a shortcoming (one that is shared by many portable devices), which is anything designed for Windows is off-limits. That isn't a lot of things, but once in a while you run into that one thing that you can't live without. In my case, we're running a program on the cloud that makes use of Active-X controls for establishing a VPN connection to the application server. Not the way I'd handle it, but I digress. The problem with this, is that users who are using Macs, Chromebooks, or even tablets are unable to access the site.

Time to set up a Remote Desktop server. All flavors of Windows Server can be configured to be a Remote Desktop server with the appropriate client licenses. What's great about this, is that you can configure the server to launch programs on login without ever going to the desktop. In my case, I configure the clients so that they login with the Remote Desktop client of their choice and all they see is an Internet Explorer window with the application login screen. If they close the browser, Remote Desktop logs out. To the end user, it just looks like another app running on whatever device they're using.

Packing Light

For years I've carried around a huge toolbox filled with just about every tool that one could have. In reality I use 1% of the tools 98% of the time. This really came to the top of my mind when I bought myself a little two-seat convertible for some summer fun. I like to have some tools with me all the time, but there's no way I could fit all of my tools in the trunk. Radio Shack had the answer I was looking for – they sell a nice little tool kit (Catalog #64-226) for $49.99 that has the most of the tools you'll really need for most small jobs. I carry that along with a tackle box that has things like a tone generator, inductive amp and a crimper for network and phone cables. It leaves plenty of space in the trunk, and I'm ready for most anything that comes up.

Radio Shack #64-226 Tool Kit

Take Note

Honestly, I'm a Post-It Note kind of guy. I use those ubiquitous little pads for notes all the time. My desk has a nice yellow sheen to it, thanks to Post-Its. Unfortunately, the more time I spend in the field, the more I realize that my little paper friends aren't very practical. Fortunately, technology can help. Apps such as *Microsoft's OneNote, Google's Keep, or Evernote* are great at fighting the sticky note tide and keep your notes under control. All of the apps that I listed are supported on a variety of devices and will sync your notes across all of them. I'm using *Google Keep* right now and I use it to help me remember things like ISDN numbers, transmitter air filter sizes and more. It's a great tool for when you're at the transmitter site and need to jot down a part number or something.

Speaking of Notes

Most of us need to keep track of receipts for one reason or another. If you have a smartphone, you're in luck! There are many apps out there like *JotNot* for the iPhone, or *CamScanner* for Android, that let you use your camera as a scanner. Whenever I get a receipt, I take a picture of it as a scan, and upload it to Google Drive for filing later. No crumbled up or lost receipts for me. These programs will also scan documents; I used mine to scan a floor plan and email it to a vendor all in under a minute. What a time saver!

Something We Hams Know

Many modern HT (handy-talkie) Amateur radios have nice built in features to help the Broadcast Engineer. Many of them have AM/FM receivers available as well as extended receive capabilities to monitor "DC-to-daylight." The prices on these radios are coming down, so it's not a bad idea to have one in your toolbox. Better yet, take the Technician Exam and join us! Amateur radio is a lot of fun, and you'll meet many other people with the same interest in RF as you.

Remote Access (Part 2)

Many of you are familiar with VNC – it's the workhorse of remote PC access. The downside to that is, that if you want to use it outside of your facility, you need to open up firewall ports and potentially open yourself up to security issues. There are other alternatives, like *GoToMyPC* (gotomypc.com) or the free *LogMeIn* (logmein.com). These services work through firewalls and can get you to where you need to go inside of your network. If you want to limit the amount of computers you want to access (for example *LogMeIn* is free, but only for a limited number of machines) then install it on one machine and use VNC on that to access the others on your network. It's a little clunky, but will work in a pinch.

Protect Those Spark Gaps

In order to give your transmitter the best lightning protection possible, it's important to have the gap between the spark balls on your tower set properly. In most cases, this means that they'll be closer together than you'd think. The problem with this is that is rain and insects are much more likely to "fill the gap" and cause problems for you. In my case, this was easily solved thanks to the creativity of one of my engineers. He took a two liter soda bottle, cut a slit from top to bottom, put the bottle over the spark balls, and zip-tied it closed. It offers great protection from the elements, though you will need to change out the bottles once or twice a year. The only caution is that your dentist may want to have a word with you if you have a large directional array!

Stay in Contact Wherever You Are

This is a good tip for anyone who is busy or on the road a lot. *Google Voice* is a service offered by Google that provides you with a phone number where you can receive text messages and voice mail. You can also set what phones should ring or not ring based on rules. My favorite feature is voicemail transcription. When someone calls and leaves a message, a transcript immediately gets forwarded to my email. While the transcriptions are less than perfect, you generally can figure our the gist of the message from it. That way you can decide at a glance if it's something you need to deal with right away. It sure beats stopping to call your voicemail service and sitting through the message. There are a lot more features as well, just suffice to say that being able to respond to text messages and voicemail from any computer or device is a great feature.

Hosa CBT-500 Cable Tester

This is a Test

How many times have you painstakingly troubleshot a device, only to find that you had a bad cable? Hosa Technology makes a fantastic inexpensive cable tester (Model #CBT-500) for $69.95 that tests XLR, Phone, Phono, DIN, Ethernet and more all on one portable package. At that price, there's no reason not to have that handy device in your toolbox.

Where's That Tower?

If you haven't yet, point your browser to Cavell Mertz and Associates website (fccinfo.com) and click on the "FCC Info on Google Earth" link and download the Google Earth KML file (be sure you have Google Earth installed). You'll be able to find the location of every AM, FM, TV and ASR registered tower in the US. It's a very handy research tool for things like checking out STL paths and figuring out who is on what tower.

Well, there you have it. A completely random collection of hints. Hopefully, you'll find at least one helpful. If you do, be sure to share it with others or bring it up at your next SBE meeting. There's so many things that we've all learned over the years that can help others!

Christopher Tarr CSRE, CBNE, DRB is the Director of Radio Operations/Engineering for 88Nine, Radio Milwaukee. He can be reached at chris@radiomilwaukee.org

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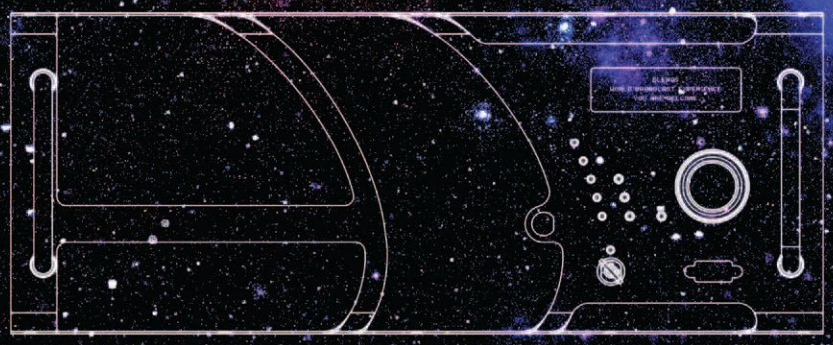

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State of the Station

Some Things to Check Before an F.C.C. Inspection

by Mike Callaghan

EAS Really Stands for Easy As Sin!

