Radio Guide

Radio Technology for Engineers and Managers
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January 2004
Volume 12 Issue 1

2004: Our 12th Year of Publication
Radio Guide Grows Northward

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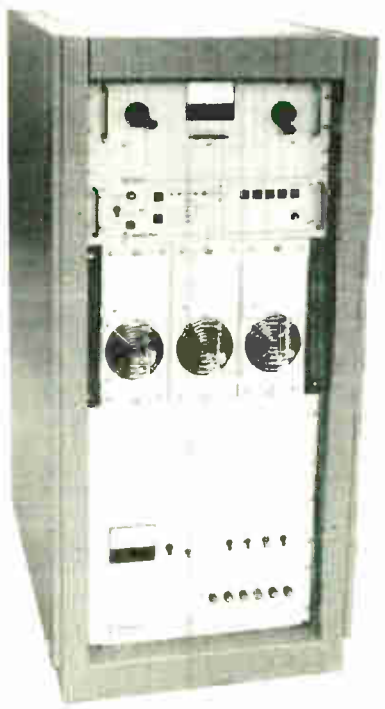

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Columns & Articles

Radio Guide

Volume 12 Issue 1
January 2004

Your Friendly Offstage Announcer

Page 4 – It is the announcer's voice that really makes radio work. Here is a look back at the early days, when announcers were only allowed to use initials to identify themselves.

Canada: Land of DAB and Taxes

Page 6 – Canadian Dan Roach discusses some of the frustrations US broadcasters do not have – as yet. "Duplicate" copyright fees and levies on CDs and cassette tapes are but a few.

More Than Just Lightning

Page 20 – Larry Bloomfield details the basics of lighting strikes and surges, and describes how best to protect your plant from physical damage, secondary effects, electromagnetic field effects, and ground reference potential charges.

Practical Engineering

Page 24 – Dave Dunsmoor teaches us to make it right – and keep it tight. Learn how to make the proper connections on terminal strips, lugs, and chassis grounds.

www.radio-guide.com

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Oh Canada!

When I was young, I remember one of my favorite episodes of the old TV series The Outer Limits was one where a disk jockey at a radio station ignored the instructions of the engineer, who had quickly instructed him to keep the station power set properly.

The disk jockey, as perhaps everyone in the industry could have predicted, waited a few minutes, then turned the transmitter power up as high as he could, and turning to the microphone, welcomed "all our new listeners in Canada." The result was, as is often the way in Science Fiction, rather strange.

But, wait! We at Radio Guide Magazine really do welcome all our new readers in Canada! As a response to a number of suggestions, noting that US and Canadian broadcasters have many of the same concerns and equipment in common, this issue of Radio Guide, and all future issues will be sent to engineers and managers all over Canada.

Apropos of our growth northward, we are also pleased to include in this issue articles from Dan Roach and Gary Hooper, relating some of their views and experience in dealing with issues similar to those faced by folks south of the border, as well as some that are not so similar - at least not as yet!

Moving forward, we hope you Canadians will find Radio Guide of interest, and will share with us some of your thoughts on the good, the bad, and the just plain silly parts of the industry we have in common. Join with us, as we all seek ways to deal with the challenges of practicing our craft in these days of industry change. Is there something you would like to see us cover in an article? Please let us know, either at the address to the left, or at editor@radio-guide.com

Welcome aboard Canada!

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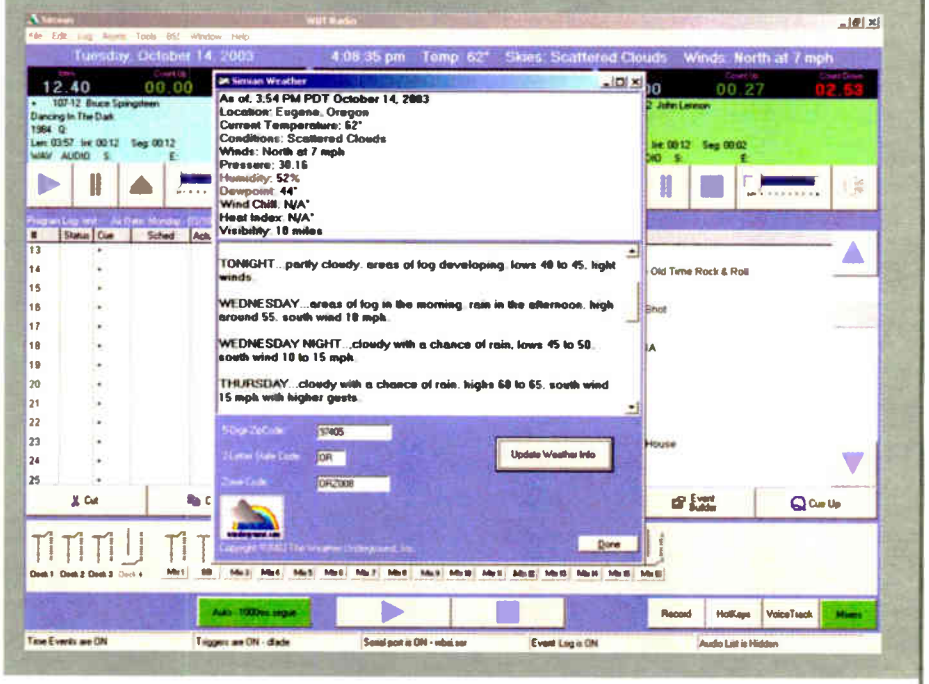

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World Radio History

What is This Thing Called Broadcasting?

Your Friendly Offstage Announcer

– A Continuing Series –

by Barry Mishkind

[TUCSON, Arizona - January 2004] It is the voice. That friendly voice. Above and beyond all the other aspects of broadcasting, it is the announcer's voice that really makes radio work. Whether you are listening to a rush hour traffic report, a news flash from overseas, or just a friendly voice on the overnight shift, it is the human voice that links broadcast program elements and sparks communication with the audience.

Reginald Fessenden

Indeed, from the earliest days of broadcasting, more than anything else, it was those voices of the pioneers coming through the air that set afire the imagination of millions of listeners across the country. One can only imagine the surprise of those (mostly shipboard operators) listening on December 24, 1906 when Reginald Fessenden began reading the Bible along with some poetry. They could hear a real person talking to them!

"HOW DO YOU GET IT?"

As the wireless industry moved into the early teens of the last century, many enthusiasts tuned in to hear voices from locations close and distant. They heard scientists, hobbyists, students, and even lab assistants who were set in front of microphones to practice counting from one to four, hoping the power tubes would not fail before their voices gave out.

As the transmitters became more reliable, content improved. From San Jose, listeners could hear Charles "Doc" Herrold's "Little Ham Program" every Wednesday evening at nine. In Detroit, Frank Edwards at 8MK (later WWJ) played music and called out "How do you get it?" Similar "programs" were run by Eunice Randall and Bob Emery at 1XE in Boston, Earle Terry at WHA in Madison, WI, and Frank Conrad at 8XK in Pittsburgh, among many others.

Eunice Randall

Initially, the stations would turn off their transmitters after asking for comments, so the amateur listeners could turn on their transmitters and broadcast an immediate response. Later on, listeners were encouraged to send telegrams and letters.

Of course, even the strongest voice would start to fade after a while. At first, without tapes, CDs, or satellite networks to fall back upon, many broadcasts simply would conclude abruptly as soon as the announcer's voice got tired or a tube died. However, the pioneers soon found a solution by devising methods of aligning a phonograph horn to the microphone so they could play records. This proved to be very popular. In time, as the industry grew, singers and orchestras would fill much of the broadcast day. In some cases, arrangements were made with newspapers to have the day's news and sports scores read out.

But it was the announcer's voice that tied all the program elements together.

Still, aside from some of the station owner/operators, much of early broadcasting was initially propelled by voices that were essentially anonymous. This was because few of the announcers used their names, and with most of the performers making brief, irregular appearances, the listening public did not get to know many of them very well.

WHO WAS THAT VOICE?

As radio stations began to attract more and more listeners, the management at RCA began to worry that their announcers could become celebrities like some of the newspaper writers had been. This presented potential problems in setting salaries, as well as in controlling them as employees. Therefore, RCA set up a strict policy for the announcers to use a set of initials to identify themselves.

For example, Tommy Cowan adopted the practice at WJZ, identifying himself as ACN, standing for Announcer Cowan Newark. Milton Cross became AJN, Bertha Brainard was ABN, and Norman Brokenshire was AON.

Nevertheless, amidst the different artists and programs, the announcers' voices became a constant in the minds of the listeners. The more familiar the voice became, the more the public wanted to know about the person behind the initials.

At first, RCA management stood firm, enforcing their policy and refused to allow their announcers to be identified by name. When listeners wrote in begging for information about their favorite announcers, WJZ, and other stations such as WHAS, would send out a short letter stating it was "against the rules to divulge the name of our announcer." What a far cry that is from our more recent past, where announcers repeat their names frequently, even using singing jingles to remind listeners exactly who they are!

A DIFFERENT POLICY

Across the street, so to speak, at AT&T's WEAF, a different policy was beginning to take hold. Announcer Graham McNamee used his own name on the air, and rapidly developed a following as the "signature voice" of the station, as he broadcast sports events, news and entertainment. As opposed to the stance taken by RCA and some other companies, management at WEAF realized the value of having the listener identify with the announcers as friends.

And when invited to show their feelings, they responded. Former concert singer McNamee received some 1700 pieces of mail in response to his distinctive delivery of his first World Series baseball game in 1923. He rapidly became the favorite of many listeners: The 1925 Series brought in over 50,000 pieces of mail.

Graham McNamee

RCA did try to hold the line. Station Manager Charles Popenoe feared the fame his staff was gaining, as they appeared in public at various remote broadcasts. Declaring all fan mail was station property, Popenoe instructed the mailroom to confiscate messages to announcers like Norman Brokenshire. (Brokenshire retaliated by renting a Post Office Box and filing a Change-of-Address form!)

However, by 1925 there was no holding back the changing tide. Stations realized they had to take the good with the bad, and while they now had some "stars" to attract listeners, they also had to contend with fact that the fees the announcers could earn (as much as 22 weeks' salary in one night!) allowed them more than a little measure of independence from the program directors' edicts.

So, the stations made the best of it, now promoting the very announcers they had tried to hide. Names like WSB's "Little Colonel," Lambdin Kay; WLS's "Solemn Old Judge," George Hay; WBAP's "Hired Hand," Harold Hough; and WDAF's "Merry Old Chief of the Nighthawks," Leo Fitzpatrick soon were known all around the country.

With most listening being done at night, the announcers sought to build their reputation among listeners in many states; each developed their own "signature" phrases and patterns of patter. And the listeners' letters poured in. McNamee would recall the passion of his audience. They would send in mail to declare their affirmation and appreciation for him, as well as correction of any mispronunciation or outrage and denunciation of anything that did not meet their approval.

The many magazines that fed the public's desire for radio, began featuring these announcers, and *Radio Digest* even ran a nationwide competition to crown "The World's Most Popular Announcer." Of the 133 different announcers whose names submitted, it was WEAF's McNamee that received the winner's cup in 1925. His signature lines, "Good Evening, ladies and gentlemen of the radio audience" and "Good night all," so identified McNamee that the Post Office would receive thousands of envelopes with nothing more than one of those phrases and "New York" on them. They were promptly delivered to McNamee.

JOIN THE CLUB

With the rise of network radio in the late 1920s and 1930s, news announcers often were added to give each station its own sound. At NBC, the late Edythe Meserand was among those hired to read the news. Still a teenager, Meserand became the first network newswoman, according to the Women's Press Club. (Later on she would found the American Women in Radio and Television (AWRT). Meserand died in June 1997 at the age of 88.)

Using the listeners' imagination as their helper, these and other announcers used their voices to become friends with the public. In fact, quite a few of the listeners believed their favorite announcer was talking directly with them. As the industry grew, and networks became more powerful, many of the famous announcers could move large numbers of people to purchase products. Eventually, this led to the development of a new breed of announcers, essentially, salesmen trading on their fame.

One of the first of these announcer/salesmen to take such advantage of their "pull" was Bernard MacFadden. MacFadden built a morning calisthenics broadcast into an effective sales tool for his *Physical Culture Magazine* and his tabloid paper, the New York *Daily Graphic*. Was this perhaps one of the first infomercials?

The seed merchants of Shenandoah, IA were also quick to understand the ability a voice on the radio had to create a link with listeners from the city to the most isolated farmhouse. Henry Field and Earl May had a sort of friendly rivalry between their stations KFNF and KMA, as they sought sell seeds throughout the Midwest. Their success was clearly evident from the crowds that came to Shenandoah to see the broadcasts, and buy seed; the crowds there were as thick as at any amusement park. Indeed, as far from New York City as they were, Earl May managed to win *Radio Digest's* 1926 competition to name the "World's Most Popular Announcer."

In any event, it did not take long for other similar programs to pop up. These were run by an assortment of charismatic health faddists, doctors, and even the occasional messiah, including the infamous Dr. John Romulus Brinkley. Brinkley eventually built what was then the most power radio station in the world just across the US border in Mexico, so he could sell goat glands, as well as their installation. But that, as they say, is a whole 'nother story.

As the decades rolled on, the power of radio was appreciated and exploited by more and more celebrities. From salesmen to politicians, they did their best to encourage listeners to pull their distinctive voices out of the ether. No pictures were necessary. It was all done with the voice – the voice of a friendly announcer. [RG]

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World Radio History

Canada: Land of DAB and Taxes

by Dan Roach

All too often, US broadcasters forget there is a whole country to the north – a country of great engineers and broadcast traditions. While their call letters may start with a "C" instead of "W" or "K" and they deal more with the colder temperature extremes, these folks have many of the same concerns as we do on the south side of the border, as well as some differences.

