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DISTRIBUTION, ANALOG & DIGITAL

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Radio Waves

by Ray Topp – Publisher

In This Issue

• In *Studio Site,* George Zahn investigates some of the built-in equalizers found in audio editing software.

• In our new *Tech Management* column, Tom Bosscher reveals how the engineering department can become a revenue producer.

• You know what you do – but does your manager? In *Chief Engineer,* Steve Callahan gives us some tips on improving the station's perception and value of the Chief.

• Does the recent Supreme Court ruling on indecency just affect morning zoos, shock jocks and wisecracking celebrities? Not necessarily. Peter Gutmann helps you protect your station's liability in *FCC Focus.*

• Are you prepared for a catastrophic loss of your studios? What would you do, where would you begin – and what should you do to prepare in the first place? Ernie Belanger gives you the answers in *Disaster Preparedness.*

• Rodents and snakes can be a hazardous presence on station property. In *Safety and Security,* Jeff Johnson provides important details on these critters.

• Engineering positions can be difficult to transition from one employee to another. Chris Tarr takes us through some of the potential pitfalls in *Operations Guide.*

• Scott Schmeling describes a few software programs he finds useful in his work, in *Tool Guide.*

• In *Practical Engineering,* Mike Callaghan provides details on implementing an effective directional RPU antenna system.

– Ray Topp, Publisher

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Dan Jackson, engineer for 92.9 FM in Perth, Australia was faced with a unique challenge. Breakfast hosts Paul Hogan and Lisa Fernandez would be cycling for hours in strong winds and pouring rain as part of the 92.9 Kids Appeal for Telethon.

The unique solution was to equip Dan's bike as a mobile production facility. The talent wore wireless mics AND in-the-ear monitors which communicated with receivers and transmitters in a rack bag on Dan's bike.

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Cover Story

TFT Inc.

Forty-Two Years of Innovation

by Ernie Belanger with Darryl Parker

I first became acquainted with TFT as I was transitioning from the field into broadcast equipment sales. I was invited to attend the annual sales meeting, at their Santa Clara California factory – that was back in 1987. Little did I know at that time that TFT was already building a rich history of cutting edge designs and a roster of satisfied customers.

Humble Beginnings

The company was founded as a Silicon Valley garage operation by Joe Wu in Sunnyvale, California. Originally from China, Joe immigrated to the U.S. as a teenager, acquired an education in Illinois, received an undergraduate E.E. degree from Purdue University, and later a degree from the Chicago Institute of Technology.

While at Purdue, Joe learned about "frequency synthesis," and applied this knowledge in a series of engineering positions, one of which landed him in California. About this same time, the FCC had relaxed engineering operations requirements for television stations. Previously, the Commission's Rules required that an engineer be present at the transmitter site when any television transmitter was radiating energy. This requirement necessitated a staff of engineers just to man the transmitter site.

A TV Beginning

Television transmitting equipment had matured to the point of being very stable, and required a minimum of maintenance. So bowing to pressure from the television industry, the Commission eliminated the transmitter operator requirement, with one caveat – that stations should observe the frequencies of the visual and aural transmitters and the modulation level of the aural carrier. There was no equipment yet developed to meet this requirement: monitoring from a remote control point. With the rule change, it struck Joe that this would be an ideal application of frequency synthesis he had learned back at Purdue.

Joe designed and built a self-contained instrument that could be connected to an antenna and would measure the required parameters. The Model 701 was designed and built in Joe's garage. Later, after the company incorporated in 1970 and moved into a much larger facility in Santa Clara, enough 701s and 702s were produced to supply over 85% of the television stations in the country. This simple innovation gave television stations the boost they needed to expand their operations, conserve their personnel and assign engineers to more productive tasks.

Moving to Radio

With the success of the television modulation and frequency monitors, TFT looked for similar applications in the broadcast industry for this same technology. The natural extensions were to FM and AM broadcast stations, so Joe led design teams to develop a series of both AM and FM modulation monitors, some of which are still in use today more than 37 years later.

In the development of the FM modulation monitor line, TFT took on the task of measuring modulation deviation in the presence of multipath. A pulse modulation duration differentiator was added to the pulse counting discriminator in a TFT monitor that would ignore peaks of relatively short duration that manifested themselves as over-modulation indications in the far field.

Today, TFT modulation monitors can be found in more than 60 countries throughout the world.

Remote Controls and STLs

The next chapter in TFT's history was driven by the industry's need for remote control equipment, that would monitor, alarm and control a transmitter site from a distant location. The TFT 7610 and 7900 series of products appeared at many stations. A version was even developed for satellite control of remote sites.

When composite Studio-to-Transmitter links (STLs) became popular, TFT designed a line of transmitters and receivers for this special application. The STL line has undergone many changes over the years as technology in Silicon Valley provided better devices for the aircraft and cellular telephone markets.

TFT patented the first IF repeating STL system, which reduced noise and distortion by keeping a radio station's signal path in the FM domain rather than de-modulation and re-modulating to baseband. The key component in the system was TFT's Reciter, which combined the functions of an STL receiver and repeating transmitter in the same chassis with an IF, rather than baseband, interface.

Syncronized FM Boosters

Driven to meet market needs, TFT's innovative design team developed one of the first systems for synchronizing broadcast FM transmitters in main and booster configurations. When two FM transmitters illuminate the same area, the two received signals differ in timing and content. The TFT booster system, based on the Reciter, locked the output frequencies of the main and booster system to the 19 kHz pilot of a composite FM signal.

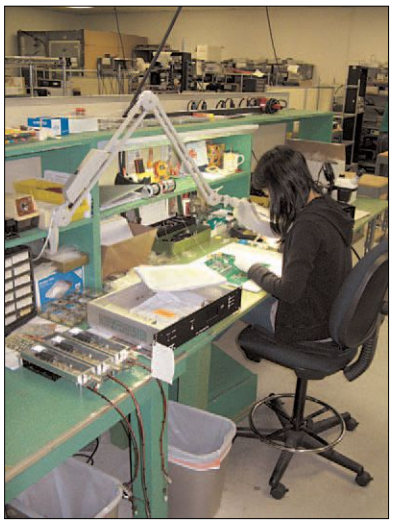
Because a single modulator in the STL transmitter simultaneously fed both the main and booster transmitters, the modulation components were in perfect coincidence and eliminated the hash from interference of upper ordered sidebands. An 8-bit digital delay in the 2.5 MHz IF in either the main or booster transmitter provided delay compensation to allow for the timing difference in the overlap signal area. In one instance in New Zealand, an enterprising broadcaster purchased one license for one frequency for the entire South Island.

A backbone STL repeater system dropped the signals into local communities, and a Reciter provided the FM output signal. All the transmitters were on the same frequency and provided continuous coverage as one would drive around the island. There was no need to change frequencies when moving from one transmitter's coverage area to another.

Frequency Agile RPU

Another innovative product developed at TFT was fostered by the company's sales channels. Distributors had asked for a full-featured remote pickup transmitter and companion receiver that was frequency agile, without the need for expensive crystals and retuning.

Distributors met at TFT in Santa Clara and laid out all the specifications for these two new products, models 8888 and 8889. "8888" is a lucky number, and that was considered as a good omen by TFT.



Small Board Assembly

A digital multiplexer and modem for analog STLs was designed and marketed in 1992 that gave analog composite STLs the ability to handle two pairs of AES/EBU signals, as stations began to consolidate their studio operations through multiple station ownership.

When digital STLs found their way into the market, TFT designed a totally uncompressed digital STL system that was capable of transporting six independent audio channels or three stereo pairs, discrete Left, Right or AES/EBU.

A History of Public Safety Equipment

In 1960, TFT began building receivers, encoders, and decoders for the then Emergency Broadcast System (EBS), the successor to CONELRAD. When the FCC began revamping the system in 1994, TFT was one of seven manufacturers to offer encoders and decoders for an FSK based system with analog distribution, as a part of the Emergency Alert System (EAS). TFT participated in field tests with the FCC in Denver and Baltimore.

When CAP (Common Alerting Protocol) came along in 2008, TFT made its third offering of equipment for distribution of emergency messages and is now working on a fourth generation for the future EAS program.

Wu Retires

In 1997 Joe Wu and his shareholders sold TFT to MTI, a Colorado-based holding company. Joe stayed on as Chief Engineer until he left the company two years later.

Since Joe's retirement, TFT has moved into a new modern facility in San Jose, California, the heart of Silicon Valley. Rather than a plant filled with rows of drafting tables and wave soldering equipment, TFT now sports many small assembly areas and Quality Assurance (QA) stations. The stock room still has well over 200,000 parts to support both new and old equipment. The old RF screen room that was in the original location has found a new home and usefulness at the San Jose facility.

TFT Has a Bright Future

Teams of test technicians, assembly personnel, and administrative staff keep the wheels turning at TFT, finding new ways to improve current products, and developing new products to meet the challenges and new demands of an ever changing broadcast marketplace. This can be seen as new and more innovative products are continuously brought to market.

Throughout its now almost fourty-three year history, TFT's continues to be driven to utilize innovative design to meet emerging market needs. TFT – a company built on the foundation of an idea called frequency synthesis.

For more information about the entire line of TFT products contact TFT at it's San Jose, Califrnia Headquarters. You may call at: 408-943-9323, email them at: marketing@tftinc.com or visit their web site at www.tftinc.com

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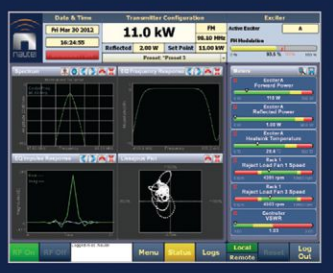

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FAQ: Frequency Asked Questions about EQ

by George Zahn

Whether it's adjusting the bass and treble on our car radio or chiseling out intelligibility of a vocal in a song's mix in studio, we all have experience with equalizers, but do we really understand the intricacies, or power, that an equalizer gives us? Let's examine the different flavors of EQ we have at our fingertips.

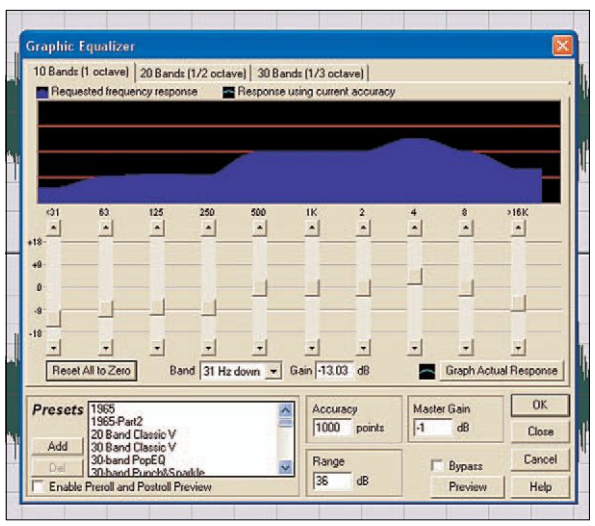
Simply put, an equalizer allows us to manipulate the volume (amplitude) at particular frequencies within the spectrum of roughly 30Hz-20kHz. Equalizers can be an outboard device or a built-in feature on a multi-channel console or a plug-in electronic extra in software audio programs. In the case of an external device, we likely have a user's manual. But a surprising number of people who use audio editing software never look at the effects menu that is often part of the software package itself, therefore missing some of the most useful features.

In short, the EQ is not just for fancy music recording studios or for critical PA situations. An equalizer can make the difference in making a sub-par microphone sound better, salvaging a news or field recording with unwanted audio artifacts, or just enhancing a recording for better broadcast quality.

The types of equalizers featured in software packages are analogous to the types we use as studio devices in many production rooms. We'll look at the two most common EQ formats: the graphic and parametric equalizers. The graphic is arguably the easiest to operate.

Let's Get Graphic

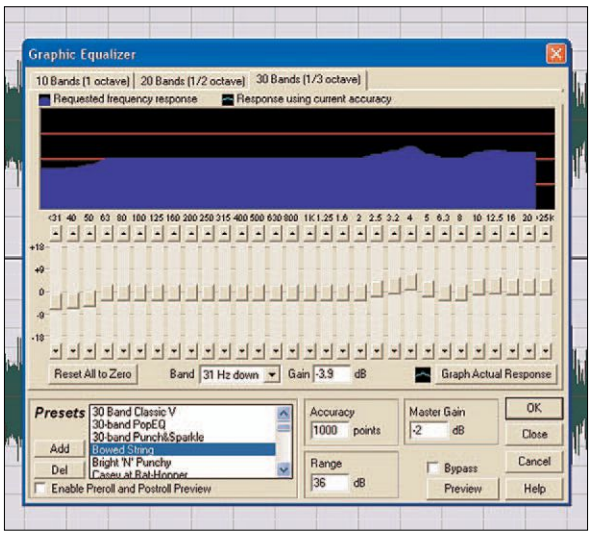
The graphic equalizer is appropriately named since it gives us a graphic representation of what we are doing to the frequency spectrum passing through the EQ – if you imagine frequency as left (bass) to right (treble) and the amplitude (volume) as the faders pulled up or down. Usually there are two banks of controls, one for left channel and one for right.



Software based, single-octave EQ.

The number of controls on the unit determines how much overall control you have. For instance, a single octave EQ gives you individual controls at roughly one-octave intervals, 31 Hz, 63Hz, 125 Hz, 250Hz, 500HZ, 1000Hz, 2000Hz, 4000Hz, 8000Hz and 16,000Hz. Each fader can adjust the volume of that "center" frequency up or down.

Want more control, but still use a graphic EQ? There are half-octave equalizers which allow 20 frequency points (31Hz, 45Hz, 63Hz, 90HZ, etc.), or even the more desirable third-octave units that split each octave into three parts (31Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 120Hz, etc.) The third octave gives you the most flexibility, since you have 30 controls, allowing you to zero in on problematic frequencies.



Software based, third-octave EQ.

The drawback of graphic equalizers is that we cannot control the frequencies adjacent to the center frequency – called bandwidth. The bandwidth for graphic EQs is set by the manufacturer on most all units, although Orban did make a hybrid graphic EQ that had adjustable bandwidths. On most graphic EQs, when you bring up 125 Hz on a single octave EQ, you're also dragging frequencies from about 90 Hz to 375 Hz along with it. The affectation is a bell-shaped curve with the center frequency being the most raised. A third octave EQ by comparison would have more narrow bandwidths.

