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Volume 11 Issue 11

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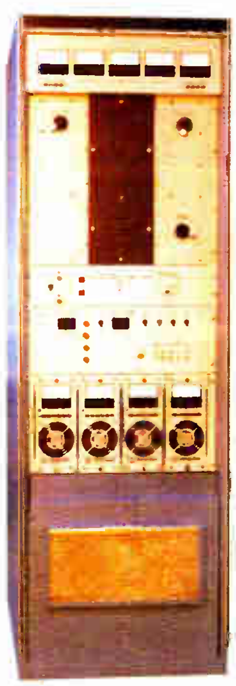

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Columns & Articles

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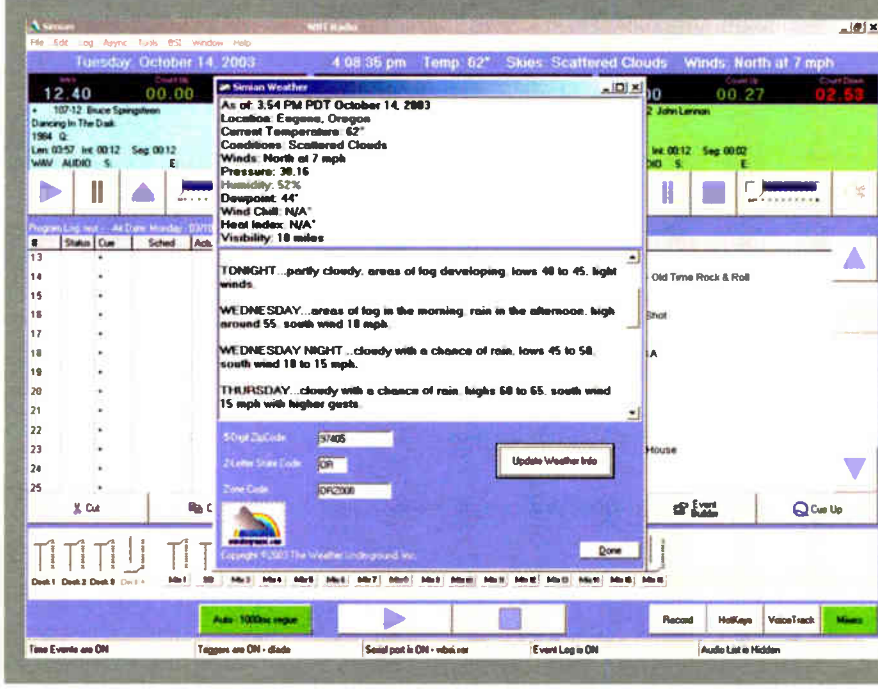
FALL SHOWS ALIVE AND WELL

It has been quite a busy couple of months. I'm referring to the Fall Show Season. This year, within about six weeks, the NAB, SBE, AES, and several state broadcasters associations held their conventions and clinics. Those exhibitors making the effort to be at multiple sites were constantly on the run.

At first, there was a lot of discussion as to whether all these shows are necessary or even could coexist. However, with reports of modest to pretty good attendance, it sounds like some good planning went into making the shows successful. Even amid an industry obsessed with budget cutting, many engineers clearly felt the need to gain knowledge.

At Madison, Wisconsin, the Annual Madison Broadcasters Clinic brought the Wisconsin Broadcasters Association, the National SBE, and local SBE Chapter 24 together. According to Torrie Kennedy of the WBA, the combined meetings reached an attendance of 185, along with 70 exhibitor's booths. Several of the attendees commented on the good information received, one noting he has missed only one year at Madison – when his firstborn was due.

In Philadelphia, according to the NAB there were close to 4000 in attendance at the Radio Show, with as many as 600 indicating they were connected to the engineering side of things. The sessions were fairly well supported, perhaps 50-70 at most times. Many engineers came down for one day, and the floor was far from dead. Several exhibitors indicated they were pleased with the turnout. All in all, Philadelphia turned out to be a very nice venue, one that ought to be considered again.



Broadcast Maintenance in the 21st Century

by Barry Mishkind

[TUCSON, Arizona - November 2003] I kid you not. There was a time when a single radio station might have 20, 40, even 60 engineers on staff. Depending upon where the studio was located, some stations even had separate studio and transmitter crews. OK, now that you have finished coughing and cleaned up the coffee you spilled, remember why.

Until combo operation became popular in the 50's and 60's, most all stations had an engineer running the console, with an announcer sitting in a studio, concerned with the content of the broadcast. In larger stations, there might be a dozen or more engineers on duty at any given time, handling everything from on-air activities, to the production room, to studio construction and maintenance.

Meanwhile, at the transmitter, other things were going on: transmitter monitoring and meter reading (remember when readings were taken every half hour?), tuning and loading adjustments, waxing, and maintenance.

MAINTENANCE?

Maintenance? Some station managers today almost seem to have forgotten what that word means, aside from a detested entry on the budget. And, under consolidation, quite a few engineers are saddled with as many as six, seven, or more stations to care for. Sadly, this means an engineer might go several weeks (or much longer) between visits. Sometimes, engineers can be surprised when they arrive on site.

Furthermore, IT often is lumped in with engineering today, as if it were just a minor addition to the workload. After all, computers only take a minute to fix, right?

The sad part is that for many stations and clusters, the engineer is considered nothing more than an expense. Far too many GMs have an attitude that says something like "you don't bring any money in the door, you only spend it." Getting additional help is difficult, the implication is "you get your salary, do the work."

The result is, despite increasing pressure from GMs to do more with less, so the GMs can meet their corporate goals, many engineers report they are able to do little more in a normal week than "put out fires." Sure, they can "donate" the rest of their lives, and work 70-80 hours a week.

But, then when the GM moves on in his quest for corporate success, the new GM often comes in ready to make his personal mark. I am sure you have been to the typical staff meeting: "We have to tighten our belts and with teamwork, we can become great!" In other words: "That was then. What are you going to do for me?"

Meanwhile, there are only 172 projects on the "to do" list, 38 of them marked "urgent."

CHECKING IT OUT

Indeed, there are transmitters to be visited and sites to be maintained. There is a lot more work at the transmitter site than simply opening the door and checking to see that transmitter is still in there. All too often, a newly hired engineer goes out to visit his new responsibilities, and the first thing he discovers is a half inch of dust on a transmitter, and who knows what inside. The building, which used to house the studio and offices, is a cluttered collection of discarded desks, chairs, and equipment removed from various places. Outside, the site looks abandoned.

Unfortunately, the GMs rarely see this. In fact, there are a lot of GMs that have never visited a transmitter site, and only see the bills that come in to maintain the site. They complain when the engineer is not "in the [studio] building." I have even heard one GM mutter, "We could be a lot better off if we could just get rid of the transmitter site and just bring everything to the studio." Sure.

On the other hand, the art of maintenance is not really lost. It is more like "out to lunch." What else can we conclude when we see transmitter sites where the property is overgrown, with trees growing into the guy wires, and grass and weeds inside the fence around the tower bases? Most working engineers do have a real sense of pride, and know what has to be done. It is getting the time and resources that is the problem.

Where to start? Each station will have its own problems, but taking a quick survey of the site is probably a good start. With pen and paper, make a lot of notes – and if you have a digital camera, take pictures that show precisely where the problems are. It may still fail to get the GM to spend money, but you will have documented the problems and as time permits, you will know where to give attention as effectively as possible.

START AT THE HUB

Sometimes it is a good idea to draw a flow chart and work from the key parts outward. For example, one of the quickest and easiest measures of station health is to start at the transmitter and work out from there. True, you could start at the towers and work back, but the transmitter room often has clues to the health status of the entire system.

Start with the transmitter readings. Grab the manual and license, and make sure all the readings are normal. If the test data for the transmitter is missing, contact the manufacturer and get a copy. Put it in the manual, as well as the technical file. If the transmitter does not appear to be putting out the right amount of power, or the directional readings deviate significantly from the licensed values, you have your first project. The station must operate legally. And do not forget modulation levels.

If the transmitter is operating in a normal manner, look around the room. Is it clean? If not, you can plan for a night of replacing air filters, vacuuming and cleaning the insides of the transmitter and phasor. This is especially important for the newer solid state units, perhaps especially for solid state. They may seem to "run forever" with little attention, but if you allow dust to settle inside, eventually you will have major problems with airflow, leading to expensive part failures.

OUT IN THE FIELD

Naturally you will check the tower lights, as it is another legal requirement. All the lights should be on, the lenses intact (no white showing), and the right flash rate, with the photocell working properly. This inspection must be made quarterly. Perhaps the station log will give you a clue as to the age of the lights.

You next should take the time to inspect the rest of the transmission system. How does each tower base look? This might seem silly, but can you actually *see* the tower and matching unit?

For FM stations, the coax and antenna need attention. Just because the antenna is 1000 feet above you and the dry air pressure is stable does not mean there is nothing to do. Some manufacturers

recommend a maintenance cycle of about eight years, with seals being replaced, as well as regular inspections of the elements themselves. A quick tip: Get your rigger to take some pictures for you.

Even the fence needs attention. Is it secure, or can intruders gain access to the tower base? This is a legal issue (several stations have received fines as

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Broadcast Maintenance in the 21st Century

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high as $10,000 fine for having excessive radiation where the public could be affected), a liability issue, in case an intruder were to get hurt touching or climbing on the tower, and a potential vandalism problem.

A good rule of thumb might be that, ideally, nothing above waist-high should exist in the tower field, and really, you should be down to the ground inside the tower fence. Even if you do not see it, as trees grow, their roots can destroy ground radials. And untrimmed branches can easily get entangled in the guy wires. You can even take the position that trimming the trees increases site security, as trees can hide intruders while they vandalize your site.

One of the reasons to make sure the entire site is well cared for is that excessive grass can hide various animals you would not want to step on, or cause you to step in a hole and wreck your ankle. Less dangerous to you, but very dangerous to the health of your towers, excessive grass can hide a deteriorating guy anchor until it is too late.

Obviously, the best arrangement is to have a landscaping crew control the growth on a regular basis. But, make sure they do not try to "scrape" the land, in order to knock down the vegetation. You might end up with little or no ground system in the end. And especially in areas with dense growth, make sure your landscapers know where the guy anchors are. That will prevent a lawn mower accident that could topple the entire tower. Many stations add a separate little fence or posts for each guy anchor for safety from lawnmowers and four wheel drive vehicles.

PROTECT THE SITE AND YOURSELF

How is access controlled to the building itself? Depending upon your situation, any fence needs periodic checking, and the doors and window security will prevent vandals from making a mess inside. While older studios often have burned out light ballasts, ensuring you can see where you are walking and working is essential. No one wants to find you laying there, knocked out because you ran into a pipe you could not see.

Certainly there are many more areas to cover. Do you have sufficient spare parts and tools to handle most common problems? No one wants to be off the air while you go shopping for a fuse! Are there manuals for all your equipment? It is amazing how many people search for missing manuals during a crisis. At the same time, is your generator in good shape? Tested?

Proper maintenance also includes pest control, and checking the roof to prevent loss during a wind or rainstorm. Is there running water? Do not allow the rest room to become germ and animal infested.

And, we return to a key thought: document, document, document. Do not keep it all in your head. Even if you stay in place for years, you will thank yourself for reminding you of traps and tricks in maintaining the site. – Radio Guide –

When The World Stopped Talking...

RADIO MADE THE CONNECTION

by Donald Kimberlin, NCE

Can it really be 40 years since JFK was shot? As we approach the anniversary of that event, Don Kimberlin shares his insider's view of how the public reacted to the news, spread mostly by radio.

[LANDIS, North Carolina - November 2003] It was the coldest part of the "Cold War." John Kennedy had ended the infamous Twelve Days in October by forcing Russia's Khrushchev to trade ICBM's aimed at America's underbelly for 15 antiquated Jupiter missiles in Turkey. It was a time of momentous events, livid anger and shoe banging.

Not that Khruschev was Kennedy's only foe: Fidel Castro also hated Kennedy, certain the JFK's government was plotting to assassinate him. And even some in the U.S. government establishment were suspected of having their own reasons to stop the Kennedy control. It was a tense time.