Radio Guide Magazine is pleased to extend our reach into Canada, and hope we can not only foster some cross-border discussion, but also share our tricks, tips and traps with one another. In this article Dan Roach discusses some of the frustrations US broadcasters do not have ... as yet.

[VANCOUVER, BC, Canada - January 2004] Canada and the USA share more similarities than differences in their broadcasting systems. My colleagues "north of the border" and I have often observed that in many respects, Canadian broadcasting trends frequently follow whatever is happening in the USA by five years or so, whether by accident or design. Certainly, that is what is happening with consolidation and DTV, to name two recent trends. But we in Canada can claim at least two areas where we are leading the way: DAB and taxes. We will leave DAB alone for another day, but a cautionary tale about absurd broadcast levies might be useful. Hey, this could happen to you!

FUND RAISING WITH CDs

We start with our silly CD levy. In 1999, the Copyright Board of Canada decided, under intense lobbying from the performing artists, that these blank CDs were a bad thing. After all, all this "illegal dubbing of music" was denying the artists their due. The solution: a levy exacted on all purchases of blank media. Never mind what you are using those blanks for – you might be using them for computer back-ups, or to store your digital pictures – the Copyright Board does not care to hear about it, and you are going to pay anyway! And while they were at it, the Board also threw in a levy covering blank audio cassettes, just in case you were thinking of avoiding the tax by reverting to analog.

Now, I am no lawyer, but I find a few aspects of this thing disturbing. Aside from the lack of recourse for those having legitimate, non-copyright infringing reasons for using CDs, I am not sure Canadian performers are entitled to payments for *all* the dubbing taking place – one can be sure it is not just Canadian material that is being copied. Or, does the fact that we have paid the levy mean we are entitled to dub off any copyright material we come across? So it would seem.

Although the cost of blank CD media has dropped in the intervening years, the levy has remained fixed, to the point where today it represents about *half the retail price* of the discs. The levy has been with us for four years now, and it should come as a surprise to nobody that (a) the copyright holders are clamoring for a stiff rate hike, and (b) none of the performing artists the levy was set up to support has seen a nickel from the government as yet.

That is correct – *all* the money collected so far seems to have landed in general revenue! But hope springs eternal, and the musicians' rights groups just know that if they can get those rate hikes they have requested, money will start to flow where it belongs.

EFFECTS ON BROADCASTERS

But hold on, it gets much, much better. Last spring, the Copyright Board ruled any broadcasters who dub CDs onto hard drives – for loading automation systems or for any other purpose – need to pay an additional levy. Let us be completely clear: We are not talking about duplication for sale, or broadcast on the internet, or any kind of additional revenue-generating project, but copies made internally by the radio station in the normal course of its business.

This levy is essentially just to place music for which the broadcast rights have already been paid (Canada's SOCAN is equivalent to the US ASCAP/BMI tariff) onto a format more convenient for airplay. To add insult to injury, the Board made the fee retroactive (to the beginning of 2001). Naturally, you are supposed to pay up right now. The low, low introductory price: 0.8% off the top of your annual revenues. That is for now; it is bound to go up later.

SOCAN
Society of Composers, Authors and Music Publishers of Canada

Where once there was one fee to broadcast music, now there are three: the SOCAN/ASCAP/BMI levy for the songwriters and composers, a relatively new fee for "neighboring rights" that goes to record companies and performers, and the new "ephemeral rights" fee for those songwriters, composers and music publishers that are so imposed upon by the radio stations' need to use automation.

When will we ever learn? Of course it will not end here. The copyright holders groups have already asked for levies on memory chips, portable music players and hard drives, too. Yes, they want hard drives taxed, regardless of their intended use – they are asking for $1 per Megabyte to start. The MP3 music players have already fallen, with a $50 or so surtax to be applied to each new sale. And while you are at it, they would like the tariffs doubled on those blank CDs. And we have not even brought up DAB and the Internet ... yet.

Life used to be so much simpler – you paid your SOCAN and got on with your business. Is it too late to get hold of some of those old CD changers?

Dan Roach works at S.W.Davis Broadcast Technical Services Ltd., a contract engineering firm in Vancouver, Canada. He can be reached at dan@broadcasttechnical.com

Full Duplex

I Have Your Priority Right Here

by George Nicholas

[CEDAR RAPIDS, Iowa - January 2004] There is an old adage that goes, "Success occurs when preparation meets opportunity." This month we focus on setting priorities, so we are prepared to succeed. When we prioritize, we are simply placing events or tasks in a logical order to work towards a stated goal. (Remember a few issues ago, when we discussed "The Plan?")

THE 20/80 RULE

Those of you who have taken business classes or have read management articles might be familiar with "Pareto's Principle," otherwise known as the "20/80 rule." What is amazing about this principle is how amazingly accurate it really is! Paraphrased, it states, *"20 percent of your priorities will give you 80 percent of your production, if you spend your resources on the top 20 percent of your priorities."*

As examples in John Maxwell's *"Leadership 101"*:

Time: 20 percent of our time produces 80 percent of the results.

Counseling: 20 percent of the people take up 80 percent of our time.

Production: 20 percent of the products bring in 80 percent of the profit.

Picnic Food: 20 percent of the people will eat 80 percent of the food .

I have also noticed how the opposite holds true as well:

Time: 80 percent of our time produces 20 percent of the results.

Counseling: 80 percent of the people take up 20 percent of our time.

Production: 80 percent of the products bring in 20 percent of the profit.

Picnic Food: 80 percent of the people will eat 20 percent of the food

ACTIVITY LOG

Let us apply this theory to the job of a Radio or TV station Chief Engineer. I encourage you to begin by keeping a diary or log of your daily activities for a week or two. Start the day at the moment you leave your home and end it when you return. You may be logging things like commuting time, maintenance and repairs on specific equipment, lunch, phone time, computer time, meetings – anything involving time in greater than five minute increments. At the end of the week, summarize the results.

By review, you should be able to determine which activities and events are productive and which are not. For example, you may find 20 percent of the sales people are responsible for 80 percent of the sales computer problems (ah, I see I have already struck a nerve!) Or, instead, you spent a few hours out of the office, engineering successful remotes.

You may find a project requires more time allocated to it because it is behind schedule or not producing the expected results. Or, you may discover several time-consuming tasks or projects you can delegate to another person or assistant.

Make no mistake – setting priorities is probably the most difficult part of an engineering manager's job. And it is one of the few aspects of your job a station manager actually understands. They may not know what a piece of equipment does or how it works, but you can be sure that if it is broken and you have not had time to address it, they might suspect you are not scheduling your priorities in the best order.

I have always used the phrase, "It's not how hard you're working – it's how smart you're working." To be successful, you must be able to juggle three or four important priorities at once.

PROJECT TRIAGE

The first step to prioritize is to label each project in terms of importance and urgency. There are four main categories:

High Importance/High Urgency - This might include being off the air or in a highly-crippled situation, such as digital audio playback failure, STL failure, audio quality issues or FCC compliance issues. These projects should be addressed first. Hint: It helps to display a sense of urgency as well. Say "no" to requests on other, less-important issues, no matter how easy they may seem.

High Importance/Low Urgency - This might include an upcoming satellite program or the day-to-day general problems you might find in your job. These should be scheduled so you can work them in during the course of a day or week. I try to avoid using the term "deadline," unless a real deadline exists. I prefer the term "target date," which suggests you have a flexible plan. A suggestion is always try to accomplish as many "target dates" as possible; otherwise someone else may assign you a new "deadline."

Low Importance/High Urgency - This has "remote engineering" written all over it! You should be able to delegate these projects to an assistant or properly-trained intern. Remember, you are still responsible; you have simply substituted yourself with a proxy.

Low Importance/Low Urgency - This might include repetitive tasks, filing, ordering spare parts, cleaning, and generally anything that does not apply to the other three categories.

So now we have arranged our priorities and things are set – for now. That is because priorities constantly change, as other, bigger problems arise. Building a new studio may be top priority on Monday, but when the transmitter goes off the air on Tuesday, all bets are off.

To help keep "priority drift" from occurring, follow the "three E's" – *Evaluate*, *Eliminate* and *Estimate*. Every week or every month, *Evaluate* the requirement/return/reward on each project. *Eliminate* any project that could be handled by someone else. And *Estimate* the top projects for the month and how long they will take.

In our next installment of Full Duplex, we will talk about what is important ... and what is not.

George Nicholas operates George Nicholas Communications, specializing in technical and communication consulting throughout the US. You can contact him via georgenicholas@csi.com

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World Radio History

The Air Chain

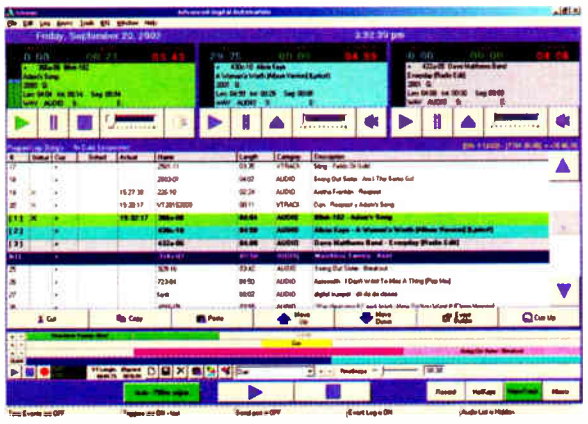
BSI Simian: Capable and User Friendly

by James Haddon, Jr.

[BATON ROUGE, Louisiana - January 2004] At first, when the owner of the non-profit station I contract for told me they were looking at Simian from Broadcast Software International (BSI) as their automation system, I cringed. Having worked with several different "Big Boy" systems, I know the costs. How can you effectively run a station on fifteen hundred bucks worth of software? After about six months of working with it, I would have to answer, "Very effectively!"

I have to say, for the price, Simian seems to be able to do most of the things the $10,000+ systems do. And Simian plays anything your computer will play. If it plays in Windows Sound Recorder, it will play in Simian. This means your PD or MD can start ripping, recording, editing, or whatever it is they want to do with the music before you have even configured Simian. The audio is completely non-proprietary.

Sometimes you do have to jump through a hoop or two to make things happen, but they can be done. For example, on one of the major systems I worked with for years, rotating cuts of audio within one "cart" was simply a matter of entering the cart number. The system told you "cart XXX already exists, would you like to add a cut?" With Simian, you first have to record the cuts under different filenames (be they numeric or "Bill's House of Horses A" and "Bill's House of Horses B"). You then build a cart and add these cuts to it with a simple "drag & drop" from Simian's Event Builder. It only takes a couple of extra steps that are worth it for the savings. Not bad at all.



SIMIAN BACKGROUND

According to COO Chris Kehoe, BSI's former Automation software, WaveStation, was beyond its prime; its latter version, WaveStation 3.0.60, was a "clunky" system due to older technologies. A complete makeover was necessary ... enter Simian. With newer technologies, Simian can take advantage of additional upgrades such as touch screen capabilities and web connect, as well as the advantages of a 32 bit environment.

Such multi-functionality and the ability to run on a standard Windows platform without proprietary devices has had a lot to do with Simian's worldwide growth. Kehoe credits Simian as being the most mature and stable product BSI has offered to date. And, after working with this software, I would have to agree with him.

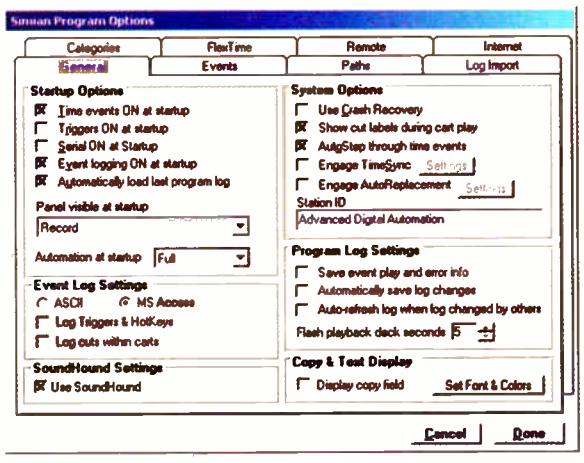
Like any competitive software company, BSI is never quite satisfied with their product and is constantly upgrading to meet the end-users' demands. In the two years since Simian's inception, 6 minor revisions, including more than 60 field suggestions, have been implemented. These upgrades are based on ideas from BSI's programmers as well as input from end-users. Licensees are encouraged to add to the "wish list" of upgrades on BSI's website.

As engineers, we have three main considerations when choosing an on air system: reliability, ease of use for the air staff, and technical support. When configured properly, Simian provides reliability in a user-friendly environment. How reliable? I have only run across one problem that caused program audio to halt since we installed Simian.

Any time I took it off line, it was me "playing" with the software – "tweaking" it and learning options. During these times, I ran Simian from our Production computer and was able to seamlessly segue from one computer to the other.

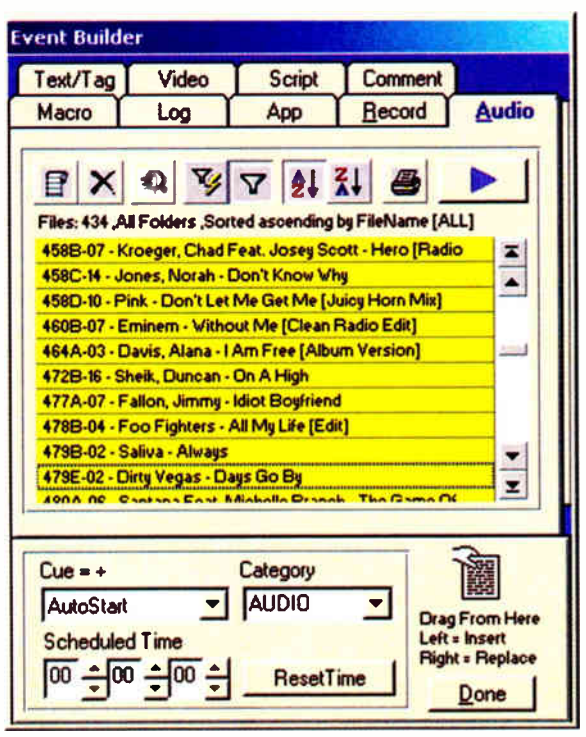
OPERATION

When it comes to setup and configuration, Simian is extremely user friendly. I have not had to edit a single "ini file" (something some systems depend on to determine deck numbers, placement, etc.). Simian has three decks placed across the top of the screen, just above the Event List (log). I cannot think of a reason you would need more. The cart decks include optional scrubbers (if you want to change your starting point or just audition a part of an upcoming event) as well as separate VU meters for each cart (VU meters take advantage of the Peak Meter of your soundcard (although cards such as SoundBlaster do not offer this option).



