

# Radio Guide

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Digital Issue Now On-Line

November-December 2009 – Vol. 17, No. 6


## JK Audio – Making the Gear We Need for Quality Remotes




### Inside Radio Guide

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The USB Matchbox II provides both analog and digital interface with stereo analog I/O on XLRs at pro levels as well as an AES/EBU digital output. Plus, there's a headphone output for critical monitoring.

We've utilized Burr-Brown's new-generation phase coherent ADC/DAC, in addition to advanced audio

circuitry, to yield exceptional sonic performance. The unit supports 32, 44.1, and 48 kHz sample rates and is plug-and-play compatible with Windows, Mac, and Linux operating systems. The USB Matchbox II also features a built-in AC power supply to ensure operation at true professional audio levels with exceptional headroom.

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When it comes to networking your facilities, there's only one best choice. Wheatstone. For years, we've been the network/control surface choice of top broadcasters. And with good reason – we care.

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**1. WheatNet-IP is easiest for a station to implement and configure.** It is, hands down, the easiest in the industry. No need for Wheatstone to provide factory on-site assistance unless you really WANT us there. The manual and app notes will have you up, running and stable in less time than any other system.

**2. WheatNet-IP is a natural for large facility multi-station networking (and for smaller facilities too!).** It uses the IGMP features of Ethernet Layer 3 switches to identify a multicast packet, see which ports are requesting that packet, and send it only to those ports. Traffic control is maintained and system bandwidth is optimized.

**3. Redundancy is critical.** A typical WheatNet-IP installation has multiple levels of redundancy. Each BLADE holds the complete map of the entire system within its onboard memory – we call it distributed

intelligence – a system with 50 BLADEs has 49 backups with failover in the event of a failure. Cisco Stackwise technology provides redundancy in the central core TOC switch. A WheatNet-IP/E-Series console studio complex can stand alone, even if the TOC goes down, with backup analog or digital program audio feeding a back end router independent of the core Gigabit infrastructure.

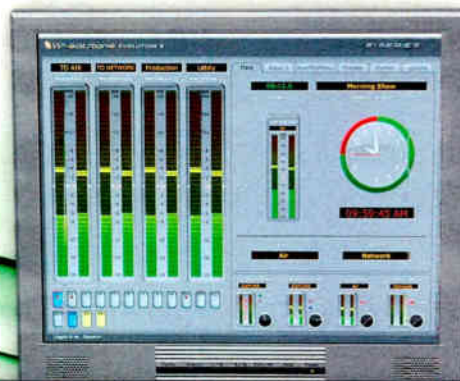
**4. Modular is better.** Why would you want to combine your switch, mix engine and I/O into one box? Beats us. With WheatNet-IP, you install only what you need, where you need it. We believe in not over-selling.

**5. Manufacturing quality is very important.** Wheatstone is proud to have the best track record in the business for build-quality, reliability and intelligent functionality. With far more up-and-running installations than anyone else, this is where we really shine. An investment in WheatNet-IP and E-Series control surfaces today will reward you with a future-proof, failsafe networking/control environment that's infinitely updatable and in for the long run.

**6. WheatNet-IP has an advantage.** Take a look at your entire environment. Wheatstone is a perfect partner because we are always there, always innovating. Built into every WheatNet-IP BLADE are features others just didn't think of – handy utility mixers, silence detection, crosspoint routing control, headphone monitoring of any source, lots of logic GPIO, and comprehensive metering of audio I/O, not just signal-presence indicators. And, in the hugely unlikely event that a BLADE needs to be replaced, you just plug in a new one and enter the BLADE number. That's it.

**7. Wheatstone is local.** WheatNet-IP and the E-Series, just like ALL Wheatstone products, are designed, engineered and built from start to finish in our New Bern NC USA facility. Everyone who works on our products is 100% knowledgeable and immediately available. You can relax – as with the famous insurance company, you ARE in good hands.

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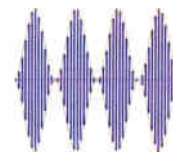
# Radio Guide

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by Ray Topp – Publisher



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**Cover Photo:**

JK Audio owner Joe Klinger and his wife Linda, JK Audio Business Manager, in front of their new headquarters.

## Radio Guide

Volume 17 – Issue 6

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**What Was**

Back in the day, when nuts-and-bolts meant, literally, *nuts and bolts*, discrete components and solder made up a reasonable portion of most broadcast gear. “Parts was parts,” and defective capacitors, resistors and such were easy enough to locate – some items even revealed themselves with a puff or two of smoke as a parting shot.

Since different models had a fair amount of discrete circuitry in common, the routine exchange of circuit-level tech tips and info made the engineer’s life much easier.

**What Is**

Now, with much gear in the form of proprietary “black box within black box,” those component-level tech tips don’t seem to be as common – or even necessary. However, systems still have their problems and the resulting downtime impact is now more critical than it ever was.

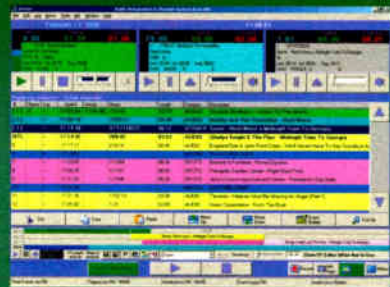
**What We Need**

While component replacement has become (almost) a thing of the past, a fix still needs to be applied. A systems-oriented approach, with workarounds and associated tech tips is even more valuable now. Just as important are those installation hints, maintenance and set-up tricks that you have learned over the years.

Contact *Radio Guide* at: radio@rconnect.com and we’ll help you get your tech tips published. Each tech tip published earns you a *free* Auto-Ranging DMM and AC Probe set. – R.T –



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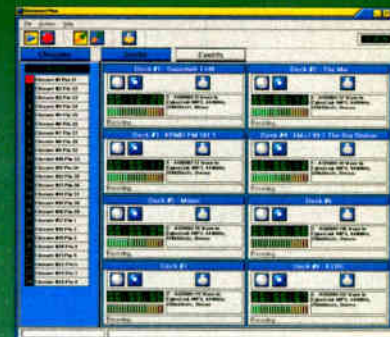
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Time	Length	
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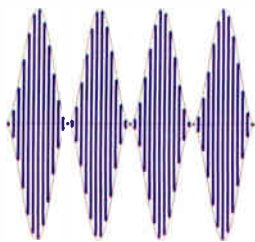
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## Making the Gear We Need for Quality Remotes

I remember when a station's chief engineer would spend hours working through some new fangled way to allow talent to do remote broadcasts more easily – a way for them to carry less gear, make set-up easier and improve reliability. Not to mention trying to find a way to squeeze the best quality possible out of a standard POTS line that was used for remotes from sponsor's locations.

Now, when I listen to our local live station, I hear one of the jocks doing a "ghost" of what we called a remote. Now it's a couple of ten second spots via cell phone so it sounds like he's talking from inside a dumpster. Worse yet, one day he apparently decided to use his blue tooth headset.

### What Quality?

The remote sounded like a cross between listening to Wile E. Coyote talking as he was whizzing along on this ACME rocket trying to catch the Road Runner, and trying to tune in an overseas broadcast on an old short wave receiver. I think you get the picture.

Don't get me wrong; there is a place for everything but not Bluetooth – at least not in my world. My wife agrees too; the Bluetooth headsets are noisy, with such terrible quality, that it hurts her ear when I call from the road. Since New York requires us to be "hands free" for cell use while driving, I switched to a wired headset for better quality.

Obviously, I'm not a fan of Bluetooth, and I certainly was not a fan of bluetooth in broadcast applications. That was, until Joe Klinger and JK Audio worked their magic.

### Enter JK Audio

Joe Klinger founded JK Audio in 1992. While audio has always been the primary focus of the company, its direction has been guided more by customer demand than by any preset business model. So JK Audio is like the old station Chief Engineers who tried to find a better way to do what needed to be done.

For now at least, this means passing on the temptation to join their competitors in the race towards the best CODECs and IP transport layers. Instead, the focus is on the right product for a particular application. This has resulted in over 30 telecom audio interface products. Sometimes the task requires a high speed DSP, other times a simple transformer in a metal box. Joe tells us that some of their best selling products are their simplest.

Now, connecting audio equipment to a phone system is considered by some to be more of an art than a science. While some people may consider that statement a compliment, flattery is not going to get a product through the tough international emissions, safety, and telecom compliance testing. In the case of JK Audio, it's the right mix of talent. And I do mean talent.

### A Mini Bell Labs – OK, I'm Impressed

Do you remember a little place called Bell Labs?

Well JK Audio is a mini version. The engineering staff includes three former Bell Labs engineers. Joe still handles all of the analog audio and telecom design, while Gary Eiklor pushes digital streams through hardware and software. Brian Prorok brings his signal processing expertise to real time in their line of digital hybrids.

Joe spent seven years at Bell Labs as an Audio Engineer. Not exactly what this young audio engineer/producer had in mind, but it was a tremendous opportunity to work with world-class developers, engineers and human factor psychologists. That's right, Joe's position, was that of a technical liaison between a large coding algorithm development group and the human factors psychologists that ran audio quality and user interface studies. It was here that Joe learned user interface design and quality assessment skills and received patents for UI design and signal processing.

This was right up Joe's alley, since he had worked in consumer audio as an audio and acoustics engineer at Concord Systems back in the early 80's when CDs were just hitting car stereos. His role was to find the link between objective measurements and subjective opinions. In his spare time he's logged many hours behind mixing consoles in the studio and live sound.



The BluePack – Ready for Man-On-The-Street Interviews or Remote Broadcasts via Bluetooth

### JK's Balance

While the R&D staff defines the product, the company is really a well-balanced family, starting with Joe and his wife Linda.

"Joe spends the money, and I have to keep everything in balance" according to Linda, JK's Business Manager. Linda handles everything financial and acts as a sounding board to keep everything in check and balance, of course.

The staff also includes Production Manager Wayne Reed and Technical Support specialist Denise Lockridge. A credit to the company's product quality and support documents, these two people share support duties for the entire company. The list goes on with an excellent office and production staff, many of whom have been with the company since the 90's.

### Then vs Now

In the early years, when JK Audio was literally a one-man show, Joe worked as a design consultant with several phone companies while slowly securing broadcast dealers for their first audio interface products. At the same time, he also worked as a designer for Winslow Industries, the largest speaker crossover manufacturer in the U.S. Long time friend and Winslow's owner, Don Kliewer became Joe's mentor, sharing his wealth of manufacturing knowledge and business ethics.

Today JK Audio products fall into fairly logical groups: passive handset interface for interview recording, field mixers for remote broadcasts, digital hybrids for interview recording and talk shows, personal/port-

table gear for field interviews and telecom interface and belt packs for TV IFB monitoring.

### But Can They Make Bluetooth Sound Better?

In a word, "Yes." Our former Bell Labs geniuses solved the problem, and in the process developed some darn good products. Which is why I noted the *past* tense when I said I didn't see it as a broadcast technology.

### The Story

Think about it. For years, JK Audio has been building wired interfaces for connecting audio equipment to cell phones. While an engineer would typically think that a wired interface would trump any wireless link, cell phone connections are an exception to the rule.

Don't forget, the headset jack on your cell phone is expecting to see a mic signal on the input and provides only a small receive signal to the earpiece. The phone typically adds non-linear processing to this wired signal to prevent feedback, and often includes side tone, or a low level return path from transmit back to receive.

An audio interface must work with these small signals on an unbalanced cable, connected to a rather powerful radio transmitter. Add the fact that there is no industry standard for the headset connector, and you have a potential connection nightmare.

Bluetooth Wireless Technology eliminates most of the connection concerns and RF problems associated with the wired cable. While Bluetooth is a standard, which requires compatibility testing, there is enough latitude in the connection protocol to allow some products to get by with compatibility issues.

### Lousy Sounding Headsets

Some low cost headset designs have placed a stigma over this technology, mostly due to their cheap component choices, poor acoustical properties, and excessive processing to make up for their cost cutting measures. Ah, there's the Wile E. Coyote talking while on a rocket sound that I referenced earlier.

It turns out that Bluetooth protocol is not to blame for the design and compatibility issues of these low cost headsets, but the stigma of these headsets continues to present an uphill marketing and education process.