That's how easy it is to get written up by an inspector with mayhem on his mind. There are so many different elements to the EAS system, even the inspectors get confused sometimes. If an agent really wants to drill all the way down, chances are he'll find something wrong. Are you sure you're listening to the right stations for your alerts? Are the tests coming in regularly and getting logged reliably? If your LP-1 or LP-2 misses a weekly or monthly test are you following up with the reason and putting it in your log?

Is your EAS equipment wired properly? Running the output audio through a console input is verboten unless you have operators 24 hours a day. The president has to be able to get on the air even if you're unattended.

Do your operators know how to originate both types of tests? Is the system logging the newer CAPS tests? Equally important, is it even *capable* of logging them? Older equipment may still be in place that doesn't meet the new standards, and if you're the Chief Operator, it's up to you to see that it gets upgraded. The deadline for this to have happened is long past.

Are you dutifully checking the logs each week and insuring they have the EAS information – namely, when the required weekly or monthly tests are launched, the signature of who did the launching, and the date and the time?

When new air staffers or board ops come on board, are they getting basic training about how to send and relay EAS tests, and how to react to the ones they receive? If they skip tests they're supposed to send, are they held accountable? Who decides when your weekly tests are supposed to happen, and do they understand what a calendar week is?

I've seen some continuity folks who thought a week was from Friday to the Monday 10 days later, and completely missed logging a test for the week in the middle. And I once got a phone call from a jock on Sunday, saying he'd found the log for the week starting Sunday, but wanted to know where the log was for the week starting Monday. He was serious!

Is the clock in the EAS system accurate? Most systems have a lithium battery that's good for a year or so. After that, a power glitch can reset the clock and log your sending tests a year away from the real time. If you still use the printer built into the equipment, can the printout be read? I've seen some printouts so dim you couldn't tell which side of the paper the printing was on! If you live in an area where EAS is frequently used, do you make sure there's enough paper to last over a really diabolical weekend, with lots of alerts, before you leave on Friday?

Messing Up the Pattern Change

FM operators get to sit this one out. AM operators need to pay attention. AM stations typically change power, or antenna pattern, or both, when the sun rises and when it sets. Mother Nature does funny things with the ionosphere when sunlight hits it, and AM stations go much, much farther when it gets dark. To keep stations on the same channel (or even adjacent ones) from blasting each other when the sun sets, we tighten up where the signals go. The important thing to remember is that the transmitter plant has to make changes twice, each and every day. In the vast majority of cases, an automatic timer or computer oversees this. To the operator it's a hands off proposition. Depending on your programming philosophy, the station may be nice and avoid making the change during a commercial. This produces a dropout on the air. Some stations switch so fast it doesn't matter. Really fast switches can be hard on the equipment – the transmitter doesn't stop making radio the instant you tell it to stop. That lingering output can burn up contacts and wreak other havoc.

The most important thing to remember about this topic is simple. You have 2 minutes before or after the time specified on the license to make the switch. If you miss, you can be in trouble. Another point is that the FCC doesn't even have to be close to the station to catch you for this. All they need is a clock, a radio, and to know when it's supposed to happen. Some stations are mandated to read the current at the bases of the towers immediately after a pattern change. In one case, some FCC inspectors were chilling out after a hard day at a motel swimming pool adjacent to an AM station. The sun went down, and no one ever left the building to go read the towers. They waited as long as they could, and still nothing happened. Finally, they accepted their fate, went inside, got out of the swimsuits, and then went next door and busted the operator.

(Continued on Page 22)

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State of the Station

Some Things to Check Before an F.C.C. Inspection

– Continued from Page 20 –

Tower Lights and Paint

This topic seems to cause a lot more grief than it should. Tall radio towers (usually above 200 feet) have to be visible to aircraft. At night they need lights. The lights, even LED ones, don't last forever. They have to come on at night and go off at sunrise. The ones on the top and sometimes in other places have to flash. Towers must be highly visible in the day, and this means they have to be painted in bright colors. Because paint fades, they must be repainted when they're not as bright as the colors on a test card. This card comes from the FAA.

Tower ASR Registration

Most towers must be registered with the FCC. These must have signs visible to the public that reveal the tower registration number. This is important. If the signs are missing, too small to read easily, or are inaccurate, you have no way to dodge a fine. Having the signs "on order" isn't enough. In places where a number of stations share a tower, the landlord will typically hold the registration. If there are multiple towers, all surrounded by a common fence, a sign at the entrance must show all the tower numbers (see photo). In this case, each tower must also have signage

If the tower is sold, the new owner must refile to change the registration. If this doesn't happen, the old owner can still be responsible for the lighting and painting.

When a station that owns the towers, like an AM facility, is sold, the new owner has to redo all of them. Even if the tower is dormant and no one is using it, the owner is still on the hook and can be fined if the lights burn out or the paint fades.

Fences

It's incumbent on the people that own the tower to keep the public far enough away to be safe. AM towers can be deadly if they just get touched. FM towers attract freedivers and people that like to climb. But if someone gets hurt on your tower, their heirs could become your new boss. You have to keep the tower secure, safe and unavailable to the public.

The Commission can, and will, write you up for open gates and insecure fences. In some cases, alarm systems with night cameras and intruder alarms are appropriate. The more secure these are, the less you need worry about the FCC and trespassers.

The Public File

There are people who specialize in making sure your Public File is complete and intact. This is a stumbling block for many engineers; all the miniscule details and formats involved can be extremely confusing. There are checklists around this, and they're a great help when you want to check the file yourself. Remember that there are specific deadlines for input from the public to be included, and certain reports and information about the way you serve the public that must be included.

Handling Inspections in General

There are some important things to remember about any inspection. It doesn't have to be the FCC. It can be a building inspector, a fire inspector, or anyone checking over your operation.

Answer questions accurately, but answer only the questions asked. Don't volunteer anything extra. Elaborating can only lead to requests for details not needed to get the question answered. If an inspector asks to see a document, provide what's asked for – no more and no less.

And don't be embarrassed by long periods of silence while the inspector looks things over.

If the inspector brings up an issue and you disagree with him, don't argue. Explain your viewpoint and let it go at that. The issue can be dealt with at the end of the inspection or even later. The last thing you want is to give the inspector a reason to really start digging; there's bound to be an infraction of some sort if he looks hard enough.

Most FCC agents are reasonable and don't want to make your life difficult; they have a job to do and are mostly interested in making sure the rules are being observed and the station is in compliance. If you have a copy of the FCC's Self-Inspection Checklist and comply with it, you should have an easy time when the Commission is at the door.

Mike Callaghan is the Chief Engineer at KIIS-FM in Los Angeles, CA. His email is: mc@amandfm.com

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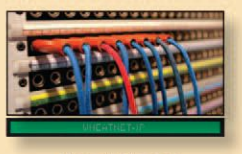

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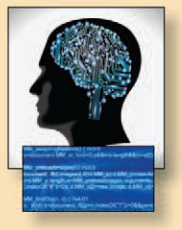

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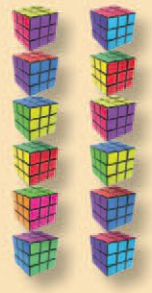

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Chief Engineer

Ice: The Good, the Bad, and the Ugly!

by Scott Schmeling

We've had a very interesting late winter and early spring here in Minnesota. The winter started out fairly mild. Then, when according to Punxsutawney Phil, spring should have been around the corner, winter started tightening its grip. We had made it through most of the winter with only moderate snow, but in March and April it seemed we had one heavy snow after another. Then in May, some areas in Minnesota had record snowfalls. In fact, May 2nd Owatonna, Minnesota had 18+ inches of heavy wet snow and twelve days later the thermometer showed temps either side of 100 degrees!