Configuring Simian to recognize the output file from your music or traffic scheduler is made simpler with the advantage of telling the program where to look in the output file, and for what information. Some on-air software does not give you this option, and therefore both the music scheduler and the traffic scheduler must be changed to accommodate the on-air software.

Through an easy to access window, Simian lets you specify what column the information begins in and how many spaces to read. For example, if your song length begins in column 5 and includes minutes and seconds in the format mm:ss, you would tell Simian to begin reading in column 5 and to read for 5 spaces. Just follow the same format for filename, artist, etc.



The Event List is where your imported log shows up. In fact, all scheduled events show up here. Unscheduled events can be added simply by dragging and dropping from Simian's Event Builder. An event can be an audio file, a text file which can be used to display information about an audio cut or copy for live announcements, put a comment in the log (much like a REM statement), record functions to automate recording from either recorder, Macro commands, even launch other applications or play video files right on your screen. The Macro commands let you automate most of Simians features such as updating weather, adjusting gain on playback decks, switching pages on hotkeys, and virtually anything the operator might want to do.

Below the Event List is the area where, in our station, we have our "Hotkeys." With a simple click of the mouse, this area can be switched between Hotkeys, Audio Recorders, VoiceTrack recorder/editor, or the configurable audio mixer.

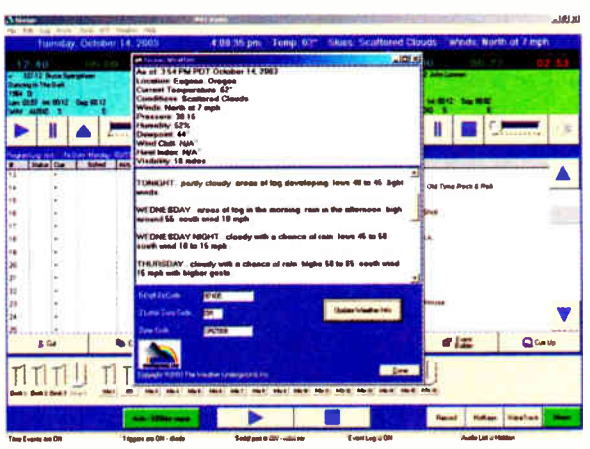
Hotkeys are buttons which give an immediate audio playback independent of the audio in the Event List. BSI's Hotkey configuration is in pages of 16 buttons. Pages can be changed with just a simple click or two. I do find one drawback to BSI's Hotkeys: Only one file can be played at a time; all 16 of these Hotkeys must be configured to play through the same audio device, which prohibits playing two at once.

For example, if you click a button that controls a music bed, then want to add a cash register sound effect because your caller just correctly identified the exact contents of the morning intern's stomach, you could not do it with Hotkeys alone. If you click on the cash register SFX Hotkey while the music bed is playing from a Hotkey, the SFX hotkey will sit in "cue" to play when the music bed is either finished or is stopped manually. On the other hand, there is a workaround: I discovered that if I played the bed in the main log I could then use the overlapping SFX.

BSI includes two audio recorders in Simian. These can be configured to separate audio devices, so you can record your caller on one while the other is recording "Baking with Motor Oil" in the background. These recorders can be configured to automatically trim silence from the beginning and end of the tracks.

The VoiceTrack editor seems fairly simple. We are currently not using it at our facility, but I have played with it a bit. Your three audio sources (playback of the end of cut "A," voicetrack, and playback of beginning of cut "B") show up as bars on a timeline. This timeline is easily variable to suit your needs. Once the track is recorded, the audio sources can then be dragged around to fall exactly where you want them. Do you have a jock that forever steps on the vocals? They will be calling him "The Postman" because he will *always* hit the post now!

An addition to the latest incarnation of Simian is the ability to retrieve and display weather forecasts and current weather conditions in the control room. There is no need to install local temperature sensors and weather stations. All the information for your local area is retrieved from the Internet. If your network has an Internet connection, all you have to do is enter your city code and Simian does the rest.



The Audio Mixer is configurable to your audio card(s). It can be used just like a mixing board to vary the audio levels of the playback decks, the Hotkeys, the record levels, etc. It is fully configurable in the Hardware Options and faders can have up to four audio devices assigned to each one. In other words, one fader can be for audio card one/device one, one for audio card one/device two, and one for audio card one/device one and two.

(Continued on page 10.)

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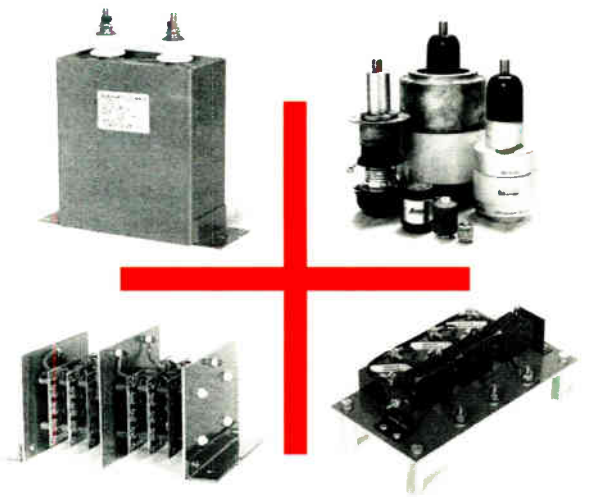

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The Air Chain

Continued From Page 8

BSI Simian

These can be configured any way you see fit and the Auto Mute during Audio Playback feature will allow you to use your soundcard as a pass-through device as an inexpensive way to mute a satellite feed in an automation situation without having to purchase a satellite switcher.

By the way, BSI includes their Info Editor, which allows you to enter any or all information about an audio file. It is all stored in the header information within the file. This is information Simian uses for song title, artist, length, segue points, run dates, outcues, daypart information, etc. The Info Editor can be used on any audio file, even something not being used for Simian. It is a cool little tool for indexing any audio files you may have at home, or sending files to other stations. Info Editor is bundled with Simian, but is also available as a free download from http://www.bsiusa.com

GETTING SUPPORT

As for Technical Support, I was not too thrilled when my first call to BSI's support line was answered by a voicemail system and the call back was less than immediate (it was, after all, Sunday). A live tech did return my call to assist me with my problem, but are they ever really quick enough?

Since then, I have discovered the BSI forum on their website and have had all kinds of answers to all kinds of questions at all hours, day or night. What is really cool about asking the questions in the forum is I get multiple answers not only form BSI's support team, but from other grunts like me out there using the software in the trenches on a daily basis. So for one question, I get several different options to try. This has been extremely beneficial to me, and really helped build my faith in the product.

One good factor when choosing on-air automation software is what the guys who have been using it think. Larry Langford, owner/operator of Good Time Oldies WGTO in Cassopolis, MI, says after using BSI software beginning with WaveStation, "It became clear that for a small station like WGTO, whatever BSI software could not do I did not need done." Originally, founder Ron Burley independently owned BSI. "I was not thrilled when the company was sold," Langford says, "but I now must admit the level of service has remained high."

Michael Sink of the Mark Media Group began using BSI software in the WaveStation days. After a failure of their previous automation system, a solution was needed quickly. "We downloaded 'The WaveStation,' gave BSI a credit card number and got the system running." And was Mark Media satisfied with WaveStation's automation abilities? "We soon replaced (proprietary systems in two other stations) because of the Windows compatibility. We found the WaveStation would do everything – plus more – as the old system for 1/10 the price."

Tim Swanson, Chief Engineer of KSWP/KAVX in Lufkin, TX (and a guy whose input on the website has helped me on more than one occasion) tells a similar story: "I searched high and low about all the automation systems of the time. I drove to other stations to look at their equipment. But when it came to WaveStation, I could download it and play with it in my own production room." Tim's stations began using WaveStation in February of 1998 and, "have evolved into the latest Simian, whose features leave other automation systems in the dust, as far as I am concerned."

Has BSI been helpful in the implementation and maintenance of the KSWP/KAVX' system? Tim says, "The staff at BSI has been helpful in every way, even on one occasion when something happened and we were off the air at 3 AM. The addition of their web-based forum gives us users the advantage to pick other broadcasters brains and tell our own tips and tricks." It is high praise like this that leads to the ever-increasing use of Simian internationally.

LOOKING AHEAD

What is planned for Simian? Kehoe says to look for continued upgrades in the future. Newer versions will have yet a lighter footprint and smaller modular "pieces." With a more modular approach, the software can be tailored more for the end user, whether it is for a radio station, a mobile DJ service, Telecom company, theme park, or virtually any situation where audio is needed. With this modular approach, the end user does not have to pay for unnecessary modules. Mobile DJ's do not need voicetracking or the ability to play commercials, for example, so why pay for it?

New products also will have additional input for their design from the engineering team from BSI's parent company, Cumulus Media. This is a group of guys who, like you, have worked with a lot of different systems and know what they need from an automation system – and know what has been lacking. I like this "think tank" approach from guys working in the field as opposed to the (for lack of a better term) "sterile" environment of some software development companies.

All together, with the software, a multi-device audio card, and a reliable computer with 180 GB of storage, you can have an automation package for less than $3,000 complete. I am glad my initial reluctance did not wear off on the owner, or I would still believe low cost and reliability could not go hand in hand. I would give Simian a positive recommendation to anyone looking for affordable software with the reliability and flexibility of "The Big Boys."

Jim Haddon, CBNT, is CE of WTQT-LP Baton Rouge, LA. He can be reached at prime937@aol.com

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	50 kW	1986	Nautel AMPFET 50
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	5 kW	1983	Harris FM5K
	10 kW	1988	BE FM 10A
	10 kW	1997	BE FM 10T
	10 kW	1980	Harris FM 10K
	20 kW	1978	Collins 831G2
	20 kW	1982	Harris FM20K
	20 kW	2000	Harris Z20 CD
	20 IW	1989	QEI FMQ20,000B
	25 kW	1991	Continental 316R3B
	25 kW	1980	CSI T-25-FA *(amplifier only)*
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	30 kW	1986	BE FM-30A
	50 kW	1982	Harris Combiner*(w/auto exciter-transmitter switcher)*

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World Radio History

IT For Radio

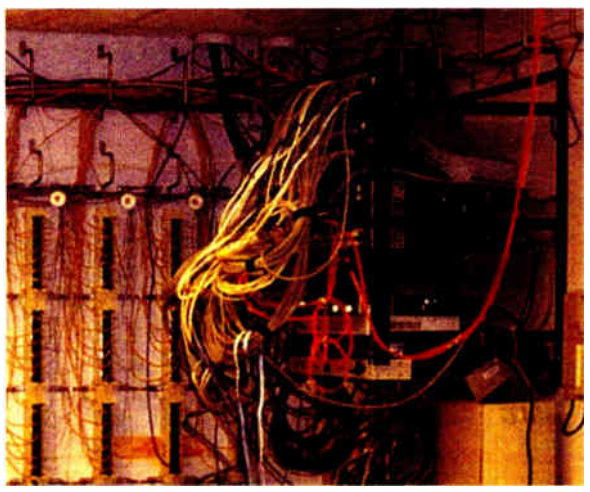
Is Your Network Documented?

by Chuck Condron

[PHOENIX, Arizona - January 2004] Much like your station studio wiring, and your transmitter site, documentation of your computer sytem is an absolute must. Why? For the very same reason: When you are down, you do not want to waste time trying to learn your own network for the sole reason of *fixing* the network. You need to repair it, not learn it. Or, in a different situation, perhaps you are unavailable and someone else needs to work on your system. Document it now, so when the information is needed, it can be found.

BASIC DOCUMENTATION

At a minimum, I would suggest clear documentation of wall jacks and patch panel locations. You might want to consider using a CAD drawing of your building, with room numbers or titles and jack location labels. I have lost count of how many times I have walked into a radio station or branch office and heard "Suzy cannot connect to the internet, can you help?" Many times Suzy is plugged into the jack, but it is a real guess as to where the other end might be. So, you traipse over to the "server room" (usually some cobbled closet next to the GMs office) and you see a bowl of spaghetti (patch panel) and lots of dust, a switch, and a router.



What now? She has not been able to print the logs, it is late Friday afternoon, and you can already taste that cool beer waiting for you, but you cannot partake, as you have to be "wire detective" today.

The best way to attack this situation is to invest in a "Fox and Hound" style toner set. The little RJ-11 battery operated device has a warble tone, and an inductive pick up battery operated listening device. Next, grab a permanent marker like a "Sharpie," plug in your toner to the jack, and go listening on the other end. Tag all jacks and patch panel locations with a label. Doing this for your Telco side is also recommended.

Keep in mind that the toner normally attaches to the first pair. Depending on how your jacks are wired, you may not be able to tone the pair you are interested in, if that pair is not wired to the first pair (center pair) of the jack. However you can get break out clips that allow you to clip the toner onto whatever pair you wish. Most of the toners have an RJ-12 and two clip leads that can be clipped to the wires or break out jack.

OK, now the wires runs at your site are documented. What is next?

