

Radio Guide

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Digital Issue Now On-Line

September-October 2009 – Vol. 17, No. 5

The ARC-8 Console – Newest Member of the Arrakis Family



Inside Radio Guide

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SEE PAGE 5

COMREX



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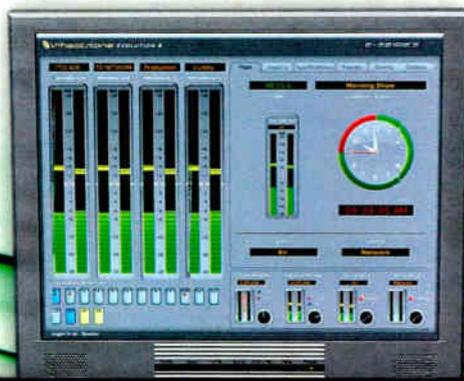
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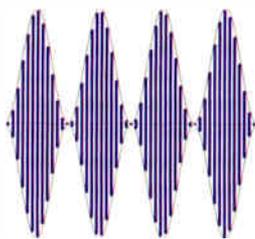
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Arrakis Consoles

It's All in the Family

by Ernie Belanger

In this day and age of corporate takeovers and competitors gobbling up their competition just to shut them down, it's refreshing to come across a company that is still owned by the founder and his family, some 30 plus years after it first opened its doors.

That company is Arrakis, who appropriately is our cover story this issue as they introduce their newest console the ARC-8.

Even more impressive than the company still being owned by its founder Mike Palmer and his family, is that Arrakis has three generations of Palmer family members actively involved in the business on a daily basis. So when Mike or his dad decide it's time to "go fishing" (i.e. retire) the succession team for the company is already trained and in place. Now that is something that immediately raises your comfort level.

Innovative From the Beginning

One of the things that first motivated Mike to start Arrakis was the quest to provide affordable, quality consoles. The company's longevity and bright future proves they hit their mark and continue to do so.

Over the years, Mike has kept the company focused on manufacturing audio consoles and furniture. It branched out into computer hard drive automation systems, to compliment their main product line, as technology evolved. Now remember, back when Arrakis first started the automation systems were those three rack or more monsters with tape players that played 14-inch reels of music and the infamous carousel cart decks.

The Success Formula

Usually there is at least one thing that will keep a company around this long: quality products that meet a market niche, excellent customer support or reasonable prices. In the case of Arrakis it's a hat trick. (For you non-hockey fans, that means it's all three.) Add to those, the ability to see an emerging market and create a product to meet the niche – even before the marketplace realizes it has the need. All make a formula for success.

Arrakis has had great success over the years with their consoles; in fact there are over five thousand in use worldwide, as you read this. Company success continues with the ARC-15, ARC-10 and MARC-15 consoles.

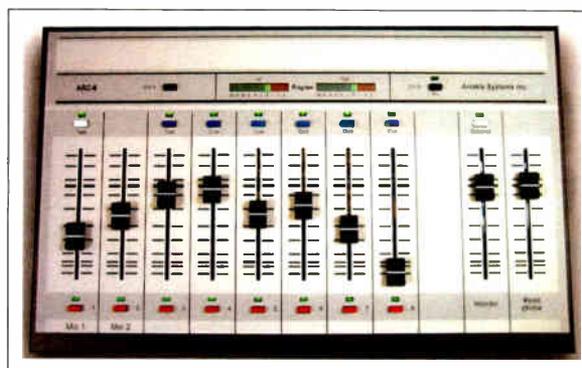
But, Arrakis is not known for sitting on its laurels. So now the introduction of the ARC-8 will round out the ARC family.

Just What is This?

I must admit that I raised an eyebrow when I first saw pictures of Arrakis' new baby, the ARC-8. It looked a little too "disposable" to me. Sort of a souped up DJ console on steroids. I thought the price point pretty much proved out my theory.

The further I looked, the more I convinced myself that was exactly what it was, and I guessed it was probably made in some remote Asian village, somewhere.

Yeah, that's just what we needed in our industry another one of "those" products.



The ARC-8

Not So Fast

Boy, was I wrong! And I should have known better. Mike and his team have done it once again. They've designed a quality console, with features needed in all size markets – and it's priced so even I can afford it for my home studio.

Plus, it turns out, its American made! 100% organically grown at the Arrakis factory in Fort Collins, Colorado. (OK, not grown, built.)

Let me tell you, this baby is cooking and it's a perfect compliment to the Arrakis line up of consoles. They've taken the best features of those "mixers" that have found their way into radio stations and combined them with the most wanted features in a radio console.

Quick Installation

The ARC-8 is designed for quick plug-and-play installation. In addition to the 10 inputs, feeding 8 channels, it has both balanced and unbalanced stereo program outputs and unbalanced mono program outputs. And the ARC-8 has even more unique features that put it at a level far above any console costing even twice as much.

Built to Last

The ARC-8 is built in the Arrakis tradition, with a rugged chassis and all front panel markings printed on the reverse side of a Polycarbonate overlay for durability. It's sleek, compact design is just 2 inches high and 12 inches deep. To gain a size perspective, just check out the cover photo. Internally, the ARC-8 is far from disposable. It's designed for field repair and field serviceability, with all IC chips socketed for easy field replacement. This makes the ARC-8 an excellent investment for any size operation.

They didn't scrimp on the components either – the switches, for example, in the ARC 8 are the same ones

they have used for 30 years without any problems and the faders are the same as you'll find in current Arc series of Consoles.

Well Designed

Unique features include a USB input for computer in and out audio interface and a stereo mix-minus bus for hook up to an external telephone hybrid. In addition, there is an external monitor input to allow monitoring of the "on air" signal.

The two mic inputs have XLR connectors and phantom power is an option. -10 dBu unbalanced inputs are RCA connectors to interface with consumer grade electronics and the balanced inputs are on industry standard RJ45 connectors. Arrakis even provides the ten foot CAT-5 cables for you, so the console comes partially prewired.

For quick hook up of audio the ARC-8 uses IP/ethernet audio, via "AARC-NET," a "CobraNet" ethernet audio distribution system designed to link its ARC and MARC consoles and Xtreme automation products with audio and logic.

In addition to all these features, the console also includes LED indicator lamps, monitor, headphone output, cue system with muting and an auto sensing power supply module to detect voltages from 90 to 240 volts.

In short, Arrakis has taken the best features contained in recording type mixers that have found their way into radio stations and the most wanted features of a broadcast studio console.

Did I mention that the ARC-8 comes with the Digi-Link Xtreme Software? The software is designed for live on air play, basic automation and radio production. This makes the pricing of the ARC 8 unit even more unbelievable.



Plug and Play – the ARC-8 Back Panel

Kudos to the Arrakis Team

As I said the ARC-8 is a perfect compliment to the entire Arrakis line. Like its big brothers the ARC-10 and ARC-15, and its cousin in the MARC family, this is one feature-rich console that is designed to give years of trouble free, reliable service.

Mike and his team certainly deserve hardy congratulations for their latest console: the perfect hybrid at an excellent price point for today's struggling economy.

But There Are Other Great Arrakis Products Too

The balance of the Arrakis console family includes the ARC-10 and ARC-15 consoles which feature the same plug-and-play technology as the ARC-8, including the USB computer interface and AARC-NET digital audio network capability. (Continued on Page 8)

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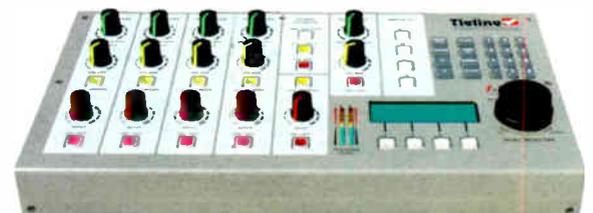
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Arrakis Consoles

by Ernie Belanger

– Continued From Page 6 –



The ARC 10

The MARC-15 a feature-laden, professional analog console for on air radio, production, and news applications. The modular design allows the console to be configured exactly to the studio's needs and to be easily serviced.

The 15 channels with up to 30 source inputs meet even the largest studio's needs. Three output buses easily handle on air, background production, and a third mix for the most complex shows. The mainframe supports up to two phone modules for two simultaneous callers. The console even features a PC-USB input module so that the console can play from, and record to, a Windows PC in digital.

The optional Studio Monitor module facilitates control room/talk studio applications. Installation is fast and easy with the attractive low profile tabletop design and the RJ45 terminated cables that come included with the console. The engineer only need terminate the other end of the cable for the specific source device. The MARC console is even plug-in compatible with Arrakis AARC-NET digital audio networking so that your studios can be connected with only a single CAT-5 network cable.

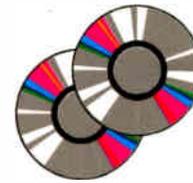


The MARC 15

Rounding out the Arrakis product line is the Digilink-Xtreme, a unique blend of an off the shelf Windows PC computer and Arrakis 'Bridge' hardware, creating a powerful and reliable automation system in Radio and Arrakis' line of studio furniture.

For more information on Arrakis products go to www.arrakis-systems.com, contact Ben at 970-461-0730 or Email sales@arrakis-systems.com

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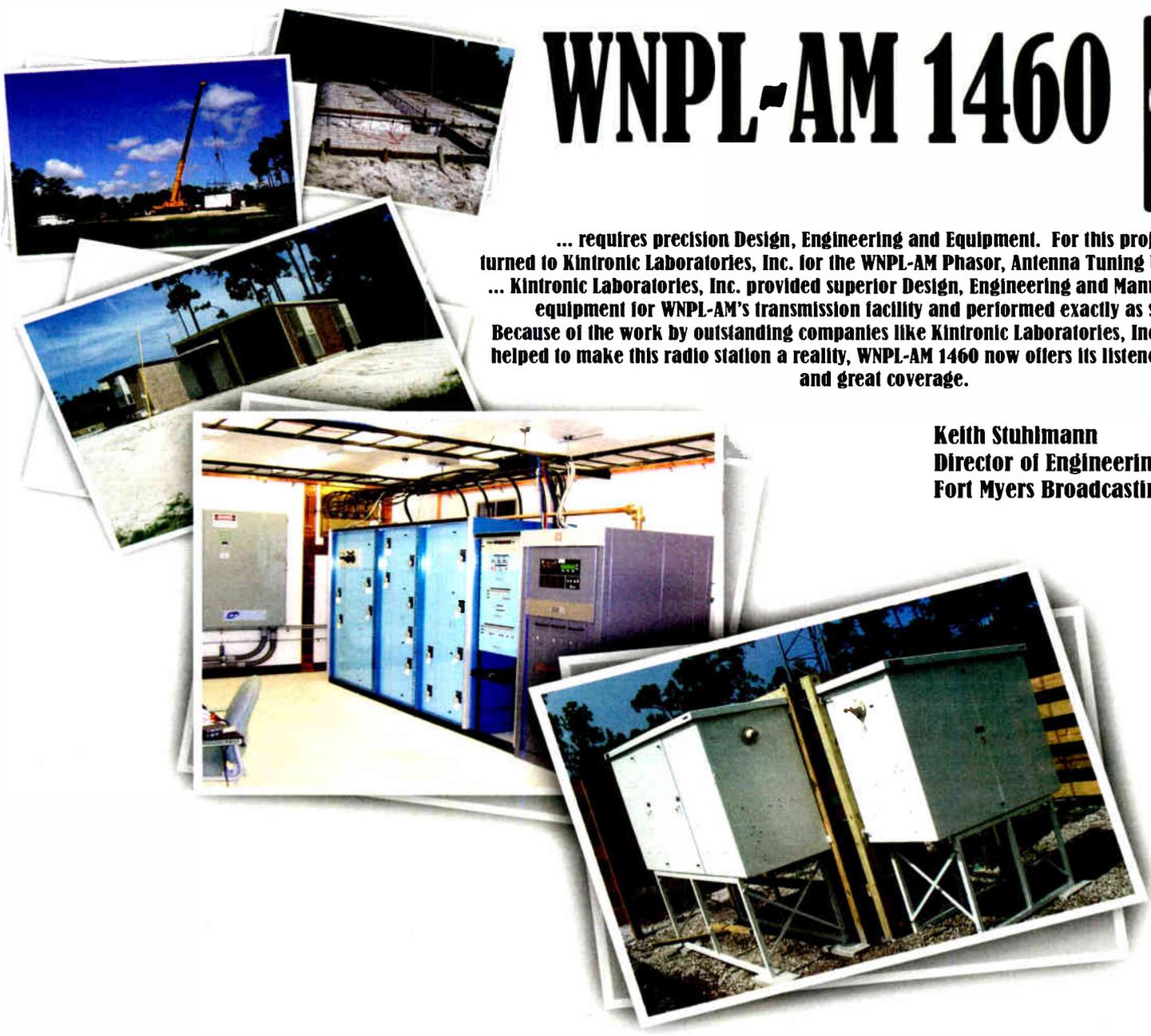
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Are Your Stations in Compliance?

