Radio Guide

Radio Technology for Engineers and Managers

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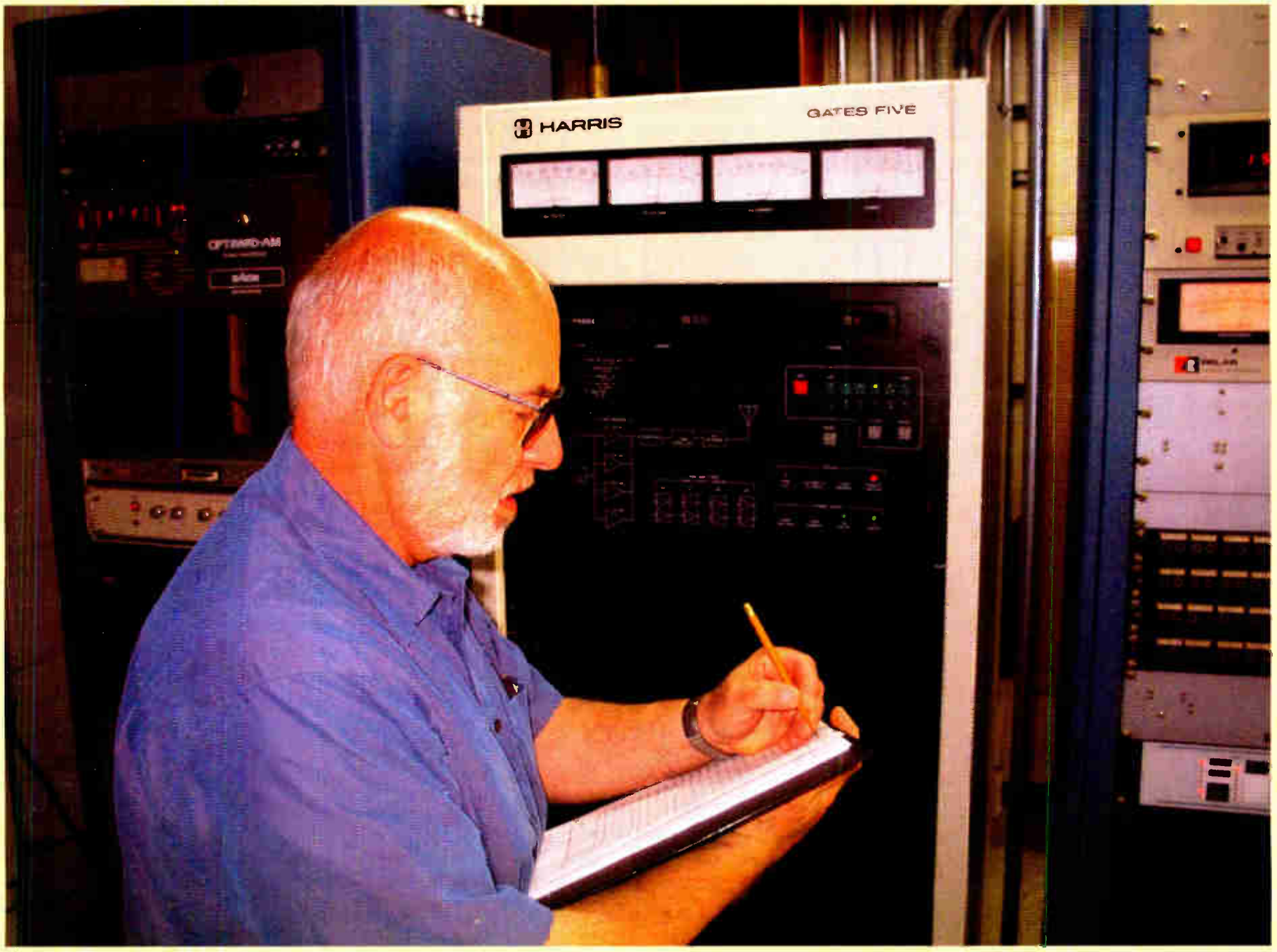
June 2004

Volume 12 Issue 6

Checking it Out – *Writing it Down!*



Good Questions Improve Station Maintenance

Page 4 – This time of year is perfect for evaluating your plant. But do not just write down a bunch of issues and leave them on the "To Do" list. Take advantage of the good weather and make plans to really get things done – the start of a new beginning that will ensure reliability of your total plant operations and better prepare you for when unforeseen things happens.

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Radio Guide is looking for radio engineers who are willing to "share the knowledge" with their peers. **Radio Guide** is well underway with its Technical Initiative program that can reward you for "giving something back." Look on page 7 for more information on how you can be a part of this exciting program.

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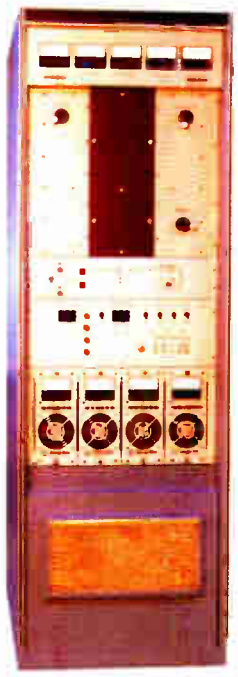

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Columns & Articles

Radio Guide

Volume 12 Issue 6

June 2004

Good Questions Improve Station Maintenance

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This time of year is perfect for evaluating your plant. But do not just write down a bunch of issues and leave them on the "To Do" list. Take advantage of the good weather and make plans to really get things done.

Audio Processing – Part 16

Page 12 –

In the 1980s, it was usually easy to tell which stations were using multi-band audio processors. On many the result was a distinctive over-processed sound.

An Engineer's Dream

Page 14 –

Imagine my surprise at seeing the parking lot full of the local radio engineers' vehicles. What could be wrong, I wondered? Did the transmitter explode?

Maintaining Audio Faders

Page 24 –

Although faders are frequently taken for granted, we must remember that they are precision electromechanical devices that require routine service in order to maintain proper operation.

Cover Photo: Burt I. Weiner logs important information for KLTX.

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Email: editor@radio-guide.com

A Good Start

By nature, engineers are a curious sort, always wondering how something works, and how to make it work better (cleaner, louder, more efficiently). And this thirst for knowledge is often matched with a desire to share it with others.

Last month we announced the start of our Technical Initiative. The goal is to encourage folks – many of whom are busy putting out fires, or under other pressures – to share their knowledge, experience, tips, tricks – what have you. And literally within hours of the May issue of **Radio Guide** hitting mailboxes around the country, we received the first submissions. Yes, submissions – plural. It appears you guys and gals really do *want* to share!

For those of you who are wondering about whether or not to participate, let us encourage you to do so. Not just for the gifts that will be awarded to the best articles (and we do have some great gifts), not for the recertification points (which you will get for "being published"), not for the money (you get that, too!), but for the satisfaction of "giving something back" to the industry we know you love.

More than one person has written, in essence saying, "I want to share, but don't know how." And more than one article from such folks has already appeared in these pages – after we have worked together crafting something that will be of value to our peers. More than one has said, in the end, "That was actually not as bad as I feared; it was actually an enjoyable experience."

Let us work together. Feel free to send us your comments and thoughts, either by email to Editor@radio-guide.com, or to the address on the left. We will all benefit.

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Simian 1.6 is the result of input from numerous BSI users. Thanks to their input, Simian now includes an on-screen weather display that updates from the internet.

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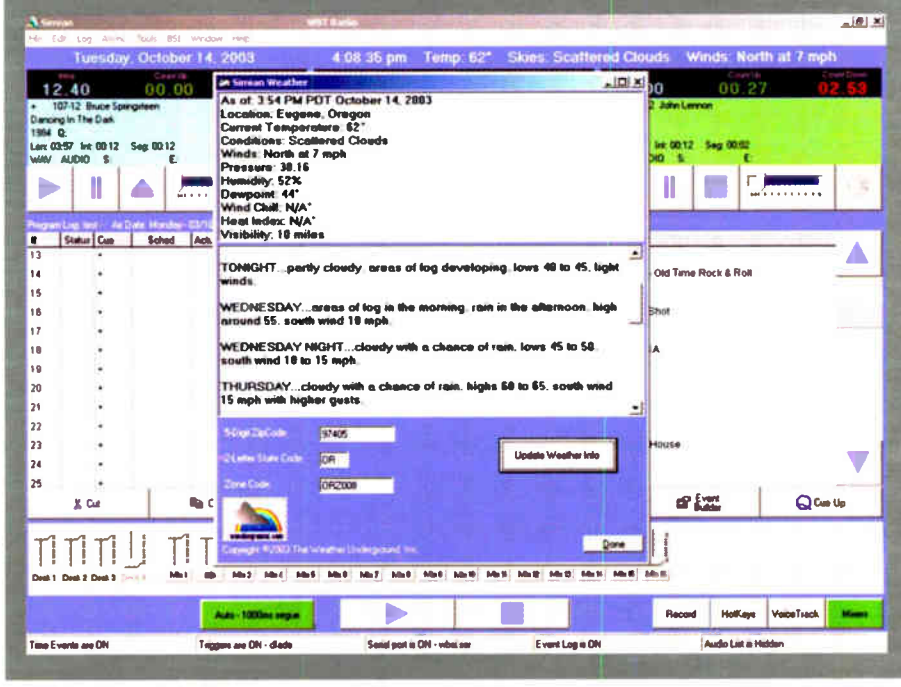

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Good Questions Improve Station Maintenance

by Daniel Carcopo

The key to getting an accurate assessment of site conditions is knowing what questions to ask. Dan Carcopo shares with us many of the questions he uses to evaluate station facilities.

[RALEIGH, North Carolina - June 2004] Ahh – Spring at last! The birds are chirping, the trees are budding, the grass is getting greener, and the cycle of nature has begun yet again. Spring is also a perfect opportunity to get to that much needed maintenance at the transmitter site – things often overlooked while the pressures at the studio kept you busy all winter long.

Springtime is a perfect time to evaluate your plant. But do not just write down a whole bunch of issues and leave them on the "To Do" list. Take advantage of the good weather and make plans to really get something done; this could be the start of a new beginning that will ensure reliability of your total plant operations and better prepare you for when unforeseen things happens.

GETTING AN OVERVIEW

So grab the nearest pad of paper and a pen full of ink and we will get started. Please note that a proper maintenance inspection, whether routine or a "yearly checkout," will highlight both technical and safety concerns. Ask a lot of questions as you go; The more you ask, the better your inspection will be.

We start by pulling up to the front of the transmitter site, and from the outside of the front gate or roadside of the entrance to the site take a look from the outside – the "total picture" as you might say. Is the fencing in good condition around the property? How about around the tower and anchor points? If your AM tower is surrounded by wooden fencing, are all the slats in place? For stations with guyed towers, are the guy anchors fenced in?

Are the proper warning signs (RF warning signs) in place? Is the Tower Registration (ASRN) number visible? Are the signs clearly legible to visitors?

While you are thinking about the tower, take a moment and look at the tower's condition. Is all of the metal covered by paint, and are the paint bands the proper color? Do the tower lamps appear to be in working order and evenly lit when on? Does there appear to be anything out of order on the tower; for example, are any of the transmission lines unsecured? Are the radomes in place on the FM antenna? (If you have deicers on the antenna, do not forget to check their operation when you get into the transmitter building.)

If you notice any of these items out of place or inoperable it may be time to invite your local tower climber to the site and set things straight.

INSIDE THE FENCE

As you open the main gate to enter the property, does the lock open properly, or does it need some oil? If there are multiple locks, do all the users understand the concept of how to put their locks together to create links in the chain, or has one person effectively locked everyone else out? Does the gate open without undue effort?

Once inside, is the driveway in good condition? Or has it become washed out, filled with potholes or otherwise requires a monster truck with mud bog tires to get to the transmitter building? Hiking in during an emergency can be time consuming and annoying.

After parking, walk around the perimeter of the building, checking its condition. Are there any problems with vandals leaving grafitti or causing other damage? Are the gutters in good condition, or are they rusted out or clogged with debris and serving no purpose? Is the outdoor light working? Better to catch it now than find it non-functional in the middle of some night.

MORE EXTERNAL CHECKS

At the transmission line entrance point, are the lines properly secured, and grounded? Or is there damage from ice having fallen off the tower and knocked the lines ajar?

Following the lines out to the tower, are they secured properly? Are they grounded to the tower properly? And are the tower grounds properly secured? If an AM station, is the ATU in good condition, free of rust and properly bonded to the ground system? Does the ATU door lock (and is the key available)? At the tower for AM stations are the lightning balls in good shape, and gapped properly? Does the base insulator look to be in good shape? Be sure to make your notes accordingly.

LOOKING INSIDE

Moving back to the transmitter building, is the door properly secured, or did a tenant unwittingly leave the door unlocked for the entire world to get into the building? As you look around inside the building, when was the last time the floor was swept? Are there cobwebs hanging all over the place? Are there "critters" in there? Or has it become a dumping ground for all the old equipment that is no longer used at the studio? (Often, old equipment has to be stored at the site but does it have to be lying all over the place?)

By the way, this might be an advantageous time to inventory any excess items, and give the list to the company bean counters to find out when the items can come off the books. Then, when it is permitted to remove these items from the records, a small dumpster can be procured from the local waste collector. If the items are still serviceable and in working order, generate some of your own "non-traditional income" by selling the stuff. Use the funds to purchase new equipment or put the proceeds into a station party fund.

In the long run, a clean building is a happy place for transmitters, support equipment, HVAC and, more importantly, you! Clean air filters ensure the equipment has proper airflow and you will not run the risk of getting a dreaded emergency call due to a clogged filter. Something as simple as sweeping the floor and taking out the garbage can help to boost your morale and also show others with whom you work, including management, that you take pride in what you do.

How is the HVAC (heating, ventilation, and air conditioning)? Has the return air filter been replaced lately? Is the room temperature within specifications for your particular equipment? When was the last time the HVAC system was serviced and the condensing coils cleaned?

TECHNICAL CHECKS

These next things probably ought to be noted on a separate sheet of paper. I suppose the first question to ask is: "Is there a transmitter log, and if so, how up to date and detailed is it?" Such a log is the key to being on top of your transmitter's condition, and in the long run will help better diagnose any potential problems as they arise.

Start with a record of the forward and reverse power; then check the plate voltage and current, screen voltages and any other readings that your transmitter may offer. For AM stations, check your base/common point current. And if your station is directional add spaces for the monitor point readings. Other things to make note of include the remote control readings. How accurate is the calibration compared to the actual readings? Leave space on your sheet to add notes about the modulation, transmission line pressures, STL receiver readings, etc.

Rudy Agus, Chief Engineer KLTX, Los Angeles

If you have a backup transmitter, open it up and look inside; does it need cleaning in there? Are there any capacitors leaking? Are the interlocks working – are they working properly? Filters clean? Are all of cooling fans working? And most importantly, if for some reason the main transmitter gives up the ghost are there means of easily and quickly taking the backup to air? Did you test those means? (That also gives you the chance to look inside the Main.)

For those stations unable to put the backup on-air due to programming requirements, run the backup into the dummy load (you do have one, right?) and check for normal parameters and log the readings. Do not forget to note other general but important information including generator fuel and oil levels. When was the generator last exercised? When was it serviced?

USING THE INFORMATION

All this data should go back to the office with you, so you can do two important things. First, make a list of priorities; the ones at the top of the list are those problems that could result in forfeiture if you happen to get a surprise inspection. The list continues with each thing that could potentially put the station off the air, if not looked after promptly.

The other important use of the data from your inspection is to produce a printout so that whomever goes to the site (hopefully on a regular basis) now has something more to do than just look at the forward power and run out of the building. A three ring binder will help keep track of these sheets, and effectively create a transmitter log that will demonstrate to anyone the plant is being run cleanly and things are getting done to ensure it stays that way.

Use the information you gathered. With your list in hand and a maintenance plan, you will be able to make your site visits more productive, promote site safety, and keep everything well maintained.