### Bluetooth's Advantage

Bluetooth does offer several advantages over wired interfaces. First, the audio CODEC is located in the audio interface, which means the audio signal will remain digital right through the phone, avoiding the headset signal processing. JK Audio uses a music grade stereo codec to digitize the audio, allowing lower noise and distortion than typical low cost headsets.

JK spent over two years on hardware and firmware integration to achieve rock solid compatibility with even the most stubborn cell phones. Another obvious advantage is phone placement. The wireless connection allows you to place your cell phone at a greater distance from your audio equipment.

A new feature to several of JK Audio's Bluetooth products is the ability to act as either a master or slave.

(Continued on Page 8)

# Tieline IP Audio Codec Solutions

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Per Codec

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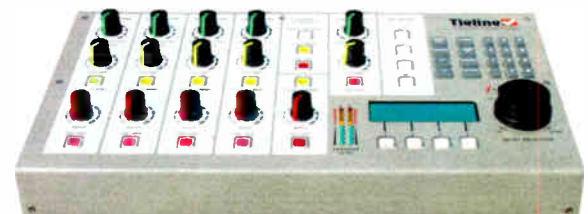
Thousands of radio and TV stations use Tieline remote codecs everyday to deliver studio quality remotes from anywhere. See [Tieline.com](http://Tieline.com) for pictures and stories.

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# JK Audio

## Making the Gear We Need for Quality Remotes

– Continued From Page 6 –

In a typical connection scenario, your cell phone acts as the master, initiating the connection to the headset, which in this case is operating as the slave device. There must always be at least one master and one slave device. You cannot connect a cell phone (master) to another cell phone (master) or connect two headsets together. Nor can you connect a cell phone to more than one slave device at a time.

Some of JK Audio's newest products include the ability to switch roles, allowing connection to a cell phone, a headset, or another JK Audio device.



The BlueKeeper Audio Gateway

### Bluetooth Profiles

Common to cell phones and headsets, the Hands Free profile offers full duplex mono, 8 kHz sampled audio. More common to music players and wireless headphones, the Advanced Audio Distribution Profile (A2DP) offers 44 kHz sampled stereo, but only in one direction, from master to slave. Bluetooth A2DP equipped cell phones,

sound cards, and music players are typically configured as the master while the headset acts as the slave. Before you get any bright ideas, we have never seen a mobile phone configured to receive A2DP audio. This is not a limitation of Bluetooth; it's simply that phone manufacturers have no reason to add the slave (A2DP receive) capability to their phones.

### Secure Technology

Bluetooth, by the way, is a secure wireless link operating around 2.4 GHz, using frequency hopping over a range of nearby frequencies. While range is typically limited to 10 meters from a cell phone, the standard allows up to 100 meter distance. Signal power is dynamically adjusted to reduce RF emissions and save battery power. This combination allows plenty of secure channels for use on busy streets and stadiums.

### Where Are The CODECs?

While almost every telecom audio interface company got its start building simple analog hybrids and interfaces, the trend is to move quickly into CODECs and high-end talk show systems. The quest for the best audio quality for remote broadcasting consumes their development staffs until there is no time for the "boring" little interfaces that got them started.

This "little stuff" becomes less interesting and a burden on engineering, production and support until it becomes easier for them to say, "We're pretty sure JK Audio already makes that product." At the same time, JK Audio will be the first to tell you that if you want a quality remote broadcast, you will need to shell out the big bucks for a true CODEC. But when it comes time to record a phone interview, put a caller on the air, or call in a quick news story, they have a solution for any budget.

### JK Audio's Home

JK Audio is located in Sandwich Illinois, less than 30 minutes from Chicago's western suburbs. They currently have over 150 broadcast dealers around the world. Sandwich is the former home of the James Knights (CTS) crystal manufacturing plant, so there is no shortage of extremely skilled electronics production staff.

### A Quick Web Site Visit Says It All

All you need to do is visit the JK Audio web site to get not only a grasp of the depth of their product line but also to gain a keen understanding of the talent, creativity and understanding Joe and his team have of the broadcast industry and the needs we have for quality and reliable audio interface devices.

Their attentiveness to customer's needs and the ability to fill them with cutting edge products like their Bluetooth equipment, promises to keep JK Audio busy for years to come.

*If you have any questions for Joe about JK Audio's products or you have a product suggestion feel free to contact Joe at 815-786-2929 or by email [info@jkaudio.com](mailto:info@jkaudio.com). Information about their complete line of products can be found at their web site [www.jkaudio.com](http://www.jkaudio.com)*

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-Robert A. McClanathan, P.E.  
McClanathan and Associates, Inc.

"... Congratulations.... The KinStar antenna is performing extremely well. Bob McClanathan who performed the FCC required testing ... was very impressed with many elements of the tower from our construction to bandwidth."

-- Jon Thompson  
General Manager  
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## Super Bowl – Broadcasts and Promotions

by Cary S. Tepper

*Editor's note: While this normally isn't an engineering related topic it is a timely one – and one which you may want to discuss with your station manager.*

Super Bowl XLIV will be held at Dolphin Stadium in Miami Gardens, Florida on February 7, 2010. While many radio and TV broadcasters look forward to the Super Bowl as an opportunity to broadcast many special events and promotions, stations and station personnel need to be aware of the numerous copyright and trademark issues surrounding the Super Bowl.

### Use of NFL Trademarks

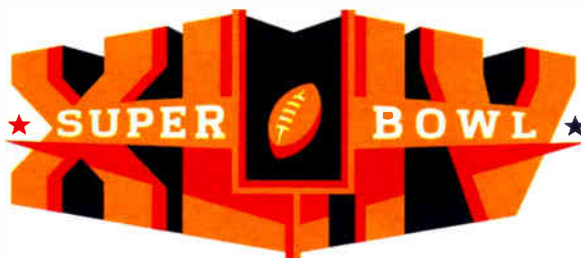
The National Football League (NFL) controls all marketing rights with respect to the Super Bowl, and it vigorously protects and enforces its rights in Super Bowl copyrights and trademarks. It is important that your station or its staff members not attempt to form an association with the NFL or Super Bowl in the minds of your listeners, unless you have a genuine contractual relationship with the NFL or Super Bowl.

False claims, misappropriation of information, and misappropriation of goodwill can lead to legal liability. If you are not an official sponsor of the Super Bowl, do *not* act as if you are.

### Use of NFL Terminology

Under federal law, the NFL retains the *exclusive* right to control marketing of the Super Bowl and its associated trademarks and phrases. Generally, without the express written approval of the NFL, you cannot say "Super Bowl," "Super Sunday," "NFL," "AFC," or "NFC," "National Football League," "American Football Conference" or "National Football Conference" or *any* team name.

However, you are allowed to say "The Big Game in Miami Gardens, Florida," "The Professional Football Championship Game in Miami Gardens, Florida", the date of the game (February 7, 2010), the name of the cities competing but *not* the team names – and you are allowed to make fun of the fact that you cannot say the phrase "Super Bowl."



The official Logo for Super Bowl XLIV – a registered trade mark of the National Football League

### Nominative Fair Use

Your use of the NFL terminology will be permissible as "nominative fair use" if the actual trademarked term (such as "Super Bowl") is used to merely identify what you are talking about, that you use the term for identification purposes only (and do not engage in any repetitive, promotional or gratuitous use), and you do not suggest that your station has any sponsorship or endorsement connection (unless you actually have a written agreement with the NFL).

Within the context of a legitimate news or sports story, you can mention the words "Super Bowl" and the team names, but your on-air talent should *not* run with the story to create an on-air contest or promote a game party with the continued use of the NFL terminology.

For example, your station cannot sponsor a "Super Bowl" tailgate party, give away a Super Bowl party to a listener or sponsor this type of event in conjunction with an advertiser. This also prevents a station or station personnel from giving away Super Bowl hats, T-shirts or other Super Bowl handouts, unless you get written permission from the NFL for the promotional event.

Even if your station is an "Official" Super Bowl station it is always best to err on the conservative side and ask the NFL for its approval before you get yourself or your station in a legal entanglement with the NFL.

Of course, all of these words of caution apply to other sporting events as well, such as "March Madness," the "Stanley Cup" and the "World Series."

### Distribution of Super Bowl Tickets

Since the NFL and its agents are the only legal sources for the distribution of Super Bowl tickets, you cannot conduct a promotion in which trips to Miami Gardens, Florida include tickets to the Super Bowl, unless you are an official NFL sponsoring station.

### News Reporting on Super Bowl Events

Since the NFL has a property right in the accounts and descriptions of the Super Bowl and sells the radio and TV rights, you will not be permitted to report on the Super Bowl from inside Dolphin Stadium in Miami Gardens. This prohibition includes any on-air reports from station personnel or friends inside Dolphin Stadium using cell phones.

Once the game has concluded, it is permissible to report the "news" of the event, such as the winner and score of the game.

### Advanced Planning

One of the best ways to ensure your station avoids the possibility of a legal entanglement is to plan your event well in advance. Be sure to check with your station's legal counsel to get their opinion and be sure that you have time to contact the owners of the bowl game or event around which you want to plan a promotion to get their written permission if necessary.

Also plan now to hold a staff meeting to discuss the do's and don'ts with regard to promotions, contests and content so they clearly understand the boundaries within which they can operate. Don't assume that your staff knows this information. It is also a good idea to have your legal council provide guidelines for your staff.

Don't assume that the NFL, other bowl game owner or an organization that might have protected rights to a trademark won't take action against your station if you use their trademark without permission.

*Cary S. Tepper is a principal of the law firm Booth, Freret, Imlay & Tepper, PC in Bethesda, Maryland. Contact him at [tepperlaw@aol.com](mailto:tepperlaw@aol.com)*

*If there is a topic you would like Cary to write about in a future column contact me at [editorial@radio-guide.com](mailto:editorial@radio-guide.com)*

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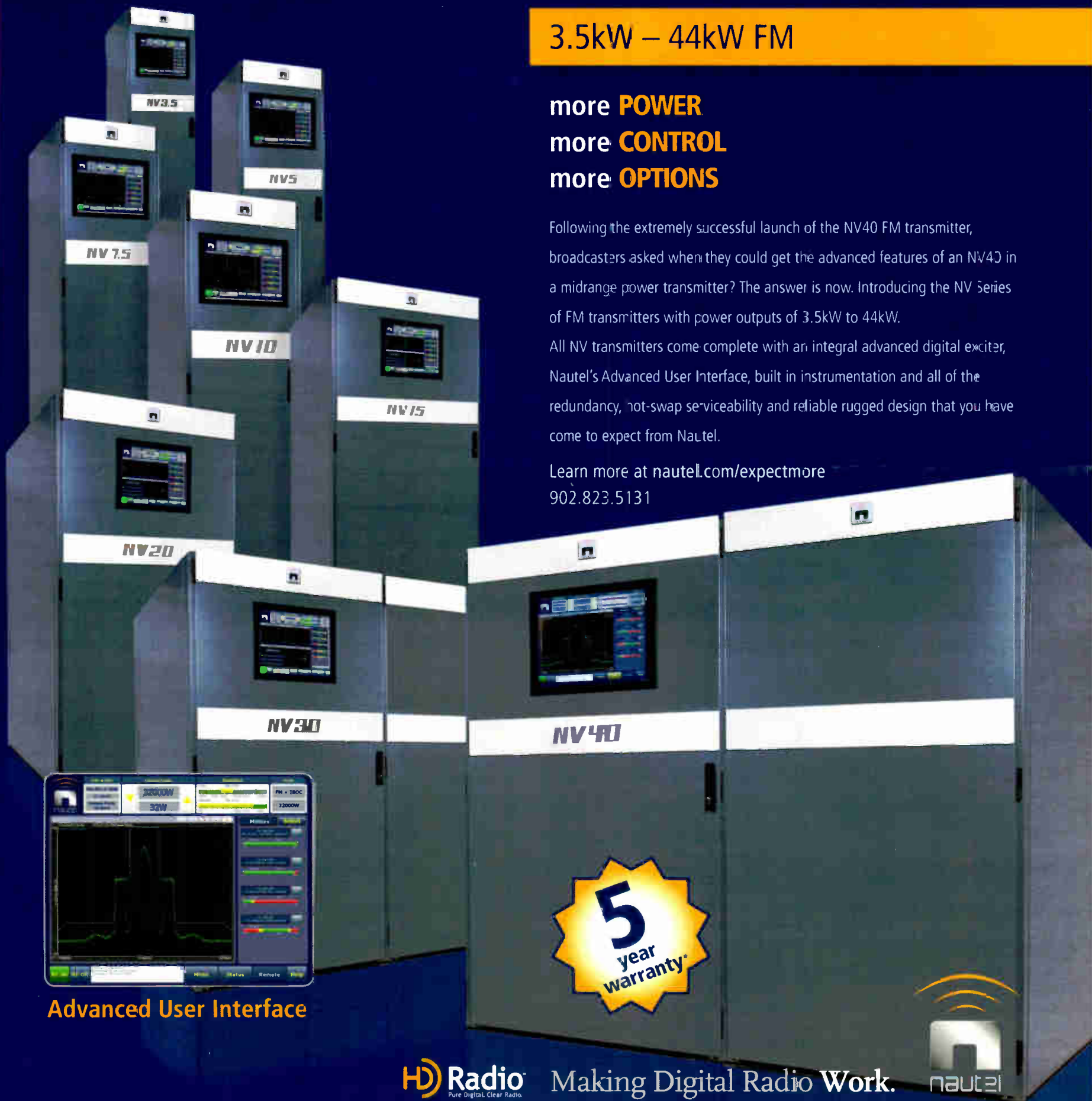
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World Radio History

## CD or Not CD? A Burning Question

by George Zahn

As radio station after radio station converts to straight digital audio delivery for music and program playback, I thought it would be time to look at where stations are on the CD player front. It seems many stations are growing less dependent on the silver pock-marked discs whose gleam fascinated us all those years ago. Are CD players' days numbered? For those still using CD players as a key source of music delivery, how do we extend the life of these workhorses, and are the new improved designs all that better?