WHERE DATA IS

I recommend you create a clear block diagram with the data path, both for your Local Area Network (LAN), as well as your Wide Area Network (WAN). This can be done with any word processor, spreadsheet, cad program or maybe something like Visio®.

Do this as you would do your studio air chain, or transmission chain: input to output. Typically, you have your patch panel, this feeds your switch, and that switch might connect to other switches ultimately leading to a core switch, and then to the router. (See figure 1).

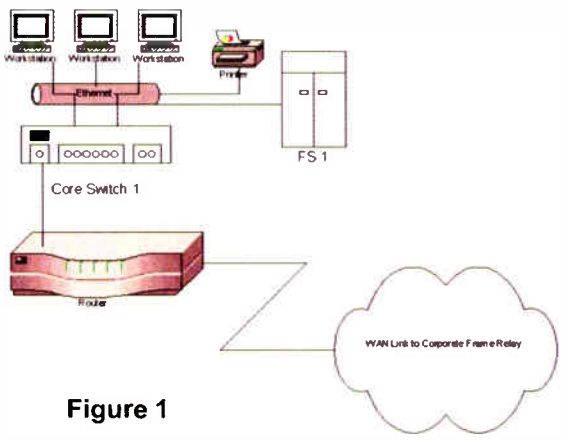


Figure 1

TALKING TELCO

Next make sure your all your external circuit IDs are documented. Just think how many times you have had maintenance issues related to a Telco oriented problems – remember those nightmares with the audio loops to the transmitter?

You should have each Smart Jack at your demarc labeled as to the Telco circuit ID as well as the Telco provider ID. Many times you might have a T1 provided by "Big Networks, Inc.," with a Big Networks ID, and then the local telephone company brings that T1 to your building with their wires, so you have the "MaBell, Inc" ID. Then, along with those, you should have the Support/Ticket phone numbers and contact names along side of the ID.

I suggest also documenting the type of circuit it is. Is it a Frame Relay, Point to Point, ATM, IMA, Fractional T1 (do you know the difference)? By the way, on the sort of diagram I suggested above, you should indicate the location of the items. Many times you may know your T1 is down, but you may not know *where* it is located in your building.

SWITCH SWITCHING

And, what about your switches? Do you know that many times, your switches are managed? This means the switch can be controlled remotely (with an IP address/Telnet session or com port connection) and programmed to perform certain tasks. You can control the speed of each Ethernet jack, 100 or 10 Mbps, full or half duplex. In some cases the switch can be V-LANed (meaning Virtual LAN).

You might well have two or more physical IP Subnets. Perhaps one segment is for your automation system, and one is for your business side computers. Say your automation system is on 192.168.0.xxx and your business side is on 192.168.1.xxx. The switch can be used to segment these two sides of your building and switch traffic accordingly. This is a very cool thing until someone plugs an automation computer into the business side or visa versa. That is when you get the call that KXXX cannot contact the server or our friend Suzy cannot print any longer.

Again, proper documentation will help you deal with these situations. If your switch is segmented, label somehow, what jacks are on what subnet. Some switches allow you to actually label the jack internally. So if you look into the switch say via a telnet session, you can see Port 1 is on V-LAN 1 and is connected to (or should be) Air Studio 1 Computer. If your switches are managed, make sure you document the IP address, and any usernames/passwords you need to the switch.

MAKE IT COLORFUL

To go a step further, I find color coded patch cables are a must. V-LAN 1 gets blue, for example, and V-LAN 2 gets red. Control room machines have their own color, servers have their color, printers, etc. The crossover cable (yes, it is a different kind of cable) to the next switch is yellow. Then perhaps, even at 3 AM you can start to see that the *yellow* crossover is connected to Suzy's computer instead of the core switch. You might even find the muddy footprint of that overnight board op leading from the patch panel to the coffee machine, then to the control room. You can then go and "address" the board op!

From a slightly different viewpoint: You may not know about the internal workings of your switch or router as it might be under the control of your corporate IT staff. It also might be under the control of the local IT person – and you are the engineer – and management dictates that these are two different departments. However, as the engineer, you know you are called in many times to fix issues related to the switch or router. Now your political skills come into play. Generally, the management staff can be contacted and can direct each team to document their section and then you can post this. The documentation can indicate just enough of what is configured to allow anyone to troubleshoot. Either way, it is a must.

You should also document and label each file server. Document the server IP address, the server name, and its task. The sales department server might be down, but no one knows which server is for sales. Maybe they know which one it is, but they do not know how you have the security laid out, or where the files should be. I would suggest some kind of document indicating "the G drive is where the sales documents are, and that XXX users have permission to Read, and YYY users have permission to Read/Write." You get the idea.

PICTURING THE SYSTEM

Sometimes your site may not be maintained by you, or you are a contractor, or the site is across the state. Some central depository of photos of the key items can be helpful. You pull the photo and see that, "Oh yeah, it's a Cisco 2600, and a Cisco 2900 connected to it, and the smart jack is to the left ..." A phone call to the receptionist allows you to walk them through a reboot of the router, or a move of a patch cord. This is very helpful when you are off the air or unable to get to the site quickly.

Lastly, I would like to address the clarity of the documentation. Many times these "docs" are engineer level docs. If you write the docs so the air staff can read it, or the sales assistant, this just might save the day. Suppose you are at the transmitter site, and the router needs to be re-booted. You can direct them to the nice pretty picture and the instructions on the wall on how to reboot the router.

If you have your system documentation in a readable – and more importantly, an *understandable* manner – you have a better chance of solving the issue. This will aid you many times when you are working on an issue late at night, or find it has been two years since you had to look at the network. The sooner you relearn the network (based on your excellent documentation), the sooner you fix your problem.

To Summarize:

- ✓ Document your wiring, wall jacks and patch panel.
- ✓ Document your network path(s).
- ✓ Document your network circuit IDs, phone numbers, and vendor information.
- ✓ Document physical locations of key elements of your network.
- ✓ Document the internal workings of your switches, routers, virtual LANs, and WAN set ups.
- ✓ Document IP address, and depending on your security concerns, the username/passwords of your switches/routers, servers.
- ✓ Document the IP address, name and, file permission layouts of each server.
- ✓ Provide photos of your key elements and have them accessible.
- ✓ Make sure your documentation is understandable by virtually anyone reading it.
- ✓ DOCUMENT, DOCUMENT, DOCUMENT

Chuck Condron is the Senior Regional IT Manager for Clear Channel Worldwide, based in Phoenix. He can be reached at chuckcondron@clearchannel.com

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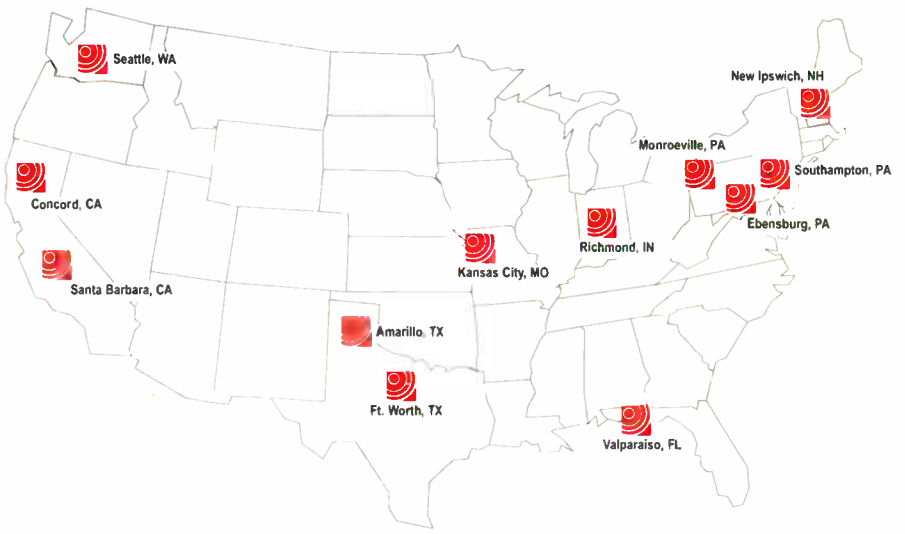

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Low Power Ain't No Power – Licensed Systems

by John Devecka

[BALTIMORE, Maryland - January 2004] Experimentation in 1972, using an induction cable buried alongside Century Boulevard entering Los Angeles International Airport, gave birth to what we now know as the "Travelers Information Service" (TIS) system. After years of testing, experiments and general mucking about, that system became the basis for the new FCC rules (§90.242), which were adopted in 1977. Since then, numerous companies have grown up to supply these systems. Some have gone away again, and some have been renamed, swallowed or conglomerated. But, through it all, the systems remained a bit of an enigma.

I could confuse this further and discuss the Radiating Cable version of these systems as well. I think I will do that later, but you should note that there is one with its own set of regulations under §90.242(b)(3). LAX included both vertical antenna *and* radiating cable systems for coverage at various times. The original system included two independent induction (aka Radiating or Leaky) cables, on the approach road and the terminal area. Over the years there have been several versions of these systems, for testing and other reasons, although most are now inoperative. The important thing is the §90.242 regulations *do* include that option.

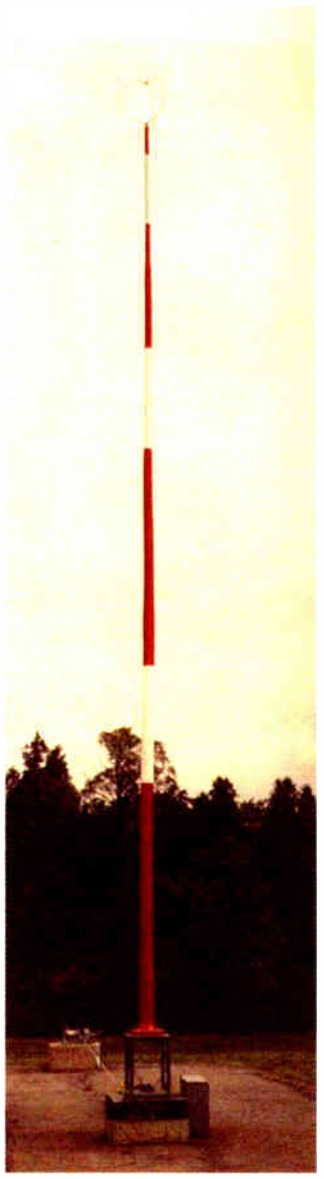
Most people know about TIS, in a general sense, from the signs on the road, but very few know the real rules. Most casual listeners do not know (or probably care) if the systems are licensed or not, and most hobbyists assume that they are "Part 15" systems without licenses. Even many broadcast engineers assume these are either unlicensed Part 15 systems or licensed Part 73 sites. Well, neither is correct, and it is important to know why.

TIS/HAR SYSTEMS

The FCC developed the rules for Travelers Information Stations (aka Highway Advisory Radio or HAR) with the intent of creating a non-commercial method for reaching a large audience on the highway and guiding them through traffic confusion – construction, airports, accidents, urban exits, etc.

To borrow the words directly from §90.242(a)(7), these may transmit "...only noncommercial voice information pertaining to traffic and road conditions, traffic hazard and travel advisories, directions, availability of lodging, rest stops and service stations, and descriptions of local points of interest. It is not permissible to identify the commercial name of any business establishment whose service may be available within or outside the coverage area of a Travelers Information Station. However, to facilitate announcements concerning departures/arrivals and parking areas at air, train, and bus terminals, the trade name identification of carriers is permitted."

It seems pretty simple, right? Well, it often gets confused in the rush to acquire the systems. In part because the rules as to who can actually license these systems are somewhat muddled by two issues: The first being that licensees are supposed to come from the "Public Safety Pool" under §90.20 "(1) Any territory, possession, state, city, county, town or similar governmental entity is eligible to hold authorizations in the Public Safety Pool to operate radio stations for transmission of communications essential to official activities of the licensee, including: (i) A district and an authority, but not including a school district or authority or a park district or authority except as provided for in Sec. 90.242;(ii) A governmental institution authorized by law to provide its own police protection."



Then the FCC changes things in §90.242 to allow park districts and authorities, but not school districts or authorities (that change has been proposed, but is not yet official).

The second muddle is the restrictions in location under §90.242(a)(5), "The transmitting site of each Travelers' Information Station shall be restricted to the immediate vicinity of the following specified areas: Air, train, and bus transportation terminals, public parks and historical sites, bridges, tunnels, and any intersection of a Federal Interstate Highway with any other Interstate, Federal, State, or local highway." But nowhere is "immediate vicinity" defined. We have to make (shudder) assumptions about that and hope that no field inspector disagrees.

What we do know with some concrete authority is that the rules do authorize TIS systems from 530 kHz to 1700 kHz, in 10 kHz steps as a secondary service only. So, suffice to say the systems are to be run in the conventional AM band, and should be operated by some form of a governmental agency, or authority.

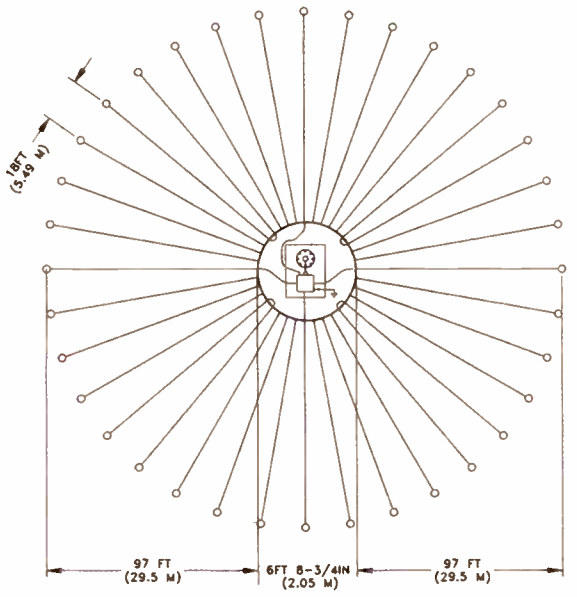
COVERAGE POTENTIAL

Well, according to §90.242(b)(4)(iv), "The field strength of the emission on the operating frequency shall not exceed 2 mV/m when measured with a standard field strength meter at a distance of 1.50 km (0.93 miles) from the transmitting antenna system." And also, the power level cannot exceed 10 watts in order to achieve the above field strength, and the antenna may only be vertically polarized.