Dan Carcopo is a systems engineer for Technical Broadcast Consultants in Raleigh, NC.

Contact him at dcarcopo@technicalbroadcast.com

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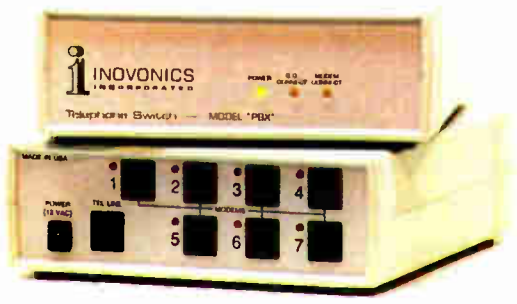

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World Radio History

Practical Engineering

Good Habits Promote Safety

by Dave Dunsmmor

[MINOT, North Dakota - June 2004] Radio engineers often find themselves working in places and at times that are – at best – inconvenient. (If the station is off the air, you can add in "pressure packed" as well.) Nevertheless, at no time should your personal safety be sacrificed.

Whenever the topic of safety issues is raised, I immediately recall to mind the old line: "Keep one hand in your pocket when finger-poking around." And that is a very good place to start. It has saved me a trip to the hospital (or worse) at least once.

AVOIDING DANGER

Of course, keeping your hand in your pocket is only good insurance up to the voltage it takes to punch through one's shoe soles (or jeans if kneeling on the concrete floor), which usually is not as much as you might think. Personally, I will not poke around bare-handed in anything that has more than about 25 volts in it while energized (40 volts is the point at which a Fluke DVM shows "HV" and I like to stay under that).

The one exception I will admit to is when I am doing IPA cathode current balancing or tuning and loading for lowest reflected power in the Continental 816 transmitter. Then one must put one's hand inside the center cabinet with the 10 kV power supply filter capacitor on the floor. However, I always make very sure that I am balanced on both feet first.

And, yes, I also have learned the hard way to remove jewelry! This was a requirement when I was in the Air Force, but I did get lax once while changing the spark plugs in an old Pinto wagon. During the process, I got my wedding ring between the wrench and the + battery post. After the major spark light show (and some yelping sound effects) the ring now had a couple of notches, and I had a circular blister on my finger.

It was 23 years ago, but the memory is still fresh!

The blister lasted about a month before it went away, but 23 years later I still have the ring (and my lovely lady), and it still has two little notches in it (the ring, not my wife!). I have never forgotten to remove my ring and watch since.

A SAFER WAY

I want to emphasize here that there is a better way, one where you do not have to worry about insulation and electrocution issues: *Power down. Connect the test equipment. Stand back. Power up.* Then you can safely watch the meter or oscilloscope, and as a side benefit you now have both hands free so you can be recording data, symptoms noticed, sounds, smells, etc. The point is: never connect a piece of test equipment to live circuits in a transmitter.

Even in lower voltage circuits taking care about where and how you touch and test is important. True, doing things this way can slow troubleshooting down a bit. But you will never kill yourself by doing things this way.

You may have been told that test gear probes and wire are usually insulated to 5,000 volts. But remember: that is *usually*. You do not want to bet your life on this one. A friend nearly died as a result of the electrical shock he received when checking an energized capacitor at a voltage of about 2,000 volts. The probe insulation failing was not the main problem, but more likely there was a buildup of surface contaminants that allowed enough leakage to nearly stop his heart. He was burned, and spent some time in the hospital.

I suspect that leakage is not the only way to suffer an electrical shock. It also seems to me that even if someone is very well insulated from ground while poking around, if they accidentally touch a high voltage source, they will stand a good chance of serious shock as a result of "body capacitance."

In such a case, the inrush of electrons to equalize the charge differential between the source and the individual may indeed be fatal, or at least very painful. While I do not have any supporting data on this theory, it does seem like a good possibility, so again I say: *Power down. Connect the test equipment. Stand back. Power up.*

UNEXPECTED DANGERS

Have you ever removed a high voltage capacitor after it has been in service for many years? Perhaps you placed a jumper across the terminals, put it in the back of the truck, and hauled it off to the shop. I did this one time many years ago, and after a couple of weeks removed the jumper, leaving the old capacitor just sitting in the corner of the shop.

Some weeks later I thought again about this dusty old capacitor and went to investigate exactly what had caused it to perform poorly (we had had a noticeable hum on the signal). I was very close to connecting the capacitor checker to the terminals when I recalled a story told me by a previous employer.

He had been a Navy SONAR technician, and one day he mentioned to me that the capacitors would pick up a charge from the air. Of course, I knew better than that, but I also knew he stated facts as he saw them. So I shorted the capacitor's terminals again "just in case" with a screwdriver. A large "SNAP!" resulted which removed part of the screwdriver's tip.

Ready to bite?

I was quite surprised, but very thankful that I had checked first. It was some years later that I learned the reason for the capacitors gathering a charge "from the air." It is known as dielectric absorption, and in short it is the tendency of a capacitor to regain a charge on its plates after removal of the supply voltage and a short across the terminals is removed.

This happens because the charge in the capacitor is stored in the dielectric material itself – not in the plates as it would at first seem. The dielectric is not a perfect insulator, so it will tend to absorb some of the charge, and release it slowly due to the high internal resistance of the dielectric material, eventually building up a substantial charge value. The better the quality and condition the capacitor, the less this occurs.

All of this probably is not an entirely accurate explanation from a chemist's point of view, but the thing to remember here is: *short the capacitor and leave it shorted.* Otherwise, it will bite!

SAFETY IN OTHER AREAS

Safety issues often include the actions of others as well as what you are doing. For example, there are reasons you leave the tower climbing to the professionals. After all, they are the ones with the proper climbing equipment, training and insurance. Have you ever watched them at work to see what is involved and how they conduct themselves? You should. It is instructive – and you might avoid a major problem.

To illustrate: as I watched a crew work one night, a kid threw a bag full of bulbs over his shoulder, and headed up into the dark. I asked the foreman about the lack of climbing gear (harness, belts, anything), and he agreed that he probably should require them. That was the last time that particular crew climbed for this company.

Hire only tower workers who use proper gear.

That may have been the way it was done in the good ol' days (A newspaper article relating the construction of a 1,500 foot tower in Oklahoma in the 1950s had the foreman boasting that his climbers did not even have helmets, much less harnesses.), but not today. Today, it is essential to realize the potential liabilities. I suspect that if a fall had occurred, our company would have been in court defending themselves even though they were not directly involved in the tower relamping activity.

It is to your advantage to insist any tower company provides you with references and proof of insurance before you allow them to approach your station. Of course, this can be a double-edged sword if you are working for a company that does not appreciate proper engineering. Sometimes the riggers will turn down your work!

KEEP A CLEAN HOUSE

Clear access to the work area is essential. I was called in one time to repair a transmitter that had burned up the phenolic insulator that held the modulator tubes. It had become coated with dust, and the high voltage had arced enough times to cause a carbon path, which then continued drawing current and eventually caught fire. The phenolic insulating plate then completely failed, and the tubes fell into the cavity below and the station went off the air.

Upon arrival, it was virtually impossible to get to the circuit breaker panel due to all the junk stored there by the station. I should have required it all be removed before I started, but in the spirit of "I can do this quickly," I let it pass. Although there were no emergencies this time, requiring a fast trip to the breaker panel, it came close to that.

I replaced the phenolic with some 1/2" plexiglas, replaced the tubes and restarted the transmitter. It immediately came on the air, but began shooting sparks out the top vent above the RF tube. Fortunately, I was able to shut the transmitter down from the front. Yet, it is easy to imagine what could have happened. The point of this story is choose your clients carefully – require them to do things *your* way when it comes to basic safety related issues.

This can be a rewarding business, but often it can be frantic. Never rush yourself. Take the time to think about what you are about to do and how you are going to do it. I have managed to live for all these years by s-l-o-w-l-y learning and applying this idea. It will pay. There is no emergency worth risking your health or your life.

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

World Radio History

The Radio Guide Tech Initiative

As announced at the NAB 2004 Radio Show, **Radio Guide** magazine has embarked on a **Tech Initiative** to encourage the sharing of technical knowledge and experience among the engineering community.

As part of this outreach to encourage information sharing, a number of manufacturers have already contributed over $15,000 of gear, to be awarded to the best submissions. Some of the items include:

Audion Labs VoxPro Digital Audio Editor

Broadcast Warehouse DSP-X Digital Processor

Comrex DH-20 Digital Phone Hybrid

Henry Engineering Studio Drive Mixer

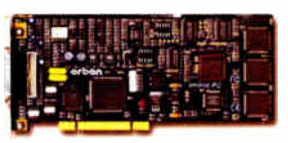
The rfSoftware rfInvestigator (full package)

Orban Optimod 1100 Processor Card

What we are asking is for you to share your Tech Tips, User Reports and War Stories as well as longer articles on topics that interest you, from studio construction or renovation, to transmitter site maintenance, or the way in which you research new equipment purchases.

Do not worry about being a perfect writer; we will help you get it done. And besides the personal satisfaction of "giving something back," you will earn re-certification credits from the SBE, a check from **Radio Guide**, and the chance to receive one of the special awards.

More details will appear here. In the meantime, please address any questions or submissions to Editor@radio-guide.com.



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World Radio History

FCC Focus

FCC Tower Compliance Issues

Part 2 – Proper Tower Marking

by Terry Baun, CPBE, CBNT

[WESTFIELD, Indiana - June 2004] From the day man first struggled into the sky, flight safety and structure height became intertwined, both figuratively and (sometimes unfortunately) literally. The need for reliable telecommunications and utility systems require structures of significant height – a need that must always be balanced against safety of flight issues.

Tower marking (which by definition includes both painting and lighting) must always be first an issue of human safety, not merely governmental rules and regulations. The cost of lamp replacement and aviation orange paint is insignificant compared to the tragedy of life lost due to an aircraft strike on a tower not properly marked.

EARLY TOWER LIGHTING

In the very early days of aviation, commercial flights were restricted to daytime operation in good visibility. Landings at airfields were assisted by the use of simple visual signals set out on the ground, or by signaling lamps which indicated to the pilot the direction for landing, permission to take off, and so on.

Of course, at first the existing towers and high structures had no such markings. According to one story, in those days before reliable radiotelephone communication, electronic navigation and GPS, as airfields began to spring up across the nation, red lamps began to be installed atop the rotating airfield tower becons to provide navigational assistance.

The idea was that each of the towers would flash the Morse identification of the airport itself, so pilots could identify the field from the air. For example, the Indianapolis airfield (IND) might have had a flashing red light that would flash dit-dit, dah-dit, dah-dit-dit, which spells IND in code.

Now, whether or not this is a true tale it does offer an explanation for the term "code beacon," since the first towers to have flashing lamps would have been those beacon towers at airfields, flashing the Morse Code identification of their field! And if you really want to believe this story, then you will understand why the existing specification for flashing code beacons is a repeating letter T (dah), which of course would mean "Tower!"

REGULATORY POWER

Although the Federal Aviation Administration (FAA) is charged with overseeing flight safety, including marking of towers and other obstructions, the FCC has been granted congressional authority to require marking of antenna towers when it determines that such towers may otherwise be a hazard to air navigation (47 U.S.C. 303(q).

The rules of interest are actually based upon *advisory* recommendations of the FAA as found in the FAA Advisory Circulars, 47 CFR 17.21-17.58. The Obstruction Marking and Lighting Circular is document AC 70/7460 and is available at the FAA website.

The FCC was given the authority to make these FAA *advisory* recommendations *mandatory*, and does this by incorporating the FAA standards right into the FCC rules. FCC Part 17, and FCC Forms 715 and 715A contain the FCC requirements relating to tower lighting, and are available on the FCC web site. Therefore, for a full understanding of all the rules pertaining to tower marking, we must look at FCC Part 17, FCC Form 715 and 715A, and then the FAA Advisory Circular which is also by reference incorporated into the FCC rules.

NOTIFICATION

The FCC always requires an FAA determination of "no hazard" before it will issue a construction permit to build on any proposed or existing tower. That FAA determination, made by the appropriate FAA regional office, takes into account the location and height of the tower and reports its recommendations for any painting and lighting, which the FCC then incorporates into the station construction permit and subsequent license.

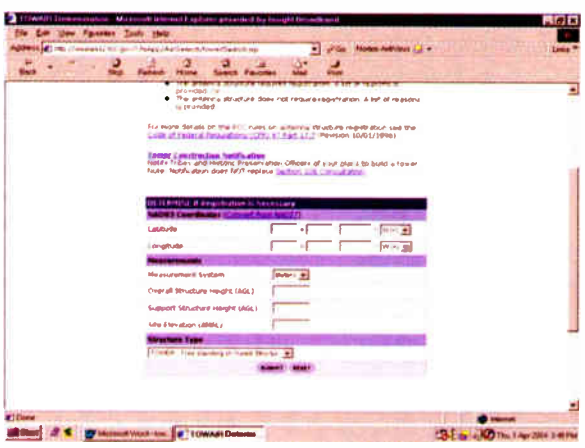
Towers that need painting or lighting in order to achieve the "no hazard" determination will be issued an ASR (Antenna Structure Registration) number which, as reported in the previous article in this series [February 2004, Page 8], provides a convenient way for the FCC, the FAA, the station owner, and the general public to quickly identify that particular tower.

But visibility is not the only standard the FAA uses to determine whether or not a proposed tower will be a hazard to flight safety. The FAA also studies the proposed RF signatures for new towers to determine if there might be possible radiofrequency interference with aviation communication signals. If such a concern is raised, the FCC then makes an independent analysis to determine how to resolve the issue, and apportions costs to the appropriate parties.

BASIC MARKING RULES

As mentioned, the basic rules of tower marking come from the FAA Advisory Circulars (47 CFR 17.21-17.58), which generally require that any structure over 200 feet above ground level be registered and marked (painted and/or lighted). But if the tower structure is located on a flight path to a nearby airport, it may require registration, marking and painting no matter what the elevation above ground level.

The 200 foot rule is not an absolute and there are many shorter towers, such as STL relay towers, that require registration, painting and lighting when located close to airports. If you have any doubts, the FAA has developed a great resource on the web, which can tell you immediately whether or not a structure requires registration. It is called TOWAIR, and it looks like this:



http://wireless2.fcc.gov/UlsApp/AsrSearch/towairSearch.jsp

As long as you know the latitude and longitude, the site elevation AMSL and proposed structure height, this valuable tool can tell you immediately whether or not your proposed tower requires registration and lighting.

Once the FAA and FCC specify the required marking for your tower, the next challenge is to fulfill those requirements. Station operators have three major responsibilities in regard to marked towers: Marking, Monitoring, and Maintenance. We will examine each of these critical areas in some detail.

MARKING (CONSPICUITY)

The essence of tower lighting and marking is to make the structure visible in all weather and lighting conditions. The FAA utilizes the term "conspicuity" to reflect that ideal. A structure may be made conspicuous by paint, lights, or both. Often, painting alone provides the required daylight conspicuity, while some type of lighting system provides nighttime protection. If medium or high intensity lighting systems (strobes) are used 24 hours per day, the painting requirement is often waived, since the strobes provide protection both day and night.

