Radio Guide

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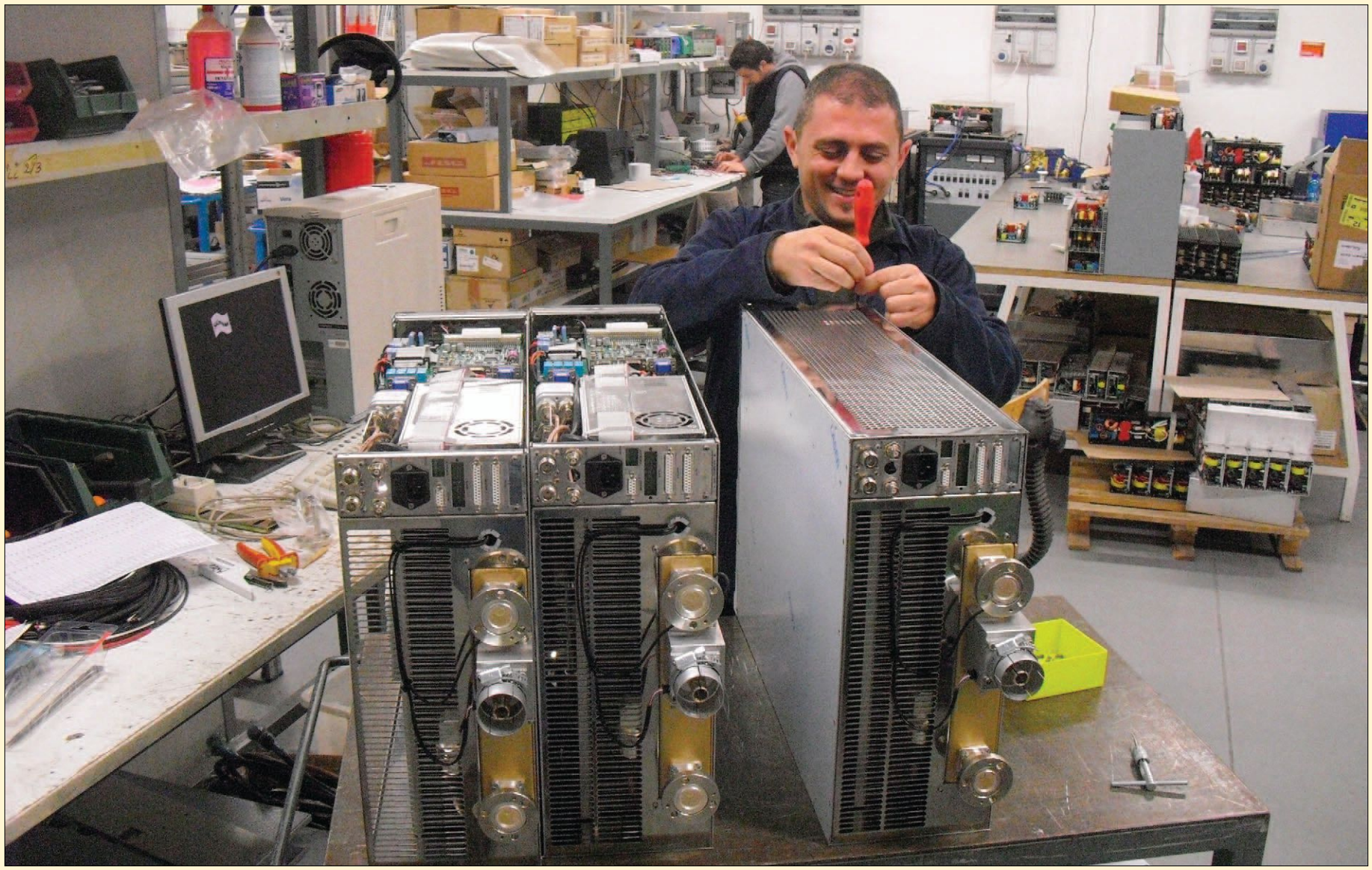
Digital Issue Now On-Line

March-April 2013 – Vol. 21, No. 2

Elenos – A History of Innovative Product Design



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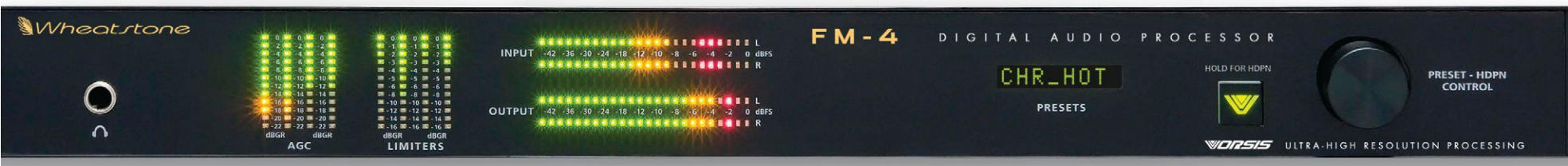

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Radio Waves

by Ray Topp – Publisher

In This Issue

• In *Studio Site,* George Zahn answers key questions and points on the importance of audio level calibration.

• In the *Links and Lines* column, Mike Callaghan reveals some of the ways in which we can all get the best – and most – from our STL channels.

• When working in an unfamiliar facility, Chris Tarr shows us how to make sense of the wiring and distribution systems already in place, in *Practical Engineering.*

• In Mike Callaghan's second article, *Tech Management,* he investigates the reasons why we sometimes fail to communicate with each other.

• Scott Schmeling finds a way to save money by replacing his old tower light controller with a home-brew unit, in *Chief Engineer.*

• In *Power Principles,* John Bredesen describes the standard Delta/Wye transformer distribution methods for AC power distribution.

• We welcome Mark Shander to Radio Guide in *From the Ground Up.* In this isue, Mark describes the Veterans Broadcasting Network (VBN).

• Just when we thought Leo Ashcraft was retired – he's baaaack! In *Transmission Topics,* we learn that engineers never really retire, and that doing things on the cheap can result in some strange results.

• In *Small Market Guide*, Roger Paskvan completes his construction project for his 2-bay antenna phasing harness, for improving RPU signals.

– Ray Topp, Publisher

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Cover Story

Elenos

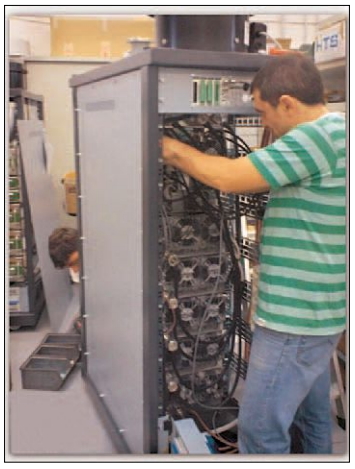
A History of Innovative Product Design

by Ernie Belanger

From its founding, it was clear that Elenos was a company destined for greatness. How could it not be? Its founder Leonardo Busi was an experienced engineer with a passion for RF, and the drive to constantly pursue the cutting edge of technology in order to develop better and more efficient FM transmitters.

Humble Beginnings

From its beginnings as small company located in a tiny factory in Ferrara, Italy, Elenos has grown into one of the most innovative transmitter manufacturers in the world. Their growth and acceptance in the marketplace pushed the company to move to a larger facility in Poggio Renatico, near Ferrara. This was just what the company needed, as it gave Elenos room to grow – and grow it has. The facility continues to expand to meet demand for Elenos transmitters world wide.



Final assembly of a high power solid state transmitters.

Creative Engineering Talent

Elenos was built around a team of talented engineers with diverse backgrounds. The result has been a long history of innovative product design and reliability, second to none in the industry. This business model has given Elenos unprecedented success, as over 40,000 Elenos transmitters have been installed in over 100 countries. This growth can be traced back to the company's driving force, the continued pursuit to produce the most reliable, high-energy efficient FM transmitters available

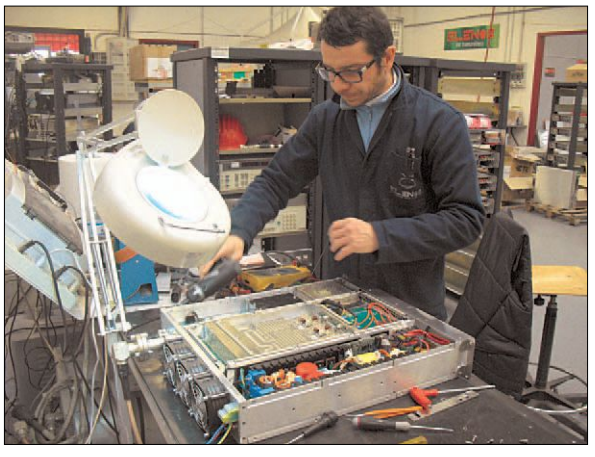
This is a passion of Elenos – creating the best performing and highest quality products on the market. Elenos designs and manufactures products to the highest standards of international Industry, and it is an ISO Certified organization.

Elenos says it was the first broadcast transmitter manufacturer in the world to study techniques to reduce power consumption, as early as 2004. A great effort has been made in the design of low-loss combiners, non-conventional RF architectures to achieve maximum efficiency, and of algorithms for the management of the RF sections, according to the maximum obtainable efficiency.

The first transmitters produced in early 2005 with this technology were the ETG3000, followed by ETG5000 in 2006, and by ETG5000 in 2007. The design objective was not so much to reach the maximum power or the minimum cost, but rather to achieve the best performance in terms of reduced energy consumption. These transmitters have been very successful, as they offer a reduction in energy consumption by twenty to thirty percent or more, than the solid-state or tube transmitters of the previous generation.

L-DMOS Enters the Mix

With the L-DMOS technology, available for the FM band in 2008, Elenos has further increased the performance in terms of electrical efficiency, achieving exceptional power savings. An ETG5000 with L-DMOS technology presents overall electrical efficiency within seventy to seventy five percent. And, depending on the operating frequency, that efficiency remains almost unchanged even in the case of transmission at half power. Only a modest reduction in efficiency results at twenty five percent of the nominal power.



Amplifier Testing

The R&D department has worked hard on the issue of energy savings since 2004, investing heavily in research and projects. The results have been excellent, and have amply repaid Elenos in terms of sales and satisfaction. But most importantly, the developments they have created translate into common sense, user-friendly transmitters that push the envelope of cutting edge technology.

Today, Elenos' customers have the opportunity to purchase a new transmitter that will allow them to recover a major portion of their initial cost, by realizing substantial savings on the cost of electricity.

As the company continues to evolve it's product lines, to add the newest capability to it's transmitters – making them more user friendly – it's easy to see that Elenos has eclipsed its competitors in several areas – their most recent being the development and production of highly efficient transmitters. Thanks in part to the investment the company has made in Planar technology, this allows Elenos to continue as an industry leader in the development of the most compact, intelligent and energy efficient transmitters.

Social Media Communication

Not only does their latest SMART Series of transmitters have standard remote control functions that can connect via dial-up or Internet connection, they've also build in the capability to have the transmitter actually Tweet or post status on Facebook. Now Elenos not only has some of the most efficient, solid state compact transmitters available, it also has a transmitter that can instantly communicate with you, if an issue occurs that causes the transmitter to function outside of pre-set operating parameters.

The Elenos Family

This communication capability, or "Speak" concept, brings transmitter to "life," and succeeds in creating successful bridges of communication between the transmitter and the engineer. The transmitter can now take the lead in the communication process, transforming it from being just a tool, into a social agent, that can "speak" and ask for help when needed.

With Elenos' apps, you can control your transmitter or check status on your smart phone, giving you instant access to all transmitter parameters and allowing you to make adjustments as needed.

Another favorable point of the SMART Transmitter is the lifeXtender algorithms that makes possible automatic management of the transmitter parameters, which allows the equipment to operate in harsh environmental conditions.

World Wide Reach

Elenos is a global company with offices and support facilities in Europe, North America and Asia. Elenos transmitter products are known worldwide for having the highest RF and audio performance in the market, that incorporate "rich" product features by use of state-of-the-art technology in design and in manufacturing.

From such humble beginnings, Elenos has fulfilled its destiny, blossoming into the world class company it is, with a future that reaches far past the cutting edge technology of today.

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Studio Site

In Celebration of Calibration

George Zahn

Wow! Not since I wrote about the venerable microphone, ElectroVoice 635A, have I received such a tremendous response to an article, and it's heartening that in this day of "zero noise floor" digital technology, some of us are still serious about proper calibration of equipment. In media, there's generally a corollary of how many people speak up, to how many people really care about a story, and if those reactions to last issue are any indication, we need to explore this topic further.

The topic of proper audio calibration came into vivid contrast for me as my station, WMKV, changed over to a new automation system in the last few months. Listening back to "old" audio from months or years ago – some manually recorded into the system and some ripped from CDs – showed wildly ranging audio levels which we're still trying to track down and correct. It seems this issue comes to the fore at many, if not most, stations.

It's easy to throw the problem away and just let processing handle the disparity in levels. Don't let your compression tackle it all for you, although it can be your friend. Also, remember that unless you are processing your Internet feed, the discrepancy in levels your Internet listeners experience can be just as disturbing as those we hear on relatively unprocessed local TV channels coming through our satellite systems. Program content is at one level, and then spots come on as virtually inaudible or unacceptably loud. It's maddening! Those of us in the profession who understand the problem may stay tuned, but how many general listeners/viewers get frustrated and tune away?