COMMUNICATION LINKS

In 1963, AT&T Fort Lauderdale served the growing demand for communication channels to most of the Central American and Caribbean nations. Despite adding more channels, delays ranging up to three days to get a call completed to some nations were not unusual. Often, the called party did not even have a telephone, so it would be necessary to "book" the call in advance; the receiving telephone company would send out a messenger, often on a bicycle, to summon the called party to a telephone, or even the telephone building itself, so they could sit down in a booth and have their conversation.

In extreme cases, a transit call via the U.S. from a European or Asian nation to a Latin nation could mean two links of "shortwave" coupled by a connection between Overseas Toll Units across the U.S. The whole scene was quite a far cry from the convenience of International Direct Dialing most people take for granted these days.

BUSY SIGNALS

Thus, the Fort Lauderdale HF radio channels were constantly occupied, at least during business days. Weekends, evenings and holidays would use fewer circuits, but even at night there was at least one working channel to almost every distant nation – and that nighttime circuit was almost constantly occupied.

November 22, 1963 was just another balmy semi-tropical day at Fort Lauderdale, with stable solar conditions permitting normal business day traffic on all scheduled circuits. After the short "morning break" to change radio frequencies up to the daytime range of 12-18 MHz, things settled down to the routine "patrolling" of circuits – watching the "volume indicator" meters on each speech terminal, observing receiver AFCs were not drifting, and checking signal levels to ensure they were within comfortable tolerances.

Occasionally, a "Pirate of the Caribbean" might pop up on a channel to cause interference, prompting the order wire circuits from the Miami operators to ring from time to time. This required our intervention to talk to the other end and take the circuit out of traffic use for a while, and make a measured guess as to whether it would be better to shut down all circuits and change frequency or merely suffer some lost time on one channel of a multi-channel system.

In the midst of this rather ordinary busy day, the order wire for my "tour" of circuits rang. I answered it and the Miami operator said, "The Technical Operator in Guatemala City wants to talk to you on Circuit 3." I said thanks, and plugged a headset into the terminal for Guatemala 3. After some time of working on these circuits, I knew the faceless voice on the other end would be Franco Godoy of Tropical Radio at Guatemala City. I said, "Hi Frank, what's up?"

Usually, as part of our ongoing international relations work, a sentence or two of pleasantries would be exchanged – but not this time. Franco just blurted out, "Did you know your President has been assassinated? The Communists did it." I simply replied, "Wow! Thanks for telling me. I'll tune in our domestic radio and see what's happening," and immediately switched the circuit back to the traffic operator.

Shouting the news to others in the room, I tuned in a local AM station, where the somber sounds of a reporter on site at Dealy Plaza could be heard, backfilling and re-explaining what was known, while the mortally wounded John Kennedy was being taken to Parkland Hospital.

EVERYONE STOPS

So there we were, finding out for the first time about the shooting of John Kennedy from someone in a country 1,200 miles distant across the Gulf of Mexico. Of course, like millions of others, we were in a momentary state of shock and puzzlement, trying to hear the news from Dealy Plaza and get some notion of what had transpired, and who the perpetrator of such a heinous act was.

As I turned away from the radio, I noticed something extremely peculiar along the row of Western Electric C4 Overseas Radio Control Terminals. Despite all the circuits showing their usual white and green lights meaning "circuit available and engaged by Traffic," all the speech volume indicators had stopped moving. Despite the charges being US$3 per minute, it seemed the whole world was in a similar state and had stopped talking! It took a full five minutes or more before speech activity began once again.

I think it is fair to say that was truly a moment when the world stopped talking.

Don Kimberlin is a NARTE Certified Engineer, based in Landis, NC. His passion for history is clearly evident. And he remembers a lot of it! You can reach him at donkimberlin@earthlink.net

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Maintaining Reliable Power Systems

Back-Up Power for Your Station

by Dana Puopolo

This is the third installment of our series about power systems. Last month we featured an overview of back up generators. Dana covers the other components of a planned power system.

[SANTA MONICA, California - November 2003] In the previous years, most broadcast equipment was analog and likely operated by a disc jockey. Typically, if the local power distribution system went down, the lights, console, and turntables would drop off until the generator came on, and then the lights would come back, the turntable motor would start up again, and the station would be back on the air, playing the hits. With computers, this is not possible. After all, when the power comes back, you are staring at machines trying to restart.

Computers need to go through a boot-up sequence, which can take several minutes. Furthermore, most computer systems do not like being shut down abruptly, and some kind of recovery routine (scandisk, etc.) runs when they are re-started. Many systems also require a manual restart of the programs and recovery of any data lost when they lost power. All this means additional start up time. Multiply this by several stations, add in inexperienced and non computer-savvy personnel, and you can easily wind up with a recipe for disaster.

UPS

It is no wonder the industry relies on Uninterruptible Power Supplies (UPSs). The UPS is an interim power unit which bridges the time between when utility power goes off line and generator power comes online using battery power and an inverter to convert DC to AC at the required voltage. Many also have some form of power conditioning, surge protection, etc. Most use some type of rechargeable battery, though many cheaper units rely on standard alkaline D cell type batteries for their power.

UPSs typically provide power for between four minutes and four hours depending upon their size. Most people are familiar with the small UPS commonly used with a home computer. These cost under $100 and will run a CPU and monitor for about ten minutes, giving time for a graceful shut down of the computer. Many radio stations use these for workstations. They are available in sizes up to about 1500 watts capacity, which will power a typical server used in broadcast facility. These units should be considered entry-level protection because they have several shortcomings.

PITFALLS

First, most of these units use power switching, which means they are off-line until the utility power actually goes off. Unfortunately, there is a lag of between 50 ms to 500 ms (half a second), during which the power actually does disappear. Though many devices can handle this momentary loss of power, some cannot. Furthermore, many of these units do not produce sine wave power. They output a "modified sine wave" (MSW), which is sometimes "dirty" enough to cause problems or damage the connected devices by stressing their power supplies.

As an example, I use a cheap MSW type power inverter in my car to recharge the battery in my laptop while in the field. I find while my regular AC adaptor for the computer works, it gets much hotter than when it is on utility power. I am sure it would burn out if I left it plugged into the inverter for more than an hour or so.

Finally, many of these devices use cheap NI-CAD rechargeable batteries, kept trickle charged by the unit. These batteries have a memory and can lose capacity if not regularly charged and discharged. They also can simply go bad. Most of us have seen a cheap UPS that failed when the power went off because its batteries had died.

If you need to use these units, they should be regularly tested on line and their batteries (or the entire UPS, since replacement batteries can cost as much as a new UPS on sale!) replaced once a year. For some applications, it is possible to consider the alkaline D cell battery units, as alkaline batteries have a very long shelf life.

The best (and most expensive) UPS units are those known as the on-line type. In these, the UPS is always on and providing power to its load, while maintaining a battery bank at full capacity. If the utility power goes off, the batteries immediately take over. Moreover, since the power supplied is generated locally, the load sees very pure power (virtually all of these provide sine wave AC), free of the surges, brownouts and sags that plague utility power.

Many stations power their entire control room, rack room and computer servers this way. The downside is the expense; a 15 kW unit can easily cost more than a similarly sized commercial grade generator. They also put out quite a bit of heat, which translates into higher electrical bills than if the devices were plugged directly into utility power. However, in an area with unstable power, they can be a lifesaver.

BATTERY POWER

If you have ever visited a phone company central office, you have likely seen their battery room – a huge room filled with hundreds of two volt lead cell storage batteries, cased in clear plastic. Most central office switching equipment is designed to operate on -48 volt power supplies, so it runs off these batteries. The batteries are maintained by a power supply. You might even say the phone company made the first online UPSs. Central offices and telephones can run for days on these C.O. batteries.

A canny engineer should have some battery-operated equipment available for emergencies. Most RPUs and many STLs have DC inputs and can run on batteries. Portable stereo mixers can also run on batteries, and laptops can run MP3s for a programming source. The key to making this scheme work is to plan it in advance. Know where all the needed equipment is located. Have cables, cords and battery supplies made up in advance.

At one station, I made up a box which contained all the cables I needed. Power supplies for mixers, etc., were made by soldering banks of alkaline D cells and 9 volt batteries together to make up the needed voltages. Each homemade supply was packed in its own small box with a six-foot wire with the proper DC connector attached.

This lash-up actually kept the big AM station in a large eastern city on the air for ten hours during a hurricane when their generator failed. We simply connected the mixer output directly to their 15 kHz program line. In the future, we surely will see more and more computers and servers designed to operate on DC power supplies. It just makes no sense to convert AC to DC to AC, and then convert it back to low voltage DC in the computer.

OTHER POWER DEVICES

No discussion of AC power would be complete without a mention of other devices available for use in a broadcast facility. These include surge suppressors, buck/boost type power devices and constant voltage transformers.

A surge protector limits voltage surges on the utility power line. These surges are quite common; a study done a few years ago by a major computer supplier found hundreds per hour – most are caused by glitches caused by voltage routing within the power grid. Others are caused by lightning, and while many believe lines need to actually be hit by lightning to be affected, most surges are induced into the line from an indirect hit (sometimes from many miles away).

Surge protectors work by clamping the AC line to ground over a certain voltage, usually 30-50 volts over the working voltage. AC surge protectors are usually either the solid state or gas discharge type. The solid state type uses two back to back connected zener diodes. When the voltage gets too high, one zener avalanches and clamps the line. The other zener conducts as a normal diode would.

The gas discharge type uses the ionization of gas to clamp the surge. These are cheaper to make, but not as fast as the zener type. Most cheap home surge suppressors, power strips with built in suppression, etc., are of this type.

Buck/boost units and constant voltage transformers are used to maintain AC voltage within a certain limit. Utility AC power is specified as a nominal 117 volts, but in practice can be significantly higher or lower. During the summer months, brownouts (deliberate voltage reductions in the power grid) are common.

I once found an FM transmitter near Boston off the air because the AC line voltage had dropped to 180 volts from its normal 245 volts. The transmitter's control relays simply would not pull in with a voltage this low! A buck/boost unit works by switching in a fixed amount of voltage (usually around 15%) when the utility voltage drops too low. It simply switches the secondary of a step down transformer in series with the utility AC power.

Constant voltage transformers maintain voltage within a 5% range. There are two types of units generally used, the autotransformer and the ferroresonant type. The autotransformer is literally a motor driven variac connected to a servo, with the motor raising and lowering the variac as needed.

Ferroresonant types, such as the Sola, for example, employ no moving parts. How they work is outside the scope of this article, but these are commonly used in transmitters to regulate filament voltage. Since these are completely electronic, there is virtually no lag time in their operation, making them ideal for use with computers. Their downside is cost, size and heat.

Next we will tie all these units together into a robust power system.

Dana Puopolo has been a broadcast engineer for over 30 years, building, operating and maintaining radio and television plants of all sizes. He can be reached at dpuopolo@usa.net


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Building a Digital Studio

Part 3 – Designing the Studio

by Mark Lucas

[KNOXVILLE, Tennessee - November 2003] Budget approved – you have the green light to go digital! While cautious about the money, management is committed; the boss figures if it is digital, it has to be important. Gosh, even speakers and headphones are digital now! The jocks do not particularly care what, when, how or where it is digital. They just want to surf the web, turn the lights down to dark and set the temperature of the room to colder than a meat locker. So, where do we go to achieve as many dreams as possible and still modernize within the budget?

Today's digital console is a marvel at adapting to change. Every personality can have every channel be exactly what they chose it to be. They can select unusual sources with the twist of a knob. The engineer can make major changes within minutes to accommodate new situations when they arise. As long as equipment is wired into the engine, the changes are quick. If something totally new walks in the door, then having some wired auxiliary in's and out's will have it connected in seconds.

While we want to take this time to focus specifically on the studio part of going digital, do not forget much of this conversion may be out of the studio and take place in the central equipment area. Some decisions on equipment placement may depend on studio space considerations, as well as effects on ambient noise levels. (In previous installments of this series we have looked at the possibilities of relocating a lot of the equipment from the studio end back to the technical equipment area.)

