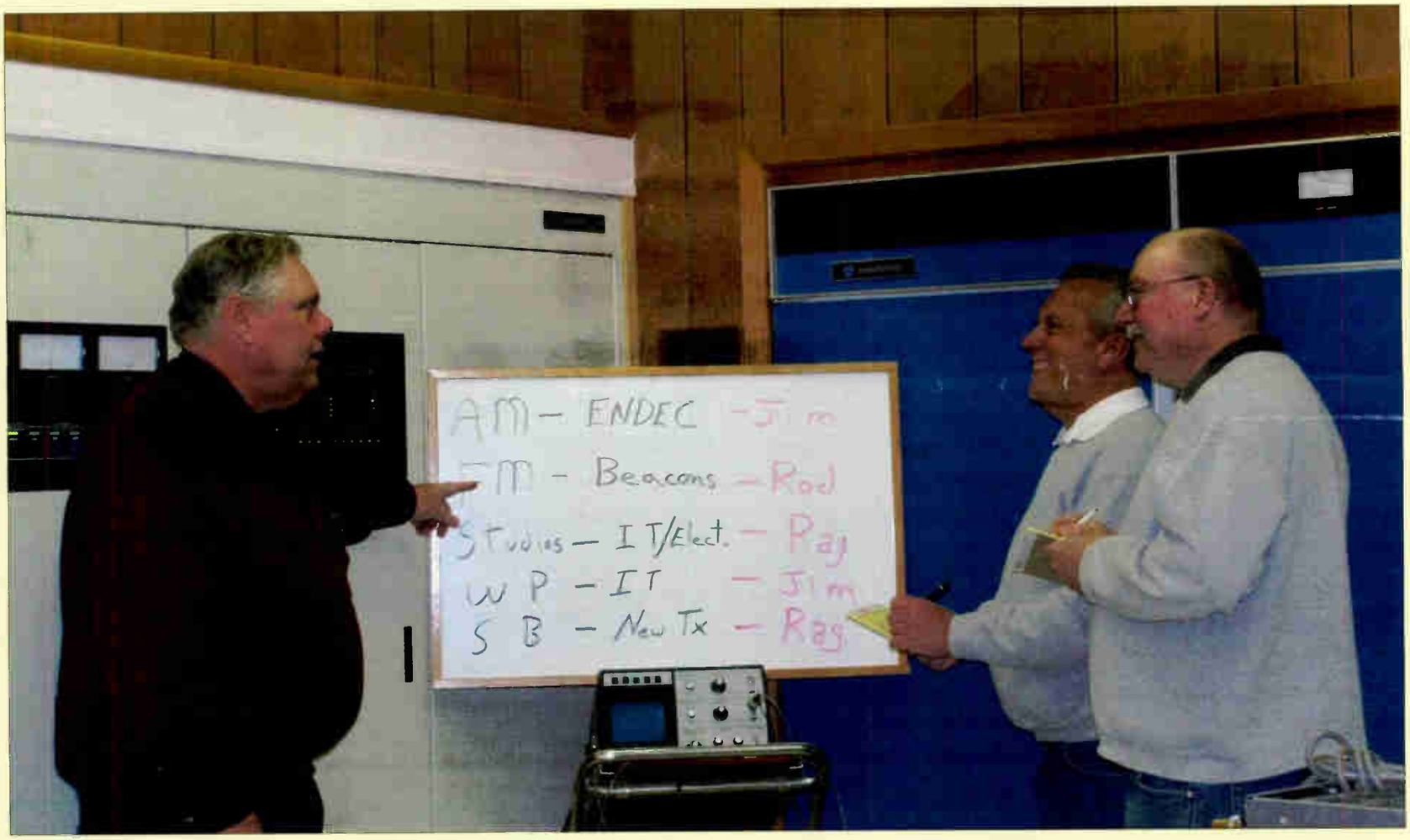
Radio Guide

www.radio-guide.com

Digital Issues Now On-Line

January-February 2008 – Vol. 17, No. 1

The Right Way to Build an Engineering Team



Inside Radio Guide

This issue on-line at: www.radio-guide.com

YOU MAY FIND YOURSELF CREATING PROBLEMS JUST TO USE OUR COOL STUFF...

...but don't make problems. There are plenty of them to go around. And Henry is there to help you get them solved.

SixMix: USB Broadcast Console is a full-featured professional radio station audio mixer. It's designed for live broadcasting as well as recording, editing, remotes, and other production tasks.

AutoSwitch: Multi-purpose stereo audio switcher and silence sensor. Switches to backup audio if your main audio source fails. It can also be used to manually select between two stereo audio sources.

Multiphones II: Multi-user distributed headphones system with Zoned Talkback. Multiple "Guest Pod" listening stations can be daisy-chained with cat5 cable.

Minipods: Compact stereo headphone amplifier for single or multi-listener systems. Use with or without MultiPhones II master unit.

The Matchbox HD: Rack-mountable Matchbox HD is the new high performance version of the industry's most popular analog level and impedance converter.

USB Matchbox: An ultra high performance USB-to-XLR audio codec. Uses Burr-Brown 8X oversampled ADC/DAC with superb audio performance.

Superelay: Multi-circuit controller for any application where multiple circuits, including AC line voltage, need to be switched simultaneously. Ideal for controlling *ON THE AIR* warning lights, muting monitor speakers, etc.

WE BUILD SOLUTIONS.

DIGITAL SOLUTIONS. ANALOG SOLUTIONS. FUNCTIONAL. RELIABLE. AFFORDABLE.

Visit www.henryeng.com for all of Henry's solutions!

HENRY ENGINEERING

Henry Engineering • 503 Key Vista Drive, • Sierra Madre, CA 91024 USA • T: 626.355.3656 • F: 626.355.0077 • email: Info@henryeng.com

Radio Guide

Contents

January-February 2009

Cover Photo:

The Engineering team at Nebraska Rural Radio Association discusses current and ongoing projects, and assigns the work. From left to right, Rod Zeigler (DoE), Ray Bitner, and Jim Liffrig. Photo Courtesy: Kim Zeigler

Radio Guide

Volume 17 – Issue 1

PO Box 20975, Sedona, AZ 86341

Phone: 928-284-3700 Fax: 866-728-5764

Ray Topp *(Publisher)*
radio@rconnect.com

Barry Mishkind *(Editor)*
editor@radio-guide.com

Radio Waves

by Barry Mishkind – Editor

The continuing layoffs reported almost daily in the radio industry have been disheartening. On the other hand, it has been interesting to note that relatively few engineers have lost their jobs.

Many radio stations have long since reduced their technical staffing to the minimum. By a rough calculation, nearly four out of five engineers have retired, moved to IT, or gone to other industries. A sort of "Gold Standard" – one engineer for every five to seven stations – seems to have been achieved.

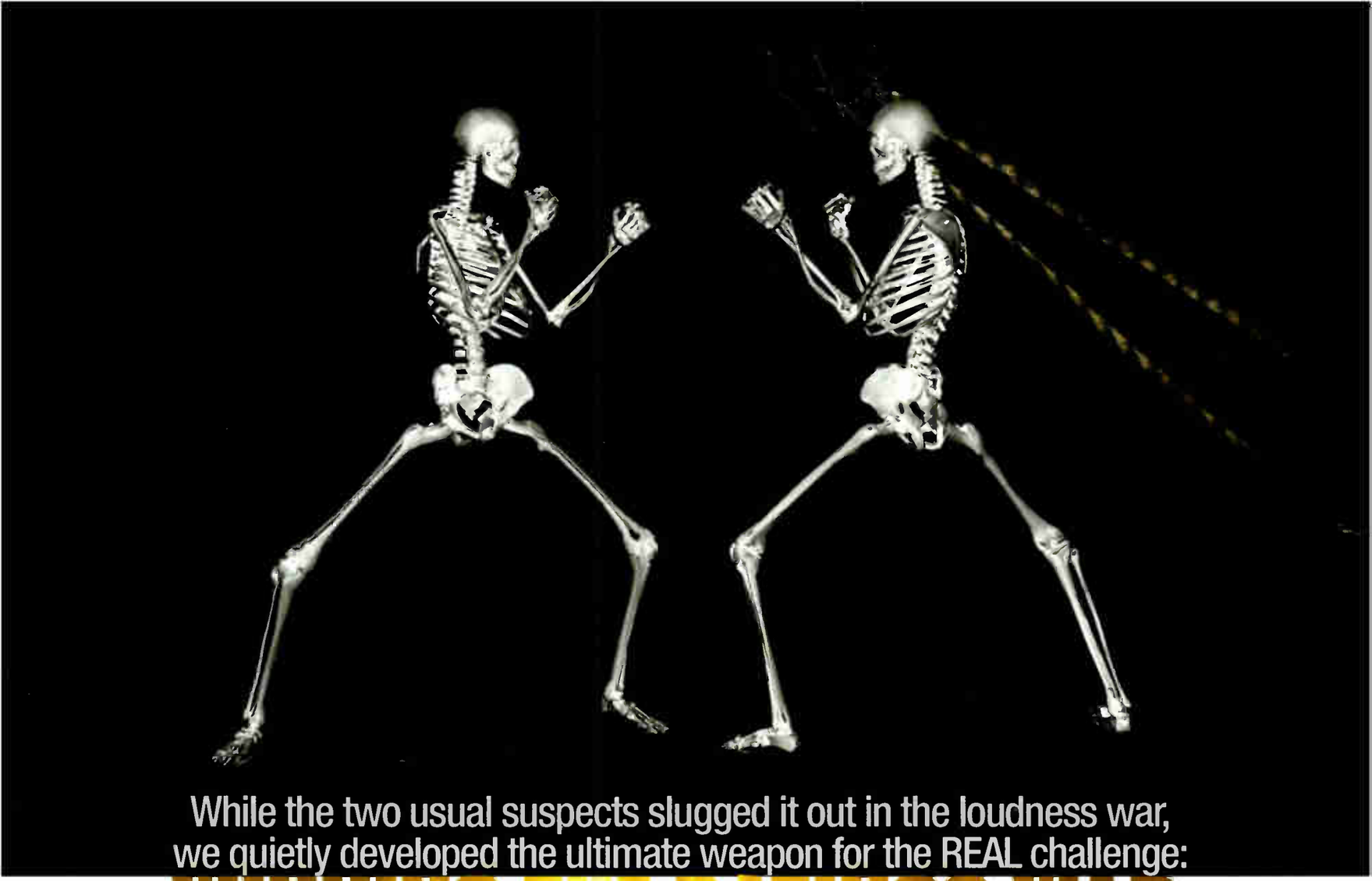
True, it takes fewer engineers to run and maintain stations today. Even some major market stations now use contract engineers. Solid-state electronics has pretty much fully penetrated current equipment – including transmitters. They, and the empty studios feeding them automated programming, require less attention. Capital budgets are stripped to the bone, "fat-free."

Would you call this a crisis? Some might. But then, maybe you know the old line about how the Chinese word for "crisis" incorporates the word for "opportunity."

The opportunity is for engineers to enhance their importance to the stations. Education is important; knowing how to maintain all the new gear, as well as the old. But more than ever, it is critical to build and keep a strong relationship whenever possible with the General Manager and the rest of the staff so you are more than a "mechanic" to call when something breaks.

Start with the very folks with whom you work. Sam Wallington's article on page 6 shows how to build and keep a good team. And, Scott Halford's encouragement to be a "Shortcut" on page 42 is good food for thought as to how we are perceived in the station.

In between, you will find the other articles that you want and need to do your job. And create an opportunity. - *Radio Guide* –



While the two usual suspects slugged it out in the loudness war, we quietly developed the ultimate weapon for the REAL challenge:

WINNING THE RATINGS WAR

Bass, loudness is simply not the draw it was in the last century. Today, with so many options for audio delivery, getting and keeping listeners means you need to SOUND GREAT across all media. That's why we developed VORSIS – to deliver clear, compelling audio that cuts through the muck without fatiguing those all-important ears.

With Vorsis, we rethought the whole process – developing new tools to let your station deliver the best possible sound to each and every one of those 20th century radios, not to mention the great new standard and hi-def radios being produced in THIS century.

With Vorsis, you're never stuck with your processor's signature sound. You have a full toolset to create your own magnificent sonic signature – one your listeners can key into just by scanning the dial. For the first time, you have the capabilities of bringing true clarity to FM, AM, and HD/DAB radio.

Intrigued? Call us or visit us on the web to learn more or set up a demo. You'll be happy you did. Vorsis – more listeners, listening more.

WHEATSTONE VORSIS

Radio has evolved. Your sound should too.™

The Metropolitan Opera sets the standard for great sound.

And it's chosen ACCESS to let the world listen in.

"Opera is one of the most challenging musical genres to do complete justice to in a broadcast, but ACCESS makes it easy."

—Matthew Galek, Broadcast Engineer for The Metropolitan Opera

The Met's Matthew Galek is a Real-World Super Hero

Not content to rest on its laurels, the most renowned and respected opera company in the world is determined to connect with the widest possible audience—in the highest audio fidelity. With engineer Matthew Galek at the transmission helm, the Metropolitan Opera broadcasts its Saturday matinee to an ever growing number of affiliates using ACCESS (and the optional AAC suite) in multistreaming mode. With ACCESS, the Met's broadcasts offer all the sonic richness it's famous for—over the most challenging IP networks. ACCESS delivers mono or stereo over DSL, Cable, Wi-Fi, 3G cellular, satellite, POTS (yep, ACCESS is a full featured POTS codec and works seamlessly with Matrix, Vector and Bluebox)—plus some services you may not have even heard of. Given the challenges of the public Internet, it's no small boast to say that ACCESS will perform in real time over most available IP connections

AAC-SOFTWARE

Contact Comrex today and find out how ACCESS can help you become a Real-World Super Hero—wherever you are!

ACCESS

Put Comrex On The Line.

COMREX

19 Pine Road, Devens, MA 01434 USA Tel: 978-784-1776 • Fax: 978-784-1717 • Toll Free: 800-237-1776 • www.comrex.com • e-mail: info@comrex.com

The Right Way to Build an Engineering Team

by Sam Wallington

While many Chief Engineers run one-man shops, with the consolidation of stations into clusters and heavier IT needs, there is a trend in some places for the technical department to grow in size. Someone needs to be the department manager. Sam Wallington offers some ideas on being a successful manager.

There is a slight problem with being promoted. Sure, the increase in responsibility and recognition are good – and a little extra money never hurts! But at some point along the way, we suddenly find that *we are in charge of someone else.*

At first, we get away with it, maybe because we are working with like-minded folks. However, we can eventually reach a point where we are in over our heads. Maybe we make that discovery the first time we have to discipline an employee. Perhaps it is when we are blamed for a mistake made by one of our folks. Or possibly it comes from being overwhelmed by everyone's expectations that you will solve their problems –but they do not help solve yours. Then comes the recognition that this is not engineering.

Indeed. You have become a manager!

A NEW PERSPECTIVE

As a department head, or manager, your whole approach to the job has to change if you want to be successful. No more one-man-band. And, since getting rid of a bad employee is much harder than throwing away a bad resistor, it is important to find ways to effectively build and manage a team.

Before we start the process though, let us take a closer look at the term "manage." One of Merriam-Webster's definitions of "manage" is "to exercise executive, administrative, and supervisory direction of." Sounds about right, does it not?

The problem is that I do not believe that people should – or even can – be managed. The word "management" often leaves a bad taste in a staff member's mouth because it is all about coercion and control. "I (the manager) will tell you (the lowly worker) when, what, and how to do your job. Any deviation from my plan will be dealt with severely!" Sound like a place you want to work (or continue to work)? I did not think so.

So why would you want to do that to your team?

THE NEED TO LEAD

Instead, *they must be led.* Back to Merriam-Webster: "Lead ... to guide on a way, especially by going in advance." That is a much better way to build a team. As Brian Ward titled his book, you should *"Lead People ... Manage Things."*

By definition, a leader must have followers. If no one is following, you are not a leader. How do you become a leader of others? Not from the advice in management articles that focus on how to get ahead by "managing" people to impress your boss (or your boss' boss), get a bigger paycheck, and take that next step up the corporate ladder.

I believe impressing your boss instead of your team is upside down. Such managing will not ensure your staff will be loyal to you. They may hang out because of the paycheck, but they will do the minimum necessary to get by since, after all, why should *they* work to get *you* a promotion? Instead, that advice needs to be flipped on its head because it is based on some wrong assumptions.

Instead, impress your team with your loyalty, concern over their wellbeing, and willingness to do the hard stuff. If you do this, your boss will likely end up being far more impressed by the team's output and your leadership abilities than would have been possible with you just tooting your own horn.

LEARNING TO LEAD

Starting with the idea that we are here for our team – and we need to impress *them* – here are a few ways to do just that.

First, and most important: **always put yourself in your team member's place.** How would you feel if your boss was the way you are? How about if he or she said the thing you just said, assigned you the task you just assigned? Change roles in your mind and watch what messages you are not-so-secretly sending to your team.

Be sincere in your praise – and praise publicly. If the accomplishment is especially noteworthy, make sure the praise is given in front of higher-ups. If you have criticism, make sure it is constructive – and *always do it privately.* I have learned the hard way that one of the fastest ways to alienate your entire team is to rip apart a staff member in front of them. Along those lines, watch your jokes. You may think they are funny, but the team will see through the humor to the truth. Make sure the truth is not that you do not care how they feel.

Tell the truth, even if it is hard. Trust is everything. If your team does not trust you and what you say, why would they follow you? Truth underlies your reliability, which undergirds your ability to lead. If you make a mistake, always be the first to admit it to everyone who needs to know – even the expensive mistakes. Though it is embarrassing, in the end everyone will know that you have integrity – something you cannot buy at any price.

Be open and clear about what you know and what you do not know. When you do not know something, just say "I don't know." There is nothing wrong with not knowing everything.

Telling the truth about someone else is more delicate. Respect their privacy, sharing outside of that privacy only what absolutely must be shared. When possible, share the blame (e.g., "*We* damaged the replacement part."). In private, it is OK to state the facts ("You've broken the part"), but look for the good in it: ("How can we do this differently next time?") or the educational opportunity ("I did that the first time I tried it too. Here's a trick I learned."). In short, extend to everyone the grace that you hope they will extend to you.