Editor's note: Rather than have Cary write on a single subject this issue I asked him to provide us some pertinent updates on several issues that effect radio stations.

Is Your EAS Handbook in Your Studio

A copy of your EAS Handbook must be located at the normal operator duty position or where the EAS equipment is installed. The handbook must be available to all staff responsible for authenticating messages and initiating actions.

If your Handbook is missing in action be sure to get a new one as soon as possible and place it in the proper location for your station's operation.

AM Stations Should Perform Annual Equipment Performance Measurements

Section 73.1590 of the FCC Rules requires that equipment performance measurements be conducted on all AM stations annually, at intervals not exceeding 14 months, to document that the station complies with the NRSC-2 emission limits and the spurious and harmonic radiation requirements outlined in Section 73.44 of the FCC Rules.

Also, a written report detailing the results of these measurements and the equipment and procedures utilized to make these measurements must be kept on file at the transmitter site or remote control point for at least two years, and made available to the FCC upon request.

In several instances, the FCC has assessed fines of as much as \$15,000 against AM broadcasters that failed to conduct their annual performance measurements.

Be sure to check your station maintenance logs to verify if and when these annual tests took place.

The Do Not Call List and Broadcasters

The "Do Not Call List" prevents commercial broadcasters from placing random telephone calls to residents to invite them to listen to the radio station and possibly win some prizes.

These type of calls to a commercial business. Under the rules of the Do Not Call List, "telemarketing" is defined as promoting a product or service, or soliciting money. Asking people to listen to your commercial radio station, and possibly win prizes, relates to a commercial enterprise and a related broadcast service.

The safe approach here would be to invite listeners and potential listeners to call in or send you an email to be placed on a "call list." You could promote the "call list" on-air, on your web site, or in any print or electronic advertisement in any medium of communications.

For noncommercial broadcast stations, owned and operated by a tax-exempt, non-profit entity, such telephone calls are permissible, but the content cannot relate to anything commercial in nature.

Are You Complying With The FCC's Political Rules?

The political season is now upon us for many state-wide and local general elections. Do you know what special rules apply to broadcasters? Is your Political File up-to-date?

Noncommercial broadcast stations should be reminded that they are prohibited from broadcasting political advertising, but must provide limited free on-air time and reasonable access to all legally qualified federal candidates

Revised AM & FM Self-Inspection Checklists

The FCC released revised Broadcast Inspection Checklist booklets for AM & FM broadcasters.

The new self-inspection booklets contain new information about modulation metering, FAA contact information and retention periods certain Public File documents

With the release of the new self-inspection booklets came an apparent FCC policy shift on the Public File. For the very first time, the FCC stated that co-owned and co-located broadcast stations must maintain a separate

Public File for each station. If you own and operate more than one broadcast station that are located in the same studio building, please make sure you divide up your station documents and maintain a separate Public File for each station.

Broadcasters Not Liable for Defamatory Statements in Political Ads

Section 315 of the Communications Act not only requires broadcasters to sell time, and equal time, to political candidates, but that statute prohibits broadcasters from censoring such material. Accordingly, broadcasters have a *Section 315(a) Privilege* against defamation lawsuits with respect to such material.

What to Do if Your EAS Equipment Fails

If your EAS encoder or decoder fails, you may continue your broadcast operations without the defective EAS equipment for up to 60 days without FCC authority, so long as you have ordered the repair or replacement of that equipment.

Section 11.35 of the FCC's Rules requires you to make entries into your station logs to show the date and time that the EAS equipment was removed, and when EAS service was restored. If you cannot repair or replace the EAS equipment within 60 days, the FCC must be notified in writing of the situation.

Was FM Broadcast Auction 79 a Failure?

On September 15, 2009, the FCC concluded FM Broadcast Auction No. 79 after 50 rounds of bidding over the course of 10 days. A total of 85 FM Construction Permits were auctioned off, resulting in net income to the U.S. Treasury of \$5,253,025.

What is likely a sign of these tough economic times, no one placed a bid on 37 of the available opportunities. These 37 no bid opportunities include a Class C3 at Cheboygan, Michigan; a Class C3 at Daisy, Arkansas; a Class C2 at Buffalo, Oklahoma; a Class C3 at Snyder, Texas; and a Class A at Albany, Vermont. At some uncertain time in the future, the FCC will include these 37 FM Construction Permits in another auction.

Cary S. Tepper is a principal of the law firm Booth, Freret, Imlay & Tepper, PC in Bethesda, Maryland. Contact him at tepperlaw@aol.com

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World Radio History

“Light Speed” Recording A Digital Recorder Checklist

by George Zahn

Last time around, we examined a wide variety of portable digital audio recorders which are revolutionizing the way that radio stations are recording in the field. In this issue, let's go through a checklist of pros and cons of these units from first-hand experience. Whether you're using one of these units for stereo, and in some cases four channel microphone recording, or if the option is to mix with outboard microphones and mixing console and use the “line in” feature to take advantage of the solid state, no-moving parts digital recording capability, these units offer convenience and a fairly decent recording.

George's Personal Portable

First of all, let's discuss some of the aspects of a unit I own, the Zoom H2 digital recorder. Please do not take this as a direct endorsement of a single product, but from discussions with some other professionals, what I learned from my H2 may be a good starting point for the questions you may want to ask before buying or trying a portable digital recorder.

The two major things that influenced my decision were discussions with others using the unit and, in this economy, an attractive price point. To be honest, I wasn't yet planning to do a wealth of significant field recording with it when I bought it. As with any good technical idea, I have found new and varying uses, and I've ended up using it more than I originally planned. Here are some things to consider from one person's experience:

Two Mics or Not Two Mics?

I knew going in that I wanted at least a stereo recorder. Think about it: even a basic, but decent, quality stereo recorder might allow you to capture a community orchestra or a chorus with just the unit itself – two mics and the digital recorder rolled into one.

For more exacting recording, I could plug a monaural microphone (you need to do some simple soldering to make the mono-to-stereo cable) or even a stereo microphone into the mic input. Anything more complex, and I would simply use the “line in” as mentioned above and actually do the mix on a larger mixer. It still beats lugging out the old reel or DAT recorders from the old days.

Just connect this unit to a photo tripod (the smaller thread on the bottom of my unit actually has a camera tripod 3/8" thread as opposed to a mic stand 5/8" thread), find your critical recording distance, and away you go!

An Important Question

One major question to ask is just how quiet are the microphone pre-amps. One of the few complaints I have with my H2 (and I use it a lot) is that it does tend to record at a fairly low level overall, even though the record level is adjustable from the menu controls. At times, if you record someone speaking very softly, you will get some mic pre-amp noise as a result when you try to bring the level of that file into your computer to edit. As with any device, learning the individual quirks of a recorder can make its operation more efficient.

While I was planning to do some basic field voice recording – gaathering natural sound for news stories and doing interviews – I have to say that I was intrigued by the H2's four microphone set-up. It also allows the four mics

to be sent to four channels on the SDHC card when recording. This does chew up twice the memory, but it gives you the option of placing the unit in the middle of a musical group and capturing four channels which can be re-mixed to stereo later.

The bottom line on the microphones is that you're not likely going to find highly accurate frequency response figures. At least on the H2, the mics err toward being a bit bright, but I've been able to capture enough bass to “fix it in the mix.”

Pickup patterns on the H2 and on many other units are adjustable between options such as 90-degree stereo, 120-degree stereo, and in the H2 with four elements, the four-channel 360-degree pickup. Again, because you're buying the mics and recorder together, at a fraction of the cost of a professional stereo mic, you might want to temper your expectations a bit. The units will give you very good stereo separation for the most part, and will definitely jump start your ability to do some quick and simple remote recording.



George's Zoom H2 with handle.

Getting a Grip

While we're on microphone performance, don't forget handling noise. Does holding and shifting the recorder while you're recording result in any unwanted vibrational anomalies? It definitely can be an issue, but unlike microphones such as an ElectroVoice E16, with clearly evident ports, these units are not quite as bad when handled. On the H2, there is a small external handle that screws into the 3/8" thread, allowing you to handle and move the recorder for interviews without directly touching the unit itself.

There is an area that I believe is a problem for these mini-marvels. I know that the H2 is very susceptible to plosives; those are the popping “P” sounds and other rushes of wind or air pressure. Before planning to use one for critical recording outdoors, make sure you test it first to see how it handles wind noise. On my H2, I am using a supplied windscreen – a high ball microphone type screen will fit this model too. Even with that, I still find myself at times, equalizing out a stray plosive or two in post production.

Chomping at the Bit-Rate

Most all of the portable digital recorders obviously allow you to connect the device to your computer's USB port as a storage device. This allows you to directly down-

load the digital files to your PC or Mac for editing without making a real-time transfer. Some even allow you to connect to the USB port and use the recording unit as a USB mic – using the mics on the recorder to input audio directly into the computer in real time.

Given the convenience of the USB transfer of files, it may seem like it's not a big deal what the transfer rate is. I can tell you that while I do appreciate the USB transfer of my audio files, the H2 seems a little slow. If I use the recorder to capture an event that lasts an hour or more, it does seem to take a few extra minutes to transfer those large files. My, how we've been spoiled in the digital age! Still, it does bear checking the transfer speed. Some may still be transferring at USB 1.0 speed, and good quality audio files can be rather large.

WAV vs. MP3

Most recorders will give you a wide variety of file types it can record, from a basic CD-quality WAV file to highly compressed MP3 files. When I'm recording critically in the field, I almost always use the best quality available. A 4 GB SDHC card in the Zoom H2 will record almost 4 hours of 24-bit, 48 kHz audio in stereo mode. In the 4-track mode it will do just under 2 hours.

As I said, there's always a new way to use good technology. To earn extra money for our station, we do a quarterly recording of an 8-hour business seminar, the copies of which are distributed to the presenting company's clients. The recording is voice only, and good MP3 quality will suffice; I can switch the file to MP3 at 320 kB/sec which is very good quality, and I can get more than 1600 minutes on my 4GB SDHC card – that's more than 26 hours!

Applying a “Compress”

For broadcasters, there are some other features which may or may not be handy. Some have auto record functions which allow the unit to start recording once a level threshold is passed. Some have a variety of compressors which prevent digital distortion, and some even have the old-fashioned Automatic Level Control similar to what we had on those old Marantz field cassette recorders.

Some come with built-in instrument tuners and even metronomes since many are also used by musicians for recording. For flexibility I would definitely be looking for a stereo mic input and a stereo line input – usually each are mini-plug size, although some slightly larger recorders may have full XLR mic jacks.

Now It's Your Turn

Just as I've shared some of my experiences, we can all learn from what's happening in the field right now. I hope you'll share some experiences of these digital field recorders. What works for you, and what would you like to see improved? Let me know the model you're using, and how you use it – the pros and cons – and your story might just be in a future article.

One thing's for sure, the new devices are changing the way we look at recording in the field, and as I was writing this article, Zoom just announced a new Q3 recorder that records up to 16 hours of WAV audio and video onto a 32GB SDHC with a built-in stereo mic and a built-in camera 640-x480/30 frames per second. Bob Dylan was right – “The times, they are a-changing!”

George Zahn is the Station Director/General Manager for WMKV Radio in Cincinnati, Ohio and a Peabody Award-winning producer. He has countless hours of recording experience, which also entails more than 500 hours of field production and recording, most notably as recording engineer for Riders Radio Theatre heard on many NPR stations. Share your “feedback” with George and your story may end up in a future article. Contact George at g Zahn@mkcommunities.org.