Check It Yourself

If you use audio editing software, I challenge you to check out the effects, or dropdown menu, and see that you likely have more than one graphic EQ at your disposal. It's by far and away the most easy to use and understand equalizer.

But there are times when we need more precise control. Though not as user friendly, the parametric equalizer grants the user a virtually infinite amount of control. Here's the catch. By comparison, a new user might look at the parametric with the confusion I might have upon wandering into a jet cockpit. It's really not that difficult, and once you understand the unit, what you can do is pretty amazing.

On a parametric, we replace the nice graphic display with a series of control knobs. There may be anywhere from 4-5 controls on a cheaper unit, to 12 or more on upscale models. Each control has three knobs and generally a switch. The first knob and the switch work together. The knob ranges over a wide frequency range and allows us to select a center frequency (let's say 1000 HZ), the switch is a multiplier (x0.1, x1, or x10) which allows us to then make that center frequency 100HZ, 1,000Hz, or 10,000Hz, depending on the desired frequency.

The second knob allows us to change the bandwidth – once again, the adjacent frequencies being affected on either side of the center. The bandwidth control allows us to narrow the bell shape from the wide pattern inherent to a graphic, all the way down to nearly a notch at the center frequency. The third knob is simply a level boost or cut control, similar to the faders on the graphic.

Sample parametric EQ control.

All in all, the parametric will give you more options than you could have ever imagined if you only used a graphic. Imagine being able to reduce or eliminate some telephone hum or noise in an important interview. On a graphic, you may dramatically affect intelligibility because of the fixed bandwidth, but with a parametric you can hone in on the exact frequency or frequencies at issue, because of the variable bandwidth and selectable center frequency.

There are also Selective Variable EQs on multi-channel consoles found in some radio and TV studios and in sound reinforcement, but we can cover those in a future article. For now, the graphic and parametric EQs are some of the most common we'll find in radio studio processing and production. In many of the audio software products, you likely will have a parametric option as well, although the computer GUI for the parametric may be a bit different than the rack mounted parametrics you'll find, the tenets are still the same.

Shelf-ish Motives

Virtually all of the graphic EQs, and most of the parametric controls, are called peak-dip controls, meaning that they affect the aforementioned bell-shaped bandwidth. Some EQs will also provide you with "shelving" EQs which affect *all* frequencies above or below a certain frequency. For instance, a parametric might have a shelving EQ selector that would let you boost or cut everything below a bass frequency or above a treble frequency. This allows us to boost or cut at either end of the frequency spectrum without using a number of extra individual controls.

Here are some really useful frequency settings to know if you're trying to enhance audio with an equalizer. If you're trying to enhance sibilance (S or T sounds) on a recording that's mushy, try a slight boost at about 4 kHz. Likewise, someone with hissing S sounds could use some attenuation at that frequency.

Want to fix a popped P? In software, just highlight the Popped P, and shelve out the frequencies from about 200 Hz and lower. If you do that on the whole word, you'll affect the tone of the voice, but if isolate and only EQ the attack of the P, you'd be amazed at what can happen!

Have a recording with AC (60 Hz) hum from a ground problem during recording? Try using a narrow bandwidth attenuation at 63HZ (and possibly some of its harmonics-125Hz, 250Hz, etc.) Let me know some of your EQ tips for making better radio!

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

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Tech Management

No Longer the Backroom Engineer

by Tom Bosscher

I have to start this column off with an old story. It was over 40 years ago that I got into this business. I need not tell you what the equipment was like back then. There wasn't much of it, and yet it all required a lot of repair and upkeep.

Six months ago, I put a new 21 kilowatt solid state FM transmitter on the air to replace a 25 year old classic tube transmitter – it was a fun install. However, a few weeks ago, it went to 80% power. After a quick trip to the transmitter site, I could see that the LED's on one of the many power supplies were not lit up. Even though I had purchased a spare power supply, I decided to call the factory. They called back in five minutes, and asked if there was a way to look at the transmitter via the 'Net.

I guided them through Logmein, and in seconds I was watching a very qualified engineer looking at the transmitter – "Yup, power supply module #11 is bad, Tom. I'll send one out overnight." Well, I had a spare, so I pulled the dead supply out, and slid the new one in. Everything came up at 100%. I shut the "refrigerator" door, and then sat and cried. After 40 years, I now was a module changer.

I was feeling sorry for myself, but a very good friend and engineer/general manager George Lake told me, "Tom, changing modules is good!" And he is right. Today's plant may have 75 times the pieces of equipment on-line, compared to 40 years ago, but most of it is 150 times more reliable. We have more to do, and with all those IP numbers, what is today's engineer supposed to do?

A few years ago, as a high school graduate, I went to night school at my very own Cornerstone University and received a diploma for an Associates Degree in Business Management. It was an interesting 30 months, but I found myself discussing business practices with too many professors who I thought were not looking at the big picture.

In business, so they say, the way to make more profit is to increase sales, or cuts costs. I pointed out to many of them, that almost all business managers overlook the investment of equipment into the productivity side. Immediately, they will say that most companies have computers for their people to use. To me, that's not quite good enough.

The Savings Multiply

Recently, a person I know had their work station computer replaced with an updated one. An improvement we all say? Except, they had a PS2 mouse with a scroll button and a browser forward/back button on it. My friend asked for her mouse back – too late, everything was gone. The mouse was missed by this friend, so her husband bought her one at $22. No big deal. I then asked her to keep track of how much time she thought the higher grade mouse saved her.

After two weeks, she told me I would not be happy with the result. By using the scroll and back buttons on her old PS2 mouse, she figured she saved only 30 seconds an hour. She said it probably was more than that, but she would stand by that rate.

Well ... 30 seconds an hour of time savings is 1,000 minutes a year, in a typical 2,000 hour work year. That's 16 hours. She makes $30,000, and with benefits, the cost to her company is $40,000 a year. That's $20 an hour. $20 an hour times 16 hours saved, equates to having that $22 mouse saving her company $320 every year. That is a huge and fast payback.

But the problem is, in most cases, the complex multi-location corporation. In her case, her IT department told her that they did not have the money to buy 10,000 mice for all the employees, if she was to get one. Equal sharing right? Except that, if the corporation *did* buy those 10,000 mice, they would be able to get by with 80 less employees. Or better yet, get a lot more work done with the existing and happier employees.

More Than a Backroom Engineer

So what does this have to do with radio engineering? Everything! We all know that the simplistic objective of our jobs is to keep the transmitters on the air, and keep the station FCC legal. Great, we just took care of eight hours of work a week. Today's radio chief engineer is more than the curmudgeon sitting in the back room looking at his collection of slide rulers.

IT work has become a priority.

Today, most of us spend well over 50% of our time doing IT work. Thirty years ago, the chief was hardly ever seen moving about the administrative/operations office of their cluster. The phones were taken care of by Ma Bell, and the typewriters by IBM. Today's chief is the one found crawling under tables to plug the office managers' computer into the network. So once again, where does the productivity part fit in?

Investment – Not Cost

It fits into the educational part of our job that many of us seem to fail at. The more we are in the back room, the more everyone thinks all is well – and all we do is cost the company money. Take a slow walk though your facility. Could this person use a printer close to them for the smaller throw away printouts? If so, get a price, and write up a two paragraph explanation to the station manager why it would be a proper investment – with a half year payback. Notice that you use the word *investment*, not cost.

What if you invested in a phone that works with the on-air system, so the front desk could answer request lines during the voice-tracked mid-day? It may be difficult to pin down numbers, but when people call the station on their iPhone, someone will answer. That's better than the competition.

We have increased productivity in one area of our facility, by installing dual 22" monitors. You can buy factory refurbished 22" monitors for $200 each, and a dual output video card is $100. Although this comes to $500, look beyond this, and listen to the announcers and staff employees talk about what they can have open on two screens.

Yes, if you have twenty employees, you are talking about $10,000, but a good manager would look at the numbers and see the payback. Unfortunately, there are too many managers who only look at the cost. This is where you would show the numbers – recommend a $5,000 project now, and another $5,000 project in six months. After another six months, ask that manager if he would like to step back one year.

Payback for High Efficiency

Another brain dead easy area to save money is digital cut back thermostats. If I ever visit your studios, my eyes look for the old round Honeywell dial. They are in over half the studios I see. Many times, cut back thermostats pay for themselves in months. Lighting? Call and talk to your local electrician. Many times, your electrical utility will pay for your fixtures to be changed out to the higher efficiency lamps. In addition, experiment with hallways and get rid of the institutional florescent lighting and install high efficiency white LED lighting that reflects off the walls and ceiling. It saves money and looks great.

Another unfortunate consequence of the centralized corporate environment is that those who work there have no chance of helping their companies to make more money. When you must have corporate approvals for anything over $75 ... well, that is just very inefficient for a person who is being paid $40,000 to 70,000 a year.

In today's changing business climate, you can make yourself a much-desired asset by looking around and helping the company or mission to save money – and improve co-employee efficiency, which makes more money. You are the one who has to check into the prices, and you are the one who will have to convince the manager that by investing a little, they can save and make a lot more.

It takes more than a 250 Watt soldering gun to be today's engineer.

Tom Bosscher is the Chief Engineer at Cornerstone University Radio. Email him at: tom@bosscher.org

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Chief Engineer

What Does Your Manager Really Think You Do?

by Steve Callahan

I have worked at many radio stations and I have learned one valuable lesson. Most station managers have no clue what you, the station engineer, *really* does. If the manager can hear the station on his car radio, he assumes that you are doing a good job. We all know that an engineer's job is so much more than just keeping the transmitter on-the air. You are involved with most every aspect of a radio station's operation.

For the past forty years, I have worked in a variety of stations as their chief engineer. I worked for some superlative managers, and some that were not so good. For the past twenty years, I have owned and operated several of my own radio stations and that has given me a very good education as to how to manage a station.

So I have sat in both the chief engineer's chair and the station manager's chair and I can really see how far apart they are ... but they really don't have to be.

A Necessary Cost

It's been my experience that about 80% of station management comes from a sales background. It's their job to make the money that pays for the station's operation. Obviously the manager comes from a profit-generating background so that means they are extremely cost-conscious and, unfortunately, they may look at the engineering department as a "necessary cost" and not a profit generating area.

You can do something about that. Look around and see how you can contribute to the station's bottom line. I don't mean you have to scrimp on necessary parts and services, but you can develop alternate revenue streams. Look toward tower rental tenants if you own your towers. Keep an eye on FCC releases to see if there are any LPFM's, Educational FM's or FM translators being proposed for your area, and approach the applicants. By stepping forward with an offer to rent them tower space, you are performing a major service by giving them "reasonable assurance" of tower space for their proposed facility.

Take a look at the possibility of renting an SCA on your FM station to a reading service for the blind or a foreign language programmer. Depending on the population count of your FM station signal, you might find several takers for either one or both of your two SCA's. Is another local AM station losing it's tower site? If so, come forward with an offer to diplex with them on your AM tower for the right price.

Rent Space – Make Money

One potential revenue area is studio rental. I know of two stations which rent out production studio space to other stations which receive a majority of their daily programming from a distant "mother ship," but need an in-town studio just for their local morning shows. This is also a good place for them to house their local Public File, as they can use the space to house their "significant management presence." If you have an older AM tower site, is there any excess real estate there? Once upon a time, AM tower sites were built in rural areas, but fast-forward to today and those same sites are now in areas which have seen significant construction and development.

Take a hard look at any perimeter space which is not part of your valuable ground system, and see if you can lease that space. Don't make the mistake that I saw one station make, when they sold two house lots adjacent to their circa 1960 two-tower array and the backyard of one of the houses now has a tower in it and two easements for guy lines. That station's signal never recovered from such a significant loss of ground system. You can learn from their mistake.

Build a Bridge

Another area that separates engineers and managers is lack of communication, which is ironic because we are in the communications industry! I can't remember how many times station managers have told me that they simply can't understand their chief engineer because he talks "engineer-eese." This is a two-way street and it doesn't take much to build a bridge of communication. Again, remember that your manager comes from a world of "cost per point" and "time spent listening" and I'll bet he or she has no idea how big a microfarad is or how many ohms is in your base impedance.

Make a conscious effort to explain your accomplishments in terms that your manager can relate to. I worked for one manager who admitted he had no technical knowledge at all. Instead of trying the overwhelm the poor fellow with technical jargon, I offered to "translate" any technical article or engineering issue for him, and he appreciated the extra effort made by me to keep him knowledgable using terminology that he could relate to.

Managers simply don't understand what you have to do during the experimental period at the tower site after midnight. While you are out there wrangling high voltage, they are home asleep in their beds. Raise your hand if your manager has gotten on your case for coming in late Monday morning after you worked all night Sunday night!

Avoid Fatal Mistakes

Good engineering practice dictates you have an extra set of hands with you overnight, if you have to deal with high voltage. It's also good to have an extra pair or eyes and another strong back. The engineer at the first station I ever worked at was an excellent contract guy who worked at a bunch of stations in Northern Vermont and New Hampshire. One night he was alone at a mountain top site and he got pinned between the tower site's access gate and his truck's front bumper. There was no one there with him to help and that was a fatal mistake.

Invite your station manager to help you at the tower site some night, when it's not going to be a really late night. I guarantee you that if your manager agrees to join you, they will be an eye witness to what you do so well. This is your golden opportunity to educate your manager and demonstrate your competency. Your transmitter site will speak for itself when your manager sees that it's always clean and neat, and well maintained. I always figured that a manager or owner could visit one of my sites at any time so they were always pristine and ready for that surprise visit.

I've heard so many engineers say that travel to professional conferences at the NAB show and the Radio Show was cut from their budgets. Join the Society of Broadcast Engineers and take a look at their certification program. When you do achieve SBE certification, make sure your manager gets a copy of your certification certificate. Attend any regional SBE Ennes conferences to get the latest news and information. Travel to and from them is usually inexpensive, and one information-packed day can be not only informative but also fun.

Make sure to tell your manager that you have found a cost-effective way to stay up-to-date on new technologies that will translate to a cost benefit to your station. Share with your manager specific things you learned about at those conferences with a one-page recap with terminology they can relate to.

Phantom in the Rack Room

Too many times, the station engineer is the phantom that lives in the rack room and only comes out to fix the gear. Make a change in that perception. Ditch the jeans, and dress for success anytime you don't have any dirty work scheduled. Get out and talk to the staff and don't wait for them to complain about a technical issue. Informally ask the sales department what you can do to help them do their job better. Chat with the news department about any new equipment they have seen their competitors use, then offer to see if you can get them a demo to try out.