Feedback – The Good Kind!

Responses to last issue's *"Using Your Head About Headroom"* provided some detailed tips and observations, some of which I'd like to share. Hearing different opinions from different readers allows for all of us to collectively learn and engage in improving our technical service.

Dave Cory of St. George Cherry Creek Radio, works with eight different stations in Utah. Dave said: "I'm one of the few remaining broadcast engineers (age 74) that believe in the amber VU meter. Some consoles have it and some don't, so it's always a struggle to train the proper use of them." Cory says that the mix of digital peak meters and VU meters drives him "nuts."

I taught audio production for more than fifteen years at a major university, and watched as the broadcast curriculum in the latter years of my time there evolved to more and more general theory, from the critical, and actual hands-on applications designed to teach important tenets such as calibration. What happens when the new "kids" hit our stations, entering broadcasting with the likelihood of less technical emphasis and training? How do we make people understand?

One anonymous engineer replied: "Folks doing production routinely 'peg' meters, and make the overload light come on in the digital meter in Cool Edit or Adobe Audition, and then record, edit, and save and re-save using MP3."

Another engineer lamented that, in trying to explain the importance of calibration, the staff listened politely and then went about the same dramatic inconsistency in levels.

One technician also added that many radio people claim that listeners can't tell the difference between WAV and MP3 file quality, yet they'll spend thousands of dollars on processing gear, and countless hours adjusting it for just the right sound.

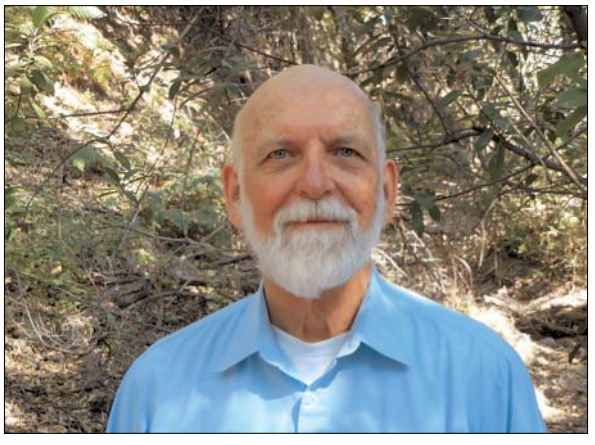
Key Questions

As a manager, I have to ask myself, are we doing everything possible to make the best possible technical product for our listeners on-line and on-air? Believe me, with the rumors of several carmakers eventually dropping AM-FM radios in the coming years, we need to be more and more cognizant of our Internet product, since that may be the primary way we reach car listeners five to ten years from now. As an on-air person as well, I have to ask myself if every edit can pass "headphone listening" muster. And in trying to do more with less – and in even less time – am I paying good technical attention to my product, including the recording levels?

If I am saying no to any of the above questions, I need to remember that what I'm broadcasting and streaming is *indeed* my product. It's not unreasonable to expect me, as an example to my employees and my staff (and for many of us in public or community broadcasting, also volunteers), to be properly trained and vigilant, to the point that volume levels are always treated as an important issue.

Adding a Point of "VU"

I also thank Dale Manquen from MANCO, in Thousand Oaks, California, for adding clarity on some terminology and information in the last issue when I was discussing operating levels. He shares the following clarification: "The 'reference level' or 'operating level' of an interface or transmission line is a specific voltage level or power level. In the old days of 600 Ohm devices, this level was referenced to one milliwatt in a 600 Ohm load, or 0 dBm (dB re 1 milliwatt). The voltage across a 600 Ohm load for 1 milliwatt is .775 Volts. Similarly, a +4 dBm level was 1.228V and +8 dBm was 1.946V."



Dale Manquen – MANCO

Manquen, the U.S. distributor for Penny & Giles faders and parts adds, "As time progressed, we got away from the '600 ohm standard' because we used low-impedance drivers to feed multiple high-impedance loads – but we still wanted to keep the same voltage levels. We adopted a new nomenclature – dBu – which is the same voltage level, but without regard to the actual resistance of the circuit's load. Thus +4 dBu would be a voltage of 1.228V in any circuit. In contrast, a dB or a VU is just a relative quantity that does not in itself imply any specific voltage or power level."

Thanks to Dale for providing more clarity to the last article. I should have referred to reference points for line levels by saying, "+8dBm" or "+8dBu" as well as references to "+4" and "0" in paragraphs 4 and 6 of last issue's article. I appreciate Dale's expertise and update, as sometimes we all take some shorthand for granted, and this is a great way for us to learn.

Speaking Volume(s)

Engineer Jim Graham from Greenville, South Carolina, looks back on some of the issues of calibration over the years: "When building production studios, I would put either fixed or adjustable pads between a mixing console's output and the input to a reel-to-reel or cart machine, then run the input pots on those recorders full clockwise. That way, they stayed in calibration and no one could mess up the input levels or balance. I also used to re-calibrate VU meters from +8 to +4, because the operators were going to overdrive the meters anyway. It is unfortunate that users can access settings in PCs to foul up the works."

I find this rush of response to something as "mundane" as calibration refreshing. It's something on which we (management, on-air talent, and engineers) can all collaborate to create a better listening landscape for our clients, our listeners. For those of us who straddle the management-talent, talent-engineering, or management-engineering delineations, we can be the "calibration evangelists" to try to convey the importance of consistent levels. At least one engineer commented that the education has to really trickle from the management down.

There may be some who scoff at the need for good calibration and level attention. After all, just one of the key advantages of calibration of recording gear was to help us stay above the noise floor inherent to old magnetic tape. Now that we have digital media, with virtually no noise, some would say "Who cares?"

In recording studios, the whole perception that "louder is better" doesn't always translate to broadcasting. Calibration is still a critical factor in consistency in the studio and in our transmission chains. I contend that, "legal is better."

Says Dave Cory from Utah, "Perceived loudness is what counts to the listener, and when our local competition over-modulates their transmitters, I get complaints that ours doesn't sound loud enough. 'Why can't we sound that way?' is the retort and my answer is that I hesitate to be in violation of FCC Standards among other things!"

For those of us who still wax nostalgic about the beauty of the old VU meter, the way our parents and grandparents basked in the glow of the "tuning eye" of their old Zenith radio, Cory passes along some info: "... at the last NAB Convention, a well-known console manufacturer reverted back to building a new console using regular amber analog VU meters! They said the demand for it was so high, they started to use them on some consoles! Hoooorah! I was dumbfounded. We ain't dead yet!"

Gotta love it! I welcome further comments on any of the topics covered in this column. We learn from each other, and it's fun to share your comments on issues that you find important.

---

*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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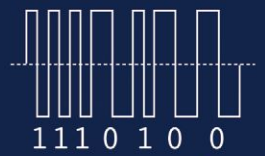

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Links and Lines

Squeezing the Most Out of An STL Channel

by Mike Callaghan

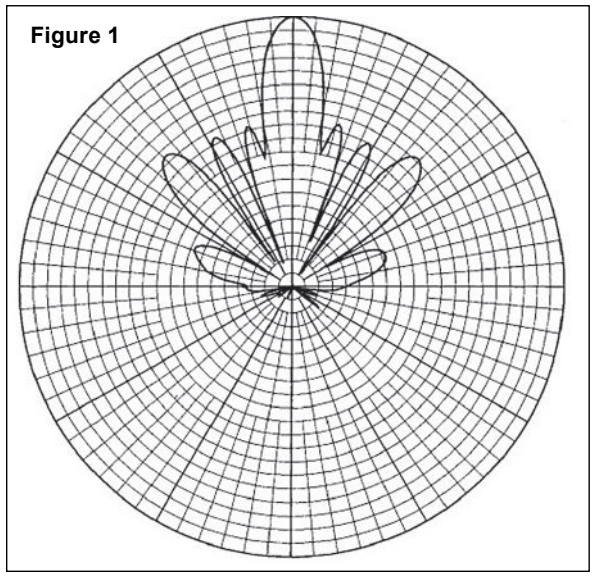
Sometimes I really envy engineers in small markets. While they have a huge number of details to keep covered, there are parts of the job that are easier for them than in larger markets – things like finding and using unoccupied STL channels, for instance. Take Los Angeles; trying to get an STL channel from anywhere in the basin to Mt. Wilson is a multi-year challenge. When I first started at KIIS, we had inherited an STL on 942.5 MHz – an out-of-the-band channel that had since been adopted by the Navy. And the sailors had a radar system that ran precisely on that frequency.

Uncle Sam scheduled ships using the radar to steam into port during our morning show, and as they appeared on the horizon, our listeners heard not just Charlie Tuna, but "BLAATS" every five seconds, as the radar antenna swept across Mt. Wilson. We used a composite STL, and I needed to add a composite clipper to keep the BLAATs below 300% modulation. So much for the secrecy of Naval Operations; if the bad guys wanted to know where the ships were, all they had to do was tune us in!

Then, one day, while I was the chairman of the Frequency Coordinating Committee, Jim Brooks, the chief engineer for KNBC-TV, called to say they'd started using subcarriers on the video STL's to carry their audio to Mt. Wilson. They didn't need 946.0 anymore. Lightning never moved as fast as I did to file for the newly-vacant *real* STL channel. KIIS has used it ever since.

In areas of high density RF, like Mt. Wilson, you can see what seem like outrageously large receive dishes. It's certainly not that we need the gain, but there are just so many signals zeroed in on the one receive site, that we need the narrow beamwidth to give the receivers a fighting chance. And with dishes this size, it's important to sweep the dish in both axis when it's being aimed. It's easy to fool yourself with a side lobe. **Figures 1 and 2** show just how strong side lobes can be, and can trick you into using one of them, instead of the main lobe.

Figure 1



There are just 16 aural STL channels, and they are best exploited to the hilt. As we add new features to our facilities, we need to carry more traffic on the channels we already have. Recent technology makes it possible to do more with them. For instance, if you start with just a single STL frequency, you can:

1. Add subcarriers to transport additional audio channels.
2. Use a digital system to add program paths.
3. Run spread-spectrum data through the same antennas.

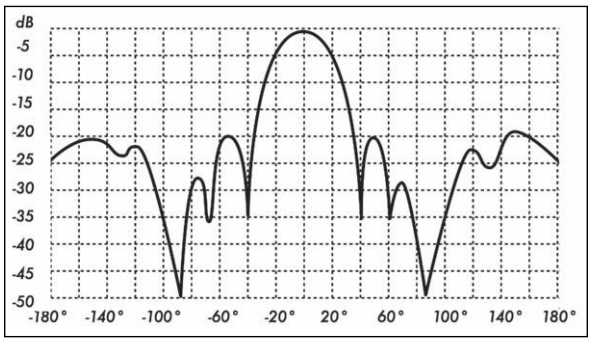


Figure 2 – Side Lobes Can Trick You

Some Examples:

KIIS sends IFB audio to a hilltop transmitter with a 67 kHz SCA channel, piggybacked on the first half of a double-hop STL. It is SCA quality, granted, but it's also just an IFB. Quality is good enough for the function. If you need, you can use more than one SCA carrier this way. Many stations use this sort of subcarrier for the transmitter's remote control. We also have a Moseley LanLink using the same antennas; this uses unlicensed spread-spectrum carriers to carry the Internet back and forth, and it's also a backup audio path for a helicopter traffic reporter – his receiver is on the same hilltop as the STL relay. The LanLink has the advantage of riding on the same high-gain dishes as the STL signal. This increases the range while avoiding interference from other systems sharing the same spectrum.

There are a number of digital STL packages that carry more than a single stereo program. Because Clear Channel has two FM stations in the same building on Mt. Wilson, we can send both stations up on each of two systems. This provides not just equipment redundancy, but also protection if one of the channels sees interference or fades. These multiple systems often have just a Watt or two of output. It's not uncommon for them to need wide-band boosters that add 10 dB or so of gain before they finally connect to the antenna. Unlike traditional analog STL's, the digital systems don't fade into noise when the signal gets weak. They encounter more and more digital bit-rate errors until they just stop working.

There are settings to change that help with this; adding to the coding interleave will partially make up for a weak signal – this increases the audio latency through the system. In most of today's facilities, though, the existing profanity and HD delays keep it from mattering.

Even short STL paths can be affected by inversion layers, especially in locations where mountains or basins trap layers of hot air that diffract the microwave paths. Even more horrific is when the layers block local signals and bring in distant ones. As rare as this is, you'd better have something besides the radio link to carry your audio to the transmitter if it happens.

And that, more than likely, means a telephone circuit. Telco paths of yesteryear were equalized phone lines, and they went all the way out to 15 kHz. Analog amplifiers, every so often, kept the levels up. You ordered them and waited while they were designed and installed – it could take weeks. Doing phone lines in stereo added another dimension to getting them right. They had to be matched in frequency and propagation delay. It just wouldn't do to have rim shots coming out of one speaker and then out of the other.

I once worked for a stereo station where the Chief took no chances. He had two separate stereo pairs going to the transmitter – two left, and two right. The phone company added a fifth pair to carry DC for manhole amplifiers at the base of the mountain. When a pair failed, you can guess which of the five it was. Obviously, the DC pair running the four amplifiers!