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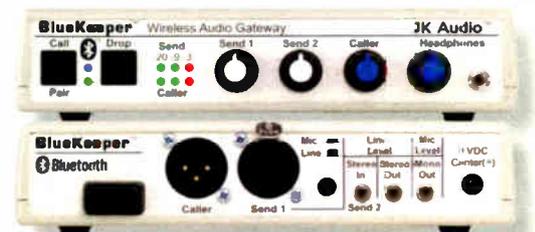
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WorldRadioHistory

Xtreme Engineering

By Rick Fulkerson

No Project is Impossible

Editor's note: This column is designed to highlight those engineers who thrive on the challenges presented by projects that most consider extreme. I hope we all can learn from those who work these projects on a regular basis. The creative ideas they use can serve as an excellent knowledge base for all. If you are someone who takes on Extreme Builds email me and let RG tell your story.

What is extreme engineering? As engineers we are asked to do a multitude of tasks far above what most would be considered our "normal" work description. These include: keeping our stations on the air regardless of what Mother Nature may throw at us, vandals and thieves, equipment failure during critical remotes, and even covering for air talent that fails to appear.

We all have our war stories and can spend hours comparing notes when we have the opportunity to get together. I was asked to share one particular story of a job I just completed. I was contracted for this job specifically because of the challenge of the transmitter site.

KJJJ Build – From the Inside

This was an upgrade for KJJJ-FM which included a major power upgrade and city of license change which consequently meant a transmitter site change. The new site is a BLM lease officially known as Gold Road Crest – otherwise known to locals as Oatman just outside of a small tourist town of the same name in northwest Arizona. The area is known for its harsh climate and terrain.

This was a total build with only the tower and building already in place. Sounds simple until you realize the tower base is 1,000 feet above the building on a mountain, with the only access being on foot straight up the side. The site was a minimum 45 minute drive (using 4X4), from any civilization. Most of my help drove 90 minutes each way, every day. Construction was to happen in July (non-negotiable) when daytime temperatures would reach 120 degrees. All work was to be performed between sunrise and noon – any later would have raised the risk of heat exhaustion.



Looking down at the transmitter building, one thousand feet below.

The items to go to the tower were a Shively 10-bay directional FM, two 4-foot microwave dishes with radomes, 1,100' of 1-5/8" coax to feed the main antenna, 1100' of CAT3 cable for a T-1 line, an equipment enclosure, two microwave radios and associated coax, hangers, electrical supplies, etc.

How We Moved the Equipment

The first thought, for those inexperienced at this type of installation, is to use a helicopter. At this mountain top site, however there is no place to set the equipment, let alone the helicopter and due to the extreme heat and elevation, lift becomes a real issue. Quotes were obtained anyway and were astronomical, with no guarantee of availability. All helicopters that time of year are usually on brush and forest fire duty.

This brought us down to manual labor for the task of physically carrying about twenty-two hundred pounds (not including the coax) up the mountain – this isn't the first time my crew and I have turned mountain goat and pack animal for a project. A quick calculation showed manual labor would cost less than half that of a helicopter.



Interbay feed lines being carried up the slope, that in places was up to a 75 degree angle.

The Tower Crew

I also contacted two different tower crews for hanging the antennae. Only one agreed to take on the challenge at this time of year, and in such a hostile environment. The owner of Com-Plus only agreed to do the job if everything, except their own tools and supplies, was already staged on top of the mountain and then, only after sending his crew members photos of the site to validate their willingness. The response was an overwhelming yes, they wanted the challenge.

So now I had the responsibility of getting everything on top ready for the tower crew. I have worked this particular site for several years. Over time I've found the best way to carry equipment and parts up is to secure them to military metal frame backpacks.

A Killer of a Climb

The steep slope of the mountain, about a sixty degree average pitch, is covered in loose rock, requiring the use of both hands. Much of the climb utilizes an old tram cable laying on the ground. The cable is used to help pull yourself up and to help keep your balance. Also, the extreme dry summer heat requires a huge supply of water and Gatorade for everyone, as well as close vigilance of each other to spot possible heat exhaustion.

I considered the microwave dishes were too vulnerable to being dented or deformed, so I carried these items myself. The dish on its mount and the mount tied to the pack is the safest method of transporting the dishes. The total weight is around seventy pounds plus the large volume of water and Gatorade. While seventy pounds doesn't sound like a lot of weight, remember the factor of terrain and heat.

One note about using manual labor. Do not use day laborers like you find at Home Depot parking lots or standing by the side of the road, who work on the cheap for cash. All liability and workman's compensation insur-

ance falls on you. To protect yourself, use only established labor force companies that carry full liability and workman's compensation insurance on all their people!

The Long Haul

It took approximately two weeks to haul all of the materials and supplies to the top, leaving only the coax cable pull. The cable is allowed to sit directly on the ground since it will not be bothered by anyone else. It is pressurized, so it is preferred to do this in a single unbroken length of 1,100 feet. To accomplish this kind of pull, I established pull stations every two hundred feet up the mountain. Each pull station had a heavy block secured to the nearest large boulder anchored into the mountain, and a two hundred fifty foot piece of heavy rope, the same as tower riggers use.

Each pull team pulls downhill against the block hoisting the cable up – it's much easier with gravity dragging your body downhill. On the day of the pull, I had thirty people on the mountain at one time. I had five "team leaders" whom I had trained on earlier projects. Each was responsible for a pull station and each had a radio for communications. Four other workers were assigned to each station: two were assigned the point to keep the connector, which was wrapped for protection, off the rocks and out of the trees and brush, and two more were assigned attaching hoisting grips every two hundred of the cable.

The first pull station pulls the cable the first two hundred feet. The first station then reattaches their rope to the second hoisting grip back at the bottom of the hill and the second station ties to the point or "lead" grip. They pull in unison for the next two hundred feet.

This process is repeated, adding the next pull station up the hill to the point until the last pull, which has all five pull stations work in unison so the cable is not distorted. The total time for the 1,100 foot pull was just over two hours.

Climbing to Climb

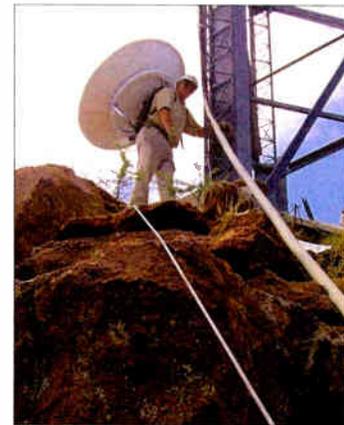
The tower crew arrived and did a banner job of installing the antenna and dishes, connecting all coaxes and hardware. This was done in three days with the crew having to climb the mountain each day, before climbing the tower.

The entire project was completed within the estimated 30 day schedule despite the terrain and extreme heat without any injuries or incidents.

Words of Advice

If you choose to take on a project as extreme as this one be sure to do your homework. Double check everything twice. If you are lucky, you won't hit any snags for which you haven't already developed a solution. And if you do, hey, extreme engineering wouldn't be any fun if one didn't crop up every now and again just to keep you on your toes.

But Rule #1 is always SAFETY FIRST!



About the Author:
Rick Fulkerson owns a Las Vegas based engineer firm appropriately named Mountain Goat Broadcast, LLC. He can be reached at 702-374-4405. Oh, for those who don't know him he just turned 59 – that's him with the microwave dish on his backpack just completing the climb.

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Physical Levels and Detection Technology

by Jeff Johnson

We have come down from the tower; climb safety having been last issue's subject. This column will now address physical site and studio security. When examining such an important subject, it is always best, first to consult an expert.

Entry into a secured area can be of two types: authorized or unauthorized – legal or breaking and entering.

Detecting Unauthorized Intrusion

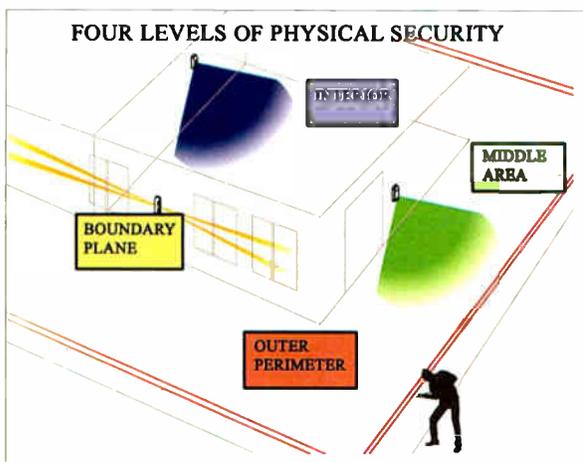
For advice on direct physical intrusion protection, *Radio Guide* spoke to Tim Bake of Cin/Data Protection Corporation, Cincinnati. Tim is the second generation of the company founded in 1968 by his father Don Bake, who is still active in the business.

Cin/Data specializes in high-value property protection. When asked how he would protect a broadcast tower site, Tim responded with a three-pronged approach – light beam perimeter detectors, infrared motion detectors, and Closed Circuit TV (CCTV) recorded as time-stamped video and/or sent to a monitoring location via the Internet.

As the science has advanced, these technologies have become more sophisticated, but they remain dedicated to detecting and alerting the physical presence of an intruder. CCTV can help identify the individual, who may be just the engineer having forgotten to disarm the system. Of course, false alarms are to be avoided in order to render rapid response to actual intrusions.

Four Levels of Security

OPTEX, vendor of optical intrusion detection systems, outlines four levels of security: perimeter, middle, boundary (immediate building perimeter or outer wall plane), and interior.



Four levels of physical security.

The first level, perimeter, detects intrusion at the fence or outer perimeter. Should the intruder penetrate the fence, he is detected crossing a middle area to the protected building. Attempting to enter a window or jimmy a door, the intruder is detected by a boundary plane of light beams skimming the outer walls. Once inside, should the intruder reach this far, interior motion detectors send a final alert. It can be seen that perimeter and middle area protection will be most useful against the onslaught of copper ground-plane thieves.

Many Technologies

Among detecting technologies are Passive InfraRed (PIR) and Infrared Photo beam. PIR detects changes in the baseline infrared level of the detector's field of view. Warm bodies disturb that baseline with their heat.

An interesting recommendation for photo beam detectors is to use dual beams; dual Beam detectors eliminate false alarms due to birds. Even more sophisticated systems use up to 16 beams, to differentiate types of intrusions – raccoons or copper thieves. Photo beams detect intrusion by sensing interruption of the focused beams.

How can differentiation be made among the different creatures – human and otherwise – or other phenomena such as blowing leaves or trash? If two or more beams at different levels and directions are combined in AND/OR logic combinations based on speed of successive interruption, they are able to differentiate between a blowing leaf, a small animal, a human or an elephant. By these methods, high security can be achieved.

Monitoring the System

According to Tim Bake, surveillance systems can be monitored by several methods as follows: on site by staff at the location via a phone call, via the Internet thru a high speed router (DSL Service), using a disk burner to transfer history of recorded information to law enforcement agencies, recordings forwarded as email designating the time frames of the recordings

Authorized Access Identification

Keyless entry technology is generally known as Radio Frequency Identification (RFID). A form of it was invented more than 60 years ago by Leon Theremin, a Soviet, for use in espionage. Theremin's invention was to utilize "backscatter" – the reader's energy field being modulated by the target's information and reflected back to the reader. This is somewhat similar to radar.

We have all seen or used cards or key fobs ('tags') that, when waved in front of a magic panel, cause doors to open and gates to rise. This is contact less technology. As technical people, I am sure we have all wondered, "How does that work?"

A common type is the "passive tag" without an internal power source. The tag contains a coil of wire acting as an antenna. The RFID reader – the box on the wall – radiates an RF field, commonly at 125 kHz. The antenna in the tag, an inductor excited by the RF field, is in resonance with a capacitor at 125 kHz. An IC, presumably incorporating a diode, is powered by this energy.

The IC contains a binary code that is received back at the reader via Theremin's backscatter. That data is sent to a controller that determines the access status of the tag holder. If there is a match, the card holder allowed entry.

The Wiegand Effect

Of the data types sent to the controller, the oldest is the Wiegand Protocol. The inventor John R. Wiegand discovered a magnetic property known as the Wiegand effect – a rapid switching of magnetic polarity in a specially annealed and hardened iron alloy wire. The

non-linear switching occurs when the wire is introduced to a permanent magnetic field produced – in our example – by a card reader.