To paint a tower might seem a simple thing, but there are several issues that are important. First of all, the paint itself must meet Federal Standards. Both the white and red (aviation orange) paint must meet the following standards when applied:

White: Color #17875 Federal Specification FS 595
Aviation Orange: Color #12197 Federal Specification FS 595

The paint is to be displayed in alternate bands of aviation orange and white as follows:

1. The bands are to be equal in width, provided each band is not less than 1.5' (.5m) or more than 100' (31m) wide;

2. The bands are to be perpendicular to the vertical axis with the bands at the top and bottom ends colored orange;

3. There must be an odd number of bands on the structure;

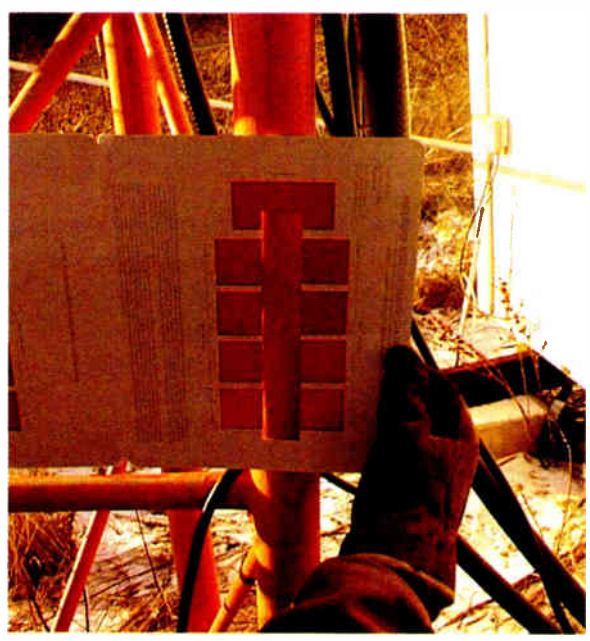
4. The bands should be approximately one-seventh the height of the structure if 700' (214m) AGL or less. For each additional 200' (61m) or fraction thereof, add one additional orange and one additional white band;

5. The bands should be equal and in proportion to the structure height AGL.

PAINT CABLES TOO

A recent change in the painting requirements specifies that if transmission lines or coaxial cables diminish the conspicuity of the orange and white paint bands then the cables and lines themselves should also be painted like the tower structure. There is some subjective evaluation here, but if the primary color of your tower is black when viewed from any face, then you should paint the coaxial cables and transmission lines to restore the full conspicuity of the orange and white color markings.

Once paint is applied, it should be periodically monitored to insure that the paint continues to offer the required conspicuity. Federal standard FED-STD-595 lists the standards for chromaticity and luminance for a freshly painted tower. *Those standards require that surfaces should be repainted when the color changes noticeably or its effectiveness is reduced by scaling, oxidation, chipping, or layers of contamination.*



Paint monitoring is best done with a color tolerance chart, available from private suppliers; Hale Color Charts of Los Angeles, California is one such supplier and the one with which I am most familiar. [www.halecolorcharts.com]

(Continued on Page 10)

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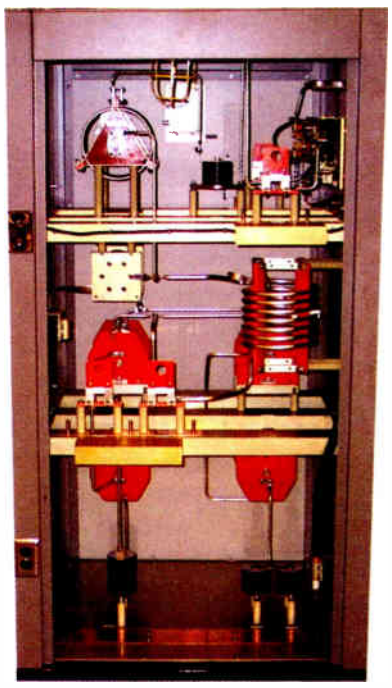

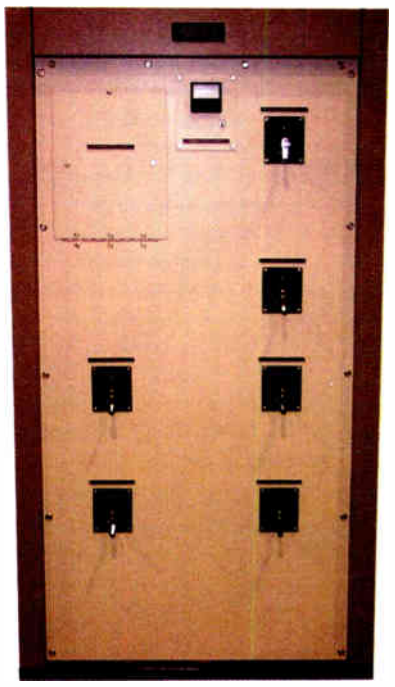

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FCC Tower Compliance Issues

Continued From Page 8

Note that although the FAA prefers that the paint color be sampled on the upper half of the tower "since weathering is greater there," a comparison at the bottom of the tower is often just as effective (and a lot more convenient!) A yearly check with a color chart is an effective way to maintain FAA paint standards, while making you aware of the continuous weathering that will eventually require a budgeted repainting.

NIGHTIME CONSPICUITY

While paint provides daytime protection to towers, it is obviously not effective in the dark. Night protection is most commonly accomplished with red lights, listed in the FAA 70/7460 Advisory Circular as FAA Style A. It looks like this: — — — — —⇨

You will notice the tower lighting schemes are numbered A0-A6. This becomes meaningful when you understand that the number refers to the number of flashing beacons for each tower. For example, an A0 tower has no beacons – just one top-mounted obstruction lamp – while an A6 has six beacons.

Additionally, for every beacon there is also a set of obstruction lamps. Thus, an A1 tower has one beacon and one set of obstruction lamps, and an A6, six beacons and six obstruction lamp sets. This designation system applies to all of the FAA lighting standards, A through F. For example, the B-5 high intensity system contains five levels of flashing high intensity beacons.

Your tower may well have lighting that does not conform to this circular since the FAA did revise the lighting standards some years ago. If your tower lighting does not agree with the current FAA standards, your station license and ASR should both specify the same non-conforming use. The FCC Form 715 (or 715A) contains the previously issued lighting standards that may be on your license, as well as other requirements detailed following.

If you have multiple beacon levels (A2-A6), all beacons should be wired to flash simultaneously. The flash rate for all beacons is to be maintained within 12 - 40 flashes per minute. Each beacon consists of (2) 620 or 700-watt lamps and both lamps must operate to produce the required luminosity of the fixture.

All red lights are to burn continuously or be controlled by a light sensitive device adjusted to turn the lamps on at a north sky light intensity level of about 35 foot candles and turned off at a north sky light intensity level of about 58 foot candles.

MEDIUM AND HIGH INTENSITY LIGHTING

Because the proliferation of "light pollution" across the country, an alternative form of structure marking is often specified for towers of substantial height. Usually applied to towers in excess of 500 feet above ground level, either medium or high intensity lights ("strobes") do provide an improved conspicuity to tower structures.

Strobe lights are ordered according to the following standards:

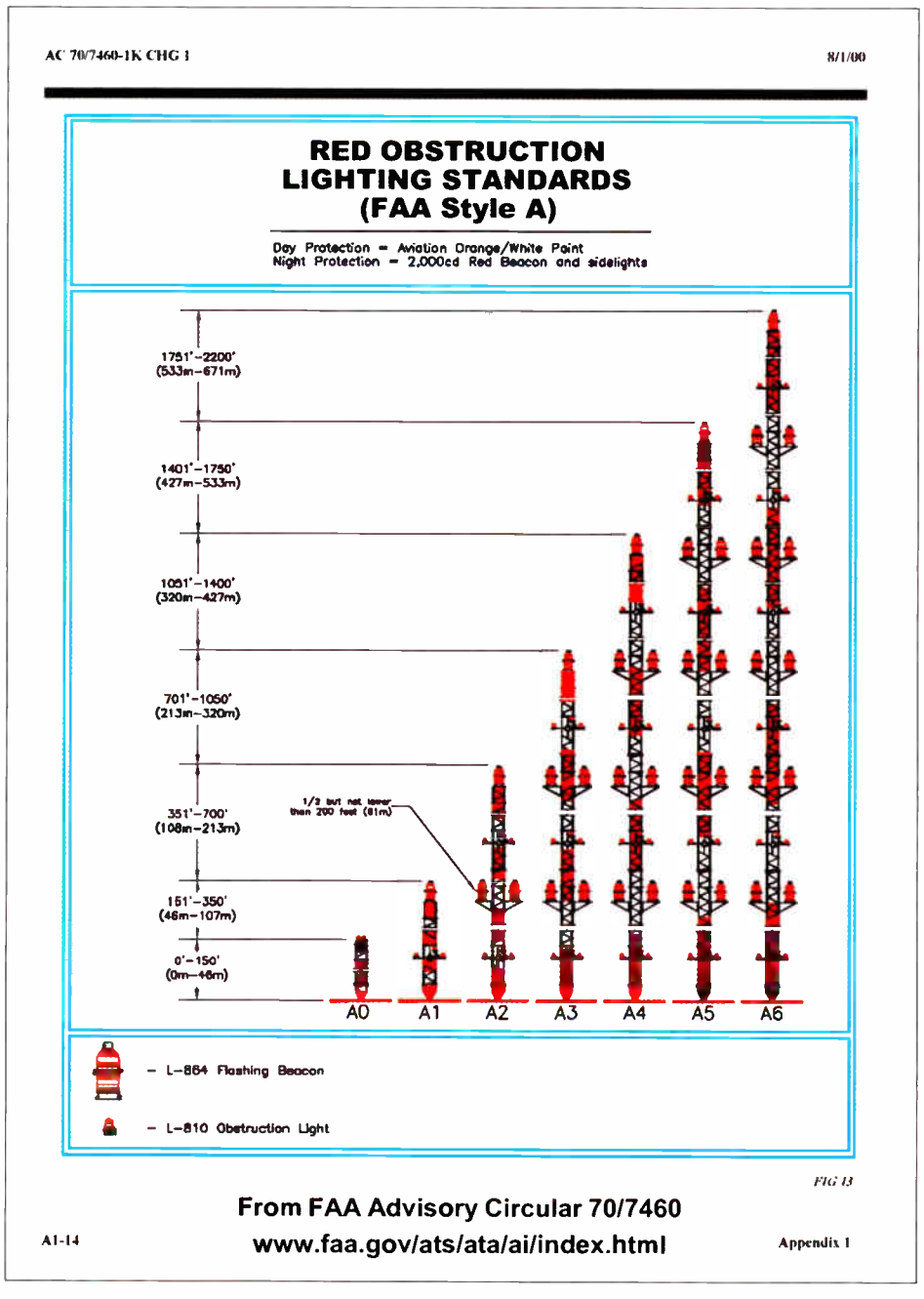
FAA Style B: High Intensity

FAA Style C: High Intensity with Medium Intensity Strobe at top of appurtenance greater than 40 feet.

FAA Style D: Medium Intensity White (towers < 500')

FAA Style E: Medium Intensity Dual (Red/White) (towers < 500')

FAA Style F: Dual High Intensity (strobes day/red lights night)



From FAA Advisory Circular 70/7460
www.faa.gov/ats/ata/ai/index.html

In most cases, strobe-lit towers operate with strobes 24 hours per day to provide both day and night protection. As a result, painting for the sake of conspicuity is not required. This provides a maintenance costs saving which can help offset the cost of the strobe system. However, the prudent engineer will maintain some sort of surface coating to protect the tower steel even if the aviation orange and white paint is not required.

MONITORING

All lights are to be observed once each 24 hours either manually or by an automatic alarm system. Failure of a top mounted light or any flashing beacon regardless of its position on the tower must be reported to the FAA within 30 minutes of discovery, and again upon restoration of normal operation. Failures of obstruction (non-flashing) lamps are to be recorded in the station log and repaired as soon as practicable, but notification to the FAA is not required.

Please note that a completely automatic tower lighting alarm system must be able to detect the failure of any single lamp (including one of the two lamps in an incandescent beacon) as well a flasher failure that would cause normally flashing lamps to be stuck "on."

Most new tower lighting packages include such an alarm system, which monitors the condition of the lights, flash rate, and, for strobes, any required light step-downs from twilight to night. Engineers may need to fabricate such a system for older lighting setups, but aftermarket tower light monitoring modules are available which can make this a relatively easy task.

If your station has installed an automatic alarm system, then you are exempt from the daily monitoring requirement so long as the system will immediately notify a responsible party of failures such as those mentioned above. That responsible party is required to investigate the situation and report to the FAA as appropriate. Note that the FAA prefers that the station visually confirm the problem prior to notification.

MAINTENANCE

Recent FAA policies mandate a 15 day window for tower lighting repairs. If you notify the FAA of a problem, you will have 15 days to repair it before the FAA notifies the FCC. You must also immediately notify the FAA again when the problem has been cleared within that 15 days. If you do not respond within the 15 days, the FAA will notify the FCC and you will soon receive a phone call from your nearest Enforcement Bureau asking why the problem was not been "cleared" with the 15-day period.

If you cannot repair a problem within 15 days of reporting it, be sure to call the FAA again and inform them of that fact.

FCC Rule 17.47 mandates quarterly inspections of the tower lighting system. Although many engineers believe this also requires a structural inspection of the tower itself, this required inspection is in fact only concerned with the tower *lighting* system. Issues such as flash rate, proper photocell operation, investigation of cracked lenses, inspection of wiring and conduits, etc. are typical components of the required quarterly inspection.

During this inspection, you may also wish to take the opportunity to do a general visual inspection of the tower, anchors, and grounding as well. Although 17.47 does not specify how or where these quarterly reports are to be recorded, most stations maintain a written report with their maintenance records at the transmitter site.

SUMMARY

Part 17 of the FCC rules, along with FCC Form 715 and 715A and the pertinent FAA Advisory Circular AC/70/7460 contain the rules and regulations applicable to tower marking, monitoring, and maintenance. Adherence to these rules is not only a regulatory requirement, but is first and foremost a demonstration of our industry's dedication to maintaining the highest standards of flight safety. In a future installment of this series, we will discuss Public Access Protection at tower sites.

Terry Baun is serves as an ABIP inspector for Broadcast Associations in several states, including Wisconsin, Indiana, Ohio, and Michigan. Contact him at tbaun@criterion-broadcast.com

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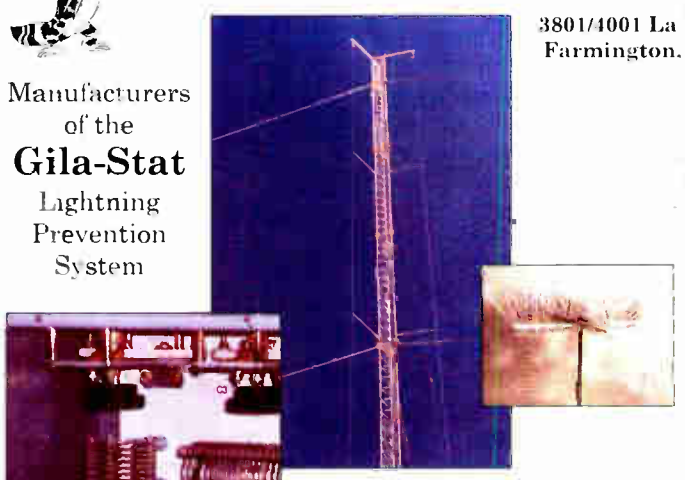

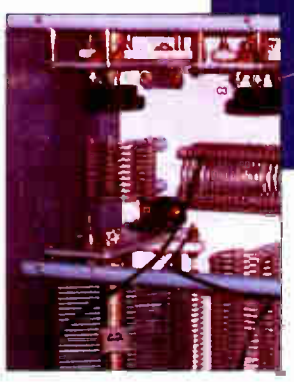

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Audio Processing From the Ground Up

Part 16 – Multi-Band Processing Made Simple (and Clean)

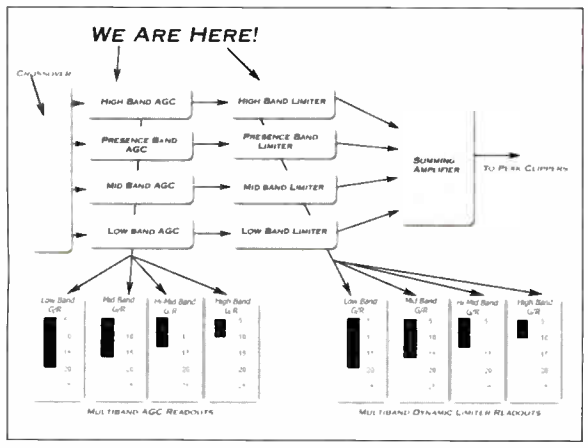
by Cornelius Gould

[CLEVELAND, Ohio - June 2004] In the 1980s, it was usually easy to tell which stations were using multi-band audio processors. On many of them, it was hard for the Program Director to resist cranking up the levels. The result was a distinctive over-processed sound that often led to a lot of grinding teeth.