FUNCTIONAL

It is possible to have a studio with nothing more than the console surface, microphones, monitoring and automation controls. Still, the goal is not to be minimal, but functional. So it is likely you will want to add some audio backup like CD players, hot-key sound effects, and phone editing gear, all leading to some extra inputs.

This means you will have the opportunity to be much more visually clean, open better site lines to guests and the remaining equipment, while still lowering noise and heat. Even when the budget may dictate staying with existing cabinetry, the more equipment you can shift to the rack area the more space you will have in the studio that you will have freedom to arrange as you see fit.

Another benefit of shifting gear to the rack room is a reduction in the demand on the studio air conditioning unit, so there may be no need to rework the air handling system. After remodeling, you may make no more demand on the air conditioning than what exists in any modern office. The motors of open reel tape machines and cart decks are gone, incandescent lamps are giving way to LED displays, CRT computer screens to LCD displays.

Now that we have pulled so many heat producing devices from the studio, we may well be better off than the rest of the building. (Surely you have put your hand down by the exhaust of a color copier and marveled at all the wasted energy!) Without all of the traditional "heaters" in the studio, the old studio hotbox could be a thing of the past. With careful lighting on the task areas, you may find that the dollars you thought you would need for a redo of the studio air handling can now be invested elsewhere.

A valuable point to consider as you plan and prepare is to measure the electrical current draw for your existing studios and technical areas. By comparing some of the key changes in equipment from old to new, you should have a pretty good handle on the needs for each area, and be able to plan any possible changes or additions in UPS power. This should be a key area for allocating some of the money you do have in your budget. Reliable UPSs are important to the stability of the facility and the on-air product. If you have used those small individual units for your digital playback systems over the years, some of them may have dead batteries and will not be useful when power is needed.

STUDIO LAYOUT

After you have given thought to what equipment will be in the reworked studio, now consider what can be done with the studio furniture. Corner pedestals at each end of the console may no longer be needed. And by eliminating some of the hard surfaces often found close to the microphone positions, voices may now reach the walls and the sound absorption there, instead of slapping back into the microphones. One side of a traditional cabinet "C" may be able to be eliminated or changed to only a countertop with room for chairs and legs for your guests and co-hosts.

If you are fortunate enough to have a budget for new cabinetry, many new looks for the studio are possible. We can now rethink this since we do not automatically need the same layout. For decades, boxy furniture was required to swallow all the rack-mounted gear in a radio studio. Today we need much more ability to deal with the computer screens and controls.

Designing the space to put these controls at their best position is something for which you should plan to spend a lot of time. Great ideas do not necessarily mean significant costs. Try surfing the web through some of the manufacturer web sites and as many station sites as you have time to visit. You may find some really clever ideas to use for your situation. And then again, you may find some things to avoid too! Just look for the visually interesting and functional layouts, then browse through your local hardware store for ways to do them, and then measure in the costs to fit it into your plans.

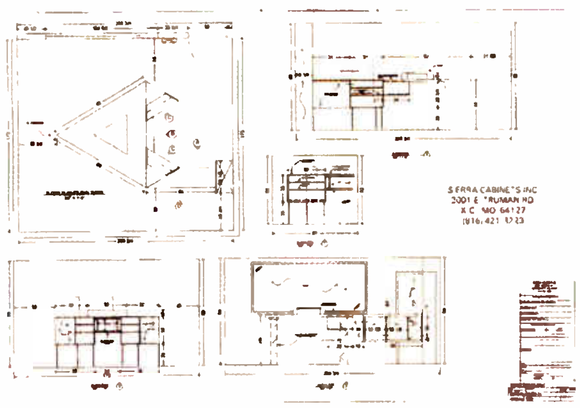
FURNITURE DESIGN

Several manufacturers supply beautiful cabinetry for studios that would look great in anyone's new build out. But if that is out of reach, then you might consider a local cabinet builder to custom build for you. Without the need for nearly as substantial bases and corner pedestals, the bill for a local design might work out better than anticipated. Two things to look out for if you decided to go that way: dealing with rack mount equipment and the actual cabinet design shop drawings.

While many intricate designs are manufactured for homes and other businesses, the shop you decide to work with may not have ever made anything for rack mount equipment and needs to understand the specific nature of the spacing and wiring needs.

To get the design right the first time, take your potential contractor to your existing cabinetry. Show them why standing the rails off the side walls gets the clearance necessary to get equipment in without scraping the sides. Show them how recessing the rails from the front will protect knobs from getting knocked off or readjusted by a jock's knees. Let them see the wiring going to and from the equipment so proper planning can be built in. And when they draw up the dimensions for the racked equipment area, hand them the exact rails to be used and blanks to use as spacers.

I have had name brand broadcast furniture with rails a little too close together and depending on the equipment screw hole cut-outs, sometimes you just about could not get the screw in!



Recognize that specific and detailed plans will have to be completed before the first board is cut. Most wood working shops are not going to work from a sketch on the back of a paper napkin. Unless you are very familiar with making drawings, then someone else is going to have to take the time to make up the blueprint drawings and work with you on ironing out problems. If you are getting very far away from conventional design, then you're going to need to be very sure of your layout and the sizes needed to accommodate your specific equipment.

MOCK IT UP

Twice now, while planning a studio that would put the proper placement of keyboards and screens at the fingertip touch of the operator, I found it useful to build mockups of the layout. This was to not only satisfy my concern for getting it right, but also to communicate exactly what I wanted to get built by the cabinet shop. Using cardboard and 1X2's, in a couple of hours you can have a pretty good life size mock-up of your studio. What better way to get the height and visibility of the keyboard just right! You can get fixed in your mind in advance exactly where everything is going to go and how you're going to place and separate power and audio cables.

(Continued on page 12)

Building a Digital Studio

Continued from page 10.

Alternatively, a miniature mock up of a studio design that I recently built helped me think through all the issues. An evening at the kitchen table with thin cardboard, toothpicks and some glue and not only did I have time to think it through, it also gave me something to show management and the cabinet builder so they had more than just two dimensional drawings. It allowed me to layout the approximation of the studio space and assure work spaces allowed proper clearances.

LOOKING AHEAD

As we design the layout of our studios, we should be thinking not only of how we are going to use it today, but how we can accommodate the changes coming tomorrow. After all, one thing is sure in radio – change! While my favorite vendors could not find the part number for a crystal ball to use, we need to try to look forward enough to accommodate the most likely changes.

For example, we must plan to minimize the number of analog to digital and digital to analog conversions. Evaluate component by component how to do this, and on the digital side how to minimize the number of conversion stages of re-clocking (from 48 to 44.1 kHz, for example). We should look to maximize the storage rate using higher clock speeds.

I think it is important to try to avoid as many stages of compressed audio as possible, since we will need to feed the final transmit stage of compressed HD radio with as unaltered a product as we can. These factors, as well as any others of which we can think, should be focused towards delivering the highest quality product we can transmit.

Another area we can count on continuing is the growing trend for computerization. Today, you can completely run a small broadcast console on a single screen surface using touch. Tomorrow will bring even greater studio capabilities.

An obvious outgrowth of this should be faster, more flexible capabilities to be in front of our listening audience. In other words, instead of being in the studio we should be out on the streets. Today, you can control your digital console remotely, turning on and off channels and changing levels. Tomorrow's enhancements should make this just as easy as being in the studio, and really lighten the load on the studio.

Computers will also be a large part of an increasing need to present many kinds of data as part of our transmission. We should be streaming our song and artist information data in the short term. Also anticipated should be sending out traffic and weather information. Interesting possibilities exist with tying together these different elements, such as the idea of GPS and traffic or weather helping the listener understand the relevance of the information.

News teasers and short stories also might be part of some stations' data programming, not to forget commercial information will be tied to those elements, as well as in a stand-alone fashion. (And any time a charge for elements exists, there will need to be a system to document it for billing purposes.)

Digital conversion can bring many benefits to the station, including flexibility that is a great leap beyond what most analog consoles can provide. Careful planning can make the conversion relatively painless, and leave you with a studio that is more of a showplace than a place to stack lots of technical gear. Yet somehow, getting it done fast is always balanced against doing it right! Next time we will look at tips on how to build a new digital studio system with a minimum of downtime!

Mark Lucas is the Engineering Manager for the Journal Broadcast Group stations in Knoxville, TN. He can be contacted at mlucas@journalbroadcastgroup.com

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Keeping the Power On

On-Line UPS's Prevent Problems

by William Bordeaux, CBRE

[SAN LUIS OBISPO, California - November 2003] Over the years, most contract engineers have installed a forest of individual uninterruptible power supplies (UPS). Populating those dark areas below desks, their green "OK" lights shine like the eyes of some electronic rat piercing through the dust. And when the power flickers they begin to beep and screech, sending the uninformed running for cover.

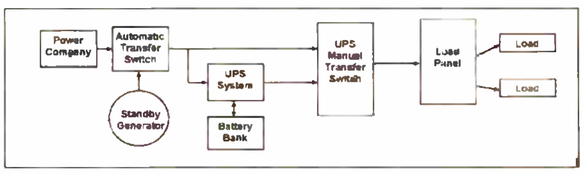
It is always a guessing game as to how long they are going to last – all too often someone in the traffic office has plugged a little foot heater into the UPS, and it runs maybe ten seconds before it dies. Other units may fare better, as soon as the UPS's scream, but does the staff: "What's going on? Can you get it to stop beeping? How long will these run? Should I back up my files now?"

True, those little UPS's are better than none at all. But with computer technology here to stay, it might be time to bite the bullet and consider a more feasible solution. Taking a cue from our computer-ISP-server brothers, one monster UPS system might make a lot of sense for your facility.

HOW IT WORKS

A typical large scale UPS system converts the incoming commercial AC power to DC (small systems use 12V, larger systems 48V, and the really big boys use 120VDC). The main DC output is fed to an inverter and smoothing choke to change it back to 60 Hz AC power; a charger keeps the batteries up. Distortion is usually less than 5% at full load, which means these systems are great for critical audio applications where a standard UPS "stairstep" type waveform will produce unacceptable noise.

Since large-scale UPS's are really a part of the power system, they rarely have any standard power outlets or plugs. The output is wired through the power load panel to feed outlets throughout the facility. When the power fails the DC current supply from the batteries immediately takes over for the DC produced by the AC/DC converter. This results in no interruption in AC power as seen by the protected equipment.



Stand-by power system using a generator and large-scale UPS.

WHY WE LIKE IT

These large-scale UPS systems (some times known as a "Ferrups" from the large iron choke used to smooth their output) have several advantages over their little under-the-desk cousins.

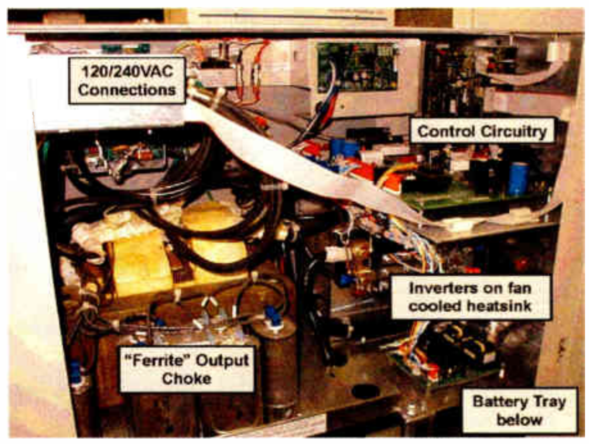
On-Line Isolated Power: Instead of using commercial power until it fails, then switching to battery, an on-line system uses an inverter to feed equipment. Station equipment is isolated from transients and other disturbances on the commercial power line.

Power Usage Monitoring: A Ferrups system has sophisticated monitoring of your present and historical power usage. You can be alerted right away when your back up capacity is compromised by a wayward staffer plugging a personal refrigerator into a protected outlet.

Back-Up Time Management: During an outage the system updates remaining run time given the load and remaining battery charge. This is a great help when making plans to shut down equipment or fire up a standby generator.

Automatic Testing: A Ferrups system can be programmed to automatically test itself to insure proper operation during an outage.

Application Control: Selected circuits can be connected to provide custom coverage to equipment. A computer/LAN interface is available on most Ferrups systems to issue commands through the LAN to shut down non-essential computers, thereby shedding load and extending run time for the entire system.