LEARN TO DELEGATE WELL

Delegating correctly really has to do with empowering your team – and letting go of things yourself. This gives your team the gift of both the responsibility and the rewards for what they do. Conveniently, that also frees you up to tackle new challenges.

However, there are at least two major mistakes commonly made in delegating.

The first is to *delegate the lousy stuff* most of the time. If you are happy to hand off copying 14,000 transmitter readings into a spreadsheet, but you always get to do the fun and challenging work, your team will be frustrated. If, on the other hand, you take some of the lousy stuff and share some of the fun/challenging stuff, it really starts feeling like a team. You are supposed to be a leader, not a dictator.

The second major delegation failure is to *delegate without enough information.* Telling someone to "take care of this" leaves all sorts of room for confusion, doubt, and mistakes. It may take longer to be thorough in your instructions than to do it yourself. But you will end up with a team member who has learned a new skill that they can hone – and you have freed yourself from being the only one that knows how.

This leads directly to **never holding back knowledge to protect your job security.** I have known a number of broadcast engineers who will not tell anyone their trade secrets for fear that they will lose their job security. I have found that being open and sharing my skills and knowledge opens far more doors than holding my cards close to my chest.

PERSONNEL MATTERS

Hire well. I believe the secret to (almost) never having had to fire someone is learning to hire well. You start by not hiring unless you really and truly need the position filled. Failing to plan well is not smart, especially in these economic times.

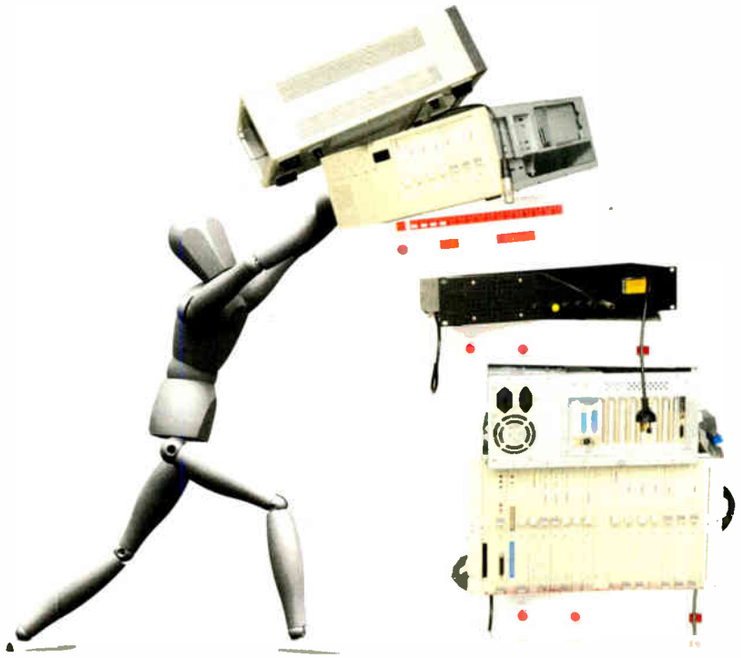
My personal guiding motto is "hire for attitude, train for skills." Obviously, that is oversimplified, as the average person off the street cannot fix a high-power transmitter even if they have the world's greatest attitude. But if they have basic skills and can handle problems – and the team – well, hire them and teach them about your transmitter. That is easier than teaching someone to have a good attitude before they destroy your team from the inside out.

The point is to look beyond ability. See how they will fit in with the team. Ask them for stories of how they have handled adversity, and look for a positive approach to problems and a sense of humor. Ask them about times that they had made mistakes or even failed at something, so you can learn how they handle the inevitable adversity. Your interview with them should include some time with the team (over lunch?).

Get yourself a make-over. Speaking of attitude, what is yours like? Leadership depends on one attitude more than any other: *yours.* Are you unpredictable – happy one moment and flying off the handle the next? If so, you may need to get an attitude makeover so that you become more consistent at empathizing with your team's challenges while still motivating them to greatness.

(Continued on Page 8)

How do you fit an entire remote truck in a single box?



Just choose Tieline...

The Tieline i-Mix G3 IP Codec includes:

- A wireless-capable 6-input digital mixer with a cross point digital matrix router
- Bi-directional audio & simultaneous communications circuits with 4 headphone controls/outputs
- BGAN Satellite capable at 32kbps and higher over IP as well as ISDN and POTS
- IP and POTS Codecs with wireless 3G/3.5GIP, ISDN, X.21, GSM and Satellite Codec capability
- On-board relay and RS-232 with full studio remote control

Tieline®

www.tieline.com

The Right Way to Build an Engineering Team

– Continued From Page 6 –

WHEN THINGS GO WRONG

Leaders handle the tough decisions. Unfortunately, leadership is not all roses and soft music. You will have times when you will need to make unpopular decisions, providing guidance or discipline to a wayward team member, sometimes leading to termination.

Do not hesitate. Prepare properly, then get right in and fix the problem, just like you would fix a sick transmitter. Prepare by learning the truth from as many viewpoints as practical depending on the nature of the situation. Document everything; your HR folks – or lawyer – will thank you later, especially if things do go badly.

Get advice from those more experienced in personnel problems (your boss?). Once you have the facts, pick a place and time and meet face-to-face with the person in question. Share what you understand to have happened and ask them for their version of the events. Make your concerns clear, as well as what needs to happen to correct the situation. Take the time to listen.

DO IT YOURSELF

Discipline must not be delegated to someone else, even HR. This is another thing that has to do with integrity. Put bluntly, it is your responsibility. It is cowardly to delegate your obligations – and can violate a person's right to privacy. Absolutely use the resources of your HR department if you have one, but the responsibility remains yours.

Do not deal with discipline at arm's length. One of the worst things you can do is fire someone by email. Though better, doing it on the telephone is not very good either. As much as it is distasteful, it is very important to the rest of the team to deal with it head on, face-to-face.

Here is why: the entire team needs to see your commitment to the team and to each individual team member. Handling things straight-on will gain you a great deal of respect. Waiting too long or handling it badly will create the opposite effect.

CELEBRATE SUCCESS

When the team – or any part of the team – succeeds, celebrate!

Your budget may not allow an elaborate party but what is most important is the recognition. Use everything from a "great job!" pat on the back to a computer-generated "Certificate of Coolness" to a small gift – anything that will tell each team member that they are appreciated for what they contribute. Do not wait for something major either; celebrate the small things along the way.

Be creative! Staple that burnt-out component to a piece of wood, label it "Detective Award," and give it to the person who stuck with it until they found the problem. Or grab a box of ice cream bars (or whatever) at the store over lunch. Bring it back and just share with the team for no reason. It only costs a couple bucks, yet will help make the entire team more cohesive. Doing it once a quarter sure will not hurt morale.

LEADING UP

It may be you are leading with integrity and your team is coming together into a cohesive unit but your boss is still a jerk, and you would love for him just once to recognize your contribution to the organization – or at least stop yelling at you for stuff that is not even your fault.

Though I have no magic bullet to fix these problems, your leadership just may be the key. Maybe your team's turnover rate goes from 20% to 2%, thus decreasing the cost of training. Or maybe one of your stations is off the air half as much as last year.

As your team becomes more effective, people will eventually begin to notice, and sometimes that is all it takes. If that does not work, do not sweat it. Just do your best to make your team the envy of every other station and word will get around. Who knows where that might lead?

It all boils down to this question: why are you leading? I hope you are leading in order to make your team the best there is. I hope you are leading to help others be successful. I hope you are leading not just to make your station the best it can be, but also in order to improve your team's lives. If so, I wish you great success and many promotions!

Sam Wallington is the Vice President of Engineering for the Educational Media Foundation in Sacramento, CA. You can reach him at swallington@emfbroadcasting.com

KINTRONIC LABS

YOUR TOTAL SOLUTION SOURCE FOR AM/HD READY ANTENNA SYSTEMS

UNIPOLE KITS & DETUNE SKIRT KITS

PRE-FAB BUILDINGS

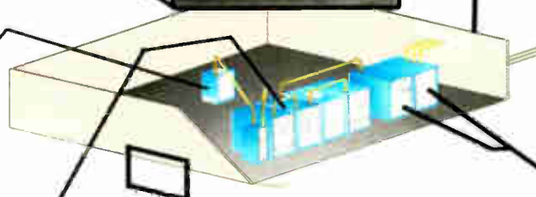
COMPLETE SYSTEMS

FM/STL ISO-COUPLERS

DIPLEXERS/ TRIPLEXERS

ATU's

INDOOR DUMMY LOAD



COMBINERS

DUMMY LOADS OUTDOOR/INDOOR

PHASORS

PRE-FAB TRANSMITTER BUILDINGS

- RF FEEDER SYSTEMS DESIGNS
- SITE PLAN DEVELOPMENT
- GROUND SYSTEM DESIGNS
- INSTALLATION SUPPORT

COME SEE US AT OUR NRB BOOTH: #1025

PowerAIM 120
AM, HF, FM
ANTENNA ANALYZER

EVERY FIELD ENGINEER'S DREAM!
CONTACT US FOR DETAILS

IN STOCK AND READY TO SHIP
CALL FOR DETAILS

COMET

JENNINGS

1.423.878.3141 or **www.kintronic.com**

Dummy Load Danger! Protect Your IBOC System

by Jeff Johnson

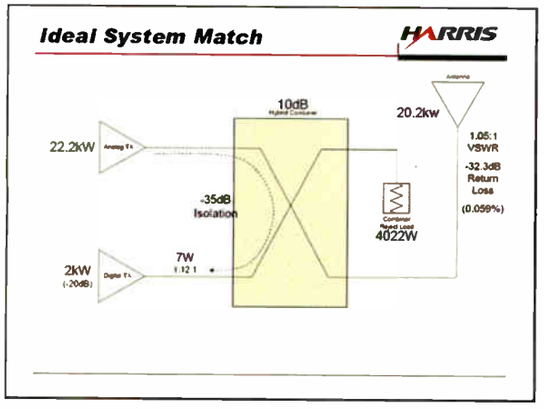
With the advent of digital broadcasts, engineers have had to become familiar with new procedures and issues related to the operation of simultaneous analog and digital transmissions. Jeff Johnson explains what you need to know and what you need to watch.

The warning label on a new Altronic dummy load.

What could this warning on a new reject load mean? Let us follow a disaster scenario and find out.

A QUIET NIGHT ENDS

You have installed your new high-level combined IBOC system with the standard 10 dB combiner. The system was set up and properly matched. All was operating well.



The ideal system match.

But wait! During an overnight ice storm your antenna gets coated and you receive that dreaded 3:00 AM call. You hope Hillary will answer, but no. Instead you hear that all-too-familiar robot voice of your remote control. Your digital transmitter has shut down – but why?

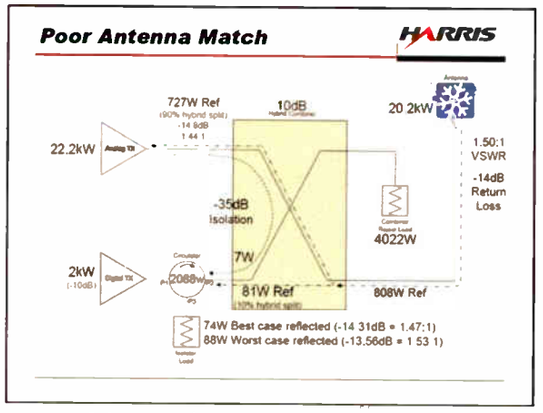
Essentially, the ice on the antenna has caused a mismatch and a resultant rise in VSWR; your antenna is reflecting power back down the transmission line. Most importantly, your 10 dB hybrid performs in reverse and sends 10% of the reflected power back into your digital transmitter.

ANALYZING THE PROBLEM

Let us say the ice is causing 1.50:1 VSWR. If the forward power is 20.2 kW, the reflected power will be 808 Watts. Your digital transmitter will "see" 10% of that power: 81 Watts. Add the 7 Watts seen from the analog transmitter due to imperfect isolation of the combiner and the digital transmitter will see 88 Watts reflected.

With a forward power of 2000 Watts and 88 reflected, the digital transmitter is suffering a VSWR of 1.53:1. Therefore, it shut down and woke you up. So far, so good.

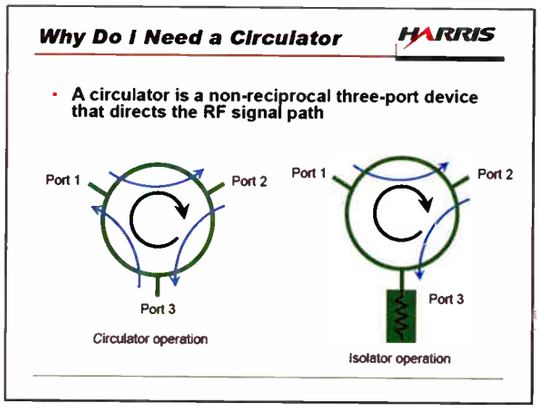
No damage has been done. The ice melts by morning, and all is well again. Time now to ponder how to avoid the problem the next time. If an iced antenna takes down the digital signal, but is not severe enough to take down the analog, that speaks poorly of your station's digital presence in the listener's mind.



Icing causing a poor antenna match.

PROTECTING THE DIGITAL TRANSMITTER

Your transmitter and antenna system engineers suggest a device known as a circulator or isolator be placed at the output the digital transmitter. According to Harris Broadcast's Keith Mullin the terms are used interchangeably, although he points out that an isolator is a circulator with a load placed on the third port.



Circulator and isolator theory.

As can be seen, a circulator is something of a merry-go-round for RF. The transmitter output is connected to Port #1. The RF energy "circulates" around to Port #2 where it exits and is sent to the antenna or combiner.

Any reflected energy returns via Port #2 and continues its ride on the merry-go-round arriving at Port #3. This port is connected to a matched load. Ideally, the energy exits the circulator into the load and is converted harmlessly to heat. The transmitter always sees a perfect load and never calls you.

NO ICE, PROBLEM RETURNS

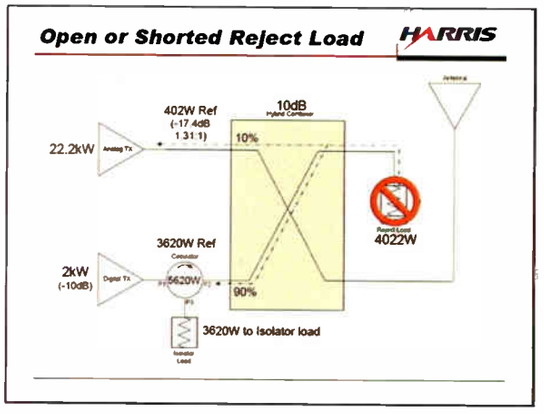
Ring! Ring! This time it is high noon in the middle of a summer Sunday. There is no ice anywhere except in your sweet tea. Nevertheless, the digital transmitter is down again.

You drive to the site and enter the building to be greeted by the only thing worse than a 3:00 AM call – the acrid smell of baked dust and fried phenolic. The air conditioning is running. You notice that the fan of the air-cooled load on the combiner's reject port has failed. This dummy load's resistors are cooked.

The analog transmitter is running, but with a high VSWR. On the other hand, the digital transmitter smells like the dummy load – its breaker has popped and its PA modules are smoking. The isolator is hot and its load also appears cooked. Now the big question: What has happened?

WHEN DUMMY LOADS GO BAD

Due to the defective reject load, whether open or shorted, all of the RF power normally consumed by the load was being reflected back into the system via the reject load port. From this port, 90% of that reflected power was being directed to the circulator, its load, and the digital transmitter.



A shorted or open reject load = Disaster!

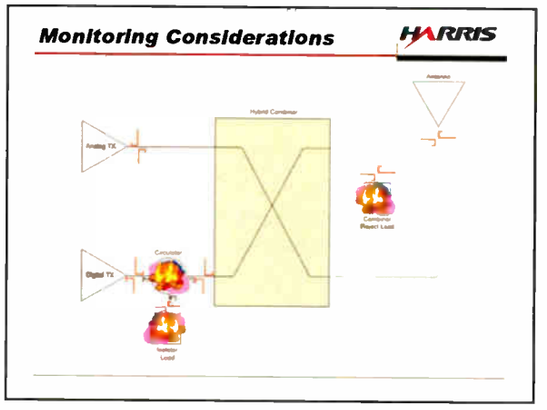
In this mode, the high power that the reject dummy load was designed to dissipate was overwhelming that component. The circulator was now getting a total of 5620 Watts, nearly three times the power it normally handles, and passing 3620 Watts to the isolator load – far beyond its rated capacity.

Then when the isolator load died, the transmitter began seeing the ruinous reflected power of those 3620 Watts. These components were severely overstressed and fatally damaged – all due to a bad fan elsewhere!

BUILDING PROTECTION

How could this disaster have been avoided? First and foremost, the over-temperature sensor of the reject load should have been in series with the analog and digital transmitters' interlock circuits.

Keith Mullin recommends additional safety power monitors be placed in three locations in the system: reflected power from the reject load, at the circulator/isolator, and at the isolator load.



Recommended safety monitoring.

Any over-wattage situation at any of these points should be configured to shut the system down immediately. A better situation would be to patch the main transmitter directly to the antenna or bring up an auxiliary transmitter. Either way, do not use the combiner and/or circulator/isolators until they have been inspected and repaired.

The illustrations and information in this article are from a presentation at the NAB 2006 Broadcast Engineering Conference by Keith A. Mullin, Senior Technical Communicator, Harris Corporation Quincy, IL, and used by permission.

Jeff Johnson is the Senior Engineer at WNKU, Northern Kentucky University. You can email him at jeff@rfproof.com

more PEACE OF MIND

more support. **more** reliability. **more** warranty.

It's Nautel's 40th anniversary and we're celebrating by offering you more protection on the world's most reliable transmitters. Buy a new NV or NX transmitter in 2009 and receive a **five-year warranty**.

Expect more. More warranty, more support through our new Quincy office and Memphis quick-ship parts depot. Plus more peace of mind.

