Radio Guide

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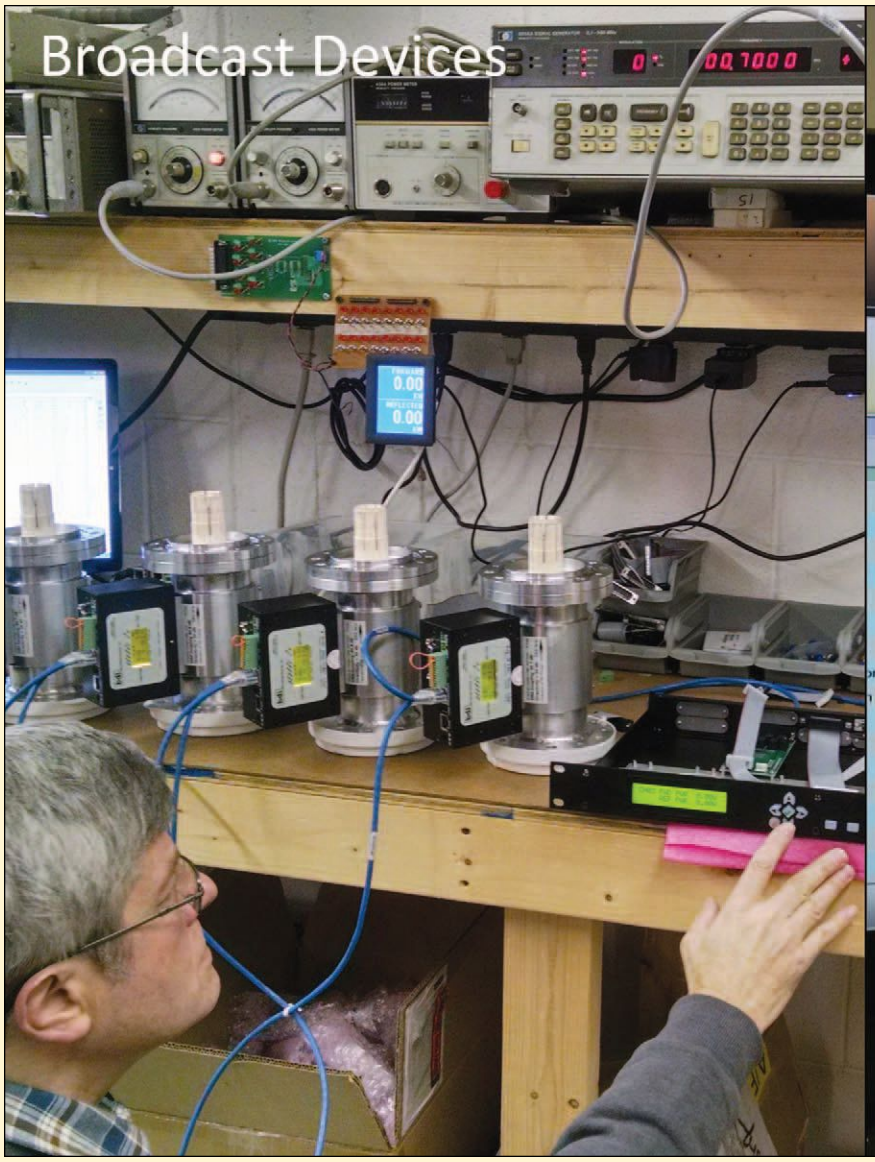
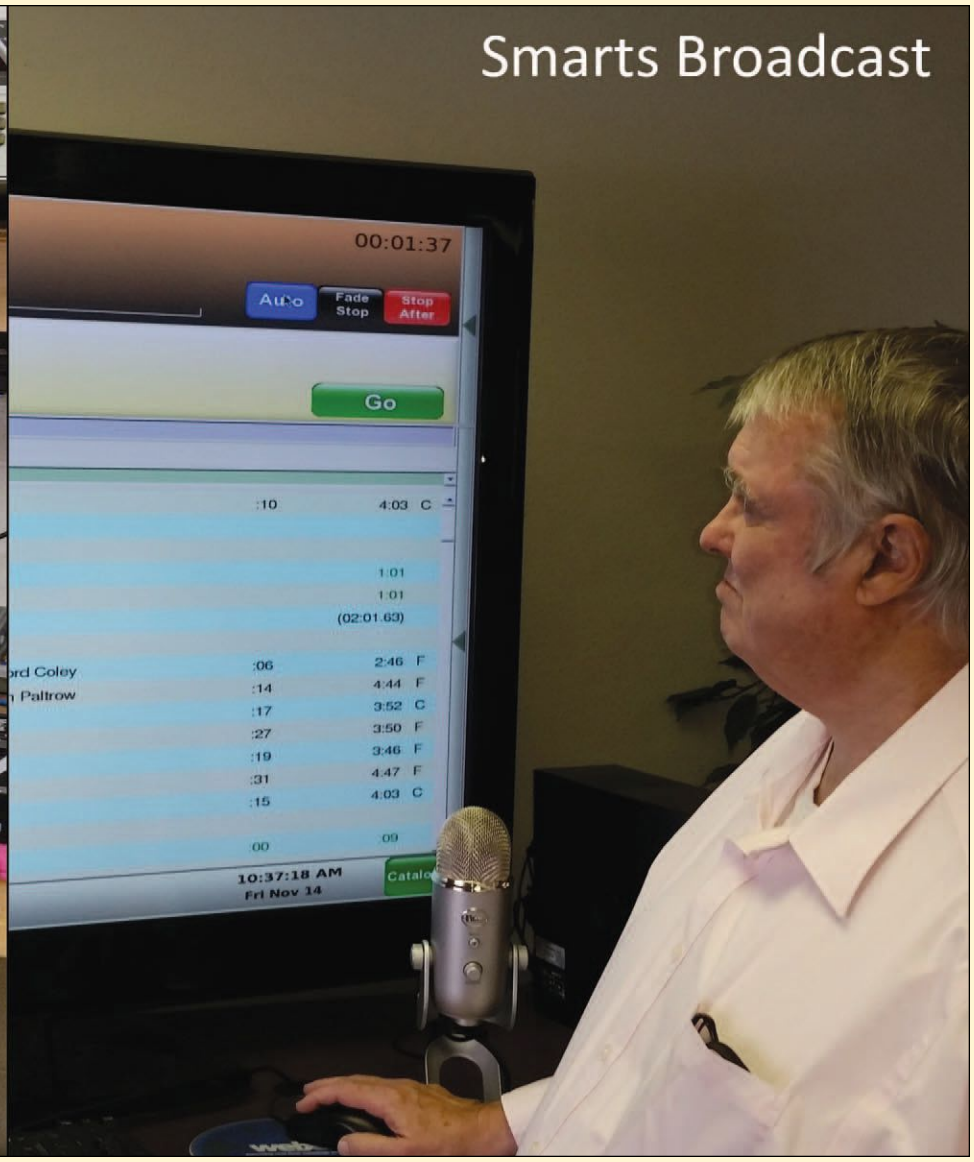
November-December 2014 – Vol. 22, No. 6

Small Companies – Large Performance





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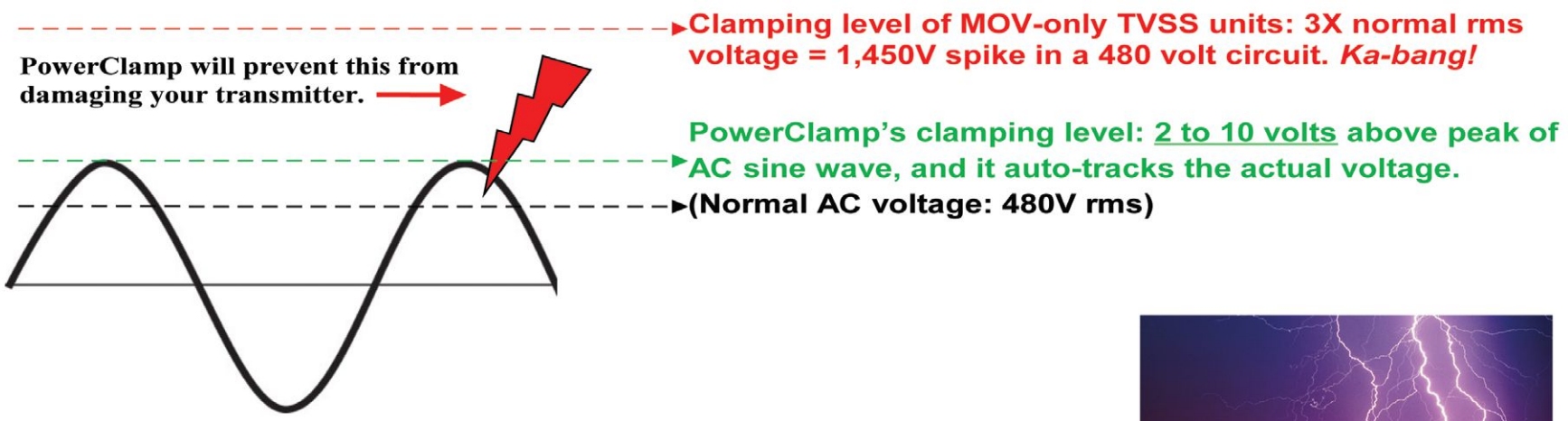

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Contents

November-December 2014

Cover Story 6
Small Companies – Large Performance

Studio Site 8
New Challengers to the "Mighty Mics"

Tech Management 10
Finding Good Engineers

Links and Lines 12
The Humble Program Loop

FCC Focus 14
Royalties and Recordings

Transmitter Site 16
Keeping Your Transmitter Cool

Transmission Guide 18
What Do The All-Digital HD-AM Test Mean?

Social Media 20
Integrating a Chat Room With Live Radio

Chief Engineer 26
Analog Console Basics

Disaster Preparedness 30
Staying Alive in a Pinch

Operations Guide 34
A Substitute For Nothing

Survival Guide 38
Remember What Your Momma Taught You

Small Market Guide 42
The Day My Continental 816R Lost All Control

Service Guide . . . . . 44 & 45
Radio Equipment, Products, and Services

Final Stage 47
Convention, and Event Register – Advertiser Information

Radio Guide

Volume 22 – Issue 6

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In This Issue

Critical Content for Radio

Cover Story – *by Elaine Jones (page 6)*

Small Companies: *"In this series, we talk with the founders of small broadcast manufacturing companies to learn how they got started in the business and their challenges of operating as a small business in the Radio industry. This segment features John Schad, who runs Smarts Broadcast Systems with his wife Jan, and Bob Tarsio of Broadcast Devices. Smarts Broadcast Systems was founded in 1984; Broadcast Devices, Inc. began operation a year later."*

Studio Site – *by George Zahn (page 8)*

New Challengers to the Mighty Mics: *What we're seeing is an increasingly competitive and congested arena of dynamic microphones, including models such as the Heil PR40 large diaphragm announce mic, the MXL BDC-1, the ElectroVoice RE320, the Rode Procaster, or even the Telefunken ELA M80. These mics represent a level of price just below the upper tier dynamics. While they may not be the "household" models many of us have used, I'm interested to hear from stations who may have added one, or converted their studio to any of these or other dynamics, and how they work for you.*

Small Market Guide – *by Roger Paskvan (page 42)*

The Day My Continental 816R Lost All Control: *"Well, this is another one of those small market things that gave us grey hair. In a routine maintenance night, my engineer noticed that he couldn't control or make any adjustments on the Continental 816R for our country station. He shut off the high voltage and checked the controls. The motors buzzed and the probes went in and out of the cavity as usual. Okay, this must have been a fluke.*

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Cover Story

Small Companies – Large Performance

by Elaine Jones, owner, Elaine Jones Associates

In this series, we talk with the founders of small broadcast manufacturing companies to learn how they got started in the business and their challenges of operating as a small business in the Radio industry. This segment features John Schad, who runs Smarts Broadcast Systems with his wife Jan, and Bob Tarsio of Broadcast Devices. Smarts Broadcast Systems was founded in 1984; Broadcast Devices, Inc. began operation a year later.

Radio Guide (RG): *What events led to the creation of your company?*

John Schad (JS): Actually, it was the resignation of our long-time traffic person at our radio station in Emmetsburg. I had heard that inexpensive computers were coming on the market, and called a vendor to find out if I could get one. He promptly sold me a computer, and then told me that I needed software. At that point I didn't even know what software was, but I hired a guy part time from our community college, learned about software and wrote our initial traffic program. We used it on our own station (KEMB, Emmetsburg, IA) and eventually began selling it to neighboring stations. That's what launched Smarts Broadcast Systems. SMARTS is actually an acronym for "Small Market Accounts Receivable and Traffic System."

John and Jan Schad

Bob Tarsio (BT): I started the company in 1985 with Frank Burgert, who at the time was a work colleague. We started the company principally to build retrofit electronics for audio consoles. We recognized a market for better electronics in other company's products and decided that this would be a good starting point. Frank decided in the 90's that he wasn't interested in continuing so I bought out his share of the company and pressed on myself. About 90 days after the events of 9-11, when I watched the twin towers fall, my job as a corporate director of engineering for a New York media company was eliminated. My wife encouraged me to pursue BDI full time; I listened to her and since then BDI has grown.

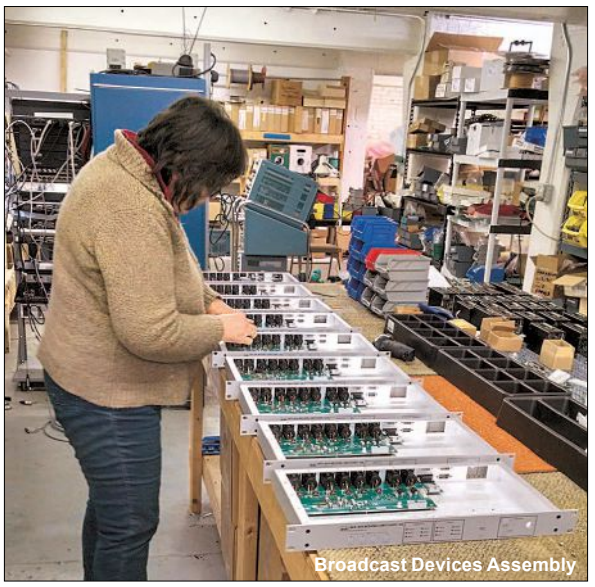
RG: *What was your first product and what did it do?*

JS: The first product was billing, accounting and traffic for small to medium market stations. It ran on a Radio Shack TRS-80 computer and would prepare a broadcast log, keep track of billing, etc. The billing-accounting and traffic program was followed by the first digital audio system in the industry, the "Smartcaster." We actually delivered a unit into the field the same week that another vendor managed to get a digital product into another station, but we won – because ours worked!

BT: Our first products were a set of replacement electronics for the Gates/Harris "Snowplow" line of consoles. The HPR-100 microphone preamplifier and HLR-100 Program Amplifier were designed to be direct plug-in replacements for the electronics that were in the Gates Executive, Diplomat, Ambassador and President model consoles. Initially we wanted to make radio stations sound better. What we found out was that customers wanted replacement electronics for their consoles because they could no longer get parts and support from Harris on this product line. In fact Harris actually referred customers to us. It was the start of a long relationship between Harris and BDI. We went on to do other manufacturer's console retrofits including RCA, McMartin, and McCurdy Radio Industries.

RG: *What has been your biggest challenge as a small company?*

JS: There are several. We grew fast enough we actually bought out a competitor in Dallas, a long way from our Emmetsburg operation. Now we had major offices in two places hundreds of miles apart, and that required new procedures to keep everyone working together. At the same time we needed to do it without losing the personal relationships we were developing with our customers. Our success in doing just that is probably the greatest reason for our overall business success.


Broadcast Devices Assembly

BT: The biggest challenge today to any small business is access to capital. We have always been privately held and have never borrowed money to finance operations. In today's environment you need to have access to capital or you don't grow. Speaking of growth, another challenge is growing the business outside of North America. Our products are sold and distributed worldwide and export has been an interesting learning curve to say the least.

RG: *How do your current products or services differ from your original offerings?*

JS: We now offer not only a billing and traffic system, but a complete automation product called Skylla. It is designed to work in any size radio station regardless of market size. It runs under the Linux operating system, which has saved us from the problems that many of our competitors have writing their products in Windows. It has also insulated us from many of the Windows-born viruses that can bring down stations using the Windows system.

BT: Our current products are a far way down the line from our first products. Today some of our best selling products are RF power meters. We introduced the first antenna monitoring product, private labeled for ERI in 2006. Since that time we continue to be an O.E.M. supplier to ERI of this product line, and in addition manufacture RF power meters, antenna monitors, site monitoring equipment and motorized RF switch controllers under our own name, which are available through our dealer network worldwide.

We still manufacture audio equipment as well – that is the other half of our business. Most of our audio offerings today are digital but we still offer some legacy solutions such as FM composite audio switching and distribution products. Our original CDS-200 was our first composite audio product introduced in 1991. We continue to build this type of product with newer models and more up to date solutions, including a DSP-based composite audio decoder-to-AES3 converter.

RG: *What has been your biggest surprise as a small business in the broadcast industry?*

JS: Probably the explosive development of the Internet and now its rapid deployment in the broadcast business. More than any other technology, the Internet is changing our industry, and we at Smarts have worked hard to embrace that change.

BT: Probably my biggest surprise is the demand for American broadcast products overseas. We, the American broadcast manufacturing industry, are still considered the leader in technology in our business and we have been able to take advantage of that leadership role. We export products to just about any country you can name that we are free to trade with.