Amazingly, despite all the advances in technology, we still can hear examples from one end of the band to the other that are very reminiscent of 1980's over-processing.

THE AUDIO GATE

The classic "80's processing sound" was mostly due to the fact that most multi-band audio processors of the time did not have silence gating, and possessed very simple processing capabilities. By contrast, today's audio processors have much more power "under the hood," and routinely include gating both within the multi-band AGCs as well as in the multi-band dynamic limiter sections.



As you may recall from previous installments, the gating function used for broadcast audio processing systems "pauses" the recovery time function. Whenever the audio falls below a pre-determined user defined level, the gate will stop the recovery time process. It will remain paused until audio levels exceed the threshold of the user-defined level. When this threshold is met, the recovery time function is re-instated, and the processor will begin to increase its gain.

WHY A GATE

This feature is very useful in multi-band AGCs. Let us look at just what could happen in the high frequency band. We can imagine that we have a multiband processor with no gating function on the high bands of an audio processor, and moderate to heavy levels of processing is being used (not at all unusual these days).

During moments of very little to no high frequency content (for example, during an old, muddy recording), this is what happens: as the high frequency material goes away, the high band processor will naturally want to increase gain until it either runs out of range, or finds some high frequency audio to play with. In this example, the only audio it is going to find is noise.

The solution to this problem is to have a gating system intelligent enough to "look" for a condition where there is very little to no high frequency audio content. When this happens, the recovery function is basically shut off. In effect, the high frequency band is told to "stop processing and wait" for more significant audio to process, rather than increasing and increasing gain until tape hiss (or some other noise in the treble region) is brought up to irritating levels.

QUIESCENCE

Another useful function is the good old "quiescent platform level" technique; some processors combine this with the noise gate feature. Some time back, we explained this type of platform level as returning an AGC to a default "resting level" before freezing it during moments of really low audio levels. Typically this quiescent platform level is set to about unity gain, although some modern processors let you set this platform level to suit your programming needs.

In the practical operation of our hypothetical processor, we can visualize this platform technique on the high frequency band; we find during moments of very little activity the natural behavior of the AGC is to eventually return to unity gain, and wait for more substantial levels of audio energy to occur. When that happens, it will either increase its gain to capture the high frequencies, or turn the level down (below unity gain) if the signal gets very loud.

The neat effect here is that you sort of end up with a natural noise reduction system where high frequencies are reduced to minimize the effects of high frequency "noises" such as tape hiss.

Most processors that have the platform level feature on their AGCs will allow you to "turn on" the platform system for any of the multi-band AGCs you feel could benefit from this technique. The effect is the same as we described on the high frequency band: it just happens on the different frequency bands independent of each other.

GATES FOR LIMITERS

These days, it is becoming more and more common to see similar "pause" gating on the multi-band dynamic limiters. These gates are more useful in an area that not many people think of: reducing clipping distortion.

To describe how this is possible, we first should review the basics of a dynamic limiter.

A dynamic limiter is like an AGC, but is purely a peak sensing system, typically running a higher compression ratio than the AGC. What I mean by peak sensing is that its main job is maintaining control over the peak levels, such as with percussion instruments (drums), or with vocal inflections where there may be a "blast" of audio levels around one letter of a word, or at the beginning of sentences.

An Interesting Side Note on Vocal Inflections and Audio Processors.

Different languages have different vocal characteristics. An audio processor designer that does not check for the response of the processor with the differing styles of vocal inflections is looking for trouble. This is because some inflections that rarely occur in the English language may occur all the time in another language.

If the processor has a tendency to distort a little bit too much on a rarely used English vocal inflection, it will usually be overlooked or not noticed at all by English-speaking users. But another language may use that same inflection as part of normal daily speech; the processor will sound distorted on voice all of the time in that language.

Trying to manage consistent performance across multiple languages can be quite the challenge for an audio processor designer.

As I described last year, the job of the "peak sensing" limiter is to be a "soft sponge" in front of the brick wall that is the peak clipper. If audio peaks hit the peak clipping stage too hard, audible distortion will be heard. The dynamic limiter is the "last chance" to smooth your audio so that it fits through the audio constraints of the peak clippers better.

Like the AGCs that proceed the dynamic limiters, the limiter has the usual "attack" and "release" parameters. The faster the attack time is on the dynamic limiter, the more it will "swallow up" the large peaks that can cause audible distortion. The faster the release time is set on the dynamic limiter, the more "packed together" or "dense" the audio becomes. This dense sound provides just enough – but no too much – power that most pop stations seem to want.

However, the more packed together the audio becomes, the higher the chances of listener fatigue becomes for the listening audience. As you may be starting to notice here, the name of the game is to provide just enough, but not too much power to your programming signal to attract and hold listeners to your station.

DISTORTION REDUCTION

The gating technique used in some audio processors on the dynamic limiter sections actually can help to reduce audible distortion. How? We will now examine what happens during the attack and release cycles of a dynamic limiter.

Attack:

The limiter has to act on a large audio peak as fast as possible. As used in broadcast (AM/FM/TV) processing, the attack time usually is not instantaneous. Some amount of peak energy will get past the limiter, and will have to be dealt with by the peak clipper. These audio signals that get past the limiter are referred to as "overshoot."

Recovery:

As the limiter recovers from attacking a peak level (by turning up its gain), it often will encounter other peaks in the audio and have to attack again, thus creating another momentary instance of "overshoot."

As mentioned earlier, the job of the pause gate in the limiter (usually called a "hold" gate) is to hold the limiter at (or close to) the level of the last peak until the next one comes around. The benefit here is twofold:

1) It minimizes the amount of work the limiter has to do when it comes time to "attack" on another peak. This results in smaller overshoots, which means you are not "slamming" into the brick wall peak clipper all the time, and thus reducing the perceived distortion in your audio product.

2) The overly "thick" sound a limiter can have when adjusting the processor to have more impact on the dial is minimized, and a smooth powerful sound becomes easier to achieve.

BUILDING YOUR SIGNATURE SOUND

Adjusting the attack and release times differently on each of the frequency bands of dynamic limiting will help you achieve a signature sound for your station by weighting certain frequencies more than others. For example, speeding the attack times can soften the sound of transients like that from drums.

On the other hand, slowing down the attack times will make the "transient snap" from the drums stand out more, but could also cause some distortion on sharp vocal inflections on dialog broadcast on the station. This is because more transients get through to the peak clipper. You will have to experiment to find the right "sweet spot" for your station/format.

Next time, we will delve into some of the listening techniques I use to get the sound I want in a radio station. I hope they will help you, and I suggest you hold off on tweaking too much until *after* you read next month's installment!

Rarely in "quiescent mode" for long, Corny loves to talk and share ideas about audio processing. The technical advisor and weekend announcer for WAPS 91.3 FM, Akron, Ohio, Corny can be contacted at: cg@radiocleveland.com

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ZZZZZ

An Engineer's Dream

by Barry Mishkind

I had a dream.

Yet, upon reflection, perhaps it must have been that super rum chocolate dessert creation.

I was sure the phone had gone off (at 3 AM yet!) and my friend and fellow engineer Bob said it was essential I come to his studio immediately. Well, OK, Bob is a good egg. He often helps me out, so I had better roll and get there as soon as possible.

Imagine my surprise at seeing the parking lot full of the local radio engineers' vehicles. What could be wrong, I wondered? Did the transmitter explode? Did the antenna matching unit get hit by lightning? What brought out all these guys at 3 AM?

All seemed calm outside, so I figured the major failure obviously had to be inside and everyone would be working frantically. But there was no panic inside the station either. Everyone was sitting around, drinking coffee or cola and chatting about things engineering.

RADIO DETENTE

Finally, Bob spoke up. He had been thinking about our discussion at the last radio engineers' luncheon, and decided it was time to do something about the modulation wars that had forced virtually every station in the market into broadcasting square waves between 2.3 kHz and 2.8 kHz in a vain attempt to be the loudest signal on the band.

"Enough is enough," he cried out! "As a group of professionals, we must do something before the average time spent listening drops below three minutes." Bill agreed, explaining there recently had been a whole series of auto accidents apparently caused by people distracted from road conditions as they tried to find a listenable station.

Greg felt the same way, complaining his PD had demanded so much clipping that the alley behind the station was now completely filled with the tops of audio waves clipped by their new MegaMod digital audio machine.

One by one each engineer spoke up. All agreed modulation wars did no one any good and – worse – the aural signature of our collective craftsmanship was not one of which to be proud. Yet, no one felt they could turn down their processing, because their PD immediately would scream they were now only half as loud as station KXXX.

The frustration built as we discussed dealing with people whose concept of good audio centered on watching a modulation monitor needle hang motionless at 125% Anything less was a wasted opportunity to grab more listeners as they tuned past the station.

Was there any way to reverse the trend to more and more smash?

A PLAN DEVELOPS

Bob caught everyone's attention as he described his plan: We would go to our respective stations and remove exactly 2 dB of clipping and 6 dB of compression from our audio chains, and then re-calibrate the modulation monitors so they would look exactly the same to the programmers.

It had to be done in the middle of the night, he said, so none of our program directors would get wind of our getting together and acting in unity in this scheme. We would do it at exactly 5:03 AM, and then go home to relax in the knowledge that everyone would be putting out a cleaner signal.

Bob predicted we would receive a lot of calls asking what we had done to improve the sound of our stations. Consultants from all over the country would call and try to learn how we managed to be both loud *and* clean, and how they could replicate it in their markets. An award would come from the NAB proclaiming we had done a major service to the industry. And certainly we would be in demand to consult the major chains.

With all that glory in our eyes, we went for it. Sure enough, not one PD noticed any difference in modulation levels. The boss called me into his office and told me how much his friends and clients liked our "new" clean sound. I tried not to spill the beans, yet could not claim all the credit either: "Well, we did do a few things with the audio chain to clean up some problems." And then ...

BACK TO REALITY

"Buzzzzzzz!" It was the alarm clock. Time to start the day. It was odd how good I felt. Driving in to work, I was sure I heard less distortion and breakup than normal. Our plan *is* working! Perhaps if we took out just a few more dB of smash, it would clean up totally. Several ideas began to come to mind.

Arriving at the office, there was a message from Bob. "Howdy guy," he answered in a cheerful manner. "Got some good news!" "Well, let me in on it," I replied. "OK," said Bob, "Just thought you would like to know that overnight we installed our new Multi-MegaMod digital processor with the variable post-tri-clipper squash circuit. We are now at least .025 dB hotter than you guys! Just try and catch up with us!"

I *had* a dream ... – Radio Guide –

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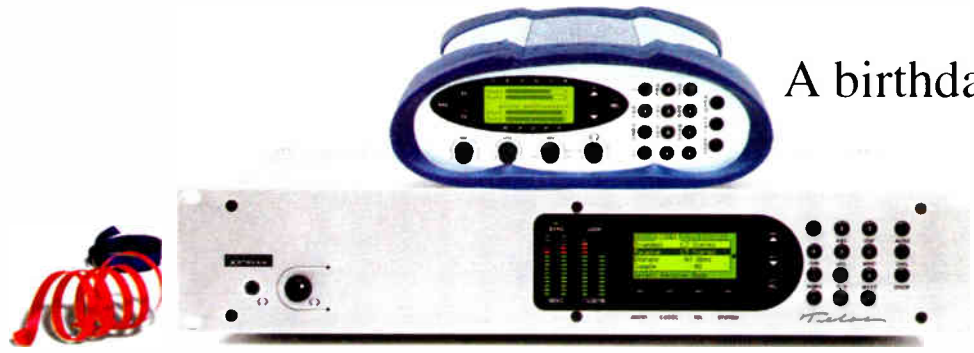

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User Reports From Radio Guide Readers

Field Guide

Ultrasone Natural Surround Sound Headphones

by Michael Halleck

[ST. PAUL, Minnesota - June 2004] Occasionally, I talk with sound engineers who are not in radio. A good friend of mine, who works for a major voice-over/commercial studio here in town had mentioned a "revolutionary" new headphone. I thought, "Right, 'revolutionary.' He records commercials all day, could this possibly be hyperbole?" After all, new technology often has a habit of being "the same wine in a new bottle."

Nevertheless, my friend assured me the headphones were getting a lot of good press in recording studio publications and he thought I should look into them for use in radio. Although a devout skeptic, I am always on the lookout for technology that can be adapted to radio. So, I tracked down a couple of pairs of these new Ultrasone headphones to listen to and review.

BRUTE FORCE

From the days of Marconi, various manufacturers have designed, built and sold what seemed to be the best available headphone of the time. We are talking Trimm Dependables (ouch, my ear hurts), Koss Pro4AA's (my neck – hey, am I going bald? Are my ears leaking?). All of these designs had one thing in common – other than pain. The idea was to get the audio in the ear simply by placing the drivers opposite the ear canal. And for a long time that seemed to be the best way to get sound where it needed to go.

Everything seemed to work OK, until age started to rear its ugly head. Well, not age so much, but deafness. It seems that placing any headphone (essentially a small speaker) directly opposite the ear canal at a large SPL (Sound Pressure Level) really does damage.

How many times have you walked into a control room and heard headphones as loud as the monitor speakers? It took a lot of people now with beige devices in their ears to convince us that really loud headphones may not be a good idea. After much research, Florian Koenig (CTO of Ultrasone in the 90s), decided there was a better way to make a headphone. Some of the greatest ideas turn out to be the simplest.

A MORE NATURAL AUDIO PATH

The Ultrasone inventor decided to place the drivers in the ear cup to take advantage of the complete ear, so you will hear like you normally do. This also keeps the driver from playing directly into the ear canal. This is one of those ideas that cause a Homer-type reaction ("Why didn't I think of that?").

I have simplified the technology somewhat, but with de-centralized drivers, we can localize the sound and provide a much better stereo image. This also means bad things may not happen to your hearing so soon. Do not confuse this with 5.1 or any of those Dolby Surround schemes.

As explained on the box by the German manufacturers "...with normal headphones you have the impression that the music is being played in your head, Ultrasone headphones with the patented S-Logic™ Natural Surround Sound give you a natural three dimensional sound."

LOW RADIATION

Not only do they have your hearing in mind, but also the potentially harmful EMF or magnetic fields from the drivers (in Europe, the EU is extremely concerned about this hazard). The headphones I tested shielded 60% of the EMF. If that is not enough shielding for you, there is another version of these Ultrasone headphones; for an extra $50, more "mu" metal is added and 90% of the radiation is blocked!

I guess they do take their radiation seriously in Europe. When I mentioned I felt less "fatigued" using Ultrasone vs. other unshielded headphones, John Ripley (the Nashville based U.S. distributor) said that fatigue is a symptom of this radiation. My guess is this is something you will have to try for yourself.

Most of my listening was done with the Ultrasone model HFI-650, which retails for $249.00. These headphones are extremely comfortable (they only weigh 256 grams – about a half pound). Nothing about these headphones says cheap. They are extremely well made with comfortable pads around the ear cups and a well-padded headband. They also fold to fit in the included carrying bag.

Ultrasone HFI-650

They only negative I found, as did a couple of the jocks who tried the "cans" (dare I call them that?), was the straight cord. A coiled cord would be a lot easier to manage especially when plugged into a small Mackie console or in an on-air studio, as the long straight cord just kept getting in the way. When queried about this, Ripley said any purchaser specifying a coiled cord would get one.