What does that really mean? Well, in most cases, with a well designed ground plane, properly tuned antenna, and a reasonably clear frequency, the systems often reach 5 miles, and beyond, in real coverage. In more urban settings, with crowded bands, it may well be less. You may, however, install multiple facilities and synchronize their carriers, to achieve increased coverage over a prescribed critical area.

Installations are best, like any AM system, with a good earth ground plane. Systems mounted on trailers, rooftops and other compromise sites are typically effective over much shorter ranges. Permanent installations with nice radial ground planes (12 or more radials of 100 feet or more) perform far better.

Options abound for antennas as well, from simple marine whips (Morad) to uni-poles (LBA) to single sticks (Valcom). All have their values in installation and performance, depending on your target area, installation location options and budget. The regulations do restrict your antenna to a maximum height of 15 meters above ground level, so do not start thinking about a tower, OK?



PROGRAMMING POTENTIAL

As the rules say, the systems are really aimed at traffic support. Whether it is used to alert drivers on I-95 to a crash and bottleneck, or citizens of Glastonbury, CT to a fire in progress, the main purpose is *public safety*. If you have a valid need for traffic control or public safety information, you will almost always be able to get a TIS license. In some cases, private businesses have purchased the equipment and given it to the local municipality, which holds the license.

This has been done, for example, around auto racing facilities, which cause multi-mile traffic jams during events. The community runs normal public safety and traffic information all year, but on the fateful weekends of races, they focus on directions and traffic control for the big event. Never using the commercial venues name, one can still announce "race event attendees should use exit 9 and head south on Route 1 in order to avoid congestion" and provide a legitimate public value, without creating commercial value.

While the rules do not permit schools and districts from licensing these systems, I can think of several examples where schools utilize the systems for parking and traffic control during events, but the license is held by the city. In most cases, these are symbiotic relationships where the community is benefiting by easing traffic issues and uses the system for community information the balance of the time.

There are even exemptions available from the FCC for critical coverage areas. Installations at a number of chemical and nuclear facilities have emergency authorizations for power levels of up to 100 watts to clear people from the region in a disaster situation. Some locations, like Dallas-Fort Worth International Airport, are authorized for higher power levels in order to achieve adequate coverage of the multiple metro areas that they serve. In all of these cases, an exemption may be requested from the FCC, assuming there is reasonable justification for the increase.

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First, a transmitter, obviously, which can be found via a number of sources: LPB Communications, Quixote Systems, Radio Systems all manufacture the units, and sell them through various channels. Second, an antenna combined with a tuning unit, to ensure a clean match and maximum efficiency in the basic system. Third, a good ground system. Finally, a good audio source.

(Continued on page 18.)

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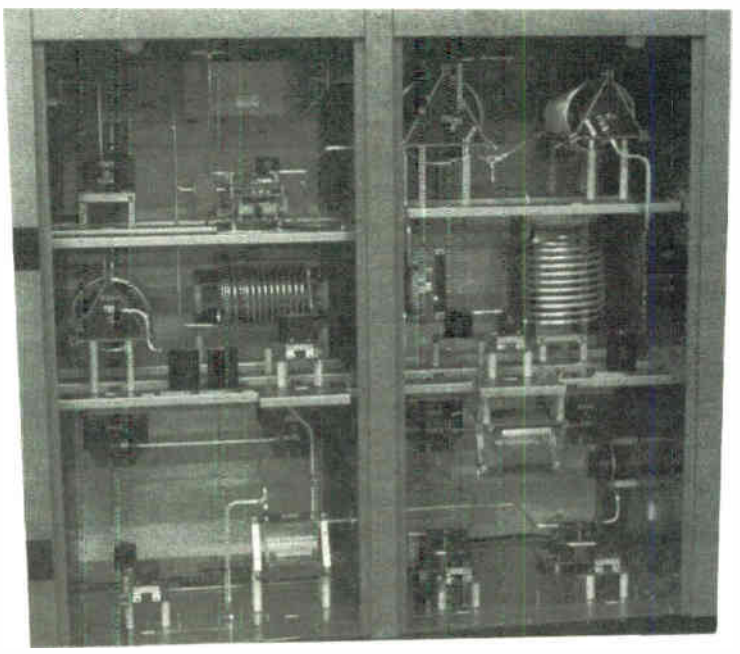

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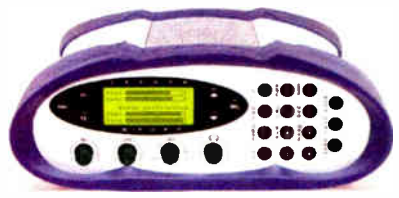

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Continued From Page14

Low Power Ain't No Power – Licensed Systems

One major comment for those out there that use or want to use these systems – they are restricted to voice-quality audio bandwidth, by a required roll-off filter over 3 kHz. This means watch your programming! If you program a digital recorder via cell phone, and have a lisp, and are standing beside a highway on a windy day ... well, we have all heard the resulting audio on a TIS at some point, have we not?

LPB Model ATU-30

Digital audio is cheap now. You can get automation systems, simple repeaters and more, to make sure you operate with many messages, proper timing and clear audio. Buy a simple program like Cool Edit (now called Adobe Audition), or any of its ilk, to make your basic recordings.

You can play them back from CDs, digital repeaters, PC's and many other sources. Think about the kind of thing you use in your radio studio – an Instant Replay will do just fine, as would many similar systems.

You can link your audio source and your transmission source in many ways, but direct lines are always preferred. You can use wireless, depending on the locations, but it is nice to have a hard wired backup in place – remember this is a *public safety* system.

IT'S THE CONTENT, STUPID

Just as with all radio broadcasts (pay attention you 20 song playlisters out there) content will gain listeners or run them off screaming. You are trying to *help* people. Remember that, and remember you need to make your messages clear and concise. Drivers have a short attention span, and should not be forced to listen to things like NOAA weather (a ridiculously common audio filler on TIS systems) when looking for traffic updates. You want content the driver can relate to, and that is either universal or timely.

The more messages, the better chance you have of reaching listeners. *Do not* leave your system repeating things like the FCC ID number and "Don't forget to Buckle Up" for hours on end. If you have a system for public safety, make sure it contains enough information to get people's attention! Once people tune in and find junk messages, they will never tune back in.

If you can, set up a system with live access, so a traffic center can update messages as needed. There is a wonderful system in Chicago (or was when I last visited) that is updated constantly and covers much of the city with multiple locations and clear messages. It was actually helpful to me as a driver, maybe not as much as a 40 mm cannon might have been, but you get the point.

TIS systems are yet another option in the little known world of *legal* low power radio stations. Take some time and review FCC §90.242 and you will find new options for your community, or maybe some of your clients. If you are in need of a way to communicate real public safety information, from parking to disasters, you need to know about this rule and these systems.

John Devecka is the Operations Manager for WLOY at Loyola College in Maryland. He would be happy to discuss issues about TIS and HAR systems via email at wloya loyola.edu as his phone mail system seems to get clogged after each column appears. Thanks for reading!

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Tech Tips

Home Made Tools Save Time ... Save Life

by John Stortz

[TAMPA, Florida - January 2004] Here is an easily homemade tool that falls in the "Why didn't I think of that years ago?" category.

INSPECTION PROBLEM

When doing a tower lighting inspection, how can an engineer know if the photocell will work properly without waiting around until dusk or dawn? Here is my solution to the problem: a tool made from one of those 18 or 48 ounce oatmeal (or similar style) round boxes and attached to an appropriate length of 1/2 or 3/4 inch PVC pipe.

All it takes to mount the box to the PVC handle is a bungee cord or some duct tape. By using a dry oatmeal cardboard box, rather than one of metal, the project results in a lightweight and easy to use tool. Painting the box flat black on the inside helps absorbs light.

The PVC provides a handle long enough for the engineer to place the can safely over the photocell without needing a ladder. Covering the photocell simulates dusk and the tower lights should switch to the night mode within about a minute. Remove the tester and the tower lights should return to day mode. What about those horizontal sensors on the side of tower or building? The use of the bungee cord makes it easy to adapt the tool to whatever angle makes it easiest to cover the photocell.

MODE AND SAFETY CHECKING

And while checking those tower lights, take a moment to be very sure they *all* turn off when removing the tool. This is especially important on taller towers. We recently had several sidelights burn out because lightning had caused one of the solid-state relays to lock "on." The small 110-watt lights were simply not bright enough to be noticed from the ground in the daytime, so the lamps just burned day and night, until they failed. Eventually, I realized this would be another good application for one of those cheap neon indicator lamps.

I first discovered those little neon indicator lamps while still fairly new to broadcast engineering. I used to short out everything with the shorting stick – not only the HV capacitors, inductors & transformers, but also the incoming power terminals. One time, I had forgotten to turn the 150 Amp main breaker off before shorting the incoming power. The resulting sparks, smoke and sound nearly scared me out of my socks and shoes! That event got me wondering what might help prevent another pyrotechnic display, yet provide good safety.

These lamps use about 1/4 watt and will last for years. Any normally closed cabinet with power controlled only by an external circuit breaker or fuse would be a good candidate for an internal neon light. The purpose of the light is just an extra warning to whoever opens the cabinet, reminding them the power is still on. The best place to put them is somewhere near the line inputs. It becomes a nice safety warning when you open the transmitter if you forget to turn the power off.

When purchasing neon lamps, the 240 volt version will last longer – buy extras. I prefer indicators which can slip into a panel hole, have an internal resistor and insulated wire leads; these can be picked up for $3 to $5 each. Another good place to hang one of these neon indicator lights is across the main power feed(s) of any equipment or the output of any breaker where danger could be present.

ALWAYS USE CAUTION!

I still short out the incoming power feed, as well as the other stuff, before sticking my hand into a transmitter. While neon indicator lamps have a predicted life of at least 100,000 hours, a power surge might have shortened that life to zero. I would much rather have another sparks and sound event with a shorting stick, than having that energy passing thru part of me. Remember: The life you save might be your own!

John Stortz, is Chief Engineer of WKES in Lakeland, FL. You can contact him at jlstortz@juno.com

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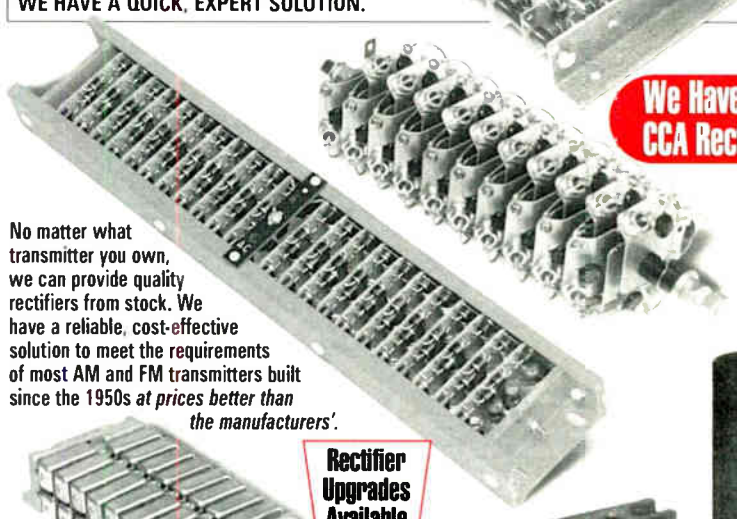

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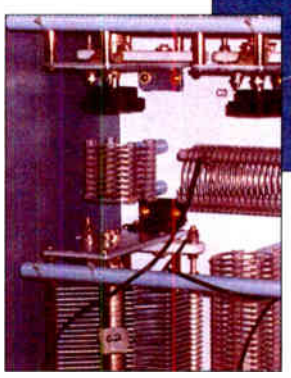

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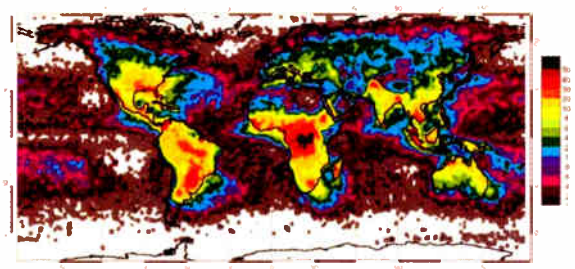
More Than Just Lightning

Part 1 – Protecting Your Plant

by Larry Bloomfield

[FLORENCE, Oregon - January 2004] Lightning is a fact of life! It is more prevalent in some parts of our country than others, but there is no place where it does not occur at one time or another. Like most everything else in life, it is not a case of if, but a case of when. Unfortunately, when that "*when*" happens, most broadcast facilities are ill prepared and lightning often takes out either the most expensive piece of equipment or that device for which you can hardly, if ever, get parts. In fact, installing state-of-the-art equipment in your facility in an environment without proper precautions against damaging transients seems to make little sense.



At any given moment, there are some 1,800 active electrical storms throughout the world, producing 100 lightning flashes per second, or about 8,000,000 lightning flashes per day. Most of us are familiar with the traditional lightning rod that has been around for the past 200 years. Remember Ben Franklin and the kite with the key on it? The lightning rod has come to represent lightning protection. But before we get into lightning and lightning protection, we should review a few fundamentals.

LIGHTNING BASICS

In school we learned there are two kinds of electricity: electrons in motions and electrons (or lack of electrons) at rest. We were taught that approximately 6.24×10^{18} or 6.24 quintillion electrons equals a Coulomb and that one Coulomb per second past a given point is one Ampere of current flow.