On April 10th, the temperatures were teetering either side of freezing. In addition, the forecast was calling for rain, freezing rain and snow, and high winds. Now ice has its good points and its bad points. For instance, ice is great for keeping our beverage of choice cool. It also makes a perfect playing surface for Hockey (I mention this only because, of course, Minnesota is "The State of Hockey!") ... and then there's *ice fishing!* (If you're not familiar with ice fishing, you can rent the movie *Grumpy Old Men*.)

As you all know, ice and an FM antenna are not a good combination. In fact, ice can have a negative effect on anything sticking up in the sky. That's one of the *bad* things about ice. The night of April 10th, and the morning of April 11th, are testament to that fact. All of our stations were effected to some degree by that ice. As the icing increased, so did the VSWRs. Most of our transmitters have an automatic VSWR foldback function. We closely monitored those that didn't, and lowered power manually as needed. That was manageable.

The big problems for us came as the ice started melting. One tower, in particular, was more affected than the others. It's an 835 foot tower sitting on top of what's called "The Buffalo Ridge." This station had stayed on all through the storm and beyond. Needless to say, every school in the area was closed and there was an abundance of announcements to get out. Then, in the afternoon of Sunday the 14th, the audio went silent! Telemetry readings indicated the transmitter was on the air, so the problem had to be the STL.

Operations Manager Keith Wright traveled to the site (he lives and works much closer than I do). We figured the STL had gone down because of ice on the antenna, so Keith took a Tieline codec and a Verizon Jet Pack (mobile hot spot) with him as a backup. We frequently use this configuration for remotes. A connection was established and the Tieline audio output was connected to the Optimod input. The station was back on! It was still cloudy and Keith couldn't see very far up the tower, so he left the site.

I really should elaborate, since getting to the site wasn't as easy as it may have sounded. There are two roads we can take up the hill. The first road was completely blocked and Keith got stuck, but a local farmer was able to pull him out. However, the other road was also blocked. There was no way could get anywhere near the site in a conventional (or even a 4-wheel drive) vehicle. The next day he came out with a Kubota tractor, with tracks instead of large tires. With that, he was able to get to the site and get the programming back on. It was too cloudy to see up the tower, and ice was still falling, so he left as soon as he could. He *was* able to see a couple things, but we'll cover that later.

Keith went out the next day, but could see *large* chunks of ice falling off the tower – he didn't go any closer. In a situation like this, personal safety is always the most important consideration. Finally, on April 23rd, he was able to get to the site for a closer look at some of the ice damage. This brings to mind that we seldom discuss the dedication exhibited by engineers (and sometimes operations managers) to get or keep our stations on the air.

Now for the *ugly* aspect of ice. Falling ice scored a direct hit on the ice bridge that was there to protect the feed lines between the building and the tower. The lines to the main and auxiliary FM antennas, and the line to the STL antenna, were under that ice bridge. All three lines had been damaged. The auxiliary line would no longer hold pressure, and the main line held pressure, but definitely had been damaged. But that's not the only evidence he found. The entire ice bridge above the STLl antenna was on the ground in two pieces! We could only imagine what was up on the tower since there was sill some ice on the tower and clouds obstructed the view half-way up. No one was climbing today!

Finally on April 26th, over two weeks after the initial storm, we were able to climb the tower and get a closer look at the damage.

(Continued on Page 28)

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Chief Engineer

Ice: The Good, the Bad, and the Ugly!

– Continued from Page 26 –

(Let me clarify there, that by "we," I mean the tower crew!) The ice had completely destroyed the ice bridge over the STL antenna – which we knew since we found it in pieces on the ground! Ice had also struck the feedhorn, bending it out of shape. Another piece hit the jumper between the antenna and the line. But thankfully, the reflector was untouched! Since this wasn't the first time ice had damaged the feedhorn, we had a spare. The crew took the spare and a jumper up with them.

Kevin Olson, from Dietz Tower, swept the line with his Anritsu Site Master. That sweep indicated damage about 400 feet up on the STL line. The only damage to the main and auxiliary lines appeared to be at the bottom where ice had destroyed the bridge.

During this entire time, we also had another station exhibiting high VSWR symptoms. We suspected line damage, and had made plans to hang a temporary line and single bay antenna. A sweep there confirmed the bad line suspicions. Replacement lines and connectors were ordered.

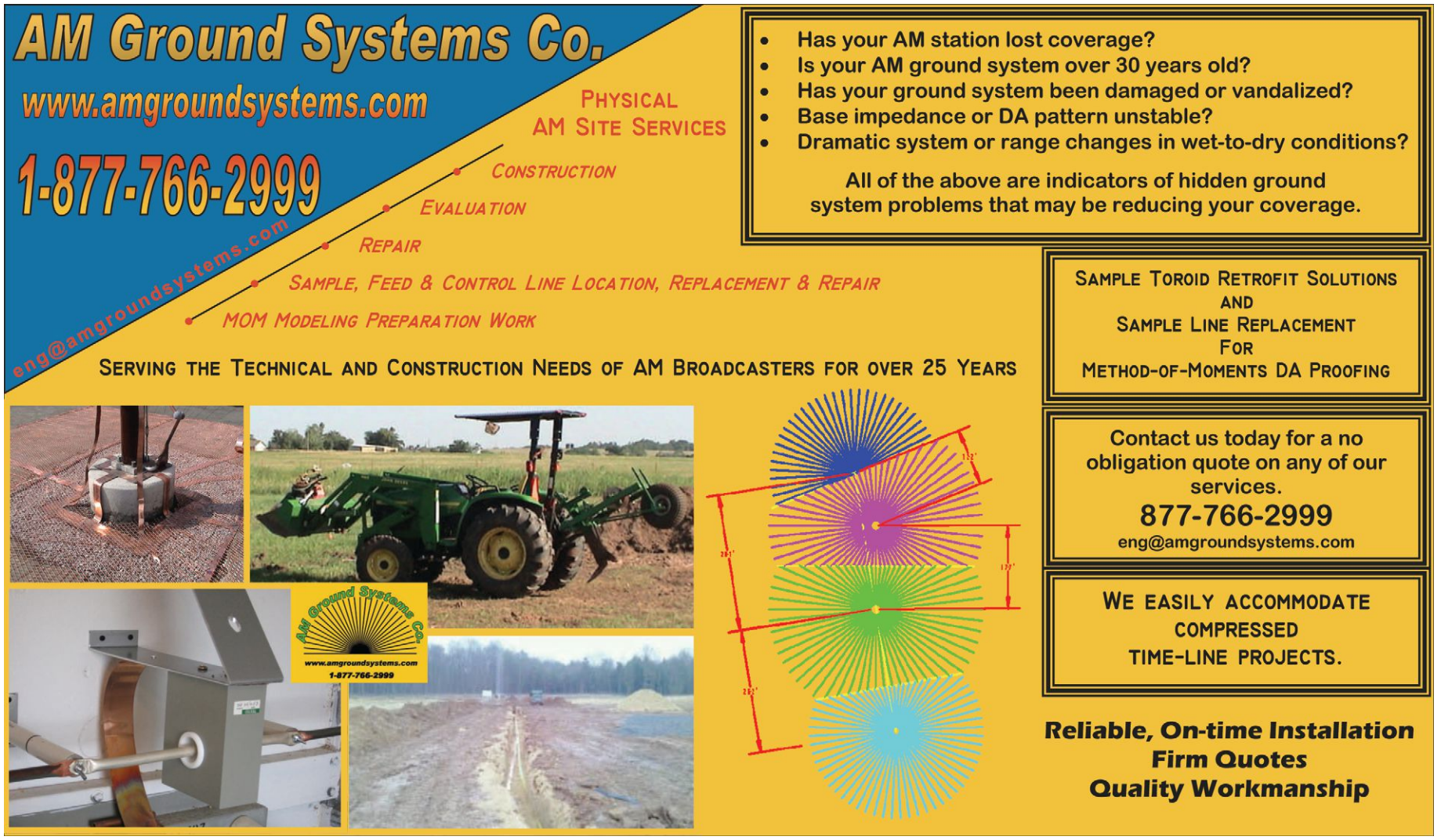
This was bad enough, but it pales in comparison to what happened in Worthington, Minnesota. They have (or *had*) a 580 foot tower for their AM and one of their FM stations. During the storm, the top 420 feet came to the ground! They, too, had very heavy icing and strong winds. In fact, over half the trees in Worthington were lost!