GOLDEN EAR TIME

But now the million dollar question: how do they sound? When I audition unfamiliar audio devices I always listen to familiar material. In this case, the headphones sounded as good as the recordings, with no colorations. After listening extensively at home (my wife was happy, I could listen well into the night and not disturb her with the speakers on) I can tell you they sound marvelous.

The headphones live up to the slogan on the box: "Trust your Ears." The complete audio spectrum is reproduced, and there does not seem to be any exaggerated anything. The highs are smooth and not spritzy, the midrange very pleasant as is the low end, which is not boomy or thumpy. A plucked bass guitar or violin string did not disappear as it decayed; if any instrument was in the recording, it was in your ears.

Because the drivers are where they are, the stereo image is as realistic as you can get without listening to a loudspeaker system and some may say better because the room acoustics are eliminated, again leaving the original studio acoustics in play. I listened to all types of music, including my own radio station. Listening off air, I started to wonder if I could do something about the AM noise, and what was that strange "whir" while the jock was talking? Oh well, listening to recorded music was less distracting – so back to CDs.

The music on the demo CD from the Ultrasone people was obviously chosen to highlight the headphone, and that it does. But after listening, I found that *any* well recorded music causes these headphones to shine. I also listened to a few SACDs (Super Audio CDs), which truly make good use of the CD medium. With these phones, an SACD sounded like there were no headphones at all, just music.

DIFFERENT VENUES

I did more than just music listening. I have an occasional gig providing engineering talent (one of the few times we engineers are referred to as "talent") to the visiting radio play-by-play announcers for our local NBA team. This involves wearing headphones for the course of a basketball game with very few breaks. After a game, I usually feel quite fatigued and my ears are "tired." After mixing a game on the Ultrsone HFI-650's, I did not notice as much fatigue – a real positive in my book.

The subtle nuances (the swish of the net or the "boing" of the rim) from the basket microphones came right through and seemed to have a bit more detail. The floor microphones sounded more realistic, with the occasional pithy athletic comment even more noticeable.

Now I could not tell the difference between a Nike or Adidas shoe squeak, but that is more a function of the microphone, right? Overall, the mix was very detailed and, because the ear cups provide a comfortable seal, the loud cheering crowd only came through the microphones I had open.

Another test of headphones is using them as a reference when recording live music. I had the opportunity to mix a "Studio Session" at our radio station for Liz Phair. This was a live performance with two vocalists and acoustic guitars in a small TV studio (we are co-located).

Again the mix was detailed and open, nothing was covered up. I could clearly hear the squeak of fingers up and down the neck as well as the pick hitting the strings. In fact, I found myself taking the headphones off from time to time to verify what I was hearing (or not). The HFI-650's did not add any coloration to any element of the mix. The image again was open and airy, the roady with the PA system also thought the mix sounded "awesome dude." Enough said!

RECOMMENDATION

I highly recommend the HFI-650's (10-25,000 kHz, max SPL of 94db) with the gold plated Mylar foil diaphragms as an excellent set of reference headphones. If $250 is a bit much, the less expensive HFI-550 (10-22,000, max SPL of 103db) for $189 could also be used on air or as reference. The earcups seemed a bit smaller, but sounded just as good as the 650's to my ears.

I did not audition the HFI-15G ($99) headphone, which is aimed at computer gamers. This headphone also has the same system as the more expensive headphones, are a bit smaller, and also available as a "Pro" version (an extra $50, more shielding remember?). On the strength of its larger siblings, I would at least give them serious consideration for on air use or again as a set of reference "cans."

Now I realize there is a bit of sticker shock regarding the 650/550 models, since headphones are often considered as disposable items by some jocks and engineers. I can almost agree, but I keep thinking about a saying from my motorcycle days: "If you got a ten dollar head, buy a ten dollar helmet." To modify that just a bit, "If you have ten dollar hearing, buy 10 dollar headphones."

The Ultrasones are not cheap, but they sound great, and protect your hearing and your head. The Germans have done it again; with their patented S-Logic™ Natural Surround Sound system they have produced a high quality, improved headphone that actually works.

Now if they could only do something about headphone hair.

Michael Halleck is the Chief Engineer at KSTP-FM (KS95) in Minneapolis/St. Paul, MN. His email address is: mhalleck@hbi.com

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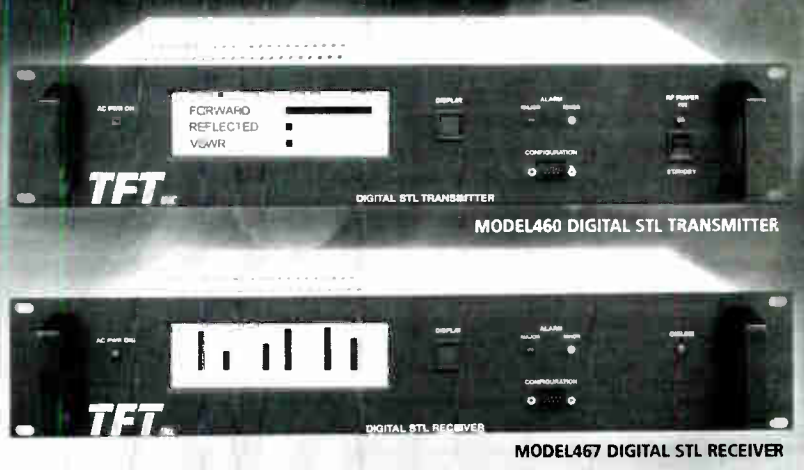

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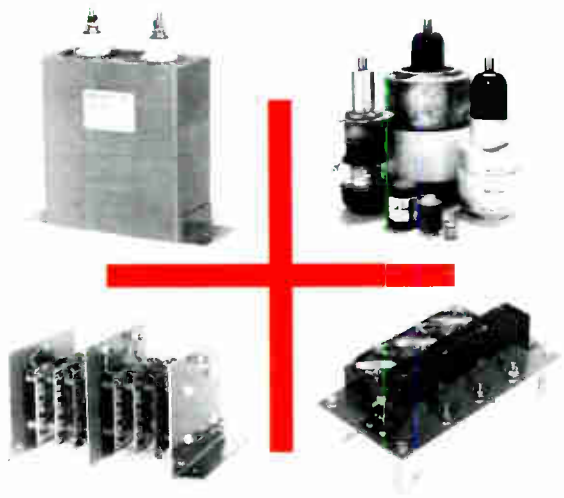

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Building a Stable Computing Environment

by Tren P. Barnett

[TUCSON, Arizona - June 2004] One of the biggest challenges facing any IT Department is reliability. In a world of advancing and evolving technology, systemic changes are inevitable even when folks resist it. And, each change brings challenges to the system's reliability. Whether it is a server or a workstation, software updates, service packs, or hardware updates, new devices must be reliably merged into existing technology with as little disruption as possible.

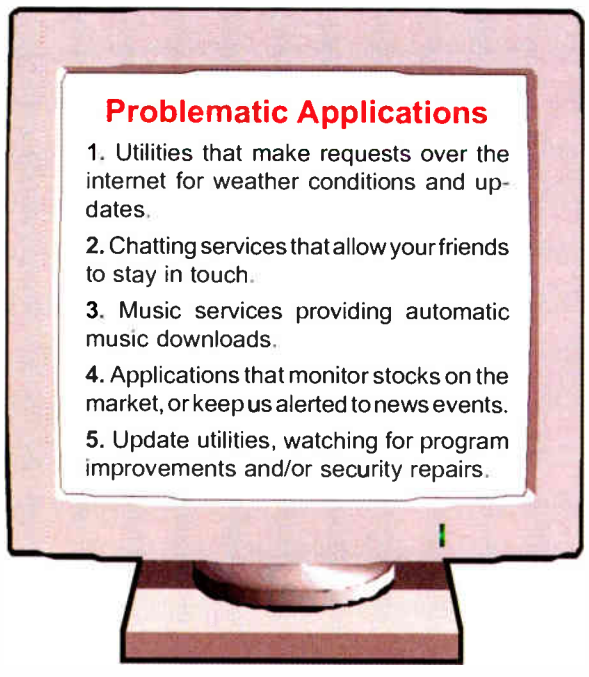
With computers handling so many of the mission-critical aspects of radio station operations, the success or failure in handling and adapting to the various changes, without disrupting on-air operations, depends largely on the how well the IT (Internal Technology) people run their department and set policies for station personnel.

TECHNOLOGY OR TERRORISM

Because IT success is based on a controlling environment, instead of acting as our friend, IT can quickly become the Internal *Terrorist* Department. Why the conflict? It is because many users enjoy setting up their computer with a desktop picture, nice sounds, entertaining screensaver, and cursor animations. Yet these very items often are culprits that lead to major problems of unreliability.

Those screensavers, cursor animations, and applications that provide ever-changing desktop wallpaper are available from thousands of developers – all hoping to make a buck off of you, the advertising, or both. Does it matter to them if their utility makes unreasonable demands of your workstation, causing unreliability? Not always.

In addition to screensavers, animation and sounds, many other items exist that can become culprits, causing havoc with the computer system. Consider just a few of them (without naming specific companies):



Then there are the tougher bandwidth culprits. These can be found in those really awesome programs that make greeting cards, publish the newsletter, keep us faxing, scanning and printing to a common device, or that allow us to interface important content with our PDA.

There are many more such items, often found in the software from many companies, all supposedly working in the background on many workstations around the world. Yet, not all are designed reliably enough for a stable work environment, nor do all respect your privacy.

WHAT STAYS AND WHAT GOES

Obviously, some of these applications and utilities must stay – while others must go. Where is the happy medium? Whatever the specific application is supposed to do, the challenge is to decide whether overall it is an important application or a system liability. Of course, when we are at work we are getting paid to work, so high reliability is a must. The IT Department is getting paid to keep us up, functioning, and reliable.

Is all of this possible? Yes, it is achievable. Workstations may require attention from time to time; however they can and should run for weeks, months and even years on end without major disruption. This however will require careful planning.

SUPPORT EXTREMES

Your IT resource may be that guy in the corner who knows the most about computers in the company. It is not his trade, but he becomes everyone's resource. Some of the most scary policy extremes can be found there. This is often the true Internal Terrorist Department, where support solutions may range from "yeah, you just need to reinstall everything" to "just reboot it every 30 minutes, computers are that way." Neither answer is acceptable.

Or, maybe your internal terrorist is one of those guys who have played with computers for 10 or 20 years or more, and he knows everything. In fact, he was Gore's chief resource when the former Vice-President was helping to invent the Internet. Yes, many facilities have experienced this extreme as well.

Furthermore, stunning policy extremes can rapidly develop from both types of IT, whether or not an IT department officially exists.

POLICY EXTREMES

Extreme number one: "Our policy is that there will be no internet access, there will be no floppy drives, all CD-ROM drives will be deactivated in the CMOS, and the CMOS will be protected by a password that only the president of the company and the chief IT Manager knows. Each computer will have exactly the same hardware, and software installed, and there will be no one enjoying their workstations or jobs."

Extreme number two: "Go ahead, install whatever you want. Reboot your computer every night before you go home, and every morning before you start. Go anywhere you want on the Internet, download anything you like, and the password for the administrator's logon is posted on the door to the closet where the server is located. Oh, and by the way reboot the server every night, too."

I know all of this is rather exaggerated one way or another. But the problem is real, and the solution often lies in the middle of the exaggerated extremes. There are companies that due to their government contract and/or confidentiality requirements have to lock down their networks and workstations. On the others hand, many may intentionally be lax, hoping to achieve a happier work environment.

One thing is certain though, when our policy falls in the middle of the extremes the IT Department sleeps better at night. Since we are talking to broadcasters for the most part, we will shoot for the happy medium.

POLICY AND COMMUNICATION = SUCCESS

Experience has shown that the best performance on workstations can be achieved when the users understand what to do and not to do. Therefore, communication is at the head of the list for IT success. After all, most users do not wish to break their computers any more than IT wishes them to do so. So, if users understand the risks, then they can deal with the solutions more readily.

A clearly stated company policy should never be underestimated, along with the required backing to keep it in force. Abuse of computers and the Internet should be addressed, along with appropriate communication standards for e-mail and data content. Company policy should cover the required steps to install and use software. And, the policy should also make clear who is responsible for non-compliance and the consequences for failing to follow policy properly.

Remember, too, the software on company-owned computers must be appropriately licensed. Furthermore, programs and utilities that may seem innocent enough, because we enjoy them at home, may wreak havoc on our intranet, as we will discuss shortly.

This issue of licensing must be understood, because many applications can be installed freely by home users, yet as soon as they are installed on a business computer the licensing is entirely different and not free. Company software cannot be installed at whim, but must be tracked. Violations on licensing can be very expensive.

IDENTIFYING BANDWIDTH CULPRITS

If Internet or intranet bandwidth becomes an issue, then it is time to audit the applications that run in the background to keep us abreast of the stock market or the weather, or program and security updates that can lead to poor performance for workstations needing the bandwidth for job related functions.

There are many utilities that we use at home and never realize their total affect on our personal computers, because their work demand is entirely different. Yet these screensavers, weather and stock monitors, animations, and other utilities often are keeping constant communication flowing over the Internet. Multiplying this by the number of users can add up to a lot of network traffic.

Many "cool" utilities come at an additional price. That price may be your privacy: Spy-ware is real and can easily damage workstation performance. A firewall controlling protocols and ports, or Internet access to specific sites may be required. Music at work often is a blessing to a user in a quiet office, yet many media utilities insist upon downloading not only album information, but also all sorts of advertising. The worst can hijack your browser and install hidden directories full of unwanted files.

ENHANCING SYSTEM SAFETY

Application settings quite often can be used to slow down bandwidth usage. Even easier than continually changing user settings, the denial of ports or access through the firewall to specific sites may reduce problems.

Locking down workstations where the users are just network users (not administrators of their own workstations) can also do a lot to keep those un-requested applications from being brought in and or installed unknowingly. If a new program is required, temporary administrative access can be granted easily enough.

A number of applications are available to provide virus protection, and firewall security; using respected industry leaders will prove to be most beneficial . Many of these programs are a necessary evil, each adding to the system burden; depending on the usage of the workstation or server, the need for them may vary. Since every new item introduced, can bring either blessings or curses, it is best to keep utilities to the minimum and up to date.

If a workstation does not need to be exposed to the Internet to perform normal job functions, do not expose it. If employees would like Internet access, perhaps using a separate workstation for such access is a viable option. If they need to monitor weather, or stock information, do it only on computers that need such information.

While a total lockdown is possible, locking down Internet access, email access, and computers is a lot of work and management. Seldom are the benefits greater than the risks. On the other hand, a careful, reasonable policy can keep your system functioning more smoothly, without undue risk to mission-critical components. We hope your IT Department specializes in Technology, not Terrorism!