We also learned there are certain fundamental things that go into the making of a capacitor – the size of the plates, the distance between the plates and the material filling that space (dielectric). Remember Coulomb's Law? It says: "Like charges repel, unlike charges attract." Following the law of nature which says everything wishes to be electrically balanced, if you try to store too many Coulombs on the plates of the capacitor, irrespective of the kind of dielectric material, you will get an arc.

Furthermore, all electrons have two charges: electromagnetic and electrostatic; so it should not come as any big surprise that when electrons move in the quantities encountered during a lightning strike, those charges are correspondingly large and *very* present. All it takes to generate current flow is a magnetic field, relative motion and material capable of carrying a current.

With the advent of nuclear reactions, it became possible to observe an expanding electric field from a point origin. This field is called the ElectroMotive Pulse (EMP). In electrostatics, the electric intensity is a ratio of the force on a charge at rest to the magnitude of charge. In magnetodynamics the magnetic intensity or induction is the ratio of the force on a moving charge to the product of the charge and the velocity. All lightning is accompanied by an EMP.

CHARGING UP

With respect to lightning itself, as an electrical storm builds, various mechanisms create a stratified charge within the storm cloud, with an electrical charge at the base of the cloud. Since we are concerned primarily with cloud-to-ground lightning, the focus is on the charge on the base of the storm, as that charge induces a "shadow" of opposite charge on the surface of the earth beneath it. Basically, the earth is a giant variable capacitor. If we can reduce any of the parts of the equation that contribute to the buildup of these charges, we can reduce the likelihood of a discharge occurring. Nevertheless, when it does happen, there is a lot going on.

As the storm charge builds, so does the cloud base charge. We know like charges repel and opposite charges attract; the cloud base charge induces an opposite charge on the surface of the earth beneath it, pushing away the same charge and pulling in the opposite charge. The cloud base charge attracts, or pulls, on the ground charge, trying to pull it off the surface of the earth. It is this tendency for the storm base charge and the ground charge to equalize through the intervening air that causes cloud-to-ground lightning.

As the storm cloud travels over the earth's surface, it drags this ground charge along beneath it. When the ground charge reaches your facility, the storm cloud charge pulls it up on, and begins concentrating ground potential on your facility. If, before the storm cloud travels away, it manages to concentrate enough ground potential on your facility so that the difference in potential between the storm cloud base charge and your facility exceeds the dielectric strength, or resistance, of the intervening air, the air breaks down electrically, and a potential equalizing arc occurs – a lightning strike.

Since we are concerned with lightning strikes to objects and structures on the surface of the earth, and some 95% of all ground strikes are negative cloud-to-ground lightning, for the purpose of this discussion we will describe negative cloud-to-ground lightning.

THE STRIKE

When the intervening air breaks down, the strike itself begins with the propagation of stepped leaders. Stepped leaders originate within the cloud charge, and extend in jumps of a hundred and fifty feet or so at a time towards the surface of the earth. These are the wispy, downward reaching branches of light you see in a photograph of a strike.

We actually see a lightning strike in two dimensions as the area of stepped leaders also has depth – so there is a field of stepped leaders working their way down toward the surface. When the stepped leaders reach to within about five hundred feet of the surface, the attraction between the stepped leader charge and the ground charge becomes so strong that objects on the surface of the earth begin to break down, and respond by releasing streamers of ground charge upward toward the stepped leaders. Streamers form off various objects on the surface: utility poles, fence posts, antennas, building edges, etc.

When a streamer and a stepped leader meet, the ionized channel becomes the path for the main lightning discharge. The other stepped leaders and streamers never mature. Occasionally, two or more will meet simultaneously, and forked or branched lightning will occur.

Once the ionized path is completed, the current discharge occurs. Although a lightning strike appears to be a single flash, it is actually a series of flashes. Lightning flashes on for approximately one one-thousandth of a second then shuts off for about two one-hundredths of a second, flashes on for one one-thousandth of a second then shuts off for about two one-hundredths of a second, repeating the process multiple times. When the potential different is no longer sufficient to continue the discharge, the lightning strike ends.

DAMAGE FROM LIGHTNING

There are four basic types of lightning damage: physical damage, secondary effect damage, electromagnetic effect damage and damage caused by changes in ground reference potential.

Physical damage is caused by current flow and heat. For example, a typical lightning strike in the United States conveys between 25,000 and 45,000 amps, with the higher amperage strikes occurring in the South, where the storms build higher. The core temperature of a lightning channel is approximately 50,000° F (27760° C) or about five times the surface temperature of the sun. During a strike, the temperature rises from the ambient temperature very rapidly, expanding in a "shock wave."

This shock wave can damage a structure. Such heat causes the sap in a tree struck by lightning to turn to steam and expand, splitting the tree. Or, when a concrete structure is struck, since concrete never quite dries out (there is always latent moisture), the latent moisture rapidly turns to steam, expands and damages the concrete structure. This is why lightning rods have a minimum length – to lift this shock wave off the roof of the protected structure.

The *secondary effect* of a lightning strike can cause arcing and induced currents. During a lightning strike, the point at which the strike occurs is relatively vacated of ground charge. The area surrounding the point of the strike remains highly charged, causing an almost instantaneous potential gradient across the area. The surrounding area then releases its charge to the point at which the strike occurred, causing a flow of current.

This current flow can arc across any gaps in its path. If that arc takes place within a flammable material, it can cause a fire or explosion. If the arc takes place within a bearing, such as in a pump in a treatment plant, it can scar the bearing and cause premature wear. If it takes place on a circuit board, it can damage the circuit board.

The *electromagnetic field effect* is similar to nuclear blast EMP, and can induce currents in nearby wires or other conductors. The on-off-on-off action of a lightning strike causes the electromagnetic field surrounding the strike to expand and collapse with the series of flashes. This electromagnetic field motion can induce electrical currents in nearby conductors, including wires and electrical equipment.

Finally, when the *ground reference potential* changes across a site, it can cause current flow through grounding systems. Assume the AC power service enters a structure at one location and is grounded there, while telephone service enters the same structure, but is grounded at a different location. Both feed into a computer. The AC power service ground establishes the potential of the motherboard, and the telephone service ground establishes the potential of the modem board. Current divides and takes all paths. The amount of current flowing over any one path is proportionate to the surge impedance of that part vis-à-vis the surge impedance of all paths.

Hence, if lightning strikes near the structure closer to one service ground than the other, a difference in potential occurs between the two grounds. This difference in potential will produce current flow. Most of the current will flow through the ground under the structure (the lower impedance path). However, some current will flow from one service ground, through the modem and computer, to the other service ground. This current flow can damage the computer.

In Part two, we will look at damage caused by lightning from an indirect hit.

Larry Bloomfield has been doing Radio and TV long enough to become the Sagacious Pixel of the Order of the Iron Test Pattern. Check his web site at: www.tech-notes.tv. Larry can be reached at larry@tech-notes.tv

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World Radio History

The Transmitter Shack

A Perfect Winter Storm

by Gary Hooper

One of greatest hassles an engineer can have is when the transmitter goes down in bad weather. Just getting to the transmitter can be a major project. And, if you have to stay there a while, are there enough parts? And what about parts for humans (food)? Twenty-seven years ago, Gary Hooper learned the answer first hand.

[THORNHILL, ON, Canada - January 2004] January 28, 1977. I remember it was before noon in Niagara Falls when the snow and wind started. It snowed and blew ever more intensely into the afternoon, it was obvious it was going to continue.

STORM MODE

I had my radio on, and for the most part things sounded normal. It was only when I heard announcements on our station, CJRN Niagara, that I realized the entire Niagara Peninsula and Buffalo area was snowed under with no end forecast. As I scanned the AM dial, stations in Buffalo were off the air. By mid-afternoon, more area stations were off; the electric power was going out in many areas. The Ontario Provincial Police (OPP) closed the Queen Elizabeth Highway.

CJRN was a 5 kW on 710 with a 1 kW standby and still on the air. Our auxiliary power came from a propane unit capable of running the Gates BC-1G standby transmitter at full power, and with the low frequency of 710, it did a good job with coverage of the Niagara peninsula.

TRYING TO GET THERE

Our normal programming had been replaced with continuous talk, informing listeners of event cancellations and emergency facilities. A repeat call was made for snowmobiles to assemble on Queen Street in Niagara Falls to be dispatched for emergencies.

In sizing up the situation, it struck me there was something less than 1/2 a cylinder of propane left at the site. (A full cylinder was capable of fuelling the generator for three days.) I phoned the propane dealer – no answer of course – but as I knew the owner's name, I called him at home. Gord said there was no way he could get me any propane. I explained the situation. He told me to feel free to go to the compound and help myself if I could get there, "and by the way, take something to break the padlock on the gate."

So, I went out to the driveway and cleared the snow off of the station wagon and threw my shovel in. I drove through the blinding snow, picking the path of least resistance through the drifts and deep snow on the roads. I did get to the propane yard, broke the lock and loaded two, 100 pound cylinders into the back of the wagon. It was still mid-afternoon, and off I headed to Fort Erie with the constant chatter of CJRN's announcers in the background and an opaque wall of snow ahead.

With the QE closed, my 20 mile route would have to be either the concessions and lines, or the River Road. Frankly the visibility was so bad that I thought it would be next to impossible to find turns and intersections on the maze of different roads in the peninsula center, so I opted to follow the river. The road varied from bare frozen asphalt to snow covered and the drifts.

Some of the drifts were six to eight feet high and twenty feet thick, covering more than three quarters of the road's width; there were broadcast warnings that many abandoned cars were hidden in the center of these drifts. Upon meeting some drifts, there was no option but to try and punch through a part of it. I did not want to disable the car by smashing the radiator, so I stopped at each one, got out to check the drift and turned the wagon around to ram the smallest part with the back end of the car.

Eventually I got to Kraft Road at Garrison and headed down Kraft toward the transmitter site entrance. I got halfway there, about five hundred yards, when through the swirling snow, the road appeared to go vertical. Out of the car I looked up a ten feet high solid wall of snow across the entire road! The wind was incredible. I tested the footing on the steep incline, it was very hard packed snow and the drift had formed like concrete.

ON FOOT

I had no choice but to walk to the site if I was going to get there at all. Pondering the situation for a few minutes, I turned off the car, opened the tailgate and slid one of the cylinders out. I do not know why, but I grabbed a large bag of peanuts out of the glove compartment and stuffed it into my coat pocket before I left the car. It took a long time, or what seemed like a long time to drag, carry and roll the propane cylinder up the drift and the five hundred yards to the transmitter building, following the tops of the trees that were visible for brief blurred glimpses along the road over the mesa of a drift.

When the building came into view through the blinding snow, I could only see the top four feet. The building was in the center of a funnel shaped drift. The west wall of the building faced the wind and was clear almost to bare ground. The north, south and east walls were buried eight feet in sculpted hard packed snow. The propane cylinder was on the north wall of course, and completely snow packed. The sound of the generator exhaust, which poked out of the building at my knee level as I stood on the drift, could barely be heard above the wind even standing three feet from it!

Leaving the cylinder on the north side, I went around to look down the drift to the building entrance on the south side. It was obvious I would have to move a lot of snow if I was to get the wrench from inside, so I trudged back to the car to get the shovel.

SITE CONDITIONS

After digging my way in, I enjoyed the warmth of the generator; its noise was a change – a break from the howling wind outside that was getting stronger. Taking a break to warm up and wanting to contact the studios to let them know what was going on, I picked up the phone. It was dead.

The STL feed was working, but a quick check of the standby 8 kHz Bell line proved it was out as well. If the Moseley STL (450 MHz link) failed, we would be off the air. First things first: I got back to the task of getting the new cylinder connected. I dug to the empty cylinder, shut down the generator, exchanged cylinders and hurriedly restarted the Onan. Only a brief quiet interlude, and the job was done. It would have been preferred to be able to coordinate the switch with master control, but without communication, they would have to wait to find out what happened.

Needing a rest, I sat in the transmitter room with the generator door closed so that I could hear the monitor. It was interesting listening, directions being given for a pharmacy delivery to someone on a snowmobile headed to Chippawa, food picked up at the local Burger King and McDonald's was being taken to shut ins and others without, a number of machines were sent to rescue some school children from a stranded bus. After a couple of hours, I thought I would try and make it out. I pushed the door open, and made it ... about four inches! In the two hours I was in the building, the fierce wind and snow had built up about three feet high against the bottom of the door.

Grabbing an unused rack panel and working through the small gap in the door, I dug away the packed snow until I could get to the shovel leaning against the wall outside. As I stepped outside, visibility was almost zero; the cold went right through my damp pants and jacket, the wind driven snow cut at my face. I decided leaving was not a wise option. The snow was being blown off of a glass smooth Lake Erie, (only a half mile west and south of the transmitter site), driven by incredibly strong winds. So, I went back into the transmitter building, reached out into the drift and filled an old Tim Hortons cup with snow, waited a while and had a drink.

DINNER!

All I could do was sit in the shelter of the building listening to the increasingly strong wind howl outside, the air duct control louvers banging, the rapping drone of the generator in the other room and the program monitor. With no way to tell anyone where I was, it seemed almost comical to sit there and hear the continuous descriptions of rescue all over the peninsula. At some point in the evening, I remembered the bag of peanuts – dinner! And later, the gods continued to smile on me: two cans of "Mountain Dew" in the tool room.

I kept my escape route through the door cleared every hour. Almost a day and a half later, in the early morning, the snow and wind finally stopped. I looked outside at the clearing sky and waited until full light, eight o'clock or so, to head toward the car. It was covered to the roof in packed snow. For a few seconds, I thought about shoveling it out, but when I looked up Kraft Road heading north, I knew it was pointless. It would be a job for heavy equipment later on.

In the end, I walked up Kraft Road to Garrison, and a half mile west to Jack Shaw's "Supertest" Gas Station. The place was full of plow and tow truck drivers, snowmobilers and OPP, all drinking mugs of coffee and one-upping each other with stories of "the blizzard".