Fortunately, they already had a long-wire AM antenna so the AM was back on very soon. And they were able to get a tower crew in the next day to assess the damage. It was determined the 160 feet of tower still standing would be able to support a single bay antenna for the FM. One was ordered and that FM was back on the next week.

People often ask how we can stand living where the weather can be so severe. My reply is always that it takes the extremes to make those wonderful averages we enjoy!

As of this writing (I'm near Boise, Idaho, right now for my daughter's college graduation), our replacement lines should be arriving any day. When I return, the lines will be replaced and one antenna brought down for assessment and rebuilding. I'll let you know how all of that turns out. And hopefully, the only ice I'll see is what's in my beverage! Until then ... keep it between 90 and 105!

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



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Translator Topics

Recent History and Current Services

by Jim Turvaville

Love them, or hate them, there is usually not much middle ground when the subject of translators is brought up in conversation. On one side we have the proponents of the FM Auxiliary service, who see them as a vital part of their programming and technical philosophy, and then there are the staunch opponents who consider those translator operators as abusing a Commission policy and wasting precious spectrum that would better be served elsewhere. There has been much said on both sides of the translator issue, and I will not begin to assume that either side is right or wrong. However, I want to bring some perspective to the discussion with a look at the recent history of the service and what the current FCC Rules permit.

Prior to 1999, most all of the FCC broadcast filing opportunities were "first-come first-served." If you wanted a new station and the spectrum permitted it, you just filed an application – on paper and in triplicate, of course. The application went on initial Public Notice, known as "A Cut Off," which made it public that you had filed the application. After the requisite public notice period, and followed by an initial review by the FCC, the application was then placed on "B Cut Off" and eventual final processing for a grant. The hitch was that, between those two Cut Off times, the application was open to competitive applications being filed for the same or an exclusive channel or location, often referred to as "me too" filings.

As spectrum became more valuable and desired, the entire filing system became clogged with mountains of Mutually Exclusive ("MX") applications. As this was before the Auction system for commercial applicants, and before the Point System for NCE applicants, the only method in the books for handling an MX was a Public Hearing before the FCC. Since those take a lot of time, and a corresponding amount of money for legal and engineering fees, they typically took years to schedule and manage; so the backlog to handle them became impossible.

All of these circumstances led to a total filing "freeze" about the turn of the century, where the FCC simply said "enough is enough" and closed all broadcast filing opportunities – the days of first-come first-serve were gone. Instead, only specific "filing windows" would be opened for applications in various services. But in its wake were thousands of applications that lay MX with each other, in all services – AM, Commercial FM, NCE FM and Translators. With the inflow stopped, the Commission began to re-write the Rules and clear out the backlogs. The already existing Auction System was expanded beyond Wireless services, where it had started in 1994, and the Point System for NCE applicants was codified for broadcasters.

While they did not directly address all of the outstanding applications, several solutions were moved forward that eventually caught up with all of the MX situations in various services. Specifically, an "open settlement" was offered for NCE applications that permitted hundreds of the MX's to be eliminated by private negotiation between the parties. As a result, from 2002-2005 a huge number of NCE stations were seen on the air. An AM filing window was opened in 2004 which allowed requests for new AM stations, and included some of the aged MX applications to be included for processing. The Commercial FM Auction System kicked into gear with a few "closed auctions" between MX applicants in 1999 and 2000, effectively being a good test run for what became the first really big event in June 2004, where 258 CP's were sold in Auction #37. Since that time, a fairly regular schedule of Commercial FM Auction windows has happened, leading to hundreds of new stations being built nationwide. A series of five LPFM filing windows opened in 2000, following the creation of that new service, with over 1,200 CP's issued – only about 800 of which survive today as operational facilities.

In the midst of this, the subject of FM translators came to the forefront and the FCC announced a Commercial FM translator Filing window in 2003. Known officially as "Auction 83," it would follow a prescribed routine involving an initial "Tech Box" submission, whereby an applicant would specify a channel and location only in a closed filing window. During the filing window, no one would know what anyone else had requested; only after the window closed would any of the electronic filings become public knowledge, eliminating the "me too" filing potential. The plan was to evaluate those initial "short-form" filings and allow non-mutually exclusive requests to proceed to a "long-form" filing. Any remaining mutually exclusive applications would be scheduled for auction. I seem to recall at the time that the FCC prognosticators had expected 1,500-2,000 applications to be filed in that initial window, which was scheduled to be 4 days long, but later extended to a full week.

To the horror of the FCC staff, over 13,000 short-form applications were filed in the 2003 window for Auction 83 – nearly half from just *two* entities, many of which were mutually exclusive with themselves as well as many other applicant's filings. Of that initial number, a total of 4,485 of the short-form proposals were identified as "singletons," those not mutually exclusive with any other short-form request, and allowed to file long-form applications just three months later. From that, the bulk of the new FM translators now on the air became available; while the remainder, which were MX'd, became the 800 pound elephant in the room that never seemed to be addressed in any effective way by the FCC. *(Continued on Page 32)*

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Translator Topics

– Continued from Page 30 –

Along about the middle of this decade, from 2003-2013 involving the Auction 83 applications, came the Low Power FM advocates. Beginning in 2005, Local Community Radio bills began finding their life in the halls of Congress, leading that administrative body to use its authority over the Commission to cause the wheels of progress to begin moving, to allow another LPFM filing opportunity. Several versions of that legislation came and went, before the Local Community Radio Act of 2012 (LCRA) set in motion what is finally moving the Auction 83 applications along, and leaving opportunities for LPFM at the same time. While the LCRA may have been a disappointment to some broadcasters with outstanding Auction 83 applications, particularly in Top-50 or other "Spectrum Limited" designated markets, the fact that the LPFM lobby forced the Commission to finally get things moving has been the silver lining in all of the process.