Interior of a 7.5 kVA "Ferrups" UPS system.

High Power Capacity: A Ferrups system is available for most commercial power supplies: single or three-phase, and voltages as high as 480 volts. In fact, using a Ferrups to power a transmitter is even possible. Since the system prevents any power "shocks" when outside power drops and returns, the equipment is none the wiser even when a generator comes on line.

Long Run Times: It is an easy (if not expensive) process to add more or larger capacity batteries to extend run time with a Ferrups system.

Calculating the cost of a Ferrups system versus those dozens of little UPS's spread out through a facility can be a tricky exercise. Large systems can cost as much as $1,000/KVA to purchase plus installation, while smaller individual systems might run $500/KVA or less. A Ferrups system is not going to be the winner in a cost comparison, but doing a cost/benefit comparison may prove such a system is the best way to go.

Bill Bordeaux is a contract engineer based in San Luis Obispo, CA. He can be reached at bill@stationengineer.com

Audio Processing From the Ground Up

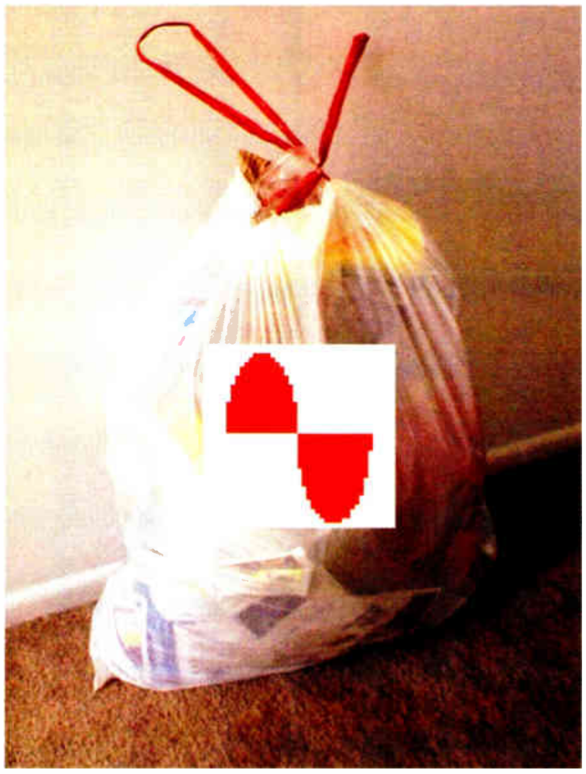
Part 11 – Garbage In ... And You Want What Out?

by Cornelius Gould

[CLEVELAND, Ohio - November 2003] The one thing to always keep in mind with any audio processing device (no matter who built it) is this: The audio processor's job, as it is typically used today, is to exaggerate the audio in various ways to make the resulting radio programming sound "bigger" than it really is. This includes music, disc jockeys, little noises, distortion, and bit reduction artifacts.

Because coded audio can be affected by any audio processing ahead of the encoder, the sound engineer needs to consider a number of source audio issues when considering audio processing adjustments – *including* using coded audio ahead of the audio processor.

There is an old cliché used by many, including audio processing manufacturers and processing gurus: "Garbage in = Garbage out." My favorite modification on this cliché in regards to audio processing is this: "Garbage in = *More* Garbage Out".



Do you want your audio to sound like this?

UNWANTED MATERIAL

Any little "noises" that are not part of the original recording sources (such as the actual CDs) will become amplified in the program chain and made more obvious after passing through an audio processor. Little noises that *are* part of the original recordings, for that matter, are made more obvious too. The invention of the program gate came about partly to alleviate the problem. Just as a literal gate puts a "hold" on movement, a program gate stops audio processor action momentarily; during quiet sections of program audio, the gate "freezes" any gain control action.

In operation, this partial solution prevents noise in the source material being "sucked up" every time there is a silent passage in program audio. However, this technique will only buy you a little bit of leeway, as all the various amplifiers, peak limiter and receiver AGC, etc., each have an effect on the end product.

The best scenario is to start with good clean audio, free of unnecessary noises. To tie in (and conclude) our side discussion about audio processing and coded audio, let us look at some issues to watch out for when using coded audio as the audio processing source material.

CODED AUDIO CONSIDERATIONS

There are several factors to keep in mind when dealing with coded audio *feeding* an audio processor. The first concerns "coding artifacts." If the source audio is of inferior quality, or is using too low of a bit-rate, tiny artifacts, such as "jingling" and "water sounds" will be re-mixed, and during processing, brought up into the mix, making the artifacts more obvious sounding than they otherwise would be. This is especially true when dealing with situations where the original audio source contains very little high end.

After passing through a moderate amount of processing, this "jingling" will be brought up into the foreground, and will then become this "weird watery jingling treble sound" over the air on your radio station. This can also happen with multiple passes though coded audio links (cascading audio codecs). Generally, after three or four passes, sonic degradation is audible. To understand this audio cascading, let us take a look at real world situations where cascading happens in our daily life.

AUDIO CASCADING

Commercial delivery: The majority of commercials come to us these days in the form of an .mp3 file. Most of us give no thought about it, but if you *really* listen to the quality of an agency commercial versus one you produce in-house, the agency commercials tend to sound pretty "gritty." And they typically have all the artifacts I described above. This is not necessarily due to the .mp3 format, but to the number of coding passes the commercials go through to get to you.

Many times, a commercial is sent from one agency to another as either an .mp3 or over a dedicated commercial delivery system similar to the DG delivery system. After being re-worked, it is then encoded again by another dedicated delivery system to you, or emailed (or downloaded) to you as an .mp3 file. Right away, there are at least two passes. On top of that, some stations will have to get the spot from another: "Bob ... can you e-mail me the XYZ hardware spot? The agency said you have a copy." Often, "Bob" will have to re-encode it to .mp3 from his station's hard drive system to send it to you. If his shared drive system uses compression, then you are dealing with at least two more passes, now a minimum of four. Get the idea?

What if your source material is "linear," but you have a coded STL link? If so, since the STL link is a vital part of your processing chain, I would suggest "demo-ing" various systems to see which ones do the least damage.

BENCHTEST BEFORE USE

Rather than immediately putting such a system right on the air, I would suggest setting the units up on the bench, back-to back, and A-B the source audio versus what comes out of the receiver unit. Note any differences; pay particular attention to sources such as commercials, satellite programming, and ISDN remotes. Another telling test is to listen to what happens to satellite programs that routinely use ISDN devices to "pipe in" a guest.

One coded STL system I worked with happened to use the Apt-X algorithm, and it performed great with just about everything we could throw at it. ISDN remotes through this system sounded a tad "metallic," but the overall performance was far-and-beyond the best we had heard from any system at that point. (Linear digital STLs were still about 10 years away from reality back then). All the audio, even satellite programming from the SEDAT receiver, generally sounded fine in the studio on the program buss – that is, until a guest was piped in over ISDN. On the air (after the STL coded link) the guests literally sounded like they were talking from the bottom of a toilet bowl.

There was nothing wrong with the Apt-X coding system. We simply became the victim of one-too-many passes through different coding algorithms.

To analyze this, look at how a typical network program is sent to you: The satellite feed itself is using coding, and the link between the studio and satellite uplink was most likely coded. At this point, the program host has passed through three different coding cycles (counting the local coded STL link). Add in the guests over ISDN, and we have four passes on their audio. Viola! The masking game hits its limit, and the audio starts to fall apart!

AVOIDING TRASHED AUDIO

With the advent of linear digital STLs and cheap hard drives, there seems to be little incentive to keeping your source material in a compressed format. Nevertheless, keep in mind that HD Radio has a higher compression ratio than digital STLs and most compressed hard drive sources. HD radio will add a permanent lossy coding system into the mix, and for every broadcast station this will add one more cascading stage to most sources. Some folks may be in for a surprise as this may be just enough to really "trash" their on-air audio quality!

Another area to watch is noises in the studio audio on its way to the audio processor. These noises can be "buzz", "hum", or hiss resulting from anything from a ground loop to a noisy STL link ahead of the processor. The thing to keep in mind is noises in the program line will be "modulated" by the audio processor. Soft passages in the programming that are above the "gate" will result in the audio processor "turning up" its levels to compensate. When this happens, the noise will also be brought up as well. This can get real annoying to the listening audience.

Over all, if your goal is to have the highest quality audio, care must be taken to solve any noise problems that are not part of the program source. (What we mean by program source here is a source, such as the original CD used on air, or the CD that was used to copy a song onto the hard drive system). At the same time, there are a few tricks that can be done to improve the performance of existing bit-rate reduced systems you still may have to live with for some time. It is all a matter of quality control in the production studio(s) and "dub stations."

As we can see, what goes into the audio processor has a large effect on what comes out. So, regularly check your audio chain each step of the way. Quality control, no matter how your system works, is job #1 for anyone employed to be the guardian of the audio in your broadcast facility!

Next month we will start tying all this together, as we begin Audio Processing Adjustment School. See you next month!

Cornelius Gould has spent plenty of time playing with audio processors and enjoys sharing his knowledge. Corny is the Chief Engineer for Infinity Broadcasting in Cleveland, and for 91.3 WAPS in Akron, OH. You can reach him at: cg@radiocleveland.com

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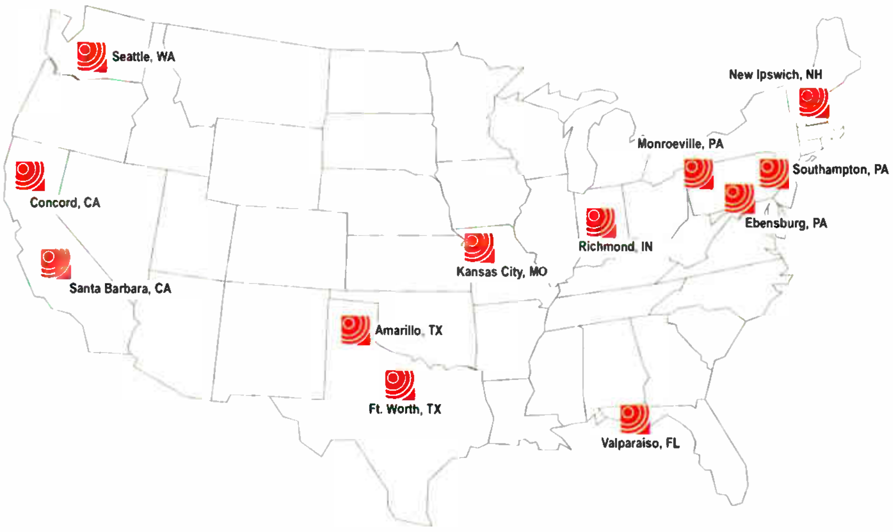

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400 W	1988	Nautel P400 (solid state)
5kW	1982	Harris MW5A
5/10 kW	1982	Continental 316F
50 kW	1985	Continental 317C2
50 kW	1986	Nautel AMPFET 50

FM Transmitters

2.5 kW	1978	Collins 831D2
5 kW	1983	Harris FM5K
10 kW	1988	BE FM 10A
10 kW	1980	Harris FM 10K
10 kW	1999	Harris Z10 CD *(solid state)*
20 kW	1978	Collins 831G2
20 kW	1982	Harris FM20K
20 IW	1989	QEI FMQ20.000B
25 kW	1997	CCA 25,000G *(single phase)*
25 kW	1980	CSI T-25-FA *(amplifier only)*
25 kW	1982	Harris FM25K
30 kW	1984	BE FM-30
40 kW	1978	2-RCA BTF-20E1 *(combined)*
50 kW	1982	Harris Combiner*(w/auto exciter-transmitter switcher)*

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TELOS SYSTEMS

Telos Phone Systems.

Telos all-digital telephone hybrids set the standard for talk radio, delivering clean, consistent caller audio. From the Series 2101 and TWOx12 (the world's only multi-caller broadcast phone systems that make direct use of digital phone lines) to the ONE and 100 Delta (the premiere hybrids for analog phone lines), there is a Telos hybrid or phone system for every broadcast application.