RG: *What's next for your company? What do you envision for the future?*

JS: More change due to technological growth. We see a secondary wave of consolidations, not of large stations in many large markets, but clusters of small stations in many small to medium markets, and we are directing our efforts to support those groups. We now have groups of over 20 stations as our customers. It wouldn't surprise me to see 50 stations in the near future. That requires technical systems that go far beyond the cart machine that was our early objective when we started Smarts.

BT: I think the future is actually bright. Broadcast is still a growing business overseas and I think that it still has legs here is the U.S. We continue to look at products that relate to broadcasting, related industries and perhaps something outside of broadcasting altogether. We have always tried to diversify our product offerings even within the broadcast arena. One-product companies tend to have parabolic trajectories. You can be the darling of the industry for a while, with a widget that no one can seem to duplicate, but you need diversity within your product portfolio to stay in it. Eventually you run out of customers to sell your widget to.

Here is what I learned: Never be enamored with your own ideas. They may be good, but you need more than one, and you probably don't have all the good ones! Whatever is next, we will continue to build reliable products that provide a good value. After all, most of what we build is in a radio or television station air chain. That is a responsibility we take very seriously.

Elaine Jones, runs a small business – providing marketing and PR services to equipment manufacturers in the broadcast and AV industries. Her company, Elaine Jones Associates, was founded in 1997. She can be reached at elaine@ejonespr.com

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Studio Site

New Challengers to the "Mighty Mics"

by George Zahn

In the last issue, one of the points of new emphasis in studio performance was the area of microphones. In this issue, we'll revisit some basics, but also look at the new manufacturers who have been making inroads into the microphone market that was once ruled by major companies including Shure, ElectroVoice, Neumann, Sennheiser and others.

For anyone over, let's say age 45, the microphones we grew up with likely have remained our favorites. One of my goals in this article is to solicit your "feedback" (perhaps a poor choice of terms when writing about microphones) on some of the newer microphone purveyors on the market. It's also of great interest to me to elicit responses as to how you test and acquire new microphones, and the input you use to make your choices.

Of the basic microphone families (dynamic, condenser, tube, and ribbon), we'll center a bit more on the dynamic group. For sheer durability, cost and general performance, these are the most commonly used in the broadcast industry. More affordable and nicely-performing condensers may be the choice of some stations. Ribbon mics are becoming more showpieces than workhorses in broadcast applications, simply because of their scarcity, cost, and fragility – despite often exquisite reproduction. Tube mics can be expensive, but some engineers and talent love them.

Dynamic and Durable

The dynamic microphone is the true "low maintenance" option that stations love. They need no special power supply (such as phantom or battery power of the condenser family), and they aren't sensitive to high humidity, extreme sound pressure levels, and mishandling as their relatives might be. Whether you're sending a microphone out with your news department or worried about hosts who shout, these mics will rarely overload, or distort from high SPL, and many in this grouping can be dropped, kicked, run over, or dragged with relative impunity. Please don't try that at home!

Of this workhorse group of microphones is a variety of different pickup patterns, from the omnidirectional ElectroVoice 635A (a standard in news kits for its legendary status as virtually indestructible), to the nice cardioid pattern mics we use in studios and even live on-air music work, with some supercardioid patterns for really tight pickups. Some of those old studio standbys are the Shure SM7B, Sennheiser MD 421, ElectroVoice RE20 or RE27 – most ranging from $300-$500 – and for some stations on more of a budget, even the stage-purposed handheld mics including the Shure Beta 58 or SM58.

Lest you think I'm joking about the 635A, please revisit a past article on some microphone war stories. This mic has been, historically, so durable that owners often send the microphone back to have the body of the mic refinished or re-painted and they feel the microphone is "as good as new." My favorite reader story on the 635A was one reporter who accidentally left the microphone dangling from the trunk of his car after throwing his news kit in the trunk. The mic dragged miles back to the station and still worked perfectly.

The More the Merrier?

What we're seeing is an increasingly competitive and congested arena of dynamic microphones, including models such as the **Heil PR40** large diaphragm announce mic, the **MXL BDC-1**, the **ElectroVoice RE320**, the **Rode Procaster**, or even the **Telefunken ELA M80**. These mics represent a level of price just below the upper tier dynamics. While they may not be the "household" models many of us have used, I'm interested to hear from stations who may have added one, or converted their studio to any of these or other dynamics, and how they work for you.

While cost limits most stations to using dynamics as the primary studio microphones, some stations will move up to condenser mics for special announcing, primary announce microphone, or for guest music applications. The dilemma is that these true (more expensive) or electret (slightly less expensive) condenser mics will generally cost you more than the dynamics. The advantage is crisper high frequency and sometimes richer sound.

The standard condensers in some studios include the likes of the Neumann TLM 102 or 103 (ranging from $700 to $1,100). I had the pleasure of using a Neumann U87 for years at one station, without truly appreciating the quality – in this case great audio was wasted on the young.

But there's been a charge of dozens of microphones in the condenser class that are offering price options that rival the mid to low end dynamics, and it may be giving the incentive to switch to condensers in studios. A glance at a variety of catalogues and websites show no less than eighteen (I bet you can find more if you really look) condenser studio mics under $300, from manufacturers including AKG, Behringer, Sennheiser, Audio Technica, CAD, MXL, M-Audio, Nady, Blue, Rode, and Samson.

Due Diligence

Here's the main thing to consider here. There are some mid level dynamics that will still offer better frequency response than the lower end condensers. Because microphones are an incredibly subjective purchase, it is vital to try to sample a microphone or two of the model you're considering. Given the fact that local recording studios might be more prone to have an arsenal of condensers, it might be worth asking around your area music scene to see if you can borrow the mic to use in *your* studio.

Once again, don't just listen and judge a sample mic somewhere other than your plant, unless you're hearing the microphone flat with no EQ or processing, and that you're listening on the headphones or speakers that you trust. The plethora of affordable condenser mics is intriguing, and we can all learn from any stories you may have on your experiments with the "non-traditional" studio microphones that have been flooding the market.

Speaking of non-traditional options, there are still some choices out there that include the ribbon microphone family and even the tube microphones. Some may have a vintage RCA ribbon mic for show or in actual use, but if you're lucky enough to have a rich-sounding ribbon it may be one of the Beyerdynamic or Coles models in this limited market, or possibly from Royer, MXL, Cascade, SE Electrics, Golden Age Project, or others. These mics, as a group, may carry heftier price tags, and some of this family are fairly fragile, but they can present unparalleled richness.

If you have a classic Neumann U47 tube mic, I've seen them valued at well over $7,000, but the current tube mics are a bit more affordable. The debate is whether the vacuum tube microphone technology really adds the warmth some say. Microphones are subjective, so it's not for me to say. Current tube microphones include those made by Telefunken, Rode, and Manley among others. The argument many will make is, the higher price tag for the technology has audible results.

Try Before You Buy?

One constant of this column is the encouragement to develop a solid relationship with your equipment vendor(s). It's always good to ask about a loaner microphone or two to try in studio, and if your vendor is willing to loan a demo, it might save making a costly unwanted purchase if the loaner doesn't live up to your expectations. In some markets, your vendor might even be a music or instrument store that carries pro audio inventory.

As we look at microphones, I realize that each station has its own needs. Some may only have a microphone or two while other will have multiple studios each equipped with multiple mics. In any case, it is a very good practice to match the microphones as much as possible, maybe keeping a "top shelf" mic for special projects.

If changing or upgrading microphones is not within the budgetary landscape right now, another "freshen up" is to ensure that you have decent or new windscreens and that any preamps and mic processing are working properly. Your microphones are possibly the most important part of your station sound, and there are more options that ever before. It's important to make a good decisions.

If you happen to be using some of the newer mics above, let me know some of your impressions of the wider range of choices. Are the tried and true still best, or are the new challengers making an inroad at your station?

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

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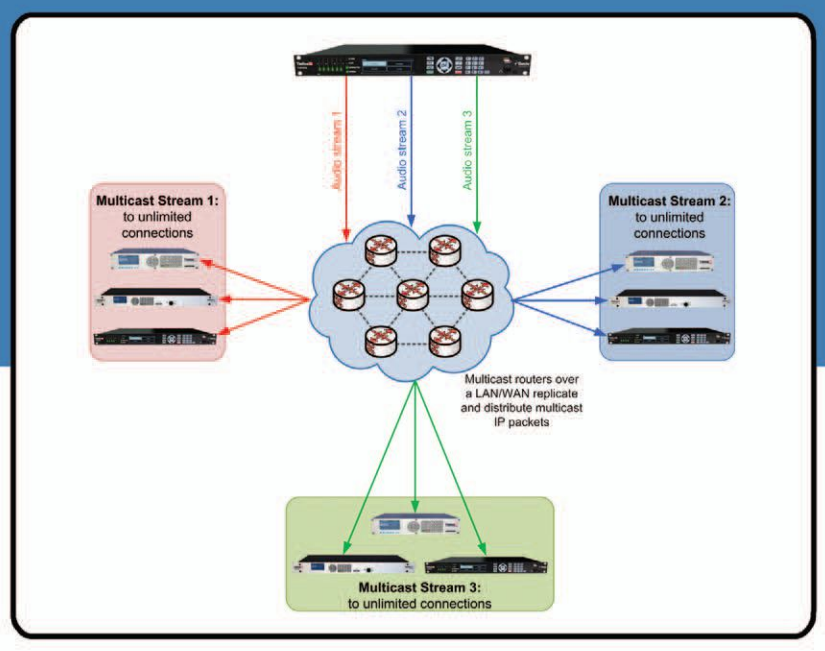

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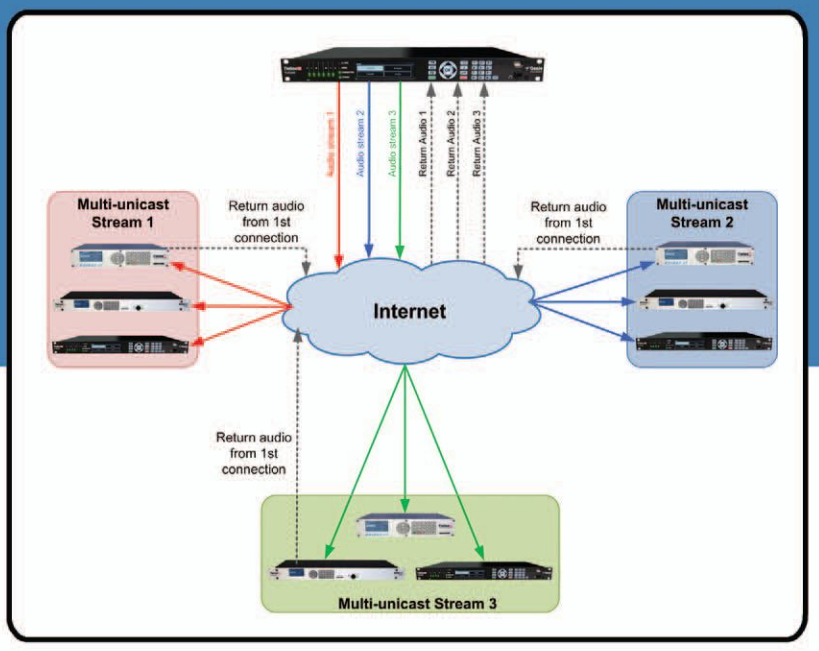

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Tech Management

Finding Good Engineers

by Chris Tarr

Broadcast Engineers are a unique breed. Unfortunately, they're a dying one as well.

For years, technical schools and the military were turning out Broadcast Engineers at a breakneck pace. However, with the dawn of the Internet, that focus has changed to IT. While it's true that there is now often more copper in the IT infrastructure than the RF systems at stations these days, there is still a need for competent Engineers. Where will they come from?

The industry is really it's own worst enemy here. If you were a technically inclined college graduate, what would look more appealing to you: A high-paying IT career with it's mostly weekday 9-5 lifestyle, or the on call, 24/7 life of the Engineer (typically for the same or less money)? Consider this sample help-wanted ad posted a while back (names removed to protect the innocent):

Wanted: Chief Engineer for five station cluster. Must have knowledge of studios, transmitters - including AM directional arrays, IT, automation systems and associated gear, basic knowledge of plumbing and HVAC systems, the ability to lift 50 pounds, and be on call nights, weekends and holidays. Salary range $35,000 to $50,000.

Who do you think would be interested in that job? My guess is that it would probably not be someone you'd really want. In fact, if you were really talented at any *one* of those skills alone, you could probably make more money.

So, that's problem number one. Fortunately that's not always the case in the industry. There are still plenty of companies that understand the value of a good Engineer are are willing to pay good money for them. A tip of the hat to them – they get it!

While that's the problem we all talk about, it's not the only problem. In fact, we sometimes are our own worst enemy. Often we like to be the "keeper of secrets" and like to think that we possess knowledge far beyond the comprehension of mere mortals! We forget that we're now the teachers. We're the ones that are replacing the military and tech schools as the ones who are cranking out new Engineers. It's up to us to find talented people in IT related fields and get them interested in broadcasting, and teach them what we know.

I've been fortunate to have been able to bring a few newcomers into the industry, one of which is now the DoE of a good sized regional broadcasting company. These folks were technical people who really wanted to learn about radio and broadcasting. They didn't know where to go, so I started working with them. Over time, they grew into very talented Engineers in their own right. It wasn't hard to do – even with some of the "downsides" I mentioned earlier, there is still a lot to love about the job. No two days are the same – there's always a challenge, and rarely a dull moment. You get to hang out with a lot of talented, creative people and work in an atmosphere that is far from a traditional office environment. While it's not for everybody, that's often a whole lot more appealing than sitting behind a desk all day.

So, that's all well and good, but where do you find good "candidates?" While that's not the easiest thing in there world, there are plenty of places to look.

Start right inside the building. Is there anyone on the promotions or air staff that seem to have an interest in the technical side of things? There are many people in the industry (including me) that started behind the mic and ended up under the wing of one of the CE's. Is there a remote tech that is really good at working on remote gear?

Part of many stations EEO plans include doing "outreaches" at job fairs and college career days. Have you thought about attending? Part of the challenge we have as an industry is that many people aren't even aware that this is a career. They turn on the radio, and don't give a second thought to the fact that someone needs to keep the equipment humming.

Use Job Fairs to Concentrate Your Search

If you're an Amateur Radio operator (I'm W9JOL) consider setting up a booth at a ham fest. There's a group of people that have plenty basic knowledge about radio. I've done several presentations at Ham club meetings about things like FM broadcast and HD Radio and have always managed to generate some interest that way.

Talk about it at your local SBE meetings if you haven't already. Brainstorm some ideas on ways to get people interested. Perhaps offer internships to the local tech school. They get an introduction to radio and we could all use a little extra help now and then.

The bottom line is that while a little "thinning of the herd" can be good for our wallets and job security in the short term, in the long run we're going to work ourselves to death because there's nobody out there to replace the people who are retiring.

If there is one thing I would call on the SBE and the rest of the industry to do, it would be to try and help us re-frame the industry. We still have a (sometimes deserved) reputation of being the oddballs in the back of the building, trying to avoid eye contact with everyone while acting like Doc Brown from "Back to the Future," when programming asks us to try something new for them. You know – running around yelling "GREAT SCOTT!"

We all know that, in reality, most of us are technology professionals. Many of us lead the way, showing station management where trends are taking us, and offering ways to increase their bottom line and improve ratings with the best use of technology. I spend several days a year ether attending or presenting in continuing education events, trying to stay ahead of where things are going. I'd say many of the people I meet at these functions are hardly the stereotypical Engineer that we always hear about.

The point I'm making with this is, that in order for station management to get past the "the toilet is leaking – better call the Engineer" syndrome, they have to look at us the same way they'd look at their Sales Managers. We need to be seen as team leaders who understand the business the same way they do and have the skills to help them achieve their goals.

Once that happens, the pay scale goes up, and the pile of duties become more realistic. When that happens, our industry becomes a lot more attractive to young, bright, technical people coming out of college. When young, bright, technical people come into our industry, we collectively win.

All of this sounds great, but it starts with us. Get involved. Be proactive. Keep your eye out for talented people and introduce them to what we do. Keep learning. Share relevant information with station management. Try to be a resource for them and help them to understand that you're more than the "fix-it" person.

I've always been taught to leave things in better shape then when I found them. I was taught that back in Boy Scouts, and I kept it with me all my life. When I come in to fix a problem, when I go Geocaching, how I raise my children – basically everything I do. I want to do the same thing with the industry that I love so much. I hope that when I retire, I've left the industry a little better than how I found it. Are you with me?

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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Links and Lines

The Humble Program Loop

by Steve Callahan

Every radio station used to have one. In the days before cellular phones and internet, the only way to get a remote broadcast back to the studio was via a telephone company broadcast loop. It was a non-dial tone line that originated at the remote location and terminated in the radio station.

Some folks say that the very early term for such line was NEMO or Not Emanating at Main Office. Back in the Dark Ages, I worked at a radio station that had a patch panel in the studio that was labeled NEMO 1, NEMO 2, NEMO 3 and NEMO 4. If the radio station was going to broadcast the local high school football game, we just called the phone company and they activated one end of the broadcast loop at the field and then patched it to us into one of our NEMO patches which were in turn wired into a board input. It was a simple system and it seemed like the phone company was more than happy to install a line anywhere you needed it for a reasonable installation fee.

A 111C repeat coil – still worth it's weight in gold.

The reason I'm taking this walk down Memory Lane is that technology has progressed farther than we want to realize. About four years ago, I was moving a radio studio from one location to another, and we had to move two broadcast loops which went to two different tower locations. We had decided to upgrade to an Internet-based STL for one site, but due to the rural location of the second site, with no hope of wired internet, we had to stay with the tried and true broadcast loop. One hint was that the Verizon installer was adamant on recycling the electronics packages at each end of the old circuit because they were having trouble getting new equipment from the manufacturer.