See what more looks like at
nautel.com/expectmore/

Making Digital Radio **Work.**

nautel

"Tuning" Fixed Capacitors

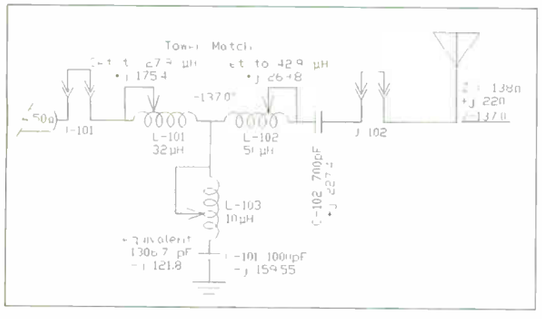
by Phil Alexander

In the last issue we mentioned that there was a way to make fixed capacitors appear variable. Because the networks of most stations depend on this simple principle, that will be our focus this time.

However, first, a bit of a disclaimer: The following applies generally to circuits handling 5000 Watts or less – which does include the majority of stations. It is true that these circuits are often handled differently and more expensively in higher powered installations. However, those specialized high power variations are beyond the scope of these articles because helping those with very little, or no, AM transmission experience understand transmission basics is our goal.

ADDING "j" VALUES

To recap: the matching network under discussion is an ATU (Antenna Tuning Unit) network to connect and match a 50 Ohm transmission line from a transmitter with a carrier frequency of 1000 kHz to a tower with a base impedance of 130 Ohms of resistance and 220 Ohms of inductive reactance. In making the match, our calculations showed a requirement for a shunt capacity (X3) value of -j121.8 Ohms. The circuit looks like this:



A "T" Network with 50 j0 Ohm Input, 138 +j220 Ohm Output, and 137° Phase Delay.

The question is, how do we get a capacitor sized for -j121.8 Ohms at our operating frequency? According to the values shown on the ATU schematic above, all we need is a 1306.7 pF capacitor to use as C-101, but no manufacturer makes that value.

However, a simple way to change the effective value of a fixed capacitor is connecting a coil in series with it. In its basic form this means mathematically, as we discussed in the last issue, adding "j" values together.

A 1000 pF capacitor has a value of -j159.55 Ohms at our carrier frequency. Connecting a +j37.75 Ohm inductor in series with that standard capacitor value will give us a net value of -j159.55 +j37.75 or -j121.8 Ohms, exactly the X3 value required to make this network match the 50 Ohm transmission line to the 138 +j220 Ohm tower with a phase delay of 137 degrees between network input and output.

SELECTING THE RIGHT PARTS

Could we use a 500 or 800 pF capacitor and more coil? Yes, that would appear to work at the carrier frequency.

But the solution that works for that frequency may not work as well for the sideband frequencies as there is a greater risk of poor transfer of sideband frequency energy especially at higher modulating frequencies that produce sidebands further away from the carrier frequency. There is always greater risk of poor performance when using larger reactances than needed and offsetting them with excessive reactances of the opposite sign.

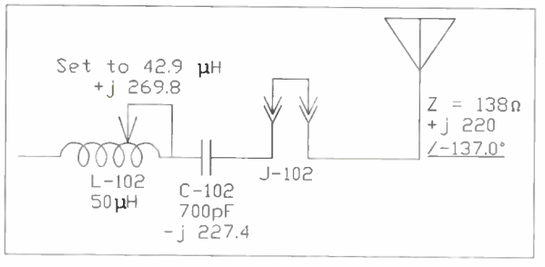
Thus, for the best results, the inductor should be minimized by selecting a capacitor having a -j value above and as near the value needed by the circuit design. However, there is an even more important reason for sticking to this rule in directional systems.

In DA arrays we would like to have all frequencies passing through a network delayed or advanced by the same amount. Obviously this is not practical, but keeping as close as possible to this ideal will give better pattern bandwidth and less modulation distortion in those areas in deep nulls where pattern bandwidth issues are the worst.

These pitfalls were not always recognized in some of the older "universal" one-size-fits-all ATU's still in service today although they were built 40 to 60 years ago. For this reason, it is always a good idea to run the design calculations before doing repair work on an older ATU, especially in a DA.

USING THE EXISTING PARTS

At first, it looks like a similar situation exists in the output branch of this network. Certainly, the schematic makes it look that way, but recall that we said in the last issue that there is a better way. If you consider the problems we have described about the pitfalls of using too much -j and cancelling a large part of it with more than the minimum +j (inductance), it is clear we need a better way.



An enlarged view of the Output Branch.

Looking at the output (X2) branch of the schematic above, we have:

- Part of L-102, the X2 (+j) required by the Tee design formula = +j269.8 Ohms
- Part of L-102, the adjustment to make a circuit with C-102 to offset tower reactance = +j7.4 Ohms
- C-102 the capacitive part of the tower reactance offset = -j227.4 Ohms
- The tower reactance = +j220 Ohms

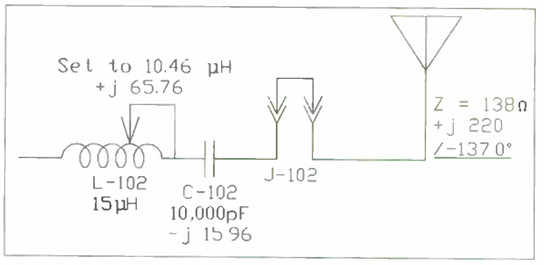
If these are summed the result is +j269.8 +j7.4 +j220 -j227.4 for a net inductance of +j269.8 Ohms. Simple inspection shows we have far more inductance than necessary.

A DIFFERENT SOLUTION

What will happen if we eliminate the excess?

First, the "Q" of the output branch will be reduced. Second, impedance bandwidth of the network will improve. Third, the group delay of the network will become somewhat more uniform thus having less impact on pattern bandwidth. Most importantly, the size and cost of the output branch coil are very significantly reduced. What, a better result from cheaper components? Strange as it sounds, that is exactly the case.

Some of us may remember something called the Communicative Law of Addition which taught us the order in which we summed a group of numbers did not affect the result. This law also applies to the j values in a branch of a network. Thus, we can, and should include the tower's reactance in our calculation of the output, or X2, branch of the network.



The Output Branch recalculated for inclusion of the tower's inductance.

Including the tower reactance in the output (X2) branch of the ATU network rather than simply inserting an opposite reactance to cancel it, makes interesting things happen. Our formula calculations show the correct X2 value is +j269.8 Ohms, but the tower supplies +j220 Ohms of that amount. Thus, only +j49.8 additional will make the network functional.

OTHER CONSIDERATIONS

However, other additions may be desirable and useful.

For example, some consider a capacitor between the physical transmission system and the tower is essential as a "DC blocker." The idea is this capacitor presents an impedance to static charges, increasing the possibility they will discharge across the ball gap at the base of the tower rather than in components of the transmission system. The interest level in this practice seems to parallel the lightning activity in the region of station and the experiences of the engineer responsible for it.

Some consider the blocker optional, but one engineer who spends his days designing ATU's for a major equipment manufacturer told me, "I put one in everything I do, unless there is some reason it would be a bad idea." In this ATU, a 10,000 pF capacitor will have a reactance of -j15.96 Ohms, and represents an effective cost/performance compromise. Do not forget that the voltage rating of this capacitor must include an ample safety factor above the maximum expected arc voltage at the tower's ball gap.

Including a 10,000 pF blocker increases the additional +j needed to just under +j66 Ohms. Even with the blocker's addition, including the tower reactance in this case reduces the size of the coil needed for the X2 branch by about 75 percent. Practically speaking, for this ATU, it means L-102 drops in size from a 50 uH coil to a 15 uH coil which will fit much more easily in the enclosure.

Next time we will address adjusting or "tuning" of this network in a way that assures it matches the input and output impedances while delaying the phase of the signal by 137 degrees. We will also take a look at sizing components of the shunt (X3) branch for harmonic suppression.

*A regular contributor to **Radio Guide**, Phil Alexander has long experience in building, maintaining and repairing RF networks. He is also one of the instructors at the **Radio Guide AM Transmission Seminar**. Contact Phil at dynotherm@earthlink.net*

Accessorize

JK Audio's Beltpack Series Is Just What Your Belt Has Been Waiting For.

Making ultra-compact professional audio tools has always been JK Audio's specialty. Our Beltpack Series takes compact/pro to new levels. Incorporating Bluetooth® Wireless Technology, our **BluePack** and **RemoteAmp Blue** provide wireless connectivity, via your cell phone, to just about any place you need to be.

BluePack allows field reporters and remote talent to conduct live man-on-the-street interviews through a cell phone equipped with Bluetooth. Mix the mic input (balanced XLR) and the 3.5 mm aux send for a 3.4 kHz station feed back through your phone (via Bluetooth) and/or grab a full-bandwidth mix from the stereo output to the recorder of your choice. Its professional microphone preamp and powerful headphone amp deliver the highest quality audio.

RemoteAmp Blue allows IFB monitoring through a cell phone equipped with Bluetooth Wireless Technology. This is a listen-only device designed for voice IFB or full-bandwidth stereo music listening. The line input jacks and separate volume controls allow wired operation in parallel with the Bluetooth connection.

RemoteAmp Two provides a wired, listen-only connection for mono IFB or full bandwidth stereo music listening. Separate volume controls for the XLR and 3.5 mm line input jacks allow a simple mix of mono and stereo sources.

Each has a powerful ½ watt stereo headphone amplifier that will cut through any crowd noise. **BluePack** and **RemoteAmp Blue** also pair to Bluetooth-equipped sound cards and music players in full-bandwidth stereo A2DP mode.

This season, make sure you're properly accessorized with JK Audio's Beltpack Series.

JK Audio

TOOLS FOR SUCCESSFUL BROADCASTS

www.jkaudio.com

JK Audio, Inc. Sandwich, IL 60548 USA • Tel: +1-815-786-2929 • Fax: +1-815-786-8502 • www.jkaudio.com • info@jkaudio.com

Taking Advantage of the Recent FCC AM Rules Changes

by Clarence Beverage

In the last issue of ***Radio Guide*** we wrote about the practical side of obtaining operational data on a directional AM antenna system to satisfy the new Rules established by the FCC in Report and Order in MM Docket No. 93-177 *(An Inquiry Into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification)*. At present, the estimated date of final approval and ability to file applications employing the new Rules is mid-February 2009.

In this issue we look at the second half of the picture, moment method modeling, referred to here as "Method of Moments" (MOM). What is this really all about, how does one comply with the new FCC Rules, and what reference resources and software tools are out there to assist you in accomplishing the task?

EARLY MODELING

G.A. Thiele and J.H. Richmond were early pioneers in Computational Electromagnetics (CEM) through the application of MOM solutions to finite thin-wire antenna models. Their work, published in the IEEE Transactions in the mid-1960s, became the basis for computer models which allowed the analysis of antennas having finite length and radius.

The later development of software code to determine the characteristics of antenna systems via MOM is attributed to Jerry Burke and A. Poggio who wrote the Numerical Electromagnetics Code (NEC) in 1981 at Lawrence Livermore Labs.

John Rockaway and James Logan are credited with developing MININEC, based in part on work done by Logan in his Master's Thesis at Syracuse University, with the first public release of the code in 1982.

PUTTING THE CODE TO WORK

It did not take professional antenna design engineers (many of whom were amateur radio antenna enthusiasts) long to begin using NEC and MININEC tools to design and evaluate antenna systems more effectively. Some broadcast milestones published in *IEEE Transaction on Broadcasting* include:

• June 1989 – Todd Chiodini from Harris Corp. published a paper on relating MOM derived base driving point impedances to measured values and the importance of the calculated values agreeing with measured values.

• June 1989 – Jerry Westberg published a paper describing a method to extract from a MOM run current magnitude and phase values on each tower in a directional array, and then utilize a matrix to determine base voltage and phase that produced the correct horizontal plane radiation pattern.

• June 1993 – Professor Al Christman described the use of elevated radials in place of a standard buried ground system based on NEC modeling.

Additionally, many interesting AM antenna system innovations have been developed through the use of NEC-4 with its unique ability to incorporate the effects of real ground on antenna system performance. These include:

• Grant Bingeman's extensive work with hot guy wire radiators and various top loading implementations.

• Kintronics Labs' innovative work on a short vertical radiator, in cooperation with engineers at Penn State.

• My joint design efforts with Al Christman on towers a half wave or greater in height, excited with umbrella feed or dual skirts, avoiding the need for a traditional ground system.

• L.B. Cebik and, separately, Ben Dawson's analysis of MW antenna ground systems and its comparison to the classic 1937 Brown-Lewis-Epstein work to name but a few examples.

Furthermore, in parallel with NEC innovations, John Rockway and James Logan were making significant strides in evolving the MININEC product:

• By 1988, MININEC evolved into a powerful DOS-based software product capable of computing antenna to antenna coupling and the design of an antenna matching network.

• By 1991, Ray Lewallen and others were working on innovative user interfaces and graphic displays for MININEC.

• By 1995, MININEC Professional for Windows was released, utilizing a Fortran engine.

• Expert MININEC Broadcast Professional was released in 1996 and has been updated regularly in response to user needs.

It is believed that, after decades of innovation and evolution, MOM software is fully developed and a known commodity upon which engineers can rely in analyzing and designing broadcast antenna systems.

COMPARING APPROACHES: MOM SOFTWARE AND 73.150

The approaches taken by Classic NEC and MININEC differ from FCC Rule Section 73.150.

Section 73.150 provides formulas for calculating the unattenuated inverse field strength from a directional antenna system at a distance of one kilometer. The basic formula shown in the Rule (Equation 1) is employed to calculate the theoretical radiation pattern, while Equation 2 is used to calculate the standard radiation pattern.

In both cases the horizontal plane radiation pattern is described in terms of polar coordinates, i.e. azimuth bearing with respect to True North equal to 0 degrees. Spacing and bearing between towers is input in electric degrees at an orientation with respect to True North.

Standard NEC and MININEC employ Cartesian coordinates, otherwise known as the rectangular coordinate system. Hence, the first step in constructing a NEC or MININEC model is to convert the array from polar to rectangular format.

AN MOM EXAMPLE

The example below is for a three tower design on 1330 kHz. Tower 1 is reference and is located at a spacing of 0 degrees and an orientation of 0 degrees. Tower 2 is 123.2 degrees from the reference tower at a bearing of 146 degrees True. Tower 3 is 246.4 degrees from Tower 1 at a bearing of 146 electrical degrees. Each tower has an electrical height of 122 degrees.

The model is being constructed with meters as the dimensional units. Polar to rectangular conversion is a function available on many scientific calculators or may be programmed in Excel using standard formulas for quick and easy access.

In a model the towers are called wires. The wire (towers) are listed below with their appropriate x,y,z coordinates.

POINT OF MEASURE

The second major difference between the FCC formula and the classic NEC or MININEC input model is that the field ratios must be converted to magnitude and phase at the base of the tower and not at the current loop. For towers approximately 80 degrees in electrical height or less, the base and current loop values will be essentially the same but for arrays with taller towers that will not be the case.

For the MOM model to give the same pattern shape as the FCC pattern, a way of converting loop current and phase to base excitation values must be developed. Loop to base conversion will be covered in greater detail as we talk about specific software features.

FCC FILING REQUIREMENTS

The Report and Order in MM Docket No. 93-177, released on September 26, 2008, Appendix D, Rule Section 73.151, provides the criteria to be used for computer modeling, that is summarized as follows:

• (C) Only series-fed towers are eligible for computer modeling. Note: There is no prohibition concerning top loading or ground system type.

• (C)(1) In Part 1 of this article we described a process of measuring the impedance of each tower with other towers open and shorted. Although that has been a somewhat traditional approach, other engineers have employed other impedance matrix measurement procedures.

Measuring one tower at a time with all other towers shorted, or all other towers open, is acceptable and preferred by some. This Rule section requires that the field measured impedance matrix data agree with the computer model. The physical antenna model may be varied, within limits, so that computed impedance matrix impedances agree with the measured impedance matrix.

• The computer model must comply with the following criteria:

1. The exact spacing and orientation for each tower in the array must be used.

2. Each tower may be represented by a single vertical wire. The radii of cylinders must be no less than 80%, and no more than 150% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides. A 24" triangular face tower would have a radius of 11.46" so the range of allowable radii would be between 9.17" and 17.19".

3. For towers represented by individual legs and cross members these wires may be modeled at their actual diameters with cross members inserted at regular intervals.

4. The maximum vertical segment length must be 10 electrical degrees. The commonly accepted formula for determining one electrical degree in length is 2.732 divided by frequency in MHz. Thus 10 degrees at 540 kHz would be 50.593 feet, but only 16.07 feet at 1700 kHz.

5. The point where power is applied to the tower, and current and impedance calculated, must be at ground level or within one electrical degree of the actual feed point elevation. This stipulation is believed to have been put in place due to concern regarding NEC. The basic NEC code calculates current at the center of a segment where MININEC calculates current at the bottom of a segment.

6. Uniform cross section towers must be modeled at no more than 125% of the actual height and no less than 75% of the actual height. In practice, towers exhibit a velocity of propagation less than the speed of light. This, in effect, is related to many factors including the tower steel being an imperfect conductor, the effects of guy wires and insulators, etc.

Generally the impedance of the tower model will merge with the actual measured data when a velocity factor near 90% (1.111 times actual height) is employed. In the author's experience, modeling a uniform cross section radiator with a height to match the measured value less than the true height suggests that further investigation should be undertaken before completing the proof process.

(Continued on Page 16)

RF Specialties® Group

Serving Broadcasters For 27 YEARS

RF Specialties has everything from the microphone to the antenna.

- Transmitters
- Antennas
- Audio Processing
- Consoles & Racks
- STL / RPU Systems
- Microphones
- Audio Cable
- Combiners and Phasors
- Transmission Line
- Towers and Lighting
- T-1 and IP Audio CODECS
- HD Monitoring
- RF Analyzers
- Remote Control Systems
- Telephone Hybrids
- And MUCH more...