Zephyr Xstream ISDN Codecs.

Since we combined MPEG Layer-3 with ISDN technology in 1993, Telos Zephyr has become perhaps the most successful digital broadcast product ever. Today, Zephyr Xstream is the standard for professional audio transmission at broadcast facilities worldwide, with next-generation MPEG AAC and low-delay AAC-LD coding that deliver the most precise reproduction of voice and music.

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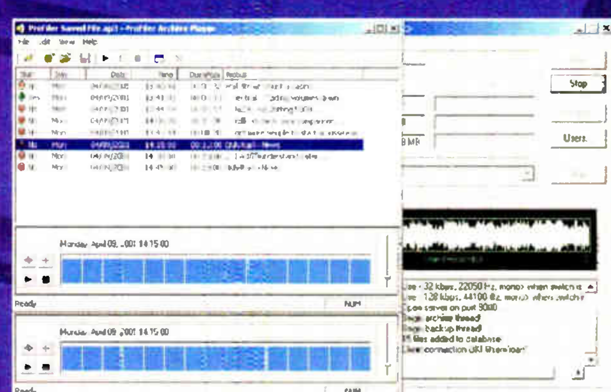

Telos ProFiler is the automatic audio logger that can log program audio, skim airchecks, and provide remote IP-network listening- all at the same time. ProFiler comes with its own pro-grade audio card with GPIO interface and runs on a standard PC under Windows 2000 or XP Professional. Profiler uses real Fraunhofer MP3 compression and user-selectable (manual or automatic) bitrate switching.

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DA Low-Down

Part 4 – Putting It All Together

by Wayne S. Reese

[COLDWATER, Michigan - November 2003] Welcome to the final installment in our series on building AM directional antenna (DA) systems. When we left off last time, we had finalized our plans for the site. So, let us pick up our discussion with the tasks of assembling and adjusting the equipment, and conducting the proof of performance. None of these have to be daunting tasks. The key to accomplishing each step is patience, thoroughness – and good help!

GOOD FENCES MAKE GOOD NEIGHBORS

There are several reasons to give attention to the fences around your site. Of course, fencing around each AM tower not optional, it is a requirement. Neglecting it may elicit a hefty fine from the FCC! (Supplement A to OET Bulletin No. 65 contains charts to determine the minimum distance fencing must be from your tower).

At the same time, do not neglect site security. A lot of expensive equipment is being brought together in one place, and you do not want to have any of it "walk off" the lot. Furthermore, towers and wide-open fields definitely can be what some call "attractive nuisances." Insuring the neighbors do not come on the property and climb on your tower (or ram the guy wires and anchors while four-wheeling) will save you a lot of grief and liability issues later. This involves both fencing around the site perimeter and each tower.

Before taking on this project, consider the following variables.

1. Timeline: Install tower fencing near the end of the construction project. You may even want to wait until after the cable installation (discussed in the next section). Otherwise, workers will be constantly maneuvering around the blockade. Just make sure the fence is setup before applying RF to the system!

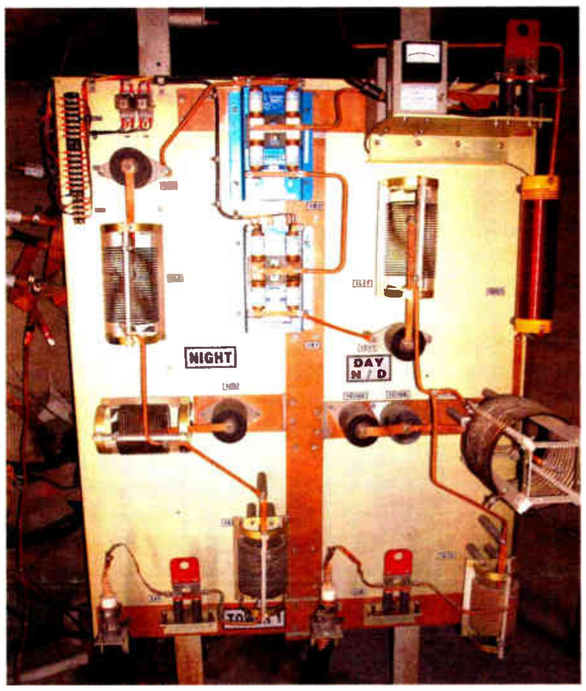
2. Caution: Ground systems are normally in place before fences are installed. Thus, extreme care must be exercised when digging holes for fence posts. Near the base of the tower, ground radial wires are laid closely together. So, there is a high probability of encountering ground wires at each posthole. Care must be taken to avoid damaging the ground wires. If any are broken, they must be repaired and the splices must be secured with some form of silver solder that will not deteriorate in the ground.

3. Material: There are several considerations when choosing fencing material. If metal is used, it must be bonded to the ground system at frequent intervals. This includes each fence post. If the fence feels hot once operating power is achieved, it may be necessary to bond between posts as well. Alternately, treated wood can be used to construct tower fences. In general, wood fences require more long-term maintenance than chain link fences, but they do not require grounding.

4. Location: Place the fencing far enough from the antenna tuning unit and/or tuning house to allow personnel easy access when tuning and performing maintenance. Occasionally, directional arrays are built only to find the cabinet doors swing right into the fence – sometimes causing arcs and sparks!

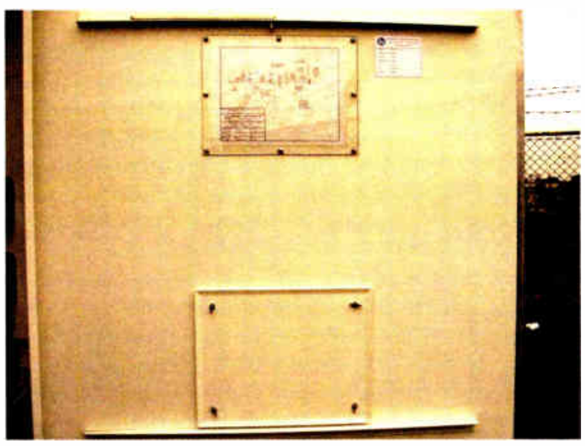
PUTTING HUMPTY TOGETHER

After the towers, transmitter, phasing and coupling equipment, and all the assorted additional gear arrives in an amazing variety of large and small boxes and crates, it is time to assemble all the components. You will save yourself considerable frustration by carefully labeling both ends of every cable running between the transmitter building and the towers. Failure to do so creates a challenge when connections are attempted, and occasionally may end up meaning hours of needless hassle.



Although there may be considerable pressure to "get it on the air right away," be sure you allow ample time for a quality installation with full documentation. This will pay dividends for years to come. Just one quick example: A lightning strike can destroy components beyond recognition.

Having full documentation allows the correct parts to be ordered so your station can quickly return to service. Although all of this documentation may seem like an excessive up-front cost, remember that without a working transmitter and antenna system your signal goes nowhere – and that means the generation of revenue comes to a screeching halt!



The vendor for your phasing and coupling equipment should provide diagrams showing needed RF interconnections. Make some photocopies and attach them inside the units for quick reference.

If your system involves multiple patterns, or if it includes switching for non-directional mode, there will be additional control circuitry to connect. Be sure the control system is functioning correctly before you apply RF energy to the system. Each of the relays should be visually inspected to be sure the system switches modes correctly.

Some manufacturers preset the phasing and coupling equipment. If this is done, you just need to check things over. Be sure all packing tape and materials are removed. Make sure all the connections are intact, coil taps are where they were preset, and mechanical connections are tight. This is also a good time to inspect all the insulators and replace any that may have broken during shipment and installation.

Ed Trombley working on a Directional Installation in Japan.

If the phasor and antenna tuning units (ATUs) are not preset, your technical consultant needs to make adjustments. He or she adjusts each network to the theoretical values using specialized test equipment, such as an RF impedance bridge or vector impedance voltmeter.

ENGAGE!

Once you are certain all connections are correct and all control circuitry is working properly, you can apply some power to the system. Never start at full power. Instead, use just enough power to be able to read the operating parameters on the antenna monitor. If they are reasonably close to the theoretical values (for example, phases within 15 degrees and ratios within 20 percent), make small increases in power.

Before proceeding, allow the system to run for a few minutes at reduced power (10 to 50 percent of rated power). Then, turn off the transmitter and inspect all components in the system for excessive heating. One of those infrared thermometers would be valuable tool at this point, both speeding up the process, and providing you with some "baseline" documentation. If you find a problem, stop, determine the cause, and take corrective action before putting any more power into the system and destroying any of the costly components.

TAMING THE SYSTEM

After solving initial turn-on problems, it is time to tune for the theoretical parameters. Your technical consultant needs at least one assistant for this job.

(Continued on page 20)

DA Low-Down

Part 4 – Putting It All Together

Continued From Page 18

Adjustments are made at the base of each tower as well as in the phasor. Measurements are also made to determine the input impedance of each network. The goal is to obtain theoretical operating parameters on the antenna monitor while simultaneously matching the input impedance of the networks to the transmission lines.

It is normal for the towers to interact with one another. The changes made at one tower will cause changes at one or more of the other towers. For this reason, it is quite common for multiple rounds of adjustment to be required to get the array "set" correctly. In simple arrays, two or three rounds may be enough. In complex arrays, your technical consultant may need to spend a week or more just completing the initial adjustments.

After theoretical parameters are achieved, the transmitter can be slowly increased to full power. Along the way, frequent pauses are needed to check for unwanted arcs, sparks, and overheating. The system needs to run at full power for 20 or 30 minutes. Then, it must be powered down to do a thorough inspection for overheated or damaged connections and components. Working with multiple engineers can speed this process along.

MAKING THE COMMISSION HAPPY

With most arrays, the theoretical parameters do not produce the exact pattern needed to comply with the authorization you have received. However, theoretical operating parameters are always the place to start.

For the final adjustment of your pattern, your consultant will need several engineers, equipped with field intensity meters, two-way radios or cellphones, and sent to specific tuning or monitor points. (Your technical consultant will help you determine the exact locations and the target values for the field strength at each point.)

Using the phasor controls, the consultant will make changes in the operating parameters. Two-way radio or cell phones communication with the engineers in the field will allow him or her to receive almost instantaneous feedback about the effect of each adjustment.

Depending upon the complexity of the system (the number of tower, as well as the depth of the critical minima) you can expect to spend anywhere from a few hours to multiple days at this stage of the project. Unfortunately, it is also possible for re-radiation problems to cause a project to drag on for what seems like forever.

Detuning external objects can be complex, time consuming and expensive. By this time in the project, however, your consultant should have seen the site and have a handle on potential problems.

When adjustments are complete, you are ready to move on to the Proof of Performance. This proof is made and analyzed to prove the adjusted antenna pattern complies with the one specified in the station's authorization.

"PROOFING" YOUR POINTS

The Rules governing proofs have been relaxed in recent years. Both the number of radials (geographic bearings on which measurements are to be made) and the number of points on each radial has been reduced from the previous requirements. The Commission specifies which radials require a monitoring point in the construction permit for your facility. Your technical consultant will figure out the remaining radials required to comply with current FCC rules. The minimum number of radials is 6 and the maximum number is 12. However, there have been some complex arrays in the past which have employed over 20 radials to measure!

Along each radial a series of field strength readings are made. Most points need to be measured in both non-directional and directional modes. For some arrays, it is possible to switch between modes as the measurements are made. In other cases, it is simpler to measure each radial twice – once in each mode.

The point where you begin measuring is determined by the geometry of the array. Your technical consultant will provide guidance for you. At locations closer than 3 km from the center of the antenna system, the Commission requires measurements at intervals of approximately 0.2 km. This usually requires walking through the area while taking measurements.

The walking field engineer needs a field meter, mapping and/or a GPS receiver, a two-way radio or cellphone. A second person, preferably at the transmitter site, is equipped with a two-way radio or phone. Again, the use of two-way communications will speed things up considerably.

The transmitter operator can log the time, location and field strength readings. In fact, a single transmitter operator can often log for multiple field personnel. If the station is equipped to switch easily between non-directional and directional modes, the transmitter operator can also perform this service for field personnel. This can significantly reduce the time required, especially for close-in measurements (often called "walk out" or "walk in" measurements).