Nowadays, we typically use digital T-1 circuits for program paths. There are numerous ways to configure T-1 equipment to carry many combinations of audio, telemetry, and digital paths to your transmitter facilities. They can also carry data from the transmitter back to the studio. (Handy for feeding the mod monitor back to the studio for AM stations – you get an off-air monitor without all the monkey chatter and whistles from a real radio.) While T-1 lines do much more than the older analog ones, the technology is incredibly more complex. T-1's probably sound better and have better noise figures than the old analog lines, but they just don't seem to be as reliable.

With fiber-optic cabling, one simple case of "backhoe fade" can disconnect literally thousands of circuits. And you can't get away from the digital domain, either. If you can get the phone company to accept an order for an analog line, the first thing it connects to at your end is likely to be an Aptex card that makes it digital anyway. At the far end, an identical card changes the digital back to analog before it gets handed off to you. This saves the phone company from having to equalize the line and check for noise. I'd be amazed if there were still any phone people that know how to do that!

This means the most common modern scenario is for a station to use a T-1 circuit as the primary program path, being backed up by a dedicated RF STL system. When the T-1 fails, the station can switch to the RF path until the circuit is repaired. Some T-1 equipment provides closures to make an automatic switch when the T-1 goes down. For systems not so equipped, add-on accessories can provide this feature. These can switch away from a bad T-1 line so fast, that listeners won't know there's been a failure. Some also provide a status closure, so the studio staff will know when the line is intact again.

The most important thing is to keep the program flowing. In this vein, it's also good to invest in a reliable "full-time" UPS system to power the T-1 and STL devices at the transmitter. This protects the gear from surges and brownouts that can change settings and cause malfunctions that can take a long time to correct.

As a last resort, for when both the radio link and telco line are missing in action, some engineers have a pre-recorded audio program at the transmitter linked to a silence sensor. Too much silence starts the fill-in audio, with a snazzy jingle for the station, and then a string of promos. This is good security, until a salesperson snags a live Sunday morning church service, and the minister starts the sermon with 30 seconds of silent prayer – which, for the radio listeners, wouldn't be silent for very long!

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

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Disaster Preparedness

A Timely Look at Disaster Planning

by Steve Callahan

Nothing like being off the air to start the station manager thinking about disaster planning! That's right, all too often, station management or ownership initiates the planning because of an extended off-air experience. It's sort of like trying to find the horse after it's already run out of the barn. In New England over the past six months, we've had our fair share of weather emergencies. Hurricane Sandy, the "Nemo" storm and the Blizzard of 2013, have all pointed up the weaknesses in our ability to stay on the air when the infrastructure around us breaks down.

Hurricane Sandy Damage in the Rockaway NY Area

Mary Ann Seidler, Tieline's new Vice President of Sales in the Americas, gave an eye opening presentation to SBE Chapter #11 in Boston recently. It got me thinking about what we all do wrong – what we all do right – and what we depend on to work 24/7/365.

The Studio Generator

First off, take a good look at your emergency power sources. You might have a generator at your tower site but do you have emergency power at your studio site? I can't count how many times I've been told by various station owners, "We never lose power at our studio, just at the tower." During a big, widespread snowstorm you can very well be without power regionally for days and (hopefully not) even weeks. All it takes is one tree falling on your power line. Make sure *all* of your operation is thoroughly covered by dependable emergency power.

I once worked for an FM station that rented space on a cell tower. There were four cell carriers on that same tower and one carrier was responsible for a generator that was powerful enough to run the entire site. They kept their generator locked and secured, which normally is a good thing. However, during an ice storm which brought down trees onto power lines in the area, the generator didn't start. When I got to the site, and got through their locked fencing to the generator, I found that the diesel tank was as dry as dust. I started a relay of five gallon jugs of diesel from a local gas station until I could find a fuel company that could deliver bulk diesel. It seems that the cell carrier in question had three cell sites down during that storm just because of a simple lack of generator fuel.

Maintain Your Generator

The lesson I learned here is, if I also depend on it, I'll share the responsibility that it will work when it's needed. Get access to the shared generator and check the fuel weekly – and make sure it starts, at a minimum, in test mode. If you are in the market for a new generator, remember how tough it can be to get a diesel fuel delivery at night in the middle of an ice storm, if fallen trees block your access road. In certain cases, I like natural gas fueled generators because the fuel is piped in to you.

Maintain your generator and have it serviced a couple of times a year, depending on usage. Undoubtedly your business manager will ask you what the generator maintenance bills are for, but tell him or her it's the cheapest insurance the station will ever buy.

Test Your Generator on a Routine Basis

Mary Ann Seidler made an excellent point in her presentation. It's a smart thing to have various levels of backups. If you are depending on one path to the Internet, remember that the Internet is not impervious to a tree coming down and taking out the power and telephone lines on a telephone pole. I was at another FM station recently that had been depending on a DSL line for the Internet access in their newsroom.

Many Were Unprepared for the Blizzard of 2013

During the Blizzard of 2013, their DSL slowed right down to nothing, so they were now considering augmenting it with a cable modem. Normally a great idea, but both the DSL and the Cable Company shared the same telephone poles to the station's studio. I suggested they look to a 4G wireless connection as a third level of backup, because there was a cell tower practically in their backyard. Now don't get a false sense of security about your cell phone or wireless device working all the time. As shown above, cell sites do lose power and backhaul interconnection, so think creatively and try to find different levels of backup.

At my own station's transmitter site, for STL opportunities, I have a FIOS modem, two POTS lines and a friendly FM station's SCA to keep me on the air. I've had the two POTS lines at the site for 20 years and they enable me to originate programming from any location, if I can't get a signal out of my studio.

My municipally-owned power company knows I can originate continuous on-air updates from their emergency command center using the POTS lines if they need me to. I could go one step further and mount a spare 450 Marti transmit antenna on their two-way radio tower for the four mile hop to my tower. Don't forget that you can utilize your RPU as an emergency STL for 720 hours a year. You won't have stereo, but you'll be heard.

Low Power Backup

If you are fortunate enough to have an auxiliary site for your FM, you've got a tremendous asset. Some station owners have seen the value in having a completely redundant transmission facility on a different tower, which is really thinking ahead. However, if you have to make it work on a tight budget, consider a different approach. A low power FM transmitter or exciter won't break the bank, and a single-bay antenna located on your studio's STL tower might very well cover a lot more of your city of license than you think.

If you lose power at your transmitter site, but have emergency power at the studios, then you'll have the ability to continue to serve your listeners. The low power RF amp or extra exciter can further be justified because they might come in handy at your normal site as backups there also.

Talk to your local power company and emergency management agency now. See if they can get you connected with their communications links so you can pass along the most current news updates. It will cost you nothing and you'll be helping your listeners during a time when they need you the most.

Keep Your POTS

All too often in this economy, station manager or ownership consider backup systems as just too costly. There is real false economy in a station manager having all "unused" POTS lines disconnected in an effort to save $20 a month. Remind your manager or owner of that time that the station was off the air and what you plan to do, to avoid just such an experience in the future. You can't predict every emergency, but at least you can have different levels of backup to fall back on.

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

Protecting Your Investment

by Peter Gutmann

It's often said that broadcasting is a "people business." That's especially true today and, as competition mounts from social media, will only increase in the future.

How can broadcasters protect their investment in the people upon whom their business depends? What legal steps can you take to encourage their loyalty or, failing that, at least to prevent them from damaging you if they move on to a competitor?

The most direct way would be through requiring your employees to sign long-term binding contracts that would oblige them to work only for you. That, in turn, would stop them from working for others and would thwart your competitors from luring them away.

But there's an immediate problem – the Thirteenth Amendment to our Constitution forbids not only slavery but "involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted." From that flows the bedrock principle that employees cannot be forced to remain at a job. Nor can they be prevented from earning a livelihood elsewhere. So even if you could prevail upon your employees to sign our ideal contract, its exclusivity provision would be subject to legal challenge and would not be enforceable.

Despite the Constitutional origin of this concern, it must be emphasized that employment law is a creature of each state and is applied by local judges. So while we can outline some broad principles, they are subject to regional and local application and interpretation.

In this article, let's explore some ways to approach a reasonable balance of protecting your "people" assets without unduly infringing their freedom to seek work of their choice. Since forcing someone to work only for you is out of the question, these approaches all tend to focus upon ways to limit the damage should a valued employee leave.

Covenants Not to Compete

The most common method is to require a covenant not to compete as part of an employment contract. The general goal is to prevent a departing employee from using his or her skills in ways that are likely to cause you economic harm. Keeping in mind that courts tend to favor employee rights, one of the primary factors to consider is the extent to which a skill set is truly unique. Thus, a credible threat could be posed by an air personality who can migrate his or her audience to a competing station, or a sales rep who can continue to exploit client relationships developed at your company. It would be far more difficult to justify preventing an engineer from ensuring the technical performance of a rival station.

In that regard, broadcasters often contend that on-air characters or client lists are their property and are not portable with a departing employee, as these assets were developed as part of the work that the employee was expected to do as part of his or her routine duties and for which they had been paid as part of their salary. Yet, unless this has been spelled out in an employment contract, it often seems an afterthought or, worse, a desperate attempt to add terms that were never part of the original arrangement.

As a general matter, courts increasingly disfavor enforcement of covenants not to compete, and in some states, including California and Massachusetts, they are illegal altogether. Other states severely limit them – in New York non-competes cannot extend beyond the length of one's employment, so all such an agreement can do is block "double-dipping" while an employee is actively engaged as station staff.

Where covenants not to compete are valid, they must be drawn as narrowly as possible to protect a station's vital interests without infringing employees' freedom. If not, then courts may either rewrite them to a more appropriate degree or decline to enforce them at all. Beyond applying a non-compete covenant to unique skills, it is essential to define its scope, both geographic and temporal. Thus, a non-compete stands a better chance of enforcement if it is limited to a station's actual coverage area, rather than to an entire large market, state or region. Similarly, it is better to restrict the length of a non-compete to the time reasonably necessary to enable a station to recover from the employee's departure and to find or train a suitable replacement.

Any contract requires consideration in order to be valid. To bolster the strength of a non-compete provision, it can be helpful to recite that something of value has been given for it. The consideration can be monetary, such as earmarking a portion of the employee's total compensation as being earned in exchange for the covenant. Or it can be less tangible, such as stating that a new employee is receiving specialized training partly in exchange for his or her agreement that the techniques are valuable, have been developed by the station at considerable expense and must be preserved as its intellectual property.

Some of these issues might be avoided by combining a non-compete with a period of paid consulting following termination. In that way, the employee continues to work for the station rather than a competitor. Yet if the termination was less than amicable, then both parties might prefer that their relationship be severed completely.

Confidentiality Provisions

A related approach requires that upon termination for any reason an employee is obligated to return all materials generated as part of his or her job and to preserve the confidentiality of all "trade secrets" and other proprietary information to which he or she has been exposed in his or her position. Confidentiality and non-disclosure provisions can be more readily enforceable than covenants not to compete, since it may be easier to define their scope, at least with respect to documents. Thus the California law that prohibits non-competes does permit the protection of trade secrets. For broadcasters, that might include such important assets as client lists, sales plans and scripts, but only to the extent that they are truly special.

Confidentiality provisions extending to intangible property such as sales techniques or verbal slogans are harder to enforce, since they often elude precise definition. A related difficulty is the need to show that the protected matter really is the unique property of the station and was not in use elsewhere or available from other legal sources.

Special remedies for breach of non-compete or confidentiality obligations can include injunctions, monetary damages or holdbacks of monies owed (such as sales commissions). But often by the time relief can be obtained severe damage already will have occurred. Even so, the mere recitation of restrictions might suffice to discourage such behavior.

Non-Disparagement

Especially nowadays, in view of the viral nature of social media posts, some of the worst harm can result from bad-mouthing a former employer or colleagues. The challenge here is how to limit disparagement while respecting free speech rights guaranteed by the First Amendment. Generally, factual accuracy and mere opinions must be tolerated. Even so, such permitted expression can run afoul of privacy laws. Here, too, the major value of forbidding disparagement may lie in appeals to conscience rather than strict enforcement.

The NLRA Challenge

Over the past several months, a further limit on all of the above approaches has been posed by the National Labor Relations Act, which prohibits employers from interfering with collective bargaining rights. (Note that this provision applies to all employers and not just to situations involving unions.)

Lately, judges have tended to toss out contractual restrictions that could be read broadly enough to discourage organizational activity. Thus, courts tend to prohibit policies aimed at restricting employees from commenting upon nearly any facet of their employment. To take a rather extreme example, a provision defining confidential information as including "management and marketing processes, plans and ideas," "financial information including costs, prices, current and future business plans" and "personnel information and documents" was struck down as potentially barring discussion of wages and other employee conditions. Thus it may be difficult to enforce a policy that prohibits employees from complaining about any aspect of their job, even if their complaints are deeply personal, phrased harshly and circulated outside the company.

The Social Media Challenge

These problems become especially acute with respect to attempts to control employee use of social media. On the one hand, you do not want to appear to unduly restrict the free expression to which we all have become accustomed outside the workplace and which has become an increasingly important resource of our open society. Yet, that very openness – and the speed with which informal and often thoughtless postings can "go viral" and be beyond recall – can go beyond embarrassment to create liability for employers.

The most serious challenge is a violation of privacy. Further spreading of publicly-available information, commenting upon matters others have posted or expressing abstract opinions are generally protected by the First Amendment and thus beyond legal recourse. But publicizing personal facts about co-workers, starting false rumors or attacking non-public figures can lead to claims against not only the responsible employee but his or her employer as well for failing to adequately supervise staff activities.