In the NCE world, translators played an important role early on, with the change in FCC Rules in the 1990's, permitting alternative signal delivery to NCE band translator stations. This led to the development of the "Satellator" technology and the propagation of several NCE broadcasters' product to a National level. Further expansion onto non-reserved band translators, specifically from many of the Auction 83 granted stations, from a Satellator feed, meets the requirement that those facilities receive their primary signal via a terrestrial antenna feed. As NCE primary stations are not prohibited from extending their primary 60 dBu contour with a translator, like commercial stations are, they can own and operate either reserved or non-reserved band translators that can repeat the primary by terrestrial means without regard to contours. This has been a significant boost in the public radio proliferation of signals, into markets previously out of reach by their primary signal.

Under the fill-in technical rules, a translator can operate at an effective radiated power up to 250 Watts at any height above ground, as long as proper contour protections and primary signal contour requirements are met. Translators gained a new life when the FCC began allowing them to be used as fill-in signals for AM stations in 2007. Initially permitted by an STA that had to be renewed every 180 days, it was finally written into the Part 74 Rules in September of 2009.

Even a daytime-only AM station is permitted to operate an FM translator at night and hours when the primary is off the air, as long as it has operated within the past 24 hours. Under the terms of Section 74.1231, an FM translator for an AM station has to maintain its predicted 60 dBu (50,50) contour within the licensed 2 mV/m daytime groundwave contour of the primary, and at the same time keep that 60 dBu (50,50) contour within a 25-mile radius drawn from the AM tower as fill-in signals.

Many Options Exist

For stations which operate with complex daytime directional patterns, this may require the use of similarly complex FM directional antennas to meet both of these requirements. Since FM translators are allowed to utilize directional antennas which exceed the usual 2dB/10 deg pattern and 15 dB front-to-back ratio limitations of full power DA's, a great variety of options exist which are "off the shelf" of several manufacturers. Arrays of multiple stock antennas are also commonly used to create maximum patterns with minimal antenna cost. Formal proof of performance documentation after construction is not required, making the actual installation of these directional antenna arrays much more affordable.

Further new life was breathed into the translator service in 2009 when the Commission allowed the analog audio of an FM HD signal to be repeated on fill-in translators, utilizing the same constraints in Section 74.1231 applicable to fill-in signals for other FM stations. That fill-in rule requires the predicted 60 dBu (50,50) contour of the translator to be fully within the licensed 60 dBu (50,50) contour of the main analog signal of the primary station. This gives a tremendous opportunity for the creation of a new programming service, utilizing the HD channel of a primary station. In some markets, a primary station has expended the resources to install HD transmitting equipment solely for the purpose of feeding one or more HD channels onto fill-in translators; the added programming channel and subsequent revenue stream has finally justified some of the expenses involved in the HD installation. With new power level options for HD operation, even a comparably lower power HD facility can utilize fill-in translator signals, since the qualification is based upon the main channel analog predicted contours instead of the actual HD carrier footprint. All fill-in signals are permitted to be fed directly, or by any available alternate means, lending maximum audio quality to the fill-in signal regardless of that of the primary AM or HD channel.

Translators may be modified under the minor change rules to any available channel that is +/- 3 from the licensed frequency as an adjacent channel move, or +/- 53/54 channels as an intermediate frequency channel move, as long as contour protections allow. The predicted 60 dBu(50,50) contour and the licensed 60 dBu(50,50) contour must overlap at some point in order to be considered a minor change. Recently a waiver of this contour overlap provision has been permitted as long as the relevant interfering contours overlap between the licensed and proposed facility and the destination of the translator is for fill-in use for AM or HD.

While there are other proposals on file to assist AM and FM stations with the use of translators, they have not come to fruition yet; with the focus of the FCC currently on clearing out Auction 83 applications and preparing for the LPFM filing window it is not likely any of the proposals will be considered in the near future.

Jim "Turbo" Turvaville has been Director of Engineering and IT for WAY Media since 1999 and currently works in their Corporate Office in Colorado Springs, CO. He also maintains a small clientele of stations under his Turbo Technical Services operation providing FCC application preparation and field work.

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Transmitter Site

Preventing Lightning With Point Dissipation

by Ron Nott

The summer storm season is upon us. Stations are checking their grounding and surge suppression systems, and wondering what else can be done. Can "point dissipation" provide an extra margin of safety from lightning? Ron Nott discusses the topic.

After more than three decades of experience with this technology, what have we learned? Some users claim great success. Others disagree. Who is right?

The Storage and Discharge of Electricity

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

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

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

Ben Franklin observed that a silent current flowed into the air above a sharp wire which led to his lightning rod. It seemed like a great idea, but why did it work with only limited capacity?

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

Different adaptations of multiple point dissipaters.

Dealing With Lightning

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

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

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

Energy Potential

We measure the energy contained in a lightning strike in Coulombs. Estimates from most lightning strikes range from 1 to about 50 Coulombs, but in the most extreme cases may reach 300 Coulombs. Typical is probably 5 to 10 Coulombs.

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

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

Damage Point

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

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

(Continued on Page 36)

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Transmitter Site

Preventing Lightning With Point Dissipation

– Continued from Page 34 –

You can find information on the Internet stating that the energy in a lightning strike can light a 100 Watt bulb for a long period of time, but this assumes millions of Volts at one Ampere, which is just not the case.

The reason why is that a Coulomb is a finite number of electrons and multiplying 10 million Volts times one Ampere does not result in 10 million Watts.

Discharge Points

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

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

Anecdotal Evidence

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

About 20 years ago, a dissipation system was installed on a tall TV transmission tower (more than 1,000 feet tall). After one thunderstorm season, the chief engineer called with a complaint. He said that the system had eliminated lightning damage to his site, but then asked if it possibly could have helped his competitors' stations as well, because their lightning damage had also been eliminated.

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

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

Dealing With AM Antenna Guy Wires

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

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

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

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

Safe Release of Energy

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

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

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

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

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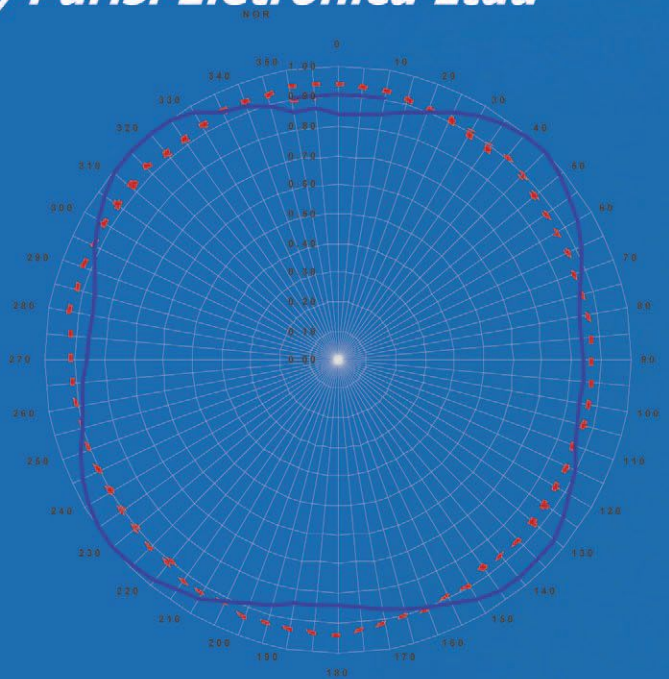