Between 3 and 5 km from the transmitter site, the specified interval between points increases to 1 km. From 5 to 15 km, 2 km intervals are acceptable. The Commission wants to see at least 15 total measurements on each radial, and it is preferable to see at least 7 of these within the first 3 km. These close-in measurements are very important. No one likes making them – frankly, they are hard work. However, these measurements provide the foundation for analysis of all other measurements.

Furthermore, if at some time in the future it is necessary to make corrections to an array, tremendous amounts of time and effort will be save with good documented measurements. (On the other hand, if the data was collected in a coffee shop, there will eventually be someone saying nasty things about you!)

After all this data is gathered, your technical consultant will take the completed measurements and analyze them. Part of this analysis is mathematical, and part of it is graphical. If anomalies appear, your consultant may ask for some of the measurements to be repeated.

Once the analysis is satisfactory, your technical consultant will assemble the Proof of Performance Report, along with an application for license. Working with your attorney, your consultant will also file it with the Commission. This is one of the few remaining filings that must be done on paper. Normally, the FCC will issue program test authority within 10 working days. Then, you only have to wait for the FCC to issue a license for your new, completed facility. Congratulations, you made it!

Wayne S. Reese is President of Munn-Reese, Inc, a Broadcast Engineering Consultant firm in Coldwater, MI. You can contact him at wayne@munn-reese.com

It May Be LOW Power But It Is Still POWER!

by John Devecka

[BALTIMORE, Maryland - November 2003] In these consolidated times, opportunities for small radio ownership are steadily creeping out of the reach of most people. Crowded non-commercial bands preclude many schools from licenses and the high cost of entry generally discourages the rest from buying a station for "those crazy students." So what is a crazy student to do? Low Power Radio is your way to salvation, my friends.

AHH, SWEET MYSTERY OF LIFE

Like the alchemists of long forgotten times, Low Power purveyors juggle a mix of science and witchcraft to turn microwatts into listeners. It remains a mystery to most of the folks who handle "real" transmitters and towers, but it can be a surprisingly effective means of reaching an audience without major investment.

Low Power Broadcasting has a long educational history in the US, going back at least six decades. There are several varieties of these stations. Before we discuss them, I will mentioned this attraction: *All* these systems are unlicensed and have *no* limitation on their content, regardless of the owner/operator.

WHAT'S THE FCC GOT TO DO WITH IT?

That is the wonderful part of Low Power Broadcasting: No License Required. Most definitely there *are* Rules, but they do not include the costly issues associated with an FCC license. All the alchemy of Low Power Broadcasting is found in the Code of Federal Regulations, Title 47, Chapter 1, Part 15, or on the web at: http://www.access.gpo.gov/nara/cfr/waisidx_01/47cfr15_01.html.

We want to discuss 15.209 (General limits), 15.219 and 15.221(AM systems). "Part 15 Devices" all require either certification (FCC) or verification (manufacturer) of the equipment, and must accept any interference created *by* a licensed station without creating interference *to* a licensed station. Of course, in 99.9% of the cases, these low power systems have no choice but to stay out of the way of the licensed stations if they want to be heard at all.

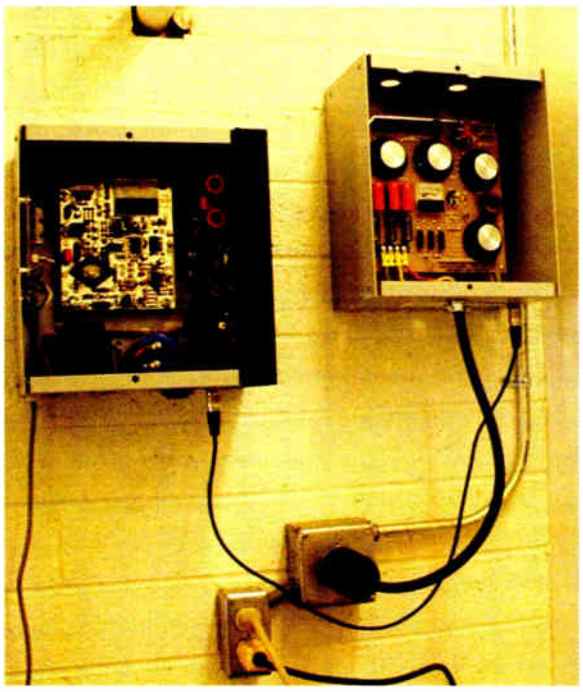
There are FM systems, but let us start with the more numerous (and confusing) AM options. AM without a license comes in three basic flavors: Carrier Current; Campus Antennas; and 100 mW systems. Each type has its own idiosyncrasies and issues to sort out, but they all are easily explored.

IF YOU DON'T KNOW THE WORDS, JUST HUM

Carrier Current systems work by impressing the AM radio signals onto standard power lines. According to the FCC (15.221) carrier current systems may operate from 525-1705 kHz, provided the field strength levels of the radiated emissions do not exceed 15 uV/m as measured at a distance of 47,715/(frequency in kHz) meters from the electric power line. Outside the AM band, fields must remain within the general radiated emission limits in 15.209.

This means you can have a radio station fairly easily virtually anywhere you have power lines. Of course, the cleaner the power the less noise you will have, and better reception. Several companies manufacture the equipment along with tuning units to match the impedance of the AC lines for maximum input. The big two, LPB Communications (www.lpbinc.com) and Radio Systems (www.radiosystems.com) have field technicians and websites to help you, with detailed technical notes to answer your questions.

The plus side of carrier current systems is they work wherever there is a power line, neutral line (or darn near any other kind of wiring). The downside is the system needs to be "clean" in order to have the best signals. Bad motor brushes, ballasts and other such noisemakers will be heard in the signal, and are hard to work around in big buildings. (Using just the neutral line for your signal will often bypass the worst offenders and give you clear signal, but it uses less wiring and therefore will usually have lower coverage.) There are numerous documented cases of large apartment and dorm buildings being covered well with a single transmitter.



Carrier current systems have been employed at thousands of locations from schools to military bases. Installation is typically performed in the worst spaces (boiler rooms, etc) where the main electrical service is housed. While tapping into the main panels provides the maximum amount of wiring, you can install these systems into most common duplex wall outlets. At some sites, multiple transmitters and linear amplifiers are used to serve several buildings.

Typically, the cost of a single building transmission system is under $2,000 (although depending on the size of a building, it may need supplemental amplification or a second insertion point in the power system).

CAN'T I JUST PUT UP A TOWER?

Yes ... sort of. The AM Rules include a campus antenna system option for "a college or university campus or on the campus of any other education [sic] institution." LPB (my old employer) petitioned the FCC to make this change long ago, but it applies mainly to rural or large campuses with enough ground to make it work effectively. The idea was, since a large campus would be difficult (and expensive) to cover with carrier current systems, and FCC measurements would probably be taken at the edge of the campus anyway, why not allow schools to do what they want on campus?

The FCC agreed so long as the system meets the 15.209 limits outside of the AM band, you can broadcast with an antenna. One caveat, however, the signal has to be essentially dead at the campus perimeter; it must comply with the 15.209 limits on *all* frequencies: At 30 meters from the campus perimeter, you must be below 24,000/F (kHz) uV/m on the AM band. (FCC field inspectors will make their measurement at the campus perimeter point *closest* to the antenna, not the furthest.)

And keep in mind the definition is specifically for educational campuses. Private sites do not qualify, unfortunately, no matter how much sense that might make.

The plus side of a single point AM campus antenna system is ease of installation, and generally good coverage outside. If you have a pretty big campus with buildings in the middle, without a lot of steel sheeting, you will probably get good coverage inside as well as out. The down side? If your campus is one long skinny rectangle, there is not much you can do to reach the ends with a single antenna, since you have to measure at the short sides. And, if your campus is inside a city with buildings scattered in among non-campus ones, forget it. Carrier current is going to do more for you.

Typical systems cost around $4,000 depending on the installation. These do need a good space to be installed well. A big, flat high roof (or piece of ground) in the middle of the campus works best.

It is possible to combine the carrier current and antenna models. Start with the outdoor antenna system and add carrier current units to supplement coverage in buildings with the worst signal. It will save money and mean more coverage in more places. Keep in mind, however: carrier current performs better at the low end of the band and compact AM antennas do better at the high end. (Some clever folks do 530 kHz for carrier current and 1530 kHz for the antenna – to keep the numbers similar.

WHAT ABOUT OFF-CAMPUS STUFF?

Amazingly, there is an option for both on and off campus, educational and non-educational sites. It is *really* low power: one booming tenth of a watt of power! FCC Part 15.219 allows the use of a 100 milliwatt transmitter with a total of 3 m of antenna, transmission line and ground lead. Not much, but you might be amazed can be done with it.

Most of the 100 mW systems are weather-resistant and run on DC power, with the antenna directly attached to the case of the transmitter for maximum antenna and minimum transmission line lengths. They are suitable for campuses, as well as retail and information systems with full commercial content.

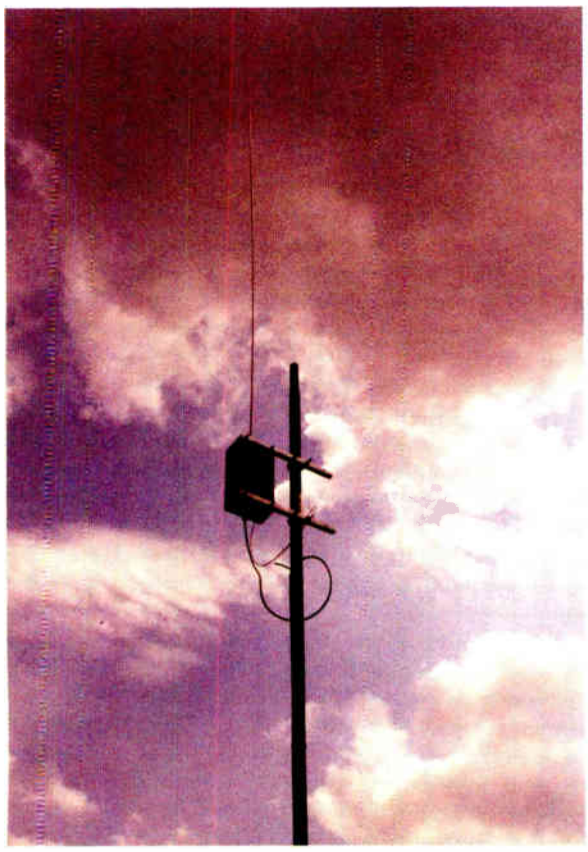
These systems are typically small (smaller than two copies of the NAB engineering handbook and a lot lighter!) and use a common 102" steel whip antenna (hello, Radio Shack?) for transmission. Most are frequency agile, sending audio and DC power to the transmitter from an indoor connection point. The best of these units can even handle 110% positive peaks.

(Continued on page 24)

Radio.edu

Continued From Page 22

With the built in tuning circuitry, coverage can be impressive, but depends very heavily on your ground, processing and the local spectrum. The units are not to exceed 100 milliwatts output at the final stage and the instructions should inform you how to determine this.



100 mW transmitters require a good ground – without it they are useless. The best installations are typically higher than other structures and tied to a solid earth ground, like a building. Some of the most extreme performance can be seen from units bolted to billboards with continuous steel framing (serious ground, eh?). Route your audio according to the best ground, not the other way around. I have seen these transmitters exceed one mile of coverage and more (I spoke with an engineer in CA who measured one with a field meter *many* miles away).

The plus side of 100 mW is they can cover large areas, with decent audio quality and minimal headache, for under $2,000 depending on the installation type. The downside is they perform best at the highest end of the band, which has grown more crowded with the expansion to 1700 kHz. These systems also benefit greatly from a processor, which may add a bit to the expense. In any case, these units do require careful tuning to give you the best performance and (again) a good ground.

RULES, SCHMULES

Do not feel bad if you are not aware of, or familiar with, the esoteric low power rules. Even FCC field engineers have cited stations using the wrong rules.

Spend a few minutes on line and review Part 15. I think you will find some useful new ideas for small systems there. If not, call me and I will explain.