In a strictly unscientific poll, I asked a cross section of some engineers and operations/programming personnel about their take on CD players, and as we examine the role of the CD player in our studios, I welcome your feedback as well.

I don't know any manager who hasn't heard some degree of debate over CD players. It seems that we're in a "Catch 44.1 kHz" over the newer designs, including slot loaders versus the old standby drawer loader decks that seem to be dinosaurs these days. Sure, the slot loaders look great, and they definitely won't get in the way of studio chairs by having a low-lying drawer sticking out as your DJ wheels past it (some stations still have those CD players mounted or shelved down low) – but are they a major improvement over the old design?

### Win, Lose, or Drawer

Manufacturers take note: Almost every person who responded to my informal poll said they found the drawer loaders to be more dependable. Engineer Jeff Johnson noted there was less chance of scratched discs with the drawer mechanism machines, although we've all probably experienced a drawer closing prematurely as we insert a disc and that terrible, almost slow motion, helpless feeling as a disc grinds between the drawer and the frame as you try to stop it. Mike Farrar is a radio producer and host who says he has had far less mechanical problems with the drawer players.

"Even the cheap plastic drawer loaders seem to be more reliable," says engineer Jay Crawford. "On many of the slot loaders, they tend to get dirty, and discs can slip and either won't go in or eject properly." I didn't expect the almost universal disdain for the slot loaders in my "survey," although I've had my own share of personal battles with both styles of decks.

It seems the only major complaint about drawer loaders is that some models have a drawer safety catch that secures the drawer to the eject mechanism. On occasion, that catch can vibrate into the "release" position, and the next time "eject" is pushed, the drawer slides all the way out and plops into the lap of an unsuspecting jock. Unlike a slot loader which might "swallow" a CD, the good part is that at least the CD in this case is retrievable and can be placed into another player.



Jay Crawford

### Hunting Dust Bunnies

Jay Crawford's assertion about the dirt issue is a key facet to maintenance for CD players. Certainly we've known from day one that dust is the enemy of the optical laser technology that makes CDs work. No matter how meticulously clean things appear on the surface, dust will pile up in racks and cabinets, and some of that gets sucked into your equipment.

Jeff Johnson, an engineer, and Dave Schram, an Operations specialist, both added the importance of popping the top on CD players to clean out the "dust bunnies" that invariably end up inside equipment. According to Schram, "I prefer to remove the cover and clean all the accessible parts with lint-free Q-Tips and 90% isopropyl alcohol."

But the key to keeping the decks clean may lie outside the players themselves. "This is going to sound more like a commercial for preventing the flu," adds Jay Crawford. "But wash your hands often. The scum that ends up in most of the machines often is the result of what you've been handling recently." Several polled agreed that the biggest operational threat to CD players comes in from outside the machine.

### You Found What – Where?

The good news is that CD players seem to be more impervious to outside stuff getting in than consoles – Crawford says he found sand poured into one at a previous station, or turntables into which one jock accidentally spilled a beer (the station will go unnamed) which resulted in a somewhat manic turntable that ran 38 RPM instead of 33-1/3.

Again, it's the "Trojan Horse" invaders that sneak in on the CDs themselves that create most of the problems. Two mentioned gremlins included the stick-on paper CD labels that can dry out over time and start to peel off creating unwanted vibration and balance problems in the player, and a Post-It note that was inadvertently left on a CD when it was inserted into a slot loader. The stubborn sticker grabbed onto the internal spindle and the machine had to be taken apart to get things back to normal. Yet another "hazard" in the survey was a magnetic tracking sticker that flew off a disc which a jock had borrowed from the public library for his show.

As we consider the future of CD players for our studios and other applications in this and the next issue, I'd be remiss in not passing along some of the "tricks of the trade" when it comes to engineers getting calls in the middle of the night or during a separate crisis with a program host who can't get a disc out of a machine.

If you have a small station with just two CD players and one goes south, you have problems. A good plan is to have a spare somewhere in a production studio or in an easily accessible place, and obviously the best way to get to the bottom of a mechanical problem is to eventually open and clean the mechanism. But for some off-hour time and mileage saving tips, here are some of the suggestions for quick fixes.

### My Kingdom for a Paper Clip

Whether it's a CD drawer on a computer or on a standard CD player, many drawer mechanisms have a small pinhole just below the CD drawer. Several of our

respondents reminded me that it's good to have an unbent paper clip handy for those units that have this feature. In many cases if you can see the pinhole and insert the end of the paperclip gently into the hole, the drawer will open. A problem on some standard CD players is that the design of the case might cover that pinhole which was placed there by the CD drive manufacturer. It's still a good thing to check for future reference on your CD players.

Another recommendation from a few sources was to have decent and easy access to the power cord for the unit. Sometimes, simply powering down the unit will reset the player's logic and allow you to eject a disc, but just hitting the power switch isn't usually enough. "On many of these units, the power switch does not turn the power off, but just puts the machine into a stand-by mode," points out Jay Crawford, "unplugging the unit for 20 seconds or so, then re-plugging and turning back on, it gives the logic the equivalent of a 'hard boot,' which might work."

### A Little "Manual" Labor

Dave Schram and Mike Farrar also remind all of us of having either a working knowledge of our players' manuals or having one handy. Schram says "For slot loaders, I usually turn the unit off/on while hitting the eject button."

Farrar adds that many players may respond to various combinations of powering on and off while trying different buttons on the CD player control panel. A good policy is that if you find something that



Dave Schram

works for your CD players, document it and have it in a handy place that a program host can find.

I know that even as you're reading this there are music groups again recording to vinyl, so I'm reluctant to say what might go the way of audio extinction in the near future. In part two of this series on the future of CD Players, I'll look at the economy of scale and the pros and cons of buying consumer-grade units versus professional CD players in today's economy.

I'll also pass along some creative uses for CD technology, and a look at some recommended CD players from our survey panel – plus a discussion on whether the future of CDs is "at risk" in this day of memory sticks, hard drives, and flash cards.

*Radio Guide* and I greatly appreciate the feedback received on flash audio recorders, and if you'd like to weigh in on any studio issue, especially CD player technology and preferences for the next issue, please get in touch. We learn collectively by sharing ideas and opinions!

*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 [gzahn@mkcommunities.org](mailto:gzahn@mkcommunities.org)*



# Your Studio – Wherever YOU Are

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World Radio History

# Safety and Security

A regular column on protecting property and persons – with a technical slant.

## Fire – a Frightening Enemy

by Jeff Johnson

Last issue, this column covered safety and security from the aspect of preventing unwarranted intrusion – breaking and entering. Then the technology of wireless pass cards – “prox” cards – and other RF identification systems was discussed.

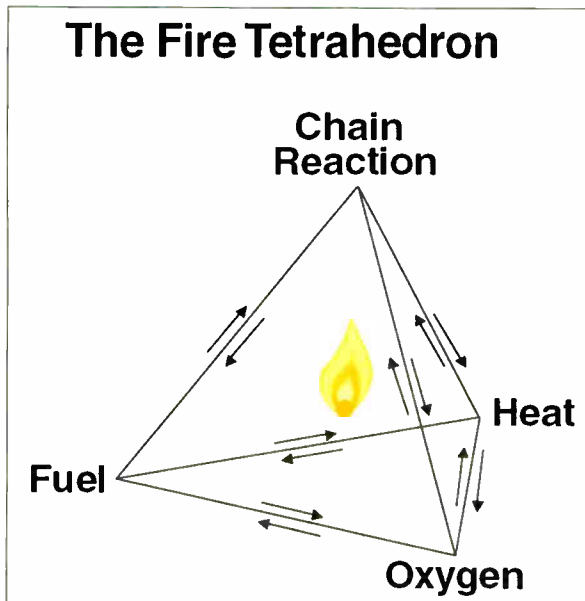
No matter how careful we are to be certain only authorized personnel are allowed access to an organization’s critical areas – from transmitter rooms to vital files – the most frightening and destructive agent of all may be inside and ready to strike – *fire*.

### Extinguishment Can be Worse Than the Fire

The most common fire fighting substance is, of course, water. Too often water can cause as much damage to valuable and sensitive goods as the fire it was meant to quench.

Fire occurs when a combustible material in the presence of oxygen reaches a critical high temperature – the combustion temperature – and a chemical reaction takes place. This is known as the “fire tetrahedron.” Fire suppression involves taking away at least one element of that combination or interfering with the chemical reaction.

Water simply cools the reaction below the combustion point, but it makes a mess and may damage other near-by items. Electrical equipment is particularly vulnerable – such as your operating transmitter – as wet insulation will arc and may break down. The resulting short circuits result in over-current situations, and your transmitter may be quickly reduced to junk.



### Clean Agents to Suppress Fire

A “Clean Agent” system introduces either an inert gas or a class of gases called halocarbons, into the space where the fire is occurring. The National Fire Protection Association defines a Clean Agent as “an electrically non-conducting, volatile, or gaseous fire extinguishant that does not leave a residue upon evaporation.”

Some commercial examples are: Inergen Suppression Systems, Carbon Dioxide Suppression Systems, Halon Suppression Systems, Novec Sapphire 1230 Suppression

Systems, and FM200 Suppression Systems. These will be explored briefly in turn.

With the inert gas systems, the oxygen percentage of the atmosphere in the space is reduced to a point below which combustion can take place.

### People and Fire Both Breathe Oxygen

The oxygen concentration in a protected area must be reduced to below 15% to quell a fire, but cannot fall to below 10% or any persons in the area will suffocate. Carbon dioxide must be kept below 10%. This is a tricky balance, and various inert clean agent gases have been developed to accomplish this.



### A Serious Warning!

A term used in enclosed area fire protection is “total flooding agent.” It is assumed that the space is sealed tightly and any ventilation fans and dampers are off and closed.

The commercial product INERGEN, a product of Ansul, is composed of nitrogen, argon, and carbon dioxide – all naturally occurring gases. These gases cannot deplete ozone, and are environmentally “friendly.” It is especially recommended by its manufacturer for telecommunication facilities. Ansul claims INERGEN is “people safe” when installed and controlled according to stringent engineering standards.

The following is from the EPA: Use of this agent (INERGEN) should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.

*This agent contains CO<sub>2</sub>, which is intended to increase blood oxygenation and cerebral blood flow in low oxygen atmospheres. The design concentration should result in no more than 5% CO<sub>2</sub>.*

An interesting side-note is that inert gas systems, unlike the halocarbons discussed shortly, do not lower the temperature in an environment. Rapidly lowering temperature below the dew-point results in fog that can hinder evacuation and condense inside sensitive equipment and on valuable artifacts and documents.

A drawback of the inert gas systems is the length of time, upwards of sixty seconds, they require to suffocate the flames. Introduction of carbon dioxide, like the other inert gases, must be carefully controlled in addition to a stringent and forceful evacuation warning and introduction delay.