The great rapidity of the switch produces a strong pulse in a sensing coil – also in the reader. A number of concentric coils of Wiegand wire is embedded in a flat card. As the card is waved over the reader, a code of pulses is sensed.



A 125 kHz proximity card disassembled.

The Wiegand wire technology has been largely superseded by contemporary RFID technologies – such as the 125 kHz technology discussed, but the original 26-bit data protocol is still called the Wiegand protocol.

New Technology – Even Smaller RFID Tags

A newer contactless technology operates at 13.56 MHz. A card, also known as a "credential" can incorporate 13.56 MHz, 125 kHz Proximity, and magnetic stripe – three-in-one. An advantage of higher frequency technology is that the antenna can be printed with conductive ink on a paper-like substrate. An EEPROM is added to complete the light, small and inexpensive tag. A typical application is library book tracking.

Cheaper yet is the 915 MHz tag. At this frequency, the antenna is very inexpensive to print in quantity. With the associated IC chip, the goal is a ten cent tag. These are intended for use in supply chain tracking of merchandise cartons or applications such as baggage tracking – temporary single-use.

A downside is the inability to use this technology for applications such as tags worn on a person. The technology is now into the microwave frequencies, and the water in the person's body attenuates the RF significantly. The preferred technology for tagging living creatures, such as ranch animals, is 125 kHz.

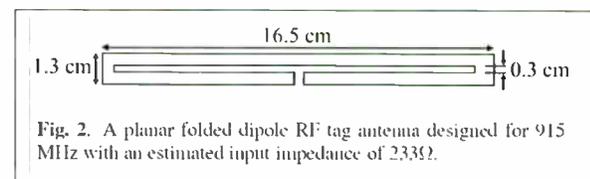


Fig. 2. A planar folded dipole RF tag antenna designed for 915 MHz with an estimated input impedance of 233Ω.

Schematic of a printed 915 mHz antenna.

Cartons to cows, volumes or VIPs, RFID technology is at the core of modern security and commerce.

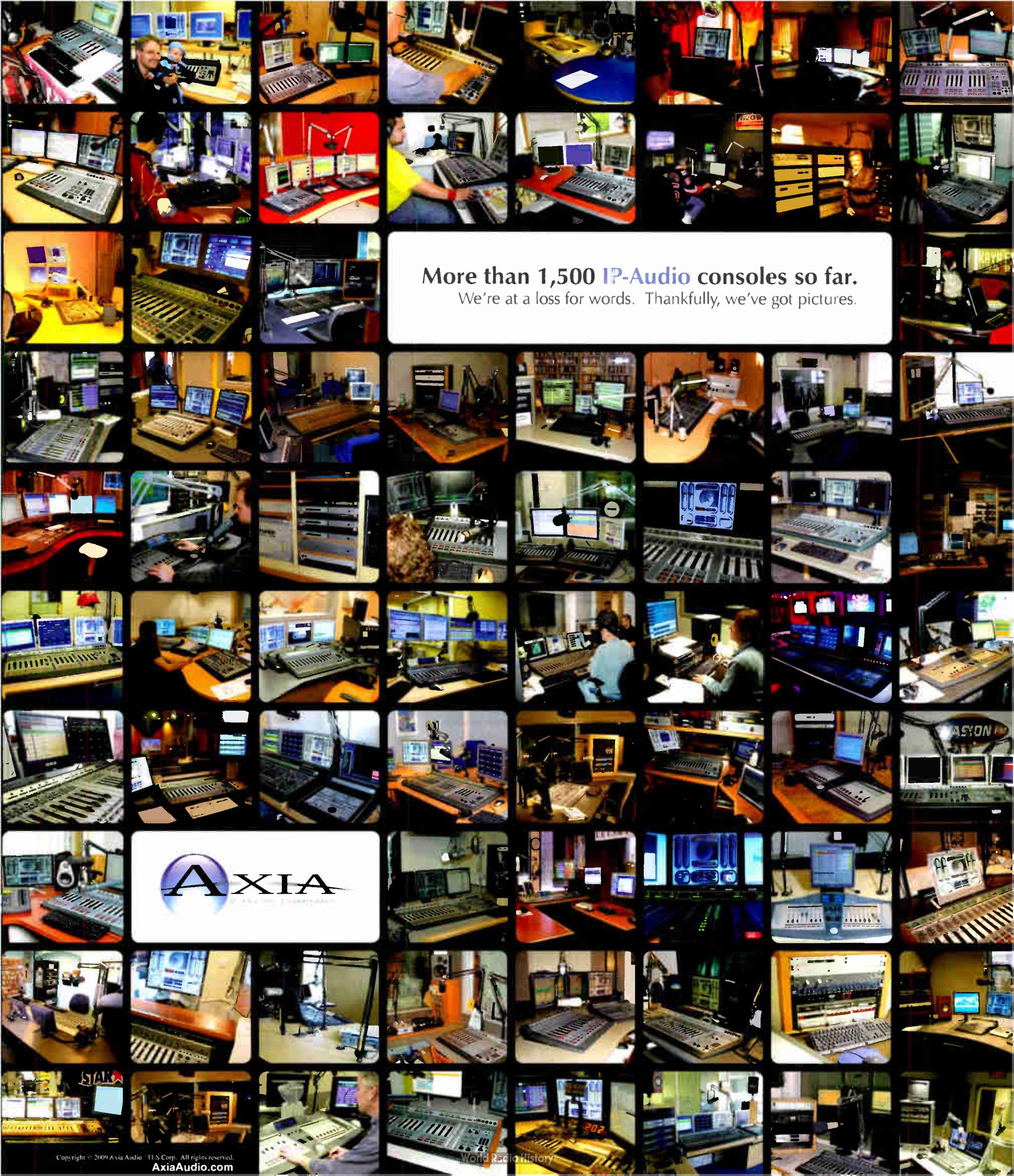
Next issue we will explore fire safety and suppression in electronic environments.

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

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Station Ops

by Christopher "Doc" Tarr

Stand Out on the Internet

These days, an email address is more than just a simple address. It's your on-line identity, and lifeblood of your business, whether you work for a large company, or are a contract engineer.

It is also your calling card, so having something easy to remember will also be beneficial in the long run.

The Way it Was

In the early days of the Internet, most people used the email address given to them by their Internet Service Provider (ISP). Often this was an AOL address or an address ending in "@yourisp.com". The problem with those is that, depending on the size of the provider, most of the easy to remember names were already snapped up, resulting in a user having to pick odd spellings of names or adding numbers or nicknames. Instead of "yourname@yourisp.com" you would end up with "yourname4355@yourisp.com", which is not so easy to remember.

Another problem early on was the service. The service providers were in the business of getting you on the Internet. Email was a secondary service, most of the time just thrown together. Mailbox size limits were small, and forget about special features. You'd be lucky if you had webmail! Another

I mentioned earlier how the Hotmails and Yahoos of the world were providing free email, but the service was fairly limited. They only allowed for a small amount of email to be stored on their servers.

Google saw the email storage problem as a potential opportunity for them. What if they could launch a full-featured webmail service that would provide ample space for a person's email – enough so that they'd never have to delete anything? In exchange, the user would agree to let us serve them ads based on the contents of their email. Google could sell targeted ads, and users could get an excellent webmail service. With that, Gmail was born.

Welcome to Today's World

Fast-forward to today, and webmail is everywhere. People often have several free webmail accounts, which takes us all the way back to the beginning of this column. All the good names are taken!

There's no argument that web-based email is convenient. Being able to check your mail from anywhere is very handy. Until recently though, that meant using a free email service. Now, however, setting up a personalized email address is simpler and

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major downside was that the service provider owned your address, meaning that if you chose to move to a different service your address would change, and you'd have to let everyone know about it.

Improvement With Time

In 1996, Sabeer Bhatia and Jack Smith came up with a novel idea. They created a company whose product was email. The email would have a web interface, and wouldn't be tied to any service provider. That service was called Hotmail, now owned by Microsoft. With the launch of Hotmail, a person could create an "email address for life" that could be accessed anywhere. The service was free, supported by advertising.

Yahoo and others quickly followed with the webmail model – free lifetime email in exchange for advertising. Just as with your ISP provided email, there were very few bells and whistles, but everyone figured that the limitations were acceptable for the free service. That is, until the 500 pound gorilla stepped in.

The Goggle Factor

Google was getting itself established as a search engine leader, but they knew that the future was "smart" advertising; in other words, advertising that was relevant to what the user was doing at that very moment. That platform was working very well for their search engine, but they set their sights on something bigger.

cheaper to do than you might think. In fact, you can often do it for \$50 a year or less!



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Registering Your Domain

The first step is to register a domain name. The domain name is the "xxxxx.com" part of your address. This will take some thought, since there are millions of registered names. Remember – this will become your on-line "identity" so look for something easy to say, remember, and most of all, type. If the .com version of a name is taken, check for .net or .org versions, you may find what you want. Registering a domain name can often cost as low as \$9.95 a year.

(Continued on Page 20)

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DMS Broadcasting, San Francisco, CA

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Stand Out on the Internet

Now, if you want to host a website with that domain name, register it through a company that sells domain and hosting packages. My reasoning for this is that you can often rollup the cost of the domain into a hosting package, and by registering the domain through the web host, they'll configure your account to "just work" instead of having to work with the Domain Name Service (DNS) and Mail Exchanger (MX), records that are used to find your web and email servers.

These packages can be as low as \$5.99 a month, and include website hosting, and webmail services using your domain. You can have hundreds of addresses in any combination that you want.

To Host – or Not to Host – a Site

What if you don't want to spend money on a website? There are a few different free mail services. Google offers Google Apps, while Microsoft offers Live Mail. Both services can be used for a custom email address. I chose the Google route: in my case, my email address from my Internet provider is something like ctarr1234@centurytel.com, but now everyone knows my address as chris@geekjedi.com. With Google, I can access my email with any email program, as well as check it from any internet connected device by using the Gmail interface. You can see by the screenshot photo how Gmail looks when it's customized for your domain.

Additionally, if you upgrade to the \$50.00 a year package, you get the added spam filtering of Postini.

The filtering is pretty effective.

Going the custom webmail route takes a little extra work, since you'll need to edit some records with your domain registrar, but there is plenty of help available, and it is pretty straight forward once you get started.

Whatever method you choose, the end result is that you'll have an email address that you control (as long as you pay the yearly domain renewal fees!) and have the flexibility to add and remove names at will.

Tricking the Spammers

A nice trick I like to use is to create "throwaway" addresses to help fight spam. For instance, if I buy something from a site on-line, I'll create a "websitename@geekjedi.com" address exclusively for that site. If I start seeing spam being sent to that address, I can simply delete it.

Standing Out From the Crowd

With a little cash outlay, and a little elbow grease, you can go from being one of a million on the Internet to one in a million!

In the next article, we'll take a look at social networking sites like Facebook and Twitter, and learn how to take advantage of these services while using your new, easier-to-remember email address to reach out and connect with your peers and potential employers.

Christopher "Doc" Tarr is the Director of Engineering for IT at Entercom's stations in Madison and Milwaukee, Wisconsin.



Editor's Note: One point that you should consider is that as our careers progress, there are the usual changes that normally occur. It is important not to tie your self only to a local ISP or an employer-provided email address. As Chris has pointed out, having your own domain or web mail address means you are always in control of on-line identity and everyone you know will always have a way to contact you regardless of where life's journey takes you.

Model 730 Inovonics' Flagship RDS/RBDS Encoder

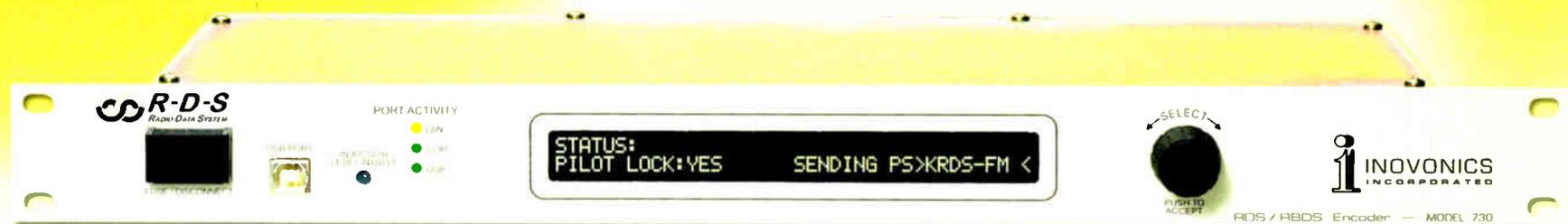
Supports RT+
Song Tagging

Featuring a front-panel LCD screen and jog wheel for instant on-site setup, the 730 may also be programmed easily through any of its data ports using the included Windows® software. USB, TCP(x2), UDP and serial ports can accept both ASCII and UECP command sets.