Meanwhile, I really enjoyed the coffee. CJRN was the local station that stayed on the air for the entire weekend.

A Past President of the Central Canada Broadcast Engineers, Gary Hooper has been a broadcast engineer for over 45 years. Based in Thornhill, Ontario, Hooper's HP Services provides any and all engineering services necessary for broadcasters. You can see Gary's website at www.hpservices.ca, or email him at info@hpservices.ca

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Practical Engineering

Successful Troubleshooting

by Dave Dunsmoor

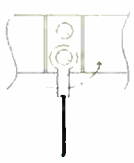
[MINOT, North Dakota - January 2004] It seems troubleshooting is oftentimes a bit of a backwards process. You often can spend a lot of time checking all the things that *could* be the problem – but are not – just to finally locate the one thing that is the problem. It sure would be nicer to find the thing that *is* the problem *first*, then check all the other things if they seemed like they ought to be looked over, just for caution's sake.

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

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

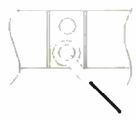
SOLID CONNECTIONS

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



Incorrect Terminal Lug Installation

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



Correct Terminal Lug Installation

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

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

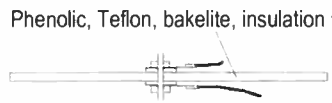
In the example below, notice how the terminal is tightened by a jamb nut up against the nut holding the stud in place. The jamb nut is torqued to the holding nut on both sides of the insulation material. Properly done this kind of connection does not rely upon the holding nuts being tight in order for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

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

RECHECKING CONNECTIONS

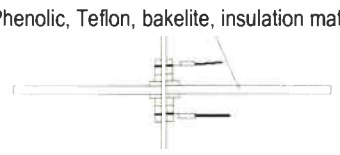
It is always my preference to go through a new installation and recheck all connections, whether using nuts or terminal strips, and generally, if they are checked again after a season of heating and cooling (about a year later), I feel they will be good for many years. Nevertheless, it is always a good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

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



Wrong Assembly Method

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



Correct Assembly Method

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

And do not forget that matching the proper wire type and size for a given terminal type and size makes for a more permanent connection. For example, most terminal ends are not designed to be used with solid wire. They will work, but will probably develop an intermittent connection after a while. On the other hand, you can buy terminals designed for solid wire – they are identified by the ribs inside the ferrule where the wire fits. These terminals will also work fine on stranded wire.

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

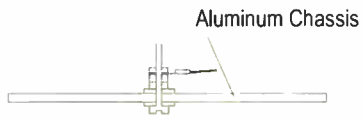
There are some actual charts designating how many of which gage wires are needed to properly fill the terminal ferrule. Again, this is an aerospace specification and has to do with gas-tight connections, not over stretching the brazed seam in the ferrule and so on, but for our purposes, close works just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

CLEAN GROUNDS

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

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

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



Correct Assembly Method
Aluminum Chassis

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

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

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

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

... AND DRY, TOO

The last thing I want to touch upon is the value of keeping connections clean and dry. I have used a variety of methods for keeping RF connections as new as the day I put them together. Some of those methods to which I have resorted are not really great, and usually take a long time to do (black tape and silicone sealer, or black tape and scotchguard for example).

But, the best method I have found - head and shoulders above all else – is self-vulcanizing silicone tape. It does not bond to anything but itself, and it does that very well. If done right, water does not migrate into the connection, and what is even better is that it is *so easy* to remove when necessary. Just cut and it practically pops apart. A quick Google search provided me with a few sources, but Radio Shack carries it in very small rolls. This stuff is simply great.

Dave Dunsmoor is a contract engineer in the Minot, ND area, as well as a Navigation/Communications (NAVCOM) ET for the FAA. You can contact Dave at mrfixit@min.midco.net

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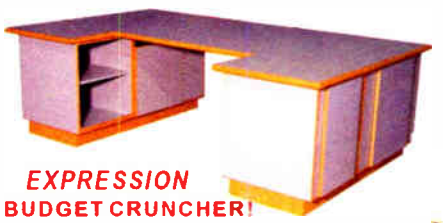

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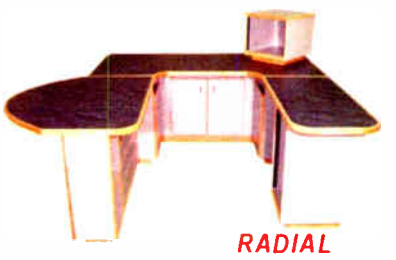

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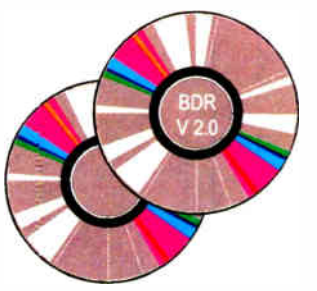

The BDR (Broadcaster's Desktop Reference) is an ongoing effort to provide useful tools, information, and history of interest to broadcasters.

The CD includes several sets of Radio Utilities, an AM and FM/TV database viewer (including DA patterns), as well as EAS printer paper sources, project schematics, historical data and pictures – even some interesting Top Ten lists.

Recent additions include the FCC and EAS checklists, and some equipment manuals. Having this out at the transmitter site can save you lots of time and effort.

A Table of Contents for the BDR can be found at: www.oldradio.com/latest.htm

The proceeds from this CD are going to be put into improving future editions of the CD, and supporting Oldradio.com and its efforts to document and display the history of our industry.

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World Radio History

EAS Q&A

Answers to Your EAS Questions

by Clay Freinwald with Barry Mishkind

[SEATTLE, Washington - January 2004] Most folks agree the EAS goal is to provide for successful alerting of the public in cases of imminent danger. But even after seven years, getting everyone together is not always easy. This month Clay and Barry explore some ways to bridge the gap between public and private entities.

BUILDING AN LECC

Barry - Clay, we hear from different areas where there are efforts to organize an LECC, but problems crop up with political factions that do not want to be involved, possibly due to the amount of work to which they will feel obligated. Do you see any solutions?

Clay - Everything beyond what is required in Part 11 is 100% voluntary; there is no requirement to broadcast weather, state or local area EAS messages. Likewise, state or local governments are not required to participate in the EAS. The hardware works only if there exists the "will" to put it to work. Broadcasters can only explain how EAS operates to government entities and offer it to them. If they choose not to use it, it is their choice.

Barry - So you recommend those wanting to use EAS locally go ahead and form an LECC, write a EAS plan and just exclude those government types who do not want to be a part of it?

Clay - They could, but there might be a better way. When trying to get a local EAS system up and running, we often end up dealing with local government workers and not the governmental leaders – the workers viewing EAS as just more work, and be opposed to it for that reason. Instead, the decision to participate in the EAS LECC should come from those elected officials who are really in charge, just as decisions relating to station participation in EAS must come from station management and not the engineer.

Many times I have found people too timid to approach these folks; they really should not be. The local EAS Committee can explain the mission of EAS to elected officials. When they are educated, their support often brings effective change and improvements. Once the Mayor, City Manager, Council, etc. are committed to EAS for their area, the workers quickly come "on board." Still, the fact is some will not want to participate.

Barry - So, there would be greater participation in EAS if more "higher ups" were involved?

Clay - I do think that is often the result.

Barry - If some wants a list of SECC or LECC chairs, where is it available?

Clay -A list can be obtained from Bonnie Gay at the FCC. Her address is bgay@fcc.gov. The SBE EAS Committee is also working on such a list and hopes to have it on the SBE Web site in the future.

AN EAN MISFIRE?

Barry - Apparently during the recent fires in California it was reported that a broadcast station sent an EAN in error. An EAN?

Clay - So far, I have not heard all the details. However, this does bring into focus the problem with broadcast stations initiating EAS messages. Of course, no broadcast station should ever send an EAN – EANs are initiated *only* by the Federal Government; they are a signal the President wishes to address the country.

At the same time, the matter of whether or not a broadcast station initiates any EAS message needs to be examined. I fully support a "backup role" for broadcasters but I do not support the notion that broadcast stations should be the primary source of EAS messages. There are just too many issues raised when this takes place. EAS messages should be initiated only by those government entities trained to do so. Thankfully, the PPW also views this as a problem.

Barry - One of the stations whose transmitter site was destroyed in the fire was the area's LP-1 station. What should the other local stations do for monitoring?

Clay - This depends on the area's EAS structure. There are supposed to be two LP stations, with the role of distributing any National Level EAS messages in their local EAS area. The chore of distributing State and Local EAS messages should be handled by background channels. Good EAS plans have a lot of redundancy built into them so as to be able to handle losses of assets.

Barry - Background channels? Are you saying nothing but EANs should be rebroadcast?

Clay - No, not really. Background channels are distribution channels for EAS messages that do not involve broadcast stations. NWR is already a background channel, as would be two-way radio systems, FAX, phone, internet email or web pages, and many other methods.

Barry - OK, so how does a weather alert get to a station without reception of NWS, if the LP stations do not run those alerts?

Clay - This is where the LECC and SECC really can help the local stations to develop a local radio network (LRN) which will get the necessary info to these stations.

Barry - Some places combine monthly tests with AMBER tests, sprinkling CAEs among the RMTs. Is this a good idea?

Clay - Not really. An inattentive operator may not realize it was only a test, and could create confusion among listeners. Such a "false alert" might also cause listeners and viewers to ignore future emergencies. Tests should *never* use real emergency codes, period.

Barry - You often say stations should not originate EAS messages? Does not the FCC expect stations and operators to be able to originate, regardless of whether or not they would ever do it in practicality?

Clay - Let me give some reasons why I have taken this stand:

1. Broadcasters do not originate public warnings. These come from some government entity: NWS, Fire, Police, Emergency Management, etc., etc. These are the true "sources" of public warnings.

2. The RMT should be a test of the entire EAS system, from the *source* of public warnings through the entire system.

3. Only by having testing from the sources can you say the *system* has been tested.

4. While the FCC expects stations to initiate an RWT, RMTs, etc. would be excessively complex for automation systems at unattended stations.

5. 100% - all - EAS plans should be written based on every broadcast station being un-attended.

6. Broadcast stations do not hire operators based on their experience with public warning systems, so it is not good EAS planning to place these people in a position between a government entity needing to inform the public and the public needing to hear accurate information.

7. Again, EAS messages need to be generated by government entities and broadcasters need to only be the conduits.

Barry - That makes sense, but if RMTs are left to government authorities to initiate, could stations get fined if the authorities mess up and fail to run the RMT?

Clay - The answer to this is *no*. If a station fails to air an RMT because one was not received, all they need to do is log the reason why. The FCC will not fine a government entity. However, the FCC does recognize State and Local EAS Plans and if the plan calls for government authorities to initiate tests, the FCC should be satisfied.

EAS UNIT PROBLEMS

Barry - We have a question from a reader in Alaska. He installed a brand name receiver and encoder to receive the EAS tests from a cable feed and from a public radio station 45 miles west of us. However, he has been unable to get the decoder to receive the tests.

Clay -Here is how to check your receiver: Ensure the audio levels going into the decoder from your sources are correct and free from clipping and distortion; some decoders will not function properly if there are interfacing problems. Try monitoring another station and have them send you a DMO to test your decoder. Or, if you are too remote, ask the manufacturer what other tests can be run in the field. If these do not resolve the problem, return the unit for evaluation or repair, logging the details of the situation as required by the FCC's rules.

Barry - KGNW has a question about their Sage Endec. Whenever it sends a RWT it immediately reboots itself two or three times; it also happens when they receive a test from others. What can they do?

Clay - This sounds like the classic Sage Power Supply problem. The solution is to replace the supply with a good one. After I contacted KGNW, they did purchase a new heavy-duty model power supply from Harris. And, indeed, the problem was solved.

AMBER ALERTS

Barry - According to the SBE EAS mailing list, the Chicago area recently issued its first AMBER alert, leading to the successful recovery of the little girl within 36 hours, and the abductor's arrest. However, the broadcast community did not use an EAS message. The alert was conveyed by traditional means, newscasts and breaking news bulletins, but *not* EAS formatted messages. Was this OK?

Clay - Yes it is. AMBER is one of those event codes falling within the voluntary part of EAS, meaning that how a given area chooses to deal with AMBER is entirely up to that area. They can choose to use EAS or to use, as you described, other means.

Barry - In other words, there is no national consensus on the methodology of deployment for these messages in the local operating areas or even at the state level?

Clay - Unfortunately, there is none. This situation was targeted by PPW's report on EAS. The problem boils down to the fact that no one (person or entity) is driving or leading EAS – there are suggestions but no standards. So the matter is 100% up to State and Local Areas as to how they wish EAS to operate; each is free to develop plans and systems to serve local needs.

Barry - I am sure that many would welcome a consensus standard for inclusion of *all* EAS messages in the DTV (as well as IBOC radio) data stream as well as any other data stream that reaches the masses.

Clay - At this juncture I know of no specific recommendations being made as to how to handle EAS with digital Radio and TV. The licensees of these facilities are still obligated to transmit the EANs, RMTs and RWTs like everyone else. As for taking advantage of the unique ability of these new facilities to deliver data, it appears everyone is waiting for someone to step forward with a formal proposal.

Barry - A reader expresses a great deal of interest about your articles on the AMBER Web Portal project. How can he find out more?

Clay - The AMBER Web Portal project is an outgrowth of the Washington State SECC attempting to find a way to augment EAS for AMBER Messages. Mark Allen, president of the Washington State Association of Broadcasters (WSAB) took on this challenge and has come up with a nifty solution. For more information, contact Mark directly at the WSAB, his email address is: wsab@mail.tss.net. Mark's phone number is: 360-705-0774.