Quicker acting is the class of clean agent gases known as the halocarbons – compounds containing carbon and one of the halogen gases. The halocarbons suppress a fire by interfering with the chemical process of burning. The molecular structure of gaseous halocarbons breaks down at high temperatures freeing the halogen atoms. These combine with active hydrogen atoms chemically extinguishing the fire.

### Grandfather Halon

The most widely known has been Halon 1301, chemically known as bromotrifluoromethane, or CBrF<sub>3</sub>. Halon is “grandfathered” with restrictions. *Radio Guide* contacted Don Norris, a design engineer in the fire protection industry. Don gives the following advice:

“No new Halon systems are permitted. Existing Halon systems cannot be modified in any way. For example, if the room gets larger or smaller, it must be replaced. It can be recharged if Halon is still available.

“There are some agents that can use the existing piping but the bottles and nozzles must be replaced. The existing panel and detectors might be able to work. A new drawing and calculation must be done. In some cases, the original pipe network was not originally designed or installed properly and so it must be modified.

“There are numerous agents available and there are many factors that affect the choice of agent. Unfortunately, there is no simple answer.”

Once the holy grail of fire suppressants for high value assets, Halon has been banned for new installations. It was determined in 1989 that Halon possibly depletes the ozone layer, and its manufacture has been banned since 1994. A similar ban has been placed on older forms of refrigerants such as R-12 for the same reason.

### Halon Replacements

Two classes of clean agent systems now replace Halon: fluorinated ketones containing carbon, fluorine and oxygen, or hydrofluorocarbons (HFC) containing carbon, hydrogen and fluorine. HFCs were developed to replace the earlier, now phased out substances such as R-12.

3M Novec 1230, a fluoro-ketone, sometimes known as “dry water,” is an accepted Halon replacement designed especially for “special hazards” where maintaining continuous operation of high-value equipment is critical. This means that your transmitter can remain in operation while a fire elsewhere in the room is extinguished.

Novec 1230 works to quell a fire by cooling the combustion below the critical temperature. 3M claims an especially wide safety margin for personnel when it is in use. Novec 1230 does not require storage under pressure and is a liquid at room temperature – thus its “dry water” nickname.

Dupont FM-200®, heptafluoropropane, is of the second class of clean agents, the hydrofluorocarbons. According to DuPont: FM-200 systems reach extinguishing levels in 10 seconds or less, stopping ordinary combustible, electrical, and flammable liquid fires before they cause significant damage. FM-200 fire suppressant can be safely used where people are present. FM-200 is so safe that it is used as a propellant in pharmaceutical inhalers that dispense asthma medications.

An important characteristic of these clean agent chemicals, is that, unlike water, they are non-conductive and are preferred for use on Class C electrical fires.

### There's No Such Thing as a Cheap Fire

Fire extinguishment systems require expertly engineered design, installation and maintenance – all expensive. But, after all, there is no such thing as a cheap fire when high-value equipment – your livelihood – is to be protected.

Jeff Johnson can be contacted at: [jeff@rfproof.com](mailto:jeff@rfproof.com)



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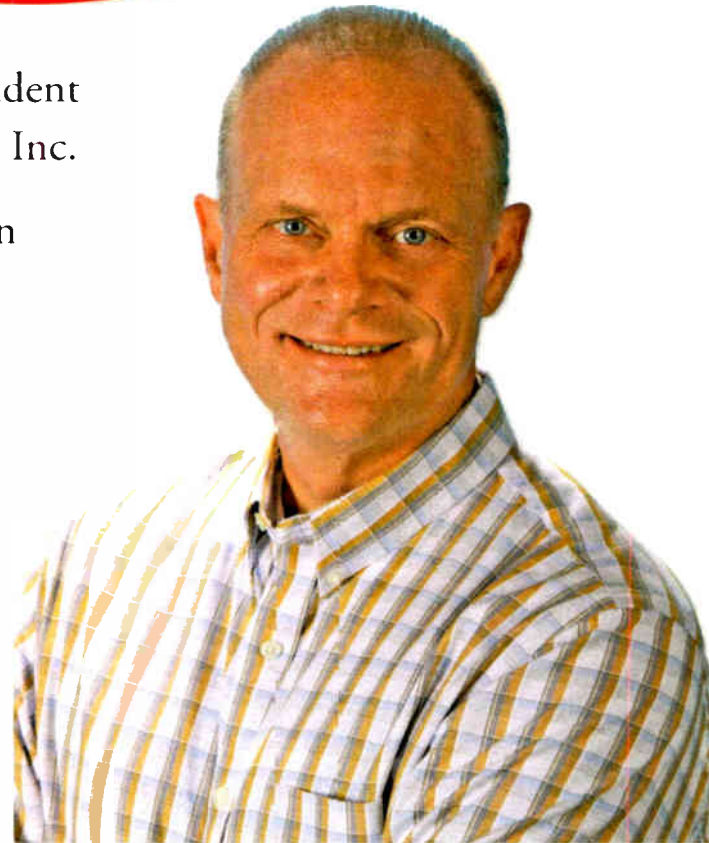
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# Station Ops

## Social Networking

by Christopher "Doc" Tarr

In our last article, I showed you how to create your own memorable email address. Now that that's up and running, let me tell you about something that some pundits are saying will eventually replace traditional email: Social Networking.

### Me Social Network?... Why?

Social Networking sites like Facebook, Twitter, and LinkedIn have taken the Internet by storm, generating millions of users. The big question is where do these sites fit in with the life of a professional Engineer?

There are few ways to look at social networking – a window to your private life, a window to your work life, or a little of both. There are some who publish very intimate details about themselves, and those who are fairly restrictive about what they want others to see. There is good and bad in both approaches.

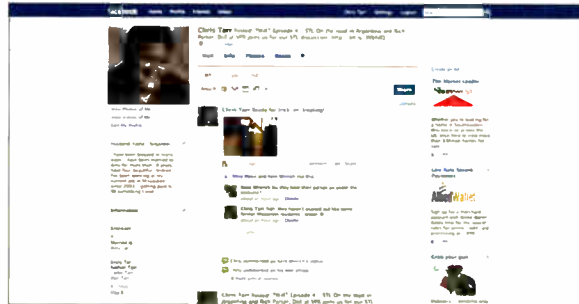
### Check Yourself Out

To truly grasp the consequences of your on-line life, try doing a Google search on your name. You may be thoroughly surprised with what you find! If you've never done that before, you'll see that not only is it a pretty big eye-opener but also you quickly realize that once something is on-line, it's there for everyone to see. There are some ways to make connections while still stacking the search deck in your favor.

Because of the explosion in Google name searching, I choose the "restrictive" approach to information on Social Networks. I use the security settings these sites provide in order to control my on-line image.

### WARNING: What You Post Could Cause Trouble

More and more, potential employers and business partners are doing searches on potential candidates to see what kind of people they'll be dealing with. I'm pretty certain you don't want them to see the picture you posted of yourself dancing around with the lamp shade on your head at the company Christmas party!



Facebook: a Rapidly Growing Site

This is why you need to understand the ramifications of using these sites, and what tools are available to control what others can see about you.

### Facebook

Let's first look at Facebook. Facebook is the fastest growing Social site on the Internet, with millions of users. You'd be surprised how many people you'll find there, and how easy it is to connect with friends and co-workers. Facebook allows you to write about yourself, as well as post pictures, play games, and join groups with people that have common interests. It's sort of like a big gathering of all your friends.

When you sign in to Facebook, you're shown a news feed, which is a collection of entries from all of your friends Facebook pages. It's very much like a dashboard showing you what all of your friends are up to.

### Want More Privacy?

Facebook offers some pretty good security. By default, people can't see detailed information about you or what you write, unless you have allowed them to see it, either by adding them as "friends" or by making the information public.

But, what if you have friends, family, and co-workers as "friends" on Facebook? There may be personal things you want your family to see, but maybe not your co-workers. Facebook does allow you to put your friends into "groups" – from there you can decide what things each group can see. That way, you can post both intimate and broad details, and control who sees what.

### Twitter

Twitter is an interesting animal. Many people consider Twitter to be a "micro-blogging" site.

Twitter is the site that asks "What are you doing right now?" and then gives you 140 characters to answer.

(Continued on Page 20)

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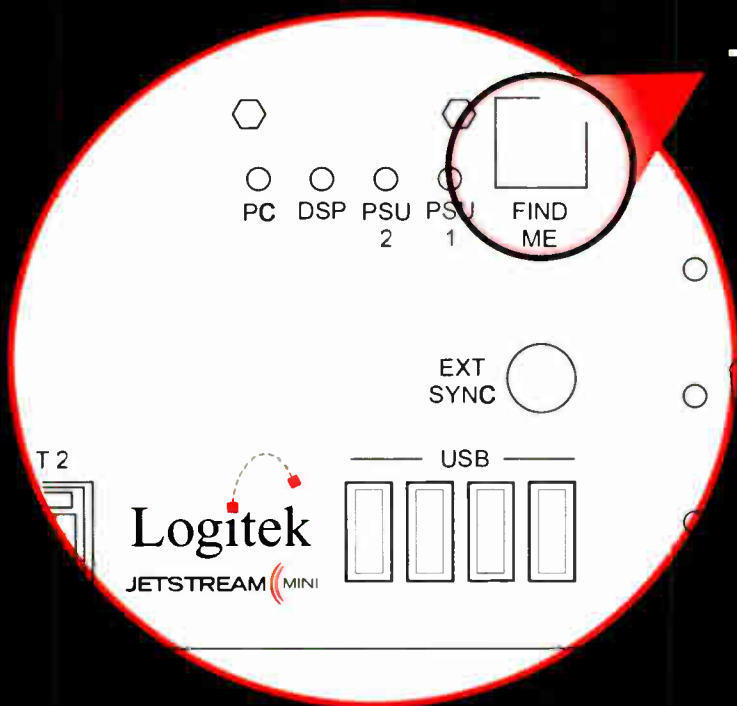


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Console Router Systems

# Station Ops

Continued From Page 18

Your Twitter "feed" is broken down into two groups – those people that you "follow" and read entries from, and those who "follow" you and find your "tweets" interesting enough to want to read.



## To Tweet or Not to Tweet: That is the Question

Many people really aren't sure what to do with Twitter until they really see the way that others use it. I look at Twitter at kind of a "stream-of-consciousness" of all of its users and believe it's a great marketing tool. It forces you to be short and to the point, and works well for posts like "Tried the new HD Radio today. Love it! Go to my site for review."

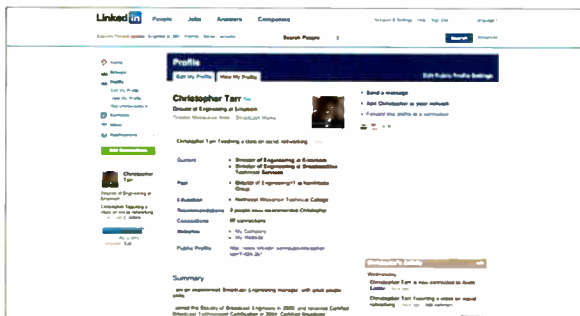
Since "tweets" are searchable, someone who is interested in HD Radio will find that post, and would likely go to your site to read the review. I think of Twitter as a two-way street. The more compelling you are with your "tweets" the more followers you will have.

## Security

Twitter security is pretty basic. By default, anything you post on Twitter is available for anyone to see, unless you explicitly choose to make your "tweets" private. Anyone can follow your "tweets" unless you choose to manually approve them, or specifically block certain users.

## LinkedIn

If you're less interested in Social Networking but still want to grow business connections, LinkedIn is like a Facebook for business. You create a profile, and then network with people you know.



In order to build your network, you need to ask people such as co-workers and business partners to connect with you. In turn, you can use those connections to create new connections with others, building a professional network.

LinkedIn also allows you to professionally recommend others, as well as have them recommend you. You

can also place your resume online and let the world know if you're interested in new work, contracting, or simply adding more connections.

It's a great tool for networking with others while promoting yourself. Most everything on LinkedIn is public, which makes sense – if you're looking to network, you want people to know all about you!

## Google Me

One last thing I recommend everyone does is create a "Google Profile." You can do this at <http://www.google.com/profiles>. If you've created a Google Profile, it will show up on the first page of a Google search using your name. Again, it's a way to stack the search deck in your favor.