The 730 connects directly or can be networked with virtually any playout system and offers full support for RT+ 'tagging,'

TMC traffic updates and other advanced applications. An Internet connection will assure accurate Clock Time and Date (CT) timekeeping.

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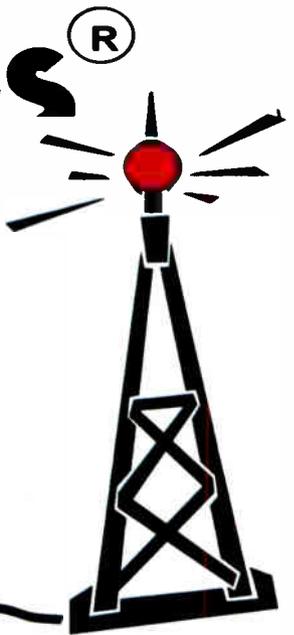
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Practical Engineering

Successful Troubleshooting

by Dave Dunsmoor

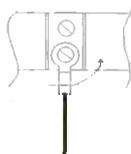
It seems troubleshooting is oftentimes a bit of a backwards process. You often can spend a lot of time checking all the things that *could* be the problem – but are not – just to finally locate the one thing that is the problem. It sure would be nicer to find the thing that *is* the problem *first*, then check all the other things if they seemed like they ought to be looked over, just for caution's sake.

Well, short of my developing some extrasensory powers, I know that finding every problem in the first place I look is not likely to happen anytime soon. So how about eliminating many of the possible problems at the source – at installation time? Poor installation technique has to be the most common source of problems I have encountered, anywhere. And I am not limiting this to the initial installation; I am talking about every time I go into a piece of equipment, whether to repair or just to look. Actually, anything I do (or fail to do) can be considered part of the installation.

We all know that electrical connections have to be tight in order for the equipment to function correctly. But is "tight" all there is to it? And, what really is "tight?" (I am not talking about just-short-of-breaking-it tight, I am talking about tight enough to make good electrical bond, and to stay that way.) Here are a few things I have learned over the years that have greatly lessened the number of times I have had to track down intermittent problems that were traceable to poor mechanical connections. I would like to be able to tell you that I was so clever that I thought these things all by myself, but that is not usually the case.

Solid Connections

First, many rack mount processors, distribution amps, transmitters, etc., use the basic screw terminal strip for I/O connectivity. Most times they will stay tight forever, but I have had on occasion found them to have loosened up. Temperature changes and vibration are the primary causes here. To prevent this, firmly press the terminal clear to the right barrier as you are tightening the screw/nut and that ring/spade terminal will stay there forever. At least that is the theory as presented to me by Boeing Aerospace QC engineers many years ago.



Incorrect Terminal Lug Installation

The problem here is that movement of the terminal lug is possible, either by fingers, tools, etc. bumping the lug or even by vibration. Then the problems start, intermittent at first, followed by an outage.



Correct Terminal Lug Installation

Here the terminal is held firmly against the barrier strip's insulating fence as the screw is tightened, and cannot work loose, nor can it be wiggled loose by accidental bumping. A small issue, but it has saved the day.

Another variation on this is the stud through the insulator type connection. Usually this will be in a high current or RF connection. Either way, we do not want the electrical connections coming loose. One most important thing to remember when making this type of connection is to be sure the electrical connection integrity is not relying on mechanical connections where a compressible material is partially responsible for the tightness of the connection.

In the following example, notice how the terminal is tightened by a jamb nut up against the nut holding the stud in place. The jamb nut is torqued to the holding nut on both sides of the insulation material. Properly done, this kind of connection does not rely upon the holding nuts being tight in order for the electrical connections to be firm.

The insulating material (fiberglass in this example) may give over the years, but as the jamb nuts are tight against the holding nuts and are tensioned by locknuts, the electrical connection integrity is maintained. If the terminal were placed directly against the fiberglass and a single nut tightening the entire assembly, it would eventually work loose and become a problem.

Rechecking Connections

It is always my preference to go through a new installation and recheck all connections, whether using nuts or terminal strips, and generally, if they are checked again after a season of heating and cooling (about a year later), I feel they will be good for many years. Nevertheless, it is always a good idea to check the various connections every year or so.

This goes for *all* the connections from the service panel through the entire path to the equipment – terminal strips, outlets, circuit breaker screws, everything. Loose connections can mean heat buildup, and more heat means looser connections – the cycle continues until there is a failure.

(Continued on Page 24)

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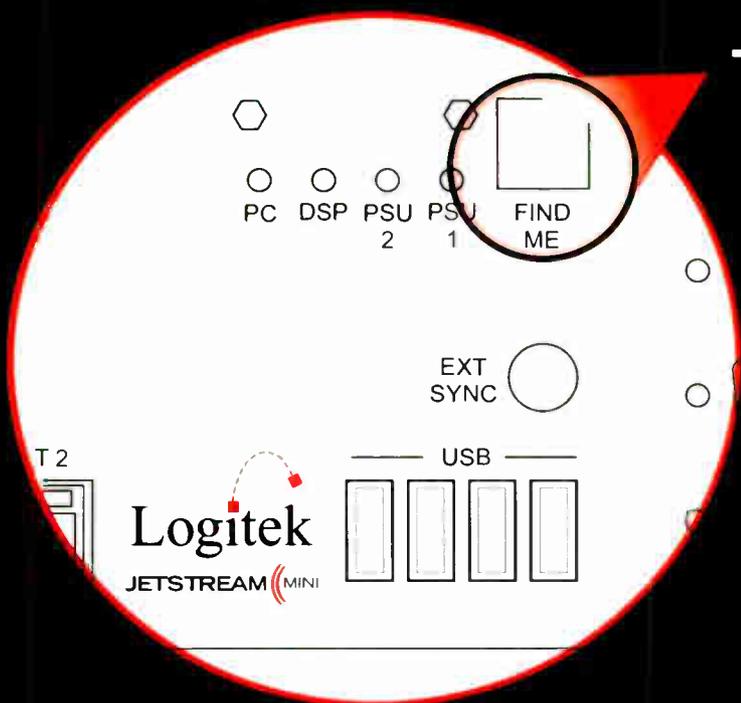
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Practical Engineering

– Continued from Page 22 –

Phenolic, Teflon, bakelite, insulation material.



Wrong Assembly Method

The "weakest link" in the tightness of this electrical connection is the insulating material itself. Notice that the nuts (and therefore the terminal lug) are tight only as long as the insulating material is under compression tension. As this assembly ages, the insulating material (and especially if it is Nylon, Teflon or similar) will compress, or "cold flow" allowing the electrical connection to loosen. If it is a high current circuit, it will heat and aggravate the condition. If it is a high voltage circuit, it will arc. If it is a low voltage circuit, it will get noisy. All conditions are detrimental to the operation of the circuit.

Phenolic, Teflon, bakelite, insulation material.



Correct Assembly Method

Notice here two nuts (tightened to each other) on each side of the insulation material are making the mechanical connection. This connection method is independent of the tightness of the nuts to the insulator, and will maintain its integrity forever. A third nut is then used to secure the electrical terminals.

And do not forget that matching the proper wire type and size for a given terminal type and size makes for a more permanent connection. For example, most terminal ends are not

designed to be used with solid wire. They will work, but will probably develop an intermittent connection after a while. On the other hand, you can buy terminals designed for solid wire – they are identified by the ribs inside the ferrule where the wire fits. These terminals will also work fine on stranded wire.

Of course, once you have the right type terminal ends, the right size wire also is important. However, when you just do not have a small enough terminal for the wire at hand, one workaround is to use some "filler," more pieces of the same gage wire layered in with the actual wire, enough to make the whole bunch approximately the same size as would normally be used for the terminal being used.

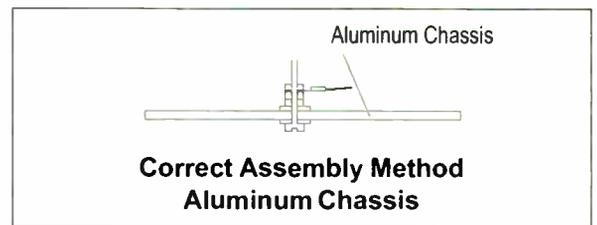
There are some actual charts designating how many of which gage wires are needed to properly fill the terminal ferrule. Again, this is an aerospace specification and has to do with gas-tight connections, not over stretching the brazed seam in the ferrule and so on, but for our purposes, close works just fine.

Clean Grounds

We have been talking about tight connections, but there is another major factor that makes up the "second half" of a good connection: clean wire and terminals. Sure, new terminal ends and new wire are usually clean, but how many times do you have to make a connection to an aluminum chassis? This will (almost) always be a ground connection, and a solid ground connection is necessary for stable operation of any equipment.

There are several ways to make connections to aluminum, the most common being a machine screw and washers and the holding nut, with the terminal being held by the pressure exerted by the nut, and the assembly process outlined above for stud connections applies here as well.

One thing to note is that for aluminum to be considered "clean" enough for a good low loss connection, it takes a little work with a stainless brush to clean the oxide around the connection point. And where does one find such a brush? At the local welder's supply – they are used for cleaning aluminum of all oxides prior to TIG welding.



Correct Assembly Method Aluminum Chassis

When the aluminum is cleaned, it helps keep the connection very low loss when the connecting hardware is properly torqued. Ground connections can then be added, or removed and replaced without disturbing the actual ground integrity thereafter. The stainless brush treatment is also valid for the areas where various aluminum chassis parts are connected to each other. Any thing done to improve the ground connection likely to result in less trouble in the future.

This applies primarily to intermittent problems type of trouble, but is also very applicable to lightning-induced current type of trouble. If all the grounds are at the same potential when a great deal of current is flowing through them, all else being equal, this particular equipment will experience less damage than one with poor ground connections throughout. Generally .001 Ohms is considered to be a good connection resistance.

This low a resistance value can be difficult to obtain, and even more difficult to accurately measure. I have used milliohm meters to determine the resistance of connections as well as Fluke Low-Ohms Ohmmeters. The milliohm meters use dual point probes with very high current on one set of points, and measurement detection on the other set to determine resistance values. $R=E/I$, and with lots of I , R is easier to accurately determine.

You can do the same by running a lot of current through a connection, and measuring the voltage across the connection, but that is usually too much trouble for the benefit gained. Just remember to brush the connection points with a stainless brush and it will be fine. – Radio Guide –

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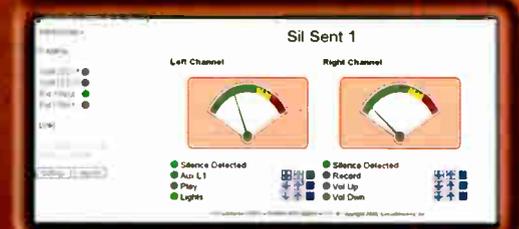
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Chief Engineer by "Tweaker"

It's Time For a Balanced Playing Field

One of the big responsibilities we have as engineers is equipment selection and budgeting.

It is difficult for us not to fall into several traps we've created over the years. For those who are new to the industry, and who have not yet developed our bad habits, hopefully they can avoid developing them by using the unbiased process I outline later in this column.

Trap 1: The Comfort Zone

One trap is to stay within our comfort zone. We've all developed our comfort zones filled with gear that we are comfortable with – kind of like that old pair of comfortable shoes. Rarely do most of us step out to explore the possibility of purchasing a piece of gear from a different manufacturer – and we are sometimes limited by the "bean counters" who always want to save a buck, at our expense.

Even with that, some of us close our eyes to some wonderful equipment.

Trap 2: Living In The Past

We often let our past rule our future, or at least close our minds. We may let a negative experience from years ago – be it our own or one we heard about from a fellow engineer – bias an equipment decision made today.