"RF" IS GOOD FOR YOU!

www.rfspecialties.com

Call your nearest RF Specialties Office:

RFSCA	Santa Barbara CA	Sam	800-346-6434
RFSCA	Las Vegas NV	Bill	888-737-7321
RFSCA	San Francisco CA	Paul	925-270-8939
RFSWA	Mukilteo WA	Walt	425-210-9196
RFSWA	Vancouver WA	Bob	800-735-7051
RFSTX	Amarillo	Don & Mo	800-537-1801
RFSTX	Dallas	Wray Reed	888-839-7373
RFSMO	Kansas City MO	Chris	800-467-7373
RFSMO	Raymore MO	John	877-331-4930
RFSMO	Richmond IN	Rick	888-966-1990
RFSPA	Ebensburg PA	Dave	866-736-3736
RFSPA	Pittsburgh PA	Ed	866-412-7373
RFSPA	Philadelphia PA	Phil	888-737-4452
RFSGA	Thomasville GA	Chris	800-476-8943
RFSGA	Crestview FL	Bill	850-621-3680

Fine Print: : The FIRST person to call their favorite RFS office, and mention this AD, wins a $10 Gift Card .from Starbucks. Limit of ONE card from each of the above listed office.

RF Guide

Taking Advantage of the Recent FCC AM Rules Changes

– Continued from Page 14 –

7. When self-supporting towers are modeled, either stepped radius wire sections may be employed to simulate tower taper or individual legs and cross sections may be used in an effort to duplicate the actual physical structure.

8. When the series reactance of the tower feed system or the shunt reactance of the base insulator is included it cannot exceed 10 uH and 250 pF respectively unless accurate measured data is available. In no event is the magnitude of the shunt reactance allowed to be less than five times the magnitude of the tower base operating impedance with the shunt reactances not considered.

It should be noted that, although the wording of the Rule focuses on shunt capacitance, the shunt reactance associated with devices such as static drain chokes can have a marked impact on the impedance of taller towers and will need to be carefully considered in the model.

• (C)(2)(i)&(II) The computer model must be adjusted so that the impedance matrix values measured in the field are achieved by the computer model with a tolerance of +/- 2 Ohms and +/- 4% for resistance and reactance. Stated differently, when the R and X are 50 Ohms or less the tolerance is +/- 2 Ohms and when the R and or X exceed 50 Ohms the tolerance is +/- 4% of the value.

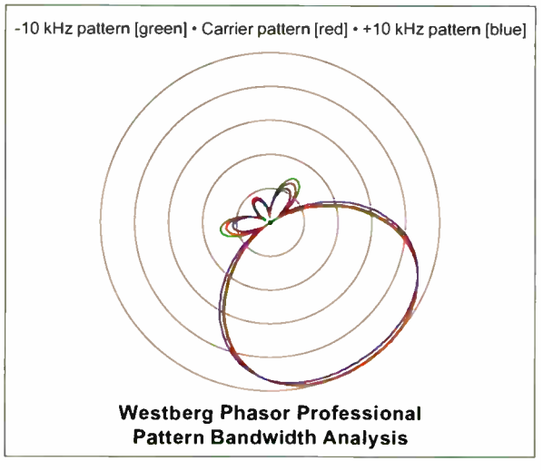
SOFTWARE TOOLS

There are several available MOM software solutions from which the engineer can choose. Each has its unique characteristics with strict regard to the 302-AM licensing process and that is the primary focus of the following reviews.

Phasor Professional – *Westberg Consulting*, Quincy, IL – www.westbergconsulting.com. Jerry Westberg is the developer of the underlying mathematical solutions employed in *Phasor Professional*. Many will remember Jerry's contributions to broadcast antenna system design reaching back into the 1980's when he wrote his initial MOM software and circuit analysis program WCAP.

Phasor Professional was first released in DOS in 1995 with the first Windows version released in 1998. The current version 2.1 was released several years ago and a new version 2.11 was due for release in January 2009.

We have used *Phasor Professional* in our firm for many years and have found it to be very stable and to render MOM based driving point impedance values that coincided well with measured values to the extent that they would be expected to do so. The program user interface is straightforward and designed to input data using traditional FCC values of frequency in MHz, tower height and spacing in electrical degrees, orientation in degrees and tower face width in inches.

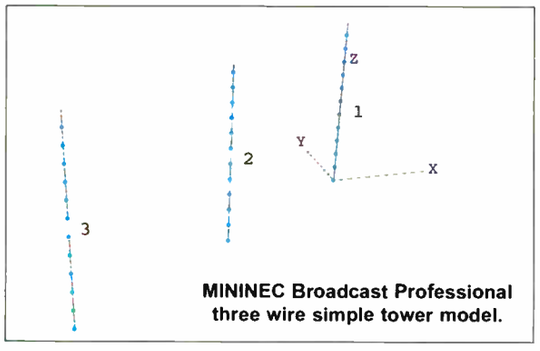


Westberg Phasor Professional Pattern Bandwidth Analysis

The firm tells us that the new revision is designed to allow *Phasor Professional* to be used for MOM Proof of Performance in accordance with the new Rules. Enhancements include the ability to specify tower velocity factor and modify tower characteristics to agree with field measured matrix values.

Expert MININEC Broadcast Professional – *EM Scientific*, Carson City, NV – www.emsci.com. Expert MININEC Broadcast Professional is written by the team of John Rockway and James Logan who are the original developers of MININEC.

The user can run the program in two ways. First, in the traditional NEC wire file format where an array or antenna system is specified in rectangular coordinates.



MININEC Broadcast Professional three wire simple tower model.

Second, and the most comfortable for those used to the FCC method, is the polar format option used to design a broadcast array. The FCC process uses a per unit pattern based upon the relative contribution (in the horizontal plane) to the radiation pattern of each radiating tower in the broadcast array.

The relative contribution is described in terms of complex field ratios (e.g., magnitude and phase). The voltages at the bases of the towers in a broadcast array can be related to the field ratios and phases that result from the FCC AM directional antenna design procedure. The field ratios are the array parameters that are input to the FCC program RADIAT which is used to compute the electric field pattern and the constraints that determine the behavior of AM medium wave standard broadcast directional antennas in the United States.

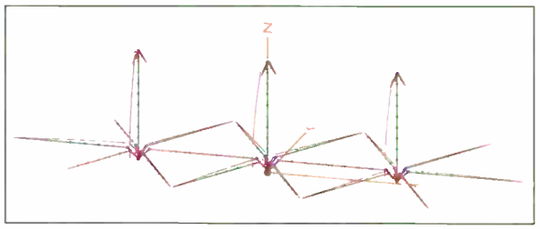
It is believed fair to say that the majority of the members of the AM Directional Antenna Performance Verification Coalition have broad experience in the use of *Expert MININEC Broadcast Professional* and that this is a widely known and recognized tool for analyzing AM directional antenna systems.

NEC-4 and EZNEC Pro/2 based analysis programs – *EZNEC*, Beaverton, OR – www.eznec.com/eznecpro.htm

Roy Lewallen, author of the EZNEC series of MOM antenna modeling software is well known in the CEM world.

In my experience the EZNEC user interface is comfortable and intuitive to use. The NEC-4 Pro series allows the implementation of NEC-4, written by Gerald Burke and available from the Lawrence Livermore Labs, which is a popular antenna modeling code for wire and surface antennas and scatterers.

NEC-4 Models can include wires buried in a homogeneous ground, insulated wires and impedance loads. The code is based on the MOM solution of the electric field integral equation for thin wires and the magnetic field integral equation for closed, conducting surfaces. For FCC 302-AM Rule compliance only *EZNEC Pro/2 NEC-2* is required, since all computations are based on perfect earth. *EZNEC Pro* requires use of the traditional NEC wire file format where an array or antenna system is specified in rectangular coordinates.



Three tower NEC (MOM) Model depicting segments, elevated ground system radials, top loading wires and current distribution in towers.

The software is designed to allow the source to be placed at a desired location on a wire, instead of the center, allowing compliance with the need to calculate current and impedance at ground or within one degree of the physical feed point on the tower.

Sources and loads are easily inserted in each radiator, and the horizontal plane pattern can be calculated in one degree azimuth steps to confirm that the base excitation values are, in fact, generating the correct pattern shape. At this time facilities to convert loop to base excitation values are not included in the software but are under consideration.

Phased Array Designer – *Grant Bingeman, P.E.*, Plano, Texas – http://www.qsl.net/km5kg/. Grant Bingeman is well known in the broadcast engineering community for his design work on RF systems. His June 1977 IEEE Transactions on Broadcasting paper on AM Antenna System Bandwidth is still topical today as bandwidth impact on HD systems is evaluated.

Our firm first began to work with Grant in the mid-1980's when Grant was contracted to employ NEC to design a top-loading system for a four-tower parallelogram DA. NEC analysis allowed the physical length of the guy wire top loading to be significantly shortened by installing an inductance in series with the top-loading increasing radiation efficiency over the standard top-loaded configuration.

Phased Array Designer was developed as a software tool to meet the needs of stations wishing to comply with the new MOM 302-AM licensing process. Tower data is input in a straight-forward format with frequency in MHz, tower spacing in feet and electrical degrees, tower height in feet, and FCC authorized loop current and phase.

An impedance matrix incorporating series and parallel reactances, entered as resistance and reactance in Ohms, is input to determine base impedance and base excitation values. Both near field and far field radiation patterns may be computed. This product is in beta testing. The layout and feel is similar to the *RF Network Designer* product.

BRINGING ART AND SCIENCE TOGETHER

Antenna modeling is both art and science. Many express concerns that there are too few engineers expressing interest in broadcast engineering. Perhaps modern antenna design is an area that may catch the interest of new entrants, given its unique mix of computational effort and field work.

If you feel that you require a better understanding of antenna systems and computer modeling, there are many good resources with a few listed here that are believed to be particularly valuable.

Griffith, B. Whitfield, Jr. Radio-Electronic Transmission Fundamentals, Second Edition. Atlanta, GA: Noble Publishing (2000).

Smith, J.L. Basic NEC with Broadcast Applications. Burlington, MA: Focal Press. (2008)

Cebik, L.B. Basic Antenna Modeling: A Hands-On Tutorial (1999) and Intermediate Antenna Modeling: A Hands-On Tutorial (2005) – www.antennex.com/Sshack/books.htm

A Broadcast Engineering consultant for over 30 years, Clarence Beverage is the President of Communications Technologies, Inc., in Marlton, NJ. Contact Clarence at cbeverage@commtechrf.com

If you thought that you couldn't afford new Automation,

then think DIGILINK-XTREME !

- Quad Play with Dual Record
- Sound card hardware included
- 16 input switcher included
- Powerful one week automation
- Voice tracking
- Ball games mode
- Music scheduler
- Phoner recorder/editor

only $100/month

Xtreme is ideal for Live On Air, Hard disk automation, Satellite automation, Internet Radio, and so much more. For less than the monthly cost of a cell phone contract you get everything including support and updates (just add a PC) !!!

advanced radio consoles for ALL jobs,

the ARC-10 and ARC-15

ARC-15
$3,495

ARC-10
starts at $1,599

The ARC-10 and ARC-15 are ideal for On Air, Production, and News studios. Available in either balanced or unbalanced models they fit every application.

- 10-15 channels, Pgm & Aud outputs
- Built in telephone channel for Call in shows
- 2-5 mics. (depending on model)
- PC sound card built in

'All NEW' from Arrakis Systems

NEW... a modular, analog console

the MARC-15

starts at only
$4,999

PC interface module for digital playback and record

- modular
- 3 mixing buses
- 2 inputs per channel
- control room and studio
- supports 2 phone channels
- electronic switching w LED lamps

www.arrakis-systems.com

970-461-0730

Monitoring Tower Lights and Other Things

by Clay Freinwald

Monitoring of tower light operation has always been a chore for the station engineer. If you are fortunate to have a modern tower light controller, this job is made easy, because the newer units have alarm contacts that can be connected to the station's remote control system. However, many times the need arises to be able to monitor tower lights where these systems are not available.

SEEING THE LIGHTS

Back in the 60's I created a tower light monitor so the station's announcer could observe the operation from the studio. This was a rather simple device consisting of a home-brew current transformer driving a VU meter. If the meter deflected to 100%, all the lamps were on.

When that station moved its transmitter to a new location things got a bit more tricky. In this case I generated a DC voltage proportional to the tower light current and supplied that to the remote control system. The announcer, at sunset, would "dial-up" the tower light function on the remote control and, again look for the deflecting meter.

With the newer remote control systems and their status indicators I have moved toward translating tower light currents into simple tower light fail/status indications. They then can be used to toggle status inputs on remote control systems that will call and alert me about any tower light failure – in addition to being able to monitor currents when I wish to do so.

CONSTRUCTING A TOWER LIGHT MONITOR

Making an effective tower light monitor is not that hard. I installed the following one at a site here in Seattle.

In this case, I am monitoring a tower that has one set of sidelights and one beacon. To accomplish this task, I have re-used a couple of old, trusty Moseley current sensors, as well as two current monitors (Diversified Electronics CMU-120-ASE-1).

The current monitors outputs, in this case DC, which are simply connected to the facilities remote control system metering inputs and calibrated so that a "100" reading is equal to "all lights are operational."

Two current sensors and two current monitors provide full monitoring for the tower lights.

The sidelight current sensor has its threshold adjusted so that a failure of any one of the two sidelights will cause the device to toggle. The beacon sensor is adjusted so that it will toggle should the operating current fall below the operation point. The beacon sensor delay is adjusted to ignore the flash rate.

The remote control system is programmed to check the tower lights after dark and, via a macro, look for the status indications from the two devices, if they are not there, it reports an alarm condition.

CHANGING TO LEDS

When I first built this monitor, the tower lights were incandescent. However, they were later changed to LEDs.

This change required that I increase the number of turns on the primary of the current transformers to obtain the desired DC voltage to make the remote control systems happy. The current sensors were changed to lower current ranges, both sensors are now one Ampere models.

The current levels being monitored can be seen in the picture by observing the pointers on the pots.

MULTIPLE TOWERS

Another application for the current monitors is at an AM array where two of the four towers have obstruction lights, but no beacons.

In this case the tower lights are two sidelight size fixtures at the top being fed via an Austin-Ring transformer. The same current monitor, as used at the other site, is employed on the primary of the tower transformer. Its trip-point is adjusted to show a failure of either of the two lamp assemblies. The unit's relay output is connected to the stations remote control system where it is automatically checked, after dark, to make sure that the lights are on.

As at the other site, these lamps were incandescent and we were concerned that changing to LEDs would compromise the ability of the current sensor to determine whether or not one lamp had failed – especially when you consider that the load to the Austin transformer is a fraction of the normal primary current. Nevertheless, the system has been working just fine for several years.

EVEN MORE LIGHTS

In this situation it was necessary to monitor the currents of a tower that had two beacons and six sidelights. This site was only used for RPU and had a dial-up remote control system. We wanted to be able to know if the tower lights were off when they were supposed to be on.

To accomplish this we again called upon the trusty Diversified Electronics current sensors, one on the beacon circuit and the other on the sidelight circuit. In this case the supply voltage to the sensors was supplied by a separate photocell assembly. This device, purchased at a local electrical supply house, was designed to turn on lights after dark; in our application, it supplied power to the sensors.

The photocell was positioned so that it would enable the sensors a few minutes after the tower lights had come on. The sensors, in turn, were connected to the remote control system and would issue a "tower light failure alarm" should the lights be off when they were supposed to be on.

USEFUL FOR MANY PROJECTS

These current monitors are very handy devices for monitoring a number of things at remote sites in addition to tower lights. They can be used to monitor such other consumers of electrons as antenna heaters, interior transmitter building lights (to log when the facility has been visited), or ventilation equipment etc. They are wonderful tools.

If you need a current transformer, you may not need to go out and purchase one. In the past I have looked under the bench and often found a suitable filament transformer whose secondary can handle the required current I wish to monitor.

Placing the secondary in series with the load will produce a voltage on the primary proportional to the load current. The problem is, you need a pretty large transformer if you are monitoring a large load. I have been known to take a transformer apart by removing its secondary and winding a few turns of wire in its place, but this is time consuming etc.

A "NEW" PARTS SOURCE

A solution jumped out at me a number of years ago in the form of a two-pole phonograph motor. (From that remark you can tell it was indeed a long time ago.) Thankfully they are still making a number of devices with these simple motors.

The good news is their bearings wear out and usually the motor, or the whole device, is discarded. (I have a box of them in the garage with my private stock). You then remove the armature and its bearing retaining bracket and presto – you have a dandy current transformer.

Repurposing an old motor as a current transformer.

All you need to do is thread a turn or two of your current carrying conductor through the generous hole where the armature was and you are in business. By making one primary turn and measuring the voltage on the secondary you can determine the ratio, you simply add primary turns until you get the voltage you want. Then add a diode and a capacitor to get the 2 to 4 Volts of DC your remote control system likes to see.

Clay Freinwald has long been an important part of the engineering community in the Seattle market and, among other things, has spearheaded the SBE EAS activities. You can reach Clay at k7cr@blarg.net

Sicon-8 Internet & Voice Remote Control

The CircuitWerkes Sicon-8 Voice Remote Control

- Uses Dial-up, Internet Web server or free Sicontroller Software!
- 8 channels of metering, status and control (expandable to 32) and up to 5 alarms per channel.
- No accessories necessary to control your site right out of the box.
- Auto-ranging, auto-calibrating meters make setup a snap.
- Includes: Function scheduler, auto-logging & alarm reporting.

Internal Web Server

Free Siccntroller Software

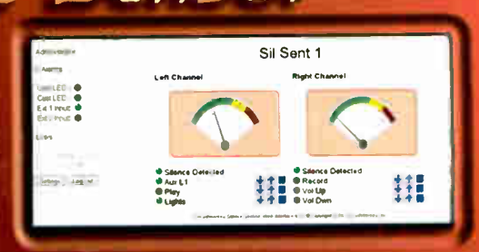
The Sicon-8 lets you control your site via Internet with its internal Web server, via telephone, auto-answering cell phone or with our free software. Setup is a breeze using the Sicontroller software that also includes scripting, e-mail alerts, multi-site management, virtual metering & much more!

NEW!! Web-Based Silence Sensor

Introducing the Silence Sentinal

Discover more online at www.circuitwerkes.com

- Detects Stereo or Dual Mono Silence (independantly adjustable channels).
- User-programmed relays (DPDT) close automatically or via Web control
- Balanced or unbalanced audio inputs.
- External trigger inputs activate user-defined actions.
- Optional Multi-Site monitoring software coming soon



Remote Broadcasting Solutions

MicTel Mic/Line to Telephone Interface

- Outputs & Inputs for telephone handset, cellular phone or balanced line level at up to +10dBm.
- Operates up to 36+ hours on two 9V alkaline batteries.
- High quality, user-switchable, internal limiter prevents clipping.
- External power input with silent, auto-switching battery backup.
- Individual gain controls for send, receive & headphones levels.