## Why Should I Bother?

Even if you aren't very interested in participating heavily in Social Networking, I strongly recommend setting up accounts. Because of the open nature of the Internet, and the ability to search for details on anyone, I find that at least some participation allows you to stack the search deck in your favor. After all, you wouldn't want an Internet doppelganger making you look bad on Internet searches, would you?

## Here to Stay

Social Networking appears to be here to stay. It's a great way to stay in touch with friends, family, and co-workers. Just remember: Once something is out on the Internet, it's there forever for everyone to see!

You can find Chris Tarr on Facebook at: [www.facebook.com/geekjedi](http://www.facebook.com/geekjedi) and follow him on Twitter at: [www.twitter.com/broadcastdoc](http://www.twitter.com/broadcastdoc)

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

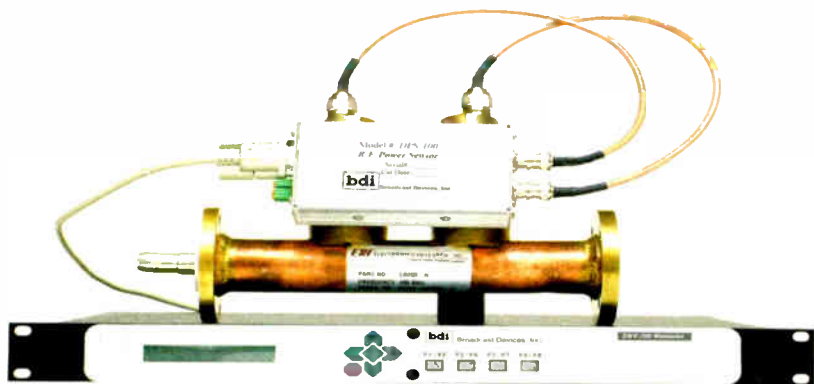
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**bdi**

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# Practical Engineering

## Good Connections Keep Things Going Well

by Dave Dunsmoor

I would like to discuss a few things that will add significant longevity to your broadcast plant. These are things that should be considered when doing the annual inspections of your plant, when you are adding equipment, and especially when building new.

### Start at the Power Entrance

As you might expect, there are some things that should always be looked at first. For most projects, that means the AC power.

Whether you are building a new studio, remodeling an old one, replacing an old control board, upgrading your transmitter, adding new equipment to a newsroom, or adding HVAC equipment – and not even touching the rest of the plant – stop and carefully consider your current electrical usage as well as what your project may be adding.

And “carefully” here means more than just a quick peek to decide that the existing breakers or wall sockets are sufficient to power whatever is being installed.

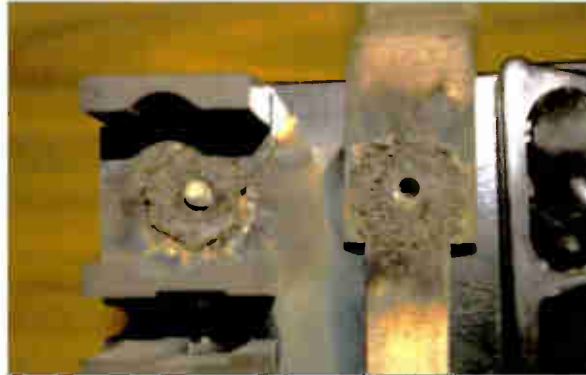
### Keep Tight Connections to Power

Certainly a cursory check of the service panel (breaker box) should be done to assure yourself that there is indeed enough capacity for the new equipment. It is most likely that if you are installing new equipment, any gear you install today will draw less power than what is being replaced. But when was the last time you did a diagnostic on the entire system?

For example, how long has it been since *all* the mechanical aspects of the electrical connections were either physically

checked and tightening as needed – or observed by the use of an infrared thermometer? Over time, various heating and cooling cycles can really stress connections.

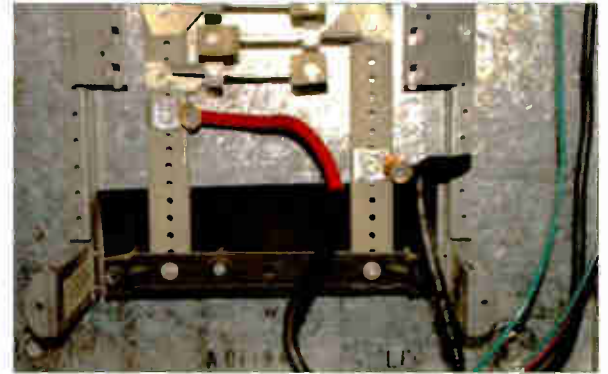
Here is a graphic example of what can happen if the electrical service is not checked periodically: a main service panel breaker – in service for many years – can fail drastically. Even though it had many years on it, there would have been no problem had it been properly tightened on a regular basis.



A loose connection caused this failure.

The point of failure is readily apparent. The guy who discovered this one did not need an IR thermometer to see where the problem was located; the connection under the buss mounting screw was glowing when he opened the panel!

A light touch stopped the glowing and (temporarily) restored power to the equipment rack. A little quick thinking and the problem was resolved (again, temporarily) by bypassing the breaker and connecting the incoming mains to the panel distribution buss bars.



A temporary way to get a station back on the air.





This got the station back on the air. The entrance switch now served as the emergency on/off switch instead of the service panel main breaker. More permanent repairs involved a new service panel, some labor, and some down time – at least it was down time that could be scheduled.

### Overheating Prevention

Over the years I have seen more than a few problems caused by overheated components. Often, a routine inspection would have caught the problem before it affected station operations.

One situation that comes to mind: a neutral wire that had been overheating for so long that the white insulation had burned back for an inch or two. The neutral wire had come loose at the utility transformer and had been causing one side of the 120 VAC to go to 185 VAC. The other leg was around 65 VAC. Neither equipment rack liked it. (Continued on Page 24)

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- AF315C3 - AM Receiver

**SAGE** ALERTING SYSTEMS

# Practical Engineering

– Continued from Page 22 –

I really prefer to brush (with either a stainless steel or brass bristle brush available at welder's supply houses) all connecting surfaces prior to mating.



**A well-cleaned surface helps to prevent problems.**

Buss bars, breakers, power supply transformers – every connection should be cleaned prior to assembly, especially the ones that will be carrying large current loads.

It helps to coat both surfaces with anti-oxidant grease to further retard oxidation and subsequent heat buildup.

## A Well-Grounded System Promotes Safety

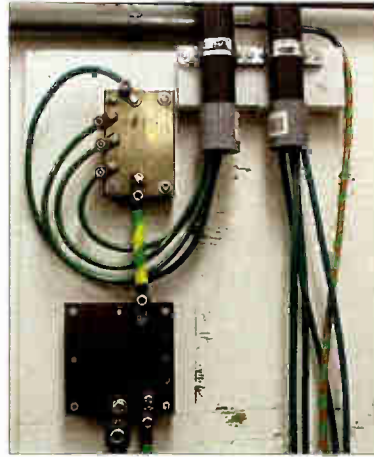
Another consideration, after the electrical supply is determined to be in good health, might be the studio and/or

transmitter building ground system. Generally, there are two aspects to ground: AC (safety) and RF.

Safety ground is designed to prevent people from being hurt (or worse) while operating electrical equipment. This is applicable to power tools, appliances, computers, remote broadcast gear, transmitters, studio gear – anything that is powered from the wall socket.

The National Electrical Code (NEC) describes how safety grounds are to be implemented, so I will not try here to describe all that is required for this to be done correctly. Generally speaking though, if there is DC continuity between the equipment chassis and the service entrance ground, it is going to work for its intended purpose.

In this illustration, please note also that the ground wires are run through PVC and not EMT. We want the ground connections (all wires included) to be as transparent as possible. On the other hand, a ferrous metal surrounding a section of wire will act as a choke to high frequency RF (lightning), impeding its transfer to ground. When that happens, the voltage gradient can be great enough to cause damage that otherwise might have been avoided.



**A ground buss system.**

## RF Grounds

RF ground – and I will include audio noise suppression here also, as it is sometimes as (or more) elusive as RF to “get

right” – is another matter. This is primarily because of the wavelengths involved.

The wavelength of 60 Hz is 16.4 million feet, a quarter-wavelength is still 4.1 million feet. This means that any length of wiring within a building, or even between buildings, will be an insignificant number of electrical degrees long, therefore any 60 Hz AC voltage impressed upon any portion of a wire will be essentially the same at any point along its length.

However, at RF frequencies, it is much easier to have an RF voltage differential between neighboring wires because at the lowest RF frequency we are concerned with (540 kHz), a quarter-wavelength is about 456 feet. At 105 MHz, a quarter-wavelength it is only about 2-1/3 feet.

The significance of the quarter-wavelength is the fact that RF voltage will go from a minimum to a maximum over the distance of a quarter-wavelength. Unwanted RF voltages can be introduced into equipment by way of audio leads, power and control wires – even some so-called ground wires – and this unwanted RF, if detected (that is, rectified by individual semi-conductor junctions) will cause noise and interference (RFI).

At increasingly higher frequencies, increasingly shorter lengths of wire will become an effective receive antenna. Unless wiring is properly configured, routed, and grounded, it can contribute significantly to noise problems.

## Clean and Tight is the Goal

The point I am making is this: all electrical connections are most effective when they are “clean and tight.”

Clean means removal of oxidation, down to bright metal before assembly. Tight means, as much as possible, an air-tight connection. Clean occurs at the time of assembly, tight starts at assembly, but needs to be revisited every year thereafter.

Clean and tight assures you of a lower cost of operation, and reduces the chance of catastrophic failure and unintended downtime. – Radio Guide –

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World Radio History

# Chief Engineer

## Do You Know How to Communicate Effectively?

by "Tweaker"

Did you answer the question I asked in my headline? If so, you most likely thought to yourself, "I communicate perfectly fine! I write email and letters, I discuss situations with friends, supervisors and subordinates, and I get what I need accomplished."

That is a fair enough answer, except you failed to ask yourself *why* I was asking the question.

### Don't Fool Yourself

A vast majority of people go through life believing that they are effective communicators, when indeed they aren't. After all, they rationalize, they speak, people listen, and tasks get accomplished. So, what is the problem?

The problem is that we inadvertently create communication "short circuits" without even realizing it because we may be communicating in a language that is not understood by the person with whom we are trying to communicate.

I'm not talking about speaking English with someone who speaks a different language or has English as a second language. I'm talking about speaking to someone in English in a way that it is difficult for them to comprehend – so that the information you are giving them or the point you are trying to make causes a communication short circuit. *What?*

Keep reading, soon my point will be clear.

### Message Received, Message Understood – NOT!

Once upon a time the above statement was as far as the definition of effective communication went. Over the years deeper studies attempting to answer the question of why some students were effective learners and others were not, revealed some very profound information about how individuals learn and communicate.

The results of the studies have changed the way teachers, good managers and professional communicators – like salesmen or orators – communicate.

### Visual, Auditory and Kinesthetic

The studies found that each human possesses three main learning/communication traits and several sub traits. The main traits are Visual, Auditory and Kinesthetic. But – and this is the important key – each uses one dominant trait that rules our communication and the way we learn. So, to effectively communicate with someone and ensure the communication takes the path of least resistance in being understood, it is important to communicate in the language that is most dominant to the person receiving the communication.

### How to Tell Who's Who

I once had a very wise gentleman tell me that we have two ears and one mouth, so we should listen twice as much as we speak and we'll learn a lot.

This is true when trying to determine someone's dominant trait. You need to take the time to listen to what a person is saying to determine how best to communicate with them.

Before I give you more insight though let's test you to see which trait is your dominant one.

### The Test

Take a moment now to think about walking on a starless, windy, winter night. Write down your description of the night in ten to twelve words. Next, think about being in a crowded amusement park on a humid, sunny summer afternoon. Again, write down your description.

Once you complete this, continue to read this column.

### So Which Are You?

Now that you have completed the test read the following descriptions.

Did your description of walking on a starless, windy winter night first reference how dark it was or how difficult it was to see where you are walking – or how you wish there were a full moon? And did your description of the summer afternoon first describe how bright and sunny it was, how blue the sky and how colorful the rides were? If so, then your dominant trait is Visual.