Clay Freinwald, Senior Facilities Engineer for Entercom in Seattle, is Chairman of the SBE's EAS Committee as well as chair of the Washington State SECC. He welcomes your questions about EAS at k7cr@wolfenet.com

World Radio History

FCC Focus

AIP Q&A

by Ken Benner, NCE

[TUCSON, Arizona - January 2004] Since the goal of the Alternate Inspection Program (AIP) is to help stations meet the FCC requirements, during the course of my inspection visits, I encourage station personnel to ask questions on any topic that is unclear in their minds. The questions raised during these inspections merit our review here for a number of reasons. Not only do they often save stations the costs of calling their legal councils, and in many cases help to avoid hundreds of thousands in potential fines, they also help keep we inspectors on our toes.

However, before answering any question, those of us in our AIP group make absolutely certain we have a black and white backup reference documentation for what we advise, lest Confusem, Conem, Bilkem & Milkem, LLP cite me (Lord forbid) for practicing law without a shingle. So, as I have said several times before, I am not a lawyer, I do not pretend to be one, and the following is not to be construed as professional legal advice – rather a simple, common sense, good faith effort of sharing knowledge and experiences to help our colleagues in broadcasting.

With that in mind, I would like to share a sampling of the questions that have been raised during my travels to stations in several different states. Some of these may seem rather obvious, but they do indicate the amount of confusion often found among those who do not deal with such issues on a daily basis.

A GET OUT OF JAIL FREE CARD?

Question - I have been told my AIP certificate of compliance will stop any official FCC Inspector at my door, is this true?

Answer - No! This is contrary to some statements in the original promotion of the program, which failed to recognize FCC § 73.1225(a): "The licensee of a broadcast station shall make the station available for inspection by representatives of the FCC during the station's business hours, or at any time it is in operation."

Question - Then why bother with the time and expense of such an inspection?

Answer - There are a number of very good reasons. An inspection: (1) allows a professionally dedicated, experienced person to take a look at your overall operation, and help you see and understand items that may have been overlooked for years; (2) share experiences and information from many other inspections; (3) share contacts of people in positions to help them most efficiently deal with problems; and (4) share on-the-job experiences of the inspector. (While we are prohibited, for liability reasons, from making repairs or adjustments, there is nothing to prohibit us from discussing how we used to solve similar problems back in the "bad ol' days.")

Question - How do I *know* if the inspector assigned to my station knows what he is talking about?

Answer - These inspections for the most part are coordinated by the various State Broadcaster Associations (SBAs) who, in most cases have carefully critiqued the credentials, experience and training of their inspectors. (There have been some bad experiences where individuals have gone out on their own without adequate SBA oversight, taken the money and disappeared, very embarrassing indeed for the SBA.)

Question - Have any stations that participated in the AIP ever been fined?

Answer - Yes, but never as a result of their AIP inspection. In those incidents of which we are aware, the stations were fined for failing to address, within a reasonable period of time, the suggestions made by the inspector.

DO IT YOURSELF INSPECTIONS?

Question - Why cannot I simply download the FCC Self Inspection Checklist, carefully review it with my staff and be assured I am safe from an official FCC inspector and a potential fine.

Answer - You certainly could do that. And we do insist each station we inspect have such a checklist to review before our arrival as well as a list of questions for us to help them with. As we see it, the prime advantage for these inspections is their educational function.

Question - How can you certify my station as compliant when under the recent FCC/SBA agreement you are prohibited from certifying political and EEO compliance?

Answer - It is important to emphasize the AIP provides information and additional sources of information for you to determine your own compliance. The filing of the proper NAB political form for each political inquiry or broadcast request, and following the NAB Political Compliance Manual is all you need. For EEO simply obtain the NABs "10 Steps To EEO Compliance" and follow it.

Question - I am told a station was fined following an inspection and consequently tried to sue its sponsoring SBA the cost of the fine for hiring an incompetent AIP inspector?

Answer - There are several variations of this story floating around. We prevent allegations of this type by insisting upon hold-harmless or indemnification agreements to protect ourselves, the stations and the SBAs from whom we work. It is also our policy to obtain initials for each item in the checklists. For example, if, due to inclement weather, we are unable to reach the transmitter site to inspect we would have the engineer or manager sign-off those items on the checklist.

Another example is a non-compliant station that would normally require a re-inspection but at a very substantial inspector travel cost. For example a station located in the Bush Country of Alaska. In such a case an affidavit faxed to the inspector certifying the proper corrections have been made will in most cases produce a compliance certificate.

Question - Is it true the FCC has stepped up its fine collections to enhance their funding?

Answer - This is absolutely preposterous! For one thing, all fines collected by the FCC are but a tiny fraction of 1% of its budget. More significantly, the fines collected are required to be deposited directly into the U.S. Treasury general fund.

Alternate FCC Inspectors (L-R): Jerry Miller, Ken Benner, Marv Olson and Arvid Sonstelie. Together they represent over 120 years of combined broadcast experience.

POWER CALCULATIONS

Question - What is the difference between direct and indirect measurement of output power?

Answer - Assuming you are an AM station, "Direct" power is obtained by squaring the current at the base of your tower (or the current read from your common point meter for directional systems), and then multiplying it by the base or common point resistance as stated on your license or last antenna proof. You would then compare this with your indirect power measurement, which is the transmitter's final amplifier voltage, times the current, times the efficiency, or as read from a transmitter power output meter.

For FM stations, the "Direct Measurement" is that power found with a wattmeter placed in the transmission line at the output of the transmitter. This should equal the TPO (Transmitter Power Output) as stated on your station license. An FM station's "Indirect Power" is measured the same as an AM – that is, the final amplifier voltage, times current, times efficiency, or as read from a power output meter.

The reason the FCC requires these two methods is so we have a means of comparison. If there is a substantial difference between these two measurements, it is time to investigate the problem, which often turns out to be a lack of proper meter calibration.

Question - My FM station is licensed for 100 kW but my transmitter only puts out 20 kW. Where do those additional 80 kW come from?

Answer - That "100 kW" represents effective radiated power (ERP), and is achieved by stacking multiple FM antennas which in effect "squishes" the pattern of radiation from a basketball or spherical shape to more of a "pancake" shaped pattern. FM effective radiated power is required to determine coverage areas so as to predict co-channel interference. In other words you would need at least 100 kW into a single FM antenna to achieve the same coverage area as a multiple antenna of typically 8-12 bays fed a power of only 20 kW.

Question - Would you define the classes of stations?

Answer - Briefly, in general:

✓ An AM Class A may operate between 10 and 50 kW unlimited time to render primary and secondary service over comparatively long distances sometimes over 700 miles at night.

✓ An AM Class B may operate between 250 watts and 50 kW unlimited time to render service only for primary service coverage. In the 1605-1705 kHz band Class B's may not exceed 10 kW.

✓ An AM Class C is for coverage only to a local area operating between 250 and 1 kW although some are still authorized to continue to operate at 100 watts

✓ An AM Class D may operate daytime between 250 watts and 50 kW. No protection is afforded for nighttime operation and these stations must protect all Class A and B stations during their nighttime operation.

✓ An FM Class A operates with a maximum effective radiated power (ERP) of 6 kW, and with a maximum antenna height of 300 feet above average terrain (AAT).

✓ An FM Class B may operate with a maximum ERP of 50 kW, and a maximum antenna height of 500 feet AAT

✓ An FM Class C may operate with a maximum ERP of 100 kW and a maximum antenna height of 2,000 feet AAT.

✓ Generally speaking, reasonably good service contours for FM stations can be expected at 15 miles for Class A, 33 miles for Class B and 64 miles for Class C.

Question - Why do you think you are so smart?

Answer - Well, golly, gee whiz, fact is I do not! I will be the first to admit many engineers, managers and FCC staffers I meet have forgotten more than I will ever know. I have found those who really know their stuff are always willing to share unselfishly their knowledge and experiences. Good people like: John Battison, founder of the SBE; my mentor, the late consultant, W. D'Orr Cozzins from Salt Lake City; Norm Paetznick, Retired CE of KSTP-Radio Minneapolis; Chuck Beardsley, CE, KBOW Butte Montana; Barry Mishkind, Tucson, Editor of Radio Guide; Jerry Miller, Retired CE, WCCO-Minneapolis; Steve Houg, CE, KCCI-TV-Des Moines; Jon Sprague, FCC Staffer, Denver; and just a few hundred others.

The important, indeed most gratifying, thing we have to offer during these inspections is to connect these remarkable individuals to those in need of information and experience.

Ken Benner is an active inspector in the AIP. Ken resides in Tucson, Arizona. Ken can be reached at bennerassociates@aol.com

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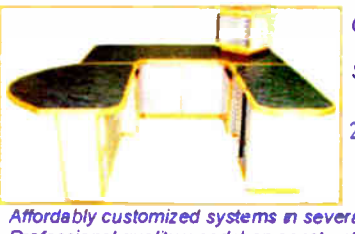

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www.michmab.com/conferences/glbcmain.html

IBS College Radio Conf. – Mar 12-14 – New York
www.ibsradio.org

Oklahoma Association of Broadcasters (OAB)
April 2-3 – Oklahoma City, OK
www.oabok.org

Black College Radio – April 16-17 – Atlanta, GA
www.blackcollegeradio.com

NAB Spring 2004 – April 17-22 – Las Vegas, NV
www.nab.org

Hamvention® 2004 – May 14-16 – Dayton, Ohio
www.hamvention.org

NAB Radio Show – October 6-8 – San Deigo, CA
www.nab.org

Letters From Our Readers

Dear Editor:

Barry, it's funny that you did the story on ERI in the [December 2003] Radio Guide. Let me relay a story to you that shows how great those guys really are over there. Working in radio and television back in Macon and Albany, Georgia, I'm very familiar with the ERI name and have always enjoyed their products.

This past spring, our WDJX, a 25kW ERP FM, burned up its transmission line. I mistakenly put 17kW into a single bay Rototiller that I "thought" could handle the power. What's that saying about making assumptions? Anyway, it didn't take long to burn up my auxiliary antenna, so we were back on the main antenna at half power, which is all the feedline could take without tripping VSWR faults – and the tower crew had to wait for the auxiliary antenna to be repaired before the main could be worked on.

I placed a call to Ken Martin at ERI, and told him what was going on. Without hesitation, he said bring it on over (Louisville is about 2 hours from Chandler). While Pete Boyce and myself ate lunch at the Backyard Burgers in Evansville, Ken's guys in the shop rebuilt my antenna. Less than an hour ... and we are back on our way to Floyd's Knobs! Walking through their shop, the guys made us feel right at home. For my first time there, I wished I had more time to look around.

Another instance of using ERI came a couple years before this when we put on a directional FM near Lexington, Kentucky. An ERI crew hung the directional FM bays. Once I told them where "true north" was, they were on the job and needed little supervision from me, since I was busy putting together the studios. In fact, the only other thing they needed from me was which way to point the STL dish when they hung it before leaving.

Ken Martin, Bill Elder and the rest of the ERI staff are aces and have earned my respect and loyalty to their antennas!

Scott Cason – Chief Engineer
Radio One, Louisville

Radio Guide Ads: Jan-2004

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$8,000 Fine for Un-Painted Tower Cables

The FCC has assessed an $8,000 fine against Tower Properties of Florida, Inc. for having unpainted cables attached to their tower structure – cables that precluded good visibility of the orange and white aviation-painted structure.

Section 17.50 of the FCC's Rules provides that antenna structures that require painting (such as the one in question) shall be cleaned or repainted as often as necessary to maintain good visibility. Further, as incorporated by reference, "[a]lternate bands of aviation orange and white are normally displayed on coaxial cable, conduits, and other cables attached to the face of a tower."

http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-03-3969A1.doc

Industry Updates

Armstrong Grants Capella Exclusive for Canada

Marcellus, NY - Armstrong Transmitter Corporation began 2004 poised for expansion by appointing Capella Telecommunications Inc. as their exclusive representative in Canada.

"We are very pleased to have found an organization, in Capella, that shares our philosophy of providing excellent quality products and exceptional customer service to its customers," said Armstrong President Sinan Mimaroglu in making the announcement.

"Armstrong has slowly worked into the Canadian marketplace in a small way to solidify our positive reputation in Canada. Now in appointing Capella as our exclusive Canadian distributor, the time is right for us to expand our Canadian business," explained Mimaroglu. Armstrong Transmitter manufactures AM, FM, UHF and VHF TV transmitters, analog and digital STL Systems, FM antennas and passive RF products. The Marcellus, NY company has been serving the needs of broadcasters worldwide since 1991.

Capella has built its sterling reputation in Canada by supplying the needs of the cable industry since 1993 and has recently expanded operations to include a new broadcast division. With its corporate office in Peterborough, Ontario and branch offices in Montreal and Vancouver, Capella's technically experienced staff is well positioned to serve their customers across Canada.

"We have searched long and hard for a US transmitter manufacturer who met our high standards of providing quality products that will offer our broadcast clients years of reliable service," said Capella President Norm Slater. "We approached Armstrong after confirming not only the quality and reliability of their products but also the superior level of post sale support they offered their customers. Our investigation showed Armstrong to be top drawer in all areas, and we are proud to have been appointed as their exclusive Canadian distributor."

Capella recently appointed Don Smith as their Broadcast Division Sales Manager. "We are looking forward to becoming a premier provider of equipment to Radio and TV stations," Smith said. "We have locked up exclusive agreements with several broadcast equipment manufacturers. This will allow us to meet every equipment need a radio or television station might have."

Capella's plan for its broadcast division ultimately includes having a broadcast specialist at each of its three sales offices, who can meet with local broadcasters and provide them with the level of service Capella's cable customers have come to expect.

Armstrong Transmitter Corp.
Phone: 315-673-1269
Email: sales@armstrongtx.com
Website: www.armstrongtx.com

Capella Telecommunications Inc.
In Canada toll free: 1-800-668-0175
Email: inquiry@capella.ca
Website: www.capella.ca

Spacewise Takes New Name

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