A perception to avoid.

Talk individually with the air staff to see if everything in the studio is working as it should. I was always gratified by their positive response when any member of the on air staff would say that there was a problem, but it was not important enough to mention to me, but then I immediately got to work fixing it. That formula makes for a happy air staff which eventually makes it's way back to your manager.

If you aren't already, ask your manager if you can be part of the station's management team. This might involve you working your way onto the team, but you should be in on the long-range planning sessions.

How many times have you heard the often-repeated story about the engineer who learns on a Monday morning from his manager that he's bought another station and it's the engineer's job to immediately find a way to feed the new station and squeeze another studio into the existing floor plan by the end of the week. It shouldn't be that way. Try to relate to the other members of the management team and listen – really listen – to what they have to say and contribute what you can to the solution of their problems. You will become a valued voice.

Just Say No

Since we are all radio station engineers, we all have a little MacGyver in us. We like to fix things. We like to make things work they way they should. Nothing is more gratifying than to push the Plate On button on a transmitter, after a long night of repairs, and have it spring back to life. However, as much as we don't want to say no, we have to, on some occasions.

As a chief engineer in a major market, and because I seemed to be the only one who could work with tools, I was once asked to: 1. Fix the female sales manager's shoe. 2. Find and fix the cause of a flood in the men's bathroom. 3. Hook up a stereo at the manager's house. These are things which temporarily make you look good to management but diminish your long-term image as the station's chief engineer. Sometimes you just have to diplomatically say no. Note that I didn't say you should refuse to assist, but find someone who specializes in that particular repair.

With all the additional duties and responsibilities on your shoulders, you should leave the shoe repairs to a professional.

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

Does the Supreme Court Ruling On Indecency Affect You?

by Peter Gutmann

As a highly cautious broadcaster with responsible staff and conventional programming, why should you ever care about the Supreme Court's recent ruling on broadcast indecency? Doesn't that just affect morning zoos, shock jocks and wisecracking celebrities? No!

We're not speaking here of First Amendment freedoms and other abstract concepts that potentially affect us only indirectly. Rather, there are some highly practical and unavoidable dangers that threaten nearly every broadcaster.

The Supreme Court has side-stepped – twice, actually – the constitutionality of the FCC's fleeting indecency policy. For now, at least, the Commission is free to apply its clear, simple standard – curse just once, or show even a flash of nudity, outside the "safe harbor" of 10 p.m. to 6 a.m. and woe be unto you. Hopefully, the Commission will still be willing to consider context (such as a frank word used in the course of an educational discussion), but that's a risky gamble – forgiveness might come, if at all, only at the end of a grueling and uncertain process to resolve a complaint.

You Would Never Allow the "F" Word

Consider a not-so-hypothetical example. Let's say you're a religious broadcaster who carefully screens your staff, music and guests and are confident that you would never allow the dreaded "f" or "s" words or their variants to pollute your airwaves. You're broadcasting a live remote in which your trusted staff interviews an artist whose sense of propriety is beyond question. But what if someone across the street yells out something obscene while the mike is open?

Or consider the visual equivalent – let's assume that a TV station is broadcasting a live sports event. Among the clearly visible spectators who form a backdrop to coverage of the action one fan is so upset at an error that he raises his middle finger in disgust, or a wise guy opens his jacket to reveal a tee shirt with an offensive slogan (or perhaps audibly curses sufficiently near the announcer). And make no mistake – even if the program is a network or syndicated feed, the affiliate remains responsible for allowing it to go out over its own airwaves.

Many broadcasters have rather smugly considered this to be a problem they'll never have to face, but unfortunately their comfort zone is illusory. The fact is, much of what goes on in the world is beyond our control – and mistakes do happen. Under the FCC's approach of punishing a single, isolated, fleeting word or visual, few are safe.

You know that old proverb about being careful what you wish for? In a perverse sort of way, the Supremes gave broadcasters what they claim to have wanted – enabling the FCC to overcome the frustrating uncertainty spawned by the last decade of confusing and often irreconcilable indecency decisions in which some situations were pardoned while other seemingly similar ones were heavily penalized. Now that's become quite simple – all may be held liable.

How can broadcasters protect themselves? The only completely reliable answer would seem to be to never air live coverage of any community or newsworthy event. But how many stations are willing to claim devout service to the needs of their listeners while subjecting themselves to such a harsh restriction? By retreating into a safety zone of only prerecorded and carefully-screened programming, broadcasters would lose much of their reason for existing in the first place. After all, audiences turn to us for in-the-moment current events, ranging from emergency information to the refreshing spontaneity of interaction with live personalities. Losing the ability to directly satisfy listeners' expectations would only aggravate the increasingly steep challenge to attract and retain a loyal audience.

Unfortunately, there are no proven means to avoid the problem of undesired and largely unforeseeable intrusions into live programming. The courts' response at times has been to rely upon the presumed efficacy of time-delay to prevent the broadcast of such problematic elements, but we all know that the technology (and its human monitors) don't work reliably.

Perhaps the most notorious proof involves the Super Bowl half-time shows. During the 2004 show occurred the notorious Janet Jackson "wardrobe malfunction" – one of the very incidents that led to the recent Supreme Court decision. At first, it seemed that the networks had learned their lesson – in the Rolling Stones halftime show two years later, they cut Mick Jagger's lead vocal mike twice to block a double entendre and a raunchy boast. Yet last year, in front of tens of millions of those impressionable kids the FCC keeps trying to protect, the singer M.I.A. flashed the ol' bird and sang a naughty word.

Clearly, if NBC was unable to rely upon its presumably sophisticated, heavily-monitored time-delay to avoid an incident during the most-watched program on all of television – and under extreme pressure to avoid at all costs a repetition of the embarrassment during the 2004 edition of that same show – it seems unreasonable to expect humble, resource-strapped, stand-alone stations to be able to do any better.

One Strike and You're Out

So the bottom line seems to be this – unless broadcasters are expected to turn their backs on the most attractive aspect of their medium and the key to their audiences and survival, the danger of broadcasting an inadvertent indecency simply cannot be avoided. And unless the FCC is prepared to soften the rigidity of its "one-strike-and-you're-out" policy, all broadcasters live in perpetual danger of having to face and defend an indecency complaint.

Observers have pointed out another disturbing aspect to the focus on profanity and nudity (especially when fleeting) – the near-complete ignorance of the far more pernicious impact of gratuitous, and often persistent, broadcast violence. Countless studies have shown that kids are relatively immune from damage caused by exposure to occasional cursing or depictions of sexual behavior, but that violence can be truly harmful in the course of adolescent development.

The legal reason for drawing that line often is based upon the section of the U.S. criminal code that provides a harsh penalty for anyone who "utters any obscene, indecent, or profane language by means of radio communication." It's true that nothing is said here (or elsewhere in the criminal code or Communications Act) about violence, but, then again, neither does it mention nudity. So, at least on that basis, it seems rather arbitrary to punish nudity while ignoring violence.

Few Broadcasters Would Push the Limits

As a result, an absurd standard has evolved by which we can broadcast sadistic torture so long as the victim screams only incoherently and keeps her underwear on. Admittedly, that's rather extreme and few, if any, broadcasters would push the limits of what they can do quite that far, but we're talking about legal standards and the potential reach of FCC sanctions. Fortunately, whether motivated by conscience or economics, the vast majority of broadcasters give greater credence to what they *should* do, rather than merely to what the law allows.

Yet, legalities aside, it seems essential to return to the practical business aspect to all this. Surely, one of the primary reasons why broadcasters risk losing audiences to cable, satellite, podcasts and other unregulated platforms is the increasing disconnect between broadcast programming and audience expectations, especially those of the demographics that advertisers tend to crave.

Many listeners surely appreciate that fact that they can tune their radio with little fear of offensive language or imagery. Yet others – and especially the younger folks upon whom future ratings will depend – identify with the spontaneity of great radio. Take that away and they will turn elsewhere for programming in which folks actually speak the way real people speak and act the way real people act – and all in real time.

The ultimate danger of the FCC's indecency policy extends far beyond licensees who "push the envelope" or abuse their editorial freedom. Rather, it casts a pall upon the very essence of radio.

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Disaster Preparedness

Plausible Reality

by Ernie Belanger – editorial@radio-guide.com

It's 2:00 a.m., and your phone rings, waking you out of a sound sleep. You reach over and pick it up, not yet awake. "Hello?" you answer.

"Mr. Smith, this is Chief Jones of the Podunkville fire department." Glancing at the clock on the end table you immediately get angry: "I don't know who the heck this is, but it's 2:00 a.m. in the morning. *Don't call me again!*" You slam down the phone.

It rings again. "Look you ..." your voice trails off as the Chief yells over you, "Mr. Jones, I know I woke you up, but your radio station is burning down."

You pause, as his words sink in, and you realize this isn't a prank or a dream. "This is for real, isn't it chief?" you mumble. "Yes sir it is, you might want to come down; we're doing the best that we can ... (a pause) but I don't think we can save anything."

Reality Strikes

In that instant, everything crystallizes – you're wide-awake, as if someone doused you with a bucket of ice water. "Thank you Chief, let me throw on some clothes and come down," you reply. "Mr. Jones, we've closed off the roads, so tell the police who you are and they'll radio me to clear you into the area." Absentmindedly, you automatically reply, "Thank you Chief."

Getting out of bed, you're on autopilot, as you get ready to face the nightmare that lies ahead. Your five-station cluster is transmitting dead air – your revenue stream just stopped!

Don't Panic – *Yet!*

Your head whirls as you drive into town. The police waive you through as the Chief alerted them you would be coming. Your heart drops when you see the entire building completely engulfed in flames.

The Fire Chief walks over and introduces himself, and you apologize for yelling at him on the phone. He just chuckles and tells you not to worry. He didn't take offence because he'd made that phone call over a hundred times this year already – he understood. He then asked if you were OK and pointed out the area where the other business owners – who were also loosing everything – were gathered.

All that work going up in smoke, you're four hours away from morning drive, dead air is filling your frequencies, and the bulk of your listeners will be waking-up and tuning into ... nothing. *What do you do?*

At this point in our story things can get very, very ugly, becoming an even worse disaster – or this setback can simply be a temporary stumbling block. What happens next depends upon you, and whether you took the time to make a disaster plan or decided to shoot craps with your station's cash flow, and its staff's future. Let's see what happens next.

Calmly Moving Forward

After a brief conversation with the Chief and your neighbors, you walk over to your car, pop the trunk, grab your emergency contingency binder, and without losing a beat you execute your emergency disaster plan.

The first call, in this type of disaster, is to the local hotel where you have already arranged to have up to six rooms available (unless they were booked full). Luckily they had the rooms, so that saved you calling your secondary location where you had made the same arrangements.

Flipping over to the staff emergency "call tree" page, you make four pre-planned calls. First to your Chief Engineer, then to your Program Director, Office Manager and Sales Manager. You tell them what's going on, and at which hotels that you have booked the rooms.

The plan calls for them to meet you there in thirty minutes. It's now 2:45 a.m., three hours and fifteen minutes until morning drive. They all arrive by 3:15 a.m., and at 3:30 a.m. the morning show teams, three members of the office staff, and the balance of the engineering staff, arrive on site to help ready the stations.

Equipment Package

The equipment arrives: a programming laptop for each station, and external hard drives with the entire music library – one for each station, with the latest commercial content as well. Two office laptops are also there, with all the traffic logs for the week, and all other accounting information.

Prior to this emergency, the commercial folders of each hard drive had been backed up daily, and they were then loaded into a plastic storage bin and taken home by one of the management team *each night* for safe storage. You had also arranged backup-to-web storage for the administrative data, including all accounting and traffic logs, on a weekly basis.

Also, in advance of this trouble, there was yet another hard drive that was constantly in the possession of the program director. That drive houses a backup of the entire music library for each station. There are also the portable mixers for the two live morning shows, complete with mics and headphones and all hookup wires, power strips and UPS. Wireless IP and WiFi devices and cards are ready to get the program audio to the transmitters, via the Internet.

The Plan in Action

Like clockwork, your emergency plan unfolds – the two practice, mock disaster drills your engineer had arranged, certainly helped this to go smoothly. Each staff member has a specific task and goes about doing it

As the office staff and the program director are busy setting up the computers and loading necessary information to go on the air, the engineering staff is hooking up the portable USB mixers and confirming they are operating – taking care of any last minute glitches before the live morning shows are to go on. The program director and other staff have been trained to take it from there. One by one, they light up the "studios" and confirm operation. Each station is signed into its secure virtual private network (VPN) and music begins to flow via the Internet.

Engineers to the Transmitter Sites

Once they set up the equipment and leave the programming and traffic setup to the other staff members, the engineering staff leaves to head up to the transmitter sites.

Upon arrival, they boot up the netbook computer(s) that have been on site for logging, and exactly this contingency. They follow the plan step-by-step, switch the audio processor input from STL to the computer, and immediately play a file that contains a legal ID and pre- packaged emergency programming – basically music and generic liners – at least audio is back on the air.

While this plays, they sign each computer onto its secure VPN and confirm they are receiving signals from the hotel "studio." The netbooks now will become the transmitter side of the audio path for each station. Once the connection is confirmed, the engineer switches to VPN audio and the stations are on the air from their respective temporary studios.

A Real Disaster Averted

It's now 5:00 a.m., one hour until your live morning shows hit the air. Some of your listeners are waking up to their usual morning programming, totally unaware that as they are listening, your studios and offices are a pile of still burning rubble. You thank the staff for their efforts as they head home to get ready for the task of working out of make shift studios and offices. The morning teams for your live stations gather their material via smart phones, and acquaint themselves with the new studios, as they get ready to go on the air.

One Final Check

You go room to room (studio to studio) with your chief engineer, who has arrived back at the hotel to confirm all is working well. He'll stay on site through morning drive just in case. The balance of his team will stay at the transmitter sites as well, just in case something should go wrong and the feeds hit a glitch.

You sincerely thank your chief for being persistent about making a disaster plan, budgeting for emergency equipment, and running the drills so everyone knew exactly what to do when the plan had to be put in place.

As you drive home to get ready for the day ahead, a single clear though comes to mind. This could have been a totally devastating day if you didn't finally listen, plan and invest in the needed gear to keep the stations up and running. You could be out of business with no programming, no traffic logs, no accounting or customer data. As you pull into your driveway, you realize that you have been listening to one of your stations all the way home.