Tren Barnett is a System Administrator and Programmer in Tucson, Arizona. He welcomes your questions on solving network problems in your facility. Contact Tren at tpb@aires.org

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	3.5 kW	1988	BE FM3.5A
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	10 kW	1980	CCA 12,000E
	10 kW	1980	Harris FM10K
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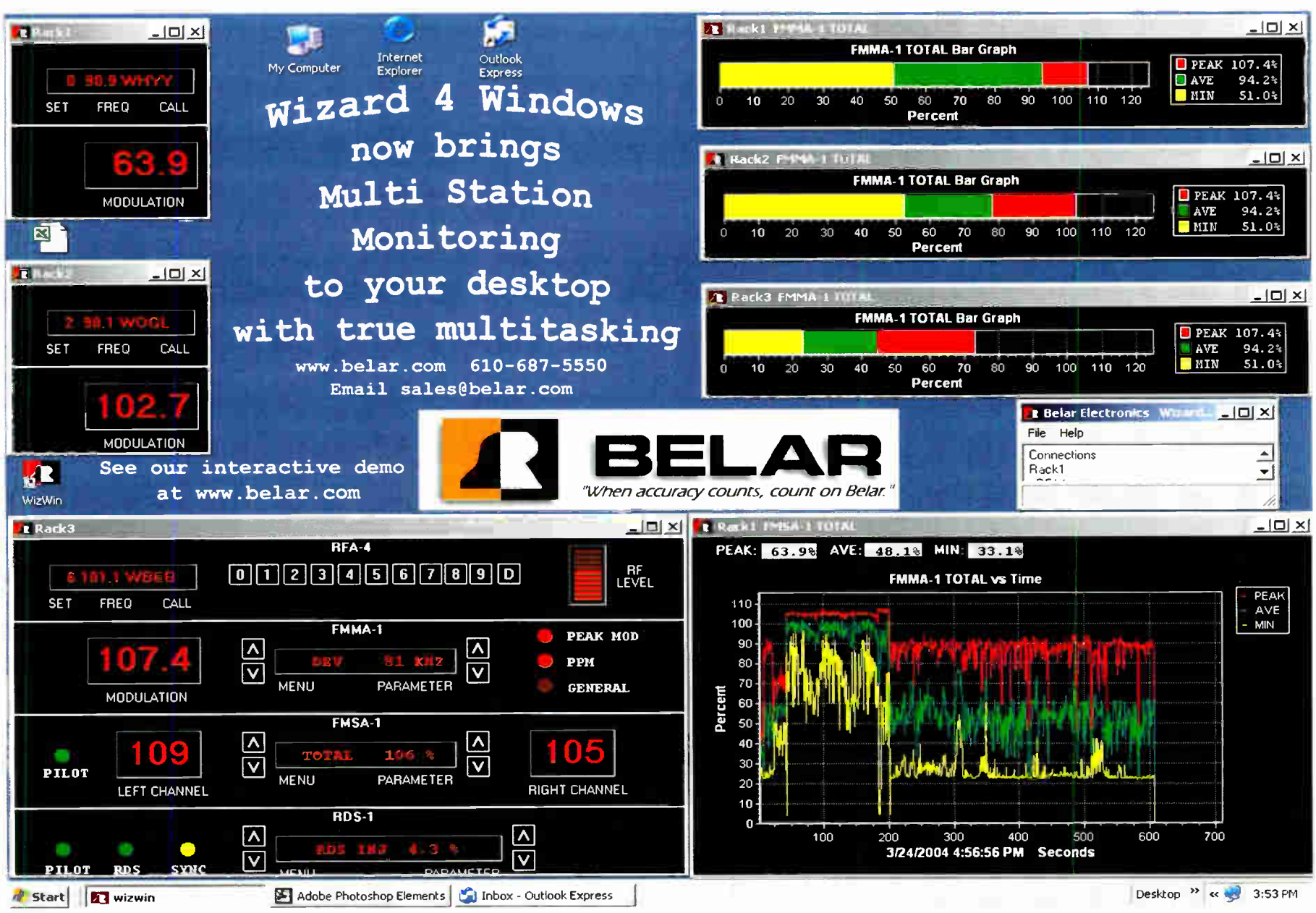


World Radio History

EAS Watch

The Public Safety View of EAS and Amber

By David Hudson

Sometimes lost in the ongoing effort to make EAS work is the relationship between broadcasters and local and state Emergency Management folks. David Hudson has been involved in emergency communication for over 14 years. Having experience at all levels of EM gives Dave a vantage point of value to broadcasters.

[EVERETT, Washington - June 2004] Public Safety and Emergency Management personnel are aware that a thin thread called "trust" holds local EAS – being an entirely voluntary system – together. And most of us are quite aware that the electronic media will likely pull the plug on the voluntary portion if the misfires, inaccurate messages, deplorable audio and disregarding of local plans continue to rise.

Sometimes, it would seem that Public Safety Answering Points (PSAPs) and Emergency Management personnel are unaware the Electronic Media is not just four televisions stations with over-eager news departments. They need to realize it also consists of numerous radio stations and it is all of the cable television systems.

WORKING TOGETHER

After normal business hours, our PSAP is the primary point for EAS activations in our county (Shohomish). EAS has been referred to as a nuclear ICBM without the mushroom cloud; there needs to be a chain of command in place to fire off an EAS alert, as we effectively take over billions of dollars of broadcast equipment and alert millions of citizens.

The broadcast community has given us a privilege – not to mention a huge responsibility – by entrusting their systems to us. Untimely and/or unclear EAS messages can scare and confuse a significant portion of the viewing/listening audience without providing them with information they need. Therefore, we make every effort to get it right.

Toward that end, thanks to a contribution from a local business, we purchased a Sage encoder along with the EndecPro software. The application runs on the dispatch supervisor's administration PC. All supervisors and their assistants are required to practice a DMO once a week, and logs are kept as a record of the tests.

Obviously, EAS is not perfect; if it were, we would never need to test it. While repetitive and boring, the intent is to be ready so the EAS can be effective. With the existing EAS design limitations, that is probably the best for which we can hope. (For example: I keep hearing TV stations call for more complete text transmission capability for EAS; thus far the FCC has declined.) It seems up to us to develop any necessary work-arounds.

MAKING IMPROVEMENTS

Education, training and communication are the key to overcoming the problems plaguing EAS as we know it today. I find it ironic that broadcasters, 911 centers and Emergency Managers are involved in the communications business, and yet we are loath to communicate with each other when there is a problem.

Unfortunately, instead of a group of people sitting down and doing a "Monday morning quarterback" critique of the problems surrounding an event, more often there is a lot of finger pointing. Here in Washington State, we use an EAS remailer to discuss any problem with alerts, and solutions for those problems. Hopefully the line of communication we have between 911 professionals, broadcast engineers, station managers, and emergency management folks will quickly solve any problems, and we will learn from any mistakes made.

ALONG COMES AMBER

Now let me touch on some issues surrounding AMBER Alerts. The AMBER Alert system is very near and dear to me. (I actually co-authored the Snohomish County AMBER Alert Plan, which the State of Washington then adopted as their plan for the entire state. But I digress...)

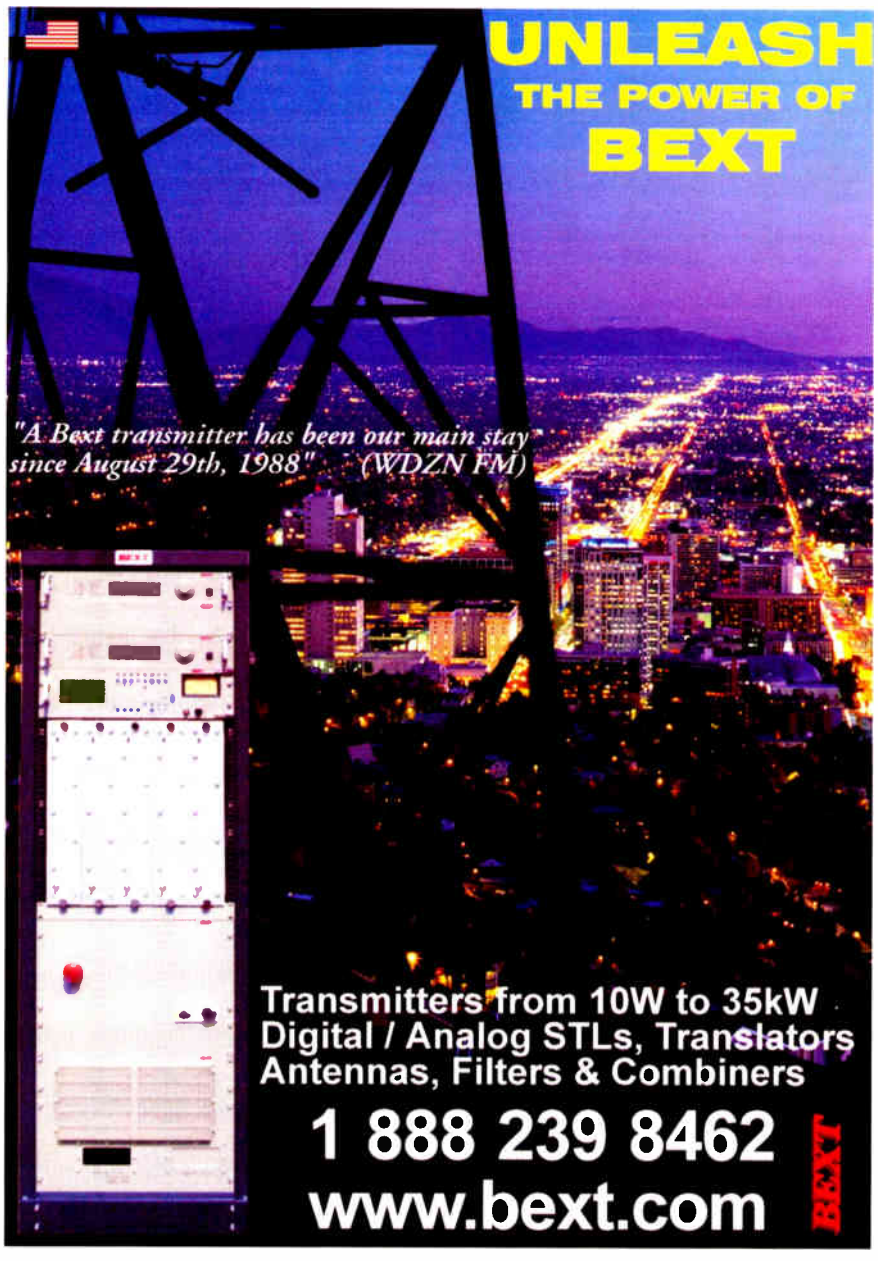
AMBER is a hot phrase. The Media is AMBER happy, and will call a child abduction of any type – even parental abductions that do not qualify under state AMBER plans – an AMBER Alert, often with an associated "News Flash." Use of the term outside of the real thing can have a harmful effect. We need to issue guidance to News Directors advising them to avoid using the term AMBER except when a true AMBER Alert is issued via the EAS. There is nothing worse than overusing a phrase to the point of dulling its meaning, and then having a true event to which no one pays attention.

The keys to prevent frivolous use of the AMBER plan are: *training, training, and more training, followed by investigation, investigation, and really good investigation by law enforcement.* Such checks and balances help not only with AMBER but in all cases of EAS activation. The ideal situation would have a committee critique each event, and discuss ways to improve the system.

Law enforcement needs to be aware there are other ways to get information to the media if the situation does not meet AMBER criteria. I am sure there is not a media outlet that would not bend over backwards to assist a law enforcement agency and air information about a missing child. Proponents of AMBER need to learn about EAS and what it can and what it cannot do.

The best thing about the voluntary portion of EAS is we are free to improve upon the system as much as we wish. AMBER is a very important tool for law enforcement, just as EAS is a great tool for the emergency management community; neither of these systems should be taken lightly. As I tell my law enforcement people, if you misuse it you are going to lose it. Together, we can make it more valuable to all.

David Hudson is the Operations Manager for SNOPAC 911 communications. His agency provides 911 and dispatch services for 13 police departments and 26 fire departments in Snohomish County. Contact Dave at dhudson@snopac.snohomish.wa.us



World Radio History

Things You Need to Know

New EAS Event Codes

[WASHINGTON, D.C. - June 2004] At the end of this month, those new EAS codes set up by the FCC and NOAA go into effect. NOAA begins implementation in daily operations on June 30, 2004.

It was over two years ago when the FCC issued the Report and Order (R&O) amending the Emergency Alert System (EAS) rules. The February 26, 2002 R&O became effective May 16, 2002. As part of the R&O, the FCC adopted numerous new civil emergency, weather and natural disaster event codes, as well as National Weather Services (NWS) marine area location codes. The complete list of event codes is shown below.

Implementation of these new codes was delayed two years to give broadcasters needed time to upgrade their EAS encoder/decoder equipment. Now NWS is making their final preparations to proceed. Any EAS equipment not upgraded by June 30th will be prone to "unknown event code" operator alarms.

NEW NAMING CONVENTION

The FCC R&O establishes naming conventions for the new and future EAS event codes. In most cases the third letter of all hazardous state and local event codes will be limited to one of four letters: "W" for WARNINGS "A" for WATCHES "E" for EMERGENCIES "S" for STATEMENTS. (The existing codes for Tornado Warning (TOR), Severe Thunderstorm Warning (SVR) and Evacuation Immediate (EVI) will not be changed.)

Weather-Related Events	NWR Code	Status
Blizzard Warning	BZW	Operational
Coastal Flood Watch	CFA	NWS Implementation 06/30, 2004
Coastal Flood Warning	CFW	NWS Implementation 06/30, 2004
Dust Storm Warning	DSW	NWS Implementation 06/30, 2004
Flash Flood Watch	FFA	Operational
Flash Flood Warning	FFW	Operational
Flash Flood Statement	FFS	Operational
Flood Watch	FLA	Operational
Flood Warning	FLW	Operational
Flood Statement	FLS	Operational
High Wind Watch	HWA	Operational
High Wind Warning	HWW	Operational
Hurricane Watch	HUA	Operational
Hurricane Warning	HUW	Operational
Hurricane Statement	HLS	Operational
Severe Thunderstorm Watch	SVA	Operational
Severe Thunderstorm Warning	SVR	Operational
Severe Weather Statement	SVS	Operational
Special Marine Warning	SMW	NWS Implementation 06/30, 2004
Special Weather Statement	SPS	Operational
Tornado Watch	TOA	Operational
Tornado Warning	TOR	Operational
Tropical Storm Watch	TRA	NWS Implementation 06/30, 2004
Tropical Storm Warning	TRW	NWS Implementation 06/30, 2004
Tsunami Watch	TSA	Operational
Tsunami Warning	TSW	Operational
Winter Storm Watch	WSA	Operational
Winter Storm Warning	WSW	Operational

Non-Weather-Related Events	NWR Code	Status
National Codes – Required		
Emergency Action Notification	EAN	Not currently implemented.
Emergency Action Termination	EAT	Not currently implemented.
National Information Center	NIC	Operational
State and Local Codes – Optional		
Avalanche Watch	AVA	NWS Implementation 06/30, 2004
Avalanche Warning	AVW	NWS Implementation 06/30, 2004
Child Abduction Emergency	CAE	NWS Implementation 06/30, 2004
Civil Danger Warning	CDW	NWS Implementation 06/30, 2004
Civil Emergency Message	CEM	Operational
Earthquake Warning	EQW	NWS Implementation 06/30, 2004
Evacuation Immediate	EVI	Operational
Fire Warning	FRW	NWS Implementation 06/30, 2004
Hazardous Materials Warning	HMW	NWS Implementation 06/30, 2004
Law Enforcement Warning	LEW	NWS Implementation 06/30, 2004
Local Area Emergency	LAE	NWS Implementation 06/30, 2004
911 Telephone Outage Emergency	TOE	NWS Implementation 06/30, 2004
Nuclear Power Plant Warning	NUW	NWS Implementation 06/30, 2004
Radiological Hazard Warning	RHW	NWS Implementation 06/30, 2004
Shelter in Place Warning	SPW	NWS Implementation 06/30, 2004
Volcano Warning	VOW	NWS Implementation 06/30, 2004

Administrative Events	NWR Code	Status
Administrative Message	ADR	Operational
National Periodic Test	NPT	Operational
Network Message Notification	NMN	NWS Implementation 06/30, 2004
Practice/Demo Warning	DMO	Operational
Required Monthly Test	RMT	Operational
Required Weekly Test	RWT	Operational

CANADA ADDS AMBER

While Canada does not use the US EAS system, a nationwide AMBER Alert program begins there this month. Instead of using US style over-the-air relays, the Canadian system will deliver detailed information on abducted children via faxes and email. Stations will use the transcripts to broadcast alerts. It currently is anticipated that this system will only be needed a few times a year. – *Radio Guide* –

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Maintaining Audio Faders in Broadcast Applications

by Dale Manquen, MANCO, Inc.