A Final Thought ...

To quote Robert Frost out of context: "Good fences make good neighbors." Although you hire your staff with the expectation that they will prove to be loyal and permanent members of your team, such aspirations evolve over time. It's always best to define all aspects of an employment relationship in a written agreement that not only covers current arrangements but looks to the future, including potentially adverse developments such as those we've noted here. While no one wants to assume the worst, addressing the "what ifs" at the outset can save much agony later on.

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

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"Zombie Alert" ... or Was It?

By Jeff Johnson, CPBE

What would happen if a crawl appeared on your TV screen alerting a Civil Emergency Message or Local Area Emergency? What if it occurred during a State of the Union Speech? What if the audio of that message said something like "bodies of the dead are rising from their graves?" A Hollywood hoax? Is this the SciFi channel?

Such alerts *did* occur, not *during* the recent State of the Union speech, but suspiciously close before it. It was a hacking into the EAS system via the Internet. It occurred to at least four broadcasters – in Montana, Michigan, Texas and Utah. It was also aired, not as an EAS alert, but as part of programming on national network TV, and at least one PEP radio station.

Here is the log of the alert received from the PEP station. Notice that the call letters in the log have not been changed from the original "hacked" version from Montana. This indicates that the audio of the tones was normal program audio. If it had been a relayed EAS alert, the call letters would have been changed to the sending station. They were not.

<entry><type>Expired</type><date>02/12/13 10:26:55</date><details>Local Area Emergency, Received on Monitor 1. The Civil Authorities have issued a Local Area Emergency for Powell, MT, Broadwater, MT, Jefferson, MT, Lewis and Clark, MT, and Meagher, MT beginning at 4:33 pm Mon Feb 11 and ending at 4:48 pm Mon Feb 11 (KRTV/CW)</details><zczc>ZCZC-CIV-LAE-030077-030007-030043-030049-030059+0015-0422133-KRTV/CW -</zczc></entry>

Notice a number of other things in the message: It was originated, purportedly by "Civil Authorities," it was an LAE (Local Area Emergency), and this alert's audio was received a day after the date in the alert. This date points to an innocent replaying of the alert over the air, probably for "fun," after the news of a "vampire alert" went viral.

From Harold Price – SAGE:

I've tracked at least one of this type of report back to the source. I've seen many others that are similar. If the alert shows up in the log as "expired," and the dates in the displayed message are for a prior day, your device has heard a recording of the actual event, played back as part of news, commentary, or "funny things this week" broadcast on the station you are monitoring. Check with your monitor source, see what they were playing when your EAS device logged the alert. Remind them that part CFR 47 11.45 says: ***"No person may transmit or cause to transmit the EAS codes or Attention Signal, or a recording or simulation thereof, in any circumstance other than in an actual National, State or Local Area emergency or authorized test of the EAS. Broadcast station licensees should also refer to §73.1217 of this chapter."*** *(73.1217 refers to broadcast hoaxes.)*

Mr. Price also strongly asserts that passwords of EAS devices must be reset from the default.

From John Dehnel – Utah SECC Chair

John Dehnel, Utah SECC chair gave permission to quote here his comments to the SBE-EAS listserv and to the author. His station was one of those hacked. His permission is appreciated.

"Apparently someone is trolling for and hacking (EAS) boxes that have not had their default passwords changed. Silly of me not to have changed it, but apparently I was not alone.

"The same message originated from our (EAS) box here in Salt Lake City. There was no record of anything received on the box (CAP or legacy) but there was a transmission about bodies rising from the grave under a CEM header.

"I headed it off before any of our main channel stations aired it, but it did auto-forward to our HD2 channels, as such an "emergency" should have. "Anyone else get hacked? Change your password now.

"This was not a CAP message but apparently one manually programmed by someone hacking into the EAS boxes via their CAP required Internet connection."

John Dehnel – Utah SECC Chair

Notice that John mentioned a CEM header, whereas the previous and a following example was an LAE. This would indicate separate hacking incidents.

From Derrick Ginter – Texas Tech University

The following is from Derrick Ginter of Texas Tech University with permission, also appreciated:

(Note: this following alert is identical to the alert shown at the beginning of this article)

<entry><type>Expired</type><date>02/13/13 03:53:57</date><details>Local Area Emergency, Received on Monitor 2. The Civil Authorities have issued a Local Area Emergency for Powell, MT, Broadwater, MT, Jefferson, MT, Lewis and Clark, MT, and Meagher, MT beginning at 3:33 pm Mon Feb 11 and ending at 3:48 pm Mon Feb 11 (KRTV/CW)</details><zczc>ZCZC-CIV-LAE-030077-030007-030043-030049-030059+0015-0422133-KRTV/CW -</zczc></entry>

"Monitor 2 on our box is an FM translator for a local news/talk AM station. That AM station, KJTV-AM, is the local Texas State Network affiliate for our area. TSN originates out of Dallas. I received permission from the Texas Assoc. of Broadcasters to monitor them as my LP-2 since we couldn't receive the original LP-2 designated in our state EAS plan. TAB allows us to monitor any local station if it is a TSN affiliate, hence our setup.

"None of my other monitoring assignments relayed the above alert, and I don't believe the translator was "spoofed." I cannot confirm, but I highly suspect that whatever show KJTV had on last Wednesday during the overnight might have run the original "Zombie Alert" as part of their program – codes and all. I'm still trying to find out what program they have on at that hour. It could be syndicated programming from TSN out of Dallas, in which case, there could be many possibilities as to how it ended up airing on KJTV and "relayed" to our box.

"So my SAGE seems to have become infected with a dormant form of the Zombie Alert virus. Do I need silver solder to kill it?" – DG

From Ricky Tam – TFT Inc.

"Be certain of: ***Just a firewall and secure passwords.****"*

From Barry Thomas

"The voice message came from a 2009 YouTube video produced for a Halloween prop. "Search YouTube for "hauntedhotsauce." The comments thread shows where the creator was informed that his audio was used for the hack and his pride at being an 'accessory.'

"And to save you the trouble ... the EAS tones in the 2009 YouTube video are a recording of an RWT on WTSP-TV, St Petersburg, FL"

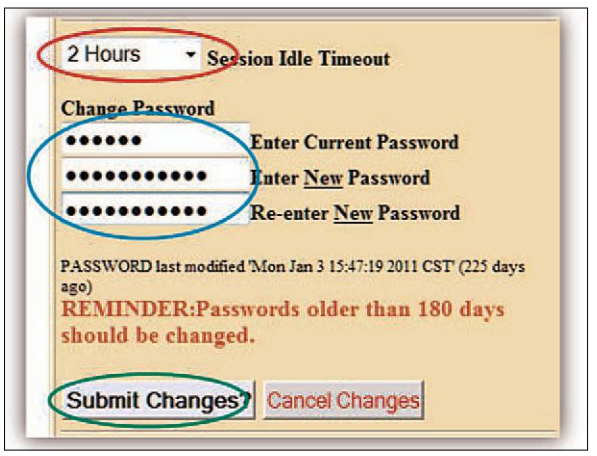
Barry Thomas, CPBE DRB CBNE
NAB Radio Technology Committee
Past president, Society of Broadcast Engineers

From Edward Czarnecki – DASDEC

As with any type of sensitive equipment, users need to use common sense measures to protect the security of the device, and of their overall operations. This kind of equipment should NEVER be exposed directly to the Internet without adequate firewalls and other security measures. ALWAYS change your default passwords, and use strong passwords. REGULARLY check for software updates from your manufacturer, and install them in a timely manner.

"These kinds of recommendations are not new. For our part, our recommendations on a defensive strategy for CAP EAS equipment can be seen in our September 2011 White Paper, 'CAP, EAS and IPAWS: Introducing a Defense-In-Depth Security Strategy for Broadcasters.'" (http://www.digitalalertsystems.com/pdf/wpdas-122.pdf).

Edward Czarnecki, PhD, Senior Director – Strategy, Development and Regulatory Affairs www.monroe-electronics.com



DASDEC Password Change Window

From Jim Gorman – Gorman-Redlich

"As you are probably aware, recent security breaches at several broadcast stations have resulted in the dissemination of false EAS messages. It appears that these breaches may have been the result of the networked EAS equipment being accessed using the equipment's default factory password settings which were not changed by the equipment owners/operators.

"Please note that such false messages are NOT capable of being generated from a proper installation of a stand-alone Gorman-Redlich EAS-l unit, a combination of a Gorman-Redlich CAP-DEC 1 unit and a Gorman-Redlich EAS-l unit, or the combination of a Gorman-Redlich CAP-DEC 1 unit and non-network-connected "legacy" EAS equipment from other manufacturers.

"In such setups, the only networked equipment is the CAP-DEC 1 unit, which is not capable of originating EAS messages (rather, it is only capable of receiving CAP formatted alert messages from the specified alert feeds and translating them into EAS messages for the "legacy" equipment).

"However, 'legacy' EAS equipment may still be capable of originating an alert message when an operator is present at the equipment site. As such, appropriate physical security measures must be taken, including protecting access with secure passwords."

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

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Practical Engineering

Reverse Engineering

by Chris Tarr

We've all been there. You take over the Engineering department at a facility or take on a new contract job. You walk in look at all the equipment and wires, and realize there's no documentation to be found. You have no idea what goes where – or why. Panic takes over and you start to worry about what might happen if something goes wrong. The reality is that there's no need to panic. However, it is important to jump in and start figuring out the lay of the land.

My experience has been that there are two ways you end up decoding someone else's work: The "sound the alarm we're off the air" method, and the "carefully sorting through wiring" method. Honestly, both happen on occasion, and both are very helpful.

The fire drill method generally happens when a device somewhere fails. You then get to play super-sleuth and trace it out. This can actually be very helpful, since generally you aren't afraid to dig right in – especially since you have no choice! This is more common than you think – especially for the contract Engineers among us. Often our sole reason for showing up is that something doesn't work.

The "Aha" Moment

Usually, right in the middle of digging, you have your "Aha!" moment, as you find the cause of the problem and make the repair. I recall one case where a station's program audio left the console, hit a punch block, ran to the TOC, fed a pre-delay DA, went back to the studio via the punch block, through the delay – then the delayed audio made the trip again through the block. That's three different program feeds on that particular block. Talk about confusion – especially when the output of the delay died (while the unit itself looked OK). I could hear program audio in the TOC, but it wasn't getting on the air! It took quite a bit of digging to find that loop back through the delay unit. Of course, after that event I clearly documented the path so that we didn't have that problem again.

The "carefully sorting through wires" method is the one that we all prefer. However, that isn't always as easy as it seems. It can be downright overwhelming! I find that the easiest way to tackle the project is to take it in small chunks. Grab your inductive amp or butt-set, and let's go!

Step by Step

Start at the output of the console and work from there. If the output goes to a punch block, find the other end and pick it up again. Remember to diagram as you go along. Does the audio go through a DA? Is it pre or post-delay? Are you sure it's the program buss? These are all things that can bite you if you don't take your time. Work your way all the way out to the STL or transmitter. Even if you don't document every single wire, being able to draw a block diagram of your signal path can not only assist you when things go crazy, but can also give you some confidence.

Case-in-point: It appears that I will be moving our studios later this year. While our current facilities are nice, I wasn't the person who designed them. Having only been here for a few months, I'm still sorting out what goes where. The thought of moving the equipment gave me a little panic attack until I decided to take a couple of days and just go through and document the entire signal path. Fortunately it's an Axia system (and really this goes for any modern digital system) so it wasn't as difficult as it could be.

Taking Away the Mystery

I sat down and created a spreadsheet of all the nodes and surfaces, then documented all the inputs and outputs, as well as the current assignments. By the time I was done, I had a document that pretty much detailed every piece of equipment in the facility, what nodes they were connected to, and how they were routed. Axia (and I assume other manufacturers do as well) has a program that will "ping" the network and report back much of that information. But to me, the process of detailing it on my own, along with the associated walking around and looking at all the connections, gave me a much better understanding of how the facility was laid out, as well as a whole lot more confidence about tackling the move, or any issues that may come up before hand. Essentially I took away the mystery.

One thing I find at every facility is the "what was that guy thinking?" element. You know what I'm talking about. Some sort of Rube Goldberg device or wiring job that just leaves you scratching your head. Our first instinct is to use your predecessor's name in vain, then try and "fix the problem."

Better Left Alone

Often I end up finding that not only was I not as clever as I thought, but also that I didn't give enough credit to the person who did the original work. Once I dig in and start to understand exactly why they did what they did, I sometimes realize that it's better left alone. The bottom line being that it's always best to try and understand the reasoning behind the work before you decide to change it. When I find things like that, I try not to dismiss it right away and instead challenge myself to zoom out a bit and try to understand why it was done that way. I often have that same "Aha!" moment, and leave things be – but not before documenting it though!

That leads me to another thing you sometimes need to do on these projects. Identifying the "mystery box." You know, that splitter or device that appears to do something – but you just can't figure out what. Unfortunately, you usually need to save those for late-night maintenance runs. Why? Because those are the types of devices where you usually end up just unplugging them and seeing what happens. Best case – nothing much. Worst case – you go off the air! At least you end up finding out for certain, and on *your* time instead of drive time.