What was dead air a few hours ago, as your studios were burning to the ground, is once again a viable signal, keeping your listener base tuned in and your sponsors happy – none of them aware of the nocturnal efforts of your staff to keep your stations on the air.

You take a moment to think about how proud you are of their efforts and how well they worked together like a well-oiled machine – following a well laid out plan step-by-step without missing a beat. A smile crosses your face as you step out of your car. Now you can get ready to go about the task of finding a new studio/office location, without the pressure of being off the air with no cash flow – thanks to advanced planning. *– Radio Guide –*

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Safety and Security

A regular column on protecting property and persons.

Critters: Rodents and Snakes

by Jeff Johnson,CPBE

During work at a transmitter site new to the author, a big, beautiful black king snake strolled across the parking area as if to announce, "Hey, this is my world!" The site, in a hilly cow pasture in northeastern Kentucky, while but two miles from Portsmouth, OH, might as well be at the end of the Earth if there is an emergency – especially if the injured is working alone.

Non-venomous Black King Snake

It is so often argued that we should never work alone at a transmitter site, but we usually do. A previous article in this series addressed pathogens of an unseen nature – viruses, bacteria and fungi. Well, "big stuff" will get 'ya too!

The following is an article written for ***Radio Guide*** *readers by Dr. Charles Grossman, of Xavier University. Dr. Grossman discuses dangerous mammals and reptiles.*

Previously I discussed some bacterial and viral infections that could be transmitted in the environment of the radio station. Now we will look at larger pests that can cause problems. Since I am writing this to provide you with information that hopefully you will find useful, I will be happy to answer questions that may arise in specific situations that you may encounter. You can contact me at the Biology Department at Xavier University in Cincinnati Ohio. My email address is Grossman@xavier.edu – *Charles J. Grossman, PhD and Professor*

Critters That Can Cause Health Problems Around Radio Stations

Annoying, Nuisance or Dangerous Mammals:

Bats, which are very important in keeping a variety of insects including mosquitoes in check, can act as a vector for certain infection diseases such as rabies. The virus is shed in the bat urine as an aerosol and bat guano can also harbor the virus, which can be inhaled and cause the disease. In the environment of a radio station, bat vectored infections are probably rather rare, although it is conceivably possible that bats nesting in closed spaces in transmission towers could be infective to technicians.

Rabies in wild animals can also be encountered from time to time in raccoons, squirrels, red foxes, skunks, etc. which may or may not pose a threat depending on the radio station location. Employees are reminded that any wild animal that is behaving abnormally should be avoided. For example, a raccoon wandering in an apparent daze in the middle of the afternoon is certainly hot behaving normally. It may be infected with rabies but the higher probability is that it is infected with distemper which is not transmittable to humans.

None the less, all such wild and sick animals should be left strictly alone and their presence reported to animal control authorities. Should a person be bitten by any animal, the animal should be captured (and if necessary killed) to allow authorities to test the animal for disease. Since treatment for rabies is a long, tedious and painful process, involving multiple injections, if the animal is found to not be infected such treatment can be avoided. If the animal is not captured then medical personal must make the assumption that the person has been exposed to rabies and the treatment regimen will have to be instituted.

More commonly, one would expect various rodents such as mice and rats to vector a variety of infective agents. Very recently, campers in a California national park were infected with Hanta Virus which is spread by dried Deer Mouse urine and feces which are inhaled. Also in Colorado a few campers each year are infected with bubonic plague also vectored by mice and their fleas. The organism *Yersinia Pestis* is endemic in these wild mouse populations and cannot be eradicated. In working in any storage area where dust and debris have accumulated, or in equipment consoles with closed fronts and open backs, the engineer should be

(Continued on Page 20)

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Safety and Security

– Continued from Page 18 –

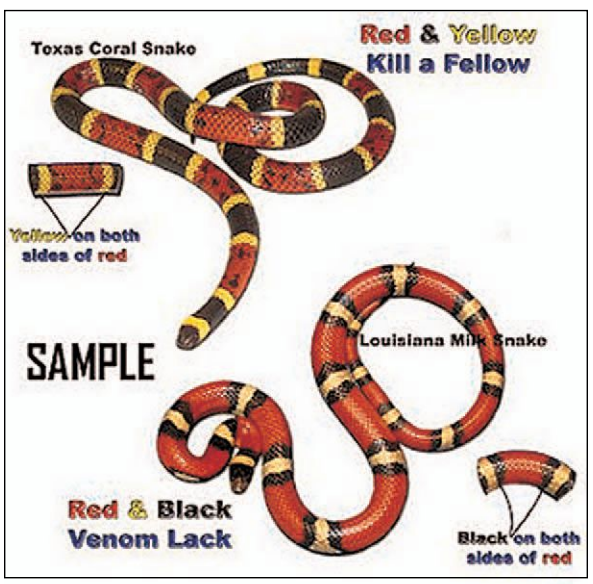
vigilant for mouse droppings, mouse nesting materials, or stored food caches. It is wise to wear some form of respiratory protection and probably rubber gloves – and if mouse activity is suspected, the area can be sprayed with diluted Clorox where this is possible. If liquid cannot be applied then it is suggested to strongly vacuum the equipment with a vacuum cleaner that has a hepa-filter attached to the air outflow side. Debris containing mouse droppings should be double bagged and discarded or incinerated.

Annoying, Nuisance or Dangerous Reptiles:

Generally, a few nuisance non-poisonous snakes may be found in the environment of some radio stations depending on the location. In the U.S., poisonous snakes may sometimes also be present. In general, snakes are not enamored with human habitations and attempt to avoid them. However, if such places contain small mammal, bird or perhaps insect populations, then this may attract snakes. Examples of non-poisonous snakes in the U.S. that may wander into rural radio station facilities are: Common Garter Snake, Eastern Ribbon, Coachwhip, Ringneck, Rat, Eastern Hognose, Black Racer, Milk, Common Kingsnake, Rubber Boa (only South CA, Eastern Montana, Wyoming and Utah), Rose Boa (CA and Arizona), Corn, Gopher, and Northern Water.

Additionally, with the advent of increasing numbers of the invasive Burmese Pythons in Florida, the stage is set not only for an ecological disaster for native wildlife but potential nasty interactions between humans and this large and aggressive reptile. Should such be identified in your facility, call animal control personnel and do not attempt to deal with the removal yourself. You can be seriously hurt or even killed by a large python, which not only constricts but also bites (although they are not poisonous).

There are few poisonous snakes in the U.S., but those that we do have should be avoided. These are: various rattlesnakes (including the Western Diamond Back, Timber, Pacific, Sidewinder), Copper Heads, Cottonmouths/Water Moccasins, and Coral Snakes). With regard to this last snake, do not confuse the Coral Snake with the King Snake. Here the old adage: "Red next to black, friend of Jack; Red next to yellow, kill a fellow," tells you that the banding pattern of the Coral snake is red band next to yellow band.



Coral snake color code comparison.

The common king, which does look much like the coral, has its bands of red next to black. You should obtain information as to the specific types of these snakes in your area and learn to identify them. Remember that these snakes are not only attracted to food items but also to water, warmth, and dens when they are ready to hibernate, so be vigilant and close up any open access in your facilities, remove debris, piles of wood and brush and keep garbage cans closed up. Garbage attracts mice that in turn attract snakes. Do not attempt to capture snakes on your own. The TV programs may make it look easy to capture these critters but having done this myself (in my younger crazier days) I can tell you that snakes will manage to bite you if you don't know what you are about. And a large Diamond Back can inject enough poison to kill you very efficiently, very quickly and very painfully. – *Charles Grossman, PhD*

An informative web page concerning snake bites is on Walgreen's site:

http://www.walgreens.com/marketing/library/contents.html?docid=000031&doctype=1

Advice from this site: Rattlesnake, Cottonmouth and Copperhead bites are painful right when they occur.

Coral Snake bites may be painless at first. Major symptoms of a Coral Snake bite may not develop for hours. Do NOT make the mistake of thinking you will be fine if the bite area looks good and you are not in a lot of pain. Untreated coral snake bites can be deadly.

The right anti-venom can save a person's life. Getting to an emergency room as quickly as possible is very important. If properly treated, many snake bites will not have serious effects.

- Do NOT allow the person to become over-exerted. If necessary, carry the person to safety.
- Do NOT apply a tourniquet.
- Do NOT apply cold compresses to a snake bite.
- Do NOT cut into a snake bite with a knife or razor.
- Do NOT try to suck out the venom by mouth.
- Do NOT give the person stimulants or pain medications unless a doctor tells you to do so.
- Do NOT give the person anything by mouth.
- Do NOT raise the site of the bite above the level of the person's heart.

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

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Operations Guide

Saying Goodbye

Creating an Exit Strategy

by Chris Tarr

It happens – engineers change jobs. In fact, I'm writing this shortly after moving to a new position with a new station, after nine years. For me, it's been a learning experience!

Unlike many other positions, Engineering and IT jobs are often very hard to pass off from one person to another. There are passwords, equipment, routines, and many other things that the "last guy" set up and managed that were often just done without a second thought on a day-to-day basis. It isn't malicious, it's simply that we often come up with workarounds or Rube Goldburg-esque contraptions that we never bother to document. Often, we are the only ones who know about those items (and the skeletons that may be in the closet)! Making matters worse, often times the General and Operations Managers have little knowledge about what the Engineering staff does on a day-to-day basis. So, how do you prepare?

First off, if you or your Engineering staff aren't documenting important processes and creating backup users on systems, get started now! Job changing aside, you never know when disaster may strike and the person who "knows it all" suddenly becomes unavailable. How will you get through? Engineers often like to be the "keeper of knowledge" but that's never a solid plan. In fact, having that information readily available to others makes life much easier – a phone-call-free vacation is certainly possible if there is documentation available to resolve problems.

Yes, it takes some time to put those things down on paper, and yes, that means that the radio station will run without you, but really in the end it's the right thing to do.

Among the things that need to be documented are IP addresses for the plant, remote dial-up numbers and access codes, locations of keys, software licenses and vendor information. Additionally, don't forget to write down any usernames and passwords for external websites, and things like that. Ideally, you should make a hard copy of any important information that may have been sent in an email. Try to organize the best you can so that the information can be found with easy "keywords." In other words, organize by station, by device, or whatever might be convenient for others. Put yourself in someone else's shoes – how would *you* find the information that you need? True story: On my first day of the last job I had, I needed to set up my voice mail. I asked the receptionist, "How do I get voice mail set up?" Her reply? "Oh, that's *your* job!"

A few of the things I did before I left my position was to change all of the passwords I have to one common one, and left that with the people who would be helping in the transition. I also sorted out all of the electronic information that I had into categories and put that on a thumb drive. That documentation included all of the facility IP addresses, remote control commands, building documentation, contracts, leases, etc. Fortunately I'm a pretty "electronic" guy, so almost all of my information is digital. Yet another reason to move that way if you haven't.

A graceful exit may not be possible in all situations.

Now, what do you do if you have to terminate an employee? That's always hard, and emotions always run high. Depending on the situation, there may not be a way to gracefully exit that situation. You definitely want to check with your attorneys, but often you can tie severance or additional "bonus" money to get the information you need from the outgoing Engineer. Have them fill out a document with user names and passwords, and allow them to be "debriefed" on any projects they may have been working on, and information on any ticking "time bombs" that may need to be accounted for.

It may help to wait a day or two for this meeting, so that everyone's heads are clearer. If things are heated, and it doesn't look like any agreement will be reached, then you need to have a contingency plan, such as having a contract Engineer, or an Engineer from elsewhere in the company available to assess the situation. Discretion is important here – Engineers are a tight group, and it's possible you may be talking to someone who knows your employee.

(Continued on Page 24)

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Operations Guide

by Chris Tarr

Saying Goodbye

Creating an Exit Strategy

– Continued from Page 22 –

That person should be brought in immediately after the termination, to change the important things like the password to the transmitter remote control, audio and file servers, email, and voicemail accounts. A competent Engineer will know what your exposure is, and will make sure that you're covered. It's always hoped that things don't come down to that, but if they do, you need to protect your interests.

What if it's an amicable parting? That's a whole lot easier. Chances are excellent that the employee will do everything possible to make the transition smooth. This is where the management needs to step up. Even with all the documentation in the world, there is nothing better for the new hire than being able to talk to the guy who kept the plant running before. That access to the facility's historical knowledge is extremely valuable, and you should compensate the exiting employee fairly for that access after they leave, as part of the move. Keep the exiting employee on the payroll as a part-time or contract employee, and pay them for their time answering email and phone calls if they're leaving the market, or even site visits if they're still in town. Human nature dictates that the person leaving will be much more open with their time and knowledge if they're being compensated for it.

In my situation, the person that I replaced is still in town, as am I. I'm lucky to have access to the person I replaced, in fact he and I know each other pretty well, and I can give him a call or send him an email if I need something. As for me, I'm still on the payroll of my former employer as a part-time Engineer. I can help in an emergency, and the people there have unlimited access to me for help. In the meantime, as they run into things that I may have forgotten to document, I'm just a phone call or email away, and I can then walk them through whatever it is that needs to get done.Once they hire my replacement, I'll stay on for a bit, helping them get acclimated. Because I'm being paid, I have an active interest in taking care of their issues on a timely basis.