Unattended Dial-Up Broadcasts with the DR-10

- The DR-10 is a Dial-Up remote control with balanced, telephone audio input & output that can control many automation systems or your audio console for unattended remote broadcasts.
- Our Silencer™ option removes control tones from the audio path.
- Use the DPDT relays to insert the phone audio directly into the program path when necessary, especially for emergencies.

TelTap Pocket-Sized Manual Telephone Coupler

- Can be used as a phone tap or a passive manual telephone coupler.
- Send or receive telephone audio.
- Compact size & low cost makes the TelTap a great addition to your remote kit for main or backup capabilities.

Lots More CircuitWerkes Problem Solvers

- Transcon-16 - Move up to 16 contact closures from room to room over an audio cable
- DT-232 - Turns DTMF sequences into user-programmed serial outputs & action steps.
- FSK Encoders, decoders, tranceivers and contact-to-FSK encoders/decoders.
- SUB-03 Subaudible tone decoder and SEN-6 Subaudible encoder.
- HC-3 telephone autocoupler and AC-12 rack of autocouplers
- DTMF-16 and DS-8 DTMF tone decoders.

Find Full product info & downloadable manuals online at www.circuitwerkes.com. 352-335-6555

Technology Guide

CES 2009

by Barry Mishkind

Was it the size of the Consumer Electronics Show or a sign of my age that it only took me one day to fall back to my tennis shoes this year? Either way, with nearly 2 million square feet of exhibits, 110,000 attendees, a lot of useful products – as well as eye candy – were on display again, spread out from the Las Vegas Convention Center to the Sands Expo, along with associated hotels.

Here is a quick summary; we will bring more in-depth material as the year progresses.

Perhaps some of the biggest buzz concerned the Palm Pre, due out sometime mid-year. Long awaited as a competitor to the iPhone and BlackBerry, the Palm Pre received many rave reviews. Its new operating system WebOS uses a 3.1 inch touch-screen and multitasking technology to allow, for example, listening to music while browsing or doing email.

DIGITAL RADIO

Radio receivers were all over the place – Internet radios, interoperative Sirius/XM "Mirge" satellite radios, and yes, HD radios. I did notice that this year, iBiquity was not in the North Hall (automotive sound, etc.). And it seemed their main focus was not for audio, but for digital services – navigation, traffic reports, song tagging, etc.

Some of the companies that brought out the first and second generation HD receivers were either not at the show or had dropped the units.

However, I did see quite a few Internet radios – and some interesting systems to deliver programming. Sanyo, C.C. Crane, and Sangean were among those showing tabletop Internet radios. Autonet Mobile (www.autonetmobile.com) displayed a van outfitted with their system that makes the vehicle a "rolling hot spot" which feeds everything from laptops to video streaming to in-dash radios. Several models of new and aftermarket car Internet radios were in booths scattered all over the CES floor.

At the same time, a number of companies are ready or preparing to provide various applications and two-way communication over cell phone or Wi-Max links. Most, like Airbiquity (www.airbiquity.com), are focused on mobile services but the potential uses are growing. ARC (www.arc.com) is bringing software to allow the user to enhance audio from the Internet.

HEARING IT ALL

Earphones have been given a lot of attention in the past couple of years. With the huge number of iPods and MP3 players, a lot of cheap earphones have gotten out. Companies like Future Sonics (www.futuresonics.com) are reversing that trend with their Atrio series of professional earphones. Designed to meet the needs of stage and recording artists, these in-the-ear reproducers provide response and clarity that allows the listener to hear it all.

Another interesting item came from a small startup company, Acoustibuds (www.acoustibuds.com). These special adaptors go on the end of your earbuds and fit your ear canal, improving the isolation and audio of any earbud, as well as keeping it from falling out.

And for those whose hearing has deteriorated somewhat over the years (who, me?), Able Planet (www.ableplanet.com) has a series of headphones tailored to make it easier to hear audio, both via noise cancellation and special equalization.

SECURITY

As we have noted many times, security is an increasing concern for broadcasters – security of site/workplace and security of data.

Webcams and their surveillance applications are able to call or email an alert, or send off a status alarm to the remote control system. D-Link (www.dlink.com) has a very nice set of solutions, with a web application to do the setup for you, and can be monitored virtually from anywhere.

Indeed, software is making it easier to control many things over IP links, including the door lock; Black and Decker (www.bdhhi.com) has a lock that you can set or release over the Internet. This might be especially good in difficult neighborhoods.

As to data security, all sorts of backup solutions were presented, as well as encrypted products. As I mentioned earlier, the capacity of flash memory is continuing to increase, making flash drives and solid state hard drives the wave of the future. (Some laptops already are being delivered without mechanical hard drives.)

Flash drives (or thumb drives, as some call them, due to their size and shape) are available up to 64 GB now. Solid state hard drives now run up to 256 GB – and Toshiba showed a 512 GB unit due out soon. For those of us who remember 5 MB hard drives, this is a mind-blower!

Various companies from Kingston to Super Talent to Ritek to Lexar featured ranges of flash drives for every need. Need something small or special? Super Talent (www.supertalent.com) claims the smallest 2 GB hard drive currently made, barely larger than a man's thumbnail.

Of course, one of the worries about flash drives is its loss, especially the contents. While we cannot prevent folks from losing things, Lexar (www.lexar.com), among others has several levels of encryption available to ensure only your people can read the data. Under attack, the drive will destroy data before giving it up. Want more security? The new Victorinox (www.swissarmy.com) Presentation Pro incorporates a fingerprint sensor to unlock the encryption. And it includes a heat sensor, so *it has to be a live finger!*

Part of keeping data secure is making sure it is backed up, so hard drive crashes and lost flash drives do not mean lost data. Several products have been developed to make backing up as easy as possible. Rebit (www.rebit.com), for example, is a system that plugs in and backs up your entire hard drive, updating as necessary. Clickfree (www.goclickfree) backups up only your personal data files, but as its name implies, all you do is plug it in and it does everything on its own. A new product, the Clickfree transformer even lets you use your own external hard drive.

A different kind of backup comes from Honestech (www.honestech.com). Audio Recorder 2.0 makes digital backups from old cassette tapes, LPs, etc. The software comes with an interface box so you can record to your USB port.

GREEN THINGS

Yes, "Green" was spoken all over the floor. Concern for the environment and the electric bill drove many products. There were solar cells, pads that will recharge whatever is laid on them, and other bio-friendly products including portable cell phone chargers.

If you are watching the Watts, look at P3 International's (www.p3international.com) new Kill A Watt PS. It is a power strip that combines surge protection with a digital display monitoring power usage.

The future was highlighted by Green Plug's (www.myinnergie.com) demonstration of a software controlled universal power adaptor, able to replace all sorts of wall warts, and intelligently shut off power to unused equipment.

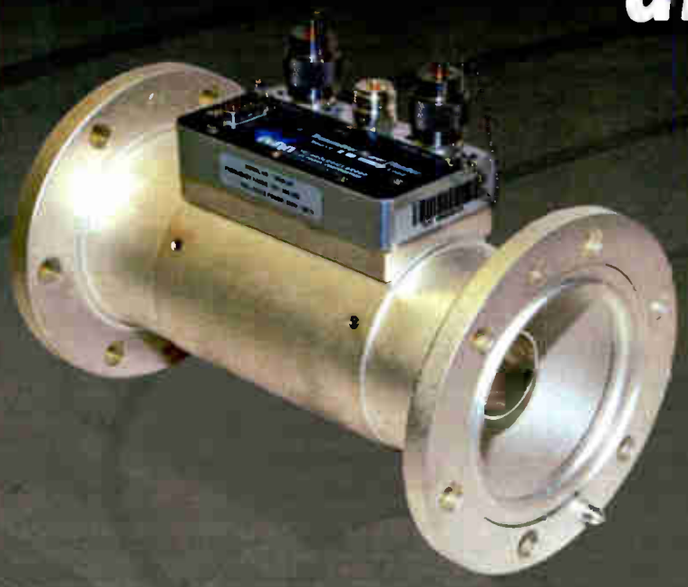
MINE IS BIGGER THAN YOURS

The "mine is bigger than yours" war on LCD screens paused this year; Panasonic again showed its stunning 11-foot wide unit. I cannot fit it in my house, but if you gave me one, I might just move!

At the other end of the scale, several manufacturers were showing a pico projector, about the size of your hand but able to put a decent picture on the wall from your PDA or cell phone, for example. At seven lumens, they will not light up a big room, but they can serve well for small group presentations.

Finally, the OLED watch: OLEDs got a bit bigger this year, but really big OLED screens are still some time off. On the other hand, after four days of walking, my feet might just be bigger than yours! *– Radio Guide –*

Minimize downtime or get up and running faster!



TRANSMITTER POWER MONITOR (TPM)

www.bird-technologies.com/tpm/scms

Enables Broadcasters in-situ power measurement to ensure regulatory compliance and to monitor for system degradation.

Never take your system down. Industry First! In-line and on site calibration.

Combine accurate power measurement with calibrated coupling ports in the same component!

SignalHawk
VNA | Spectrum Analyzer

SIGNAL HAWK , SH-361S 100 kHz to 3.6 GHz, Vector Network Analyzer & Spectrum Analyzer

www.bird-technologies.com/sh/scms

Enables any level of technician to easily verify system installation, monitor sites for system degradation, or troubleshoot system failures.

Perform your spectrum sweep at twice the speed!

Made in the USA to conform to drop/splash military specification.

Get 40% longer battery life when in the field.

Troubleshoot your system with 50% greater fault location resolution.

BIRD
TECHNOLOGIES GROUP

30303 Aurora Road
Solon, OH 44139
440.248.1200
866.695.4569

SCMS
YOU KNOW WE KNOW RADIO

Contact SCMS 1.800.438.3040 www.SCMSInc.com

Mid-South: 877.391.2650	South-Atlantic: 770.632.1295
Central: 731.695.1714	South-West: 210.775.2725
West Coast: 866.673.9267	North Central: 513.376.8600
Mid-West: 513.899.3036	Pro Audio: 877.640.8205
North-East: 315.623.7655	Latin America: 760.650.1427

IT Guide

Software That Won't Break the Bank

by Drey Blevins

All across the country, radio stations are buckling down and cutting costs. Everything from office supplies to staff to software is being reduced or cut completely. What is an IT Director/Radio Engineer to do? Well, times are tough and when the tough get pushed, they hit the Internet! Download.com to be exact.

HOW LOW CAN YOU GO?

Now, I know what you are sitting there thinking: "How are you ever going to be able to find software that will 'replace' the big named brands and be able to do this for free or at a minimal cost? It is just not possible."

Or is it? It may be hard to believe but there are software companies that just give us free software. Sometimes, it is open source and sometimes it is nothing more than a computer graduate student who created a piece of software with a free license for a grade. Free and "oh so cheap" software *is* out there. We just have to find it.

So, for a moment let us do some shopping and see what we can find. We will take some software titles that we use around the stations where I work and see if I can find something comparable in functionality, either "on the cheap" or with a zero price tag!

A BASIC NEED

We should start with what could be considered the most important piece of software on any computer on your network – that would be the antivirus protection. We all know the "staples," Norton, McAfee, etc. But is there a way to moderate the costs entailed generated by use throughout the company?

Of course, we all know that in a business we cannot get away with using the (awesome) *free* personal versions of the antivirus software that are out there. But, I would like to list some alternative names of antivirus programs, from companies that provide free personal antivirus software and provide affordable licensing for businesses.

AFFORDABLE AV

First off is one that I use personally and know well: Avast! Avast! is a great antivirus program and made by a company with the same name. Cruise on over to www.avast.com and take a look at what Avast! can do for you with their program and their licensing program. They provide for both Windows and Mac.

One of the reasons I love their free product is its ability to scan instant messages in real time and scan file downloads within peer to peer programs like Limewire, Bearshare or Kazaa (come on, admit it – we have all used them) and will shut down the Internet connection upon detecting any type of infected file. After eliminating the threat, it is easy to restart your Internet connection.

Next up is AVG. AVG Technologies also has a wonderful *free* version along with "per seat" licensing for corporations. You can check it out at www.avg.com. Another one is ThreatFire and you can find it at www.pctools.com. Just remember that not only do these companies provide us with outstanding free software, but they also have some great paid software products for home *and* business use.

Another strong antivirus program is called F-PROT. F-PROT ranks highly in antivirus protection and comes at a very attractive price. F-PROT is light on your computer's resources and can be password protected to keep unauthorized changes from being made.

It can be installed on Windows, Unix and even Exchange servers. And I saved the best for last: the price. For 10 computers the price is $50 for one year! Yes, that is the business license price. Easy to install, easy to use, light on resources and password protected – this one is begging you to try it out.

Each antivirus program is different and scans with different virus signatures. In fact, some folks run a second AV program just to be that much surer their machine is clean. You can even do it without installing another AV program on your machine by using one of several provider websites that allow you to perform on-line scans. For example, both Trend Micro (http://housecall.trendmicro.com/) and BitDefender (http://www.bitdefender.com/scan8/ie.html) provide free on-line scans.

You will need to approve, download, and install an activex control for each to run. But, if you think you might have been infected and you want to get a second opinion on your in-house protection, both are worthwhile methods to ensure you are virus free.

AN INEXPENSIVE OFFICE

Now, let us move on to talk about office software. We all know and love the software that has been "trialed" on our new systems for years: Microsoft's Office suite of productivity software.

(Continued on Page 24)

EVENT 5800

HIGH CAPACITY BIDIRECTIONAL STUDIO TRANSMITTER LINK

TRANSPORTS UP TO 9 RADIO STATIONS, UNCOMPRESSED, OVER A SINGLE LINK

EVENT 5800 IDU

EVENT 5800 ODU

The Moseley Event 5800 — is a carrier class T1/E1/IP Ethernet radio link. Combined with the Starlink SL9003T1, the Event 5800 creates a high capacity bidirectional STL/TSL.

HIGH PAYLOAD CAPACITY

HD RADIO™ READY TODAY

LEVERAGE IP DEVICES AND APPS

EASY DEPLOYMENT

EXCELLENT ROI

Moseley

www.moseleysb.com

Dave Chancey: (805) 968 9621

Bill Gould: (978) 373 6303

Continued From Page 22

Software That Won't Break the Bank

Inside this suite you will find Word, Excel, Access, PowerPoint and a few others depending on the package you purchased – Standard, Student, or Professional. Depending on which package you choose you could pay anywhere from $150 to over $650 per seat/license. I was quoted $30,000 for 45 licenses or seats for Microsoft Office 2007. This software suite alone could cause a radio station to go under.

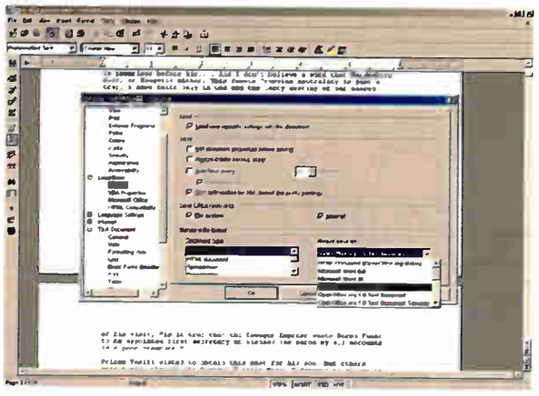
Luckily, I have a really cheap alternative for you. It is so cheap that it is *free!* This is because it is software that we call "open source." Open source means that those who wish can contribute to that product to make it better by helping work on the source code or working on the product in other areas. Either way, it is a community effort and free for all to use.

The software is called OpenOffice. You can find it at www.openoffice.org; Sun Microsystems is the primary sponsor of OpenOffice.

OPENOFFICE

OpenOffice has a productivity suite which is very much comparable to Microsoft's Office suite. For example here are the programs in the suite and the Microsoft comparable program in parenthesis: Writer (Word), Calc (Excel), Impress (PowerPoint), Draw (Paint), and Base (Access).

I know from experience that the documents and spreadsheets that are produced from the OpenOffice suite are compatible with Microsoft Office programs. So, if you create a document or spreadsheet with OpenOffice and then send to a client, you will not have to worry if he or she uses Microsoft Word. They will be able to open it without any problems. If they have any issues, just doing their updates should take care of those problems.



The standard formats available in OpenOffice are compatible with Microsoft Word.

On the OpenOffice website, you will find a very comprehensive help and FAQ section. If you do not see your question there and you end up finding it elsewhere, you are encouraged to come back and post your question and answer there to help others like you. That is what the community is all about. And again, it is all free.

GET IT NOW

When you decide to download OpenOffice you might find that it seems a bit too much to handle – but just relax!

You will find the download page easy to follow, and in a few easy steps you will be working with documents and spreadsheets without any help from Bill Gates' old company – and feeling oh so proud of yourself!

Now, it *is* a fair-sized file: 142 MB. Depending up your machine and Internet service, you might need to first download their BitTorrent file sharing program. (Once you have installed this program and gotten your OpenOffice you can uninstall it and go about your business as you did before.)

Nevertheless, if you cringe at the thought of installing any type of file sharing program – or you are on dialup, without wideband Internet access, then you can order a CD from the website.

SEARCHING FOR GOODIES

As you can see, if you just take the time to look around the Internet – and more specifically www.download.com – you will find some very good, inexpensive software, even free software. You can even tighten your search by operating system, license, user, and editor rating.

Since even the pay-for-play software usually permits "trial installation," my suggestion is to use either a virtual machine or a system that you trust explicitly to test the program for suitability. Just make sure it is not needed in day-to-day operations – in case you download a program and the install fails.

I have a desktop unit that is my guinea pig. I download and install all these programs. If I like them and can use them, I will then install those onto my laptop or other machines around the facility.

By the way, if you happen to download and try out any software, please help out the community by creating an account and then providing some user feedback or review of the product you just installed. That helps build a better ratings system. Also, feel free to let me know, so I can share your thoughts with others.