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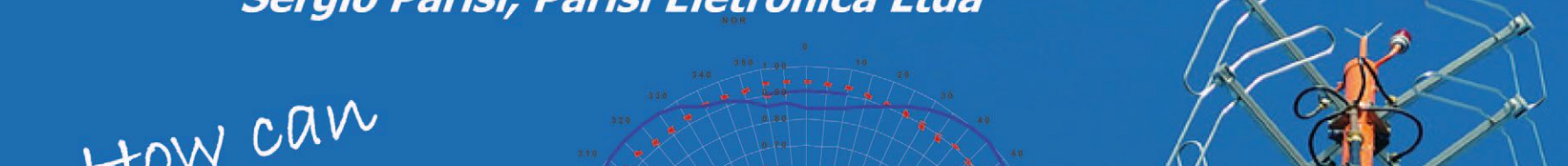

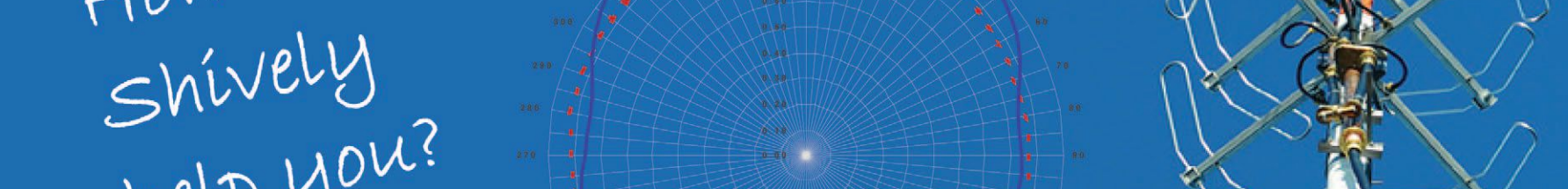

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Operations Guide

The Doctor is Never Right

by Leo Ashcraft

Imagine for a moment if you ignored all the advice you received from your doctor. You didn't do anything to reduce your weight, eat a balanced diet, exercise, etc. Well, we're all a little guilty of that from time to time. But let's imagine that you just completely ignore his advice for whatever reason. It would be no surprise that you might develop some complication due to your avoidance of the advice given.

You might develop diabetes, for instance. Now going forward, let's say you continued down this path, and maybe changed your diet a bit, but never filled your prescriptions for the drugs necessary to keep your blood sugar in check. Well, you can surely expect further complications and additional ailments as a result of this reckless behavior.

Listen to Your Doctor

In the real world, we generally try to follow our physician's advice. I mean, after all, isn't that why we pay for insurance, doctor visits, physicals, etc.? If we just ignore their advice, what is the point of even showing up for those appointments and writing those big checks? To buy the doctor a bigger house, a fancier car? No, we respect his advice because we know it is backed by many years of professional experience and training. We don't pick the first doctor we find in the phone book. We research, and ask our friends and family. We take picking out the right doctor seriously. And while writing out the check is painful, we know we have done our best for our body in an effort to stay healthy and live longer.

Protect Your License

Now let's transfer that logic to something else that is important to you – your FCC broadcast license, for instance. These aren't easy to obtain, are highly valuable, and generally something we would fiercely protect. Your entire livelihood may be based off of this document. You might have hired the best engineering firm, the best attorney, etc. to secure this license. You may have even hired the best person to install everything. But once it's operating, many fail to follow through with this behavior. The reasons may be complacency, laziness, financial, or other concerns. But whatever the reason, the fact is you can never relax when it comes to FCC compliance matters.

Besides retaining a good engineering consultant, it is your responsibility to know the FCC Rules and what is required of you concerning day-to-day operation of your broadcast station. You cannot trust, hope, or wrongly assume that your engineer or attorney will tell you everything you need to do. That's not their job – its *your* job. If you can't be bothered with taking the time to learn the rules, radio simply isn't the game for you.

Doctor Leo's Ranting Again – Doctors' Orders

So what is Leo ranting about in this edition of ***Radio Guide***? Now I would never be one to compare my skills to that of a doctor, but in the broadcasting game, after 28 years, I have a good handle on FCC regulations. And when it comes to basic obligations and requirements, I've learned to understand them fairly well.

So when I tell a client about a violation and the steps to take to come into compliance, I am not doing so to run up the bill or hear myself talk. I do it out of concern for the future of that station. I understand the results of non-compliance, and the financial hardships and even license revocation that can, and surely will, follow. So when your trusted engineer gives you advice, especially when it involves your license and regulatory matters – do listen and follow the "doctor's orders."

Violations = Bank Deflation

Case in point: You may have already read about a former client of mine that was fined for inoperative EAS equipment. This client is located in Texas, and I had warned them for *years,* as I have other stations in the area. Every time I was called in for one thing or another, I reminded them about the importance of the EAS equipment, and that it simply wasn't enough to have the equipment in the rack. It needed to work as well!

I explained that they would need to prove to a FCC field agent that it is currently operational, and has worked in the past. I went further to explain that they might check back several months or more to make sure it had been working in the past as well. I explained the importance of proper logging and keeping those records. My advice fell on deaf ears, as all too common is the case. The result? Rather than spending the needed money to make the system work, and later comply

(Continued on Page 40)

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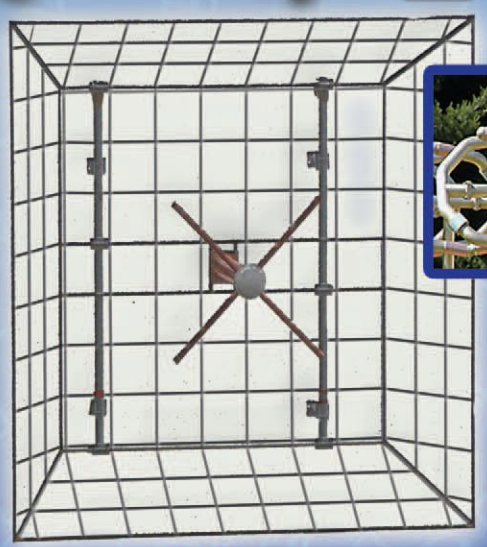

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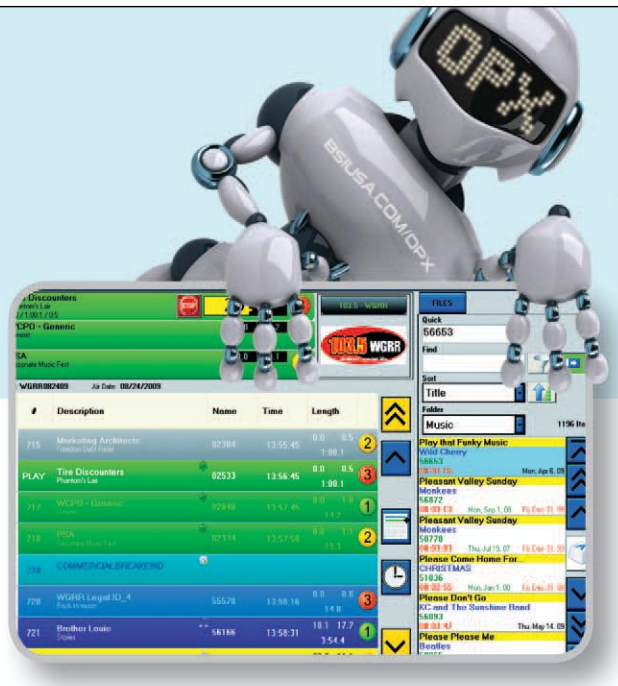