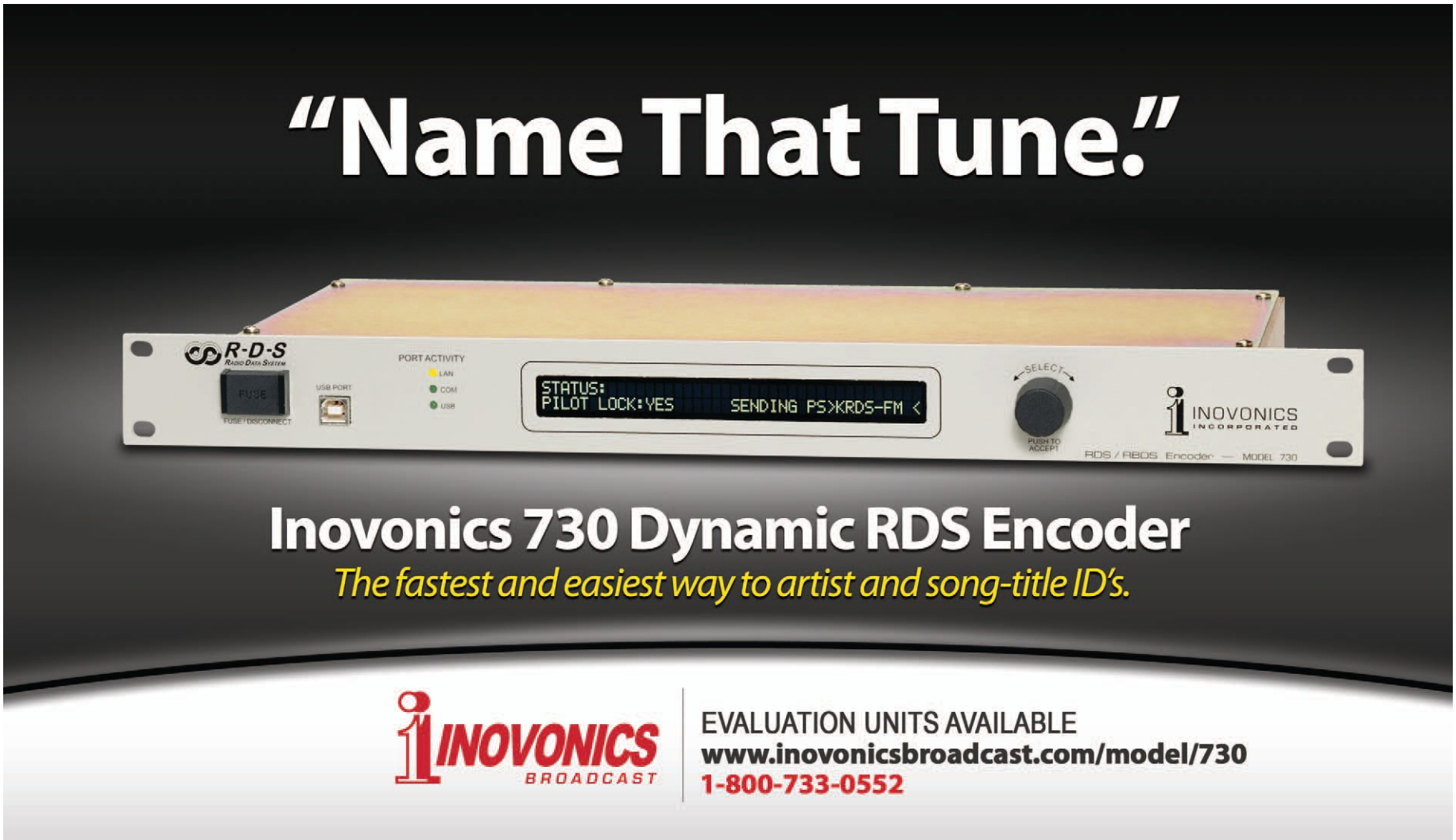
Having the transition set up like this goes a long way in ratcheting down the anxiety level of everyone involved, and really is the best path to take whenever possible. I can guarantee that there is always something that comes up that would be easily solved if the new employee can freely contact the old one. Keeping those lines of communication open helps everyone involved.

That leads me to another point: The "little messes." Every station has them, some more than others. Those little "patches" that we're not particularly proud of, or those temporary fixes that managed to become permanent. Just like interest, those often compound over time. Sometimes you can get most of them fixed on your way out, sometimes not. But it's *very* important to let someone know about them.

One situation that I recall from the past a doozy! There was a Burk Auto-Pilot computer in one of the studios, put in by the previous Engineer. There had been a recent transmitter installation resulting in the controls for the main and backup transmitters being swapped on the remote. Nothing wrong with that, except that whenever Auto-Pilot was started, it ran a script that shut down the "backup" (which was now the main!) and fired up the filaments on the "main." Needless to say, I got a big surprise when I rebooted that computer for the first time and took the station off the air! I'm sure the previous Engineer meant to fix that, but never got around to it.

Change is usually difficult. Even with the best laid plans, unforeseen situations arise. It's always in everyone's best interested to work together before and after a separation to make sure the transition is smooth. After all, it's a small world, and neither the employer nor the employee want to have a reputation for being difficult. It's always best if the parties involved can work together to move forward. Remember, it's not "if," but "when." Even if you don't plan on ever leaving, you will eventually retire! Changing jobs is a stressful, difficult thing for not only the employer and the departing employee, but for the new hire as well. Taking some time now to document the plant, and have an exit and emergency strategy in place will ensure that things go smoothly when change inevitably comes.

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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11

192.168.2.199
Fault: None
Config: <none>
Preset: CGSmooth
Input: Livewire 1
Input
Pri
Sec
Wide Band
AGC
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Limiters
FM
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Output
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HD
Analysis
LOUDNESS MONITOR
3 kHz
7.5 kHz
Preset
Wizard
Basic
Advanced
SL
LO
ML
XO
MH
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Tool Guide

Software Tools

Another Engineering Swiss Army Knife

by Scott Schmeling

As Chief Engineers, I'm sure we all wear many caps – and sometimes the boots to go with them. For example, on any given day I might be taking meter readings and inspecting a transmitter site, changing PA tubes, or replacing transmitter components. Or I could just as easily be changing fluorescent light tubes, clearing a clogged sink in the bathroom or making one of the computers "run faster." I've left out a great number of things, but you get the idea. It's that wide variety of "duties" that keeps the job interesting and one of the things I love about it.

I think it's safe to say that one of our most useful and most valuable tools we have is our computer. Mine does all the normal computer stuff: e-mail, word processing, etc., and for that alone, it's almost invaluable. But over time, it's come to do so much more. My laptop is fast becoming as versatile as my Swiss Army Knife, and every new software tool is like adding another blade to the knife. Today I'm going to share with you some of the software tools that I have found to be very useful – and many of them are free!

Let's start with a couple basics. We use Microsoft Office (the free equivalent is Open Office: www.OpenOffice.org). I have put together several wiring forms using Excel. This came about from trying to decode scraps of paper stuffed in a notebook when I needed to know what was connected where, or what audio was on a particular cable pair. I've built forms for punch blocks, computer inputs, audio console inputs and outputs, multi-pair cable, as well as transmitter log forms and many more. Once you've decided how you want your forms to look, it's fairly easy to adapt them to your particular situation or configuration. In my opinion, Excel is really good for this because you can set the column width and have things line up the way you want (I've never had much luck using tabs in Word – although my wife is sure I could use a TABLE in Word and insert it).

I use Word for procedure and instruction sheets. If I'm doing a sheet for software configuration, for example, I like to use the ALT+PRINT SCREEN keys. We've all heard, "a picture is worth a thousand words" – the same is true of a screen capture. If I have the software screen up and press <Alt> and <Print Screen>, the active window image is captured and placed in the clipboard automatically. By using <Alt> and <Print Screen> instead of <Print Screen> alone, you get just the active window rather than the entire screen. I then open Paint, paste the image and save it as a jpg. Then, when I'm doing the sheet for that software, I can choose INSERT, and drop the jpg image into the document.

Most likely your computer is sitting on a network. I've discovered a few "network tools" I like, and have found them to be very useful. I think my favorite is *Ipscan*, full name *Angry IP Scanner* (www.angryip.org) – the web site calls it a "fast and friendly network scanner." It scans your network (you define the range) and lists "dead" (unused) IP addresses as well as the identity (and I believe MAC address) of the items on your network. Recently, I was installing a device for a friend. I was not familiar with their network so I ran *Ipscan.*

With those results we (with some deductive reasoning) were able to determine where the static IP's (and to some extent the DHCP range) were, and I was able to assign a proper address to the device. I have also used *Net World Scanner.* According to their website (www.petri.co.il), *Net World Scanner* is small, free and simple – this tool will list all IP addresses on a given subnet (even remote ones). It will also list the NetBIOS name of the computers, and if any shares are present. Double-clicking a computer will list the shares on that computer (providing you have the right access permission – this is not a hacking tool). I know there are many more networking tools out there, but these are the ones I've used.

For many of us, reel-to-reel and cart machines have been replaced by computers with sound cards. *Adobe Audition* is the audio editor I hear and read the most about. In my mind, it does far more than most of us will ever need. The free alternative is a program called *Audacity* (www.sourceforge.net) – a new version has been released. Again, according to their website, Audacity is a free, easy-to-use audio editor and recorder for Windows, Mac OS X, GNU/Linux and other operating systems. You can use *Audacity* to record live audio, convert analog to digital, cut, copy, splice or mix, and change the pitch or speed of a recording. *Audacity* supports Ogg, Vorbis, MP3, WAV and AIFF files. You can check their website for a complete list of features.

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Tool Guide

by Scott Schmeling

Software Tools

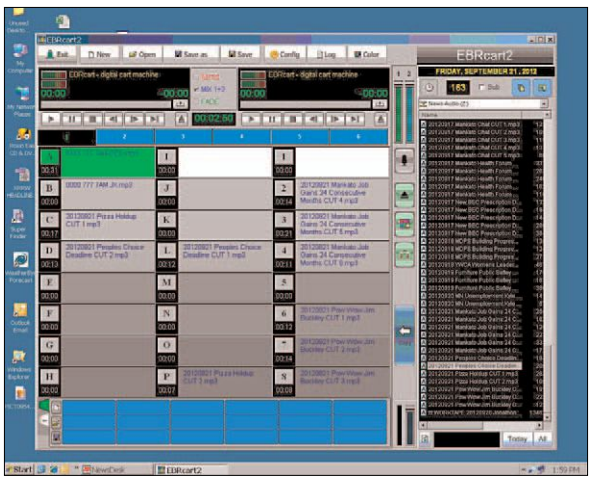
Another Engineering Swiss Army Knife

– Continued from Page 26 –

I've also found a handy *Digital Audio Level Meter* by Paul Marshall (www.minorshill.co.uk/pc2/meters.html). I found this when we were setting up new computers for streaming. I wanted to verify my audio input levels before starting the streaming software. The program worked like a charm and I've used it a number of times since.

I also had a need for a simple cart substitute program, for situations where a full-blown automation system would be over-kill and the learning curve might be longer than you want. *EBRcart2* (www.ebraudio.com) is a "cart wall" type of digital cart machine program. Using a Windows Explorer-type file explorer, you can navigate to your audio files, then simply drag and drop them onto the button you want – schedules can be set up and saved for easy retrieval. It works great with a touch-screen monitor, too! EBRcart2 is not free, but at $50, it's close to it! A free program (last time I checked) is *JazlerShow* (www.jazler.com). I "played" with this program a couple years ago then did nothing with it. I'm sure it has evolved since then.

There's another little goodie we've put on some studio computers (both "audio" and "Internet" machines). It's called *DS Clock* (www.dualitysoft.com). You can use it to display time in a variety of ways. We prefer a simple banner showing time and date. You can position it where you want it on the screen. We usually put it in the upper right corner because it seems most out of the way, yet very readable there.



EBRcart2 digital cart machine program.

A while ago I had been looking for an inexpensive, easy to learn program for drawing schematics, floor plans, flow charts, etc. I found *Gadwin's Diagram Studio* (diagramstudio.com). *Diagram Studio* comes with templates for network diagrams, organizational charts, flowcharts, block diagrams and more, to get you started. This program is not free, but is also in the $50 range. Along with the templates, there's a quick tutorial to help you get started.

And while on the subject of drawing, Middle Atlantic has a free program called *Rack Tools* (www.racktools.com). It comes with a database of the entire Middle Atlantic product line. In addition, you can create drawings of your equipment and store them. Then you drag and drop from the Middle Atlantic database and the database of your equipment to create drawings of your rack(s). If you're starting with an empty shell, this is a great aid to planning what goes where in your racks.

Another handy "tool" is a little goodie called *CPU-Z* (www.cpuid.com). This program scans your computer, and tells you what motherboard you have. My favorite feature is the memory reporting. The SPD tab tells you exactly what type of memory is in what slot. So often the "running slow" complaint is taken care of with a little more RAM. Using *CPU-Z*, I can check the memory type without shutting down, opening the case, and popping the memory out. Then, when I have the correct memory in hand I can make the change.

If you've ever needed, or wanted, to create a PDF file – there's a freebee for that! *Cute PDF Printer* (www.cutepdf.com) allows you to create a PDF file from any printable document. You install a converter and the PDF writer, and it appears as an additional printer on your computer. Rather than send your document to the printer, you select Cute PDF and store the file in you're My Documents folder. Slick and easy!

I know I've just scratched the surface. There are several programs I use that I haven't mentioned yet. If there are any you have discovered, I'd love to hear about them, and maybe in a future article we'll talk about some others. I also apologize for not having as many screen shots as I would like. I am writing this away from the office and don't have access to everything I normally would.

As I said in the beginning, it's the wide variety of duties, from transmitter sites to building maintenance to computers that keeps the job interesting and one of the things I love – although I could do with less toilet plunging!

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

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Practical Engineering

Building a Better RPU

by Mike Callaghan

Many stations use UHF RPU systems to bring audio back to the studio from remote sites. Doing this avoids the expense of phone lines, waiting for them to be installed, and testing the lines ahead of the actual remote.

One problem with RPU's, however, is the limited range they provide. Going long distances can mean signals that aren't airworthy, and frequently this can make remotes either implausible or cause them to sound less than pristine.

Oftentimes, stations use yagi antennas at the transmit end and aim the antenna for the best sound, while using an omni-directional antenna at the receive site. This degrades the overall performance in two ways; the receive antenna not only has mediocre gain, but it also picks up noise and interference from directions other than where the remote is.

There is a way to alleviate both these issues – it's simple and makes perfect sense. It requires two things of the radio station:

1. The RPU receive location is at a high elevation, and has some sort of remote control system available to work with it.

2. The remote control system must have one vacant metering and two vacant control channels.

Obviously, this is easiest for FM stations where the RPU reciever is at the transmitter site. The alteration involves replacing the omni-directional receive antenna with a high-gain Yagi, and then aiming both antennas toward each other before each remote! The improved signal will dramatically increase the range and usefulness of the system.

Making this happen involves adding some additional equipment at the receiver, but it's well worth the effort.

A medium-duty Ham antenna rotator is used to turn the receive Yagi to collect the greatest signal. The direction it points is controlled through a command channel on the transmitter remote control system. A sample of the rotator azimuth voltage feeds the metering input on the same channel. This allows returning to the same antenna azimuth again and again. To decide when the highest signal level is being received, a variable-frequency oscillator (VCO) is controlled by the RPU receiver's AGC circuit. The varying pitch it produces indicates how strong the received signal is. The output of this oscillator gets sent back to the studio through the same circuit as the remote audio. ***Figure 1*** is a block diagram showing how the parts work together.