Drey Blevins is the Market IT Director/Assistant Chief Engineer for the Curtis Media Group in Winston-Salem, NC. Contact her at dblevins@curtismedia.com

Can a radio console be over-engineered?

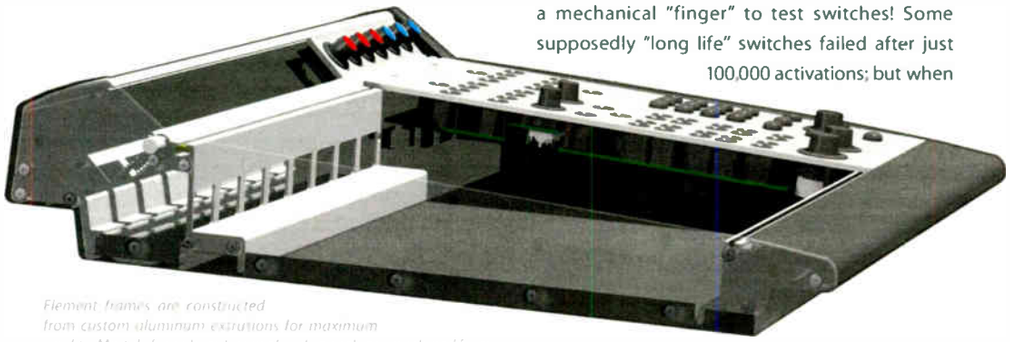
(Only if you think "good enough" really is good enough.)

The radio console, redefined.

Building a great console is more than punching holes in sheet metal and stuffing a few switches in them. Building a great console takes time, brain-power and determination. That's why Axia has hired brilliant engineers who are certified "OCD": **Obsessive Console Designers,** driven to create the most useful, powerful, hardest-working consoles in the world.

Beneath the surface

There's more to a great board than just features. **Consoles have to be rugged,** to perform flawlessly 24/7, 365 days-a-year, for years at a time. So we literally scoured the globe for the absolute best parts — hardware that will take the torture that jocks dish out on a daily basis.



Element frames are constructed from custom aluminum extrusions for maximum rigidity. Module faceplates & console side panels are machined from the [illegible]

First, Element is fabricated from thick, **machined aluminum extrusions** for rigidity and RF immunity. The result: a board that will stand up to nearly anything.

With so many devices in the studio these days, the last thing anyone needs is gear with a noisy cooling fan. That's why Element's **power-supply is fanless,** for perfectly silent operation inside the studio.

Element modules are **hot-swappable**, of course, and quickly removable. They connect to the frame via CAT-5, so pulling one is as simple as removing two screws and unplugging an RJ — no motherboard or edge connectors here.

Faders take massive abuse. The ones used in other consoles have a big slot on top that sucks in dirt, crumbs and liquid like the government sucks in taxes.

By contrast, our silky-smooth conductive-plastic faders actuate from the side, so that **grunge can't get in.** And our rotary controls are high-end optical encoders, rated for more than **five million rotations.** No wipers to clean or wear out — they'll last so long, they'll outlive your mother-in-law (and that's saying something).

Element's **avionics-grade switches** are cut from the same cloth. Our design team was so obsessed with finding the perfect long-life components that they actually built a mechanical "finger" to test switches! Some supposedly "long life" switches failed after just 100,000 activations; but when our guys found the switches used in Element, they shut off the machine after **2 million operations** and declared a winner. (The losers got an all-expense-paid trip to the landfill.)

Element's individual components are **easy to service.** Faders come out after removing just two screws. Switches and rotary volume controls are likewise simple to access. And all lamps are LEDs, so you'll likely **never need to replace them.**

Engineers have said for years that console finishes don't stand up to day-to-day use. Silk-screened graphics wear off; plastic overlays last longer, but they crack and chip — especially around switches and fader slots, where fingers can easily get cut on the sharp, splintered edges. We decided that we could do better.

Element uses high-impact Lexan overlays with color and printing on the back, where it **can't rub off.** And instead of just sticking the Lexan to the top of the module like some folks do, our overlays are **inlaid on the milled aluminum module faces** to keep the edges from cracking and peeling — expensive to make, but worth it. For extra protection, there are **custom bezels** around faders, switches and buttons to guard those edges, too. Which means that Element modules will **look great for years.**

By the way, those on/off keys, fader knobs and bezels are our own design, custom-molded to give **positive tactile feedback.** The switch is flush with the top of the bezel, so it's easy to find by touch. But if something gets dropped on it, the bezel keeps the switch from being accidentally activated.

More than just products

Even the best products are nothing without **great support.** So Axia employs an amazing network of people to provide the best support possible: Application Engineers with **years of experience** in mapping out radio studios... the most knowledgeable, **friendly** sales people in the biz... Support Engineers who were formerly broadcast engineers. Plus a genius design team, software authors who dream code... one of the **largest R&D teams** in broadcast.

And now Axia has become radio's **first console company to offer 24/7 support,** 365 days a year. Chances are you'll never need that assistance, but if you do, we'll be ready for you. Our 'round-the-clock help line is +1-216-622-0247.

Proudly Over-Engineered

Are Axia consoles over-engineered? **You bet.** If you're looking for a cheap, disposable console, there are plenty out there — but this ain't it. Not everyone appreciates this kind of attention to detail, but if you're one who seeks out and appreciates excellence wherever you may find it... Axia consoles are built **just for you.**

AXIA
A TELOS COMPANY

www.AxiaAudio.com

Consoles

Macs in a Radio Station? Absolutely!

by Chris Tarr

A CHANGING VIEW

For a long time, the only places where you would see an Apple Macintosh computer in a radio station were in the production or on-air studios. Macs had gotten a bad rap in the past for being incompatible with Microsoft networks, many printers, and other peripherals.

For example, ProTools is often considered the "gold standard" in audio production software – and it is designed to run on the Mac operating system. In the studio, the venerable VoxPro system was originally offered only on the Mac platform, though now there is a version available for Windows.

Often it was the users of these machines themselves that did the support. Generally they were the station's "Mac Gurus," while the Engineering staff dealt with the Windows machines. Very rarely would you find support for both platforms. Sometimes, an Intel processor emulator allowed Windows to run but it required a lot of memory, it ran relatively slow, and some programs just would not run. The Mac generally remained a mysterious machine only fit for "those creative guys."

Then, a couple of years ago, Apple made a big change – they moved from the Motorola "PowerPC" processors to an Intel architecture.

CONVERGENCE

What does this mean? Why, the best of all worlds, of course!

It all changed with OS X (pronounced Oh-ess-ten), a complete redesign of the operating system, including compatibility with just about everything out there. This fundamental shift opened the door for much better virtualization – and the potential for a much wider user base. With Intel processors and the addition of "Boot Camp" – which allows a user to boot their Mac into the Mac OS or Windows – Windows can run natively, virtually as fast as on a PC.

Now my Mac connects with any network, any printer, and any computer. Share documents and spreadsheets with a PC? No problem. Want to print to that shared printer? Print away.

ENDING THE SOFTWARE DIVIDE

Another misconception is a perceived lack of software for Macs. While it is true that many specialized programs are still Windows-only, there are plenty of Mac titles that cover the spectrum. What about those special Windows-only programs? Run them on your Mac with a virtual machine.

Even better, with a copy of Parallels (www.parallels.com) or VMWare, (www.vmware.com/products/fusion) you can run Windows right alongside Mac OS X. Both programs include the option to run Windows in the background and integrate running Windows applications into OS X – a window with Safari (Mac's web browser) and another with Outlook can run next to each other. I do this every day at work, and it really does work well.

PLUSES AND MINUSES

There is a benefit to running Macs in the office as well. Due to the design of the OS (and its still smaller market share) there are yet to be any viruses or spyware written for the Mac platform. No more long nights decontaminating a studio computer.

That said, those considering a mixed environment should run an antivirus on your Mac anyway. It is easy to inadvertently forward a Windows virus to someone through your network. The few Mac antivirus utilities out there do scan for Windows viruses, thus protecting other users on your network. I personally use VirusBarrier X5 (www.intego.com) on my machine.

There are some downsides to Macs, including price; Mac hardware is usually much more expensive than PC hardware.

On the other hand, in an office environment the savings come in maintenance. Since Apple designed the OS and the hardware, there are no problems trying to find drivers – and OS upgrades are never frustrated by hardware incompatibilities.

Another issue is the learning curve. While Macs are easy to use, there are many things that operate differently; it took me several weeks to fully understand how OS X works. However, once you get past the basics, you will find out that OS X is very well thought out and easy to use.

All-in-all, there is absolutely nothing wrong with a well built and cared for Windows machine. They serve me well. So if you are looking at replacing computers, why not take a look at a Mac? You will be surprised at how far they have come.

Chris "Doc" Tarr, CBRE, CBNT, is the Director of Engineering for Entercom in Milwaukee and Madison, WI. You can contact Chris at ctarr@entercom.com

Can do.

CODECS

Zephyr / IP (Rackmount)

NEW

Zephyr / IP (Mixer)

Featuring ACT™ – Agile Connection Technology, which continuously monitors the connection, adjusting the buffer and bit rate to compensate dynamically for network conditions. Zephyr/IP does so automatically without audible artifacts to keep delay as low as possible and quality high while maintaining a rock solid connection. Also available in a mixer version.

Xstream

The Best Way To Hear From There™

Xport

The "Go Anywhere" Zephyr

HYBRIDS

Nx12

The Nx12 is our most powerful performer, setting new standards for studio telephone interface systems. It gives you the latest hybrid technology and audio processing by Omnia for the cleanest, most consistent call quality ever. Even on VoIP and cell phone calls, so common in today's talk show environment.

ONE x Six

Six Lines No Waiting

Telos One

Ideal Interface Solution

Telos Two

Advanced ISDN Hybrid

2101

Whole-Plant Solution for Large Studio Complexes

CONTROL

Desktop Director

Caller Management Simplified

Call Controller

Easy, Cost Effective Screening

Switch Console

Control As You Like It

Console Director

Smooth Integration with Nx12 and 2101 systems for Axia Element Owners

SOFTWARE

ProFiler

Multi Channel, Multi Streaming Audio Archiving

NeoScreener

Advanced Call Screener Software

Telos

AUDIO | NETWORKS

www.Telos-Systems.com

Field Guide — Telco and Codec

The JK Audio BluePack

by Eric Leonard

The BluePack is the latest must-have bit of radio reporter gadgetry from Joe Klinger's JK Audio. Smaller than JK's previous cellphone interfaces – and wireless – it has already proven itself invaluable in my field reporting in Southern California.

SIMPLE AND CAPABLE

The BluePack combines a microphone preamp, audio mixer, and powerful headphone amplifier with the innovative cable-free Bluetooth interface that connects to virtually any cellphone.

The Bluetooth link eliminates the need to carry a dedicated headset-jack-to-interface cable. Guided by the manual's well-described procedure, pairing the BluePack with a cellphone takes just a few seconds. Once paired, the BluePack memorizes the link to your cellphones, so it can make a call and connect quickly.

The front of the BluePack has only a few simple controls and indicators: three small, protected thumbwheels control microphone gain, line-in gain, and the headphone volume; a red LED shows power, another indicates peak audio level, and a single blue LED flashes with varying frequency to show Bluetooth status.

The case is formed from metal with a bomb-proof belt clip on the bottom and a 9-Volt battery tray on the side.

The back of the BluePack includes a single XLR microphone input, a pair of 3.5-mm jacks for line-level input and output, and a stereo 1/4-inch jack for headphones.

AN EXCELLENT ENG UNIT

I pressed the BluePack into service the very day I picked it up. A Metrolink commuter train had collided head-on with a freight train in the San Fernando Valley, and our news team had to get to the scene – and on the air – as quickly as possible.

Police had closed the streets so reporter Aron Bender and I knew we would have to leave our RPU-equipped trucks behind and hike into the location. Additionally, rescue helicopters were landing and taking-off as firefighters used power tools to cut through the metal skin of the passenger cars.

JK Audio's BluePack

Noisy situations like that make live-reports on a cellphone difficult; few handsets can deliver loud, clear audio – especially when the cell phone and cell-network's echo-cancellation systems are at work. Nevertheless, the BluePack enabled me to bypass the cell phone's auto-gain audio circuits and monitor a perfectly clear pre-delay feed from the radio station – despite the din of rescue workers around me.

CLEAR PHONE INTERVIEWS

In less chaotic situations, I have been using the BluePack to record incredibly clear telephone interviews in the field.

The stereo line-out jack includes the BluePack's "send" microphone and line-in audio on the left channel and the "return" audio from the phone call on the right channel – with no crosstalk.

This can produce a perfect two-channel recording with my audio and the phone audio completely separated (just like a landline hybrid) and ready to edit.

OPERATING TIPS

Here are a few tips to help you get the best quality:

If possible, use a cell phone that allows the user to vary the Bluetooth audio output from the phone, because while the BluePack enables the user to adjust the overall headphone volume, it does not have a control for the incoming Bluetooth feed from the phone (my iPhone works great for this). Otherwise it may be difficult to find a good balance between the "local" and "return" program in your ears.

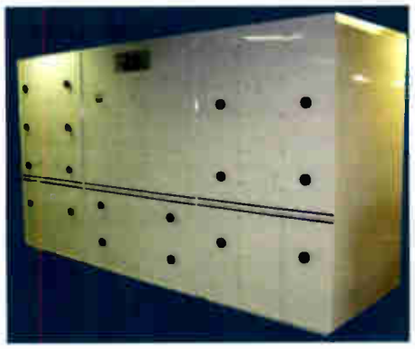
Secondly, pay close attention to the red "peak" LED on the front of the BluePack. While there is plenty of microphone gain available, it is easy to overdrive the audio sent to the cell phone over the Bluetooth link. I adjust the level so I can see the LED flash, then turn the gain down a bit so the LED does not illuminate, and the audio sounds great.

Finally, make sure your cell phone has "line of sight" to the BluePack while you are on the air. Although the Bluetooth link will stay connected at considerable range, I have found there are bits and pieces of audio garbled and dropped when the phone and the BluePack are separated by an object (or me).

KFI takes great care to use only the best quality audio in our news reports. When I need to do cell phone live shots, the BluePack delivers.

Eric Leonard has been a field reporter for KFI AM-640 in Los Angeles since 1995. He can be contacted at ericleonard@clearchannel.com

AM Antenna Solutions



Directional Antenna Systems

Diplexer/Triplexer Systems

High-Power Antenna Tuning Units

RF Components

LBA Technology - your trusted supplier of digital engineered AM antenna systems. LBA customized products include:

- **Directional Antenna Systems**
- **ATU's**
- **Multiplexers**
- **Combiners**
- **Cellular/PCS Colocation**
- **Isolators**
- **RF Components**

We offer complete RF project design, management, procurement and installation services.

LBA enables thousands of broadcasters in the US and worldwide to:

Factory Dealer For:

COMET · JENNINGS · SCHOMANDL · KATHREIN · TOMCO

OVER 45 YEARS EXPERIENCE IN AM

Reach Farther, Sound Better!

LBA TECHNOLOGY, INC.

3400 Tupper Drive, Greenville, NC 27834
800-522-4464 / 252-757-0279 Fax: 252-752-9155
LBATech@LBAGroup.com

www.LBAGroup.com

SINCE 1963

Telos Zephyr and The Remote in Paradise

by Jim Hibbard

When I first got the call to engineer a remote for The Dan Patrick Show – halfway around the world for the 2009 *Sports Illustrated* Swimsuit photo shoot, I did not have to think twice. A few days at the incredible Raffles Resort in the Grenadines with Dan and some beautiful models would be a great story to tell my future grandkids. Every guy I know offered to pay me to be my assistant, including my teenaged son!

GEARING UP TO GO

The first thing was to choose remote gear that could work on a DSL speed Internet connection. I did some Internet research, and with what I saw at the NAB Radio Show in Austin, Texas, I called Telos Systems.

The Zephyr/IP Mixer

Telos has a new box: the Zephyr/IP Mixer. We sent a rack unit to the east coast master control studio, and a portable mixer unit came to me in California, so we could set up and test prior to traveling.

SETUP

There are four windows on the Ethernet/Livewire setup page where you enter the IP address, IP Mask, Gateway, and DNS Server information. Once you figure out what goes where, the setup is easy.

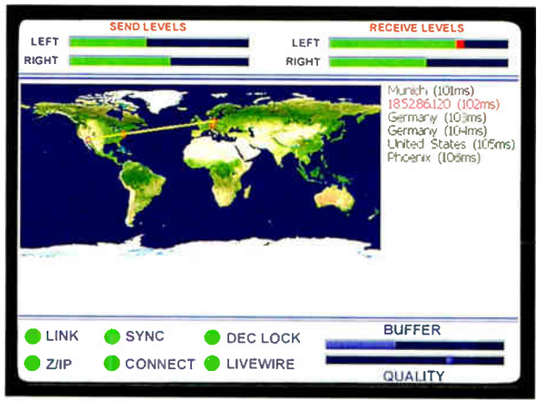
Knowing that I was traveling to a remote island with who-knows-what kind of IT department, I brought along a small D-Link router. This turned out to be the smartest decision ever. I set up the IP parameters of the D-Link router in the four windows of the Zephyr/IP Mixer. This enabled me to move from one ISP to another without having to set up the Zephyr again. There is some additional setup that is a bit time-consuming, so this is not a unit that can be configured on the fly the first time out.

To make the Zephyr easier to use, Telos has a proprietary network – called Z/IP – that is in my words: "a clearing house or broker" that will put you in touch with anyone in the address book in the Z/IP Network. Just add your name to the 'Buddy List' and it shows up on the network. Using the Z/IP Network especially works well when working with unknown firewalls, daisy-chained switches, and routers. When you see the Z/IP icon light you know you are good to go.

MAKING THE CONNECTION

Once our remote unit was connected to the Telos test line and we confirmed that everything was ready to go, our local contract engineer Carl Osgood entered the studio IP information on his unit in the studio. We had a static IP address available, but did not end up needing it.

We named both units at their respective locations and added them to the Buddy List. Connecting the units is as simple as going to the Buddy List, highlighting a name and pressing the 'OK' button. In an instant, the machines are talking. In the window, you then see a map of the world that shows the path of connections between the two Zephyrs, a list of states, and in our case, a list of countries with the path time in milliseconds.