John Devecka is Operations Manager for WLOY in Baltimore and spent a past life designing, supplying and installing Low Power Broadcasting systems on a global scale. He is believed to sleep with a copy of Part 15 under his pillow. He can be reached by email wloy@loyola.edu or phone at 410-617-5349.

\\Networking\How To

Connecting to the Office

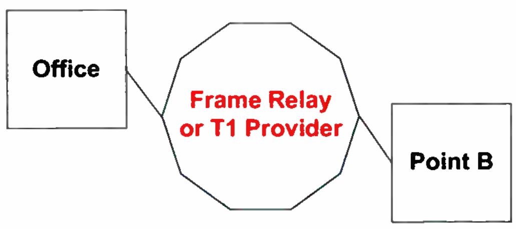
by Tren P. Barnett

[TUCSON, Arizona - November 2003] Some months ago, this column started as *Networking 101*. Like so many things in life, *Networking 101* reached a certain stage of development, and prompted a number of reader questions. Enough well thought out questions rolled in that we deviated from the plan for a while to handle some of the questions under the guise of *Networking 102*. Now, I would like to journey back to what we were discussing under *Networking 101*, as well as continuing the *Networking 102* articles so to speak. Both titles really seem ambiguous to what we are trying to achieve, so we will now refer to this column as *\\Networking \How To*.

Perhaps you recall our original goal when we started out with the *Networking 101* articles: develop a network that would resemble a reasonable sized business network and achieve ease of administration while providing basic necessities such as Internet access, e-mail, a SQL server – with all of this sitting behind a Microsoft ISA server for protection. However, as it turns out, very seldom do businesses have a totally stand alone network.

CONNECTIONS FROM OUTSIDE

Often there is a need to tie in another office, be it a small building next door or access for individuals telecommuting from home. What we want to do is get from our main office to our other site, which we will call Point B. One solution is wireless networking connections. However, when circumstances preclude this option, one of the questions posed most often falls into this category: "Do I really need to go to frame relay or T1?" Here is a typical block diagram of such a system.



Unfortunately, all too often we can be hit with heavy charges to tie together offices that are not overly close, through Frame and TI. In some places an office may exist just across an invisible line drawn through the state by bureaucracy. Because of this drawn line, tying into the office may require yet another vendor, and of course everyone wants their slice of the pie.

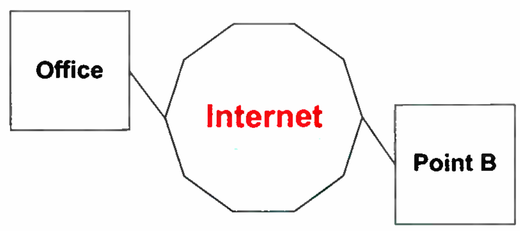
Nevertheless, if you have the basic parts of a network in place at the main office, with an internet presence through statically assigned IP addresses, other options exist. For example, High Speed DSL, cable modem, or other similar services which are available through many sources. Dial-up works also, but is very unreliable for demanding work practices.

Before we go too far, let us make sure we understand the prerequisites. The office at work must have (1) a direct tie to the internet and (2) we must have statically assigned IP addresses there. The speed of the service is less important then the need for the static address with no filtering occurring. However, service that is too slow can make the link useless.

VIRTUAL PRIVATE NETWORKS

A Virtual Private Network (VPN) will allow us to do this. VPN is used all over the world and is a very cost effective way to accomplish our goal. Computers with Windows 98 and later operating systems can use VPN connection. VPN servers with Windows NT4 or better have been assisting them around the world.

VPN allows the Office to talk to Point B as if it were on the same network when certain criterion has been met such as authentication, encryption schemes, etc. With a VPN setup in place, Point B's user can work from a remote location with total access to all network resources allowed by the administrator. We will cover how to configure our servers and users for such access in another article.



While all of this can be accomplished by software in a Windows NT4, 2000, 2003 environment, Cisco makes what is known as a "Pix." This little box sits at both sites and creates the needed tie on demand. With a Cisco Pix in place, we can have the same environment existing as if our offices were tied via nice T1 routers. Often a remote site through DSL can provide excellent speed and access meeting most all networking demands. (Obviously the more connections we tie in, the more office bandwidth will be consumed.)

It is worth noting that if the remote site has a static address, a connection can be initiated at any time by either site. Once a connection has been established two-way traffic is not an issue. While it is possible to keep a permanently open connection so a static IP is not required, if a static IP address is not assigned at the remote site (Point B), the office cannot demand a connection, but must wait for a connection to communicate to the remote site.

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

FCC Focus

Keeping EAS Operations Legal

by Alan Alsobrook

[ST. AUGUSTINE, Florida - November 2003] When doing Alternative Inspections, right behind the Public File, for the most legal problems, comes EAS (Emergency Alert System) operations.

EAS is a simple system and most of the problems I have seen have been from either a lack of attention, or basically just not caring how the system works. Since the FCC has been getting really feisty lately on EAS problems, many stations are now receiving NALs (Notices of Apparent Liability) rather than NOVs (Notices Of Violation). If you are not familiar with the difference between the two items, you should be.

The NOV used to be the most common piece of paper received from the FCC after a visit. Your engineer could usually answer it within ten days stating how the problem was corrected, and you then seldom heard from the FCC again. (You would now have a history with the FCC but you did not have to pay anything.) On the other hand the NAL requires a higher degree of response – and the FCC is already wanting your cash. Your best course of action is to notify your attorney and correct any problems as quickly as possible.

Now let us examine what you need to do to keep your EAS system legal.

HAVING THE RIGHT ANSWERS

The first item usually asked is: "Is this station a participating or non-participating EAS station?" Unless you have a letter from the FCC stating you are a "Non Participating National station" (as required by section 11.41(b)), your answer should be "We are a participating station." This rule only applies to the national messages.

While there is no requirement to participate in state and local events, if you are a Non-Participating National station you should be ready to show your means of signing off the air immediately in the event of a national message. While not required for the majority of participating stations, I recommend that you also keep a letter indicating your national participation status, as well as any local and state plans and station procedures, along with the EAS handbook. Doing so may well save you some grief.

You cannot find your EAS handbook? While this could be a problem in an inspection, you can solve it quickly, right now. The EAS Operators Handbook is published by the FCC and is available easily for download on their website: http://www.fcc.gov/eb/eas/. Remember, you *must* have a copy of this handbook at each EAS operator position or EAS equipment control location, preferably both, if they are separate.

EQUIPMENT CHECKOUT

After the handbook has been found, we can move on to the actual EAS Equipment, which must be certified for EAS use, installed and in operational condition. If you have any question about that refer to http://www.fcc.gov/eb/eas/certsel.html. If the equipment is set up for manual operation, it must alert your EAS operator *instantaneously* at *all* times.

Since it is always possible for an operator to be out of the room and miss an alert, my personal suggestion is to protect yourself by having your equipment installed so there need not be an operator intervention for any national message to go on the air immediately or to get a Required Monthly Test (RMT) on the air within 60 minutes. Installing and programming the equipment that way does not preclude you from screening all other emergencies, or putting the RMT into a regularly scheduled break within one hour.

When checking your EAS equipment, verify which signals you are monitoring to get your messages. You must monitor two different LP (Local Primary) stations. You determine what stations are your local primary stations from your state plan. As long as you are monitoring those two assigned LPs you are free (and encouraged) to monitor as many additional sources of EAS information as possible.

Since state plans *do* change from time to time, be certain you review them often enough to be sure your monitoring assignments have not changed. If you are unable to monitor one or both of your assigned LP stations then you should contact your LECC (Local Emergency Communications Committee) or SECC (State Emergency Communications Committee) and determine other possible sources. After you have done this, you must contact the FCC EB (Enforcement Bureau) field office for your area, and obtain a waiver for your monitoring requirements.

TESTING ... TESTING

Approaching the last of the EAS requirements, we need to give attention to the required tests. Your testing requirements are that you must *receive* at least one RWT (Required Weekly Test) or activation from each of your two local primaries each week. You also have to *transmit* one RWT each week.

Yes, it is acceptable to forward the RWTs you receive, as long as at least one of them is *random*, since your RWT transmissions should occur at random days and times. However, do remember that where LRNs (Local Relay Networks) are initiated by local governments, they are not bound like broadcasters to part 11 and therefore may not run their RWTs randomly.

We should also note – as there has been much confusion on this – there is no rule saying you can not send *more than one* RWT in a week. In fact 11.61(a) specifically allows additional tests. One of the stations I take care of is a college radio station; each semester as a new group of board operators comes in they have to learn the EAS operator responsibilities.

WFCF Student Operator Serena Forrester, receiving EAS instruction from station manager Dan McCook. Flagler College, St. Augustine, FL

During this time, I will often see eight to ten RWTs transmitted in a week. Then, a few weeks later they will miss one. Unfortunately, you not allowed to "bank" RWTs, in case one is missed. As a "failsafe" I like to program an automatic RWT about 3:00 AM every Monday morning in addition to the random test. This test does two things for me: It gives me an easily identified break on the EAS log each week and it is there as a backup should the operators miss an RWT send.

The RMT is designed to better test the entire EAS message chain. You have to receive and retransmit within 60 minutes one of these tests each month. (This test alternates; odd months it is between 8:30 AM and sunset, while in even months it is between sunset and 8:30 AM.) When these tests are run, you should be seeing them arrive from each of your LP stations and most other stations you are monitoring.

There is a slight hierarchy worth mentioning here: An RMT replaces the RWT in the week it occurs. An actual alert also can be used to replace an RWT, and if it is retransmitted with full data encoding and EAS alert tone, it can replace the RMT as well.

Unless you are fully automatic, all of your operators should be familiar with the operation of your EAS system. Normally, I seldom ask for an operator to perform a test during an inspection, especially if the logging indicates a well-run system, since it would interrupt airtime. However, when I ask the operator on duty about the EAS system and they seem to be lost or confused, I may ask them to explain how one is done, or occasionally even will ask for a test.

MAKE SURE IT IS LOGGED

Finally, we get down to logging requirements – one of the more important aspects of keeping your station out of trouble with the FCC. You must keep logs of each EAN, EAT, RMT, and RWT received, along with any transmission made. Of course logging all events received and transmitted is perfectly fine.

I am often asked, "What should we do if we miss a test transmitted or received?" Obviously once a test is missed you cannot go back and do it. When this happens you should log the reason why the test was missed in your EAS log. On a missed reception, your receivers should be fully checked for proper operation. If no problem is found, then you should check with the LP from which the test was missed to see if they had a problem and *note it into the log*. If no problem is found *note that* in the log and pay very close attention for the next test.

"When does the week start?" is another common question. *You* determine your week; typically it is either Sunday to Saturday, or Monday to Sunday. Whichever week you use make sure you are consistent (a small note somewhere on the log indicating the beginning of your week would not hurt). If you happen to use a different week than your LPs do, you occasionally may have two tests in one week and none in the next. Again the protection is to indicate on the log the test was received in the previous or following week.

Another inspection checkpoint: The EAS log must be reviewed once each week. It is highly recommend you design easy to read and review EAS logs. It makes your job easier each week, and if the FCC should happen to drop by for a friendly visit, they will be in out and out of your EAS records in minutes! Just keep in mind the longer the FCC has to look through your logs to find what they need to see, the more problems they are likely to find.

Finally, from my personal perspective: I think EAS is a vitally important tool we broadcasters have to help serve our community. If you are not aware, the FCC has recently added new event and coastal location codes. One of the very important new codes is the CAE (Child Abduction Emergency) also known as the AMBER Alert. If your equipment has not been updated to accept this and other new codes, now would be a very good time to do it. Support your local LECC & SECC. If you do not have one of these in your area, speak with your local Emergency Management people and be the first on your block to get one started.

Alan Alsobrook is a contract engineer based in St. Augustine, FL. He also serves as the Alternate FCC Inspector in Florida. Alan can be reached at aalso@aug.com

Answers to Your EAS Questions

EAS Q&A

by Clay Freinwald with Barry Mishkind

[SEATTLE, Washington - November 2003] We continue our monthly discussion of EAS matters. Got a question? Let us know at the address below.

IS EAS A PUBLIC SERVICE?