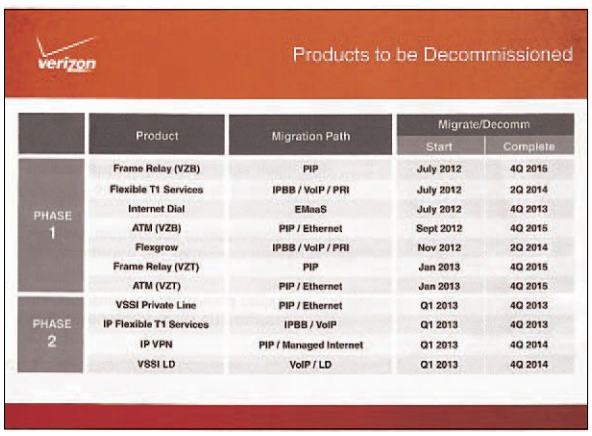
Last year I noticed in the FCC press releases that Verizon was asking to be allowed to de-tariff copper-based telephone services in Massachusetts. They asked for a year to make the transition of the old copper to their fiber network. This really didn't come as a surprise to me, but several years ago I acquired a memo from Verizon that they were not going to build any more of their fiber network, but were going to focus their efforts on moving customers to their existing fiber network.

I noticed on page 14 of my September telephone bill that on or after October 31, 2014, Verizon was going to grandfather Analog Data Private Line Channels, and those services would not be offered to new customers – and they would not renew existing contracts current in place. It also said that Verizon will discontinue these services in the near future. Well, this rather ominous statement got the local broadcast engineering community humming. Many still depended on PAS or Program Audio Services and there was a frantic flurry of activity to investigate licensed and unlicensed STL options before the deadline.

A telco package – a rare commodity today.

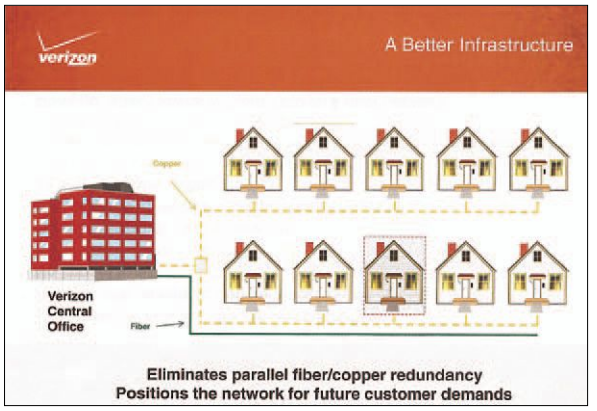
However, broadcast stations weren't the only ones affected by this decision by Verizon. Public service entities like police and fire departments also utilize PAS circuits to connect their police and fire radios at remote locations to a "voter" system, which selects which tower site is receiving the best signal from a portable radio. For example, in the town where I live, there are 10 PAS circuits which relay two-way radio audio from three towers for the police, fire and department of public works back to their respective headquarters.

I met with representatives of my town's fire, police and DPW and showed them my bill page, which of course they hadn't seen on their bills. I suggested that they might start planning now to upgrade the old copper circuits with some sort of RF or Internet-based system. Unfortunately, they felt that Verizon would never just abandon police and fire departments and that a decision to remove the copper circuits didn't apply to them.



	Product	Migration Path	Migrate/Decomm Start	Migrate/Decomm Complete
PHASE 1	Frame Relay (VZB)	PIP	July 2012	4Q 2015
	Flexible T1 Services	IPBB / VoIP / PRI	July 2012	2Q 2014
	Internet Dial	EMaaS	July 2012	4Q 2013
	ATM (VZB)	PIP / Ethernet	Sept 2012	4Q 2015
	Flexgrow	IPBB / VoIP / PRI	Nov 2012	2Q 2014
	Frame Relay (VZT)	PIP	Jan 2013	4Q 2015
	ATM (VZT)	PIP / Ethernet	Jan 2013	4Q 2015
PHASE 2	VSSI Private Line	PIP / Ethernet	Q1 2013	4Q 2013
	IP Flexible T1 Services	IPBB / VoIP	Q1 2013	4Q 2013
	IP VPN	PIP / Managed Internet	Q1 2013	4Q 2014
	VSSI LD	VoIP / LD	Q1 2013	4Q 2014

On October 16, I attended a statewide meeting between Verizon and the Massachusetts Public Safety Government Working Group. The meeting was called a "Technology Upgrade Initiative" by Verizon and four regional Verizon vice presidents were in attendance. It was held in the Massachusetts Emergency Management Agency's headquarters which happens to be in a very cool repurposed underground bunker, which was built in the days of the Cold War. On the other side of the table were approximately 60 representatives of fire, police, EMT, sheriffs and other emergency first-responders. I was very surprised to see that I was the only radio station/broadcast-oriented person in the room.



Joe Zukowski, Verizon's Governmental Affairs VP started the discussion by saying that they hadn't announced this upgrade properly and that it had stirred up a lot of misunderstanding, which was the primary reason for the meeting. He wanted to make it clear that all copper lines were not suddenly going away, but eventually just the copper lines that ran in parallel with Verizon's existing fiber network would be removed. I had already learned that the previous week, from a Verizon installer who confirmed that he had been in an adjacent community with 100% fiber coverage and his crew was stripping off the old copper from the poles in that town.

Mr. Zukowski made the valid point that the old PAS circuits required technology that was just not available from manufacturers anymore. Remember my installer who was adamant about recycling my old PAS circuit packages several years ago? However, representatives of the public service radio community asked why, if their PAS circuits were working, did they have to be replaced? One fellow noted that a $70 a month PAS circuit was going to cost $1,100 a month if it was upgraded to fiber, and that his agency couldn't absorb such a budget hit, especially in the middle of a budget year. Another commented that they had PAS circuits for decades and that they served the purpose well and that fiber along with their required codecs was more than was needed for their purposes.

Mr. Zukowski offered a case study of one community that had been the first in Massachusetts to be have all copper facilities migrated over to fiber. Lynnfield, a small town just north of Boston, once had 5,000 copper POTS lines in service. However, due to technical advances like VOIP and the heavy use of cell phones instead of residential telephones, that number had shrunk to less than 500 POTS lines today. Verizon just couldn't justify the increasing cost of maintaining a copper-based network now with just 10% of a customer base.

Verizon provided a list of 113 Massachusetts communities with fiber that that would be eventually transitioning copper to fiber, and I wasn't surprised to see my hometown on that list. They also said that there were no plans to add any further fiber communities, which confirmed what I had read in my Verizon memo years ago. That was some comfort to me because the towns that I presently had broadcast loops in service were also not on the Verizon fiber list.

The lesson to be learned is to not only keep abreast of what's going on in your radio station, but also in the regulatory environment and in allied industries that share common technologies. If you hear a rumor about something that might affect your station's performance or facilities, don't panic, but do your homework and get the real facts.

Steve Callahan, CBRE, AMD, is the owner of WVBF, Middleboro, Mass.

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FCC Focus

Royalties and Recordings

by Peter Gutmann

The recent, highly-publicized legal victory of Flo and Eddie against Sirius XM holds major (that is, expensive) potential repercussions for large segments of the radio industry – if it is upheld.

In a nutshell, here's what happened. In 1970 the Turtles (you do remember them, right?) sued their record label. In exchange for foregoing underpaid royalties they obtained ownership of their master recordings. Howard Kaylan and Mark Volman, d/b/a Flo & Eddie, Inc., then bought out the other Turtles to become the exclusive owners of the band's recordings. In 2013 they sued Sirius XM Radio in California for unauthorized use of the Turtles recordings on its subscription-based satellite and Internet services. Although the case was removed to a U.S. District Court, it remained governed by both California and federal law. That's where things get a bit complicated, so bear with me.

Federal copyright law is focused on balancing two often conflicting principles – respecting the economic interests of rights holders v. encouraging preservation of and access to their work. The practical problem began in 1909, when a Copyright Act for the first time provided protection for recorded musical compositions, but not for the recordings themselves. The rationale was based on the rather absurd and seemingly irrelevant pretext that the discs could not be read with the naked eye. The distinction remained in force for over six decades, during which over 30 bills were introduced in Congress to extend protection to sound recordings, but none passed.

Now fast forward to 1971, when the Sound Recording Amendment finally updated the law, but only to forbid the outright duplication of a recording. Imitations and performance were left untouched and thus remained outside the scope of federal copyright protection. In addition, the Amendment was to apply only to recordings first issued after February 15, 1972 (when the Amendment took effect) and was to expire at the end of 1975. The 1976 Copyright Act essentially incorporated the 1971 Amendment into an omnibus revision of federal copyright law and extended its protection until 2067.

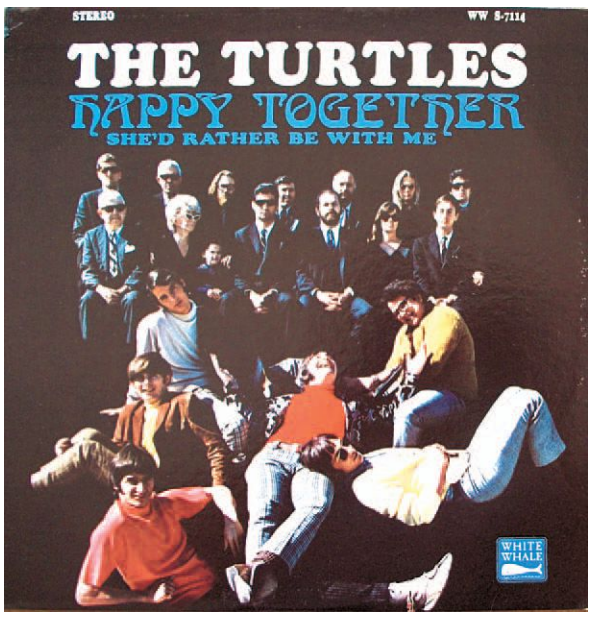
All of this left unaddressed the question of protection for pre-1972 recordings. By default, it relegated remedies for older recordings to the laws of each state. It further provided that those state powers would terminate in 2067, when federal law would apply to all recordings, regardless of age – except, of course, to those that had entered the public domain prior to then. (However, Congress keeps extending copyright length, so few if any currently protected recordings are likely to ever become public domain.)

In the meantime, in the 1973 case of *Goldstein v. California* the Supreme Court had upheld a California anti-piracy law and proclaimed that it was not preempted by the federal statute. The 1976 Copyright Act confirmed that result.

And that's where the law stood when Flo & Eddie asserted their rights under California law to control the use of the Turtles' pre-1972 records. They raised two primary claims of unauthorized use by Sirius XM.

The first claim was conversion and misappropriation – that is, Sirius XM's public performance by broadcasting and streaming the content to consumers without Flo & Eddie's consent and the consequent economic injury that resulted. Here, the court found infringement for having played and distributed the actual recordings to listeners, some of whom were in California and thus subject to that state's law.

The second claim was reproduction – that is, Sirius XM had used the Turtles recordings in backup libraries and databases, "tips and tails" and buffering, all in the operation of its business, as well as in caches for on-demand listening. In California unauthorized reproduction of copyrighted material is not just a matter of civil liability but a criminal offense, and thus subject to a higher standard to warrant conviction. Here, the court denied relief at this stage, holding that it did not have enough information to conclude that copying had occurred in California, as opposed to in other states whose separate laws would apply.



Is that a jury in the background? What foresight!

It is important to note that this decision was on a motion for summary judgment (that is, granting relief on undisputed facts – here, Sirius XM admitted that it had done all these things and so the only issue was how to apply pertinent law). After a trial and decision on the reproduction claims and to set damages for the misappropriation, whichever party is dissatisfied undoubtedly will appeal, and so the final word is far away at this point.

Even so, there are three aspects of the decision that may prove significant in the future. First, the judge emphasized that the rights being considered applied only to performance of the actual pre-1972 recordings and that "covers" would not infringe the rights of the owners of the original. As the court stated: "Any person can make a sound recording based on a copyrighted recording without the permission of the owner, so long as they produce the sounds independently rather than recapture the actual sounds in the copyrighted recording." So, at least in California, sampling is actionable but mimicking a pre-1972 recording, even if the result is barely distinguishable from the original, would avoid copyright liability (for the performance itself – publication rights remain). Thus if this decision is upheld and followed elsewhere the net result may be to create a new splinter industry so radio stations can replace their older records with sound-alike copies. As an avid oldies fan, I don't like that!

Second, Sirius XM had raised the defense of laches – that is, waiting too long to bring suit after the plaintiff knew or should have known of its claim. As the court put it (with reference to their biggest hit), "Flo & Eddie and Sirius XM have been 'happy together' for years without any licensing or royalty arrangements." Even so, the court ruled that in actions for monetary damages, as here (and as opposed to seeking an injunction), such considerations do not bar a lawsuit (although they could serve to limit damages to recent and future losses).

Finally, the court did not yet reach the issue of how much compensation to award for the unauthorized public performances, so we have no idea whether the financial blow will be crippling or a mere annoyance.

The ultimate impact of the ruling remains unclear. A final decision in California will impact national distribution services that necessarily do business there, but it remains to be seen how courts might react to similar lawsuits brought in other states, and in particular in the state where a given radio station is located or has its listeners. Presumably, oldies formats would face the most severe added costs and may no longer be viable. Even short of dropping the format altogether, stations may tend to purge their playlists of pre-1972 material (or substitute imitations of the originals).

Looking further ahead beyond royalties for older content, radio will face ever-increasing competition for overseas-based Internet music streaming services. Why? Because in nearly the entire rest of the world copyright expires after 50 years. Music buffs have already come to satisfy much of their craving for deep catalog from European and Asian import CDs and streaming services. In the meantime, American distributors face absurdly long (essentially perpetual) American copyrights, aggravated by the difficulty of locating, much less coming to terms with, all potential copyright holders. While this imbalance persists it will continue to drive business away from our shores and "protect" future generations of Americans from their own cultural heritage.

Hopefully, common sense can restore a suitable balance between copyright holders and the public before federal law takes over and imposes a uniform standard in 2067 (assuming that anyone still cares about pre-1972 records by then). I personally won't worry too much about that.

And speaking of increased copyright royalties, another ominous development has surfaced in the news lately – the formation of a fourth performing rights organization. Global Music Rights has already signed up major acts, including Journey, Van Halen and John Lennon, and undoubtedly is aggressively seeking to lure many others. (Recall that for decades SESAC had a negligible catalog of interest to most American broadcasters, but established a U.S. beachhead by signing Bob Dylan and Neil Diamond and went on from there). Like SESAC, the newcomer will not be subject to the consent decrees that serve to regulate the rates charged by BMI and ASCAP, but rather whatever the market may bear. Indeed, it reportedly plans to seek rates 30% higher than the majors.

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

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Transmitter Site

Keeping Your Transmitter Cool

The heat was a physical force that attacked instantly as the door was opened – the transmitter shelter was stifling. The air conditioner was silent and the transmitter was dead except for the fault light and a few readouts – all of them well beyond their normal operating temperature.

This was not the first time, nor would it be the last that the remote site crashed during a late afternoon in August. A new fuse in the air conditioner, and about 30 minutes to cool everything to normal temperatures, would get the station on the air again, but there was something fundamentally wrong.

A Long-Standing Issue

Indirect information from non-technical people at the station had mentioned that this was a repetitive problem.

A quick look at the specifications of the transmitter and air conditioning unit disclosed no problems. In fact, it appeared the unit was oversized for the job, for closed-loop cooling of the transmitter shelter.

The cooling for the shelter was rated at 40,000 BTU/h. The transmitter environment was closed-loop cooling, which is another way of saying the air was drawn out of the transmitter shelter, passed through the air conditioner and returned to the space. This way all airborne contamination issues were minimized to the very small amount of air that might infiltrate the building when high winds blew across the site.

The real question was; "How much cooling does the transmitter shelter really need?"

The Equipment Heat Load

The main transmitter was a 5 kW solid-state FM that had a nominal rated efficiency of 80%.

Some of the group that came off the assembly line may have produced efficiency that high, but on a good day, this one was about 75%. That difference may not sound like much, but 5 kW TPO at 80% requires 6.25 kW input while 75% boosted that by over 400 Watts. Additional loads such as a large blower in the transmitter and the usual rack of equipment, plus an auxiliary tube type transmitter on hot standby meant a total equipment heat load of about 3 kW.

Cooling ratings are based on BTU/h (British Thermal Units per hour); at 12,000 BTU/h/ton of rated cooling capacity. A kilowatt hour equals 3412 BTU/h.

Energy Conversion Factors:
1 kilowatt/hr =
3412 BTU/hr =
1.341 HP/hr =
0.2843 Ton/hr (cooling)

Thus each rated cooling ton can remove 3.517 kW of heat from the environment. It is easy to calculate that the heat generated by the equipment amounts to less than one ton of rated air conditioning capacity. However, there is a catch. In fact, there are a couple of them.

More Than The Equipment

First, the cooling rating assumes an ambient temperature of 100 degrees Fahrenheit. With the hot sun beating down on the cooling unit, as it was in this case, the cooling air temperature instead became the "cooking air temperature" as the air conditioner sat there and cooked all day.

Second, the equipment is only a fraction of the cooling requirement in a small station like this one. The heat gain of the shelter was the main heat source.