By letting our past experience close our minds, we prevent ourselves from give credit to a manufacturer whose equipment may have had issues early on, but who has made improvements in quality. In the auto industry

Toyota and Hyundai are perfect examples of companies whose first entries into the market were less than stellar. But, the quality of their products today have come a long way since then, to the point that they have surpassed other manufacturers. Many broadcast equipment manufacturers have done the same.

Trap 3: The Infamous Double Standard

Another trap that we struggle with is the double standard that seems to have developed over the years. We hold American manufacturers to a different set of rules than we do foreign manufacturers.

We have lowered our expectations of support and quality of documentation based upon the lower prices we pay for foreign made goods. We demand U.S. manufacturers have top-of-the-line support and documentation, but we quickly purchase foreign goods at lower prices, accepting their shortcomings. A bit of a Catch 22, wouldn't you say?

Some of us have even become angry with U.S. manufacturers who have higher prices in order to maintain the level of support we demand of them. Our attitude: we want the better quality and support of the U.S. made product, but we don't want to pay more than we would for equipment with inferior support and documentation.

So how do we get past our self-built traps? Go back to the basics. Open our minds and use a process that helps us stay balanced in our judgment.

The Process

First, make a list of the features you need as a minimum – this is your base line. Now add some bells and whistles that are nice to have, but that aren't deal breakers and that aren't proprietary to a single vendor.

Don't factor any one manufacturer or product line into your list; you want to be as unbiased as humanly possible. With your list in hand, take a serious look at all the vendors who manufacture the product you need. Eliminate those who do not have the basics you require.

Once you have narrowed down your list of vendors and you are ready to make a final decision on what equipment to purchase, this guide may help you avoid some pitfalls in the process.

Request a copy of the manual or go on line to download one if it is available. Look over the documentation.

If it is weak or incomplete, you or your engineer potentially will be spending a lot of time with the customer support line when you have an equipment problem – this is the last thing you want to do in an emergency.

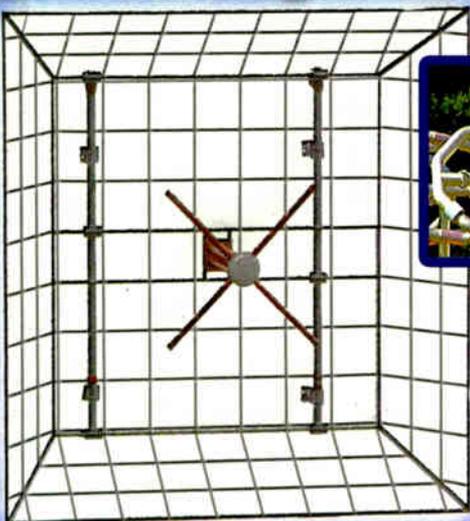
Remember, the stronger the documentation, the less down-time you will experience because more information will be immediately available so troubleshooting and repairs can be made quickly.

Ask for a user's list. Be sure you get one with both customers who have had problems, and those that didn't. A manufacturer that offers good customer support won't

(Continued on Page 28)



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Chief Engineer

— Continued From Page 26 —

It's Time For a Balanced Playing Field

be afraid to let you speak with customers who have had problems with their equipment and needed to use their customer service and their technical support line.

Keep in mind that while no manufacturer builds perfection, a manufacturer proves itself as a reliable supplier based on how well it has dealt with problems that have occurred.

It is also important to remember that one customer support SNAFU is different than a consistent pattern of poor customer support. You can pretty much be assured that how a customer or tech support department has dealt with problems in the past is how they will handle your problem, should one occur.

Should you find disturbing information about a situation, always be sure to get both sides of the story. Sometimes, even though the manufacturer did everything humanly possible to remedy a situation, the customer is never satisfied and will bad mouth a supplier rather than admit they, the customer, may have had unreasonable demands or expectations.

Tech Support

While all manufacturers have some level of tech support, there is a standard you should look for if you are buying a mission-critical piece of equipment, regardless if you have a back up system available.

That standard is the availability of tech support 24 hours a day, 7 days a week, 365 days a year (24/7/365). Anything less opens you up to potential long periods of down time, with no support.

If you call after hours and the company doesn't have "live support" at the factory, the answering machine or answering service should provide you with a cell phone number to contact the engineer or support person who has after-hour support responsibility.

If you are wondering why this is important, think about this: the last thing you need is to have a critical system go down on a Friday night and have to wait until Monday morning for tech support. If it's a holiday weekend you may not get support until Tuesday morning. Be sure tech support is indeed available, even when the factory is closed, for a holiday break or summer vacation break.

Finally be sure you are getting real tech support by someone who you can clearly understand, and who understands you. Also be sure it is a technical support staff member and not someone in administration, sales or marketing who is not a factory tech or engineer.

While it's always a prudent business practice to have a backup system for mission-critical equipment, some stations simply can't afford it. Others foolishly don't want to invest in it, even though it would help keep their revenue stream secure.

Warranty - Basic and Extended

While the claim of an extended warranty may get your attention, there are a couple of things to remember.

With today's electronics, if a product is going to have a problem that doesn't show up during factory testing it will normally show up within 30 days of installation, the time it takes a piece of electronics to really burn in and settle down.

That said, those extended warranties are tempting, but don't forget to look at the details of how a warranty works because each is different.

Don't assume you know. Be sure you know.

The Devil is in the Details

There is a power generator manufacturer, for example, who has a basic 90 day warranty on it's products. This is mentioned on it's literature and in its specifications. What isn't mentioned is that it begins the day the generator is manufactured, *not* the day it is sold or installed. This manufacturer also has a "free" extended warranty *but* there is a catch ... and it's huge!

First, you have to fill out and send in the warranty card that comes with the generator. Secondly, the installation must be performed by a factory trained technician. If not, then the generator must have "start up" service performed by a factory trained technician, within a specific time, after the installation date. In either case the cost is about a thousand dollars. Oh and that warranty card has to be signed by the factory trained tech.

In our industry there are some manufacturers who won't send warranty parts from a simple phone call requesting them; they have a process that requires on-line return authorization forms to be filled out - and some want the bad parts sent back before they send replacement parts, etc.

Take the time to look at the logistics of how a warranty problem is handled, and factor that into your purchase decision.

The bottom line: it is important that you hold all manufacturer's to the same set of standards, regardless of equipment cost. To do anything less unfair and just wrong. — Radio Guide —

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Transmitter Site

To Insulate or Not to Insulate

by Ernie Belanger

As the seasons change, those of us in snow country are beginning to prepare our transmitter sites for the onslaught of Old Man Winter.

For some of us, this year's winterization may take on a new twist.

Insulation and Heat or Air Conditioning

Many transmitter buildings are nothing more than wooden or concrete block shacks on mountain tops or in empty fields. Over the years, we may have depended on the heat generated by our tube transmitters to provide "heating" of the shack. This was usually adequate for us to get out of the frigid temperatures while performing preventative maintenance, but in most cases it was never as warm as it should be, to work in complete comfort. Nonetheless, we worked through the chills to get the job done.

Some of us have relied on portable electric heaters when the "box" was off the air and we were called in for the off-air emergency – transmitter off the air equaled no heat in the shack. What heat may have been left after the shut down quickly escaped through the unblocked nooks and crannies in the walls, or was replaced by the bitter cold that quickly found its way in.

It's Time to Rethink Our Shacks

Today, one thing most often overlooked, when new solid state transmitters are installed, is transmitter building insulation and a source of adequate heat or air conditioning (AC) to

keep the building at a temperature comfortable not only for our new transmitter but for us, when we arrive on site for maintenance or that emergency call.

In warmer climates the installation of a solid-state transmitter may trigger the need for AC to be installed. Our old tube monsters were more heat tolerant than their solid-state cousins. If you are in a warmer climate the same procedures for insulation hold true, only in your case we talking cooling not heating.

Shop for the Right Unit

For convenience and expediency, some sort of electric heat should be installed. There are several types available at home centers or industrial supply houses. A unit designed to keep rooms at constant temperatures would be the preferred method vs. the smaller, exposed coil type, portable electric or flash heaters designed to quickly warm a small space. Luckily, for those who just need AC, even the most economical window units are designed for continuous duty.

Management May Think You're Crazy

More than likely, when you bring up the subject of insulation and heat or AC at the transmitter shack you will meet resistance from management because they don't have a clear understanding as to why it is needed now, when it wasn't needed in the past.

So, it is important that you have all your ducks in a row before meeting to discuss the need.

Meeting Prep

Go to the shack and make measurements of the walls and ceiling. Rather than estimating the project cost, take your measurements to a building supply store or home center. Discuss the project with the personnel at the contractor desk or customer service. They will be glad to create an estimate for you. I would do this even if I were going to have the project done by a contractor or handy man. This way you know what the materials cost so you can be sure you're not being overcharged.

If you choose to do the project yourself you still may want to get an estimate or two from local contractors so you can show management how much you will save the station. Another option to consider would be to enlist the aid of the local high school or community college shop instructor. The instructor may take on the project as a teaching tool for the class. So you get free labor for the project and you can "supervise" vs. doing the labor yourself.

There may also be a tax credit the station can take advantage of for becoming more energy efficient by insulating the building. Check with an accountant on this.

When you meet with management you will have to help them understand how this project is now a vital necessity before the arrival of winter, if you're in cold country.

Half Empty or Half Full

In your research it is important to remember projects like this are a trade off. The more you insulate, the lower any heating or cooling bill would be, but the higher the cost of the project. The less you insulate the higher the cost of heating/cooling bill, but the lower your project cost will be. The key here, however, is to get some insulation in place. Some is better than none at all, and more is better than less.

On one hand you need to keep the heat or cool in the building, on the other hand you're not insulating a living space so you probably won't need to use 2x6 construction and six inches of insulation rated at R-19. *(Continued on Page 32)*

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SINCE 1963

Transmitter Site

– Continued From Page 30 –

Before You Start

Now that you have the green light, inspect your building. During the daytime, go inside, shut off any lights and allow your eyes to adjust to the darkness. You want to find any “light leaks” that may exist. Make note of where they are.



A crack found during a lights out inspection. This is an easy entrance for a field mouse and blowing cold air. The fix? A new door sweep cost \$5.

If you see light, you know that cold or hot air will enter here and depending upon the leak's location and size, mice, snakes, rats or other critters will use the same place to come in from the weather. Remember, an adult Norwegian Rat, the most common here in the States, can squeeze its body through a hole the size of a quarter. You can imagine what size crack a field mouse can squeeze through.

Plug the Holes

You should start your insulation process by plugging these leaks. To keep out critters you could use a heavy metal mesh immediately against the wall and then use expanding foam insulation to plug them up, from both the inside and outside. If your leaks are around cables, steel wool will help protect from critters and expanding spray foam insulation will stop drafts.

With this step complete, you are now ready to begin the rest of the project.

Studs and Insulation

If you have a wooden building with open studs you're in luck because you only have to insulate in the existing wall cavities. With a concrete or block building, insulating walls can easily be constructed out of 2x4's. If you are doing it yourself, a quick visit to a home center or a web site like DIY.com will get you the information needed to properly construct a “stud wall.”

Remember too, you'll need the proper anchors to attach the base plates, the headers, and the 2x4's across the top of your wall, to the floor and ceiling. Since your wall isn't a weight bearing or support wall you won't have to double either the header or the plate.

Most likely you will want to place your studs 16-inches on center (16 inches from the center of one stud to the center of the next stud) – standard width insulation is made to fit. In addition to the normal construction tools – power saw, hammer, level, square, and measuring tape – don't forget a good staple gun and lots of staples, to secure the insulation to your studs.



Here again, if you aren't sure, discuss the project with someone more knowledgeable.

Insulating is fun ... NOT!

From experience I suggest you wear a long sleeve shirt, gloves, goggles, a hat and a paper mask when you insulate. The last thing you need is to breathe in fiberglass fibers, which can cause damage to your lungs, sinuses and throat – or get a case of the itchy skin irritation because of exposure. A set of Tyvek coveralls would be great to keep fiberglass off your clothes as well.

Other safety and installation tips are available at your local home center, or you could go to an insulation manufacturer's web site for handy tips as well.