How It All Works

Before the remote, the receive antenna is set to the approximate direction using a map, the rotator, and the remote control's azimuth reading. When the remote crew arrives on site, they raise the RPU antenna on a mast, and aim it in the general direction of the RPU receiver. Then the RPU transmitter is turned on.

They call the studio on the phone. The board op or DJ answers the phone, and drops the RPU audio into cue on the console. Then the studio operator uses the remote control to

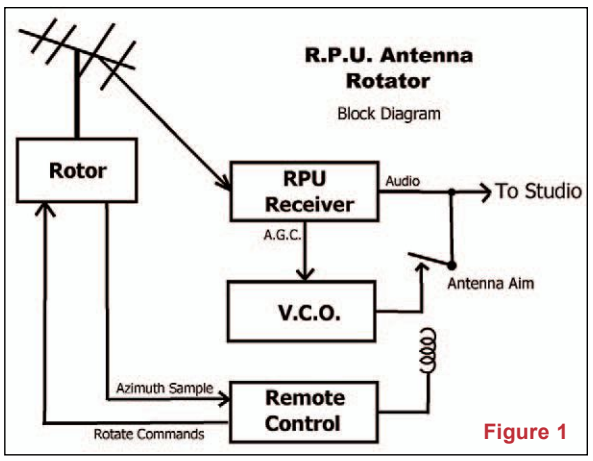

Figure 1

switch the RPU feed to the VCO output. The person at the remote site hears the VCO tone through the phone, and swings the transmit antenna around until he hears the tone rise. This means the receiver is picking up his signal. Then he peaks his transmit antenna for the highest pitch. After this has happened, the operator at the studio uses the remote control raise and lower to turn the receive antenna so the tone is again peaked. Finishing these two steps insures both the antennas have been aimed at each other and the RPU path is the best it can possibly be.

Finally, the studio operator uses the remote control to switch off the antenna-peaking VCO and to restore the circuit back to the RPU receiver output. Then the remote can begin. If the station does frequent remotes from the same locations, a log can be kept of the receive antenna azimuth headings so it can be reset prior to each remote.

If phone lines are used to bring the RPU audio back to the studio, it's a good idea to leave the oscillator on between remotes. The constant tone keeps the phone company from thinking they've found an "available pair" when they're looking for an open circuit to pilfer.

(Continued on Page 32)

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Practical Engineering

– Continued from Page 30 –

Selecting a Rotator

Any number of antenna rotators will work, but be sure to get one that has an azimuth meter on the control unit. This meter connects to a potentiometer inside the rotator that outputs a voltage proportional to the rotator azimuth. A sample of this voltage is tapped off from the rotor control cable and feeds a metering channel on the remote control. It gets calibrated to read 360 degrees on the readout when the antenna is turned all the way North.

The two clockwise and counter-clockwise buttons on the rotator console unit are tied across the raise and lower relays of the same channel on the remote control. This allows turning the antenna to any direction from the studio, while using the metering display to see just where it's pointed.

Sampling the AGC:

Some RPU receivers already have a sample of the AGC voltage brought out to the rear. Others will require opening the chassis and tapping off the appropriate sample point. The schematic will be a help; it might be easiest to find where the signal level metering circuit is and use that as a sample.

The variable-frequency oscillator is easy to build. It's based on the Exar 2206 function generator chip. The circuit ***(Figure 2)***, will fit on a 4" x 6" perfboard. It requires a 12 Volt supply. You'll probably want to use this to also operate a pair of raise / lower interface relays between the station's remote control and the antenna rotor clockwise and counter-clockwise switches.

When used as a VCO, the 2206 inverts its output frequency – the pitch drops as the input voltage peaks. So the circuit includes a simple NPN transistor inverter to set it right.

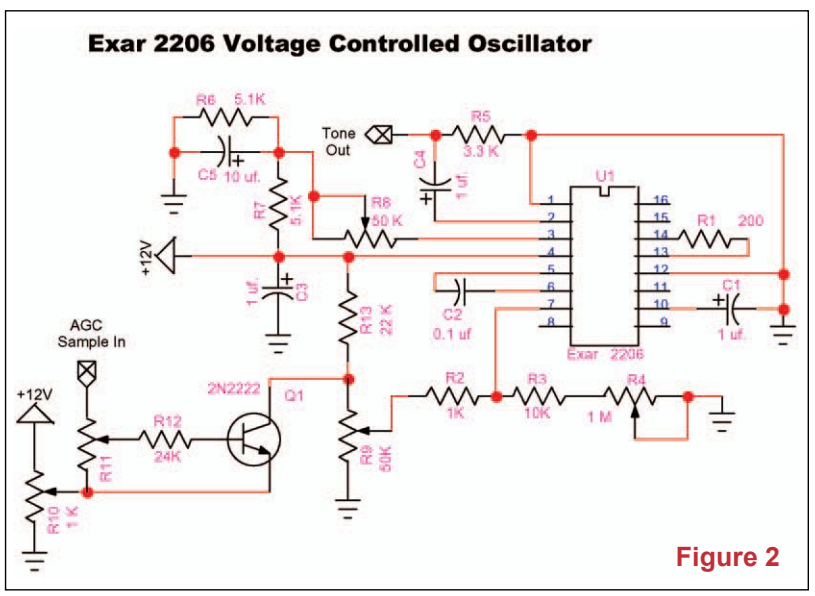


Figure 2

Because different receivers use widely different AGC schemes, you may need to be patient in setting the pots that drive the Exar circuit. Different AGC voltage ranges require different settings to get the pitch range just right. Start by measuring the receiver's AGC voltage with no antenna connected. Set the wiper of R10 to get the same value between it and ground. Move R4 to mid-range. Set R9 to get a low-frequency (~ 400 Hz.) 'idle' tone from the 2206. Trim R4 if needed. Connect the receiver AGC sample to the circuit, and key the RPU transmitter to get a high RF reading on the radio. To get the needed signal, key the RPU transmitter into a dummy load somewhere close to the receiver with the antenna input shorted. Then set R11 and R9 for a high pitched output from the VCO. Repeat if necessary.

R8 adjusts the output level. Set it to be about the same level as normal remote audio. The idling tone is what the oscillator produces with no RF into the receiver. This gives you a steady keep-alive tone you can monitor to make sure the remote circuit's working.

You'll also use a latching on-off relay (or a relay with a latching circuit) to connect and disconnect the oscillator. You can wire it to just bridge the tone across the receiver output – you won't be using the receiver audio and the tone at the same time anyway.

The attached legend ***(Figure 3)***, shows one way to set up the two remote control channels.

Remote Control Functions

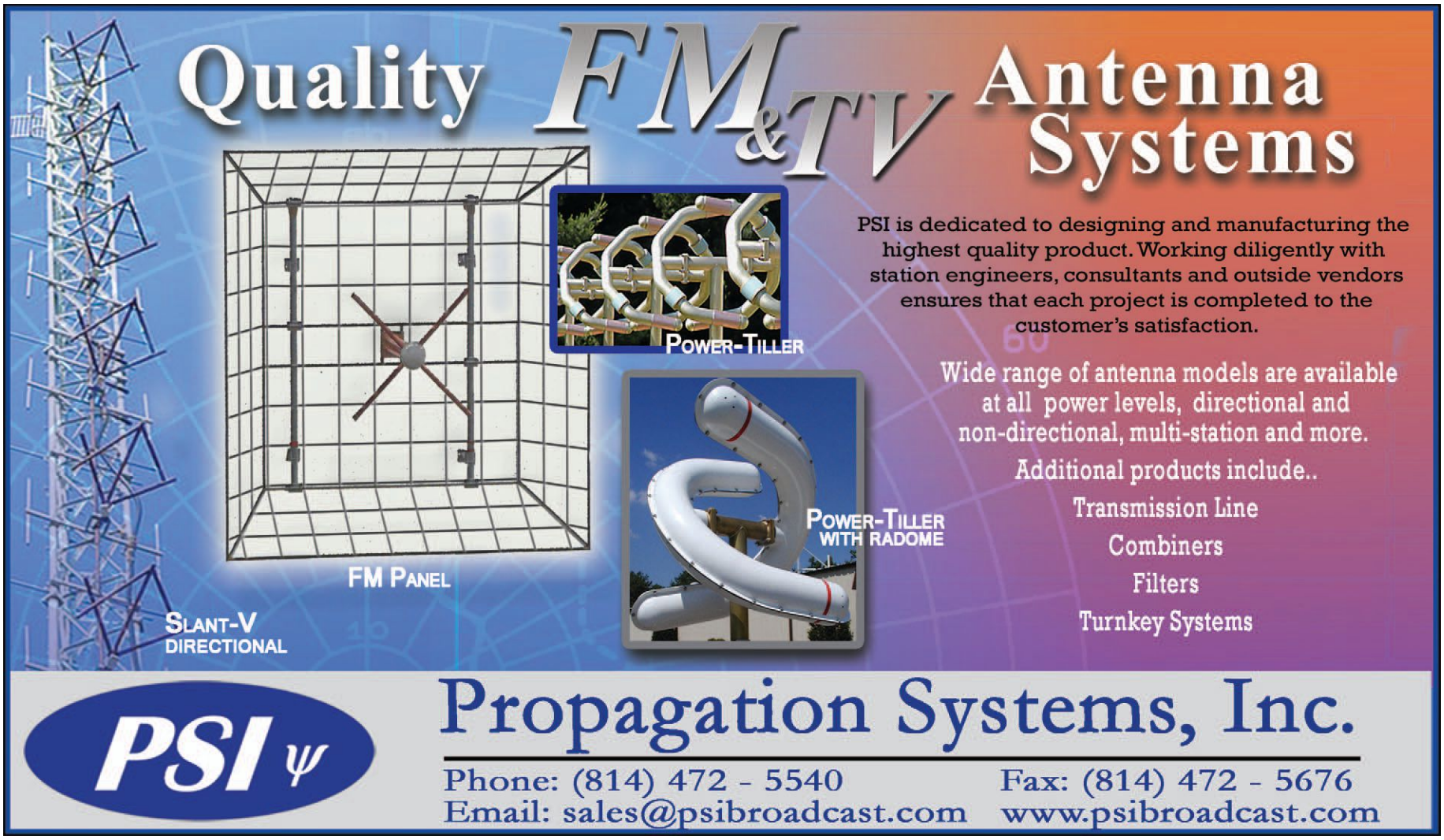
Figure 3

Channel	Raise	Lower	Metering
1	Osc On	Osc Off	Not Used
2	CW	CCW	Azimuth

As you swing the antennas around while aiming them; the pitch might rise too high to pass through the telephone to the remote site, so that the remote op won't be able to hear it. If this happens, move the receive antenna to get the tone back down into audibility, aim the remote antenna end, and then do the receive end adjustment last.

This project will admittedly take some time to assemble and install. You'll get to work out the relay interfacing and azimuth reading. Once it's complete, you'll appreciate how quickly the antennas can be aimed and remotes can be ready to go on the air. Overall, it will provide much more flexibility and value to your remote pickup system.

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



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Tips From the Field

– More Tips on Page 36

Tech-Tips from Radio Guide Readers

#1 Don't Drag 'Em ... Roll 'Em

from John Stortz

A friend and former contract engineer, Art Karmgard, once asked me to help him replace an old 10 kW tube transmitter with a new solid-state one. He needed help moving the two units. Art was equipped with a bucket full of 1" steel shafts, maybe about 10" long. After removing all connections to the old transmitter, slipping a couple of those rollers under the front edge removed most of the floor friction and made it possible for one man to push from the back. We rolled the transmitter into the narrow hallway, re-oriented the rollers, then rolled it into a back room, passing the new transmitter and clearing the way for the new transmitter to be rolled into place the same way. On flat floors, it is extremely easy. There are just a few simple laws of physics to keep in mind.

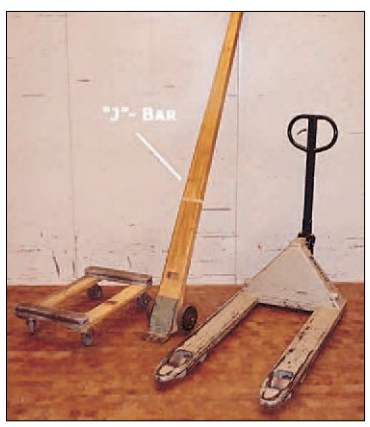
1. As the object moves along the floor, the roller is also moving along the floor, as well as toward the rear of the object. Eventually, the rollers will be further back and the majority of the weight will be shifted to the leading side of the roller[s]. Before this happens, additional rollers must be placed at the front or the object will tilt forward and friction will be opposing further movement.

2. Eventually, the rollers will come out the rear. So it is good to have at least three sets of rollers in order to have one (preferably two) sets under the object at all times.

3. When turning a corner, you can either completely clear the corner, then rotate the rollers under the object by 90 degrees, or place the leading rollers at a 30-45 degree angle and watch the object turn the corner with ease. Notice the object turns the same as a car when the front wheels are turned to one side or the other.

4. So far, the discussion has assumed the object is being moved over a flat floor. Moving up or down an incline is more tricky. In such cases, a professional moving company would be the wise choice.

A few years later, Art moved away and gave me his bucket of steel rollers. But I have found Sched-40 PVC pipe can move most objects. I keep three in my work truck. It makes it easy to move a heavy item in or out of the back.



Furniture Dolly, J-Bar, Pallet Jack

Other items that can help you move heavy gear are: a furniture dolly, a J-Bar, and a pallet jack. They are all simple but effective tools.