This particular shelter is about ten feet by twenty feet, and approximately eight feet high. Typical of an equipment shelter of fifteen or twenty years ago, it is Utility Green in color to blend with its surroundings, and has no shade for natural cooling. The shelter is oriented with its front toward the southwest which means that, as heat is peaking in the late afternoon, the maximum wall area is in direct sunlight. Previous experience showed the cooling required by solar load was about 30,000 BTU/h during a typical hot summer day in August.

No Room For Error

It is easy to see there was almost no safety factor in the design. Any reduction of transmitter efficiency or air conditioner efficiency would cause a slow buildup of heat inside the shelter which, in turn, would place a greater load on the air conditioner, which would ultimately cause a transmitter temperature fault.

On most any extremely hot day, the station could count on a failure in the middle of afternoon drive time. Clearly, a change was needed.

Management suggested the possibility of using fan cooling rather than air conditioning. They thought it might be cheaper. It was the beginning of a wild goose chase, but a very instructive one because some plants can benefit from cooling fan systems, especially where the load is unusually large and the temperature extremes are mild.

Analyzing the Heat Load

The first consideration for a fan system is the design-maximum outdoor ambient temperature. That is a fixed factor you can do nothing about. In this case, 105° F was selected, based on weather records.

The next consideration is the maximum acceptable temperature in the ventilated area. Based on the fact that the transmitter began automatic power reduction at 120° F – and shutdown completely at 125° F – 115° F was selected as the maximum temperature. In other words, no greater than a 10° F differential had to be maintained above the outdoor temperature.

Based on the air conditioning data, a heat load of 48,000 BTU/h was selected as the maximum load, to give a small safety factor in the design.

The Air Flow Factor

Of course, once the maximum cooling load for the air conditioning system is reached, the only way to remove heat is via air flow. In other words, we needed to know how much air must flow through the transmitter shelter to keep the temperature at or below 115° F when the outside air temperature (OAT) is 105° F.

To make that calculation, you must first know the density of the air in fractional pounds per cubic foot, and the specific heat of air. The combined gas law formula sounds complex and difficult, but the reality for finding air density is a simple calculation.

The formula which combines the effects of Boyle's Law and Charles Law says PV = mRT, where:

- P is the absolute pressure in pounds per square foot of air (PSIA x 144),
- V is the volume in cubic feet (in this case = 1),
- m is the mass in pounds, R is the gas constant for air (in the English system = 53.3), and
- T is the temperature in degrees Rankine (F + 460).

All we need to do is divide both sides by R x T and our formula for the density for a cubic foot of air becomes m = (P x V) / (R x T).

For various conditions, the specific heat of air, or the energy input required for increasing the temperature of one pound of air one degree Fahrenheit is 0.24 BTU/lb/F. Thus, one BTU will raise the temperature of one pound of air slightly more than 4° F – or more exactly 4.167° F. Put another way, 2.4 BTU's will raise the temperature of one pound of air 10° F.

Factoring the Density

At this point, the numbers are easier to handle, and the air flow volume is easier to visualize, if we convert from units per hour to units per minute by dividing the heat load by 60. Thus, 48,000 BTU/h becomes 800 BTU/m.

Dividing that heat load by the specific heat of air says we need 3333.33 lb/min. air flow for a 1 degree rise, or 333.33 lb/min. for a 10 degree rise.

Useful Conversion Factors
Absolute air pressure at sea level:
14.696 PSIA =
29.92 inches Mercury (Hg) =
1013.5 millibars =
759.968 mm Hg
(Air pressure correction for altitude: At elevations from sea level through 5000 feet AMSL the correction is subtracting 1.0 inch of Mercury from the sea level barometric pressure for each 1000 feet above mean sea level. For example, the absolute pressure at 4500 feet would be 29.92 - 4.5 = 25.42 inches of Hg.)

The transmitter site is about 1000 feet above sea level so the average true barometric pressure will be about 28.92 inches of Mercury. Converting this to PSIA is done by dividing by 2.0359 (29.92/14.696), resulting in 14.205 PSIA or 2045.52 PSFA.

Since we are finding the volume of one cubic foot, the P x V part or numerator of our equation is 2045.52. The design outdoor temperature is 105° F, making the absolute or Rankine temperature 565 R. Thus, the R x T part, or denominator of our equation, is 53.3 x 565 = 30114.5, making the density 0.06724 lb/ft^3.

This shows we would need about 4,907.4 cubic feet of air per minute for keeping the shelter at or under 115° F when the outside air temperature is 105° F. To simplify, round that up to an even 5,000 CFM fan or blower capacity.

Making Sense of the Calculations

However, with that much flow in hot weather, the entire air volume of the shelter will change slightly more than three times per minute. In other words, to achieve the cooling needed, the transmitter shelter becomes a wind tunnel with air moving through at roughly one foot per second! In addition, automatic controls on the intake filter panels will be necessary because winter outdoor temperatures below -10° F are not uncommon.

Would it be better, perhaps, to duct the air directly through the transmitter? That might work, but the rack-mounted equipment would get too hot because, except for the transmitter, the shelter would become an oven. In this case, it is not practical because ducting to the transmitter would prevent access for maintenance.

For efficient operation and low pressure drop, velocity through the filter media should be no more than about 350 feet per minute, and slower is better. Also, we need about 50% excess for extending the time between filter cleaning. Dividing 5000 by 350 and multiplying the answer by 1.5 gives a filter media area of 21.4 square feet, minimum. Increasing that to something that will fit means building a filter panel six feet by four feet, or something similar.

While a fan may sound less expensive, it is easy to see that a design that will actually get the job done is more expensive than a larger air conditioning unit. A correctly-sized filter also carries a rather high maintenance cost, especially in an agricultural area where farming activities sometimes drown the transmitter site in huge clouds of dust reducing visibility on a clear, sunny day to less than 200 yards.

A happy ending came with a new and more enlightened GM taking the helm and almost immediately ordering installation of a 60,000 BTU/h air conditioner. Since then the building has stayed well. – *Radio Guide* –

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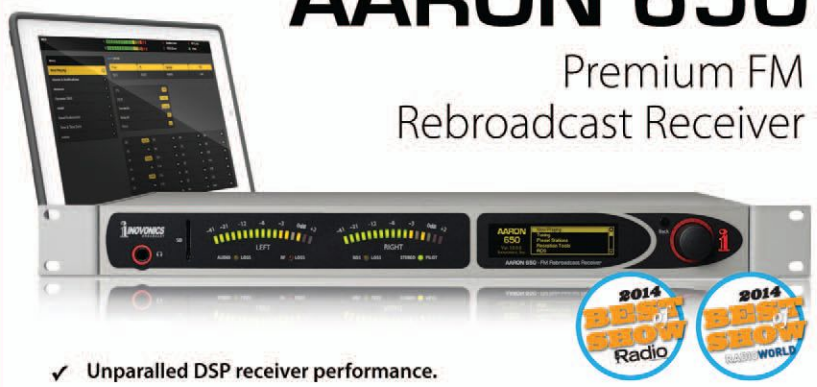

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Transmission Topics

What Do the All Digital HD-AM Tests Mean?

by Ted Schober

I attended David Layer's presentation at the IEEE 2014 Broadcast Symposium, on the NRSC tests using the digital only mode of HD-Radio for the AM band with great anticipation. I headed to San Antonio to discover the results of their study, as I have been touting digital only for the AM band for the last year. Unfortunately, as the results were presented, my hopes for AM stations rolling out HD digital-only into an existing base of receivers were dashed.

The tests were undertaken on a wide variety of stations, from big Class A stations without interference, to modest size Class C stations that suffer heavy co-channel interference. An innovative system was used to take the speaker output of Ford rental car radios to determine the performance of the system, and map the digital coverage, and where the digital receiver "dropped out."

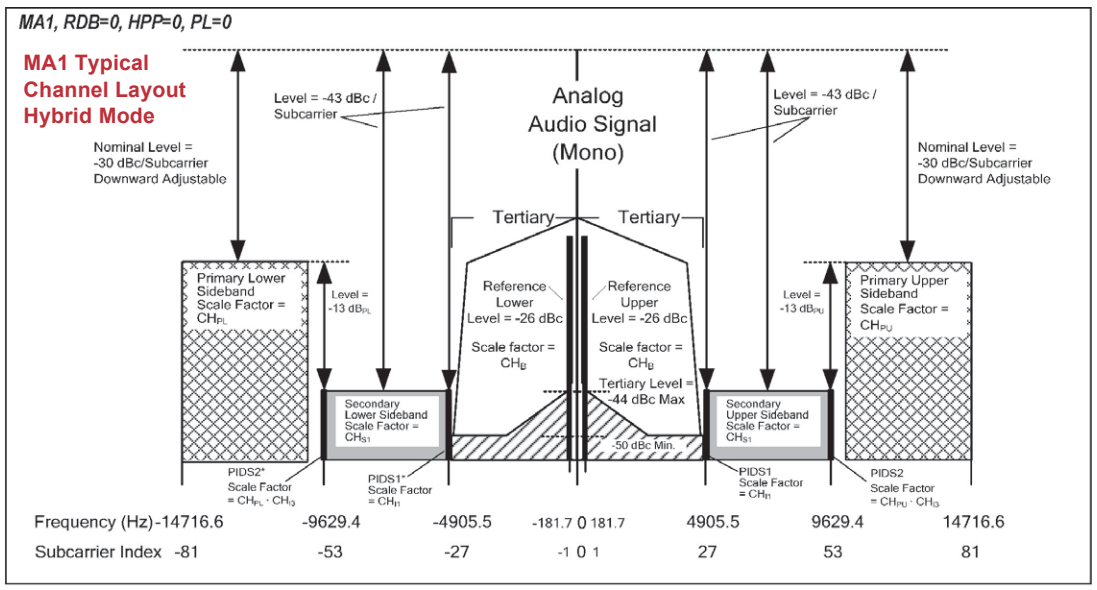
Contemporaneous audio recordings were made, to determine audio performance compared to analog AM. The transmitters were switched to analog mode to make the comparison. This experimental plan clearly showed the performance expected when a station switches from analog AM or HD-AM hybrid mode to digital, when the signal is received on a representative HD car radio – at least currently manufactured stock radios in Fords.

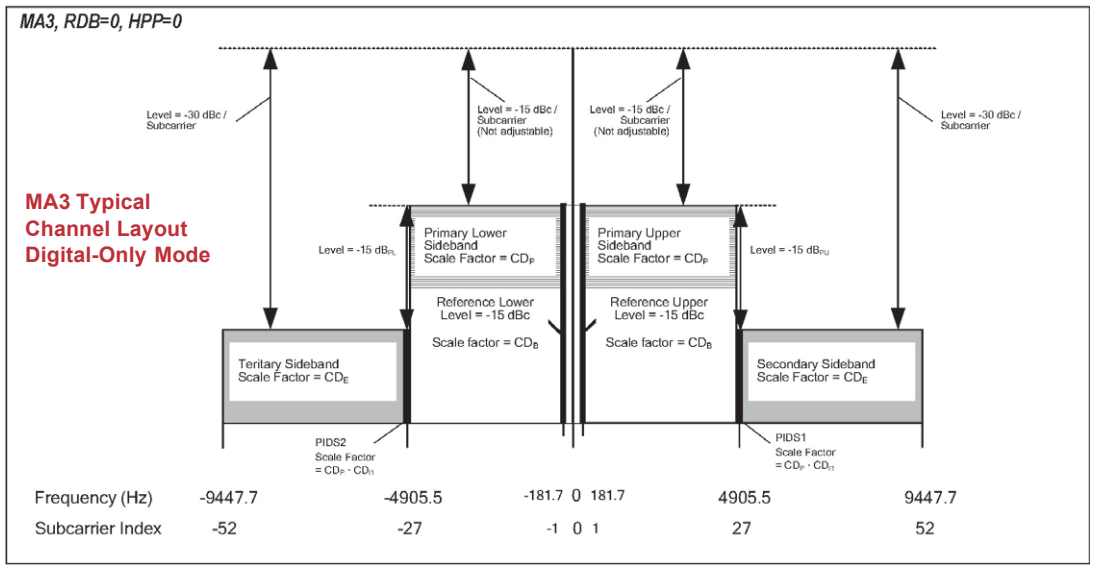
I anticipated great results. Eleven years ago years ago Ibiquity ran field tests with WD2XXM, Ibiqity's 10 kW experimental station in Frederick, Maryland. WD2XXM operated on 1670 kHz at 10 kW. With a custom made receiver properly configured for Mode MA-3, these experiments resulted in dropout-free coverage from Frederick Maryland all the way to Harrisburg Pennsylvania. The signal level at Harrisburg was about the 0.05 mV/m, a very weak signal, unlistenable for an analog station. The WD2XXM frequency was free of interference, so the range of the station was very good.

Unfortunately, the 2014 field test performance was anything but! The digital signals stopped, in many cases, between the 1 mV/m and the 5 mV/m contours. And at locations near the loss of signal, the bits in the secondary and tertiary were completely lost, so the HD-AM codec showed off all its warts, and sounded far worse compared with the analog signal at the same location. This short range appeared to be true, even for Class A station WBT in Charlotte, although it is completely clear of co-channel or first adjacent channel interference from other stations.

Unfortunately, these results destroyed my hopes for a successful rollout of full digital for AM radio stations using existing HD Radios. There may be several reasons for this lackluster performance to be discussed below.

A short review of the differences between the MA-1 hybrid modes, and the MA-3 digital only modes, is needed to understand the rest of this article. Although there are several different sub-modes for each of the operating modes, they have a common basic transmission frequency layout. Sideband signal levels can be adjusted to avoid interference, and modulation and error correcting codes can be varied to compensate for interference. Hybrid mode, using limited 4.9 kHz analog audio frequency response or allowing 8 kHz response, can be retained by eliminating the Secondary and Tertiary sidebands. This lowers the digital data rate and digital quality in favor of better analog fidelity. For those who would like to delve further, this system documentation is detailed at the NRSC Standards website.[1]





HD Radio's MA-1 hybrid mode uses the AM channel +/- 14.7 kHz, occupying the station's own channel, plus half of the neighboring station's channel with its digital signals. The conventional analog signal rides within the bounds of the station's central channel. This means that the receiver bandwidth must be 30 kHz to pick up the digital signal. That is five times the bandwidth of the typical analog receiver! The noise energy that is collected is proportional to the bandwidth of the receiver, so the noise bandwidth of a receiver in MA-1 mode is 13 decibels poorer than an AM receiver. The main channel of an AM station generally has much less interference than the first adjacent channels, even for the Class A stations, so including the adjacent channels in the receiver bandpass really hurts.

The MA-3 digital only mode has no analog signal, so the protected central 10 kHz bandwidth holds all the digital data. This should provide excellent digital service area coverage. Unlike the MA-1 hybrid mode, that uses the adjacent channel, likely to have strong stations nearby for the data signals. The MA-3 mode should be relatively immune from interference from other stations at the edge of the service area (hopefully out to the 0.5 mV/m contour).

The HD digital-only tests using the stock Ford receivers had better coverage than typical of the hybrid mode, but only by a few dB. This performance was so spectacularly poor (-32 dB) compared with the optimized receiver in the tests eleven years ago, that there must be severe reasons why the Ford receivers showed such a deficit. There may be several factors combining to "kill" coverage.

It is apparent that the DSP functions of the Ford receiver are not optimized for the 20 kHz bandwidth of the MA-3 mode. The radio almost certainly retains the 30 kHz receiver bandwidth needed for the MA-1 mode even when the MA-3 mode uses a much narrower bandwidth. This means that the receiver picks up at least 300% extra noise, and is completely susceptible to first adjacent channel interference, while the fully implemented system is robust in the presence of first adjacent channel interference.

It is also likely that the car radios suffer from automobile generated noise, much greater than in a car manufactured a decade ago. This noise can be mitigated by various techniques, but is much harder when the receiver bandwidth is 30 kHz instead of 10 or 20 kHz. Current Ford autos have conventional whip antennas which should have respectable AM performance.

Unfortunately, the firmware in HD radios are in a closed IP environment, and cannot be updated over the air or remotely to adjust the bandwidth when MA-3 mode is detected. This means AM Broadcasters cannot count on an inventory of good performance, medium wave HD-digital-only radios among the current crop of OEM radios. The OEM radios in the field appear to have such terrible performance because they are optimized only for hybrid mode. The short range and nasty sound when the secondary and tertiary data is missing will discourage listeners from tuning in to medium wave HD digital-only signals.

AM Broadcasters must immediately lobby Ibiquity for all new receivers to properly implement medium wave, HD digital-only operation in all new chipsets so that there might be a viable inventory of receivers in the future. Otherwise, AM broadcasters must embrace the universal all system chips, which will properly receive HD MA-3 mode as well as DRM-30, and eschew the HD only radios that have poor digital only performance.

1. www.nrscstandards.org/SG/NRSC-5-C/1082sF.pdf

Ted Schober, PE, is a consulting engineer, and the owner of Radiotechniques Engineering, LLC. He may be reached at: ted@radiotechniques.com

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Social Media

Integrating a Chat Room With Live Radio

by Mike Phillips

Radio stations have always relied on the ubiquitous telephone to interact with their audiences. Telephone systems, while indispensable, are a somewhat limited method of interacting, in that there is typically one caller on the air at the time – not all callers get through the call screener, and many people are self-conscious about going on the air and don't make the call.

Integrating a chat room with a live show has become standard fare for many Internet broadcasters. The chat room is an integral part of the shows broadcast by Leo Laporte on his TWiT network. Adam Curry and John C. Dvorak use an IRC-based chat room on their *No Agenda Show*. Not only are the chatters able to interact with the hosts in real time, but they are also able to communicate with each other.