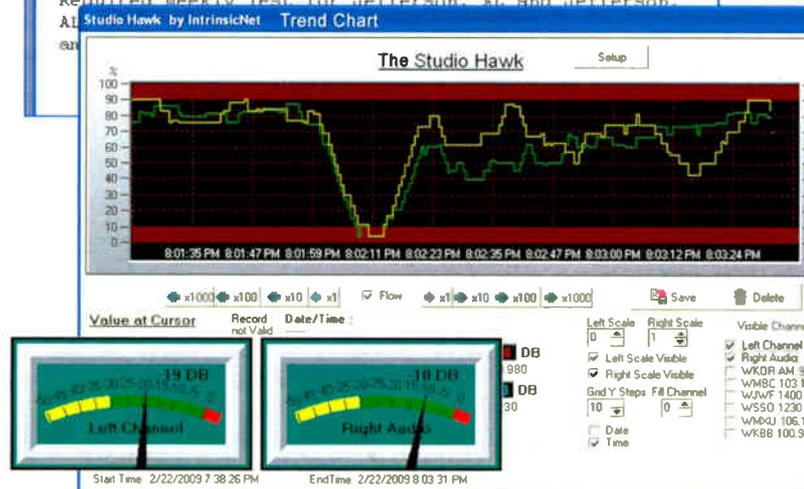
Sealing the Deal

Once the insulation is up, you'll need to finish the walls to help seal the cold out and to prevent insulation sag. Remember to insulate the ceiling as well, to prevent heat or cold loss there. All your other efforts will be a waste if you leave the ceiling untouched. – Radio Guide –

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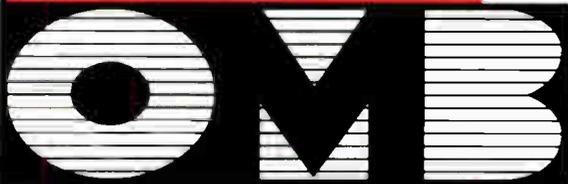
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BSI's Op-X Automation

by Dave Supplee

In June of this year we had the opportunity to replace the automation for our five-station cluster in Harrisburg, PA. The system needed to be designed to complement each of our varied formats. We needed ease of operation, maintenance and backup capabilities on a platform that was not going to be obsolete in a few years. Most of all we needed it to be reliable.

After researching the automation systems available, we decided on Op-X from Broadcast Software International (BSI). It has proven to be a good match for us.

Maximum Flexibility

The Op-X system consists of three major modules: the File Server, Audio Server and Studio On-Air Interface. Each of these can work independently, allowing configuration flexibility and redundancy. This means you can configure Op-X to run a single station or the largest of station clusters, depending on your need.

Ease of Operation

The On-Air Interface is simple and easy to learn; our air talent became completely comfortable with it after only a few minutes of practice. The interface also offers very powerful controls including the ability to assign commands to the hot key buttons and change the appearance and colors of the screens.

In addition to the three main modules, other modules add to the system functionality.



Op-X Sreen Shot

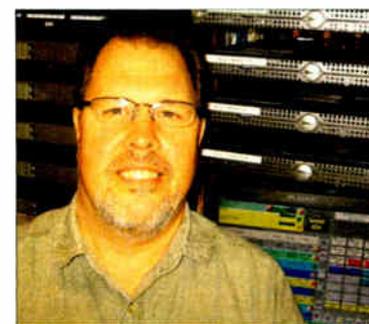
Simplified Voice Tracking

Voice Tracking with Op-X is done easily from any work station, or even remotely using any high-speed Internet connection for remote voice tracking. The remote voice tracker has the exact same look and feel of the in-studio screen so your talent immediately feels comfortable with it.

Easy Satellite Operation

The Clock Builder module uses a common sense approach to set up satellite show clocks. There's no need to spend hours writing complicated playlists to perform simple repetitive functions.

Long-form time-shifted programs are recorded an hour at a time, complete with all closures and special routines to handle automated sports programming. The stretch/squeeze and auto fill functions ensure spot breaks time out perfectly. Complete visual indicators and logging of all closures have proven invaluable when troubleshooting programming network problems.



The author at his Op-X monitoring station.

Straight Forward Audio

Op-X uses uncompressed .wav files and the Cart Chunk standard for header information, so there's no proprietary file and/or database structure to backup.

Even More Features

The Op-X Merge/Playlist editor converts our traffic and music schedule files from external sources with speed and accuracy. The Serial Server shares serial devices like audio switchers and GPIO devices among all stations reducing the number of audio switchers and associated hardware.

Redundancy

The Audio Server module will operate even if the network fails. If hardware fails on one machine, a module can be launched from any other machine on the network.

Dave is the Chief Engineer at WNNK in Harrisburg, PA. To find out more about OP-X contact Broadcaster's General Store at 352-622-7700 or BSI at 541-338-8588 or email: sales@bsiusa.com

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Field Guide

Transmitters

The Nautel J1000

by Scott Cason

As the contract engineer for a particular client, I had been maintaining their aging Harris SX 2.5 main transmitter (with a CCA 1000D for a backup). When Harris stopped support of the SX line, the company's Director of Engineering realized that it was time to replace our aging rig.

Ready to Install

The Nautel transmitter arrived on a Tuesday afternoon. Fully crated, including the rack, the total weight was 320 lbs. While that is maneuverable with just one person, I highly recommend getting a second pair of hands.

Delivery, setup and installation were the easiest of any installation I can remember. The transmitter was ordered already mounted and wired up in the matching rack option.

Hooking Up Power

The Nautel guide recommends using 10-gauge wire for the incoming power. However, once the shells are placed around the wire and screwed together on the connectors for the exciter and power amplifier assemblies the connectors that Nautel supplies are hardly able to contain the 10-gauge wire. I would recommend the connectors be made slightly larger to accommodate the larger wire.

Nautel has, as an option, a surge suppressor for the incoming AC, outgoing RF and remote lines. I highly

urge this surge suppressor be ordered as part of the transmitter package.

The Start Up

Once the AC lines were in place, the RF output was hooked up and the all important smoke test was next. Power was applied to the box and it jumped to life with no errors on the front display (and no sparks from the AC connectors). Finally it was time to turn on the RF.

After pressing the RF ON button on front of the exciter, the fans on the power amplifiers spun up and B+ voltage came up – but there was no current or power output. At first, I started to panic, thinking something was wrong. But it was I that was wrong; until you tell the transmitter what power you want, it just waits for you.

Once I programmed one preset with our daytime power of 1,000 Watts, and another with our night time power of 500 Watts, everything was fine.



The J1000 from Nautel

Audio and Control

Remote control hook-ups, along with interlock and audio, for the Nautel are very easy to access since they are on a screw terminal block on the back of the exciter assembly. Practically everything can be monitored on the remote control outputs.

The audio was a simple 600 Ohm connection from our processor output to the audio input on the back of the exciter.

On the Air

With everything hooked, the transmitter was fed into the antenna controller and turned back on, putting it on the air.

The total time from uncrating until on the air was two days but this only was because I was not in a hurry and could take time. I had a J-1000 *on the air in six hours* at a previous client when their 40-year-old main transmitter failed and parts would have taken too long to arrive.

After three installs, I can report being very happy with the results. Nautel has built a solid, reliable transmitter with the J-1000. This is a transmitter I would not hesitate to recommend to other station owners wanting to replace older, less efficient transmitters, or simply wanting to keep up with the latest in transmission technology.

Scott Cason is a contract engineer based in Louisville, KY. You can contact him at scott@lagrange-com.com You can contact Nautel at 902-823-5131 or www.nautel.com



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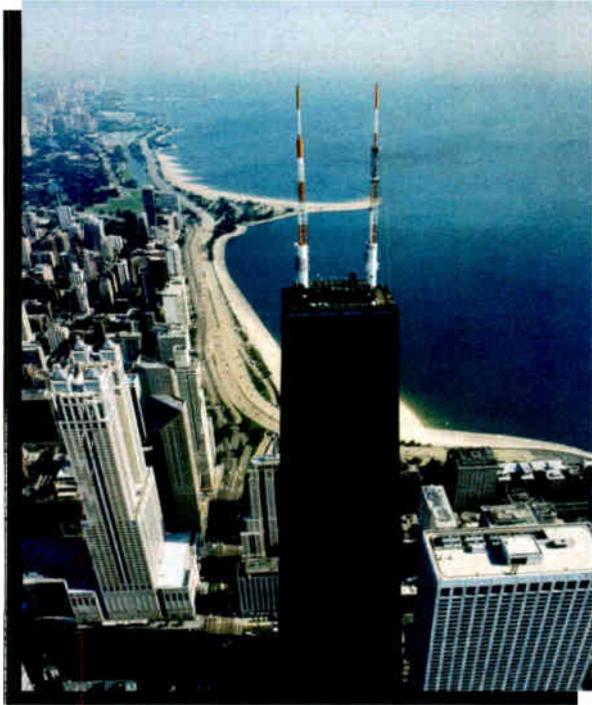
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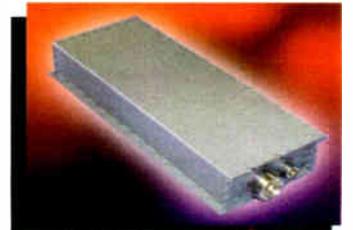
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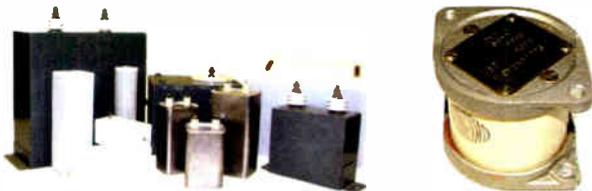
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Tech Tips

By Jeremy Storm

An Inexpensive Temporary Dehydrator

Many times dehydrators are installed at transmitter sites, and never checked again until there is some major problem. If you find yourself with problems at an odd time, here is a solution that works in a pinch.

If one of your transmission systems uses a dehydrator, you might find this useful.

Hilo, Hawaii has two distinctions. We have the highest rate of interracial marriages, and the most annual rainfall of any U.S. city. I am not sure if the two are related, but here "where the rain reigns" would be a good place to test my idea.

Trouble Call Call

One day the low pressure alarm status indicator at one of our FM sites lit up at the studio. I arrived at the site and found the dehydrator compressor making a terrible grinding noise. It seems it threw its needle bearings along with other metal bits, and by the time I arrived, it was well on its way to a meltdown.

The transmission line at this site is a bit leaky so setting up nitrogen gas would be impractical. Until parts arrive (or the bean counters let you replace the compressor – at a cost of something like \$1,400), what can an engineer do to keep things operating?

A Low Volume Compressor

All we really need is a low volume moderate pressure compressor, something like an aquarium pump. These are capable of making a peak pressure of 4 psi, and will pump up to one liter per minute at no pressure. It would be perfect for our needs.

I know dampness in a home closet can be controlled with DAMP-RID. This is an inexpensive chemical (calcium chloride) dryer. This, along with the aquarium air pump, seemed like a natural.

To construct my emergency dehydrator, the following items were bought locally for a total of \$23.

- (1) Aquarium air pump.
- (1) Aquarium tee with valves.
- (1) Plastic box with snap-on lid size: one cubic foot.
- (1) Container of DAMP-RID (and an extra box of chemical).
- (1) Length of plastic hose for aquarium pump, enough to run to the RF feed line gas barb.

Putting it All Together

Set it up like this:

Cut a three (3) inch section from the hose to connect air pump out to the input on the tee.

Connect the remaining hose to one output on the tee and open its valve. (This will connect to the feed line later.)

Close the other valve.

Cut a 1/2 inch hole in the lip of the box lid just large enough for the output hose and compressor power cord.

Activate the DAMP-RID container by pouring in the pellets.

Put the DAMP-RID container, air pump and tee valves into the box and close the lid.



Connect the output hose to your feed line gas barb. Wait a few minutes for the air to dry then plug in the air pump.

After a few more minutes the pressure will reach 4 psi. Finally, lift the lid and open the closed bypass valve slightly so the pressure drops off to 1 or 2 psi.

This will make sure air is flowing through the pump and the small draft will help circulate the air in the box. Replace the lid and sit back to enjoy your handiwork.

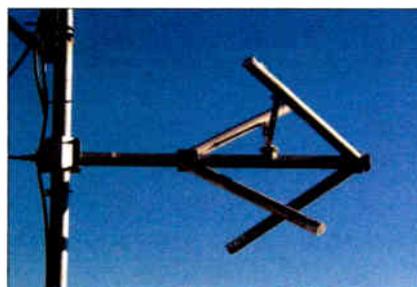
Minor Task

This dehydrator is not automatic so be sure to check the DAMP-RID container monthly and add or change the chemical before it turns into a liquid.