John Stortz is the Chief Engineer at Moody Radio Florida (Lakeland, Ft Meyers/Naples, Sarasota and Crystal River), with studio in St Petersburg, Florida. You may email John at: jstortz@moody.edu

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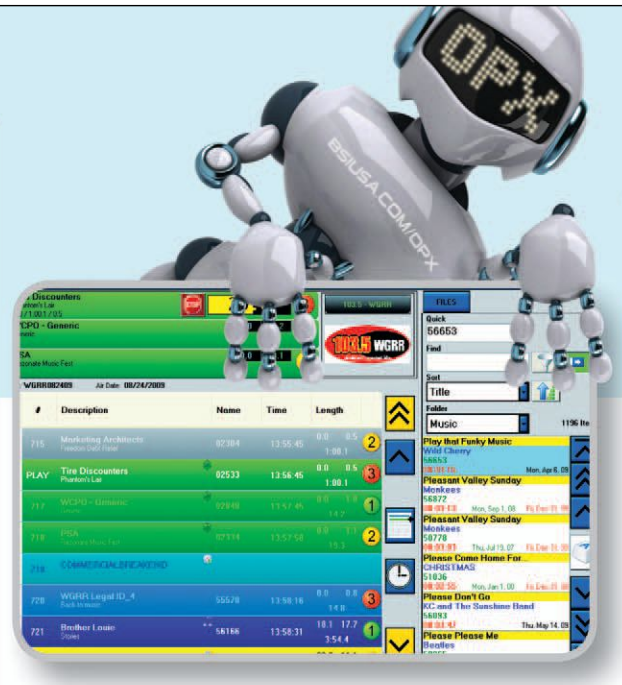

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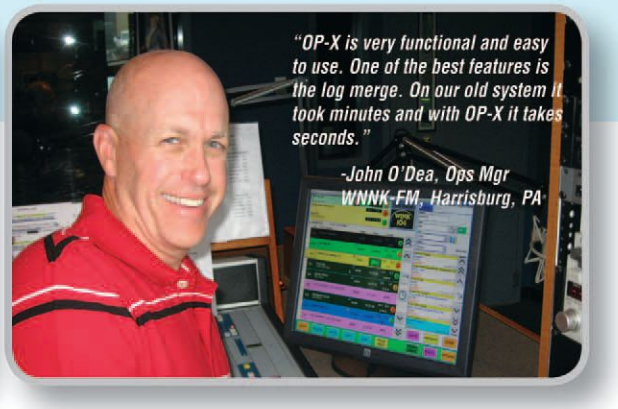

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Tips From the Field

– More Tips on Page 34

Tech-Tips from Radio Guide Readers

#2 Your Email is a Spam Magnet

from Steve Tuzeneu

I expect when you read the headline you thought, "Huh? I don't think so." Whatever you're thinking, you and your station may be doing things in such a way as to make your e-mail address a spam magnet.

Have you ever checked your e-mail at the station and thought: "Where is all this spam coming from?" If you are like most people, you don't spread your e-mail address all over the Internet, but you are still getting all those obnoxious Viagra and Cialis offers practically every day.

Or how about the really trashy stuff like the girl who invites you to see her newly posted pictures? Those disgust me – I know where they're going with *that* one. The funniest spam I get is from the dear old lady who wants to leave me twenty million dollars to do the work of the Lord. I also get e-mails informing me that I am the beneficiary of a huge estate, and all I have to do is send them my contact details. Yeah right! Can you say scam?

So how do these people get your e-mail addresses in the first place? Well, the answer is simple: you posted it on your station's website! That's right! It's out there where everyone can find it and add it to a mailing list. Large numbers of people visit your website and copy e-mail addresses manually for their own use or to sell to someone else. Other people use software to capture your e-mail address from your website. Did you know that companies sell software that harvests e-mails from websites every day?

As I write this article, I have an advertisement open in my browser. It's by a company called Lead Tools Direct, based in Rockland, California. They sell software for a one time fee of $79.00 that extracts e-mail addresses and contact information from websites all over the Internet. You can buy this software to target businesses or consumers.

Now you must be thinking, "What can I do about this?" Excellent question. For starters, don't post anyone's e-mail address on your website – remove those e-mail addresses right away. As mentioned before, software robots are working around the clock to collect those addresses. Instead, use a form. Some companies and radio stations will send visitors to another page when they click on the "contact" link. On that page is a form where they enter their name and e-mail address, and below that, in a text box, the message they wish to send. But before you can do that, you need a thing called a "CAPTCHA" page."

For the definition and a visual display of what a "CAPTCHA" is, visit: www.captcha.net On that site, you will get a bit of history and an explanation of why it is used. If you don't have it already, this would be an

excellent tool to use on your website to drastically cut down on spam. Since "robots" can't read images, they can't fill out your CAPTCHA form and send you spam.

In addition, you may wish to close out some e-mail addresses and create new ones. Instead of john@wnut.com, you may need to delete that one and create a new one for John something like this: jsmith@wnut.com.

It is difficult to get off of mailing lists once your e-mail address has been passed around to spammers, so the steps I have mentioned will help put a stop to it. It will take a visit with your station's webmaster, some time to set up a contact page with the "CAPTCHA" feature installed, and a policy of keeping staff e-mails private. It's worth the time and effort after you find you won't have to be busy deleting email you don't want.

Steve Tuzeneu is an experienced radio station manager and engineer and is the Director of Engineering for Sonshine Media, LLC. You may reach him at: steve-at-sonshinemedia.net

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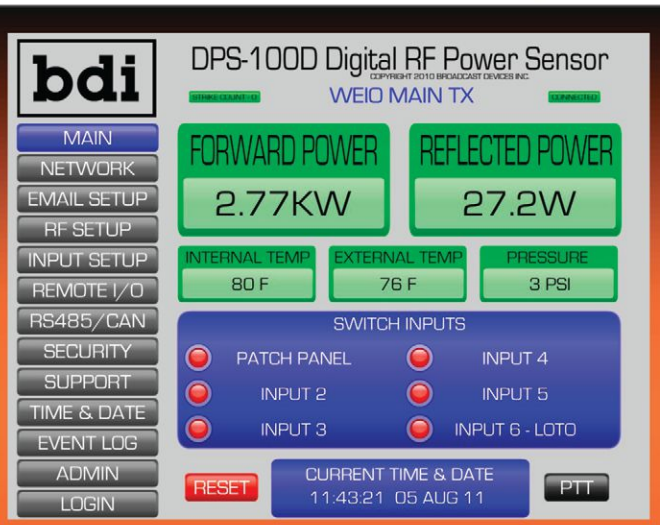

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LPFM Guide

So You Want to Own a Radio Station?

by Leo Ashcraft

Setting up a Low Power FM Radio Station is not as easy as it can appear at first glance. Low Power does not translate to easy licensing. Remember that this is a serious issue and that you cannot start without having planned everything. Knowing where to start is important, and it may not be where you might think.

Licensing

You might be surprised to find that many would be LPFM station operators first contact me looking for equipment. Equipment is one of the last steps in the process.

Your first step in opening any radio station is securing the license. It's not like dropping by the local courthouse, filling out a form and walking out with a business license. There are procedures that must be followed. Engineering must be prepared and submitted to the FCC, proving the station can coexist with existing broadcast services.

Unfortunately, the FCC handles broadcast station licensing on its own schedule. I misuse the word "schedule" here as the Commission doesn't seem to have any rhyme or reason when and why they open a filing window. Before this quest to get on the air begins, the FCC must open a filing window. These don't happen often or according to any predetermined schedule. In fact the last LPFM radio filing window occurred more than ten years ago.

The good news is, you won't have to wait ten years to apply for your license. An LPFM filing window is expected to open briefly in Summer 2013. However, there are preparations that need to be taken to be ready for this window. You'll need a non-profit organization, one preferably two years or older. But don't give up if you're just a sole radio guy wanting to fulfill his/her dream of owning a radio station. A nonprofit is easy and inexpensive to start and should not be a barrier to applying for an LPFM station.

There are various other items that need to be considered and prepared in advance of a filing window. Tower location – will you build your own or rent space on an existing tower. Studio location – local zoning issues, etc. There are many pitfalls along the way, and it is highly advisable to secure a broadcast engineer to handle the process for you. You have one shot at this; don't blow it by trying to handle it yourself. A reputable engineer can save you thousands of dollars along the way, many headaches, and maybe your entire dream.

Equipment

When you finally have a Construction Permit (CP) in hand, it is the time to start looking at equipment. Usually, an LPFM radio station has a very low budget, and for this reason some people may think to look around for the lowest prices on the equipment that they need. I understand that price is a big issue, but money spent wisely can prevent possible future failures, station down-time, and lost listenership.

Antenna

This is a very important part of the transmitting system. The choice needs to be made according to the area where it has to be installed. Stainless steel is always recommended, especially where the weather is harsh or in close proximity to the ocean. Bad weather (ice and snow) can affect the performance of the antenna unless protected with a fiberglass radome. A poorly built antenna may also cause a failure in the transmitter creating a chain reaction.

Installing the antenna is something that needs to be done with the utmost care. Once the antenna is mounted on its mast, you must understand that it has to face many possible weather conditions; for this reason, spending

(Continued on Page 40)

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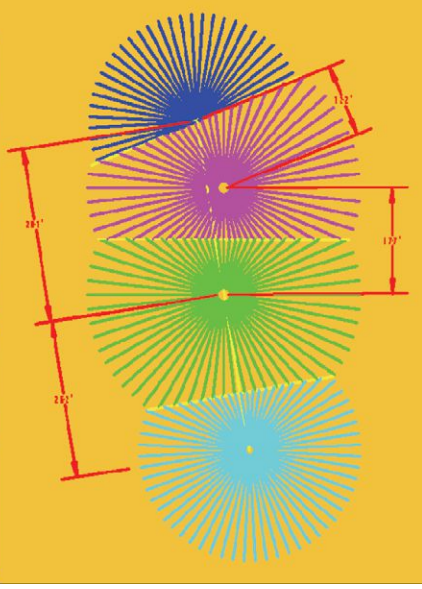

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LPFM Guide

So You Want to Own a Radio Station?

– Continued from Page 38 –

more time in the installation will save you more money in the future. When rigid or semi-rigid cable is used for the feedline, it is always advisable to connect it to the antenna through a 3-foot pigtail, made with flexible cable. In this way, vibrations will not be transmitted to the antenna connector, and it will act as a "spring" between the antenna connector and the rigid line.

It is very important to properly tape the connectors with vulcanized tape. They must be well protected so that water does not go in between the rubber protection and the copper shield. If this occurs it will cause a rapid deterioration of the cable with possible increase of the reflected power.

Grounding the antenna is another very important issue. Cable companies sell grounding kits for almost every type of cable. It is best to bond the feedline to the tower every 5 feet with these grounding devices. If this is not possible, then at least provide grounding every 10 feet.

Cable

The choice of the cable is crucial. Most of the time stations consider having 30-50 more Watts of power from the transmitter. However, an incorrect choice of cable can cause a substantial loss of power. It is important for stations to understand how power can be gained and lost.

Half-inch cable should be the minimum requirement for an LPFM. It is still maneuverable and has a contained loss. Avoid using low cost cable like RG-8 or RG-213, as you will lose almost all of your transmitting power.

As previously mentioned, good grounding is an important requirement. The cable should never be tightly curved, since in that point the impedance could vary and the performance of the cable will be compromised.

Particular care should be taken where the cable enters the building. Make sure it curves adequately to enter the building and be careful not to smash the cable. Do not bend it sharply along the corners of a wall, and make sure that it is fastened and out of the way, so that no one can inadvertently damage it when moving around the site.

Transmitter

Usually this is considered as the first item to purchase, but for me it is the last piece of the chain. For example: In many cases the FCC has granted your Low Power FM Radio Station 100 Watts ERP which means, TX Power + Antenna Gain + Cable Loss + Other losses = 100W

When using a single bay antenna with a typical power gain of 0.47 and 100 feet of 1/2-inch cable, the choice ends up being a 250 Watt transmitter.

Remember that the transmitter is an electronic device and it is subject to stress. When you buy a 250 Watt transmitter and you run it at 250 Watts, it's similar to running a fast car at its maximum speed 24 hours a day. You must be aware that there is a good chance that something could happen, especially if everything has not been installed properly.

If we have a 500 Watt transmitter and we run it at 250W the product has more flexibility and less stress – like traveling in a comfortable car at 70 miles per hour. A 500 Watt transmitter is somewhat more expensive, this is true, but the additional outlay will more than pay for itself in the long run, in terms of fewer problems and less repair expenses.

Another solution could be using a 2-bay antenna. With this array, in the same situation, you will need only 150 Watts for your 100 Watt ERP.

If a 500 Watt transmitter is not in the plan, then it is a good idea, instead of buying a 150 Watt transmitter, to buy a 250 Watt and running it at 150 Watt maximum. But remember, LPFM stations must use FCC type certified transmitters, so that cheap import from Brazil may not be so cheap after an FCC inspection.

Leo Ashcraft is CEO of Nexus Broadcast "Broadcast Outside The Box!" He is a broadcast consultant with over 28 years engineering experience and an avid LPFM advocate for over 15 years. More information at NexusBroadcast.com or 888-672-4234

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Small Market Guide

Not a Time to Celebrate But a Time to Cooperate

by Roger Paskvan

The fourth of July is usually a holiday of fun and time to gather with friends and family, to celebrate America's birthday and enjoy the nice summer days. Unfortunately, for many of us that was not the case this year. In small marketville, we were recovering from a massive storm that hit the evening of July 2. Our listening area was hammered with a large thunderstorm featuring 83 MPH straight line winds, knocking out power to more than 10,000 homes in the area.

At 8:17 p.m. the station went dark and the generator kicked in, keeping us on the air. Our emergency weather team arrived in minutes and began broadcasting the storm's path and emergency information for the general public. The EAS system kept going off giving storm alerts, adding to the excitement. The winds increased all the way up to 80+ miles per hour. It was horizontal rain, something I had never seen in northern Minnesota. To me, the outside looked like hurricane Katrina.

The winds kept building, then the trees started to snap like tooth picks. A two foot diameter oak cracked and fell over three parked cars right in front of the building. Next we heard a tremendous crash and the STL tower next to the building fell over and smashed into the roof. That took care of the FM stations – the path to the transmitters six miles away was gone.

Our emergency crew ran into the AM control rooms, simulcasting both AM stations with weather information. Someone called the station and told us that our two AM's were the only radio stations on the air in the entire area.

Just as fast as it came, the storm dissipated and left its ugly imprint everywhere. Our town was an absolute mess, and "no travel" messages went out to everyone – "Stay off the streets as the city crews are worked all night to make the roads passable."

Within the hour, our station manager, owners and many of our staff began the process of rebuilding. We needed to get the FM STL back up to feed the FM tower. The station staff pitched in and worked through the night removing all the damaged antennas and salvaging coax. Flood lights lit up the sky as our staff enjoyed a most cooperative time. Tripods and poles were erected for antenna mounts to hold the STL antennas.