How you document it is up to you. While I prefer to use Visio or ConceptDraw for diagramming, even a simple hand drawn flowchart is better than nothing. Remember to not only have a paper copy on site somewhere, but also keep a copy in that cloud account I talked about in a previous article. You never know when or where you'll get that frantic call about something being wrong. You increase your chances of solving the problem immediately over the phone if you have something you can use as a reference. It's also not a bad idea to label the devices in the rack (I've also covered that in a previous article) so that you cut down on the "what does it look like?" distraction.

Remember that this isn't about detailing every single wire. While that level of documentation is nice, it typically isn't practical to do. That's not a problem however, because if you at least know what the signal path is finding the wires becomes a whole lot easier. With a good diagram, an emergency can pop up and you can quickly isolate the problem and patch around it since you know where the signal is supposed to travel.

Know the Path

The same could really be said for any site – studio or transmitter. It's all about knowing what you have and what it's supposed to be doing. After all, troubleshooting is simply following a path and figuring out where things stop working. If you don't know that path, you can't expect to be able to find the problem.

I really am a stickler for knowing deep details about what is in every rack I encounter, and how it all interacts. Even if the wiring is not documented, knowing even a small amount of signal flow information can allow me to at least make some good educated guesses, and take a problem and distill it down into manageable chunks instead of taking a lot of time and effort to solve. In this age of more work for fewer Engineers, finding ways to speed up repairs and move on to the next task is more important than ever.

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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Tech Management

Are We in the Communication Business?

by Mike Callaghan

The history books tell us the first radio broadcast happened on October 29th, 1920.

What do you bet the promotions people never got around to telling engineering about the first remote? How often do we have to remind ourselves we're in the communication business?

Programs get cancelled, schedules change, people get laid off, new workers get hired, new board ops suddenly appear, old ones leave – and all these things seem to happen in a vacuum. Why?

Say you have a promotion meeting, and everyone agrees on where and when an event will be – all the details get hammered out. Mere moments after the meeting breaks up, two or three people stay behind and between them, they reorganize the entire event. Secure they have the facts straight, no one else hears about their post-meeting meeting until the day of the soiree. And then they're astounded that everyone else is so ignorant – "How could you not know? We came up with a better way!"

Many times the most important people are the last to know. Sometimes the result is an inconvenience. Other times it can be a major black eye.

We once did a promotion inviting listeners to an early store opening – hundreds were lined up at 6:00 AM to get in. But the account executive never insured the store management knew. The store stayed locked until 9:00 AM. The fiasco made the local paper. And yes, it gave us a huge black eye.

So, why are people afraid to spread the word? Why do we keep facts to ourselves? Why do we leave out important details and still hope for the best?

There are two ways this happens: Indeliberate omissions and deliberate ones. Indeliberate omissions are when people just make mistakes in the way they communicate. Like broken links on a website.

Indeliberate Omissions:

You've see the emails sent to a bunch of people that says, "Someone needs to cover this" – with no clue about who that someone is. The people on the list make a deadly assumption. Because it went to a bunch of other people besides themselves, they don't have to worry about it! Someone else will catch it for sure, right? Not even close! And after the ball is dropped, there's no one person to blame.

How about assigning a last-minute job to someone who's absent? In a large cluster, the temp help may not know how to respond to an unusual task. And by the time they get around to asking, the issue is beyond help.

For that matter, people may get promoted, replaced, or change titles often enough, that you really have to check to make sure the person you ask for help is still doing that job.

Frequently, it's not clearly defined who's supposed to pass along the information. As long as anyone thinks someone else is the messenger, the land mine is armed and in place. People may stay quiet to avoid intruding on someone else's authority, and only when it's almost too late, do people come forth with clarifications.

Because radio is a 24/7 adventure, there are times when you need to reach someone who's not at work when you are, and phoning them in the middle of the day could wake them up. You have to decide if an email or phone call is better, but if you send them an e-mail, you do it at your own peril.

Email:

The fallacy about email is that once you've sent it, you might think you're off the hook, and your tail is covered. But emails don't always get through. Spam filters, changing addresses, and any number of software foibles can get in the way of timely delivery. And some people just don't get around to looking at it very often.

While email is convenient, it's no substitute for face-to-face encounters. Many companies are instituting 'E-Mailess Fridays. This is just what it means. On Friday, you don't send emails. You get up from your desk, walk down the hall, and knock on a door. Now you get body language, face-to-face visuals, and real communication instead of a paragraph of text. People remember one-on-one chats, while text messages go into a mental stack, where recall is precarious at best.

Deliberate Omissions:

Why do people make secrets out of things they really should be sharing?

1. *People may be afraid of showing their ignorance.* When this happens, the person being quiet really, really hopes someone else will open up and spill the beans. They aren't ready to share information because they aren't sure they have the facts straight themselves. They'd rather watch things spin out of control before revealing their ignorance.

2. T*hey think keeping the facts gives them job security.* Some people think by passing out the facts just a little at a time, it makes them indispensable.

(Continued on Page 22)

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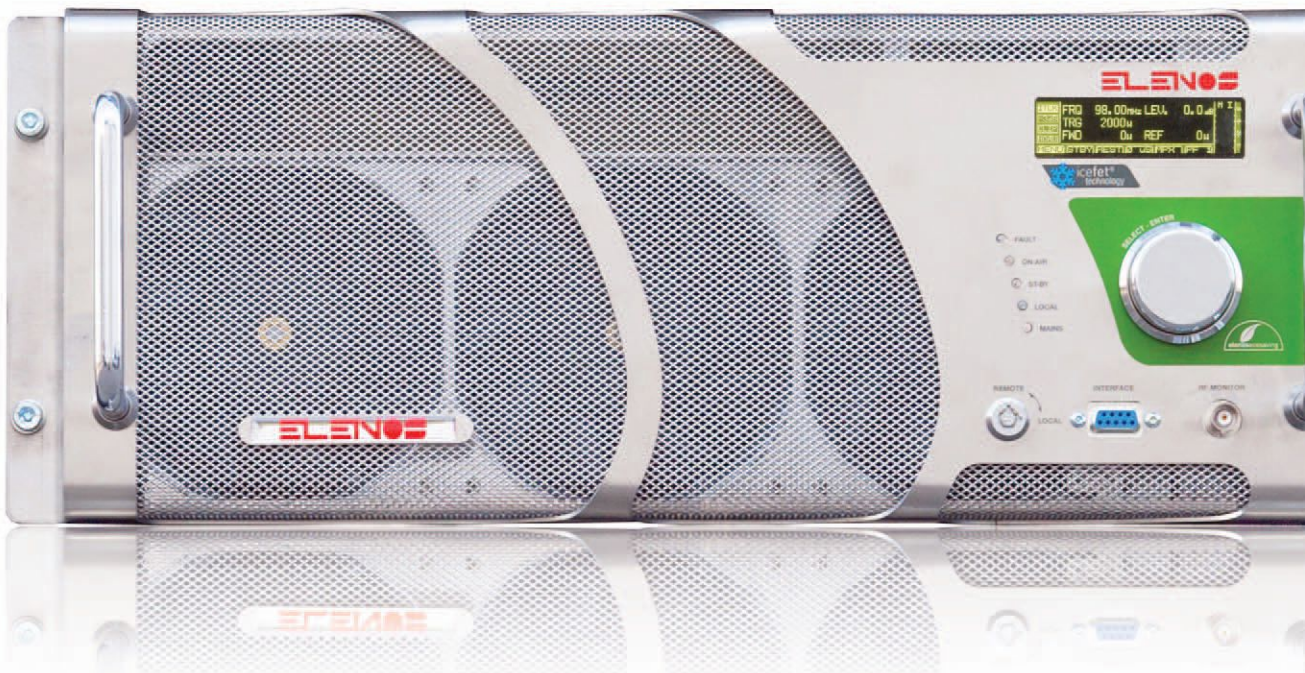

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Tech Management

– Continued from Page 20 –

Being the "go-to" person keeps them important. The problem is, it really slows down everyone else. Frustration grows exponentially when this happens. When facts are hard to locate, what is known gets distorted, as people "fill-in-the-gaps" with inaccuracies.

3. *They might want to keep their mistakes hidden.* We *all* do this now and then. Why draw attention to our blunders – out of sight, out of mind. And maybe, just maybe, someone else will get blamed!

4. *They may have received mixed input themselves.* If someone answers to more than one person, and doesn't know who is right, they're in a no-win situation if they say anything at all.

5. *A lot of it is fear of stepping on someone's toes.* Taking away their authority, and maybe doing a part of their job without asking, we might assume they'll handle letting the others know, and they assume the same thing about us.

And oftentimes, when communications fail and the train wreck is upon us, it's the engineers that pull the rabbit out of the hat, and get things pulled together at the very last minute. They're the ones that move the remote setup to the other end of the block. Or they string together extension cords because there wasn't an outlet. After it's over, everyone breathes a huge sigh of relief, and everyone vows the miscommunication will never happen again. "From now on, there will be plenty of notice, everything will be organized, and we'll be responsible about this." Right? This has all the sincerity of a New Year's resolution. Just wait a week. History will repeat itself. The reason this happens is because we let it happen. Old habits are just too hard to change.

Because it's easy to load up a van, the promo people can be ready to roll with just a few minutes notice. The air staff is similarly flexible. To these groups, it's just those pesky engineers that won't cooperate. They insist on having days of advance notice so they can get the phone lines installed and tested.

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Frankie !

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KIIS Promo Contact: N. Trotter **Phone:**	**Talent:** Frankie
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Date Lines Ordered: 8/31 **Revd by:** Chris Velasquez **Due In:** 9/7 **Due Out:** 9/11 **Site Eng:** Mikel Callaghan **Site Eng Cell:** (818) 279-8305 **Studio Op:** [X] Verizon	**SPID # 1:** 909-630-0784-0101 **SPID # 2:** 909-630-0785-0101 **Order #:** 5740811 **Tx Protocol:** AAC-LD Stereo **Rx Protocol:** AAC-LD Stereo **Data Rate:** 64/32
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Remote Information – Clear and Complete

Let's talk about that. The mainstay of many remotes have been ISDN lines. ISDN lines take time to order and to get installed. The phone company has rules and they can be firm in enforcing them. Occasionally, telco does come through with an heroic effort to get lines in at the last minute, (and I hope you send flowers or something fun to the phone people when they do this) but most of the time their hands are tied. So the engineers aren't trying to be difficult; we just live with this limitation. So does every other station in the market using ISDN lines.

Aside from the phone lines, there are cables that need to be counted, batteries to replace, PA systems to be checked out, and remote gear to be gone through. All details to be covered, and that we need to know about ahead of time. These are more reasons the technical people don't get to just jump in a van and take off.

Put it in Writing:

I have huge faith in filling out forms to pass critical information. Written instructions are reliable and they don't change on a whim. Their only downside is that you can't be sure everyone that needs them has them.

A way around this is setting up web pages where the different people responsible for remotes can fill them out themselves. And best of all is a website accessible to anyone that wants the information. If you're out at a shopping mall trying to set up an ISDN line, and telco left the SPID numbers off the tag, it's easy to log into the web site and see what they are. The same page has all the contact info for the venue; names, phone numbers, everything you could want to make the remote go off easily.

KIIS Remotes / Events for June 2007

Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
					1	2 Beach Shack
3 Gibson Amph.	4	5	6	7	8 Seacrest 'PAIR' Party	9 Beach Shack Disneyland
10	11	12	13	14	15	16 Beach Shack
17 Universal	18	19	20	21	22	23 Beach Shack
24	25	26	27 Raging Waters	28	29	30 Beach Shack

The website we've used has a calendar showing all the remotes for each month. Clicking on a remote takes you to a page for that event, with all the details clearly displayed. It can be accessed with a simple password, and sderves as a center point to show cancellations, changes, and everything else that might catch staff members off guard.

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

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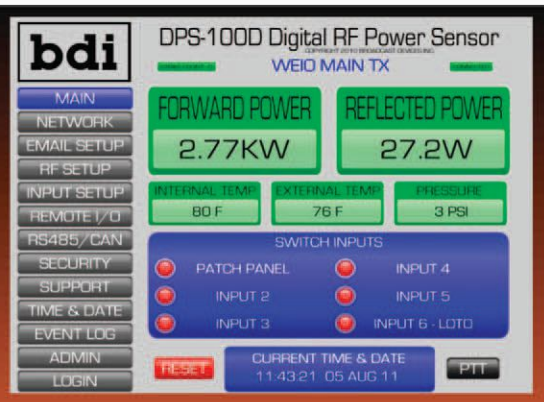

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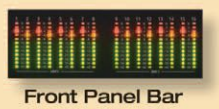

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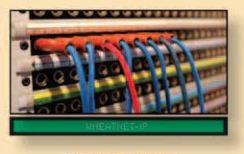

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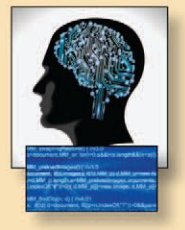

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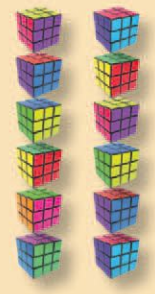

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WHEATNET-IP: THE INTELLIGENT NETWORK

Wheatstone

Chief Engineer

Constructing a Tower Light Controller

by Scott Schmeling

As Broadcast Engineers, one of the systems we maintain is tower lights. Most often, the maintenance involves having a tower crew climb the tower and change the bulbs, but sometimes the problem is in the controller. I had a little bit of both recently.