Chat services are here to stay. It is quite common to visit a company's website and be greeted by an option to "Live Chat" with customer service. While some companies do not commit the resources necessary to keep wait times to a minimum, others are using chat to create a positive customer experience by, among other things, avoiding long telephone hold times. These web chats are one-on-one services, but the technology is similar to the one-to-many services discussed here.

Free Chat Services

If your radio show has its own web page or website, there are many ways to implement a chat room. Some useful free chat room services include:

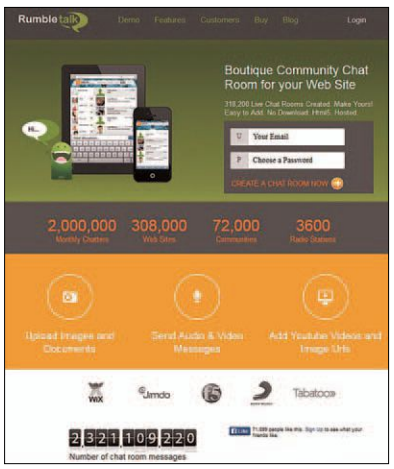
- ChatWing (http://www.chatwing.com)
- ChatRoll (http://www.chatroll.com)
- Chatango (http://www.chatango.com)
- 123flashchat (http://www.flashchat.com)
- 99Chats (http://www.99chats.com)

Be forewarned that picking a chat service is a very subjective task. If you ask anyone who manages a chat room, you'll be surprised at how subtle differences in the way they work make a lot of difference to the operator. Most of the free chat rooms are very limited in functionality and capacity. However, most free chat providers have premium versions with greater capabilities.

Paid Premium Chat Services

One of the most popular premium services, that claims to have 3600 radio stations as clients, is RumbleTalk (http://www.rumbletalk.com). Their minimum account is $14 per month, paid annually. With an account, you can embed their chat room into your web page or website, and you're in business. More expensive accounts have more features that may be useful in your situation.

Now that the simple solutions are out of the way, let's take a look at some additional options that may appeal to the engineer who prefers to get under the hood. We'll also explore some best practices for integrating a chat room into your broadcast routine.



RumbleTalk – www.rumbletalk.com

One of the oldest and most common chat services is called IRC (Internet Relay Chat). IRC is the geeky one that seems to be preferred by most gamers. An IRC server application is hosted on a server, and chatters access the server using a chat client or a web interface. Once a chatter connects to the server, he joins a room created to attract like-minded chatters. As an example, assume that WABC sets up a free IRC channel at GeekShed (http://www.geekshed.net). The channel is arbitrarily named #onair. Note that the number sign is part of the room name.

A listener, who must already have, or must set up, a free GeekShed account, fires up an IRC client, such as mIRC or X-Chat, connects to the GeekShed server at irc.geedshed.net, and joins the #onair room. When logged in, the listener is able to chat with other listeners and, hopefully, with someone from the station who is involved in the live broadcast.

(Continued on Page 22)

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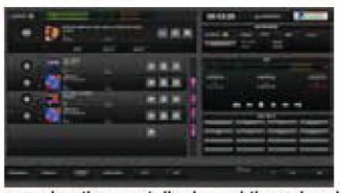

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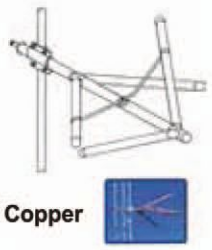

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Integrating a Chat Room With Live Radio

– Continued from Page 20 –

There are many good and free IRC servers, such as freenode, efnet, quakenet, ircnet, and dalnet. While the IRC protocol has been declining in popularity for years, it's still alive and well in chat rooms for live media shows.

If you are able to edit or create websites, you have many more options for creating chat rooms available to you. One of the most popular ones is to set up an IRC channel with a free or paid provider, and incorporate a web-based IRC client into your website. The web client avoids the need for a non-technical listener to download, install, and configure an IRC client to be able to access the chat room. It's a good idea to make it as easy as possible for a listener to participate in chat. Mibbit (http://www.mibbit.com) is a well-designed web IRC chat service that you may want to consider.

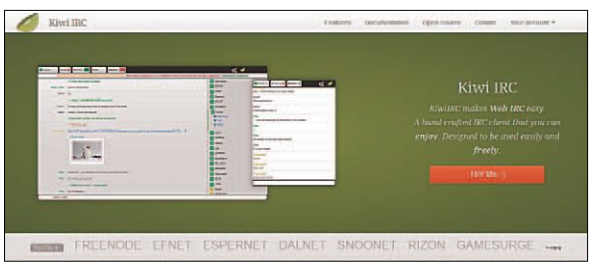
With a web client, such as Kiwi (http://www.kiwiirc.com), you have the option of allowing a listener to participate in chat with a randomly assigned user name, like user_387923, without having to create an IRC account. If you want more control over your chat room, you can require the user to log in with IRC user name and password. Opinions differ over which way is better. You may have to do a little trial and error to make your decision.

A chat room has to be monitored for unwelcome activity, such as spammers and other problem participants. Regardless of which tools you select to set up your chat room, make sure that you choose a solution that has moderator controls.

Mibbit IRC Chat – www.mibbit.com

You need to be able to kick and ban participants by user name, IP address, and domain. The moderation requirement is one reason that some stations are unwilling to set up a chat room. The way most Internet broadcasters moderate their chat rooms is by recruiting volunteers, who are typically some of the station's best fans, to keep a close eye on the chat room – whether it's open 24 hours a day or just during certain shows. It's amazing how well some of the volunteers perform, and how dedicated they are to the task.

Integrating a chat room into a live talk show can be a great resource for interacting with an enthusiastic audience. Be aware, though, that if the host ignores the chat room and does not interact, or does not periodically introduce some chat room content into the show, the chatters will get frustrated and lose interest. It's also a good practice to remember that most of your listeners are not sitting in front of a computer or smart device reading the chat room. A comment like, "Thanks, Andrew. I agree" is distracting to the radio audience, while a comment like, "Andrew in our chat room says that the bill was filed in Congress about 15 minutes ago," engages the chat room, provides useful information, and encourages other listeners to check out the chat room. The chat room needs to be a resource, not a distraction.



Kiwi Web Client – www.kiwiirc.com

On-line chat has grown up quite a bit since the days of AOL Instant Messaging. The use of chat rooms to interact in real time with listeners is an established resource in the on-line community. With the proliferation of smart phones, pad computers, and other portable devices connected to the Internet, the opportunity to interact with listeners should be embraced. Depending on whether your appetite is for a simple or a geeky solution, you can add a chat room to your station's website for little or no money. Consider doing so. You might be surprised at how making your station interactive can increase listenership.

Mike Phillips started in the radio business in 1962 at his family's radio station in Laurinburg, NC. Over the years, he has been engineer, on-air, sales, and management. He is presently an attorney in Cary, NC and provides audio help for broadcasters and podcasters. You can reach him at radioguide@mikephillips.me

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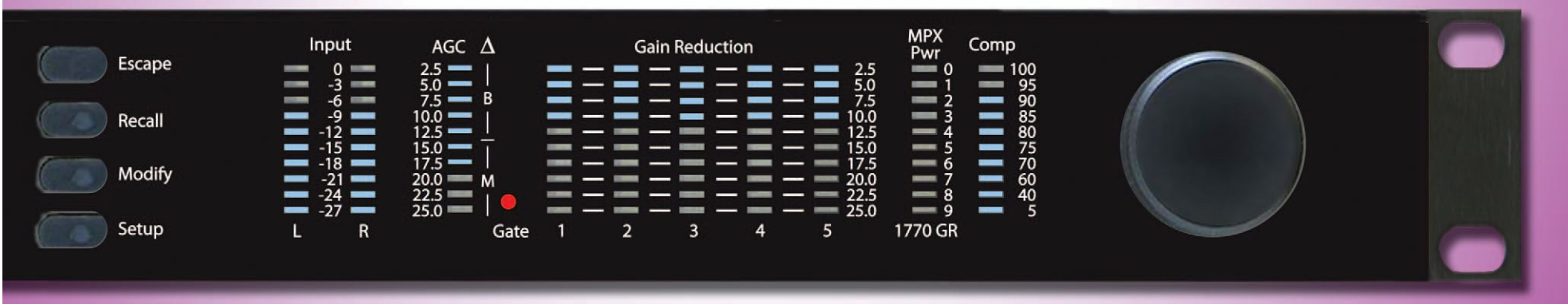

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Oh, The Voices - Part I: Tidying Up Talent Vocals

by Steve Dove, Minister of Algorithms

What you need to know about getting the most out of talent, from solving sibilance and noise issues to how to outsmart those tricky microphones.

The microphone processor has long been important but in recent years it has become vital. Mainly this is due to the recent trend of referencing audio to 0dBfs (the maximum signal level in a digital system) rather than the cozy old nominal 0dB VU. Most popular music releases are "normalized" or processed so that their highest peaks are at 0 dBfs, if they're not totally squashed and clipped to blazes up against that limit. Compared to a playout system crammed full of this and hyped-up commercials, an unprocessed announcer's voice can seem quite wimpy and out of place.

Consider also the entire radio air-chain. Sitting ahead of the transmitter is usually a Very Serious Processor, which is generally set up (in a music format) to be optimal for music, secondarily for voices. Presenting a processed voice that better suits the "big guy" can pay large benefits in on-air voice sound.

Other program distribution chains such as that produced by highly bit-reduced streaming codecs benefit from attention to the voice, whilst talk radio lives and dies by - voices. A good mic processor brings much to all these scenarios.

Let's run through the sorts of things we might want to do to a voice to tidy it up, improve listenability, and better integrate with today's technological expectations.

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The same can't be said for the public internet, which is migrating to IPv6 to keep it in IP addresses. The length of an IPv6 address is 128 bits, compared to 32 bits for existing IPv4 addresses, or that unique numerical string that's needed by every device to connect to the internet. Who would have thought that the internet would blow through 4.29 billion available IPv4 addresses, the last and final block of which was allocated not so long ago? IPv6 will give us, well, a whole lot more. It's the difference between being able to fill a golf ball versus the sun with IP addresses!

What does IPv6 mean to networked IP Audio?

Go to: INN17.wheatstone.com

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Chief Engineer

Analog Console Basics

by Scott Schmeling

If you're reading this shortly after it arrived in your mailbox, it's probably early December. Let me take a couple seconds here to wish you all a very Merry Christmas and a healthy and prosperous new year. This year, much of the country got an early taste of winter with intense cold, and in some areas, record breaking snow. I know that not All of my transmitter sites were ready for winter when it hit. Hopefully, by now, yours are as well.

OK, let's get started. As you well know, every radio station is made up of several "parts" working together as a system. That system takes an audio source and sends it through those various "parts" out to the transmitter, up the tower, and out to your listener's receivers.

Arguably, the center of this system is your audio console. That's the piece that sends your selected audio out through various equalizers, amplifiers, STL, and audio processor. Unless your station is fully automated, the console is probably the one piece of equipment that is touched by virtually every person who goes on the air. (How many people do you let "touch" your processors?!)

Have you ever thought about the parts of your audio console? It, too, is made up of several parts working together as a system. In this article, we'll be talking about analog consoles. Also, as far as I know, the terms "console," "mixer," and "board" can (and probably *will*) be used interchangeably. We will also look at a couple modifications or "adaptations" you can add, to further enhance the functionality of your console.

Okay, let's "pop the hood" and take a look inside. Whether your console is a modern, multi-bus using IC's, or an old, tube-type Gates Dualux, the parts are similar. For many of you "seasoned veterans," this will be a review, but some of you may never have thought about what makes up your console. The illustrations I'll be using feature the NE5532 dual op-amp. It is probably the most widely used op-amp in broadcast audio equipment. It's easy to find and easy to work with. I like easy!

Most consoles are made up of three basic parts. First in the signal path is the input amp, followed by a summing circuit and the output amp. In addition, there may be some monitoring circuits for cue and monitor speakers. Okay, there *is* one other, rather *major* piece: the power supply. But we're not going to discuss that here.

Figure 1 is a Basic Audio Mixer Block Diagram. Let's assume your line level sources are at approximately a 0 dB level. The gain of the input amp is usually set to 0 (or unity). This means the level going into the attenuators will be approximately 0 dB. If your input is a microphone, there will usually be a mic preamp ahead of the input amp. The preamp amplifies the low microphone level (approximately -50 dB) to about a 0 dB level. From a functionality standpoint, we'll call both of these devices the Input Amplifier.

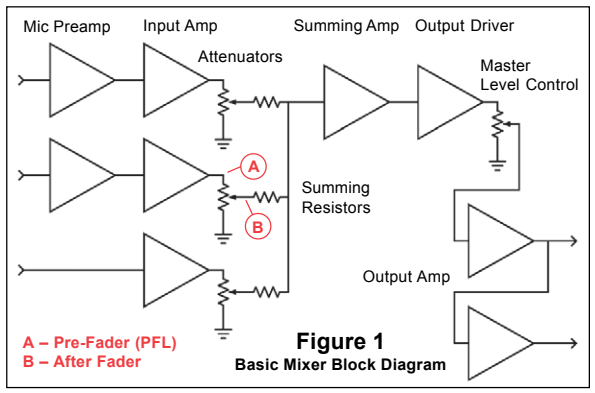
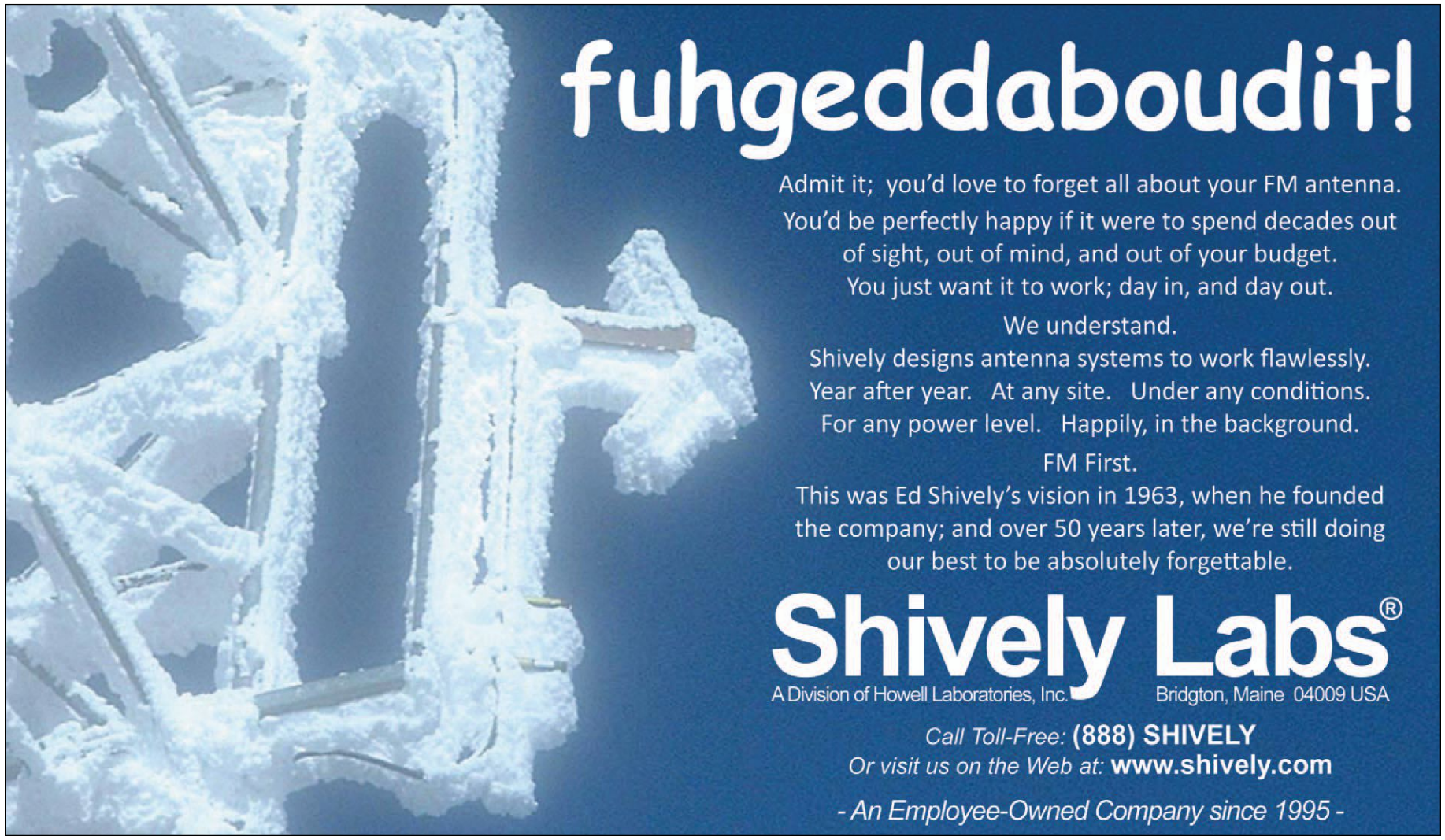


Figure 1
Basic Mixer Block Diagram

Next is the Attenuator stage. The attenuator (or "Fader") could be a simple variable resistor (potentiometer or "pot") or it might be a Voltage Controlled Amplifier (VCA) integrated circuit. I guess the biggest difference between the two is that, with a potentiometer, the audio is actually going through the resistor. That means if your pots are not soldered to the circuit board, the audio will be leaving the board to get to the pot – which means there's a chance you could pick up a little noise. With a VCA, the audio never leaves the circuit board. The pot varies a DC voltage that is fed to the VCA, which causes a change in the audio level with less chance of getting noise nasties.