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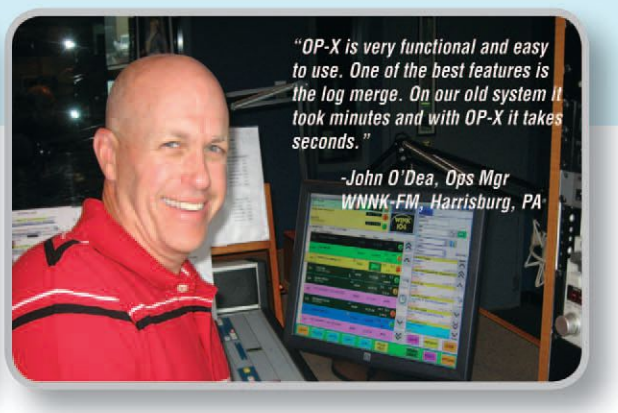

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Operations Guide

The Doctor is Never Right

– Continued from Page 38 –

with the new CAP rules, they did nothing. So rather than spend the $3,000 they needed to comply with current CAP rules, they now will be spending $9,000 on the FCC fine – and will *still* need to pay that $3,000 to come into compliance. $3,000 of supposed savings now cost them at least $12,0000. And if they don't pay? Bye bye license.

Tick Tick ... *BOOM!*

So I thought to myself, when I saw the NAL, what a shame. But then I thought, this may be beneficial in some way. I'll call my other clients in nearby cities to let them know what *could* happen – what *did* happen – and how they should be in a hurry to come into compliance. Well, I was incredibly wrong. One station's response was: "This was not our station that was fined. How much time do we have to get into compliance?" Um ... T minus ten years – and T minus one year on the CAP system. Their grace period on the CAP system ended almost one year ago today, not to mention the EAS system that hasn't functioned in years.

So on they go, out of compliance, like a ticking time bomb. Yet they find money to purchase toys for the studio, and even remodel their property. Ultimately, I think they may try to play the ignorance of the Rules card, which most of us who have been in the industry, for any reasonable amount of time, realize *never* works with the FCC. So it makes those of us trying to help these stations look bad too. I even had a field agent say, "Hey your name is all over these stations records." Yes, but I can't force the owner of a station to come into compliance. So for some, like the station I mentioned with the fine, I felt the only thing I could do was to resign.

Beyond these stations, there are stations – full power and low power alike – that are out of compliance for one reason or another. While the common denominator on most is EAS/CAP compliance, there are many other issues that plague these stations. One station is operating more than ten miles from their authorized coordinates with incorrect height and TPO to boot. They do have an EAS – but alas, its not actually hooked up! Well I guess it doesn't matter, since they also never bothered to keep their non-profit corporation renewed. It's a mess.

That was a low power FM station. But there is a commercial AM station that operates with incorrect (more than 50%) TPO, with a EAS in the rack, power plugged in, but monitoring nothing and not tied into the audio chain! These may seem like extreme cases, but unfortunately they are not. From non-commercial stations running commercials, to stations transferred to new owners without FCC consent, you name it.

In Violation? You're just a Pirate!

Honestly folks, if you're not operating under the terms of your license (and especially the guy ten miles from his authorized coordinates) you're nothing more than a pirate broadcaster. And out of the same mouths these people speak badly of pirate operators themselves! Talk about hypocrisy!

It's simple really. If you don't want to be a pirate station, learn the rules of the game my friend – stay compliant. This takes continuing education and, at the very least, a competent engineer on your side. But remember, if you don't listen to that engineer's advice, you're just setting yourself up for disaster. Heeding the doctor's orders can prevent future ailments and painful financial hardships that will surely come otherwise.

Your Attention Please

So *now* do I have your attention? If you see the importance of staying in compliance, and why your engineer is nagging you, there are some services available to you that can help. First, consider joining your state's Broadcaster Association. They have valuable tools that can help with your continuing education, and advice and tools to get and stay in compliance.

One such service is the Alternative Inspection Program (AIP). Most state Broadcaster Associations have a similar program. With this program (for a small fee) they will send a certified engineer to review your station, from equipment to Public File, just as a real FCC field inspector would. They will comb through everything and report back to you with their findings. The good part is, violations will not result in a fine, and you will have time to rectify the issues within a given time period. And many State Associations have a deal with the FCC where the FCC will not conduct an inspection as long as you are participating in the AIP! Of course if a complaint is received, they may still come investigate regarding that complaint. But overall it can save you some headaches and sleepless night not having to worry about the FCC showing up for that inspection.

Leo Ashcraft is CEO of Nexus Broadcast "Broadcast Outside The Box!" Leo@NexusBroadcast.com / 888-672-4234

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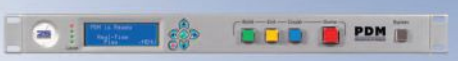

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Small Market Guide

Can the FM Dial Take it Anymore?

by Roger Paskvan

Small market radio usually gratifies the "Ma & Pa" radio stations with ideas that have made small market radio survive. Well, survival is about to get a lot harder these days with our government (FCC) gearing up to play that great big card game again – an October window for LPFM and translators.

Remember back in 2003? What a mess that turned out to be – more than 13,000 translator applications sent to the Commission, with some companies filing over 1,000 applications each! It was a suicide paper mill, designed to forever modify the FM dial.

How things in the radio marketplace have changed over a decade. The FCC's recent actions in its Report and Order have indicated that a majority of these 13,000 applications have been dismissed for a number of reasons. The Commission is making a major effort to clean up this situation, to allow room for the upcoming new filing window next fall. The FCC finally put caps on the major application mills. These mill companies are now under a cap of 70 small market applications per identity, further limited to three per given market. Many pattern filers have lost hundreds of applications through dismissal, but the Commission will still end up granting thousands of CP's to "pollute" the FM dial sometime this year.

So where is all this heading? What is going to happen to small market radio? All these new translators enhancing their AM counterpart. New translators bringing big city formats into small marketville will have their impact on the fragile marketplace in rural America.

What about LPFM? Low Power FM (100W at 100ft), will give each church and other organizations the ability to play radio in every small town. Little do they know that these LPFM stations have all the requirement of their big cousins, like EAS, transmitter monitoring, program origination restrictions and operating hours, including a non-commercial ticket. Yes, just like the big dogs, but without the big reach to bring in operating revenue like the big boys!

Capture Effect – Rule of the Day

The new LPFM window will do its negative diligence to the FM dial – station after station, filling up the FM frequencies until pretty soon we have what sounds like AM at night! The Night AM dial is just a mess, unless you are one of the lucky stations that has been around so long you have a grandfathered clear channel. Soon the greed for auction money will outpace the intelligence of frequency farming, and our crystal clear FM dial will no longer hold that honor.