[THOUSAND OAKS, California - June 2004] Perhaps you remember the catch phrase in the TV advertisement for regular oil filter changes? "You can pay me now, or you can pay me later!" The same scenario applies to maintaining high quality linear motion and rotary faders in audio consoles.

Although these faders are frequently taken for granted, we must remember they are precision electro-mechanical devices that require routine service in order to maintain proper operation. Resistive tracks get dirty, sliding bushings need cleaning and lubrication, and wire brush contact fingers get dirty and wear. However, periodic inspection and cleaning can minimize on-air failures and maximize fader life.

VALUABLE PARTS

A typical analog or digital audio console may have from 10 to 150 linear faders, with a replacement cost of $60 to $500 each, depending upon the style and if the faders are motorized. At those prices a periodic replacement of all the faders is not an option.

Fortunately, with proper maintenance, many faders can last over 20 years. The operating environment determines the stress and rate of wear for a fader; the biggest single environmental factor is cigarette smoke. Not only can cigarette ash fall into the fader slot, but airborne tars and nicotine coat all the sliding surfaces. This residue shows up as dark stains on the cleaning pads when the fader components are washed during servicing.

With this in mind, our best strategy is to periodically clean and lubricate the faders to extend the life, and then replace worn parts when necessary. You may not be able to change policy and stop smoking in the control room, but you can at least be aware the faders will need service more frequently if smoking is permitted.

DJs OR MONKEYS?

Have you ever wondered if your DJs are climbing up and dancing on the fader control surface? Finding out how that mechanism suddenly is mounted at an angle can be quite a frustrating experience. Nevertheless, no matter how the physical abuse occurred, the bent or broken fader parts may require replacement of the mounting blocks or the bracket upon which the knob is mounted. Having the original parts numbers and specifications will help in locating and ordering replacement parts.

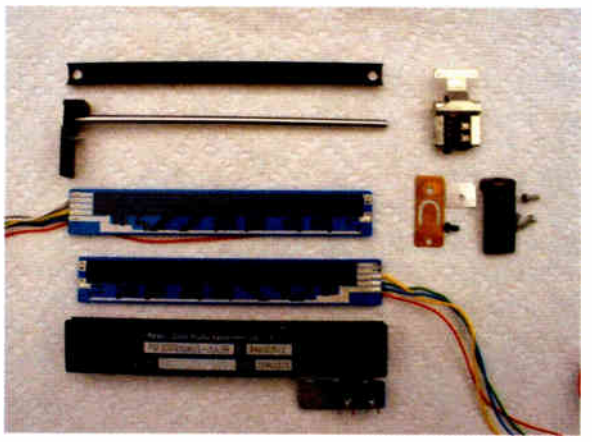
Maximizing the life of a fader centers around two factors: cleanliness and lubrication. We have already noted that the conditions in the Control Room are important determinants of fader life. However, regardless of the environment, regular inspection and cleaning will provide the best possible operation.

Cleaning these units requires disassembly of the fader to reach the internal parts. The ease of disassembly varies with fader type. It is recommended that you set up a proper work area with good light and containers to hold the various fader parts (that way, you can find them when you are done!), and allow enough time to be thorough.

INSIDE THE FADER

Begin by dismounting the fader from the panel and disassembling the fader enough to get the slider assembly out of the fader. Clean the resistive track and rod with isopropyl alcohol, and use a cotton swab wetted with alcohol to clean the bore of the rod bushings and the spring wire contacts on the slider.

You will normally have some loose carbon from the resistive track on the cleaning cloth, but excessive amounts may indicate damage to the track. Inspect the track with a magnifying viewer, looking for deep cuts into the resistive tracks where the brush fingers ride. If the track is worn through, replacement is the only option.



Inspect the brush fingers for wear at the point of contact with the track. The contact area should be a small circle or oval. If the wires are actually worn partially though, the contact pressure drops and the fader will get noisy. If the wire wears completely through and the end breaks off, the wire becomes a gouge that will destroy the resistive track almost immediately.

Some techs believe they can improve the fader by re-bending the fingers outward to apply more contact force. This short-term solution will just cause accelerated wear on the resistive tracks and contact, leading to catastrophic failure.

PROPER LUBRICATION

Proper lubrication is *extremely important!* Lubricants that are not compatible with the conductive plastic tracks have destroyed many faders. (One technician wiped out all the motorized faders in a console with just one can of WD40!) Penny & Giles uses a special Dow Corning silicone oil to lubricate the rods and bushings of the faders. Unlike petroleum products, this oil never becomes gummy or sticky.

In the "old days" Penny & Giles also used a small amount of silicone oil on the surface of the resistive tracks. Since the oil tended to hold dust onto the track, Penny & Giles subsequently developed a newer technology that includes Teflon-like lubricants within the resistive track. For this reason, you should not apply any wet lubricant to the tracks. A suitable lubricant is a PTFE (Teflon) dry aerosol spray that can be rubbed into the pores of the resistive track.

One of the difficulties with using silicone oil is that it likes to migrate away from the site of application. For a fader this means that the lubrication creeps off the rod onto the slider assembly and end blocks, leading to wear and "bad feel."

In the mid-1990s, Penny & Giles developed and incorporated a new technology to trap the oil on the rod, with a resulting increase in the period between re-lubrications. To cite one example, the author has seen a tripling of the service interval for the motorized faders used in the Martinsound Flying Faders fader automation system.

Although upgrading the older faders with this oil containment technique is difficult, the good news is that replacement faders or fader parts will probably give significantly better service life than the old parts being replaced.

POST SERVICING CHECKS

After servicing, faders can be easily checked for crackles and noise. After re-assembly, apply a DC voltage of 1 volt across the fader, then hook the wiper to an audio amplifier with quite a bit of gain. If the fader is working properly, there will be virtually no noise heard in the audio monitor as the slider is moved along the track.

On the other hand, excessive crackling noises indicate poor contact due to worn parts..

ADDITIONAL TESTS

There are more complex tests to check other characteristics, including signal tracking and the smoothness of slider travel. You may wish to view http://www.manquen.net/audio/index.php?page=37 for a complete set of fader test procedures.

Furthermore, motorized faders have all of the audio components and characteristics listed above, plus the motor, pulleys and drive belts or cords requires for servo operation. Detailed servicing of these items is beyond the scope of this article, but additional information also can be found of the MANCO website at http://www.manquen.net.

As we have seen, proper maintenance for faders is not too difficult. And, as the saying goes: "An ounce of prevention is worth a pound of cure." This is indeed true when it comes to keeping your audio faders in top condition - you will be protecting your fader investment as you eliminate fader problems.

Dale Manquen runs MANCO, the exclusive US and Canadian Distributor for Penny & Giles faders and fader parts. He has over 15 years of experience with Penny & Giles faders, and is happy to help find parts, oil, and information. You can reach him at 805-529-2496, or by email at dmanquen@email.msn.com

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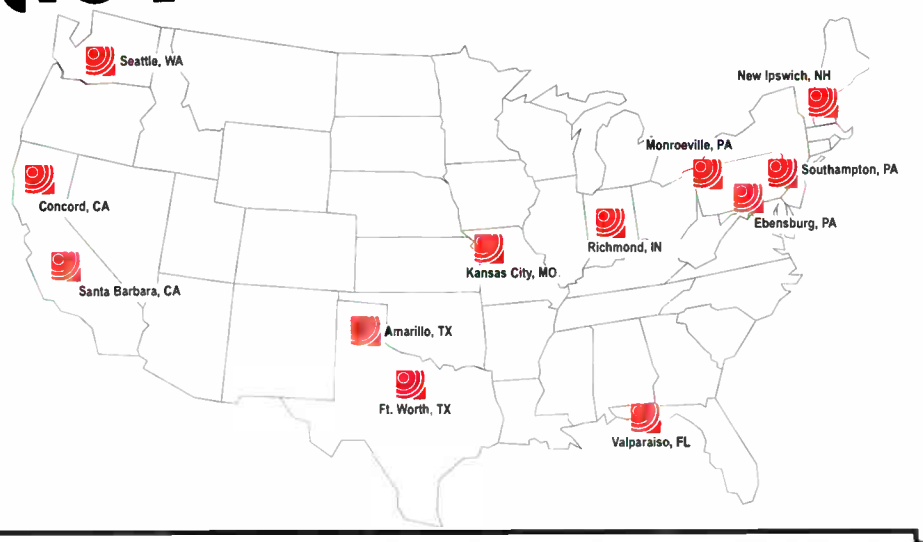

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Chris Kreger & John Sims	Kansas City, MO	1-800-467-7373
Rick Funk	Richmond, IN	1-888-966-1990
Ed Young	Monroeville, PA	1-866-412-7373
Dave Edmiston	Ebensburg, PA	1-866-736-3736
Harry Larkin	Southampton, PA	1-888-260-9298
Sam Matthews	New Ipswich, NH	1-800-485-8684
Bill Hoisington	Valparaiso, FL	1-800-476-8943

Visa and Mastercard are welcome. Offices Independently Owned and Operated.

Tech Tips

A Rechargeable Battery Saver

By Ray Vaughan

[MIAMI, Florida - June 2004] A few years ago I built something that has saved me a lot of battery packs. Have you ever plugged in a battery operated device to charge it, then forgot about it? Perhaps you came back a few days later to unplug the charger and you noticed the batteries were warm. Oops, you just fried another set of ni-cads!

The problem is that the cheap chargers just do not know when to quit. They will keep current flowing through the batteries for way too long – and heat equals death for ni-cad batteries. It is also a waste of electricity. By the way, if the device does not have an indicator to show you that charging has stopped, then it is most likely still going – even days later.

This simple project will solve your problems, but timing is everything.

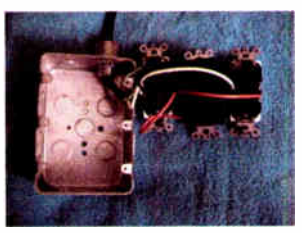
SIMPLE PROJECT

The main component for this project is the Intermatic 12 hour shut off timer, FD12HWC. It is a simple mechanical timer that goes off after ticking down for the amount of time you dial up. If you act fast, Home Depot seems to have these on closeout at $5 each (at least here in Miami), way down from the $15 plus I paid. If you miss them at Home Depot, I am sure you will be able to get them at your local electrical wholesale houses.

The rest of the parts are cheap electrical supplies available at Home Depot for just a few bucks. An electrical box, some receptacles, and some wire; get the deeper electrical box to give you a little more room for the wiring. All in all, you should be able to make one of these for under $10 – if you act quickly.

PUTTING IT ALL TOGETHER

Here are some pictures of the one I made. It should take about 2 hours to do this project, one of those walking around in Home Depot. Wire it up as described below. I used stranded #12 wire to connect between the parts, but. #14 would be fine.

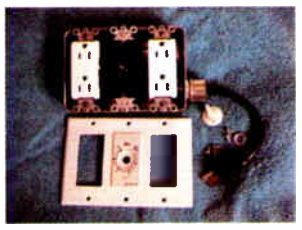


To wire this timer project, the black wire from the line cord goes to one side of the timer. The other side of the timer goes to the darker brass screws on the receptacles. This is the 'hot' side. The white wire from the line cord goes to the silver screws on the receptacles. That is the Neutral. The green ground wire from the line cord goes to the electrical box.

CAUTION

If this is your first project that uses 120 volts, get a friend to check the wiring for you. He or she can use an ohm meter to verify that the Hot and Neutral are not shorted to each other, or to the metal box. Or, you can use a three-light outlet checker to make sure you got the receptacle wiring right. Do *not* attempt to plug this in while the box is open and the wires are exposed.

After you are sure the wiring is correct, line up the 6 mounting screws in the center of the receptacle slots, and put the timer and sockets in the electrical box.



Of course, you are perfectly free to modify this design. Maybe you only desire one duplex receptacle? Maybe you would find it convenient to mount it on the wall in the shop and omit the line cord? Or, you could add a pilot light? You might even want another one in the kitchen to turn off the coffee maker after you have that morning brew. In other words, use your imagination and have fun with the project.

This is what it looks like with the newer fancy wall plate. It works with the older style too.

Now when your batteries start to get low, plug the charger into your battery saver and twist the knob to set it for 5 to 12 hours, depending on the recommended time in the devices instructions. You can just set it ... and forget it.

Ray Vaughan, KD4BBM, is a long time engineer in Miami, FL. He can be contacted at ray@rayvaughan.com

World Radio History

Gear Guide: Telephone Audio & Control

Broadcast Tools

The **tiny TOOLS TT-1** is more than just an ordinary telephone line coupler. It is a rackable compact telephone line powered auto-answer and auto-disconnect hybrid. The TT-1 utilizes dual-hybrid transformers providing full duplex audio at a plain old coupler price.

A multi-turn hybrid "NULL" trimmer allows the user to achieve 20 plus db separation figures. Features include: Front panel Line "Seize" button; call "Drop" button; "Auto-Answer/Monitor" switch; Audio "Mute" switch; "Off-Hook" and "Ring" indicators.

The rear panel is equipped with a RJ-11 jack for the telephone line and a second "loop-thru" RJ-11. Screw terminals are provided for balanced send and caller audio; remote dry contact seize and drop switches and SPDT off-hook dry relay contacts. The TT-1 may be installed on a desktop, wall or on the Rack-Able shelf.

Broadcast Tools
Phone: 360-854-9559
Website: www.broadcasttools.com

Comrex

Matrix Portable from Comrex provides the most convenient way to deliver superior audio quality on any dial-up telephone circuit. It's delivered equipped to handle full duplex audio, with up to 15 kHz audio bandwidth, over standard dialup POTS.

Adding an optional GSM module allows 7 kHz audio to be delivered on the GSM Wireless Network. Comrex customers have been very resourceful delivering their remotes from helicopters, boats, trains and automobiles using this feature. Note: Comrex, being very conservative suggests stationary operation only.

An optional ISDN Module is also available. It offers MPEG Audio Layer III, G.722, and Comrex's Turbo G.722, allowing you to select the most appropriate combination of fidelity, compatibility and low delay for your needs.

Comrex
Phone: 800-237-1776
Website: www.comrex.com

Conex

Brand new — the **Conex DT-90** Telephone Access Audio Switcher. The DT-90 is a 4 channel stereo audio switcher that can be operated via any dial up phone line by using any Touch Tone phone. It features 4 stereo channel inputs and one stereo channel output. To control the switcher, you simply call the number the unit is connected to, enter an optional access code, and press the number 1 followed by a channel number from 1 to 4.

You can also feed the audio from the output of the switcher back down the phone line or listen to audio at the remote location with the built-in mic. Also included are 4 independent latching/momentary relays. All connections are made via plug-in terminal strips.

You control the number of rings before answer, access code, and the time-out duration. Made from quality parts for great reliability.

Conex Electro Systems
Phone: 360-734-4323
Website: www.conex-electro.com

Henry Engineering

MixMinus Plus is a special audio device that is designed to add a "mix-minus" facility to an audio console or teleconferencing system. It is often used in a broadcast station to create the "send audio" which is fed into the Send input of a telephone hybrid. MixMinus Plus has inputs for "Program" audio and "Caller" audio.

The unit removes the Caller audio from the Program signal. This Program-minus-Caller audio is fed back to the caller via the hybrid. Up to 40 dB of caller null is typical.

The MixMinus Plus needs no adjustment once installed, and will work with virtually any console and hybrid. The MMP is also applicable to satellite audio systems, removing incoming audio from a return IFB or cue feed to prevent echo and feedback.

Henry Engineering
Phone: 626-355-3656
Website: www.henryeng.com

Inovonics

A single telco phone line can serve several devices at a remote site. The **Inovonics' PBX** replaces multiple phone lines, and connects to the phone line with one RJ-11 jack. Seven more RJ-11s connect to gear that require dial-in/dial-out access.