(Continued on Page 28)



**I don't understand!  
Could you repeat that?**

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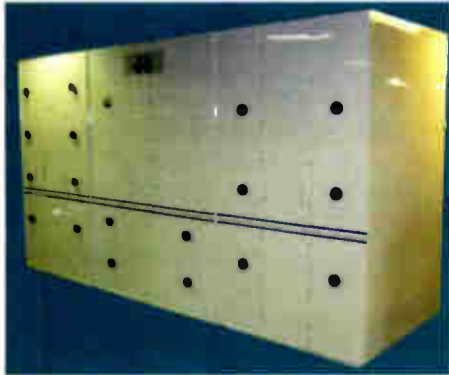
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# AM Antenna Solutions



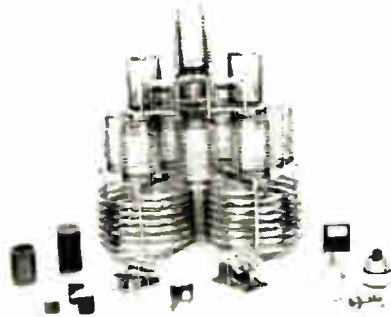
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SINCE 1963

# Chief Engineer

- Continued From Page 26 -

However, did your description begin with hearing the wind blowing through the empty trees or rustling through the underbrush, or the snow crunching under your feet as you walked on that starless, winter night? Did you describe the amusement park as noisy and did you hear the kids laughing, the music from the rides, the calling of the barker at the ring toss game etc? Then chances are your dominant trait is Auditory. Also, if you read to yourself, hearing the words in your mind when you read, there is no doubt about it.

If you felt the cold wind biting your face, were you chilled to the bone and shivered as the wind blew on that cold winter night, and imagined that you were feeling the oppressive humidity on that hot sunny day—did you feel excited and electrified by the atmosphere at the amusement park? Could you smell the popcorn being made and taste the cotton candy? Guess what? You're a Kinesthetic.

## Why the Test?

There are several reasons for the self test. It helps you become aware of your dominant trait. This is helpful because you now know the language in which you communicate to others naturally, and the language that is the easiest for someone to use when communicating with you. It helps you understand some of the differences in the three traits and it may help you to understand how the short circuits in communications occur.

While you're describing something in terms you clearly understand, you may be speaking a totally "foreign language" to the person receiving the information. This the short circuit.

## Effectively Communicating and Teaching

Now that you have this information, the first step is to figure out the dominant trait of the people you work with and work for. This is easier than it seems. You don't have to go around testing them, simply listen and soon enough they will tell you what they are.

Visuals love to paint pictures. They have a sharp, clear picture of an experience. Visuals speak in visual terms: "Can you see what I mean?," "Do you see the difference?" Or in a disagreement: "You're not seeing this the way I am," "Can't you see what I am trying to accomplish," "We aren't seeing eye to eye," "Management isn't looking at this the right way," "That looks heavy to me."

Auditory individuals identify with the sounds related to an experience. They speak in auditory words, "You're not hearing me," "I want you to listen," "That sounds good," "How do you hear the situation is going," "That sounds heavy," "Management isn't listening."

A kinesthetic develops strong feelings toward an experience. They like to be in constant motion. They will speak in words that describe feelings: "Can you get a feel for what I am saying," "I'm getting a handle on it," "That's a soft sound," "Can you feel my pain," "I feel like the world is crashing in on me," "Management doesn't have grasp of the situation."

## Now What?

Armed with all this information, you can now design your communication to ensure that the message is sent, received *and* understood. You should now find it easier to sell an idea and to have subordinates clearly see (visual), get a feel for or grasp (kinesthetic), or truly hear (auditory) what you are trying to get across when you speak to them.

If you doubt this will work, I will let you in on a trade secret that most sales professionals use to immediately make you feel comfortable and ultimately sell you, without you even knowing it. (I feel like a masked magician giving away the secrets to the magic trick.)

When a good salesperson encounters a prospect at NAB, for example, or even on the phone, they know within 30 seconds the client's dominant trait by listening to the prospect.

They then immediately switch to the language that instantly puts the customer at ease, and makes them immediately lower their defenses so they are more open to be easily induced to purchase the product. Their communication in that dominant trait immediately builds trust.

That's something to think about the next time you pick up the phone to talk about a product, stop by a trade show booth, or go to buy a car.

## Practice Listening

Over the next few days, train yourself to tune into conversations and listen for the verbal clues that will give you insight into someone's dominant trait. Time yourself, and find out how quickly you can make the ID.

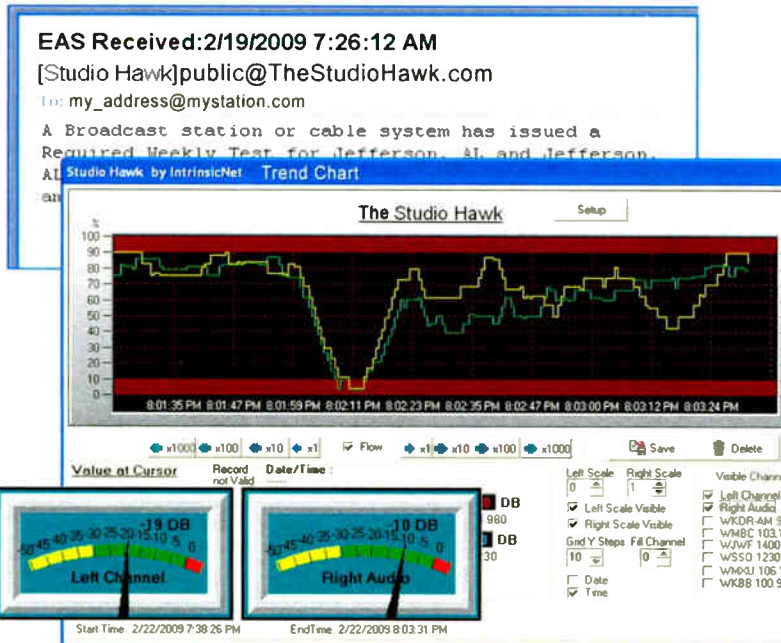
Keep practicing until, as with the best sales professionals, identifying someone's dominant trait becomes second nature to you.

## For More Information

If you want to delve more deeply into this subject search for "visual, auditory and kinesthetic learning styles" in your favorite search engine. There are a myriad of references on-line.

*Want to communicate with me? Email [editorial@radio-guide.com](mailto:editorial@radio-guide.com)*

# THE STUDIO HAWK

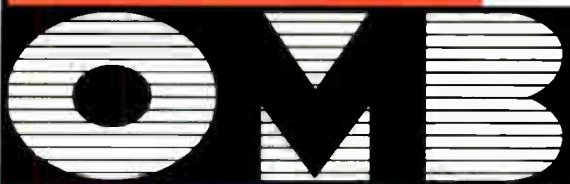


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# Transmitter Site

## Get Your Transmitter Sites Ready for "The Most Wonderful Time Of The Year"!

by Scott Schmelling

Evidence is all around us. The seasons are changing. Here in Minnesota, most of the leaves have dropped, farmers have most of their crops in, and it's time to prepare for winter (it comes every year about this time!).

### Ready for the Deep Freeze?

Preparing your transmitter site is not unlike the preparations you do at home. You caulk around your doors and windows at home to keep the cold out. The same should be true of your transmitter site. Check around your doors (and windows if you have them). Shut the door and feel for any drafts blowing in. Turn the lights out and look for any sunlight showing through. If you can see sunlight, you can bet you'll have cold air – and maybe snow – blowing in. Also be sure to check around any cables entering or exiting the building.

If you see gaps, or feel a breeze, you have options. Smaller openings can simply be caulked. If it's a larger opening you might want to put some backer or "caulk saver" in first. The caulk saver is essentially a flexible piece of cylindrical poly foam. It comes in various diameters and is available in the "caulk department" of your favorite hardware store. If you see *really big* gaps you might want to use an expanding foam product. This, too, is available in various forms. The original doubles in size as it expands and cures so be careful not to overfill.

You can also get "minimal expansion" foam. This is made specifically for use around doors and windows. It doesn't expand as much, nor with the same force, as the original.



Duct Seal Fills the Gap

I've just discovered a *black* foam that says it is weatherproof! I've used this type to fill the gaps around my cable access. Depending on the size of the gap, you might also be able to use a product called Duct Seal (a clay-like product used by electricians to fill the gap around conduits).

One other tip – if you suspect some "critters" might be able to get inside your building through any of these openings – put a little steel wool in the gap before you foam it. I don't know about you, but I *hate* seeing the evidence of mice in my transmitter buildings

### Wooden Window and Door Frames

When they're installed, wooden frames come primed but not painted. Unfortunately, they almost never get painted. The primer coat looks OK at first, but over time the primer breaks down and the wooden frame becomes exposed to the elements and the damage starts. It wouldn't take long to brush on a coat of paint and it's certainly cheaper than replacing the wood after the frame rots.



Poor maintenance by the previous owner.  
A door frame being destroyed due to neglect.

### Time for a Good Cleaning

This is also a good time to do a slightly more thorough cleaning. The summer bugs are dead or dying. Grab the Shop Vac and vacuum them up. While you're at it, suck up any spider or cobwebs. Most of what we vacuum is fine dust from inside the transmitter. If you're getting tired of your filter plugging up with that fine dust, try Shop Vac's disposable filter bags. They're very much like the bags in your vacuum at home. In theory (I haven't been using them long enough to prove it yet).

(Continued on Page 32)

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# Transmitter Site

– Continued From Page 30 –

they will allow you to suck up a lot more dust before you loose suction. The time you spend cleaning now will make the time you spend at the site later a lot more enjoyable.

## How About a Little Heat

In the warmer months we normally route the heated transmitter exhaust air to the outside. When it turns colder outside I like to divert at least some of that transmitter exhaust into the room for some free heat. That can be accomplished in a couple different ways – depending on your ducting. If it's round duct, you can insert a T-section with a damper inserted to divert some of the hot air out the center port and into the room.

In the summer you put a cap on that port and let the hot air go outside. If you have a square/rectangular duct you can install a register and damper on one side and adjust the damper as needed.

## Air Conditioner Winter Prep

If you have a window-type air conditioner at the site, cover it up to minimize air blowing in through or around the unit. Again, a trip to the hardware store might be in order. Air conditioner covers are available. Pick the size that's right for you, and get a couple sets of bungee cords to secure the cover (the little elastic straps on the covers just don't cut it when the strong winter winds blow).

## Don't Forget the Overgrowth

Outside, check any vegetation growing near the building. Take it down if you can. If you leave it there, it can become a cozy rest stop for mice, and it will grab and hold snow that blows around. Two good reasons to clear it out!

So far, none of this has been technical, but if you're like me, you wear many hats. Chief Engineer, Janitor, Grounds Keeper, Building Maintenance, and occasionally – Plumber! Since I'm the only one that goes to the transmitter sites, it's normally up to me to take care of the above maintenance issues.

## Getting Your Transmitter Ready

I know you do anyway, but take a good close look at your transmitter. How are the final and the drivers? If they're getting close to end of their life, this would be a good time to change them. It's better to do it now rather than have a failure during a blizzard when you'd really rather *not* be on the road.

The same is true of your nitrogen tanks – except the nitrogen tanks are even more fun to drag through the snow from the road to your building. (Notice the sarcasm in my voice? I speak from experience!) If your tank is getting low you might want to check on getting a replacement.

## Don't Forget About Lights

Check your tower lights. If you need to re-lamp, call your tower crew now. Any tower crew I know would much rather re-lamp a tower before it gets really cold outside.

Take a close look at your tower light controller, too. Look for signs of overheating on the solid-state flashers. If your controller uses a mercury switch on a motorized cam, look at the wiring from the switch capsule. Look for any signs of fraying. And be sure the motor spins the way it should. Check the contacts of the contactor. On more than one occasion, I've discovered one of the four contacts fused closed, keeping some of the lights on all the time.

As long as you're checking lights, don't forget to check the light on the outside of your building. You may have a simple switch, a photocell, or a photo-cell/motion detector combo that turns on at night if it detects motion (like you

walking up to the building at night – because you had to park back on the road!). Cover the photocell (there's usually a delay between darkness and "lights on" so, be patient), and verify that everything is working. If you have a High Pressure Sodium light fixture that's not working properly, call your favorite electrician. He may have a test set that will diagnose your problem and determine whether it's the bulb, igniter, or ballast.