At the top of the attenuator (or the output of the input amp) you will see an "A" in the diagram. That indicates a point to tap off the signal for an additional circuit. Many newer multi-bus mixers have a "PFL" button that connects to this point. PFL stands for Pre Fader Listen. (Although, in the world of PRE and POST you might

(Continued on Page 28)



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Chief Engineer

Analog Console Basics

– Continued from Page 26 –

think it could also stand for POST Fader Listen – but it doesn't!) This is the spot where you would sample the audio for a cue amp. There is also a little "modification" that would use the audio at this point, but we'll talk about that later in the article.

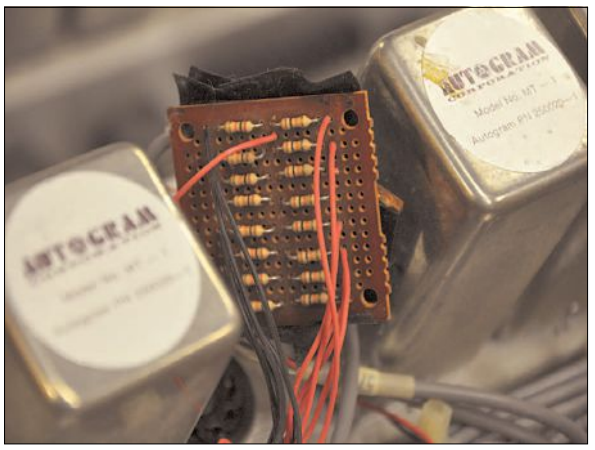
After each attenuator you see a resistor. The other sides of all the resistors are connected. These are the Summing Resistors. They feed the Summing Amplifier. The purpose of the Summing Amplifier is to compensate for some of the loss in the summing resistor network.

From the Summing Amp, the audio goes to the Output Driver, through the Master Level Control, and on to the Output Amplifier. There are a few ways the audio can feed the two Output Amplifiers to achieve a Balanced Output. One method would be for the two output amps to be configured as *inverting* amplifiers (audio feeds the negative input of both). Audio from the Master Level Control would be connected to the inverting input of the first output amp. That amp's output (inverted) would then feed into the inverting input of the other output amp, thereby inverting it *again*. This is a prime example of two negatives making a positive. A *positive* going signal at the input of the first amp results in a *negative* going signal at the output. That *negative* going signal goes to the Negative Output terminal as well as the negative input of the other output amplifier whose *positive* going output signal goes to the Positive Output terminal.

(After reading the previous paragraph a couple times, I can foresee an article of some of the many applications of the op-amp.)

I mentioned earlier, a couple "modifications" you might find useful, depending on how "feature-packed" your console is. We used to use an Autogram AC8 console in several of our studios. These were great consoles and built like a Sherman Tank. Anyone who has used, or is currently using one knows exactly what I mean. The biggest problem we had with them was the audio from the mixer front panel was connected to the amplifier deck using "Jones" connectors. Every now and then the audio would get scratchy. All we had to do was exercise and/or clean the Jones connectors and it was good as new. That is, until capacitors in the modules started to dry out. (There I go, digressing again!) Anyway, the console had the standard Program and Audition outputs with a Left/Right and Mono of each. What it *didn't* have was a Mix-Minus bus.

A mix-minus became necessary when we got our first real telephone interface (yes, a Gentner!). Look again at point "B" on the diagram. I created a mix-minus by connecting a 10K resistor to the wiper of *each* pot (both left and right). To clarify, I mounted 16, 10K resistors on a piece of perf board. Then I tack-soldered the red and black conductors of some Belden 9451 to the left and right wipers of each channel and routed that cable to the perf board. Then I connected all but the two wires coming from the channel used for the Gentner. This created an additional *summing* network. I didn't have an amplifier for it, but fortunately, the Gentner could be configured for a line input or a mic input. I chose the mic input and it worked perfectly. (By the way, I ran the wire from the "Gentner channel" but did not *connect* it. I did this just in case it was ever decided to move the Gentner to a different channel.)



Adding a Mix-Minus Circuit

The other modification idea you might find handy (or at least interesting) is to tap the audio for the studio microphone at point "A" on the diagram. The is Pre-Fader Audio. In other words, it's always up at about a 0 db level. You could do this in both the on air studio and the news room. Then feed that audio through a push-button switch into the other studio console's cue circuit. You've just created an inter-studio intercom. You could run the audio into the headphone amp, but you *might* be asking for trouble. Do you really want your on-air guy talking into the news person's headphones – while they're on the air (or vice-versa)?

Well, I've rambled on long enough. Again, I wish you all a very Merry Christmas and a Blessed and Happy New Year. And until next time ... keep it between 90 and 105!

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

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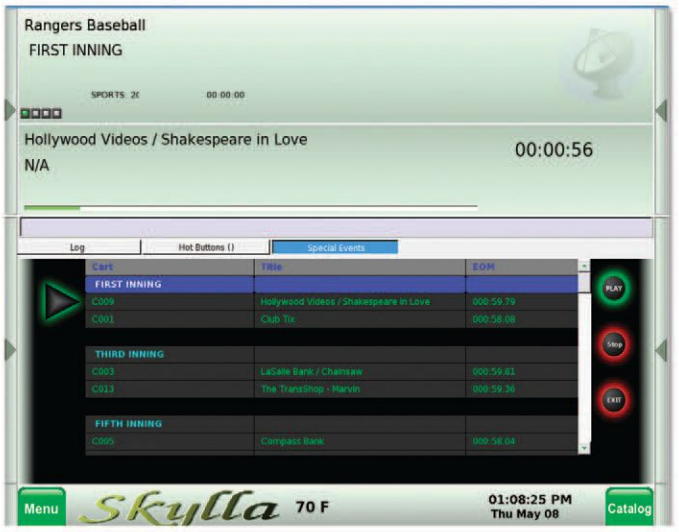

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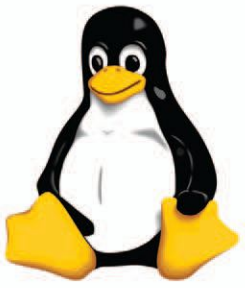

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Disaster Preparedness

Staying Alive in a Pinch

by Tommy Gray

Whether or not we like it, we could one day find ourselves smack in the middle of a disaster of some sort. When that happens – be it hurricane, tornado, fire, or whatever – the technology departments of your stations (Engineering, IT, etc.) will be called upon to rise to the occasion. Major problems are nothing we want to deal with and hope we never do. However, to be totally unprepared for them would be a severe and painful oversight. It is the hope of every good engineer that his backup systems never be needed. I can tell you though that no one in his or her right mind would turn down good backup equipment if it were available.

The first thing we usually think of is a backup transmitter. For those fortunate enough to have been blessed with a new transmitter in recent times, you more than likely have the old unit there to easily commission into auxiliary or emergency service. For those with a limited budget, the addition of a simple patch panel would make switching to the backup as easy as loosening a couple of clamps, and "throwing" the switch to the other port. Then, the backup transmitter is plumbed into the main antenna, and all that would be necessary is to simply warm it up and turn it on. Voila, you are back on the air, at least at a reasonable amount of power. Even if the standby is so old and worn that it will not make full power, you can still cover a great deal of your contours with a listenable signal until repairs can be made.

The same goes for old processors, old STL transmitters/receivers, or just about any old gear in your audio or RF chain. Keep them installed, and ready to go into use quickly in the event you have a failure. The point is that you need to "stay on the air at all costs," and the weakest link in your chain could be the one that will break and keep you off the air, without some form of backup equipment.

One important thing to consider implementing is backup electrical power. Here at our plant we currently have three levels of redundancy with regard to electrical power at the studio. We have UPS systems of sufficient size to "float" all the technical equipment and to prevent it from ever being without power. When the building AC goes down (which does happen from time to time), the UPS systems prevent the computers and digital audio chain from going down or, worst case, having to reboot. Within thirty seconds, the next level of redundancy kicks in, and that is the standby generator.

The generator system is large enough to power the entire studio building, including HVAC systems and lighting. There are also a couple of large generators next door in the office building. The technical operations are all co-located with the on-air operations in our original building. When the organization outgrew the building, a new building was built next door and Technology (Engineering, IT and Facilities) took over the entire building. The new offices have their own UPS and generator systems.

The transmitter sites do not have UPS systems large enough to handle the transmitter, but have systems large enough to support computers, remote controls, etc., to keep them afloat for a reasonable amount of time in the event of a failure. Something as simple as a small desktop UPS can help you to know if the electricity is off, or something along those lines, when things die at the remote sites.

Backup servers and backup systems for your automation and audio is a necessity. Try putting in a totally new inventory of audio, in the event your only audio storage dies. Most stations would not even have access to all the audio they have accumulated over the years to restore it. That is why large backup facilities, and even off-site facilities, are important. It doesn't do you a lot of good to have a backup in your main building and then lose the building to a tornado or fire now does it?

We currently have a cheap Point-to-Point microwave link to to one of our transmitter sites that is close enough, so that we can install an off-site storage unit there for our critical system backups. The link was cheap, and even an old decommissioned server with a large RAID array will give you a decent backup. We have great backups here at the studio and more in the cloud, but an off-site backup that is totally under your control is a great thing to have! I will be talking more about this in future issues.

We currently have four levels of audio redundancy here as well, and have plans for others. We have a satellite uplink that feeds our remote sites for backup or primary

(Continued on Page 32)

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Disaster Preparedness

– Continued from Page 30 –

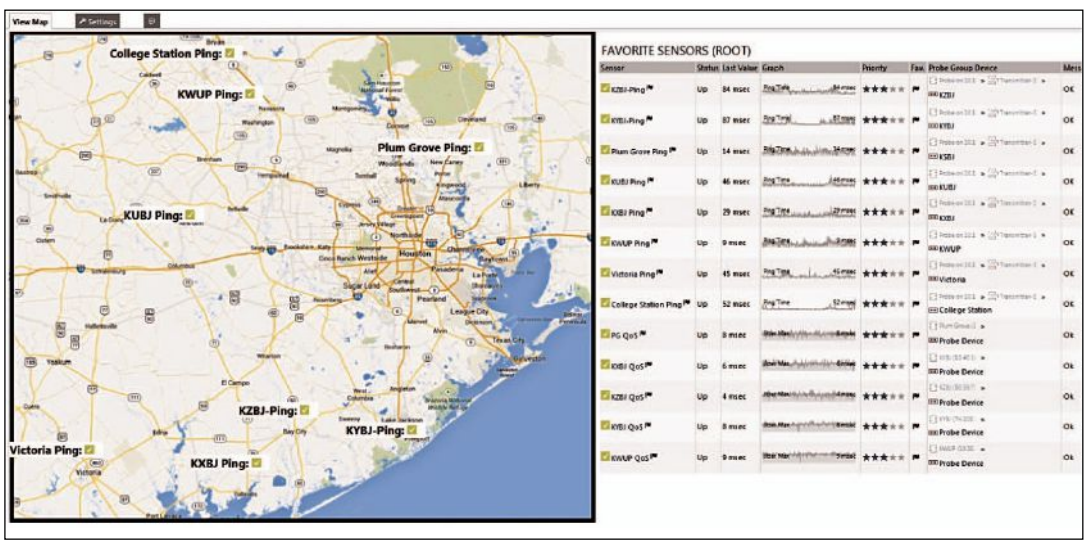
service. Each receiver has the capability to play an audio loop in the event it loses the downlink from failure of the uplink or a local hardware failure. We have remote control capability to force the units into the backup mode at any time, but normally they will do it automatically. Next, the units also have the ability to stream a Shoutcast™ stream that we feed to the sites by data lines. Some of our sites have MPLS circuits and others have DSL or Wireless Internet (depending on location and availability).

The way the receivers are configured, the instant the system loses the downlink, it reverts to the live stream we feed it from the studio. This will keep live audio going until the downlink or STL is restored. If the stream and the downlink are not operable, it will revert to the file. The file is currently an 8 hour loop we keep updated and refresh periodically.

I can tell you that at one point, we have had to use all three backups for one station or another in the last few months. Without them, a station could have been down for hours with no programming. As it is however, they were never down over a very few minutes, and in most cases a few seconds.

Another backup system we use is for our data links. Our transmitter sites have computers with remote login capability, and the ability to monitor transmitters, satellite receivers, remote controls, or anything else that has a GUI and remote login capability. To assure the reliability of our data links, we use a graphic monitoring system along with the common PRTG program to check on link stability, link status, and QOS. The display is on a web page and is currently being setup to display on a large flat-screen monitor in the technical areas of our building. We get email when a link goes down, and the display shows status. There are mobile apps to show these features as well.

Below is a screen shot of our preliminary configuration. It will be refined soon to include even more data and capability, and other stations we are getting connected to the Internet. It is very basic right now, but you can see the monitoring capability this gives us for our "Transmitter WAN."



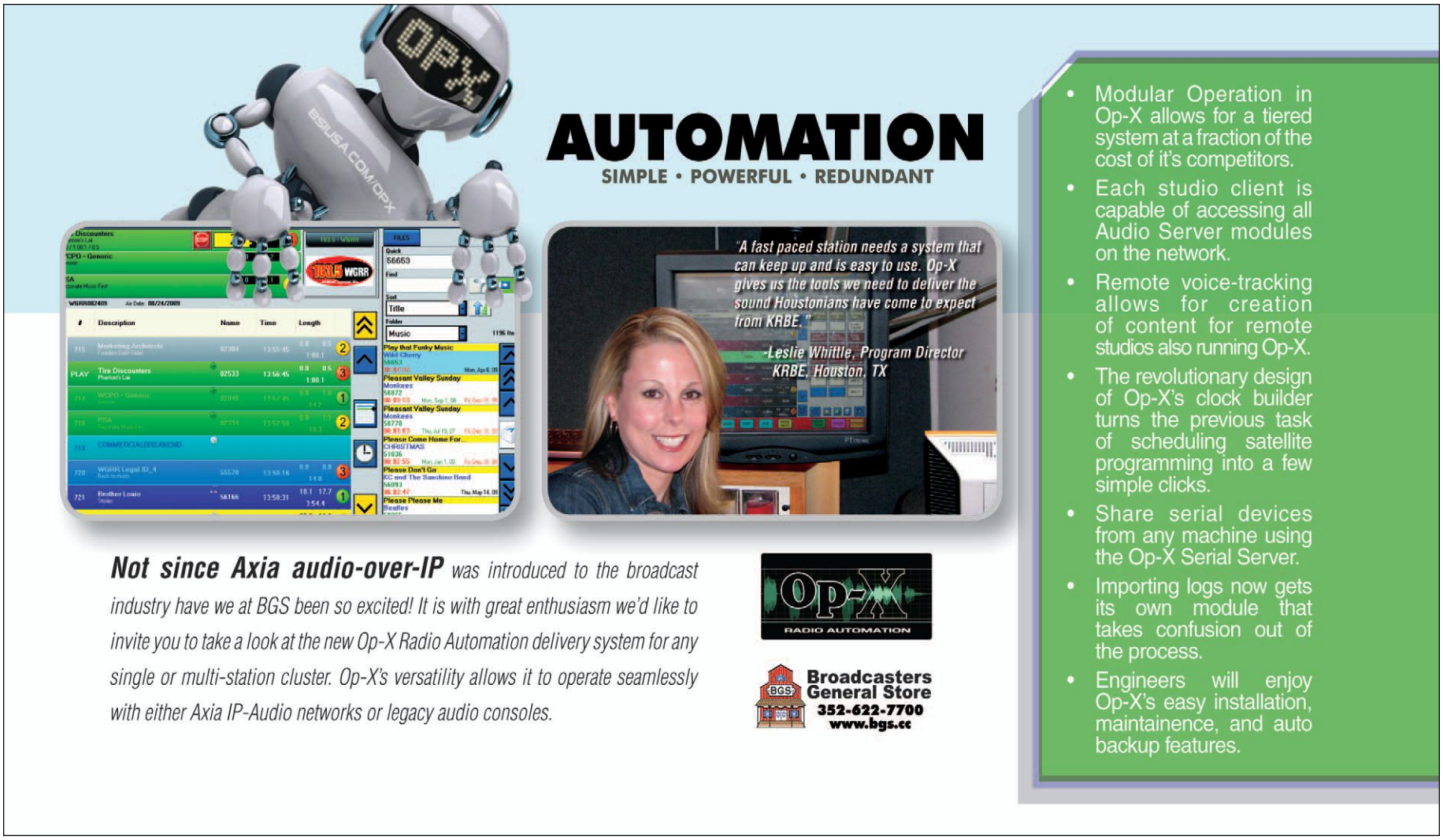
Whatever methods you use, backup systems and capabilities are vital to keeping you on the air and keeping both your listeners and management happy. I promise you that the day you keep your stations on the air when everyone around you is down you will be the most popular employee in your company!

In the next article I will show you a few backup system options to give you some ideas on how to do things where you live. You don't have to spend a fortune to have basic backup capabilities. You can start with a few cloned hard drives, or an old desktop turned into a file server with some inexpensive external hard drives, etc. There are free backup programs out there that can take care of automating your backups daily for you. If you have a few bucks to spend, set up a cheap data link to another building in another part of town, or at a remote site, and you have your own instant "Cloud Backup" for no monthly fees, once it is installed and working.

Take an old frequency-agile exciter and an adapter or two and you have a small backup transmitter even though you might not have a "real" transmitter to use. Just remember one important thing (and I will elaborate in a future issue). When you operate at reduced power or on an emergency system that will not produce your licensed power, you are limited to only a few days like this before you must file an STA with the FCC to continue.