For outgoing calls, the first equipment to go off-hook seizes the line and makes its call. Dialing into the remote site, you call the main number. As soon as the PBX goes off-hook you punch in a 3-digit security code followed by a single digit.

The PBX puts ringing voltage out on the corresponding jack. When the equipment answers it is connected to the line. The PBX is transparent to audio and data.

Inovonics
Phone: 831-458-0552
Website: www.inovon.com

JK Audio

Simply plug **RemoteMix Sport** into an analog phone line, connect up to three microphones and headphones, and you're ready to call into the station.

RemoteMix Sport also connects to any PBX telephone system through our Universal Handset Interface. You can also connect through wireless phones that accept third party headsets.

The combination of the mixer output and the headphone cue input jacks makes RemoteMix Sport perfect for use as a front end mixer for your POTS or ISDN CODEC. Built in mic and speaker for call setup. Runs 28 hours on two 9-volt batteries. All this for under $1000.

JK Audio
Phone: 800-552-8346
Website: www.jkaudio.com

Sine Systems

The **DA1-2** is designed primarily for remote broadcasts at unattended stations but with the array of features included its uses are unlimited. The DA1-2 combines a telephone autocoupler, a DTMF tone operated controller, audio switching, logic (alarm) sensing and relay outputs into an extraordinarily flexible system.

The relay panel includes one DPDT and seven SPDT relays with LED indicators. All connections are made via pluggable screw terminal connections. The optional DB-1 Delay Board can be used to eliminate the brief control tone bursts from reaching the air audio signal. And the CI-1 Composite Insertion Module is available for installations were discrete audio is not available. List: $965.00

Sine Systems
Phone: 615-228-3500
Website: www.sinesystems.com

Telos Systems

Telos Systems' popular **TWOx12** Talkshow System, the dual-hybrid 12-line broadcast telephone system that works with analog or digital telephone circuits, now includes the ability to manage phone lines from two separate studios.

Version 3.0 software now provides TWOx12 users with multiple-studio capability. Using the new Dual Studio mode, exclusive control of one of TWOx12's two hybrids is assigned to each studio.

On-air lines can now be shared between two separate studios, allowing use of a single TWOx12 for simultaneous production of live and pre-recorded talk segments. In Dual Studio mode each studio controls one of TWOx12's two hybrids. Users can choose to evenly divide or share incoming lines between two studios, or custom-assign individual lines to specific studios

Telos
Phone: 216-241-7225
Website: www.telos-systems.com

Tieline Technology

The new Tieline **i-Mix G3** combines a 6-input digital studio mixer with POTS/ISDN/GSM and data codec capabilities. You can add an optional POTS module to create the world's first 15 kHz Stereo POTS audio codec over two analog lines. Broadcasters will be able to phase lock left and right audio channels to deliver stable and reliable 15 kHz FM quality stereo programming. Also, you can deliver your program to two different POTS locations at the same time.

With on-board phone coupler control you can take live callers in the field. An optional ISDN module delivers stereo or mono audio over ISDN links. Compatible with both ISDN and 15 kHz POTS codecs. Delivers up to 7.5 kHz over GSM or up to 15 kHz over HSCSD wireless links.

Tieline
Phone: 800-750-7950
Website: www.tieline.com

World Radio History

DSPX Digital Audio Processor

- 18 x 24-bit DSP's providing 1 GIGA-MIPS of power
- Comprehensive BLUE audio metering and screen
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- Multi-band programme dependent limiting
- Look ahead limiter and distortion cancelled clipping
- DSP stereo encoder with composite clipping control
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- LAN / Net webserver for remote control
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- Software upgradeable

Dual processing paths for FM and DIGITAL RADIO USE HD/IBOC and NET)

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CircuitWerkes Control Solutions

pREX Programmable Relay Multiplier & Converter

- 12 optocoupled inputs and 16 CPU-controlled relay outputs.
- Control any output or a group of outputs from a single contact or from a group of GPIs using logic modes like AND, OR, XOR, NOR, NAND, NXOR, Interlocked, etc.
- Output modes include: Momentary, Toggled, Leading or Trailing Edge, Pulse Stretching up to 45 hours, Input Debounce, Maximum Ontime, Minimum Ontime and more.
- Program or control the relays by serial port using terminal or GUI.

REX Affordable Relay Expander/Multiplier

- The REX accepts a wide variety of input signals & converts them to contact closure outputs.
- REX's optocoupled inputs can be driven from active high or low incoming signals.
- Each of the six inputs controls four SPST relays for a total of 24 outputs.
- The REX features a 50-pin telco (RJ-21) type connector that interfaces directly with prewired telco punchblocks. Type 56 telco punchblocks & cables are optionally available.

Unattended Dial-Up broadcasts with the DR-10

- The DR-10 is a Dial-Up remote control with telephone audio input and output for telephone remote broadcasting.
- If your automation works with satellite networks, you can use the DR-10's relay outputs to fire commercials, liners, etc
- Use the DPDT relays to insert the phone audio directly into the program path when necessary, especially for emergencies.
- When used with our Silencer™ Option, the DR-10 is the ***ONLY*** product available that will completely remove DTMF control tones from the audio path for extra clean remotes.
- Active, balanced, audio output feeds line level phone audio to your console or automation system.
- Balanced audio input lets the caller monitor the station audio from remote locations. Great for IFB, too.
- Use the DR-10's interlocked relay mode to make a DTMF controlled audio switcher for remote monitoring or unattended audio routing in your facility.
- Special anti-falsing filters prevent false trips during broadcasts.

Learn how you can take control at www.circuitwerkes.com

CircuitWerkes, Inc. - 2805 NW 6th Street, Gainesville, Florida 32609, USA. 352-335-6555

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Final Stage

Send your information for publication to: **radio@broadcast.net**

Date Book

Radio Conference Guide

List your Convention or Gathering Here
Email: radio@broadcast.net

Nebraska Broadcasters & SBE Chapter 74
August 11-13 – Lincoln, NE – www.sbe74.org

32nd Annual SBE22 Broadcast & Tech Expo
September 23 – Verona, NY – www.sbe22.org

Electronic Equipment Expo
September 28-29 – Seattle, WA – www.emexpo.org

Pittsburgh Chapt. 20 Regional SBE Convention
October 6 – Monroeville, PA
www.broadcast.net/~sbe20

NAB Radio Show – October 6-8 – San Diego, CA
www.nab.org/conventions

2004 Broadcaster's Clinic – October 12-14
Marriot-Madison West Hotel, Madison, WI
www.wi-broadcasters.org

Southwest Communications Expo
October 19 – Phoenix, AZ – www.sbe9.org

Broadcast Engineering Expo, SBE Chapter 67
October 22-23 – Grapevine, TX
www.sbe67.org

Bos-Con Boston SBE Regional Convention
October 26-27 – Boston, MA – www.sbe11.org

National College Media Convention
November 4-7 – Nashville, TN
www.collegebroadcasters.org/convention.shtml

Correction

Dear RG:

I was just reading the article, "Being Digital in Vegas: NAB 2004," and saw an error. The "Tomorrow Radio" project is not a "PBS" project as noted in your article, but is a project led by National Public Radio (NPR). PBS, as you know, is the Public Broadcasting System, also known as "Public Television."

Freddi Hamilton
National Public Radio, Washington, DC

Freddi:

All of us here missed that one. Thanks for pointing it out.

RG

Did you miss one of Corny's articles?

2003 & 2004 *Radio Guide* Issues are Now Available on the BDR CD

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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Letters From Our Readers

Clay:

Just wanted to tell you how much I enjoyed your Radio History article in **Radio Guide** [May 2004, Page 19]. I especially enjoyed the reference to the CK722. I remember saving for months to buy one and eventually burning that beautiful blue paint off of it.

Then to my surprise, finding it would oscillate way beyond its specs. (should have had foresight to see that I may have had something).

Thanks again;
Jerry Snaper – C.E. KMYC [KG6FDM]

Jerry:

Thanks for the nice note. When I ran across this old magazine I asked Barry if he wanted me to write about the memories that it brought back. Looks like we have "scored" with this one as there are a lot of us that are getting "older," and the older you get the more you love to look back – it sort of comes with the territory. Stay tuned as I have a number of installments in the works.

The CK722. You bet – a pretty shade of dark blue with a Red Dot. Remember the CK768? The first Raytheon RF transistor?

Thanks – Clay Freinwald

New Gear

Henry Engineering

PowerClamp Surge Suppressors

Henry Engineering has introduced the PowerClamp line of Transient Voltage Surge Suppressor (TVSS) units for the broadcast and professional audio industry.

PowerClamp TVSS units improve transmitter and studio system reliability by eliminating spikes, massive high-energy surges, noise, and harmonics from the AC power line. These power line imperfections often cause transmitter shutdowns, tripped breakers, and weird unexplainable problems with broadcast gear. PowerClamp TVSS units effectively attenuate noise spikes to within a few volts of the power line to eliminate the cause of these problems. PowerClamp units are available in 4 sizes for use at transmitter sites, translators, and studio installations.

For detailed information and broadcast users' testimonials, please visit www.henryeng.com or contact any Henry Engineering dealer.

Henry Engineering
Phone: 626-355-3656
Website: www.henryeng.com

Roadshow Updates

Taste of NAB Roadshow

2004 Itinerary

For venue locations visit: **www.tech-notes.tv**
For more info email: **larry@tech-notes.tv**

** Lunch Meetings ** Evening Meetings*

22	Jacksonville, FL	June 14th	Monday*
23	Atlanta, GA	June 16th	Wednesday
24	Huntsville, AL	June 18th	Friday*
25	Nashville, TN	June 21st	Monday*
26	Knoxville, TN	June 23rd	Wednesday*
27	Greenville, SC	June 25th	Friday*
28	Charlotte, NC	June 28th	Monday*
29	Raleigh-Durham, NC	June 30th	Wednesday
30	Charleston, WV	July 6th	Tuesday
31	Philadelphia, PA	July 8th	Thursday
32	New Haven, CT	July 12th	Monday**
33	Boston, MA	July 14th	Wednesday
34	North Eastern NY	July 16th	Friday*
35	Ithaca, NY	July 19th	Monday**
36	Cleveland, OH	July 21st	Wednesday**
37	Columbus, OH	July 22nd	Thursday*
38	Indianapolis, IN	July 26th	Monday**
39	Urbana/Champaign IL	July 28th	Wednesday**
40	Madison, WI	July 29th	Thursday**
41	Mpls/St. Paul, MN	August 2nd	Monday**
42	Omaha, NE	August 4th	Wednesday*
43	Riverton, WY	August 6th	Friday*
44	Salt Lake City, UT	August 9th	Monday*
45	Bozeman, MT	August 11th	Wednesday*
46	Boise, ID	August 13th	Friday*
47	Spokane, WA	August 16th	+Monday*
48	WA State Univ	August 18th	Wednesday*
49	Seattle, WA	August 20th	Friday*
50	Eugene, OR	August 23rd	Monday*
51	Portland, OR	August 24th	Tuesday*

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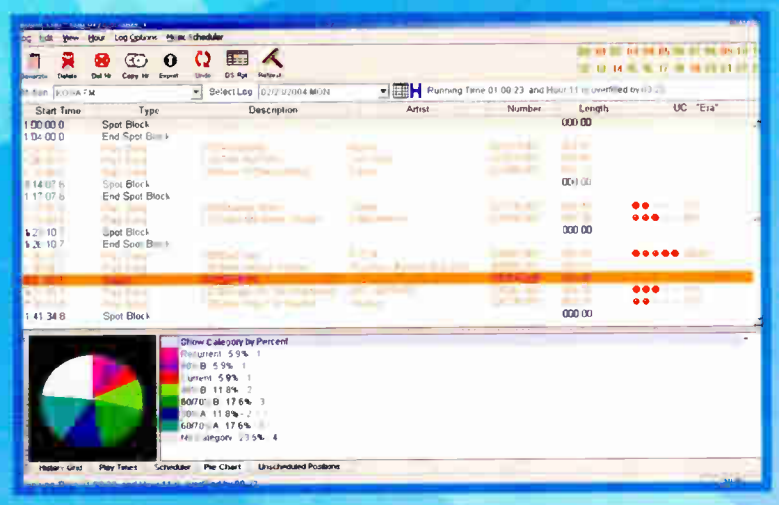
Prophet Systems

If you haven't looked at us lately.



If you haven't looked at Prophet Systems lately, you probably don't know that we've not only reinvented digital automation systems, but we've changed the way stations look at music scheduling, news gathering and content delay systems.

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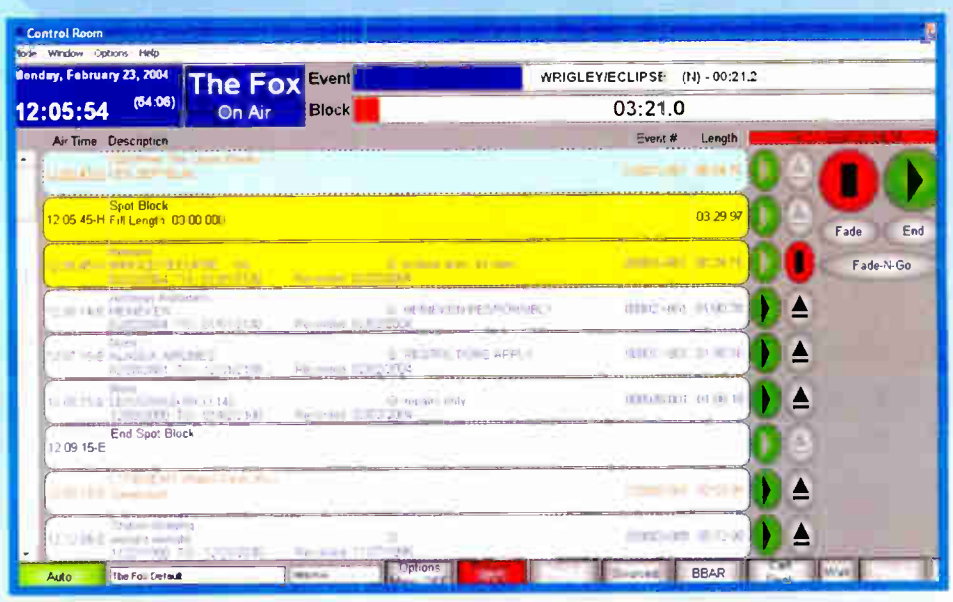
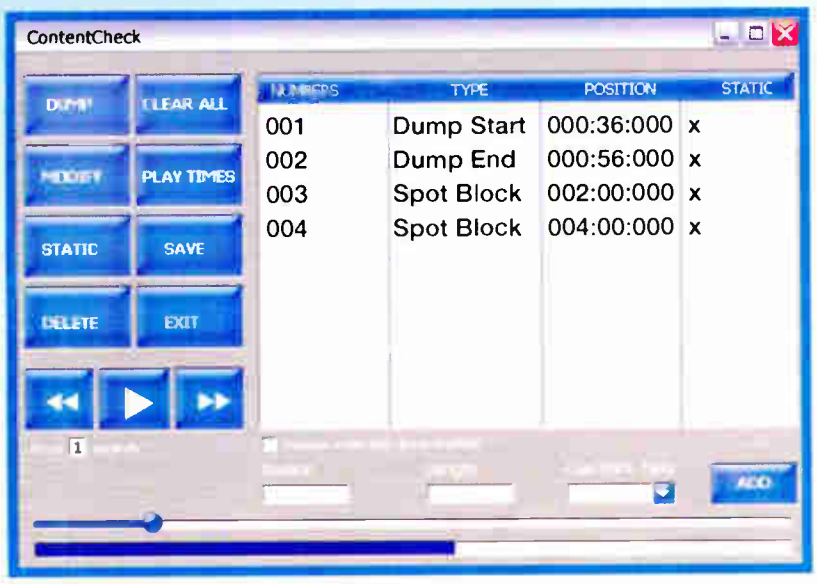


Change is good... why live with outdated technology.



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