## One Last Bit of Winter Prep

While we're talking about winter preparations, don't forget your vehicle. It has to start when you need it. Change your oil, check the battery and clean the posts. If you can't remember when you last changed spark plugs, you might want to think about that too. Don't forget your tires; check your air pressure. And if they're getting a little light on tread you might want to think about replacing them. The last thing you need is to find yourself in a ditch on a cold winter night because of worn tires that couldn't grip the road.

We've all heard the saying: "You take care of it, and it will take care of you."

## Emergency Travel Kit

During the winter, I always have a blanket and a sleeping bag in my van. I have a plastic tote for a parka, ski pants, boots and really good warm gloves. I also put a winter survival kit together – just in case. You can enter "Winter Survival Kit" into your favorite search engine and find recommendations for your area. Be sure to include a set of jumper cables and a tow rope. They could be for you, of course, but also so you can be of help when needed!

Winter really *is* a wonderful time of the year. With a little advance preparation, you can enjoy it as much as I do.

*Scott Schmeling is the Chief Engineer for Minnesota Valley Broadcasting a 16 station group in Southern Minnesota. He can be reach via email at [scottschmeling@radiomankato.com](mailto:scottschmeling@radiomankato.com)*

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## Acer Aspire One – 11.6-inch Netbook by Ernie Belanger

When I first took the position as editor of *Radio Guide*, Ray told me that he wanted me to have a computer to use for the publication. I debated between laptops, netbooks and desktops systems.

Luckily I have experience with two of the three. I wanted portability for trade shows and so that ruled out desktops. Back in the day when I was a road warrior I had lugged around a couple of different laptops. All were heavy, bulky and they were a pain to use on a plane because of their size.

### The Logical Option

I started exploring netbooks on the recommendation of one of computer experts at my local Internet Service Provider. He and I had discussed his eight-inch Acer one night when he was over at the house. While I was impressed with functionality in such a small package, I knew instinctively that a screen that small wasn't going to cut it for my needs.

I visited several retailers to check out the ten-inch screen netbooks from all manufacturers. I had narrowed my selection down to two, but then I stumbled upon the 11.6-inch Acer.

It was a perfect fit. It had all the features I needed and a screen size that I could live with while on the road or when I just don't want to plug in my fifteen-inch flat screen monitor. To top it off, it wasn't that much more expensive than the 10 inch models. I lucked out and got mine before the price went up and Windows 7 was added.

### This Baby is Loaded

The full size keyboard has the feel of my desktop keyboard: it has three USB2 ports, a 3G/wireless LAN, a 3G SIM card slot, an Ethernet connection, Bluetooth, a memory card reader, mic in, audio out and it weighs less than three pounds with the eight hour battery – it also has a built in video camera to boot.



The Acer Aspire One 11.6 – in Basic Black

Although it doesn't have a built-in CD/DVD player, it is available as a USB add-on – I bought one.

You can also pick your color so you don't have to be stuck with basic black. The USB drives and wireless mice are also made in color's to match so you can coordinate if you choose.



### So How Is It to Use?

In a word, great! In fact I use it to edit and do preliminary layout of my editorial pages complete with photos and it doesn't skip a beat.

You're reading an issue of *Radio Guide* that was edited and laid out (at least my part of it) on my Acer. It's got plenty of RAM (2 GB) and a 160 GB hard drive for storage.

### A Down Side

There's nothing perfect in this world and this is true for the Acer Aspire One 11.6.

The only issue that I have with this computer is the same one that I have with all portables – the touch pad. But, I made sure that it could be switched off, via software, before I bought it.

I hate them for two reasons. First, when you accidentally brush the pad, your cursor ends up in never, never land somewhere; second, while typing, the hand movement on the body of the computer will, on occasion trigger menus to open and mouse clicks to occur causing things to happen that shouldn't. The simple solution is to use a wireless mouse.

I must say the Acer Aspire One 11.6 gets my recommendation. If you're looking for a sleek, lightweight computer that will be a workhorse for you, this is it. – *Radio Guide* –

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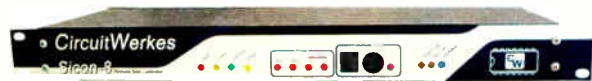
# Field Guide

## Remote Controls

### CircuitWerkes Sicon-8 Remote Control

by Steve Smith

Every now and then you hear of yet another piece of equipment that will make all of our engineering lives better, more productive, and easier. And while I've heard it all before, I believe there is one newer unit on the market that delivers it all.



The Sicon-8 from CircuitWerkes in Gainesville, Florida, is fast becoming my new best friend. In travels where I am continually confounded by remote controls that were set up two or so contract engineers ago – with no passwords, serial numbers, or authenticator codes so that check out was a near impossibility, I've had several occasions where the clients were just ready to commit to a new control system.

#### Easy Setup

With the Sicon-8, setup is a snap. On the software side, the Sicon-8's Windows program interface makes setup and deployment close to a complete joy.

Sicon enables you to actually record your own voice to label meters, functions and status. So, when you get that call in the middle of the night, you can understand what the unit is telling you more quickly than units that require the pitch and speed controls for the voice interface. It's a bit amusing to see two different engineers, both readjusting the voice

properties of other units to their satisfaction, when one can't understand what the other engineer has set up.

Big and bold buttons for functions are at the top of the home screen making everything easy in and easy out.

#### Hardware

One rack unit contains eight full metering, status and command channels. A very simple and clean front panel displays critical operational status and voltages of the Sicon. Hybrid nulling is a piece of cake with built in tone generator – with input/output/null adjustments right in front of you.



Connector Rich Rear Panel

#### Rear Connections

On the back of the unit there's a dense layout of interface connectors that may seem cramped for some interface cable schemes. I've found, with proper placement in a rack, at eye level, wiring and checking of cables is easier than one may think. If you're still cramped, fanning out to a terminal strip or block is no problem.

#### Internet Conductivity

The Sicon-8 features a built in web server that brings web deployment within minutes. The unit uses an RJ-45

connector to the web server, along with a very thoughtful programmable web server reset, just in case you may want to give it a reset on a regular basis.

X-10 functionally and full addressing is also built into the Sicon with an RJ-11 rear connector.

#### Back Up Connection

If your site needs a bit more back up, a cell phone jack is incorporated to handle fail-over should you need to get around the Web or Telco connection.

Every function addressable by the Windows software is also addressable by DTMF. Once you practice and learn the DTMF sequence and levels, you can re-program any functionally from password to alarm triggers.

#### Sized to Fit Your Need

You can add eight channels with a 1 rack unit expansion chassis, for up to 3 chassis for a 32 channel system.

The price of the Sicon-8 is making it possible for multi-station clients to deploy a complete remote control change out to standardize on the Sicon-8. Multipoint unit software does not require the layers of setup experienced in other units.

#### Other Uses

I've already started a rough out to use the Sicon for some home automation projects.

It's one lean, mean functional machine. While it is tough enough to control any type of remote source, it is definitely ready to go for broadcast.

*Steve Smith is a contract engineer at Strategic Infrastructure Protection Technologies LLC he can be reached at 240-483-4600 for more information on the Sicon or any CircuitWerkes product email kyle@circuitwerkes.com call 352-335-6555 or visit their web site: www.circuitwerkes.com*

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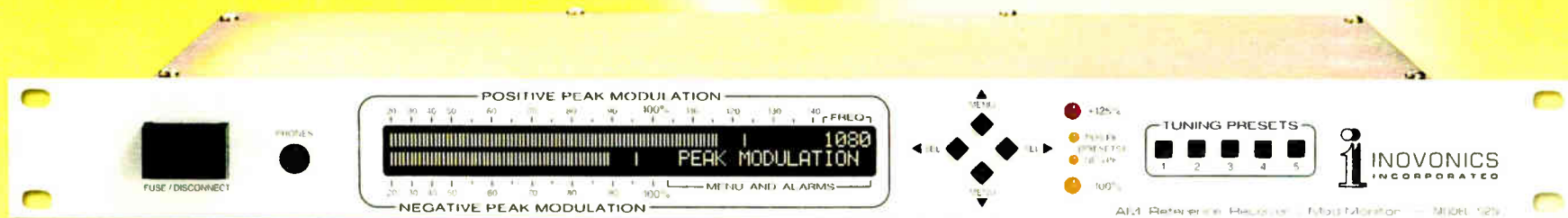
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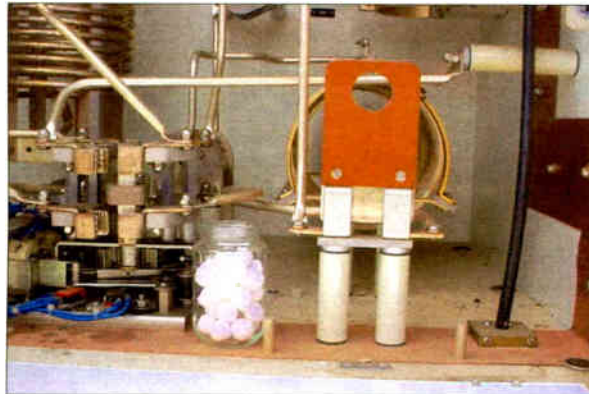
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# Tech Tips

## Using Moth Balls for . . .

by Gary Peterson

Have you ever opened a door at the transmitter shack, or tower base and had something unexpected fly or run out? How about finding Black Widow spiders in an equipment rack at a transmitter site? These are the sorts of surprises I have never enjoyed. A convenient solution was as close as the hall closet: moth balls. I have long used moth repellants in and around broadcast electronics. I use them in ATU cabinets and any other place I do not want something jumping out at me when I open the door.



Moth balls are usually naphthalene or para (p or 1,4)-dichlorobenzene. Both tend to sublime (turn directly from a solid to a gas) without going through the liquid phase. The rate of sublimation is a function of temperature and air

circulation. Para-dichlorobenzene melts and boils at a lower temperature than naphthalene and, therefore, normally sublimates more quickly. Either will last longer in a closed area or at a lower temperature.

Neither product is directly corrosive to copper, aluminum, steel, silver-plating, insulation, electronics, etc. However, para-dichlorobenzene contains two chlorine atoms per molecule. If an ATU cabinet was filled with p-dichlorobenzene vapor and an RF arc occurred, a small amount of free chlorine gas (very corrosive) could be produced.

The amount of chlorine would be very small. However, with repeated arcs over a period of time, the corrosive effects of the chlorine could be noticeable.

On the other hand, Naphthalene contains no chlorine (just hydrogen and carbon) and, therefore, has no possibility of producing a corrosive byproduct. Plus, because it sublimates more slowly under similar conditions, naphthalene will last longer. Moth balls and snake repellent, containing naphthalene, are available at most hardware (such as Ace) and home improvement (such as Home Depot) stores. It is very reasonably priced.

To prevent naphthalene from sublimating too quickly (as in an ATU cabinet where the temperature may reach well over 100 degrees F on a regular basis), place it in a glass jar and punch a small hole in the metal lid. The size and number of holes in the lid will affect the rate of vapor release.



If some critter is burrowing under your doghouse, pour some moth balls into the hole. Whatever is doing the digging will pack up and move.

It works everywhere. I maintain a translator, in a small building (outhouse size) on top of a rock outcropping. Somehow rattlesnakes were getting into the shack, likely because field mice could get in there. A couple of open boxes of moth balls every year keeps everything but me out. I love the stuff! (My heart rate still goes way up when I prepare to open the door, though.) — Radio Guide —

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# Tech Tips

by Bob Burnham

## Punch Block Tips

The "66" style punch block has been a staple in broadcast studios for decades.

Once upon a time someone thought that by borrowing them from the telephone industry, we would save time and space constructing studios, rather than using those cumbersome barrier strips. They were right.

### CONTORTIONS R US

But who among us has not spent hours with our bodies jammed inside studio furniture adding wires to a block bolted in a place apparently selected by a sadist (or some chiropractor's marketing agent)?

When designing and installing the many studios at Specs Howard School in Southfield, Michigan, there were three factors that I kept in mind:

1. Efficiency (and comfort) during the installation process, especially since for the most part, it was a one-man task for me.
2. Ease of maintenance, and adaptable to future changes.
3. Reliable, yet reasonable in cost.