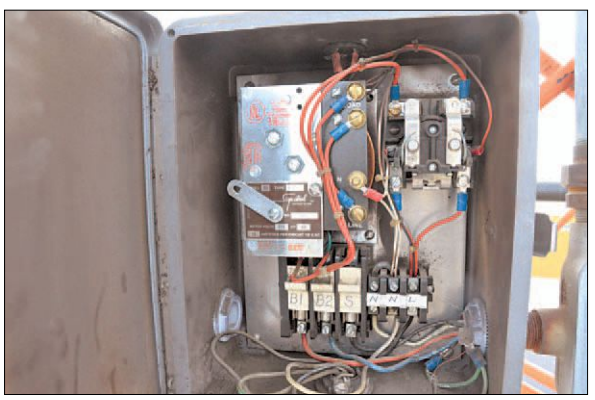
The controller for a red light (incandescent) tower consists of three parts; a photocell to turn the system on at dusk and off at dawn, a relay (controlled by the photocell), and something to make the beacons flash. Most of my light controllers are solid state, but one is an older, motor-driven model, that had given me two issues in the past. Once, the motor stopped turning (and the beacons stopped flashing). A little spray of lubricant and a hand spin, and it was working again. The other issue took a little more to fix. The middle beacon was not flashing, and after verifying that the bulbs were good, I put my meter on the terminals and found no voltage.

I had to physically remove the controller unit and take it inside to work on it. I found that the contacts for the middle beacon were severely pitted. I disassembled the unit so I could get to the contacts, and cleaned them with a wire brush and some solvent. I reassembled the whole thing, and tested it on the bench – then took it back out to the tower and put it back in the controller box. All was good again ... at least for a couple years.

Let me interject one thing here. When given the choice, I much prefer having the lighting controller mounted inside with the photocell outside. I have some tower-mounted units that are far enough off the ground that I either need a ladder or a climbing belt to work on them. Even when you're just a few feet off the ground, it can be very tricky handling your meter and/or replacing parts – especially when hardware falls to the ground, as it almost always does. And who wants to climb up during bad weather? Yes, mounting the controller *inside* gets my vote every time!

OK, back to the issue at hand. This controller started giving me grief again and I decided rather than repairing it again, it was time to replace it – *and* move it inside! I made a quick call to my favorite vender and found that the minimum price for a new controller would be roughly $1,100. The new controllers include current sensing relays to provide a failure indication, but I didn't need that because I have a current sensor with my remote control. All I wanted or needed was something to duplicate the functionality of the failing unit. So I decided to build one myself!

This tower had two beacons, plus two sets of side obstruction lights, fed from a 20 Amp, 120 Volt breaker. The new controller needed a relay with a 120 Volt coil, a photo cell, two flasher modules (one for each beacon), fuse holders, 20 Amp fuses, and terminal strips to connect the power wiring. I checked my spare parts box and found that I had the two flashers I needed, but the relays I had were 220 Volt coil instead of 120. I ordered the parts I needed.



Original Controller

The tower was roughly ten feet from the back wall of the building, and a piece of 1/2-inch conduit carried the wiring to the controller. I replaced that conduit with a ten-foot piece of 3/4-inch – a larger conduit was needed because we needed more wires! We ran four #10's (beacon #1, beacon #2, side markers and a ground), three #14's for the photo cell, and one #8 for the neutral. I figured the total distance from the tower to the controller (inside) would be close to 20 feet. When buying wire, I'm a firm believer in getting a little more than I need. I'd much rather have ten feet left over, than to have to go back into town and buy more – so I got 25 feet of each, in colors to match the existing color code.

(Continued on Page 28)

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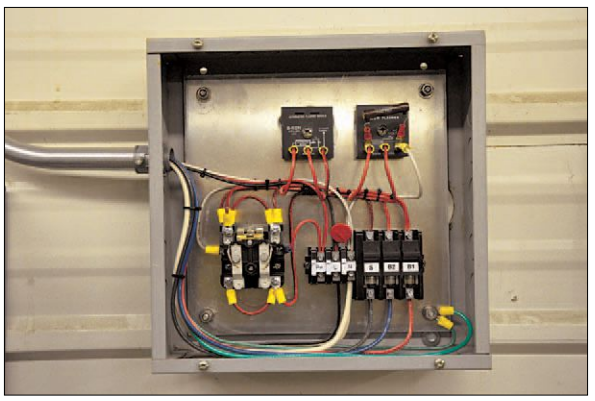
Chief Engineer

Constructing a Tower Light Controller

– Continued from Page 26 –

Once all the parts were on hand, I started putting it together. I already had a box to house the unit, but I wanted a good thick piece of aluminum to mount the components, and to act as a heat sink for the flasher modules. A local metal fabricator had 7/8" aluminum in stock, so I had a piece cut to fit. Next I laid out the components, positioning them for easy accessibility, and marked the location of the mounting screws. The next step was to drill and tap the holes for the mounting screws.

Speaking of tapping holes, I've discovered a wonderful time saver. In the past, when I was going to tap a hole, I would mark the spot with a center punch, find the proper size drill bit for the tap I would be using, drill a hole, and then cut the threads with the tap. Greenlee (and I imagine, other manufacturers) makes a combination Drill/Tap. They call it the D-Tap (for obvious reasons). I still mark the hole with a center punch, but now the D-Tap drills the proper size hole, cuts the threads and, if I want, it will cut the countersink; it can be used in a power screwdriver or drill. If you use a drill, be sure to go to your lowest speed so you don't strip the threads right away! You can find more information about the D-Tap bits at www.greenlee.com. Search for either "D-tap" or just "tap."



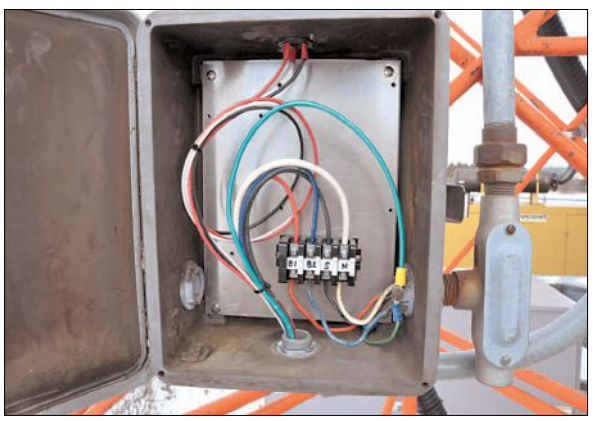
New Controller

Once all the components were mounted, I cut pieces of #12 stranded wire, crimped connectors, and started making connections. It took shape quickly, but then, there weren't that many parts to it. Now, in the interest of full disclosure, let me say I did not really design this circuit – I borrowed the design from units already in use.

When installation day arrived, I had a two-man tower crew. Jonathon climbed the tower and replaced all the bulbs, while Dave stayed on the ground and gave me a hand. We replaced that 1/2-inch conduit with 3/4-inch as mentioned earlier, then we connected some 3/4-inch from a junction box to the new controller. Finally, we pulled the wires.

I was able to trim and connect both ends of the wires while Dave and Jonathon went to lunch before heading back. If things didn't test well, I would call and they'd stop back. I didn't have to call them – my beacons were flashing and side markers were lighting.

After cleaning up I headed for home. It was close to sunset, so I looked at the tower as often as I could, as I drove away. Unfortunately, it was still too light outside to turn them on. I checked my remote control later for the "STATUS ON," then my wife and I took a little drive for a visual inspection. We got close enough to verify everything was lighting properly. I guess, in the world of Broadcast Engineering – that was a romantic ride!



Wiring Junction Box

Remember, to report a tower light failure, you now call Lockheed Martin in Texas, 877-487-6867. When prompted, enter your state. You will need your ASRN (Antenna Structure Registration Number). Be sure to get the initials of the person you reported the outage to, for entry into your log. And remember to call back when the lights have been fixed.

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

Scott will gladly send a diagram and parts list for the controller by e-mail, to anyone who wants it: scottschmeling@radiomankato.com

Power Principles

Commercial AC Power

by John Bredesen

Most Americans take electrical power reliability for granted. Reliability expectations and realizations continue to grow. However, because we, as broadcast professionals, depend so heavily on a constant, reliable supply of commercial power to do our jobs well, it's helpful to understand where our commercial power comes from and how it gets to your facility.

Commercial power is usually generated by one of four processes; 1. by burning oil, gas or coal; 2. nuclear fission, 3. hydroelectric, and 4, increasingly, from "green" sources such as photovoltaic cells and wind farms. The first process simply boils water and the steam is used to turn turbines connected to generators.

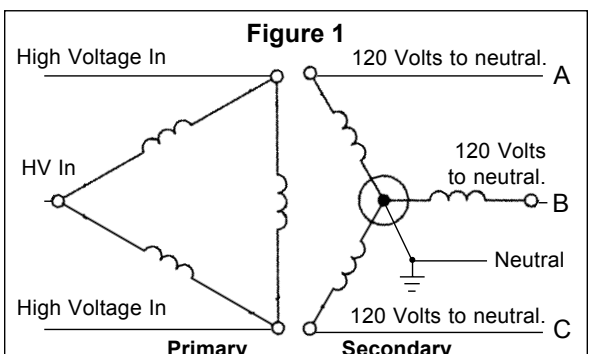
Some elements of nuclear based generation are the same, but instead of combustion as a source of heat, water is circulated through the hot core of a nuclear reactor. Again, steam is generated and used to spin the turbine. Hydroelectric generation uses the kinetic energy in falling water to directly turn a water turbine. Some areas of the country are beginning to see increasing amounts of electricity generated by wind turbines and by huge photovoltaic cell installations.

Electricity generated in large facilities is always three-phase. When the power leaves the generating plant, it's stepped up to 115 kV or above to minimize I^2R transmission line losses. A technology being used more and more for transmitting huge amounts of energy (in some cases, Gigawatts) for long distances, is the use of super high voltage DC, sometimes as high as 800 kV. Three-phase power from the source is rectified and then is reconstituted back to AC at the load end

Regardless of the transmission method, when the lines reach a substation serving a community, voltage is reduced to an intermediate level of 60 or 115 kV for distribution to smaller substations. Switching of sources occurs at this level to patch around problems and assure continuity. Voltages will be further lowered to about 12 kV or lower for distribution in an area of the city.

Utilities place voltage-controlling regulators in these lines and further distribution switching will occur at this level. From there, it's transformed to the voltage needed by the end user using the very familiar transformers, either pole-mounted or pad mounted on the ground. Usually this is three-phase with the exception of distribution to areas such as residential neighborhoods where only single-phase power is usually needed.

Figure 1

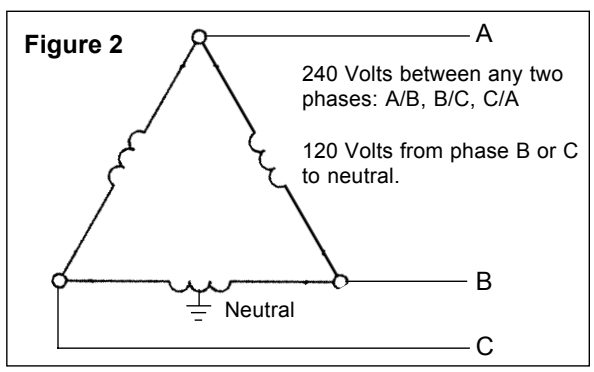


208 Volts between any two phases: A/B, B/C, C/A

You, the end user, will generally be confronted with one of two configurations of three-phase power coming into the transmitter building. One is referred to as a Delta and the other a Wye connection. Both are widely used, with new construction favoring the Delta-Wye system, where the high voltage primary is connected in Delta and the secondary a Wye ("Y") configuration as shown in **Figure #1**.

If we look at the secondary "Y" connection, we see it provides 208 Volts, three-phase, along with 120 Volts, single phase. The secondary of the transformer can also be configured as a Delta, **Figure #2** (primary not shown), providing 240 Volts, 3 phase, and 120 Volts, single phase. Note also with the Delta that 120 Volt connections can only be made on one phase (B to neutral and C to neutral), and that there is a so-called "wild" leg or phase with an elevated voltage relative to the neutral connection. **In Figure #2**, that's the "A" leg.

Figure 2



A doubling of these voltages can be used in cases of very high power installations such as 50 kW AM, where a "Y" secondary will provide 480 volts, phase-to-phase and 277 volts from any one phase to neutral. A Delta configuration will supply just 480 volts. These voltages are also commonly used in large commercial and industrial applications. Note that neither of these configurations supply 120 volts.

(Continued on Page 32)

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Commercial AC Power

– Continued from Page 30 –

Where 480/277 volt power is used, there will usually be a separate station owned step-down transformer inside the building to derive 120/240 volts.

Open Delta

Utilities will often provide three-phase power using an Open-Delta arrangement shown in **Figure 3**, with the arrangement providing the same nominal voltages as the closed Delta. The reasons for using the Open-Delta configuration are almost always economic, because only two transformers are needed instead of three. Although there are transmitter installations operating with the Open-Delta connection, it should be avoided if possible for a number of reasons.