Barry - We continue to hear about those station managers who feel EAS is just an interruption with no upside for the station. They claim they are doing "Public Service," but can they do so without EAS participation?

Clay - In the minds of many who have been in this industry for a long time, public service means running spots for non-commercial or community groups, that is the typical "PSA." EAS is not public service in that sense, but rather could be called a "community service."

The problem is EAS testing can hardly be put into that category. On the other hand, your station's willingness to forward/air EAS messages is important. Actually airing EAS messages (not tests) should qualify as community service, especially when those messages could save lives and property.

Barry - That is a great way to look at EAS participation. It may help some station managers to take a second look at EAS. Of course, it is not always easy for an engineer to interest management in this sort of thing. Any suggestions that have worked around the country?

Clay - One of the best methods is by getting the state broadcasters' association involved in EAS at the SECC level. In fact, I highly recommend that every state association have a permanent seat on this committee. This participation provides the link between the mission of EAS and the broadcasters in the state.

Barry - How about at the local level, are there ways to get stations more involved with EAS?

Clay - Again, EAS is not "an engineering thing," but rather a community service function. Unfortunately EBS responsibilities were considered an engineering function. When EAS came along, this thinking did not change. It may well be up to the engineer to *interest* others in the EAS mission.

For example, the station news department, news director, or other department member may well want to get involved once he understands the mission and the station's role. Some managers might want to get involved due to the positive image participation generates. I like to point out that one of our EAS leaders is a traffic director at a TV station.

Barry - Nevertheless, aside from the Presidential alerts, EAS is voluntary. Is there a downside if broadcasters chose not to participate in the voluntary side of EAS?

Clay - Yes. Emergency managers and other governmental entities might go to their Congressional representatives, and tell them broadcasters are choosing not to participate. This could end up back-firing and resulting in what is not voluntary becoming mandatory. I have always been fearful of a situation where a broadcaster chooses not to run an EAS message and it results in a loss of life, etc. It would seem to me this might generate the kind of "heat" no broadcast ownership would enjoy.

Let me quickly add that this is a two way street. Emergency managers, and other governmental entities involved in public warnings, have an obligation to work with broadcasters just as broadcasters have an obligation to work with them. This is why I continue to stress the importance of these emergency communications committees (SECC and LECC). It is by their working together that EAS can really do its job.

MISSING RMT AND OTHER PROBLEMS

Barry - Let us consider an operation issue or two. A reader asks what happens if they do not receive a Required Monthly Test (RMT). Should they initiate one themselves?

Clay - That is a very common response, but the short answer is no. If a station is not designated a source in the state or local plans, it never has to originate an RMT. A station's obligation is to know when an RMT is supposed to run and, if it does not, log the reason why it was not relayed by your station. This requires investigation of the matter until you can state for sure what happened, and then logging of the information. I like to think there is an FCC inspector out there with an RMT schedule checking to see who has been naughty.

Barry - If a station should not initiate an RMT, should they run a Required Weekly Test (RWT)?

Clay - Some traffic departments are wise to the ways of EAS testing and have a copy of the RMT test schedule, so they do not schedule an RWT during the week an RMT is to run. If you miss relaying the RMT, you would be wise to run an RWT. Remember an RMT can be "subbed" for an RWT – only – if the RMT runs.

Barry - OK. Now here is a special case: A DJ at a daytimer comes in and discovers an RMT was received at 3:00 AM. Does he have to relay it when the station signs on for the day?

Clay - This is a gray-area where you are likely to get differing opinions from FCC employees. But, let us look at it this way: An RMT issued at 3:00 AM would have to be relayed within one-hour. Since the station was not on the air, this could not be done. However, while I would not run it at 6:00 AM, I would log the receipt of the RMT at the time it was actually observed. (I would not log it as being *received* at 3:00 AM as the FCC is not likely to think someone came in just to listen to the test.)

Barry - Another reports some of the stations in his market use their own audio in the test, is this wrong?

Clay - You did not specify which test you meant. If the test is an RWT, there is no audio required, just the transmission of the EAS Tones. However if the test is an RMT, the audio should be coming from the *source of the test*, which should be a government entity. In that case, the entire test should be relayed as received. I have to admit it is tempting to replace the received audio with something that sounds better, but I *do not* recommend it. The best thing to do is to work with your local or state EAS committee to see what can be done to improve the audio quality

NEVER MIND!

Barry - In the last round of FCC Part 11 rule changes, some suggested there should be a cancellation code so everyone would know the emergency had ended, rather than wait for the duration time in the initial message to expire. How would you suggest for emergency managers to signal that an event is concluded?

Clay - True, the FCC did not embrace a cancellation "event code" as many would have liked. However, some states have adopted the ADR Event Code (Administrative Message) as a cancellation code. Here in Washington State we use this procedure for dealing with child abductions (CAE) that are resolved. When the child is found, or police terminate AMBER, an ADR is transmitted via the background channels to the electronic media.

As another example, we recently had a 911 outage. A local TOW Event Code was used, and when they system was up and running again, the initiating government entity initiated an ADR. A word of caution here: While the use of ADR for this purpose is not precluded by the FCC, it is vital this procedure become part of your state or local EAS plan so all parties know what to do; for example: "Listen to the message, but do not broadcast or relay it."

Barry - Clay, is it true some areas are still using the CEM Event Code for AMBER?

Clay - This is my understanding. In some small markets where budgets are very tight, all EAS equipment still has not been upgraded and therefore the Civil Emergency code is still being used for child abductions. I have also learned that in some cases some creative funding alternatives have been used to help smaller broadcasters get their equipment upgraded.

BETTER TESTING

Barry - Tell me about the "EAS Kill Switch." What is that?

Clay - As governmental entities have tested their EAS message generating equipment, there have been "accidents" where a person thinking they were practicing ended up sending an unintended message to the electronic media, occasionally prompting some panic. The principle of the Kill Switch is to help prevent this from taking place. In some cases a simple switch is installed at the output of the EAS encoder is labeled TEST or LIVE. I understand in some cases a light has been added for attention-getting purposes.

Barry - What brought this on?

Clay - EAS mistakes by government entities are not easily ignored. In fact it only takes a couple of these bureaucratic "screw-ups" for broadcasters to start talking about pulling the plug on EAS participation. I maintain that if government can come up with a method for *not* launching an ICBM by mistake then they can also avoid sending un-called for EAS messages. Must of us are familiar with the 2-key requirement for the missile launch. If it takes two government employees to make sure a foul-up does not take place, so be it!

GETTING THE WORD OUT

Barry - The National Weather Service (NWS) is trying to increase the number of NWR transmitters. Do you know if their goal is to cover the entire country with weather radio stations?

Clay - Yes – sort of. The NWS is focusing on covering a very high percentage of the population, rather than trying to cover every square mile; there is a difference. Here in our state (WA) NWR covers a substantial portion of the population with the goal to increase this to 95% this next year.

Barry -Amateur Operators are also getting involved in EAS, are they not?

Clay - They sure are! In fact if you look at the R & O for EAS you will find the FCC was also thinking Amateur Radio would want to be involved. Thus far this involvement has come in several ways. Many 'repeaters' have installed receivers and decoders tuned to NWR and other background channels.

When an EAS message comes along, the Hams monitoring that repeater instantly get the information. Additionally, Hams are a great resource of technical assistance, especially in creating and maintaining the various communications systems needed for a robust EAS system. SECCs and LECCs would be wise to provide for Amateur Radio participation in EAS.

Barry - You are quite an advocate of using background channels for relaying EAS messages from their sources to broadcasters. Should broadcasters volunteer to help out by letting local governments use their RPU equipment and frequencies?

Clay - They could. However what that does is tell the government entities they do not have to provide a method of distributing their EAS messages to the media. Frankly I would not let them off the hook so easily. If you do a little digging you will likely find a non-public safety radio system that would be ideal for getting the job done. Explain the need, the concept, and keep the pressure up until the system is operational. Then everybody wins.

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

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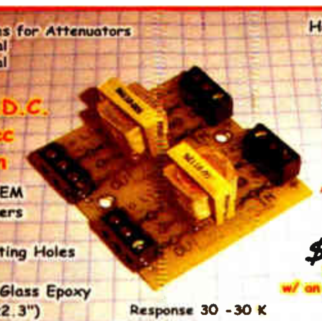

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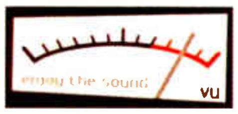

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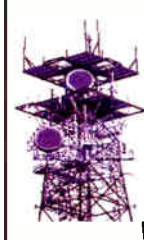

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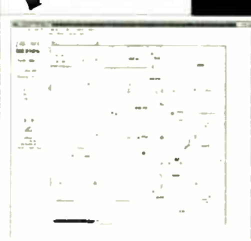

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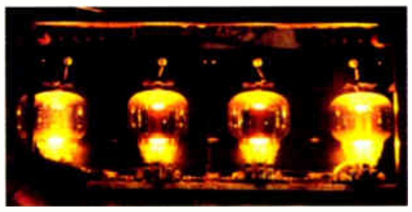

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"Field Notes"

Letters From Our Readers

Dear Editor:

I just read the latest copy of "Radio Guide" *[Sep-2003]* and I must complement the article on the 2003 blackout. Dana Puopolo's explanation of how the grid works was the first real explanation of *how* the grid works that I have seen in *any* publication, general or specialized.

Kudos on his writing and on the coverage of the issue!

James Snyder – Senior Video Engineer
Ground Network Engineering, Intelsat

Dear Editor:

I noticed Don Kimberlin's excellent article entitled, "The World's Most Heralded Radio Failure" in the October 2003 Radio Guide. By any chance, is this article posted on the web?

As publisher of the CGC Communicator newsletter for southern California broadcast engineers (and as a Marconi fan myself), I think the article should be called to the attention of a wider audience, and want to do my part in making that happen.

Bob Gonsette – Publisher
CGC Communicator

[Yes, in fact we are now in the process of posting selected Radio Guide articles on our websites. The Marconi article you mentioned may be found at the historical website: www.oldradio.com/archives/jurassic/marconi2.pdf ... Editor]

Dear Editor:

I enjoyed reading your article *The :60 Second Engineer* in the July 2003 edition of Radio Guide (page 12) and would like to share it with some co-workers.

The easiest way to do this for me would be by email – would you please send me an electronic copy of your article?

Ken Sleeman – Project Engineer
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Chip Morgan, president of CMBE Inc. stated, "We're pleased to be able to provide a low cost alternative for stations that want to document their signal performance. Using portable high speed data acquisition systems, stations can make quick measurement campaigns and analyze the data themselves, or use our mapping division at www.REALcoverage.com for more detailed studies."

"We're thrilled that CMBE is able to provide this service to broadcast stations and we're proud to support this project," said Christophe Poulain, vice-president, business development, Audemat-Aztec, Inc. "Our test equipment is used by many of the largest broadcasters worldwide, and we are glad that individual stations now have a source where they can try the equipment for a short period of time, or use it for a smaller project."

REALcoverage.com is renting the Audemat FM-MC4 for a week at a time and provides all the equipment and software needed to measure the coverage of FM stations. Other Audemat-Aztec products are available as well, for purchase or rental. Contact the firm for more information.

Phone: 802-758-5000 **Fax:** 802-758-7000
Email: sales@cmbe.com
Website: www.REALcoverage.com

Transmitter Parts

CCA Parts & Schematics

For over 30 years, CCA was an industry leader in the manufacturing of AM, FM, and Shortwave Transmitters. Because of their dependability and quality craftsmanship these transmitters are easy to operate and repair. Recently the company fell victim to a slow economy and was forced to file for Chapter 7 Bankruptcy.

Vernon Boyce, former Chief AM Test Engineer for CCA has formed CCA Electronics, Inc. to respond to the needs of the former customers of CCA.

CCA Electronics, Inc. has a mission to be the leading supplier of replacement parts for all CCA, CSI, and SI Transmitters.

Many parts are in stock now and ready for shipment. They also have all the schematics and manuals for the above transmitters.

Call Vernon 24/7 for a quote.

Contact: Vernon Boyce
Phone: 770-529-6777
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