### A BETTER WAY

The most popular punch block version, manufactured by Siemon, can be mounted directly or with a mounting bracket that allows the wiring to be fed through the sides underneath the block. I strongly recommend using the bracket. Sheet metal screws can be used to secure the block to the bracket. The key here is the block is *removable* from the bracket.

By leaving plenty of service loop for *all* cabling, the block can be physically removed and placed on a horizontal surface for future work.

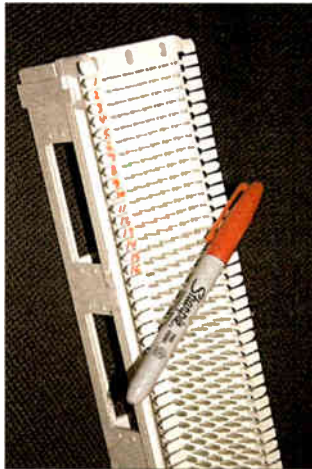
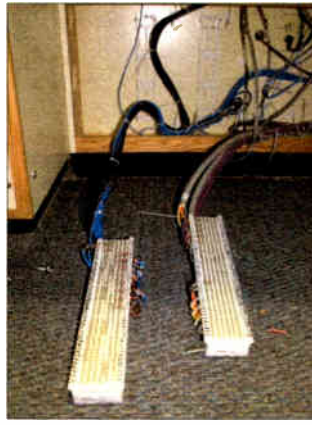
Pre-wiring a block as much as possible is actually the most desirable way to it. Since studios often were in use the day before – or even the very day I planned a console upgrade – I had to make very efficient use of the time I spent in the studio. Many blocks were pre-wired on my desk or workbench before they even went into a studio.

Using a punch tool for an extended period is faster and much less stressful in a comfortable environment, or at least having the ability to punch it on a horizontal surface.

### DOCUMENTATION AS YOU GO

With a brand new block, the *first* thing to do is to get out your Sharpie® and number the block on both sides – even if you know you are only going to use half the terminals.

It reduces the chance of errors and makes it easier should any extra terminal connections be needed in the future.



Obviously, the next step is to prepare a wire chart identifying which wire goes to which punch block number. Some like to number the wires themselves, using various types of labels and/or shrink-wrap.

### SOME ADDITIONAL TIPS

1. Punch grounds individually rather than tying them to an external strap. This minimizes the chances of ground loops, and if any occur it is very easy to lift grounds at the block.

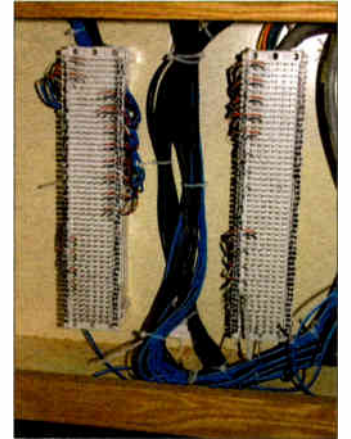
2. Keep a second punch tool with a dull blade handy should the ground wires have a tendency to break during the wiring process; it is faster than trying to adjust the impact on the tool between punches.

3. Use block mounting brackets so that the cabling can be neatly routed *under* the block when mounted. A sheet metal screw at the top and bottom will secure the block to the mounting.

4. The surplus cable can be neatly bundled with cable ties and loosely hung nearby should the block need to be removed again. Use cable tie anchors secured with a small sheet metal screw to secure surplus cabling.

5. The Siemens part number for the standard "66" block is 66B3-50; the mounting bracket is S66-B6. These very low cost items should be available from your favorite supplier or broadcast vendor.

Planning ahead this way, you can build and wire punch blocks in such a way as to make things much easier for you on that day when you will need to work on them again. – Radio Guide –



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## Comrex ACCESS 2.7 Firmware Release

Comrex Corporation has announced the release of 2.7 Firmware for its line of ACCESS IP codecs which includes the ACCESS Portable and ACCESS Rackmount. In addition to functionality enhancements such as HTTP streaming, added support for 3G wireless devices, the addition of FLAC algorithms and web browser improvements, the 2.7 Firmware update features N/ACIP compatibility with IP codecs from other manufacturers as well as a significant technology enhancement known as BRIC UDP Transmission Enhancement or BRUTE.

“When Comrex introduced BRIC Technology in 2005, it was a breakthrough in providing reliable audio transmission over the public Internet,” says Comrex Tech Director Thomas Hartnett. “Since then, we’ve gained lots of experience on extra-challenging IP wireless networks like Wi-Fi, satellite and 3G. At the same time these networks have skyrocketed in popularity. As a result, these services can be burdened with overuse which sometimes causes IP audio transmission to suffer.” Hartnett continues: “We’ve taken our findings back to the lab and improved on the BRIC concept by adding a reliability layer along with intelligent congestion avoidance. The resultant combination, BRUTE, delivers the best possible user experience over modern networks, especially those plagued by overutilization and marginal coverage.”

N/ACIP or Network/Audio Contribution over Internet Protocol is a technical specification (EBU-TECH 3326) drafted by the European Broadcast Union that creates a set of standards by which various manufacturers of IP-based audio codecs can interoperate. Comrex ACCESS customers can update their pre-2.7 codecs with the latest firmware update to connect to IP codecs from other manufacturers that have implemented N/ACIP protocols on their devices.

The 2.7 Update with BRUTE and N/ACIP compatibility is available for free to all existing ACCESS Portable and Rackmount users via download from the Comrex website at: [www.comrex.com/updates](http://www.comrex.com/updates) or by contacting Comrex Tech Support at (978) 784-1776. The 2.7 Update will be included on all newly purchased ACCESS shipped from Comrex.

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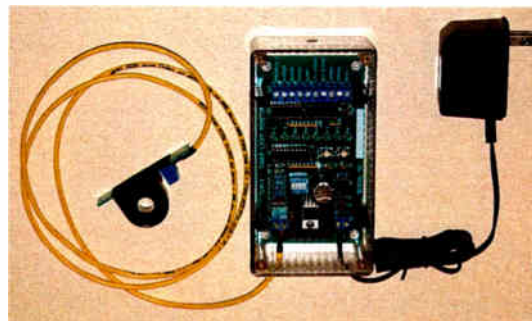
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# Radio Pipeline

Broadcast Devices – BW Broadcast – Progressive Concepts

New Equipment

Updates and Modifications

Industry Information & News

## BW Broadcast BW-IPCA1 Codec

Building on its reputation for reliable, high quality equipment at an attractive price point, BW Broadcast announces the BW-IPCA1 codec, designed in response to the demands of broadcasters that have not, until now, been fully satisfied by available products.



IPCA1 Codec

Using latest-generation IP and audio coding technologies, the BW-IPCA1 was designed from the ground up for stable operation with the lowest latency and best audio performance possible based on network characteristics. To keep latency as low as possible, the BW-IPCA1 uses a proprietary, dynamically adjustable jitter buffer that adjusts to network conditions, providing 24 bit audio, with up to 48 kHz sampling, at the lowest possible delay at all times.

Supporting UDP, UDP Multicast and TCP/IP protocols, the unit includes a range of low delay codecs operating at bitrates as low as 32 kbps with fewer quality/bitrate trade-offs. Linear, and a selection of lossless and low delay-low bit rate codecs, are all on board with some popular third party codec options planned. And if the worst should happen, and the data network fails, the built-in Plan B silence detection can trigger local audio failover to SD card storage.

"Research showed that for the BW-IPCA1 to be successful, it would have to cope with a wide range of demands," said BW's audio-over-IP manager Paul Sykes. "From difficult network connections with low bandwidth, to fixed, high bandwidth applications requiring copper-cable fidelity, the BW-IPCA1 sounds great with minimal latency."

Convenience features include AES/EBU digital and XLR line-level inputs/outputs, headphone jack, OLED metering, GPIO and RS-232 ancillary data channel. The graphically rich web interface and telnet interface provides automated control, and the BW-IPCA1 firmware is remotely upgradeable.

**BW Broadcast**  
[www.bwbroadcast.com](http://www.bwbroadcast.com)

## Progressive Concepts Deva – Band Scanner Pro

A new FM spectrum diagnostic tool is available from Progressive Concepts. The Band Scanner Pro is a digital tool which, in conjunction with your PC, can be used to evaluate FM broadcast band congestion and to log station identification parameters. The Band Scanner Pro can measure RF level, MPX deviation, Left and Right Audio levels, RDS and Pilot injection levels. The system is powered by the USB port of any Windows PC. Windows software is supplied free of charge which sweeps the receiver across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency. It then analyzes each carrier and creates a station list.



Stations with an RDS presence are further refined to show all the radio data groups being transmitted. Its interface is like a portable radio: it may be tuned manually through the receiver screen or by double-clicking a point on the spectrum plot or an entry on the station list. Spectrum plots may be saved as jpg or bmp files. The RDS data error level is graphed in a separate window on the receiver screen. The program can be monitored with headphones plugged into a standard 1/8" jack located on the rear panel of the Band Scanner.

For more information on the complete line of Band Scanner Tools, or to purchase a Band Scanner product contact Eric Hoppe at Progressive Concepts.

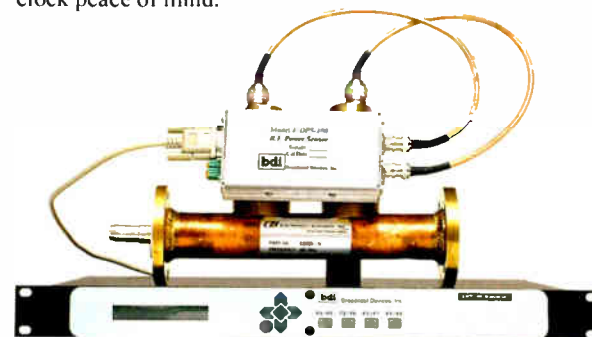
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630-736-9822 • [www.progressive-concepts.com](http://www.progressive-concepts.com)

## Broadcast Devices SWP-200 RF Power Meter/Switch Controller

The SWP-200 Digital RF Power Meter/Switch Controller is suitable for digital and analog forward- and reflected-power measurements. The SWP-200 provides complete control of one, to up to four RF switches. The SWP-200 can be interfaced to most four port switches and optionally can be provided with interface cables for most four port switches made.

The SWP-200 provides one-button control of four port switches, manages interlock closures and transmitter control in a single rack unit chassis. Optional features include RF failure and RF safety sensing to protect a switch from damage if RF is present when a switch command is called for.

There also is an optional LAN Interface that allows the SWP-200 to be connected to the Internet. The SWP-200 can operate in hands-off, pre-programmed mode, or in manually controlled mode. The SWP-200 also can be used in AM radio applications to control multiple open frame contactors. This is a versatile RF support product that provides around-the-clock peace of mind.



## The DPS-100 Dual Power Sensor

The DPS-100 is designed to interface with the above SWP-200 Power Monitor VSWR Protection System. The DPS-100 attaches to any RF directional coupler or DC line section that has been retrofitted with an RF sample element. The RF signals are converted to a pair of proportional precision DC voltages or as an option serial RS-485 data stream. The DPS-100 has two RF ports to measure forward and reflected power.

The DPS-100 is suitable for use in measuring analog AM/FM, digital radio/television RF power.

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# FINAL STAGE



## RADIO ROUNDUP

### The Radio Guide Event Register

Email your dates and info to: [radio@rconnect.com](mailto:radio@rconnect.com)

#### 7th Annual Ohio Broadcast Engineering Conf.

November 10, 2009  
Columbus, Ohio  
[www.oab.org/engineering](http://www.oab.org/engineering)

#### SBE Chapter 39 Tampa Technical Conference

November 12, 2009  
Tampa, Florida  
<http://dev.sbe39.com/home/eventsmeetings/november-09-training.html>

#### Consumer Electronics Show - CES 2010

January 7-10, 2010  
Las Vegas, Nevada  
[www.cesweb.org](http://www.cesweb.org)

#### National Religious Broadcasters - NRB 2010

February 27 - March 2, 2010  
Nashville, Tennessee  
[www.nrbconvention.org](http://www.nrbconvention.org)

#### NATE 15th Annual Conference and Expo

February 15-18, 2010  
Lake Buena Vista, Florida  
[www.natehome.org/AnnualEvents/Index.cfm](http://www.natehome.org/AnnualEvents/Index.cfm)

#### NAB 2010 Spring Convention

April 10-15, 2010  
Las Vegas, Nevada  
[www.nabshow.com](http://www.nabshow.com)

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### Website

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