The Zephyr/IP display provides plenty of information.

This is a pretty amazing bit of technology.

THE MIXER AND CODECS

Within the Codec menu, Telos has a list of Codecs including AAC-ELD, AAC-HE, MPEG Layer 2, G.711, and G.722, as well as Linear PCM. We used AAC-HELO, a low delay codec that worked well for a three-hour talk show with lots of phone calls.

The mixer section is just like the one in the Telos Zephyr Xstream MXP. It has a four-channel mic/line mixer with four headphone outputs. Monitor 1 was used for Dan's headphone feed; Monitor 2 controls headphones 2, 3 and 4. Each monitor mix has a balance control between send and receive audio.

(Continued on Page 32)

MT-MR Platinum STL System

Why the MT-MR Platinum?

-For its **excellent quality-price** value.

-For its **adjustable transmission power** output from 0 to 20W for any selected operational frequency.

-For its **double conversion receiver** that makes it apt for **digital codification** (Up to 4 audio channels).

-For being **digitally synthesized** in 20 MHz operational band for frequencies from 150 MHz to 960 MHz.

-For the fact that **both the transmitter and receiver can measure the modulation percentage and pilot signal level** (19 KHz stereo without disconnecting the audio from the transmitter).

-For its **remote control**.

-For its **analog telemetry**.

-For being made for **mono or stereo (MPX) signal**.

-For its **capability to work with AC power voltage from 90 to 250 V, 50/60 Hz**, and also with external battery if needed.

OMB, the Future of Communication

OMB AMERICA
phone. (305) 477-0973
(305) 477-0974
fax. (305) 477-0611

3100 NW 72nd. Ave. Unit 112
MIAMI, Florida 33122 USA
http://www.omb.com
usa@omb.com

Continued from Page 30

Telos Zephyr and The Remote in Paradise

In addition to the headphone outputs, there are two XLR outputs (running the same mix as Monitor 2). I used this output to record the show on my laptop. AES/EBU input and output are also on the unit.

READY ON SITE

I had allowed two days for setup because I had no idea what to expect when I arrived on the island. I took 250 feet of CAT5e in case we needed to move from the location the resort had planned for us.

As it turned out the actual remote setup was in the bar next to the restaurant overlooking the pool and the beach. I really only needed about two hours on site. The local IT guys had an Internet drop for our router along with a POTS line (for our backup unit) ready when I arrived, so setting up was very minimal. Because I had pre-configured the Zephyr to the D-Link, all we had to do was plug it in and it was ready to roll.

The resort IT guy had sent a picture of the 240 VAC power connector ahead of time so I could be sure to take some of the correct adapters. We used a couple of step-down transformers to drop the 240 VAC to 120 VAC for the computers, cell phones, and the backup gear. The Telos Zephyr IP Mixer itself uses a switching power supply that will handle 120 VAC to 240 VAC.

I used a split for the three microphones that went both to the Zephyr IP Mixer and the other remote unit. We had four sets of headphones and two laptops (one for Dan's Internet and instant messenger for call screening, the other laptop was for me to check my e-mail and record the show).

The system was up and running in minutes.

Back at the studio, Carl Osgood was on hand to assist Dan's producers, Paul Pabst and Patrick O'Connor, making sure all the boxes were "talking" and setting up the microphone gain.

MAKING IT HAPPEN

The simplicity of the Telos Z/IP Network made the Zephyr my first choice for our IP unit. As a backup, I did take along a POTS remote unit for connection in case the IP went down for any reason – to cover the uncertainty of being in a foreign country. However, everything worked flawlessly over the Zephyr/IP, so the backup unit was not needed.

During the remote broadcast, we took several phone calls, which were received and screened at the studio. One particular call really showed the capabilities of the system. While Brooklyn Decker was on the air with Dan (following her 5:30 AM photo shoot), they called Brooklyn's fiance, Andy Roddick, who was in China for a tennis match.

Without a hint of delay, it was a perfect exchange with Dan and Brooklyn in the Grenadines, Andy in China, and Paul in the studio. For the average listener this may be no big deal but, technologically, it was pretty cool.

Dan Patrick and Brooklyn Decker spanning the world via the Zephyr/IP.

A SUCCESSFUL REMOTE

Aside from the two days it took each way to get to and from the island from California, the two-day remote went flawlessly. Just like the show from the studio, guests called in, talked to callers, and Dan Patrick and Paul had their banter with quick back and forth discussions.

Impressively, using the Zephyr/IP Mixer our link never dropped in almost four days. The only snag was with the soft carry-on bag for the Zephyr/IP Mixer. With increased restrictions by airlines, there were some hassles getting on some aircraft, as it is too big to fit under the seat, and often times overhead bin space is limited.

Next year, I am going to take a hard-shell case and more sunscreen.

Jim Hibbard, President of Pacific Mobile Recorders, is a studio designer and systems integrator, and chief engineer of The Dan Patrick Show. He can be contacted at jim@pacificmobilerecorders.com

Station Stories

North of the Border, Canada Boasts a Long Radio History

by Scott Fybush

Radio broadcasting as we know it began November 2, 1920 at KDKA in Pittsburgh, right?

Not quite. The research of many broadcast historians in recent years has given the lie to that claim. Articles here in ***Radio Guide***, at www.oldradio.com, and elsewhere have laid out the claims of other pioneering broadcasters such as KQW/KCBS, WHA and 1XE/WGI. But radio was also active outside the US.

EARLY VOICES

Our neighbors (or neighbours, as they spell it) north of the border have their own claims to radio primacy, too – going all the way back to 1901 and Marconi's (possibly apocryphal) transmission of the Morse letter "S" between Cornwall, England and Signal Hill in St. John's, Newfoundland.

Flash forward a decade, and Marconi is once again the name at the center of Canada's entry in the first-on-the-air sweepstakes. Just before the outbreak of World War I, the Marconi Wireless Telegraph Company acquired the rights to Reginald Fessenden's patents for wireless voice transmission. As early as 1918, Marconi's Montreal office was making transmissions that would be recognizable today as "broadcasts," and by 1919, those transmissions were going out under an experimental broadcasting license with the call sign XWA.

Just as Frank Conrad would do the following year in Pittsburgh, the Marconi engineers worked out a deal with a local record store to supply music in exchange for promotional mentions. And as early as May 20, 1920, XWA was broadcasting scheduled, publicized programs, including one that was heard as far away as a hotel in Ottawa.

REGROUPING

Alas, the Canadian claim dissipates a bit after that May 20th broadcast. While experimental broadcasts continued sporadically through the rest of 1920 and 1921, and while additional experimental stations as far west as Winnipeg opened later in 1921, it was November 4, 1922 before XWA was transformed into a fully licensed broadcaster, operating with 500 Watts on 440 meters under the new calls CFCF, which would later be said to stand for "Canada's First, Canada's Finest."

While commercial broadcasting exploded across the United States in the next few years, Canada's broadcasting environment moved in a slightly different direction, as a handful of fledgling commercial stations were soon joined by a powerful national network under the aegis of Canadian National Railways, the quasi-governmental operation that was, at that point, one of the chief links tying Canada's far-flung population together.

CNR's radio network began in quintessentially Canadian fashion, by leasing time from existing broadcasters to create what were known as "phantom stations." This relatively low-cost means of broadcasting thrived in Canada in the twenties and early thirties, allowing numerous "stations" to exist in cities that boasted only one or two physical transmitting plants.

In CNR Radio's decade of operation, it owned only three actual stations, CNRA Moncton, CNRO Ottawa and CNRV Vancouver. By 1933, a change in government produced a change of status: CNR Radio was nationalized as the Canadian Radio Broadcasting Commission (CRBC), which in turn became the CBC in 1937.

THE CBC

With a significant government investment in facilities, the CBC quickly began trading the patchwork network of leased facilities used by CNR Radio and the CRBC for a new web of full-powered transmitter sites in major Canadian cities. It was not always done gently.

In some areas, the CBC bought out commercial operators. For example, in Winnipeg, the Manitoba Telephone System was persuaded to sell its CKY (990) to the government network after the CBC, which was also the national broadcasting regulatory agency, denied the station permission to boost power to 50,000 Watts. To the west, in Alberta, commercial station CFCN in Calgary lost its home on 1010 to the CBC, which put station CBX (later CBR) on that frequency from a site at Lacombe, halfway between Edmonton and Calgary.

(Continued on Page 36)

Your passion for creating great radio got you where you are today. Now it's time to take advantage of the techniques and technologies at the NAB Show to ensure your programming will be heard everywhere your listeners are tomorrow. This is the ultimate venue for exchanging strategies and identifying sound solutions at the global level. And the smartest way to guarantee the programming you create reaches more consumers — at home, at work and at play.

At the NAB Show you'll find virtually every innovation driving production, editing, programming, transmission, ad sales and new media solutions for your thriving radio enterprise. Visit the unparalleled exhibit floor to see, touch and test advanced technologies that enable HD, live audio streaming, video archiving/streaming, revenue-generating web sites and more. Then experience a wealth of hands-on educational opportunities presented by top talent, producers, advertising managers, PDs and web developers, the stars influencing today's best radio content.

Join professionals who share your passion for radio excellence at the NAB Show this year. For more information, visit **www.nabshow.com**.

NABSHOW™

Where Content Comes to Life™

FREE Exhibits Passport
Use code A530 when registering online

Conferences: April 18–23, 2009 / Exhibits: April 20–23
Las Vegas Convention Center / Las Vegas, Nevada USA
www.nabshow.com

Station Stories

North of the Border, Canada Boasts a Long Radio History

– Continued From Page 34 –

Similarly, CFRB in Toronto was denied a power increase to 50,000 Watts on its Clear Channel frequency of 860 as the CBC forced a swap that moved the commercial station to a more crowded frequency, 1010, so that the CBC's CJBC could occupy the 860 frequency.

Another Toronto signal, CBL, traced its history back to one of CNR Radio's early phantom stations. CNRT in Toronto had leased airtime from 500-Watt commercial station CKGW, the voice of the Gooderham & Worts distillery. (Because of limitations in CKGW's signal reach, the CNR also leased time on a second commercial station, CKNC, later known as CNRY, CRCY, and CBY; finally as the flagship of the CBC's new Dominion Network in 1944, it would change calls once more to CJBC.)

CBC's Hornby, Ontario site.

A SHOWCASE IN TORONTO

In 1937, CBC engineers built a showplace transmitter facility at Hornby, Ontario, some 25 miles northwest of downtown Toronto, initially for the use of its new Toronto flagship, CBL on 840. In the process, they created what would become the first site in North America to be shared by two 50,000-Watt stations.

When the Hornby site opened on December 24, 1937, CBL immediately became the most technologically advanced station in Canada. Visitors were welcomed to the then remote site to tour the Art Deco building; a gallery overlooked the transmitter room from behind sweeping stainless-steel railings. Out back, a 645-foot tower was then the tallest in Canada and one of the tallest in North America.

NARBA STRENGTHENS THE CBC

With the implementation of the NARBA treaty in 1941, the landscape changed dramatically in the CBC's favor. CBL moved from 840 to 740, a newly-cleared Class I-A channel. Another new Canadian I-A channel, 690, went to the CBC's French-language station in Montreal, CBF (previously on 910), as well as to its Vancouver station, CBU. (690's prior occupant, Toronto's CJBC, was displaced to 860, and then, as noted earlier, to 1010.)

At the same time, Montreal's English CBC station, CBM, slid up the dial from 910 to yet another new Canadian Clear Channel, 940. A fourth Canadian Clear Channel, at 1070, was occupied by the CBC's 50,000 Watt outlet serving the Maritimes, CBA, operating from the plant at Sackville, New Brunswick that would soon become the home of the CBC's international shortwave broadcasts as well.

By 1948, the CBC's domination of the Canadian AM dial was complete. With CFRB relocated to a new directional facility on 1010, CJBC moved in with CBL at Hornby, using the same 645-foot tower for its own 50,000-Watt non-directional signal.

While numerous commercial stations would gradually raise their own powers to 50,000 Watts in the fifties, sixties, seventies and eighties, few enjoyed signals comparable to the big CBC outlets from coast to coast. Instead, they usually relegated to facilities that were often highly directional in order to avoid interference to co-channel stations in the U.S.

Remember CFCF? Even though it could trace its heritage back deep into the earliest mists of Canadian radio history, the Marconi station was broadcasting with just 500 Watts as late as 1950, when it was finally

(Continued on Page 38)

Station Stories

North of the Border, Canada Boasts a Long Radio History

– Continued From Page 36 –

granted belated permission to increase power to 5,000 Watts on 600 – and even then, the signal came from a four-tower DA-1 antenna system south of Montreal, limiting coverage to Montreal and the sparsely-populated area to its north.

FM COMES OF AGE

The CBC's AM dominance would last barely half a century. The first cracks came as early as 1977, when CBH in Halifax, Nova Scotia added an FM relay to its AM 860 signal, which was challenged by a tight directional pattern. To the north, CBCT in Charlottetown, Prince Edward Island signed on the same year as the CBC's first FM-only outlet.

The move to FM began accelerating in the late eighties, with some AM stations literally shutting down and moving to FM. 1988 saw the closure of CBD in Saint John, New Brunswick. In 1989 CBH's AM signal in Halifax signed off, followed a year later by the move to FM of CBQ in Thunder Bay, Ontario.

As more Canadian listeners began moving to FM in the big cities, the CBC at first began to look for ways to move its biggest AM signals over to FM. Toronto's CBL lived to see its sixtieth birthday, but not much more: by the time that mark rolled around in the fall of 1997, CBL had won permission to shut down 740, replacing it with a new FM signal on 99.1 in Toronto and three more new FMs in outlying areas.

CBL ran a pair of Continental 317C transmitters.

Matched pairs of Continental 317 transmitters served CBL on 740 and CJBC on 860, by then carrying the CBC's French-language Radio-Canada service. Out back, the 1937-vintage tower had been replaced in the early nineties, though the base of the tower was preserved as a sort of monument out front.

In April 1998, the CBC officially turned on the new Toronto FM signal. At Hornby the massive transmitter hall remained, trimmed out in Art Deco stainless steel and glass block, though its contents were changing.

Then, on June 19, 1999 CBL fell silent on 740. As current and retired engineers gathered at the Hornby facility to mark the occasion that night, they celebrated in surroundings that had changed little since the CBC built the plant in 1937.

June 1999 brought the end of an era at CBL.

BAND SWAPPING ACCELERATES

Over the next decade, the CBC would move AM services to FM in most of Canada's other big cities as well. In some, it received permission to close down its venerable AM transmitters; in others, including the major western cities of Winnipeg, Calgary, Edmonton, and Vancouver, it was granted "nested" lower-powered FM signals to supplement the AMs that remained.

(Continued on Page 40)

Station Stories

North of the Border, Canada Boasts a Long Radio History

– Continued From Page 38 –

Three AM closedowns are of particular note: in New Brunswick, 50,000-Watt CBA had moved from the Radio Canada International site in Sackville to a new site closer to Moncton in December 1968. Not quite 40 years later, on April 7, 2008, that site fell silent as CBA moved to FM.

In Montreal, as in Toronto, the CBC had operated two 50,000-Watt signals – English-language CBM on 940 and French-language CBF on 690. In 1978, both stations moved from their separate transmitter sites to a new joint site at Brossard, east of Montreal.

At Brossard, 690's non-directional signal and 940's directional signal shared the main 585-foot tower, while 940 also used the 367-foot second tower to form its array. That site lasted barely two decades, being silenced briefly by the big ice storm of 1998 and then for good a year later, as CBF and CBM left the air to be replaced by FM services.

While CBA's 1070 channel has yet to be reused, the Class I-A channels in Toronto and Montreal did not stay silent for long.

BUILDING BACK ON AM

In Toronto, 740 was soon allocated to CHWO, an adult-standards station in suburban Oakville that had been operating on 1250. Its rebirth as "AM 740" in 2000 found an audience all over the eastern U.S. and Canada, as the big 50,000 Watt signal from Hornby lit up with the sounds of Peggy Lee and Frank Sinatra.

CHWO lights up 740 again.

CHWO (now known as CFZM) contracted with the CBC to provide transmission services from the old Hornby site, which had remained active for the French-language signal, CJBC 860. A decade after CBL's move to FM, the Hornby site is going strong. In January 2007, CHWO replaced the aging Continental 317Cs, which had been used in an alternate-main configuration, with a pair of Nautel XR50s. The new owners also added some more aggressive audio processing, installing an Optimod 9200 to replace the minimal processing the CBC had used.

CLOSING AN HISTORIC LOOP

In Montreal, meanwhile, our story comes full circle. When the 690 and 940 frequencies became available in 1999, they were reallocated to two Montreal AM stations with lesser signals. The French-language 690 facility went to Metromedia's CKVL, which had been operating with 50,000 Watts by day and 10,000 Watts by night on 850. On its new fulltime 50,000-Watt home, CKVL was renamed CINF, "Info 690," becoming Montreal's first French-language all-news station.

And 940? It went to CKVL's English-language sister station, CIQC, which became CINW, "940 News," on its new 50,000-Watt home. That move quietly rectified a long injustice, for CIQC, with its 5,000 Watts on 600 kHz, had changed its calls back in 1991 from ... CFCF.

So after eight decades on the air, Canada's first radio station had at long last reached its full 50,000-Watt potential, transmitting from the same array (four 282-foot towers near the Kahnawahke Indian Reserve south of Montreal) that had been used since 1956 by CFCF/CIQC. CINF on 690 shares that facility as well, leaving the old CBC facility at Brossard vacant but still standing at last report.

Today, the station known variously as XWA, CFCF, CIQC and CINW is owned by Corus Entertainment and programming oldies as "AM 940, Montreal's Greatest Hits," quietly continuing a broadcasting tradition that stretches back over 90 years to Marconi's Montreal laboratories and the birth of radio in Canada.

Scott Fybush is a regular contributor to ***Radio Guide*** *and publisher of a yearly calendar of various tower sites. For more information contact him at scott@fybush.com*

Survival Guide

Be a Shortcut

by Scott Halford

"If we want to deserve more, we have to provide more."

– Nido Qubein, author, speaker, and president, High Point University

A sort of "Business Darwinism" is taking over in most organizations – survival of the fittest – as excess is trimmed and only the *necessary* survive.