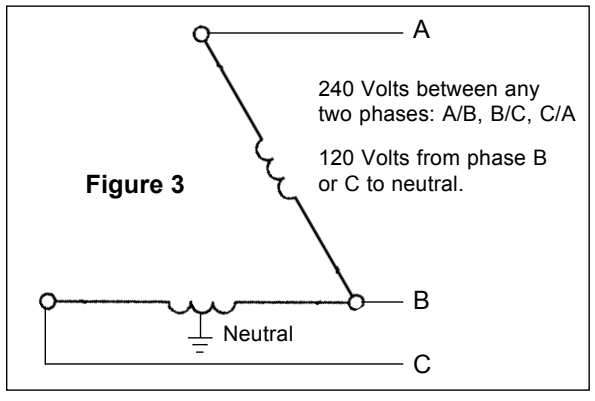

Figure 3

First, voltage regulation under a varying load is poorer than with either a Closed-Delta or a Wye configuration. Second, the configuration is more susceptible to transient pass-through from the primary. Third, there can be a significant third harmonic content as well as voltage and phase unbalance, resulting in the generation of ripple frequencies the transmitter filter section wasn't designed to handle.

Some manufacturers will not honor their warranty if their transmitter is operated on an Open-Delta system. If for reasons beyond your control you must use an Open-Delta supply, be sure to check with the transmitter manufacturer. It may be possible to use a Delta-Delta or Delta-Wye transformer between the utility's Open-Delta transformers and your transmitter, to approximate a Closed-Delta configuration. I've not had any firsthand experience with this approach, but I've heard of it being used with apparent success.

Overheating

A small voltage unbalance in a three-phase motor or transformer can result in overheating. One source indicates that a phase unbalance of 3.5% (7-8 volts in a 208/240 system) can result in a 25% increase in heat generated by a motor. Transformers will also overheat when subjected to these unbalanced conditions.

Regardless of the supply configuration, it's important to work with the power utility to obtain phase voltages as closely matched as possible. Problems associated with unbalanced voltages and phases aren't necessarily limited to the Open-Delta configuration.

Phase Converters

It's not unusual to be faced with the need to install a higher power transmitter with a requirement for three-phase current, at a remote site where only single-phase power is available. Phase converters are available which convert single phase power to three-phase and they come in two broad varieties; rotary and static.

The rotary converter, in its simplest form, is simply a single phase synchronous motor driving a three-phase generator. Modern rotary converters will look similar to a large motor, but without an external shaft. But beware, because some rotary converters have poor voltage and phase characteristics. If you go this route, make sure the rotary converter you're considering is acceptable to the transmitter manufacturer.

The conventional static converter that's been around for decades is unsuitable for transmitter operation because it doesn't really create three-phase power. It's use is to trick a three-phase motor into thinking it's receiving polyphase power.

A contemporary design for a "static" phase converter is based on modern solid state electronics. Much as a common battery-operated power inverter creates a 60 Hz single phase source, it's possible to create a three-phase converter that operates from single-phase power by using a microprocessor and an inverter to create the "third leg."

Here's the URL for an interesting white paper on the subject: www.phasetechnologies.com/phaseperfect/files/phasewhitepaper.pdf It's mostly directed to operation of large three-phase motors, but many of the same principles would apply to a three-phase transmitter. In every case, however, be sure to check with the transmitter manufacturer before committing to a given converter, which is the case anytime you're faced with an unusual power source situation.

In spite of the problems you read about, describing brownouts and power failures, this country has a good record of supplying reliable electrical energy. Usually several organizations are involved in bringing the power to your electrical meter. What happens after the meter is largely up to you, and sometimes it's not a trivial situation. If you're not exactly sure of what you're doing, hire a good electrical contractor or consultant to help you.

John Bredesen is an engineer with NPR station KLCC in Eugene, OR. He "retired" as CE of the station several years ago, but finds it challenging and fulfilling to stay involved as the industry moves more completely into the digital era.

From the Ground Up

VBN – Veteran's Broadcasting Network Creating a New Radio Network in Today's World

by Mark Shander

Imagine it's 20 or 30 years ago, and a new radio network is about to start up. The competition then was still made up mostly of the core groups of broadcasting companies, and America looked up to those giants of the talent pool to bring them the stories they trusted.

Fast-forward 20 or 30 years, and the world has changed. Mobile device, PC's, and the Internet now give individuals and groups the power of the world's mainstream media. Information routinely distributed by people who have no corporate entities behind them, is many times turned to for the "real truth traditional broadcast journalism won't tell you."

America's Veterans are still experiencing some of the same issues they found themselves facing 20 to 30 years ago. Except now, they just might have their own network – and their own voice. The "Voice of Veterans" (www.thevoiceofveterans.com) is where VBN America began.

Vernon Bagley is a military Veteran who served as a military officer. His "Voice of Veterans" program is unique in a flood of programs vying to serve Veterans, and bring their issues to light. It was developed to help enable Veterans, who are in many cases having difficulty transitioning back to civilian life, to become active members of society again.

Vernon Bagley is the host of "Voice of Veterans" on "Arizona's News/Talk 1260 and 96.1FM" in Phoenix. KBSZ brokers programming for a few hours on weekends.

In earlier days, broadcast stations required huge investments in equipment. Although the costs are less with equivalent equipment today, the same issues that plagued studios back then, still tend to show up.

The VBN network has two primary recurring technical issues. The first is with the primary broadcast studio/master control facility, and the second occurs when transporting the equipment out of the studio for remotes.

Because much of the equipment is inherited (or donated), the opportunity to chose specific pieces of gear isn't always there. However, the requirement for broadcast-quality sound is always there, so connecting equipment and making sure it sounds good is a full-time job. At least it's expected to grow into one.

The host mic in the talk studio is a Shure SM-7. At one time, the mic had been a Shure SM-5 with a unique windscreen, but that mic was provided by a volunteer who took the mic with him when he stopped participating in the network. The biggest challenge with the transition from the SM-5 to the SM-7 was that the mic preamp used for the SM-5 was modified for the mic itself. Several people pushed to get it restored and repaired. It also had been rewired numerous times, and was held together by questionable solder connections.

The SM-5 mic originally lacked punch, but that problem was fixed with an audio control channel with a Valley People Dyna-mite. This unit had great limiting and compression available – the peak setting, combined with the warm, rich sound of the SM-5, sounded even more robust, and much of the early programming had host audio that sounded especially "announcer-like." However, there was a big difference between host and guest sound, and guests sounded thin.

The replacement Shure SM-7 more closely matched the Sennheiser MD-421's and Shure SM-58's that made up the remaining mics in the studio. With the new SM-7 in the host position, and the MD-421's at co-host and initial guest position, the SM-58's were more for occasional use only.

The hosts, who had become very happy with the fat sound, and the difference between their mics and the others, insisted on something to differentiate again.

(Continued on Page 36)

From the Ground Up

– Continued from Page 34 –

While it would have been preferred to have the mics match even more closely, the SM-7 and a new Aphex voice control was assigned its own channel on the Arrakis console, while the remaining mics were put though preamps and sub-mixed before the Arrakis with an inexpensive Behringer production mixer, and Behringer compressor with limiting. The output of the entire console goes through an Aphex Compellor, which then goes to the STL. At the transmitter site, the STL receiver goes to an Orban 9100A processor that is set aggressively for talk. The deficiencies of the STL are fairly well hidden from the listening audience, as the overall product sounds very usable and listenable – and the hosts are happy again.

The studios shown in the following photo are part of the Fountain Hills Community Radio station owned by Dennis Contino, former town councilman. The broadcasts reach a speculated 50-55,000 people in the metro-Phoenix area, Saturday afternoons over KBSZ 1260 AM and FM translator 96.1 FM, as well through a video stream and soon-to-launch leased terrestrial broadcast channel in Phoenix.

For the past few months, the show has left the confines of the radio station's news-talk studio and control room facility, and is always traveling or broadcasting from another location by doing a formal, permanent live remote. This serves two purposes. First, it allows Bagley, his co-hosts, and other program hosts on his new VBN America Network, to become their own entity, away from their flagship station. Many of his hosts and co-hosts are radio or TV personalities either in Phoenix, or have some national broadcast journalism recognition.

VBN America programming broadcasting live from their "second home" studios in Fountain Hills AZ, at Discover Mobility, a large scooter, power chair, custom golf cart and assisted living product retail store.

Finally, it also allows them to begin the task of creating a new radio presence in Fountain Hills, Arizona, where they have in service an older broadcast Codec, sending the mono audio voice mix between 11-15K, over POTS to the station's rack-mounted receiver. It goes to show that, even in a major market like Phoenix, the "Wizard of Oz" engineering philosophy of "don't look behind the curtain" can still be responsible for a market-competitive sound.

Of course, having a couple of engineering-savvy people available to call on helps as well. Bagley also has a fair amount of radio and television production experience of his own to draw from, having distributed and syndicated programming for satellite-delivered radio and TV networks in the past. The additional benefit that VBN America has is that it can pack up its gear and set up for a live remote at almost any location.

VBN America's primary mobile studio moved to Chandler, Arizona the first weekend in March for "A Taste of Greece," celebrating Greek Heritage, dancing, music, food and entertainment.

The audio and video equipment (including DV and HD cameras not pictured), allowed for live broadcasts, streaming 24/7, to show people what they're missing. A feed was sent to a second PA area, so people in the dining area could participate and hear the show – and the Greek music or band when the show was in replay.

In the mean time, a small group of dedicated people enjoy what has been a very cozy facility and a very comfortable, familiar equipment configuration to work with.

It's just exciting for us all to watch, and I'm sure if you'd like to contribute or participate, Mr. Bagley would appreciate your service to their listeners, whether it's military or civilian. And as he ends every break and every show – "We will see you on the other side!"

Mark may be reached at: markshander@yahoo.com

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Transmission Topics

A Working Retirement

by Leo Ashcraft

As many who follow this column know, I recently retired. I looked forward to taking some relaxation time and enjoying myself, as I ease myself into the older years of my life. I planned to open a restaurant, which is still in the works. I intended to continue to help the LPFM service as an advisor/consultant to make sure it stayed on track. I've made great progress in detaching myself from many of the day-to-day activities of Nexus Broadcast and the Conexus LPFM Advocacy. Dustin Williams and John Guiteress have taken the reigns at Nexus Broadcast, while Gene Rowley and Alan Mccall are operating Conexus.

So, with these very capable people taking over my babies, I set off for vacation to sunny Florida! In the meantime, as always seems the case, someone began calling me for help. They had installed their directional antenna system without our help or guidance, and suddenly had given up on trying to do it themselves – they wanted someone down there pronto! Off went Dustin from Nebraska, to help this fellow put his mess of an antenna system back together.

Leo the "Shrink"

This story simply began with a guy who had purchased his equipment from someone else, at a total savings of about $500. Additionally, he found that if he used local guys that would climb the tower for him and "install" the antennas, he could save thousands of dollars. So off he went. hiring these local guys – surely, if they had the nerve to climb the tower, they must have the brains to install those antennas?

I didn't hear from him for a few months, until just recently. He had chosen to purchase the equipment elsewhere and hire someone else to install it. Unfortunately, those "someones" didn't support the products after the sale, so he decided to call me – the guy that he *didn't* spend any money with – for after the sale support! I felt sorry for him, as I often do for someone in his position. I don't understand the mentality that expects consulting services from a consultant, for free. It's like going to a psychiatrist and not expecting to pay for the time you spend with them. After you read this story I am about to tell you, you'll see why I sometimes do feel like a "shrink."

Now ... the Rest of The Story

The client told me his signal was good out to about 25 miles in one direction, but not very good in a different direction that he wanted to cover. I explained this was a very good signal for a 1 kW directional FM at 100 feet HAAT. But he insisted he should have a better signal out in this other direction, which happened to be the *null* of the directional system. I told him about the illegalities of removing the parasitic elements, which might resolve the signal problems in the null. He insisted this was the way he wanted to go and suggested that we put up fiberglass rods in place of the metal parasitics. I advised him that this would likely be obvious from the ground, so he suggested painting them. I then explained to him, once *again,* of the *illegal* nature of these modifications and their consequences.

He called back in a week and reported that he had removed the parasitics and replaced them with painted fiberglass rods, but the range had not improved in the direction he desired. He indicated that the reflected power had only increased slightly, which was a concern for me, as removing these parasitics should have created an issue. I asked him if he had someone retune the antennas to compensate for the removal of the parasitics; he had not. So, again, the minimal increase in reflected power perplexed me.