Of the two STL paths, we were able to get a signal to the transmitter only with the digital STL. The Mosley analog signals were too noisy to use since we were only 10 feet off the roof. Our 90 foot tower had been twisted up into pieces. Facing the dilemma, a quick meeting resolved the issue of how to feed the FM stations with an audio signal. Our station manager came up with the idea of feeding one station on the digital left channel and the second FM station on the right channel. Of course this meant both stations would be bridged left to right and be in mono. The plan worked, and by early morning we were on the air with two FM stations, loud and clear.

Electricity returned by morning for the station, but some of our hardest hit listening areas were without power for several days. Calls poured in all the next day – emergency requests, with the dominant theme: "When is the power going to return?" Our station suspended regular programming and stayed with emergency programming through the Fourth of July. There were reports that the local stores had sold every generator in the entire town – how we have become so accustomed to electricity.

Yes, the emergency had brought us together and the entire staff worked around the clock in a spirit of cooperation. It was a learning experience and a good test of our emergency preparedness. Another chapter in the pages of small market radio comes to a close.

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

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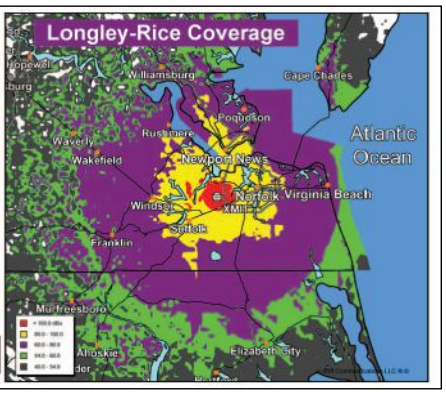

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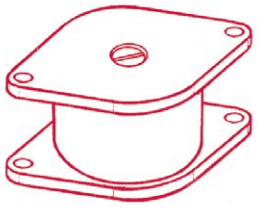

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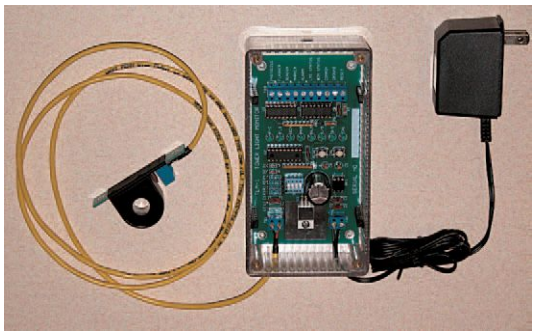

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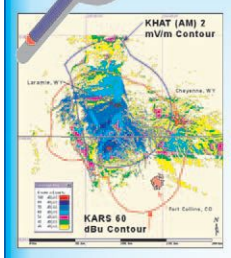

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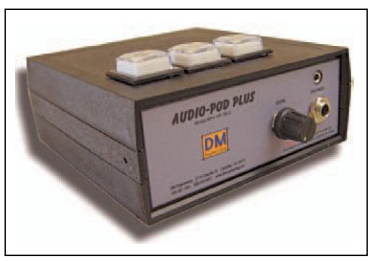

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For more information: **www.dmengineering.com**

Elenos – *ETG 5000*

The new Elenos ETG 5000 is the most energy efficient transmitter on the market, at 74% or higher.

The ETG5000 will save broadcasters on electrical operating costs *and* it will also save on your air conditioning bills because the Elenos transmitter stays cool – even in the most extreme heat.

The ETG5000 will save on rack space too – it only takes up 4RU of space.

Only with an Elenos transmitter will you find this much reliable power in this small space. There's no worry about fan failure with six ventilation fans – extra fans keep it running cool. Even if the fans stop – this intelligent transmitter will keep working! The ETG-5000 also comes with a built-in exciter.

All Elenos transmitters come with a standard 3-year warranty and 24/7 tech support.

Contact Elenos USA for details. 1-855-ELENOS-0. (1-855-353-6670)

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

Nautel – *NVLT*

Nautel NVLT 3.5 – 10 kW Analog FM Transmitters.

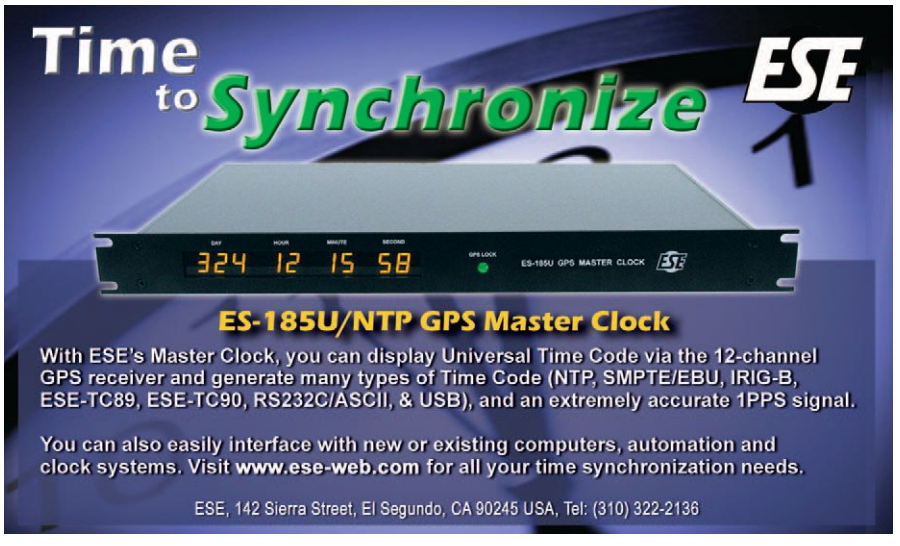
Nautel has recently launched the new NVLT line of transmitters that marry the proven architecture of its highly successful NV Series with the intelligent features of the award-winning VS Series.

Operational capabilities include analog or AES digital input; PushRadio™; Livewire IP Audio I/O; Shoutcast or IceCast streaming input; local content storage; USB audio backup; dynamic RDS, dual SCA and stereo coders; scheduler and playlists. An Orban Inside™ option with full Advanced User Interface (AUI) integration is also available.

Control capabilities include full local or remote access via Nautel's award-winning, web-based AUI with onboard audio spectrum analyzer, modulation monitor and other powerful instrumentation. The advanced remote capabilities of Nautel's AUI can help engineers save time, trips and money.

The NVLT Series has an integrated, full-featured direct to channel digital exciter with industry leading performance specifications and modular solid-state, hot-swappable, redundant architecture, and boasts the highest efficiency in its class at 72%.

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



Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

Broadcasters Clinic & National SBE Meeting
October 9-11, 2012
Madison Marriot West, Middleton, Wisconsin
www.wi-broadcasters.org

SBE 22 Broadcast and Technology Expo
October 11, 2012
Tuning Stone Resort and Casino, Verona, New York
www.sbe22expo.org

College Broadcasters Inc, (CBI) Convention
October 25-27, 2012
Sheraton Altanta Hotel, Atlanta, Georgia
www.askcbi.org/?page_id=1500

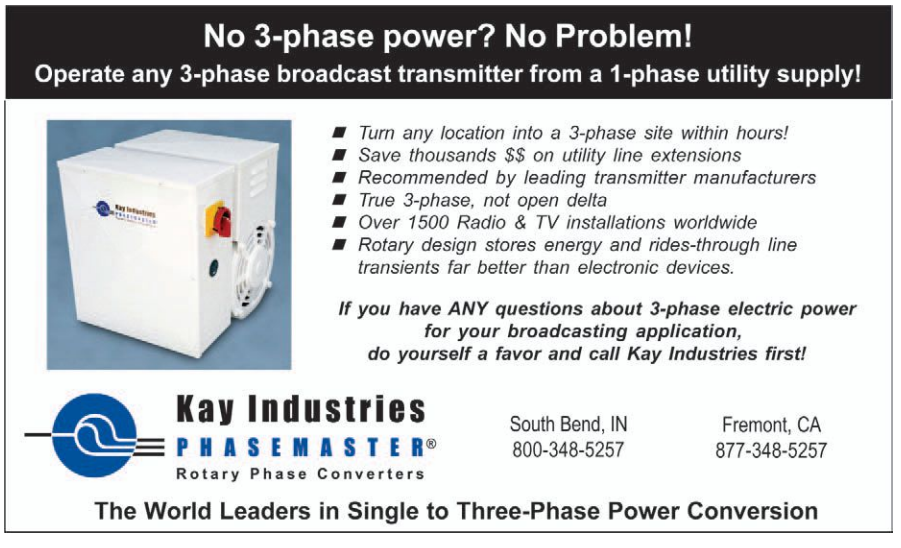
AES 133rd Convention
October 26-29, 2012
Moscone Center, SanFrancisco, California
www.aes.org/events/133/

2013 CES Conference
January 8-11, 2013
Las Vegas COnvention Center, Nevada
www.cesweb.org

NRB Convention
March 2-5, 2013
Nashville, Tennessee
www.nrbconvention.org

Radio Guide Advertiser Info – Sep/Oct 2012

Advertiser - Page	Website
25-Seven Systems - 46	www.25-Seven.com
Altronic - 39	www.altronic.com
AM Ground Systems - 38	www.amgroundsystems.com
Aarlon - 41	www.aarlon.com
Armstrong Transmitters - 43	www.armstrongtx.com
Arrakis - 17	www.arrakis-systems.com
Array Solutions - 40	www.arraysolutions.com
Axia - 33	www.axiaaudio.com
Bay Country - 41	www.baycountry.com
BEXT - 41	www.bext.com
Broadcast Connection - 35	www.broadcastconnection.com
Broadcast Devices - 36	www.broadcast-devices.com
Broadcast Software Intl. - 34	www.bsiusa.com
BSW - 26	www.bswusa.com
BW Broadcast - 21	www.bwbroadcast.com
CircuitWerkes - 19	www.circuitwerkes.com
Coaxial Dynamics - 35	www.coaxial.com
Comrex - 1, 5	www.comrex.com
Davicom - 43	www.davicom.com
DM Engineering - 47	www.dmengineering.com
Econco Tubes - 43	www.econco.com
Enco - 29	www.enco.com
Elenos - 4	www.elenos.com
ESE - 46	www.ese-web.com
Gorman Redlich - 42	www.gorman-redlich.com
Graham Studios - 46	www.graham-studios.com
Henry Engineering - 2	www.henryeng.com
Inovonics - 24	www.inovon.com
Jampro - 20	www.jampro.com
Kay Indistries - 47	www.kayind.com
Lightner Electronics - 18	www.lightnerelectronics.com
Michael Patton - 47	www.michaelpatton.com
Micro Communications - 42	www.mcibroadcast.com
Moseley - 15	www.moseleysb.com
Myat - 13	www.myat.com
Nautel - 7	www.nautel.com
NTI - 37	www.ntiam.com
OMB America - 9	www.omb.com
Omnia - 25	www.omniaaudio.com
ProAudio.com - 23, 39	www.proaudio.com
Progressive Concepts - 37	www.progressive-concepts.com
PSI (Propagation Systems) - 32	www.psibroadcast.com
Radio Systems - 30	www.radiosystems.com
RAM Systems - 22	www.ramsyscom.com
SAS (Sierra Automated Sys) - 11	www.sasaudio.com
SCMS - 31	www.scmsinc.com
Shively - 28	www.shively.com
Systems Store - 47	www.systemsstore.com
Telos - 27	www.telossystems.com
TFT - 41	www.tftinc.com
Transcom - 43	www.fmamtv.com
Wheatstone/Audioarts - 3, 48	www.wheatstone.com



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WHEATNET
THE INTELLIGENT NETWORK

"gotta have it!"

"Wow, Wow!"

Rick Hunt, Vice President & Director of Radio Engineering, Entravision Communications Corporation

"Leave it to the exquisite design talents of Gary Snow and the Wheatstone team to really hit the nail on the head. The LX-24 is not only the most functional, feature-laden IP based console for radio, it also raises the bar for the finest ergonomic radio command center on the planet."

Tim Schwieger, President / CEO, BSW- Broadcast Supply Worldwide

"A high performance, reasonably priced, great looking console integrating common sense features such as overload indicators for meters and ergonomic controls. Very impressive and well thought out."

Benjamin Brinitzer, Regional VP Engineering Clear Channel Media & Entertainment

"Wheatstone continues to hit balls out of the park and this year they did so again with the LX-24 control surface. This new product marries the best of the old (modular design architecture) with the new (Audio-over-IP)."

W.C. Alexander, CPBE, AMD, DRB, Director of Engineering Crawford Broadcasting Company

"By far the most elegant and feature rich control surface on the market. The attention to detail and functionality is remarkable. Its architecture, such as "hot swappable" modular design, is a winner. A traditional meter bridge is appreciated by users and your millwork guy will appreciate the fact that it's a table-top design."

Kris Rodts, Director of Engineering, IT & Facilities, CKUA Radio Network

"Considering the LX-24's attractive good looks, modularity, traditional console layout and functionality, I can't wait to get my hands on one!"

Greg Landgraf, Senior Engineering Manager, Corus Radio Western Canada

"I didn't think Wheatstone could improve upon the E-Series of consoles, but they have done it with the new LX-24. This is a beautiful, well designed console and the individual faders, integrated meters with overload indicators and low profile table-top design make this a must have for our facilities."

Michael Cooney, Vice President of Engineering & CTO, Beasley Broadcast Group, Inc.

"Cool and sexy (I sound like Bruno from Dancing with the Stars). A great addition to the WheatNet-IP family."

Norman Philips, Vice President of Engineering, Townsquare Media

"I am very impressed with the sleek new design that incorporates single channel-strip architecture, integrated metering and stereo cue speakers in a thin, sloping chassis that needs no cabinetry cut out. Well done."

Erik Kuhlmann, Senior Vice President of Engineering, Clear Channel Media + Entertainment

"Wheatstone's innovation continues to make AoIP a viable product for professional broadcasting facilities. Just a few things that make the LX-24 stand out to me are the clear and decisive metering, individual fader modules, and "out of the box" thinking with faders for the headphone and monitor volume controls instead of rotary knobs."

Phillip Vaughan, Chief Engineer KFROG, CBS Radio

"The LX caught my attention on the NAB Show floor. The look, form and function are unlike any other IP console available today. The easy-to-read buttons and displays are just second to none, not to mention the most bang for the buck. I can't wait 'til I have the opportunity to deploy my first LX."

Anthony A. Gervasi, Jr., Sr. Vice President Engineering & Technology, Nassau Broadcasting

Wheatstone
LX-24
ADVANCED MODULAR NETWORKABLE CONSOLE

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