Keep things on the air and keep everyone happy... including yourself!

Tommy Gray is the Director of Broadcast Engineering/Technology/Facilities at KSBJ/NGEN Radio Networks. He may be reached at: tgray@ksbj.org



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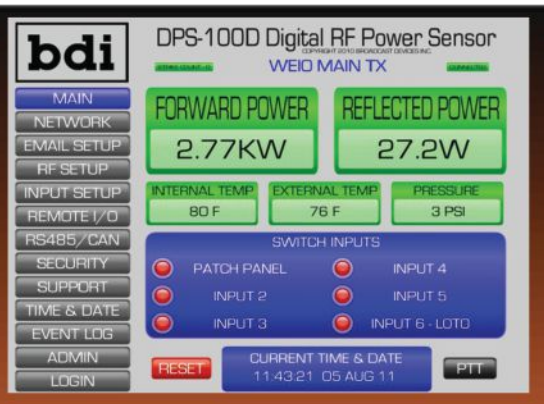

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Operations Guide

A Substitute for Nothing

by Jim Turvaville

Growing up in a very small town in Northwest Texas in the 60's, I was not aware of the Boy Scouts; they may have existed somewhere in the area, but not in my hometown. Looking back over the past couple of years of articles I've submitted to *Radio Guide*, a recurring theme seems to subliminally appear, that is eerily similar to the Boy Scouts – be prepared. Perhaps it is the influence of my early years in Engineering with so much zeal and so few resources, the wise mentoring of a select few guys along the way, or just my appreciation for Captain James T. Kirk, which developed this mindset of there being no such thing as a no-win scenario. To this day, chills run down my spine when I run across a station that is off the air, and my thoughts immediately start racing to contrive some method with which to remedy the situation.

I have innumerable times repeated this quote, attributed to Konstantin Josef Jirecek (1854-1918), a Czech historian, politician, and diplomat: *"We, the unwilling, led by the unknowing, are doing the impossible for the ungrateful. We have done so much, for so long, with so little, we are now qualified to do anything with nothing."* If ever a statement, no matter how cynical, was applicable to radio engineering, that one often sums up what we do on a daily basis. I'll not lump every station or every engineer into the same category, but the sheer numbers tell us that the great majority of radio facilities are not owned by any of the big groups and are not in high ranked (if at all) markets. By and large, it is the group of single owner stations which still populates the airwaves, and it is those with which I have had the privilege of working most all of my career. So as a last word on this subject of being prepared, let me outline some ideas as food for thought, on ways you can do "something" to keep serving your communities when things go awry.

AM Transmission

Propagating an AM signal is not rocket science, but it does require some engineering, and with some preparation you can do it about anywhere, any time needed. I'm not speaking of a simple power outage; rather, a catastrophic failure or the inaccessibility of your radiator system. Every AM station should have "some" kind of a transmitter that will operate in a non-standard environment. With the modern solid state AM boxes, many of the lower power models are able to be easily removed from the rack and set up in the back of a van with a portable generator. If you have a 5 kW AM, that is probably not the case, and an alternate transmitter would be needed.

I recall nearly every little AM station with which I worked in my early years had an LPB box in the back room, from the little 20 Watt to the 100 Watt models – with a jumper to connect it to the tower in some way. We rarely needed them, but on more than one occasion I strung extension cords from a portable generator to power that little transmitter. Do not overlook your Amateur Radio friends – they have access to transmitters, antenna matchers (aka ATU units) and radiating devices (long wire, whips, etc.) which will certainly work at some power level in the Standard Broadcast band.

Even if it is a 250-foot spool of #8 stranded THHN electrical wire, some farm T-posts with insulators and an appropriate power-rated Ham Radio antenna matching box, you can find a way to load your transmitter into a radiator and get on the air. Is that ideal? Absolutely not – that kind of a rig is no substitute for your main radiator or for a fully operational licensed auxiliary facility. Rather, it is a substitute for "nothing" – being totally off the air.

FM Antennas

From my earliest days as an engineer, finding a way to broadcast in a crisis was a regular topic of conversation among my mentors and peers. What began as musing on the ability to cut the outer shield off of a section of 1-5/8 Heliax at *just the right spot* exposing *just the right length* of center conductor, then hose clamping copper strap below it to make a high power ground plane antenna; morphed into all kinds of crazy ideas for getting FM RF to radiate. Some of which I have spent hours experimenting with to test for … well, I have no idea! But along the way, I have designed some pretty functional FM antennas out of copper water pipe and scrap coax pieces. As for ground plane antennas, I try to always have a Comet CFM-95 antenna in the shop; it, and others like it, retail for around $125. It's a ground plane radiator that can be tuned on the fly across the FM

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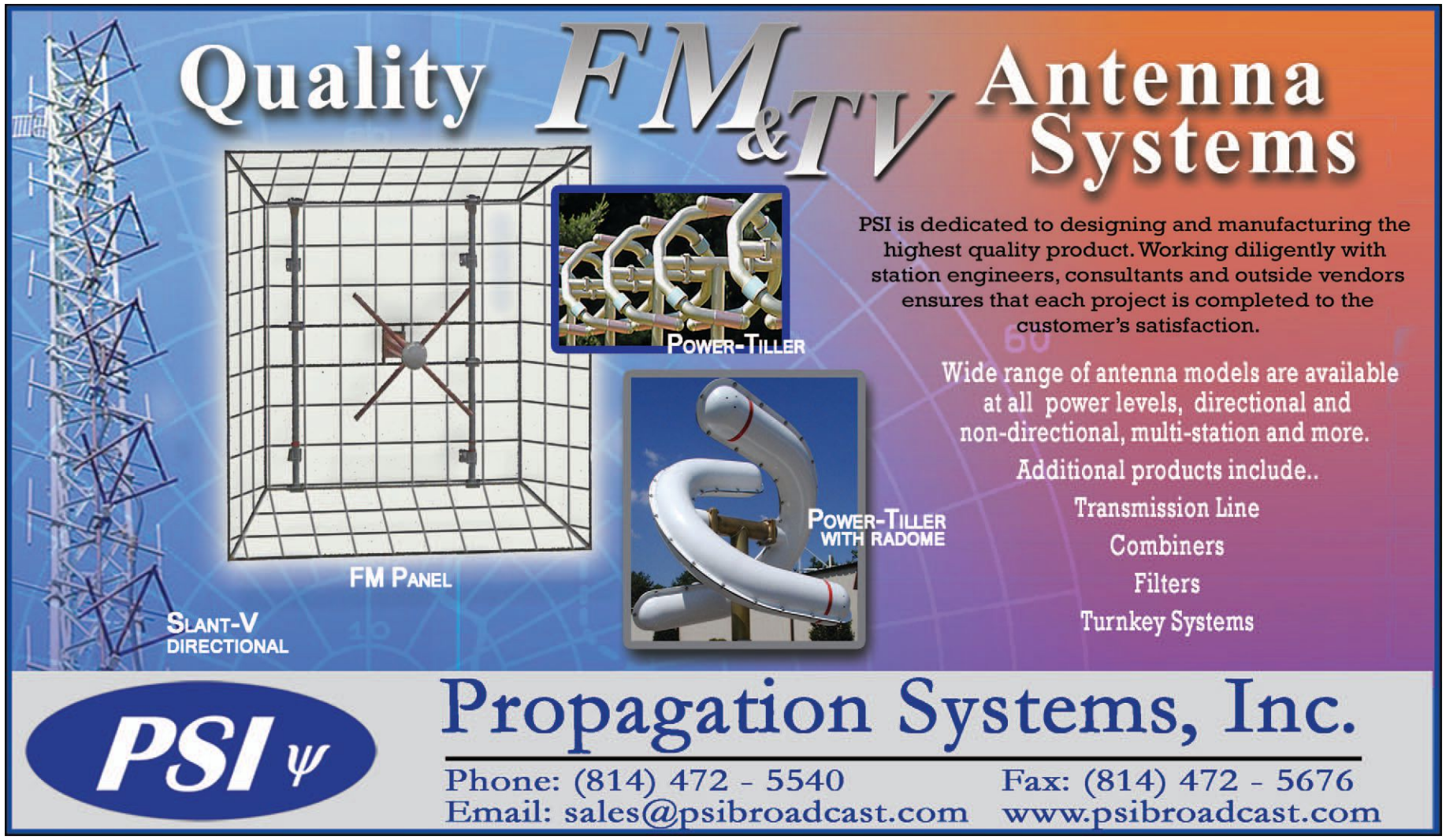

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Substitute for Nothing

– Continued from Page 34 –

band and can take 250 Watt input; and is lightweight and easy to mount on just about any vertical pipe.

There are many broadband FM antennas which can be used as auxiliary or emergency backup radiators – both domestic and foreign made. A good one-bay import can be had for under $500 and kept on hand for such needs. Keep some 3/8 or 1/2 inch coax on hand with connectors that will feed an antenna from your RF source, too. Is that ideal? Absolutely not – that kind of an setup is no substitute for your main FM antenna or for a fully operational licensed auxiliary facility. But once again, it is a substitute for "nothing" – being totally off the air.

FM Transmitters

I am keenly aware of the budget constraints of smaller market stations; I've been there all my life, and still work with them on a daily basis. Not everyone can justify a backup transmitter of some kind; but do not overlook your ability to make at least some FM radio with what you have on hand. Every higher power FM transmitter has an exciter and often an IPA module that is the heart of the system, and it is mathematically less probable to be the source of a failure than the equipment following it. Know how to make that exciter and/or IPA come on without being connected to the main transmitter (a control jumper may be needed) and have a way to patch its RF to the antenna. Know how to get AC power to it from a regular plug or a portable generator, and how to power the other items in your rack needed to get a signal on the air.

Don't overlook the foreign import units available by U.S. vendors and those which are non-type accepted you may find on-line. While you can never legally operate one of those non-type accepted units on your station under normal circumstances, in a time of real crisis and emergency many of those FCC restrictions are temporarily overlooked. If you choose to have that kind of a backup, make sure you check it out prior to using it, for bandwidth emission compliance and performance. Have a way to get your audio into it, power it properly, and get the RF to the antenna. I carry a 15 Watt Chinese unit in my truck as a last-ditch "make RF of some kind" unit – it was under $200. Though I've never used it on the air for more than 24 hours, it has saved my lunch on more than one occasion.

So you know by now – right? Is that ideal? Absolutely not – that kind of an setup is no substitute for your main FM transmitter or for a fully operational licensed auxiliary facility. Rather, it is a substitute for "nothing" – being totally off the air.

Studio Source

It has been discussed before, but bears repeating – find "something" that will keep a facsimile of your regular programming running without access to your regular studio. Most every format can be originated from a recycled desktop PC with some freeware automation software – even an iPod with your format and station ID on it beats silence. We are not talking serious money here, but we are talking some time and effort to get the audio set up and occasionally updated. At most stations, everyone wears three or more hats, but an afternoon of cooperative work with the staff, and this can be set up. It is quite common to find an old desktop PC at my tower sites with audio loaded – ready for a day which we all hope will never come. I have used *Zara Radio* for years for this purpose, and there are half a dozen similar ones which work just as well. A small mixer with 2 microphone and 2-4 line inputs can be had for under $100. With balanced high level outputs, it will drive any analog processor or exciter input.

Did I forget to mention – is that ideal? Absolutely not – that kind of an setup is no substitute for your main studio or for a fully operational auxiliary studio facility. Rather, it is a substitute for "nothing" – being totally off the air.

General Preparation

It has also been previously discussed about having portable or backup AC power available to power all of these ideas above. We'd all love to have nice backup generators at our studios and tower locations which would kick in automatically and we never miss a beat, but reality says that's the exception rather than the rule. Check your RV supply places for portable generators that run on Propane; the storage time is years and maintenance is a lot lower than the diesel and gasoline versions. Own a few DC-AC power inverters; I find them at Harbor Freight on sale for under $200 for a 2 kW model that will run a small transmitter setup from your truck.

OK, one last time. Is that ideal? Absolutely not – that kind of an setup is no substitute for your main AC power source or for a fully operational generator facility. Rather, it is a substitute for "nothing" – being totally off the air.

When things go awry and you're down to "nothing," I hope you've thought of how you, too, can do anything with nothing.

Jim "Turbo" Turvaville is the retired Director of Engineering and I.T. for WAY Media (www.wayfm.com) and now maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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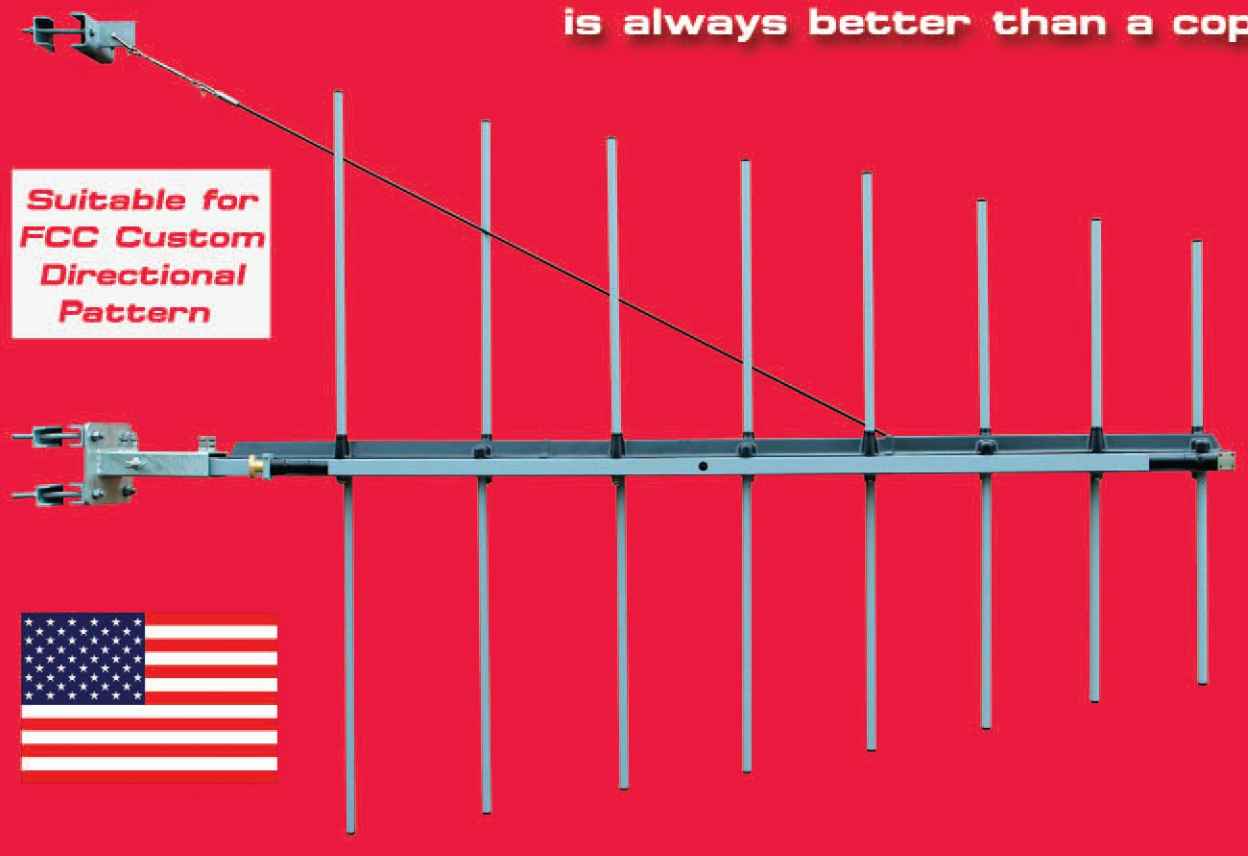

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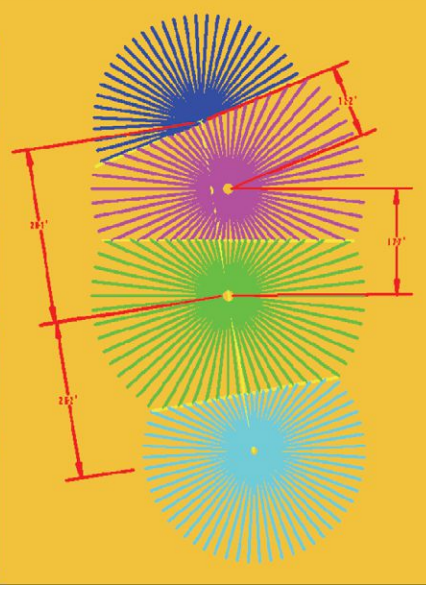

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Survival Guide

Remember What Your Momma Taught You!

"Choose your friends wisely." "Do your chores before you play." "Measure twice, cut once." "Break the bad news gently." "Make your problems work for you."

Most of them are just variations of what your Momma told you; if you were listening to her, they became part of your psyche. From time to time, it's a good idea to revisit these lessons – and apply them to your role as an engineer.

Choose Your Friends Wisely

New technology and untried products can be your best friends or your worst enemies. To a great extent, this depends upon making intelligent choices, based on your knowledge and experience.

If you are like many of us, you do not enjoy being caught off guard on a technical question that you do not know anything about. Therefore, it pays to know at least a little bit about every technology coming down the pipeline – and even some of what is still out on the horizon.

In fact, as an engineer, you are expected to keep abreast of new products and act as the technical resource person in the station. This may be one area where you can be perceived as more than just on the debit side of the financial statement – the station's management and marketing people need your expertise to come up with successful business models.

This is your chance to make money for the station. In layman's terms, describe the new technology you have learned about and throw in your opinion on how it will work for your station. Being able to offer the right technical solutions is a key to personal success.