He mentioned that the fiberglass rods looked just like the real metal rods that they had replaced. That got me to thinking about the type of paint he may have used. It turned out that, not only had he used primer, but he followed that

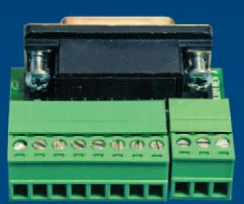
(Continued on Page 40)

Offering Solutions

Mixer Buddy

COP-2

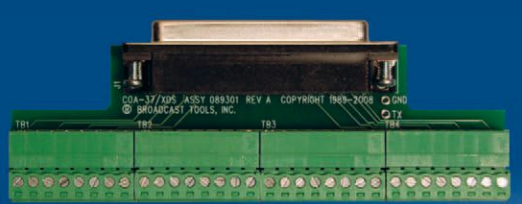
COP-3



COA-15 MAX

COA-9 XDS/MAX

Switcher *Sentinel*® 3»Web



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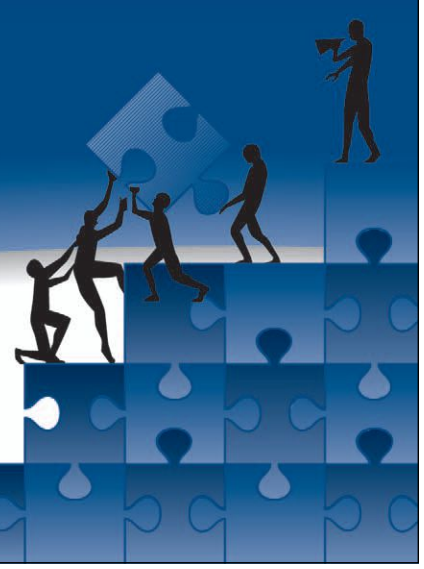

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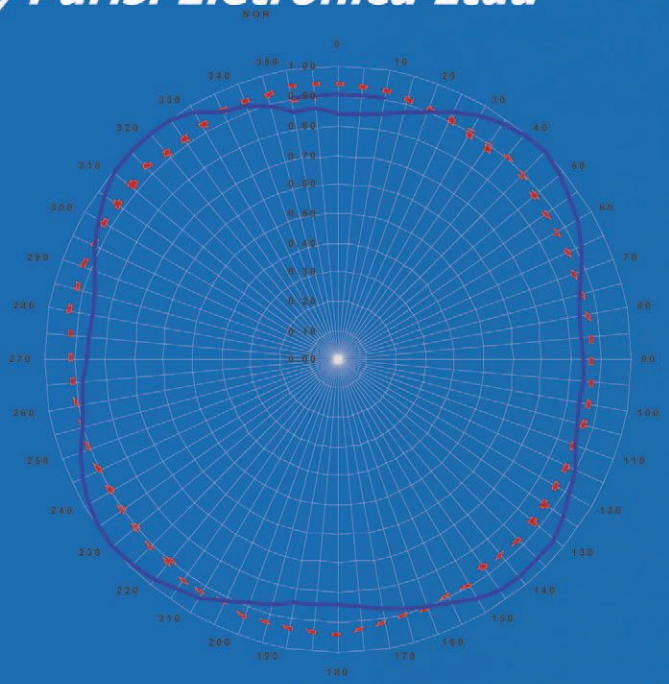

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Transmission Topics

A Working Retirement

– Continued from Page 38 –

with aluminum paint! So this explained why the signal and the reflected power had changed very little. He had replaced the solid metal parasitics with a sort of aluminum-plated fiberglass rod!

Finally, he removed the parasitics completely, and the reflected power increased as expected. Of course the signal didn't improve much, as the antenna was still tuned for the parasitics – I could not get across to him why it would make a difference if it was not properly tuned.

Next he told me that one of the antennas seemed to be bent and was angling outward – not lined up with the other antenna. He swears the box was not damaged in shipping and the antennas were not dropped at any point. This was a free-standing tower, which tapered smaller toward the top. It became obvious to me that the "bent" antenna was intended to compensate for this slight angle. But even this slight angle, though, wouldn't have caused the severity of the issues the client was experiencing.

However, the client had reversed the antennas, even though he continued to claim he had followed the manufacturer's instructions exactly! But it was an indication that the customer had no business installing this antenna system and further problems were likely to be discovered.

Under Pressure – Dustin On The Scene

With Dustin on the scene, his first observation was that the 1-5/8" line was not pressurized! This was very important for this antenna system, especially since the location was susceptible to a large amount of corrosion due to its locality. Pressurization with nitrogen is very important, as a positive pressure keeps out moisture and corrosives in the air from entering your line. If there is constant pressure from inside the line, nothing can get into it. The nitrogen further insures that no moisture will enter the line from the pressure source – anytime an air-dielectric coax is used, it should be pressurized.

The instructions for this FM antenna system clearly stated that the line was to be pressurized, and even specified the pressure required. The customer apparently felt that this was not important, since he would have had to purchase the nitrogen tank and regulator. Again, trying to save money, without the education to back his decision, had now cost him even more money.

Dustin is still in the field as I write this, so we don't know the full details. He will be pulling down the entire antenna system to inspect it for corrosion and other damage. Personally I suspect that one of the antennas is actually upside down. This is highly possible since the *entire* antenna system is currently upside down! So much for following the instructions to a "T."

Once Dustin has fully inspected the system, and reinstalled it with the original metal parasitics, we expect the system to respond properly with enough radiation in the customer's desired area, to work well enough for his needs. We'll update you on the progress of this station in a future article in ***Radio Guide.***

Qualified = Quality

This story accentuates the need to hire properly trained broadcast engineers to install, upgrade, or maintain your radio or television equipment. Trying to saving a few bucks with inexperienced people generally won't save you any money at all, and clearly, by our example, quite the opposite. In an effort to save money, our client not only paid an unqualified person to initially install the antenna system, but is now is paying the full rate he would have paid the first time to get it right. Additionally, using the wrong people, or doing it yourself, can expose you to severe FCC sanctions and even license revocation. So if you really want to save money, take the time to find experienced and qualified people to help you.

But now back to my retirement. As you can see I am still quite busy in a consulting/advisory basis for clients, while also assisting Dustin and John. I keep my hand in things – especially engineering – as it's difficult for me to let go. I have been working more since my retirement "announcement" than before, it seems. But as I write this article today from my hotel room, listening to the waves caress the warm sands of this Florida beach, I think back on the many years of serving our wonderful customers, and realize I wouldn't be sitting here enjoying this life without them. For that, my friends, I thank you!

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

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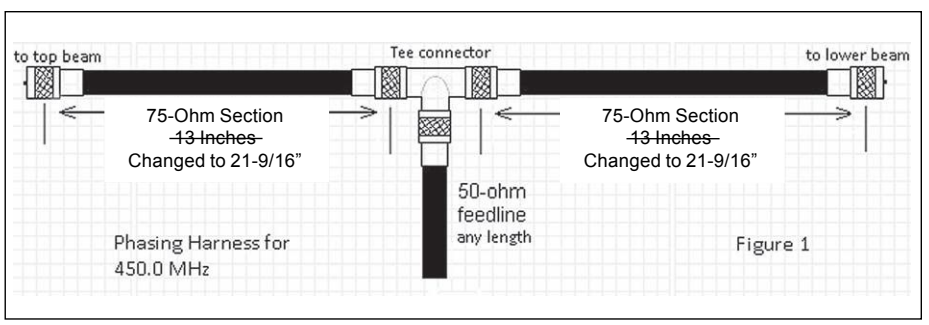
Small Market Guide

Two is Better Than One – *Part 2*

by Roger Paskvan

In our last issue, we outlined the theory and calculations for a phasing harness, to couple two Marti beam antennas together. In this second installment, we will explain how to construct that harness. From part one, we multiplied the quarter wave 4.32" by a multiple of three (4.32" x 3 = 12.96"). Thirteen inches was our magic number for a 3/4-wave of coax cable to inter-connect between the two beams. After looking at the 25 inch spacing between the two beam antennas, it becomes apparent that two 13 inch pieces will be exactly 26 inches between antennas. You might get lucky and the coax will reach the feed point connectors, but that could be a tough stretch. A better approach would be to use a multiplier of five instead of the three. Remember, any odd multiple will exhibit the same characteristics we want. (4.32" x 5 = 21.6") This becomes 21-9/16" on each side of the "tee" connector. The total coax will now be 43.2" long and there will be plenty of extra coax. (See Figure-1)



You now have to cut two identical pieces of 75 ohm coax (Beldon 8241) and install type "N" connectors on four ends. The 21.6 inches must be measured from the end of the connector center conductor to the end of the other "N" connector center conductor. If you get the connectors soldered and the final measurement is too short or too long, start over. You are finished when you have two equal coax segments, measured from center conductor to center conductor on each end. They should be 21-9/16 inches each.

Now assemble the harness as in Figure-1. The feed line will connect in the center of the "tee" and the two ends will connect to your Yagi beam antenna feed points. From part one of this article, the beams should have been mounted 26 inches apart on the tower, and the extra coax is taped to the pipe between the beams. The line to the Marti unit connects to this center of the "tee." Use some good quality RG 214 or Heliax from the antenna "tee" to the Marti unit. Why go through this much effort to double the signal at the antenna and then lose it all in cheap lossy coax to the Marti?

When you are finished, the two beams will be combining signals together, thus providing near 3 dB of actual gain. The quarter wave transformer that you just constructed is basically an impedance doubler. The top beam antenna has 50 ohm impedance; the quarter wave transformer multiplies the 50 Ohms times two, providing 100 Ohms at the "tee connector. The lower 50 Ohm antenna also multiplies its 50 Ohms to 100 Ohms at the lower end of the "tee." We now have two 100 Ohm "resistors" in parallel, and the "tee" output is therefore 50 ohms. This works great, but only at the cut frequency or a narrow frequency range on each side of your Marti channel. If you use your Marti from a number of locations, a tower rotor will point the beams in the direction of maximum signal. (See Figure 2)

Figure 2 – Beams on Tower

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

Service Guide Radio Equipment Products and Services

Service Guide Radio Equipment Products and Services

Telos Z/IP ONE Codec

Z/IP ONE, one of the Telos Zephyr family of codecs, is a slim, affordable 1RU device that's designed to deliver the best possible quality remote broadcasts using public IP networks and mobile phone data services – even from connections behind NATs and firewalls.

Z/IP ONE AoIP codecs are EBU N/ACIP compliant and support the SIP (Session Initiation Protocol) standard, which enables Z/IP ONE to connect to a variety of VoIP devices. Z/IP ONE gives broadcasters incredible connection flexibility; they can connect to IP networks using a traditional wired connection, or via EVDO, UMTS or Wi-Fi – each Z/IP ONE ships with a matched WiFi modem stick.

Broadcasters love the sound of Z/IP ONE remotes. Dave Barnett, Chief Engineer of KVMR in Nevada City, California, recently wrote that, "Z/IP ONE has allowed us to improve the audio quality, reduce the cost, and expand the available locations for our live remotes ... after over 20 years of live remote broadcasts I can confidently say that this little box is probably the most impressive thing anyone around here has ever heard."

Telos' exclusive Agile Connection Technology (ACT) is the foundation for the Z/IP's excellent performance. Z/IP ONE's ACT routines monitor IP network conditions and adapt dynamically to minimize the effects of packet loss and jitter, maintaining your connection regardless of network bandwidth fluctuations. If network congestion occurs, ACT automatically adjusts the bit rate of your selected codec. The result is excellent fidelity at low bitrates, with nearly inaudible loss concealment and very little delay.

And this happens without user intervention – no fiddling with settings while you're on-air.

Telos uses genuine Fraunhofer MPEG codecs in all of its Zephyr products, and Z/IP ONE has the industry's largest choice of high-performance FhG codecs, including AAC-HE, AAC-LD, MPEG Layer 2, MPEG 4 AAC LC, MPEG 2 AAC LC, G.711, G.722, linear PCM, plus a new codec based on Advanced Audio Coding-Enhanced Low Delay (AAC-ELD) that delivers exceptional fidelity at low bitrates. Coupled with ACT, this wide array of coding choices enables Z/IP ONE to deliver exceptional performance on real-world IP networks.

Z/IP ONE also helps users deal with troublesome corporate firewalls and NATs (Network Address Translation layers) via its complimentary Telos Z/IP Server service. Hosted by Telos, Z/IP Server is a worldwide registry and presence server for all Z/IP ONE codecs; it also helps Z/IP ONE detect whether it is installed behind a NAT. If it is, the Z/IP ONE determines the type of NAT and configures itself accordingly, enabling the codec to accept calls from outside without requiring special configuration changes to your NAT. All of which makes connecting to another Z/IP ONE as simple as finding your target in the onscreen list and pressing "Connect."

Getting audio in and out of Z/IP ONE is easy: analog I/O is presented on professional, balanced XLR connections. Livewire™ I/O is also standard, enabling quick one-cable hookup to Axia networks. Dual Ethernet ports are provided for LAN and WAN connections – essential for keeping your local network separate from the outside world. A transparent RS-232 channel and an 8-bit parallel GPIO port round out Z/IP ONE's remote toolkit.

Z/IP ONE setup is easy, with intuitive front panel controls that make fast work of remote field connections. There's also a built-in HTTP server; connect to Z/IP ONE with a PC and browser for initial setup or remote configuration and diagnostics. Other features include IPv6 support, SNMP, automatic redial options, enhanced Wi-Fi monitoring tools, and a "Router Mode" that allows Z/IP ONE to act as a router between the LAN and WAN interfaces – perfect for connecting laptops or other networked gear where only one IP drop is available.

Telos is the world leader for broadcast codecs, with over 20,000 Zephyr ISDN and IP codecs in use around the world.

For more information about Z/IP ONE, visit:
www.Telos-Systems.com/zip-one/

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

2013 NAB Spring Show
April 6-11, 2013
Las Vegas Convention Center, Nevada
www.nabshow.com

Texas Association of Broadcasters (TAB)
August 7-8, 2013
Austin, Texas
www.tab.org/convention-and-trade-show

2013 NAB Radio Show
September 18-20, 2013
Orlando, Florida
www.radioshowweb.com

SBE 22 Broadcast and Technology Expo
September 25, 2013
Tuning Stone Resort and Casino, Verona, New York
www.sbe22expo.org

WBA Broadcasters Clinic
October 8-10, 2013
Middleton, Wisconsin
www.wi-broadcasters.org

135th AES Convention
October 17-20, 2013
Javits Center, New York
http://www.aes.org/events/135/

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