Capture effect will become the rule of the day, because co-channel and adjacent channel interference will limit the reach of even the most powerful FM class C stations. You will be competing with a pile of 100-250 Watt translators or LPFM's that will encroach your secondary coverage circle, limiting your signal penetration into markets that used to be listenable.

When I was a kid, my father put up a 10-element FM beam and rotor for what he called FM DX. We lived 250 miles from Minneapolis, but five out of seven days a week we could listen to powerful, 1500' tower type, Minneapolis FM stations in our living room. Those days are gone. I tried this recently, and how sad to learn that every direction is filled with interference on the distant stations. If not interference, you have an LPFM or translator at hiss level right on top of a class C station that you were hoping to hear from a distance.

Department of Natural Radio

The greed for auction money has turned what were public frequencies into a mess that cannot be cleaned up again. The nice clean FM sound is being polluted by so many identities, all wanting to play radio in rural America, and not caring about the consequences. Sometimes I wish we had a DNR (Department of Natural Radio) to protect our natural resource radio from pollution and spectrum waste. This *was* the job of the FCC, but after Al Gore showed the Commission how to make so much money through auctions, it will never be the same.

This author views the upcoming changes to the FM spectrum as a means to create a virtual river, full of pollution with dead fish floating on top. No one is protecting this natural resource anymore, and it will only deteriorate with time. Auction revenue mandates are replacing common sense engineering. Can we save our FM dial anymore? I don't have answers, but in my opinion, this greed for spectrum money could be the driving force to FM extinction!

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

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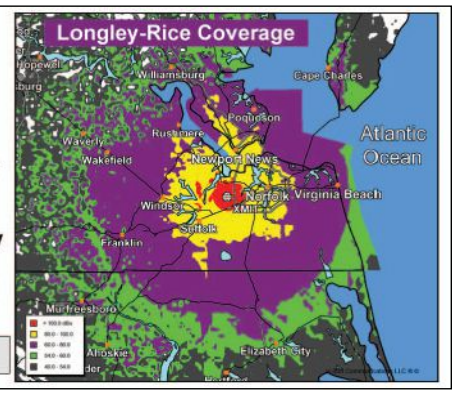

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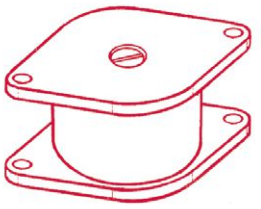
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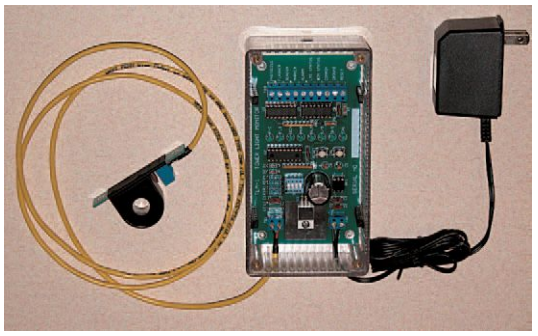

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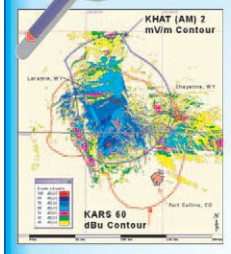

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BW Broadcast – *V2 FM Transmitters*

BW Broadcast has launched V2, the next generation FM Transmitter line, with ratings available from 5-1500 Watts.

The solid platform has now been taken to a whole new level, thanks to years of experience and feedback.

"Gold clamp" transistors can be changed in minutes with only a screwdriver, and without needing a soldering iron. Slide-in universal power supplies make replacement a breeze and a truly innovative heatsink design ensures ultra-long life thanks to ingenious airflow. Carefully chosen fans are rated with over 10 years of life at 120° F.

Included is an Ethernet connection on every V2, with smart phone apps for simple remote management. Intelligent alarms and email alerts ensure station management with minimal intervention. A real time clock and logging is available for detailed status, and a high resolution OLED display for metering processing also makes setup simple.

Multi-band DSPX audio processing means stations without a dedicated processor sound great, right out of the box.

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

Elenos – *ETG3000 FM Transmitter*

Elenos has introduced their new digital transmitter, the ETG3000, a high-power (3 kW), ultra-compact FM transmitter with direct channel digital exciter – a lightweight system housed in two rack units.

Combining high-efficiency, low-power consumption and reliability, with high fidelity and extreme sound purity through the use of digital technology, the ETG3000 maximizes the concept of energy efficiency, compactness and reliability. The unit's extremely compact size and low weight allows easy installations and reduced transport costs.

Thanks to integrated technologies such as intelligent protection, ICEFET technology, ecosaving and Lifextender algorithms, and proprietary power supply design; the reliable ETG3000 performs under the most extreme conditions.

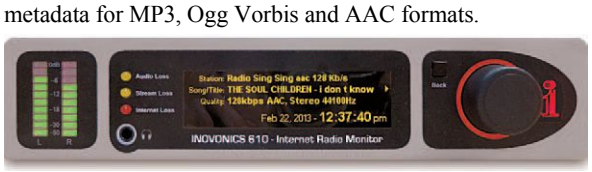
Advanced digital signal processing assures high audio performance, fidelity, and the total absence of microphonic noise are guaranteed. Furthermore, the system comes with audio MPX input, L&R with stereo generator, AES/EBU, SCA, RDS, and Ethernet input options for IP audio streaming.

The ETG3000 is also equipped with remote control and management; the user can receive data and send instructions to the transmitter via several communication channels.

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

Inovonics – Model 610 Internet Radio Monitor

The Inovonics 610 (list price $990) is the first dedicated hardware solution for uninterrupted monitoring of streaming, on-line radio quality and performance. Much more than a consumer-grade "Internet Radio," the 610 provides balanced analog and AES-digital outputs, self-logging alarms that constantly check for audio loss, stream loss and Internet loss, and an easy-to-use tuner that decodes audio and displays live metadata for MP3, Ogg Vorbis and AAC formats.



Rear-panel alarm tallies provide local alarms, and on-line notifications alert personnel with e-mail or text messages when any of the three alarms occurs. The front panel displays left and right audio metering, local LED alarms and an OLED screen with jog wheel for advanced control and editing of all tuning and monitoring parameters. The 610's Web interface allows complete setup and control of the unit from your PC, tablet or smartphone, and reliable 2-way connectivity is ensured with a built-in Dynamic DNS utility. The 610 will stay locked to your stream at all times, even in the event of a power loss.

Free yourself from uncertainty when it comes to Internet Radio and get an Inovonics 610 Internet Radio Monitor today.

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www.wi-broadcasters.org

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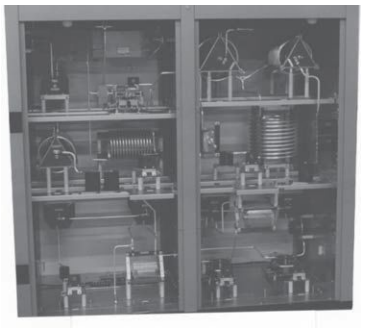

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