The aquarium pumps are very reliable and should not be a source of trouble during the time it takes to repair your very expensive automatic dehydrator. – Radio Guide –



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Tech Tips

by Stanley Swanson

Using the Right Fence

The FCC says that antenna towers having radio frequency potential at the base must be enclosed with an effective locked fence.

What it Takes to be Secure

The FCC does not define what is meant by an effective locked fence. They will probably accept any type of fence three feet high with a locked gate. Although a three foot high fence will keep out chickens and small children, it really cannot do much against thieves and vandals.

A lot has been said recently regarding security, and this usually includes the subject of fences. While I was at KBNL(FM) in Laredo, Texas, we had the opportunity to construct a new antenna site. The previous site had had one break-in and one attempted break-in (a hole in the plywood roof). The site had a concrete block wall partially around the tower base, with the concrete block building serving as the remainder of the wall.

This time we built a transmitter building with poured reinforced concrete walls and roof, and a single metal door. From previous experience I had learned that the door should swing out, not in, so that it could not be forced. We also needed a fence to enclose the building and the tower.

An Effective Fence

If you are not thinking of a concrete block wall, you are probably considering a chain link fence. Chain link fence comes in heights of between three feet and twelve feet. Residential chain link fence is commonly 11 or 11-1/2 gauge wire, with about a two inch mesh. (Mesh is the distance between parallel wires; some refer to it as a diamond.)



Typical 11-1/2 gauge wire.

This type of fence can easily be cut or climbed, and is of little value for real security. Barbed wire at the top does little to discourage unwanted visitors, and can be successfully climbed over. Razor ribbon is more effective, but I would not be surprised if someone takes you to court for damages after he tries to climb it!



This nine gauge fence provides more security.

The best approach is to start with a fence that is difficult to either cut or climb. I suspect that many people do not know that there are various varieties of chain link fence. Chain link fence for

security purposes should be of at least nine gauge wire (smaller numbers indicate heavier wire). Mesh sizes such as 1-1/4 inches, 1 inch, 5/8 inch, 1/2 inch and 3/8 inch are available. A good fence should have a mesh size of 1 inch or less.

The larger gauge and smaller mesh make it very difficult to cut the wire, as well as being more difficult to climb. Look for samples at your fence dealer before deciding on the fence material. If you choose a good fence material with a height of six feet or more, you may decide that barbed wire or razor ribbon are not needed.

Use the Right Posts and Gates Too

Your fence dealer will also be able to tell you what diameter posts and top rails are suitable for the fence material you choose. An important note: since the posts will probably be set in concrete, they may not make a good ground connection; one or more ground rods can be used for safety from lightning or other causes.

The easiest point of entry will be the gate. Make sure you have a kind of closer that cannot be forced. You will probably want to use a heavy chain to secure the gate. I once had to cut a chain with a hacksaw because someone had left our lock out of the loop. I can tell you that it was not easy! - Radio Guide -

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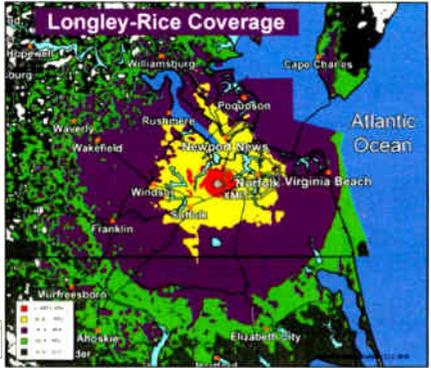
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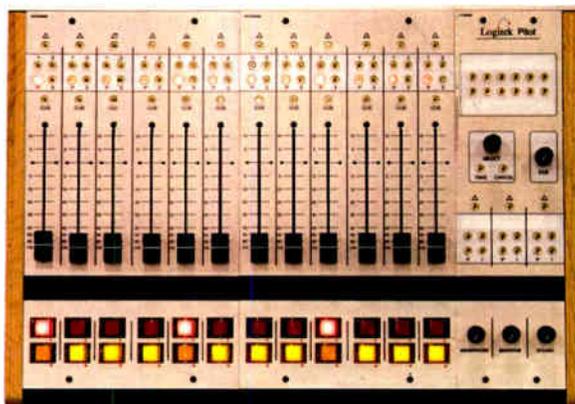
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Pilot Audio Control Surface

Logitek Electronic Systems has introduced the Pilot, an inexpensive audio control surface for IP audio networking systems. Designed to complement the JetStream Mini IP audio router, the Pilot surface has a scalable design that provides up to 24 faders in increments of 6 faders.



Audio sources may be routed as desired to each of the Pilot's faders; change buttons above each fader work in conjunction with a select knob to the side. Each fader may be independently assigned to a Program bus or any of three Auxiliary busses. In addition, a Cue switch above each fader will route that fader's source to a built-in cue speaker; twelve configurable soft keys may be programmed for user-specific functions. The Pilot includes bright, wide angle displays below the faders which have room for 16 character source names and support Unicode characters for display of Chinese or Kanji text. Because the Pilot operates with the JetStream Mini, extensive mix-minus capabilities are provided along with access to analog and digital I/O and IP network audio sources.

The Pilot console is ideal for radio stations that want the flexibility of IP audio routing and mixing at an entry level price. With the Pilot's traditional console styling, the learning curve is very low but the flexibility to assign sources where needed is still available. The Pilot is an ideal surface for both beginners and experienced operators, and is an affordable entry point for IP audio operation.

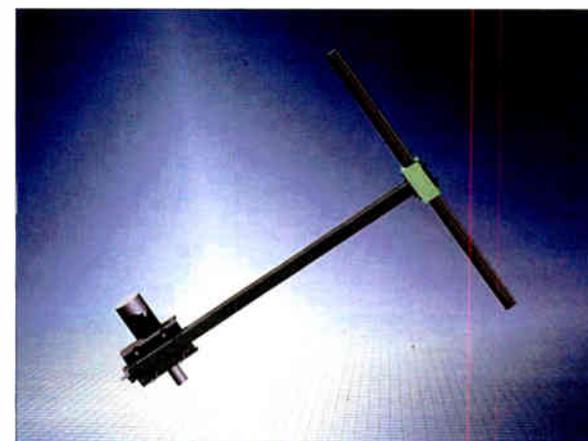
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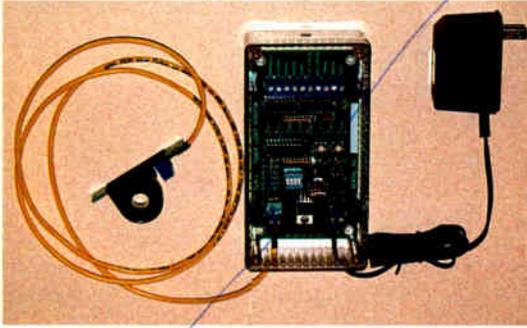
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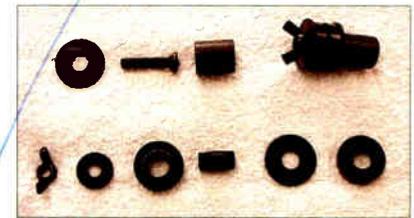
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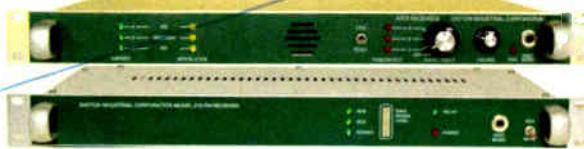
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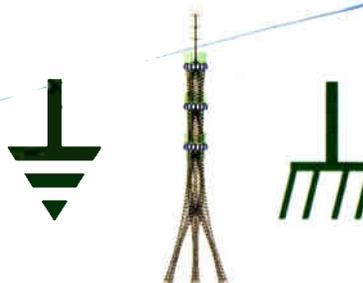
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The Bext Lex 150 joins the highly successful Lex Series which previously included the Lex 30, the Lex 50 and the Lex 100 (30 W, 50 W and 100 W respectively).



The BEXT Lex 150

The new Lex 150 offers 150 Watts of power in the same small size, one rack space enclosure as all the other Lex models, and comes with plenty of broadcaster-friendly features, including all the following:

Direct frequency programmability from front panel; built-in, selectable, very high separation internal stereo generator and fast audio clipper; USB port in the front for PC connection and two independent RS 485 ports in the rear.

The Lex 150 also features: up to seven station presets (frequency, power and audio setup) allowing for ideal back up to multiple stations; built-in, front panel programmable FSK ID Keyer by software for auto-ID of Translators; full telemetry and remote control interface built-in; fast access to all functions and all readings from front panel via user-friendly menu display.

Also found are: proportional auto-foldback of output power in the event of excessive VSWR; adjustable power output from 0 to 150 Watts; soft-start from turn-on; automatic power control maintaining the output at any pre-set level.

The Lex 150 accepts 120 or 230 VAC and an optional DC voltage input. There is also an optional AES-EBU digital audio input (XLR type and optical type); optional sync port to lock frequency onto 1, 2, 2.5, 5 or 10 MHz external reference; optional built-in RDS encoder. The unit includes a low pass/harmonic filter and can be used as a stand-alone transmitter.

BEXT

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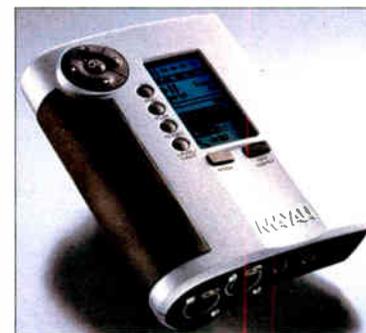
Broadcast Supply Worldwide Mayah Flashman II

Recorder and IP Audio Codec in one: FLASHMAN II from MAYAH Recorder and IP Audio Codec FLASHMAN II.

So far interviews have been recorded on a digital solid state recorder for later editing and sent as a file to the studio. With FLASHMAN II the recording is made simultaneously to the On-Air transmission.

FLASHMAN II has two switchable Microphone/Line inputs with professional XLR connectors – in microphone mode they can utilize 48V phantom power. One line output and one headphone out provide monitoring capabilities.

With no limitations in terms of storage capacity of the used media, it is possible to record hours of mono or stereo audio signals in three basic formats, such as PCM WAV (BWF), MPEG Layer 2 and Layer 3, as well as using the advanced MPEG-4 HE AACv2 coding algorithms.



The exciting new ability – to record locally, while feeding the audio live over IP – now gives a reporter higher control over their material and the ability to edit it after the transmission, for subsequent re-use. Basic connectivity is provided via Ethernet to connect FLASHMAN II to any LAN/WAN or Internet. With the optional interface cards it also can establish bi-directional connections using wireless networks, such as UMTS/3G or Wi-Fi.

With a simple preset, one of the advanced coding algorithms for transmission can be chosen: MPEG-4 HE AACv2, for high quality audio at the lowest bitrates around 20-24 kbps, or AAC ELD for high quality with a very low delay.

FLASHMAN II has a solid aluminum body with a comfortable grip. The monochrome LCD-Display is easily readable in darkness as well as direct sunlight. User interface of FLASHMAN II provides an easy access to all significant settings or functions of the device.

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The Radio Guide Event Register

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SBE 22 Broadcast and Technology Expo

October 6-7, 2009

Tuning Stone Resort and Casino – Verona, New York
www.sbe22expo.org

127th AES Convention

October 9-12, 2009

Javits Center – New York
www.aes.org/events/127/

Wisconsin Broadcasters' Clinic

October 13-15, 2009

Madison, Wisconsin
www.wi-broadcasters.org

Pittsburgh SBE Chapter 20, 2009 Equipment Expo

October 19-20, 2009

Pittsburgh Expomart – Monroeville, Pennsylvania
www.sbe20.org/expo.html

7th Annual Ohio Broadcast Engineering Conf.

November 10, 2009

Columbus, Ohio
www.oab.org/engineering

Consumer Electronics Show (2010)

January 7-10, 2010

Las Vegas, Nevada
www.cesweb.org

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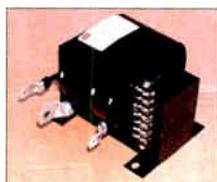
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