This means companies are making decisions about who will keep the organization afloat during lean times, and now, more than ever before, employees have the ability to secure their own futures. That is, if they are those who are the indispensable, go-to resource their company cannot live without: a Shortcut.

These are not shortcuts of the easy-way-out variety, dispensing shoddy quality or questionable ethics, but rather Shortcuts with a capital "S" – professionals their company cannot live without. During these scary times it makes good sense to see if you are a shortcut.

WE NEED YOU!

Employees are being asked to do the added work of those laid-off in this recession, adding stress to their lives. Shortcuts are the ones called upon because they were willing, during better times, to work at vaious things very passionately and personably.

Enter you – the Shortcut. You become consistently good and gracious at what you do and others trust you. You predict the boss's needs and then exceed them, a resource and sometimes a reassurance as they wade through the piles of things at which they need to be effective.

THE SHORTCUT FORMULA

There are a few simple things to consider in terms of being an invaluable Shortcut. Here is the first part of the formula. People use Shortcuts most when:

1. They do not have enough *time*.
2. They are lacking *talent* or skill in a needed area.
3. Their *desire* to do something is low.

The other part of the formula is when, as a Shortcut, you make other's lives:

4. *Easier*, because they do not have to do the legwork.
5. *Better*, because the quality of their life goes up, or they look good to those they wish to impress.
6. More *money*, because they make more money.

Frame your job in a way that it addresses this part of the formula and your influence and value go up. Of course, you have to add a big dose of positive attitude and emotional intelligence that make dealing with you such a pleasure.

BE "THE EXPERT"

The Shortcut is the go-to person in his or her own little corner of an industry who can find and distill the right information at the right time to the right people in the right way.

These people create the lives they want because they have done something the average person is not willing to do: They commit themselves deeply and strive to become experts. They essentially become the Google of their business.

BE EMOTIONALLY INTELLIGENT

Shortcuts also have high emotional intelligence (EI), being able to deal well with the day-to-day hassles and adverse events that come your way. Those who do not cope well usually have bad attitudes and inappropriate approaches to even the simplest requests. There is nothing worse than a really smart person who makes another feel like an idiot.

Shortcuts understand their purpose in life is not to show off their knowledge and expertise, but rather to use them to teach others and to create simplicity in other's lives. In doing so, they use excellent common sense and the social graces that make them magnetic. All things equal, most people will use a subject matter expert who exhibits excellent emotional intelligence in difficult situations over the creepy expert who blows his top over a simple request for services.

Be a Shortcut. When you are, you will build the life you want because you are giving time and peace of mind back to others so that they can build the life they want. In this economy, that is the surest bet you can make.

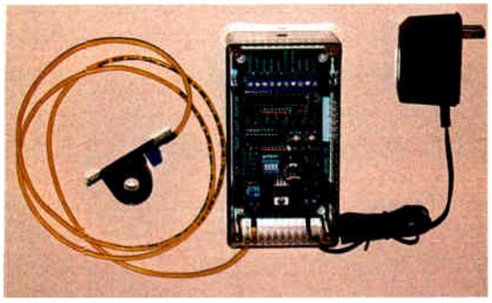
Scott Halford is the author of "Be A Shortcut: The Secret Fast Track to Business Success," (Wiley; January, 2009) which helps individuals become the professionals their company cannot live without. Scott is a leadership consultant and keynote speaker with nearly 20 years specializing in emotional intelligence, critical thinking and the principles of influence. For more information or to find out if you are a Shortcut, go to www.BeAShortcut.com and take the Shortcut Quotient Inventory (SQI).

Service Guide Radio Equipment Products and Services

Service Guide Radio Equipment Products and Services

TLM-1 TOWER LIGHT MONITOR

Avoid Costly FCC Fines for Lighting Violations!



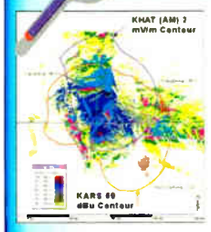
A microprocessor based system designed to monitor the status of FAA type A incandescent tower lights.

- Individual alarms for photocell, flasher, beacon & marker.
- General alarm output for any failure type.
- Status outputs for lights on/off and beacon on/off.
- LED indicators for each alarm and status output.
- Opto-isolated failsafe outputs for each alarm.
- Easy setup – one button calibration.
- Installs inside the transmitter building.

FM Services

www.towermonitor.com • 336-667-7091

rf Investigator V 3.0



FM...AM...or Both

You choose!

rfSoftware, Inc.

innovative engineering tools

Are you tired of switching from program to program to complete a project?

How about displaying your drive test output on top of your Longley-Rice prediction to SEE how your station is operating.

Save *time, money, and hard drive space,* with software that gives you all the tools in one program to work *smarter not harder.*

Call 352-367-1700 for Details!

Visit www.rfsoftware.com Today

MOORETRONIX

BROADCAST & INDUSTRIAL ELECTRONICS

Our 7th Year

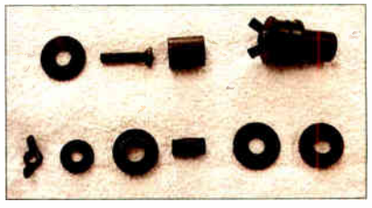
Our client list continues to grow. Thank you for your confidence and equipment purchases.

We Re-Condition

Pacific Recorders BMX I-II-III, AMX, ABX and RMX, Stereo-Mixer and Mixer News-Mixer products.

We have replacement Wind Screens and Blast Filters for the SM-5B microphone.

We now have SM-5B hanger hardware as shown in the photo.



See the "News-Update" page at our website.

Tel: 800-300-0733 Fax: 231-924-7812

WWW.MOORETRONIX.COM

RECEIVERS

OUTSTANDING specifications and pricing on professional quality receivers for **EAS**, station monitoring and translator applications.

The **AFC3** is a three receiver rack mount that is configured for your **EAS** or monitoring specific application.

Our **AF210FM** receivers meet today's Translator application specifications for reliability, linearity and cost.

DAYTON INDUSTRIAL CORPORATION

2237 Industrial Blvd., Sarasota, FL 34234 Tel: (941) 351 4454
Quality Receivers Designed and Manufactured in the USA
Email: sales@daytonindustrial.com Website: www.daytonindustrial.com

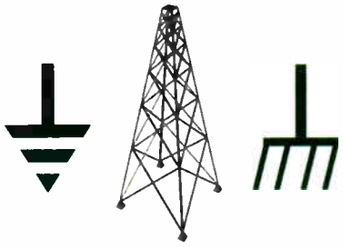
Radio Works R. F. Consulting

Broadcast & Communications Design & Repairs
Grounding Systems Design Assistance
Coaxial & Wave Guide Systems Testing
Communications Industry Testing from 100 kHz to 20.0 GHz

Gary A. Minker

Office (561) 969-9245 • Iden 159*61*1957
7225 Catalina Isle Drive, Lake Worth, FL 33467
Email: Gary@radioworksrfconsulting.com

Please visit our Web Site to download an article on Grounding Methods
http://radioworksrfconsulting.com/download.htm



Celebrating Our 27th Year Serving Our Customers

TOWER SIGNS

FCC COMPLIANCE
STANDARD FCC OR MADE TO ORDER SIGNS
FCC TOWER REGISTRATION SIGNS
BEST QUALITY - NO FADING - NO EXTRA COST

RED GUY WIRE MARKER BALLS
GUY WIRE PROTECTORS
BIRD MARKERS COAX TAGS

antennaID@msn.com

REQUEST FREE CATALOG

ANTENNA ID PRODUCTS
antennaID.com
610-458-8418

Professional Equipment Repair

- Consoles
- Exciters
- STLS
- Automation Systems
- Audio Processors
- Transmitters
- Remote Equipment

at Lightner Electronics, Inc.

Toll Free: 866-239-3888
www.LightnerElectronics.com

www.digitalradioengineering.com

Phone: 845-355-4001

digitalradio engineering

Professional Broadcast Engineering Services

Consulting • Project Management • Contract Engineering
FCC Alternative Inspections • Due Diligence Inspections
Engineering Staff Oversight • Engineering Staff Assistance
Facility Inventory • Broadcast Equipment Acquisition
New & Pre-owned Broadcast Equipment Sales

McPherson Radio

Specializing in pre-owned QEI transmitter products.

QEI – *6 Month Warranty* – QEI

All equipment tuned and tested on your frequency. MRC has a repair facility to meet your broadcast needs, for repair of QEI exciters and low power transmitters. Other broadcast manufacturer products are welcomed too.

Bob Brown at 856-232-1625 Fax: 856-232-2075
Email: mcphersonradio@comcast.net

Radio Pipeline

New Equipment

Updates and Modifications

Industry Information & News

Broadcast Electronics – BW Broadcast – Nautel – SCMS

BE Announces Affordable Line of Low Power FM Transmitters

Broadcast Electronics (BE), Inc. announces a low-power FM transmitter line, scalable from 1kW to 5kW with integrated FM exciter.

"This transmitter is the direct result of our customers coming to us and asking for an affordable, reliable FM transmitter that could scale up or down in power as needed," said Tim Bealor, BE Vice President, RF Products. "In addition to ease of installation and maintenance, the STX LP requires much less rack space for total overall lower cost of ownership."

As the only scalable, frequency-agile LPFM transmitter with built-in exciter at the sub $7,000 price point, the STX LP transmitter is of interest to independent broadcasters who are implementing low-powered stations.

BE supplies full turnkey systems, from solid-state 60W to single-tube 100kW operations and for a variety of applications. Its newest transmitter, the STX LP, is ideally suited to the needs of broadcasters who are starting low and medium powered stations or are requiring reliable, affordable backup to an existing facility.

Available in 1kW, 3kW and 5kW models, the STX LP transmitter fits a small profile and can be power upgraded in the field by simply adding PA modules. The STX LP includes IP connectivity for configuring and monitoring operation remotely from any laptop or PC, and is HD Radio compatible for eventual conversion to the U.S. iBiquity digital radio standard.

BE Adds to Sales and Tech Team

Tim White, formerly with Clear Channel, and Bryan Jones, formerly with CBS Radio, strengthen BE's commitment to excellence.

Effective immediately, Bryan Jones, most recently Director of Engineering for CBS Radio in Portland, joins BE as Western Region Sales Manager. Jones replaces Ellis Terry and expands the role of regional sales manager. He will represent BE's RF transmitters as well as BE's studio automation products and remain in Portland to effectively serve broadcasters in the western U.S.

In addition, Tim White, formerly Market Director of Engineering and IT for Clear Channel in Sarasota, Florida, has been appointed RF Technical Service Engineer. He comes to BE with 30 years of broadcast engineering experience.

Broadcast Electronics
217-224-9600 • www.bdcast.com

Nautel Expands Support Services with New Memphis Parts Depot

Extensive parts inventory at FedEx hub ensures fastest possible turnaround time for Nautel customers.

Nautel Limited has announced the establishment of a parts depot in Memphis, Tennessee. The parts depot is located minutes from FedEx's Memphis hub and allows expedited North American parts delivery to Nautel customers. This announcement follows on the heels of Nautel's recent expansion of customer service in its new Quincy Illinois office.

The company says the new parts depot will benefit all North American customers but Nautel customers in the West will especially appreciate the enhanced service. "Nautel chose Memphis for the location of its new parts depot because of its proximity to FedEx and other national and international shipping companies," said Kevin Rodgers, Nautel's Manager of Customer Service. "With this location, orders received up to 7:30 PM Eastern Time can be shipped for next day delivery."

"Nautel is investing in services to support its expanding base of customers," said Peter Conlon, Nautel CEO and President. "While other companies are trimming back in response to the current economic situation, Nautel continues to make investments in engineering, sales and support that are completely focused on our customers." The company now operates three support centers in North America: Hackett's Cove Nova Scotia, Bangor Maine, and Quincy Illinois. Nautel 24/7 service is accessible toll-free at 877-628-8353 or by live internet chat.

Nautel Limited
902-823-3900 • www.nautel.com

BW Broadcast Ships AM Version of DSPXmini

BW Broadcast has developed an AM version of its exceedingly popular entry-level DSPXmini processor.

Built on the successful DSPXmini platform, the DSPXmini-AM packs 4 bands of AGC, 4 bands of limiting and an anti-aliased clipper into a compact 1U rack.

Other features include adjustable low pass filtering to accommodate all AM standards, high frequency equalization, asymmetrical clipping, low frequency transmitter tilt compensation and a tone generator to facilitate easy installation and adjustment. A range of user presets and algorithms specifically optimized for AM processing will help make a station stand out with intelligibility and fatigue-free sound. With an RRP of less than $1,500, the DSPXmini-AM is the most affordable serious AM processor on the market.

BW Broadcast
www.bwbroadcast.com

SCMS, Inc. Announces Acquisition of Bradley Broadcast Sales

SCMS, Inc. today announced that it is in the process of acquiring the business of Bradley Broadcast Sales (a.k.a. Bradley-Matthews LLC).

The two companies signed a purchase agreement on Friday, December 19th and the deal was currently scheduled to close on Tuesday January 13, 2009. The terms and price were not disclosed. For now, the two companies have in place an interim operating agreement whereby Bradley will continue to deal with its customers by telephone and e-mail, but the orders will actually be shipped and billed through SCMS. Once the deal closes, Bradley Broadcast will function as a sales office of SCMS.

Bob Cauthen, President of SCMS, said that "Bradley Broadcast is a familiar name to many in the Broadcast industry, and their expertise with government and institutional customers will also bring additional value to SCMS. Art Reed and Bob Eburg will be manning the Bradley office (under the name, SCMS, Bradley Division) and will be serving the same customers they've been helping for so many years." Cauthen continued, "Bradley is one of the many small businesses that has been hit hard by the recent problems with the U.S. economy ... but by leveraging the existing warehouse, shipping, and billing operations at SCMS headquarters in North Carolina, Bradley will now be able to function more efficiently as a sales office."

This acquisition is another in a series of SCMS growth initiatives. Before acquiring Bradley Broadcast, SCMS acquired the Harris Broadcast Center in 2007, then in 2008 reached an agreement with Google to sell Google broadcast automation systems to broadcasters, and also is the U.S. broadcast stocking distributor for the Bird Technologies Group.

With the interim operating agreement in place, and ordering activities now being processed through SCMS, Bradley's existing parent company Bradley-Matthews LLC has now begun the process of an orderly termination of its business operations and expects to have concluded this process in February.

SCMS Now Stocking Bird Electronic

SCMS, Inc. is proud to announce an agreement with Bird Electronic Corporation of Solon, OH to become the Master Stocking Distributor for their broadcast products. This will include the new Signal Hawk Spectrum Analyzer and family of TPM Broadcast Power Monitors.

For more information on Bird products visit www.bird-electronic.com

SCMS Inc.
800-438-6040 • www.scmsinc.com

Final Stage

RADIO ROUNDUP

The Radio Guide Event Register

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

National Association of Tower Erectors – NATE 2009
February 23-26, 2009
Nashville, Tennessee
www.natehome.com

IBS International College Radio Conference
March 6-8, 2009
New York, New York
www.frontiernet.net/~ibs/2Kconvo.html

Michigan Assoc. Broadcasters & SBE-91 Convention
March 10-11, 2009
Grand Rapids, Michigan
www.michmab.com/conferences/glbc_main.html

NAB 2009 Spring Convention
April 17-23, 2009
Las Vegas Convention center, Las Vegas, Nevada
www.nabshow.com

NAB Radio Show 2009
September 23-25, 2009
Philadelphia, Pennsylvania
www.nabradioshow.com

Wisconsin Broadcast Clinic
October 13-15, 2009
Madison, Wisconsin
www.wi-broadcasters.org

Radio Guide Advertiser Info – Jan/Feb 2009

Advertiser - Page	Website
Altronic - 36	www.altronic.com
AM Ground Systems - 42	www.amgroundsystems.com
Armstrong Transmitters - 41	www.armstrongtx.com
Arrakis - 17	www.arrakis-systems.com
Axia - 25	www.axiaaudio.com
Bay Country - 40	www.baycountry.com
BEXT - 41	www.bext.com
Broadcast Devices - 39	www.broadcast-devices.com
Broadcast Electronics - 26	www.bdcast.com
Broadcast Software Intl. - 4	www.bsiusa.com
CircuitWerkes - 19	www.circuitwerkes.com
Comrex - 5	www.comrex.com
D&H Antennas - 40	www.dhsatellite.com
DM Engineering - 47	www.dmengineering.com
Davicom - 20	www.davicom.com
Econco Tubes - 38	www.econco.com
Fanfare - 43	www.fanfare.com
Freeland - 38	www.freeland-inc.com
Gorman Redlich - 41	www.gorman-redlich.com
Harbach (Peter Dahl) - 47	www.pwdahl.com
Henry Engineering - 2	www.henryeng.com
Inovonics - 1, 37	www.inovon.com
Intrinsicnet (MySine) - 32	www.plussine.com
Jampro - 37	www.jampro.com
JK Audio - 13	www.jkaudio.com

Advertiser - Page	Website
Kintronic Labs - 9	www.kintronic.com
LARCAN - 39	www.larcan.com
LBA Technology - 29	www.lbagroup.com
Lightner Electronics - 22	www.lightnerelectronics.com
Mainsource - 47	www.mainesource.us
Micro Communications - 43	www.mcibroadcast.com
Microwave Filter - 43	www.microwavefilter.com
Moseley - 23	www.moseleysb.com
Nautel - 11	www.nautel.com
NAB - 35	www.nabshow.com
OMB America - 31	www.omb.com
Omnia - 48	www.omniaaudio.com
Pristine - 8	www.pristinesys.com
PSI (Propagation Systems) - 24	www.psibroadcast.com
RAM - 30	www.ramsyscom.com
RF Specialties - 15	www.rfspecialties.com
SAS - 33	www.sasaudio.com
SCMS 21	www.scmsinc.com
Shively - 34	www.shively.com
SystemsStore - 28, 47	www.systemsstore.com
Telos - 27	www.telos-systems.com
TFT - 41	www.tftinc.com
Tieline - 7	www.tieline.com
Transcom - 42	www.fmamtv.com
Vorsis - 3	www.vorsis.com