Finding Good Friends

Product evaluations often are good clipping materials. You can call the users and ask a few more questions yourself.

Install a filing system by subject matter so it is easy to pull out the relevant folder or PDF file. You can then call or send an e-mail to the users of the equipment just to gather a few words of wisdom from them. Almost all of them should be willing to correspond, in spite of their typical broadcast engineer schedules.

To start your own file system, subscribe to the magazines, e-zines, and Internet support groups that relate to your field. (If you are reading someone else's ***Radio Guide***, go to www.radio-guide.com and get a free, personal subscription for yourself. A treasure trove of experiences, opinions and technical assistance is also available at www.radiolists.net)

Do Not Forget Old Friends

Peer pressure among competitor stations sometimes forces us to procure new equipment just to keep up with what we perceive will put us on a level playing field with others. We may think – or be pushed by the Program Director to think – that we need to have the same (or newer) equipment for our signal to be competitive.

Although this may be true for some situations, it also is possible that you just need to maximize the capability of your present gear. New equipment and new technology do not necessarily mean better, in terms of quality and reliability. This is especially true when replacing only part of a system. The new gear may not mate well with the rest of the program or RF chain.

Therefore, procurement of new equipment should be rationalized carefully with regard to its function and improvement of the broadcast system. If you need to join the bandwagon, make sure it will take you to where you want to go.

Do Your Chores Before You Play

As a group, engineers often tend to procrastinate on housekeeping chores. Of course, there may be plenty of valid excuses for this behavior.

There is always one more piece of equipment that needs to be worked on before squaring away the shop table. The transmitter floor has to wait for another day until you have the spare time to mop it. Cleaning the battery terminals on the generator is put off until later on, since the generator is still working anyway. The engineering log has to wait until you find time to put your notes and thoughts in order.

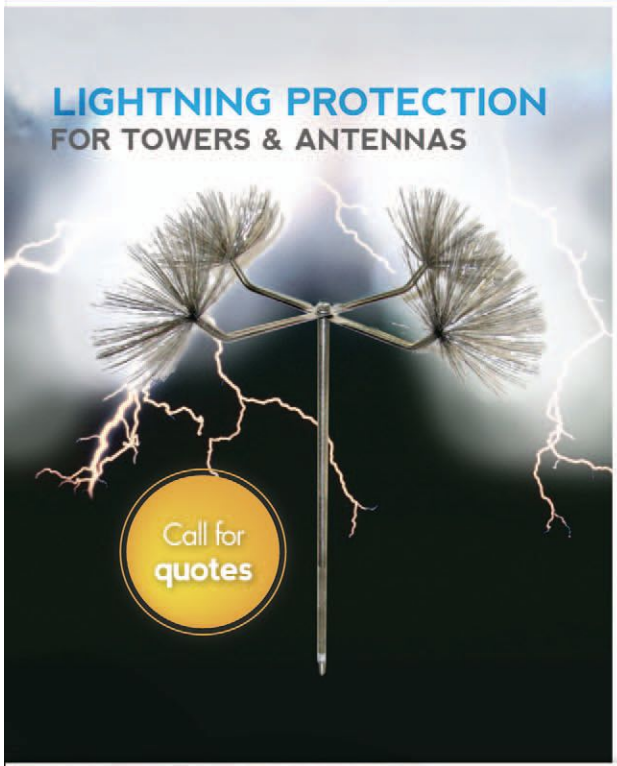
Of course, there are a number of additional "unimportant and/or small tasks" that are on your backburner or – worse – on your tasks-to-forget list. Regardless of however small these tasks may be, they can overwhelm you when they pile up.

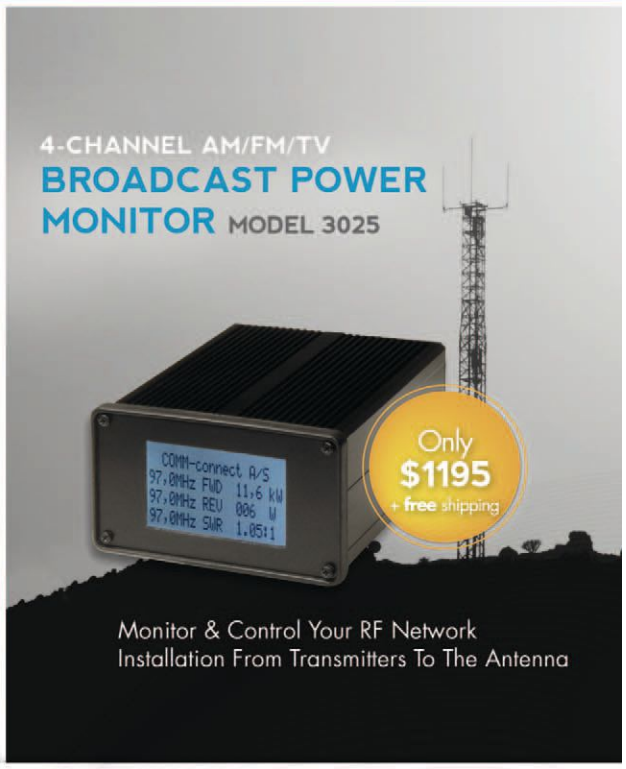
Organize for Efficiency

E-mails, for example, should be answered within the 24 hours after you first see them. Clean up your inbox regularly to lessen the clutter. Come up with ways to help you focus on the important correspondence, and not to waste time on the 80% non-essential messages in your Inbox.

Take note that if you keep the building floor clean, there is less need to replace or clean the transmitter door filters. It is possible that transmitter failures will also be fewer. There are other simple tasks like this that can have a profound effect on the efficiency of your facility.

(Continued on Page 40)





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Survival Guide

Remember What Your Momma Taught You!

– Continued from Page 38 –

It is good to spend some time to make a facility audit and revisit your maintenance program to make it work more effectively for you.

And do not forget to document everything you do. Some day you will need that information and the grey matter just will not be able to pull it all back without a trail.

Measure Twice, Cut Once

We are busy working with our hands all the time; generally we enjoy providing solutions to problems that we encounter at the station. Our sleeves are folded up on our arms and, with a few tools in our back pockets, we are ready to go at a moment's notice.

However, many times when it comes to planning projects, we resist taking the time to sit down, get others in the think-tank, and work through everything that we might need to finish a project. We tend to do the "paperwork" job in a hurry, all too often missing some important details. This scenario almost always ends up with open-ended projects that our accounting people feel should have been closed a long time ago.

We could get away with such habits if money was not a problem. The problem in the real world is that money is a very limited resource and needs to be managed in the form of a budget. Projects need to have a start and a finish date in order to satisfy management functions. The difference between a capital expense and an operational expense should be clear to an engineer. It is just the normal way of conducting business.

The bottom line is to plan your projects as best as you can, trying to anticipate all the details that may be left out on the wayside. Devise checklists, talk to manufacturers, and engage all possible users in the planning of the facility. Call your friends at other stations who can give you a few tips and learn from their experience. By being resourceful and creative, you can come up with a plan that includes every item you need to handle.

Break It to Me Gently!

Are you afraid to bring up bad news? You should be, if that bad news will mean being off the air and the emergency expense will be at least $10,000. No GM will enjoy that kind of surprise.

On the other hand, the response from management will definitely be different if you share the bad news as a forecast of an impending failure weeks – or even months – before it becomes an emergency. People appreciate being forewarned and will perceive that you have the situation under control. You do not need to look like a prophet of doom – just be a reasonable forecaster of possible and probable events.

However, make sure that you do keep track of the situation, and create reminders for when to give updates as to when the situation is mitigated or needs to be addressed on a scheduled maintenance night. This is one area of our job where our communications skills are especially important for our own sake.

Gentle Works Down the Chain Too

Staff evaluations should be given at regular periods and shorter intervals of time. It does not have to be as formal as the annual one, but the main ingredient should be there: feedback.

Feedback is the "breakfast of champions" – and so it is when working with people. Do not pile up all the negative things you see in a folder for the annual evaluation. Remember that bad news cannot wait. It should be communicated as soon as it shows its ugly face.

Evaluations are given to improve the behavior of an employee at work. Thus, you should give feedback on the performance of an employee as soon as they are observed. And do not forget: positive feedback can be just as important. Good employees need to hear "Well done!" or "Ataboy!" from time to time so they do not get discouraged.

Make Your Problems Work For You

The only difference between a stumbling block and a stepping stone is how you look at it. Problems and challenges in the station are not necessarily bad. They can be an opportunity for you to prove your worth to the organization. The key is to make the best use of what is made available to you.

Have you ever worked for a less-than optimum facility, with an obsolete transmitter, barely making 95% modulation, with fading power tubes being used, and "home-made" DA switching gear. To say that some of these stations were made up from someone's backyard scraps, would not even pass as a joke.

But even this situation should not deter you from being creative; the "daily" failures of the transmitters can help to sharpen your skills to make improvements. The obsolete transmitters you may want to curse can become your best training ground.

In the end, you may find that your signal sounds pretty good compared to another station using brand a new transmitter. Our listeners only have our signal with which to judge us. They simply do not care what kind of equipment we use to put that signal on the air.

All of this really proves one thing: it is harder to learn anything, when everything is working well. Be thankful for the opportunities that may be disguised as problems. Then, *make them work for you.* – Radio Guide –

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Small Market Guide

The Day My Continental 816R Lost All Control

by Roger Paskvan

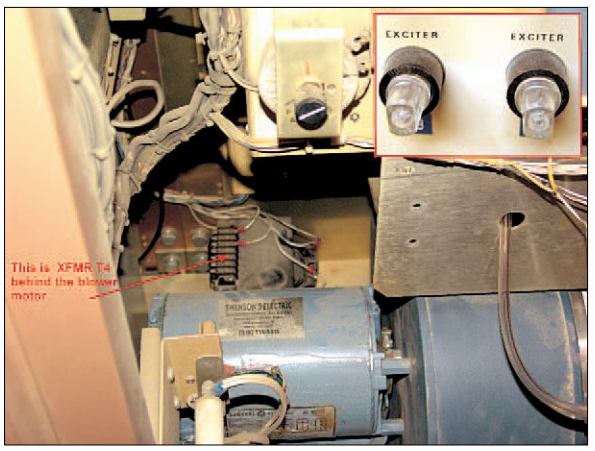
Well, this is another one of those small market things that gave us grey hair. In a routine maintenance night, my engineer noticed that he couldn't control or make any adjustments on the Continental 816R for our country station. He shut off the high voltage and checked the controls. The motors buzzed and the probes went in and out of the cavity as usual. Okay, this must have been a fluke.

A few days later, the power output was at 90% and we went to the transmitter to check out the problem. Again we noticed the tuning and loading controls had no effect on the output. Further investigation indicated that all the motorized controls in the transmitter seemed to be on strike! Well Murphy was hard at work and our problem had resurfaced. With the RF power off, we tried to troubleshoot the problem but could not find anything wrong. All the motors worked fine – but with the HV on, none of the motors would work. This sure didn't make any sense. How would the HV power supply affect the 120 Volt AC line that controls the motors? They are not even remotely related. It defied small market logic.

Getting serious, we traced every wire, thru harnesses from the motors back to its control or common feed. We couldn't find any breaks or loose connections – all seemed too good. This really takes some time, especially if your transmitter is old and neatly laced up. Looking at the schematic showed a transformer (T4) that supplies the common 120 Volts single phase to the transmitter control motors. This was one transformer that we had never seen. It was well hidden, and it took a call to Continental to find out where it lived. Of all places, behind the final blower motor, way down in the bottom left cabinet on the floor (see photo).

Well, sure enough, the secondary winding of this T4 transformer had 120 Volts with the HV off and 77 Volts when the HV was on. Why, became the issue. How is the high voltage power supply related to this problem? They are not tied together but one definitely affects the other. Of course the control motors were low on voltage and couldn't turn, but the reason still was hidden from us.

The next evening, I double checked all the fuses that I had checked several days ago. All were okay, except that one of the two, 3 Amp fuses marked "exciter" was black. Our FX-50 exciter was mounted in a separate rack and this fuse powered the panel 802 exciter outlet when mounted inside the Continental transmitter. We did not use that internal outlet so I kept



Transformer T4 is found behind the blower motor.

overlooking that fuse. Although this fuse is labeled "exciter" on the fuse panel, it is inner related to the transformer T4. A real careful look at the schematic did reveal a roundabout path that lets current flow through this fuse to the control motors.

Bad design (or our stupidity), but either way, with this 3 Amp exciter fuse blown, the control motors won't work when the high voltage is on. However, they *will* work with the high voltage off, which sure fools you. Replacing the exciter fuse, we had overlooked many times, cured the problem, although the relationship to the high voltage power supply still remains a puzzle. Another day in small marketville and another lesson learned in the college of hard knocks. Check all fuses, even if you are not using the said item that is fused!

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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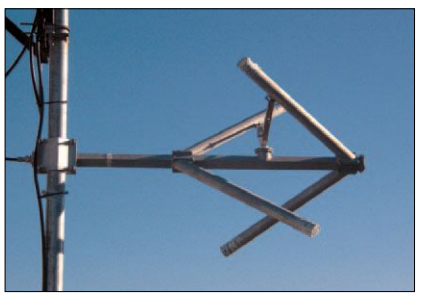

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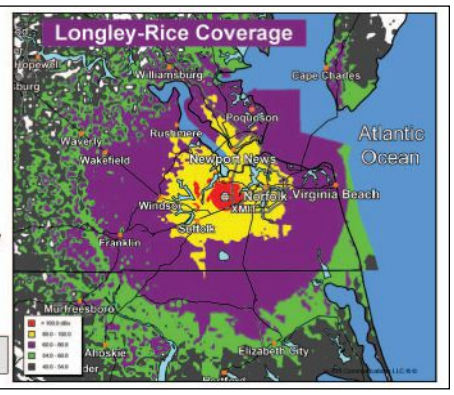

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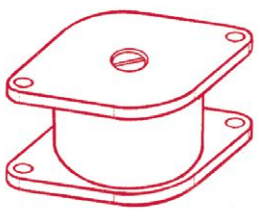

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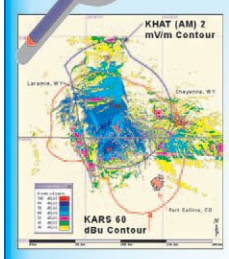

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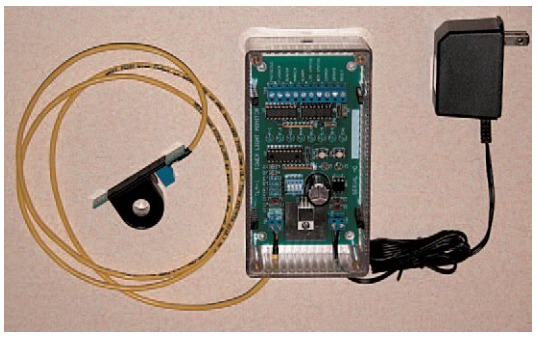

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Las Vegas Convention Center, Nevada
www.cesweb.org

2015 NRB Convention
February 23-26, 2015
Nashville, Tennessee
www.nrbconvention.org

NATE 19th Annual Conference and Expo
February 23-26, 2015
Lake Buena Vista, Florida
www.natehome.com/annual-conference/

NAB 2015 Spring Convention - Las Vegas, Nevada
Show: April 11-16, 2015
Exhibits: April 13-16, 2015
www.nabshow.com

Texas Association of Broadcsters (TAB)
August 5-6, 2015
Renaissance Austin Hotel
www.tab.org/convention-and-trade-show

NAB Radio Show
September 30 - October 2, 2015
Atlanta, Georgia
www.radioshowweb.com

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Altronic - 36	www.altronic.com
AM Ground Systems - 37	www.amgroundsystems.com
Arrakis - 31	www.arrakis-systems.com
Bay Country - 43	www.baycountry.com
BEXT - 43	www.bext.com
Broadcasters General Store - 17	www.bgs.cc
Broadcast Devices - 33	www.broadcast-devices.com
Broadcast Software Intl. - 32	www.bsiusa.com
BW Broadcast - 21	www.bwbroadcast.com
CircuitWerkes - 19	www.circuitwerkes.com
Classified Ads - 4	www.radio-classifieds.com
Coaxial Dynamics - 35	www.coaxial.com
Comrex - 5	www.comrex.com
Davicom - 41	www.davicom.com
Delta Meccanica - 43	www.deltameccanica.com
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Inovonics - 1, 13	www.inovon.com
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Orban - 40	www.orban.com
Phasetek - 47	www.phasetekinc.com
ProAudio.com - 35	www.proaudio.com
PSI (Propagation Systems) - 34	www.psibroadcast.com
Radio Systems - 28	www.radiosystems.com
RadioTechniques - 44	www.radiotechniques.com
RF Software - 45	www.rfsoftware.com
Samco Antennas - 46	www.samcoantennas.net
SAS (Sierra Automated Sys) - 27	www.sasaudio.com
SCMS - 23	www.scmsinc.com
Shively - 26	www.shively.com
Smarts Broadcast Systems - 29	www.smartsbroadcast.com
Stackley Devices - 46	www.stackleydevices.com
Studio Items - 41	www.studioitems.com
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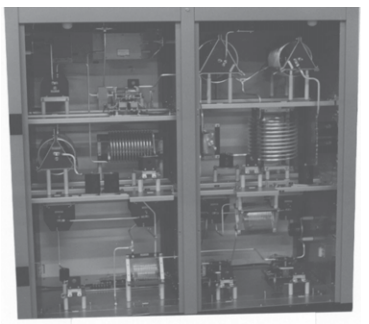

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