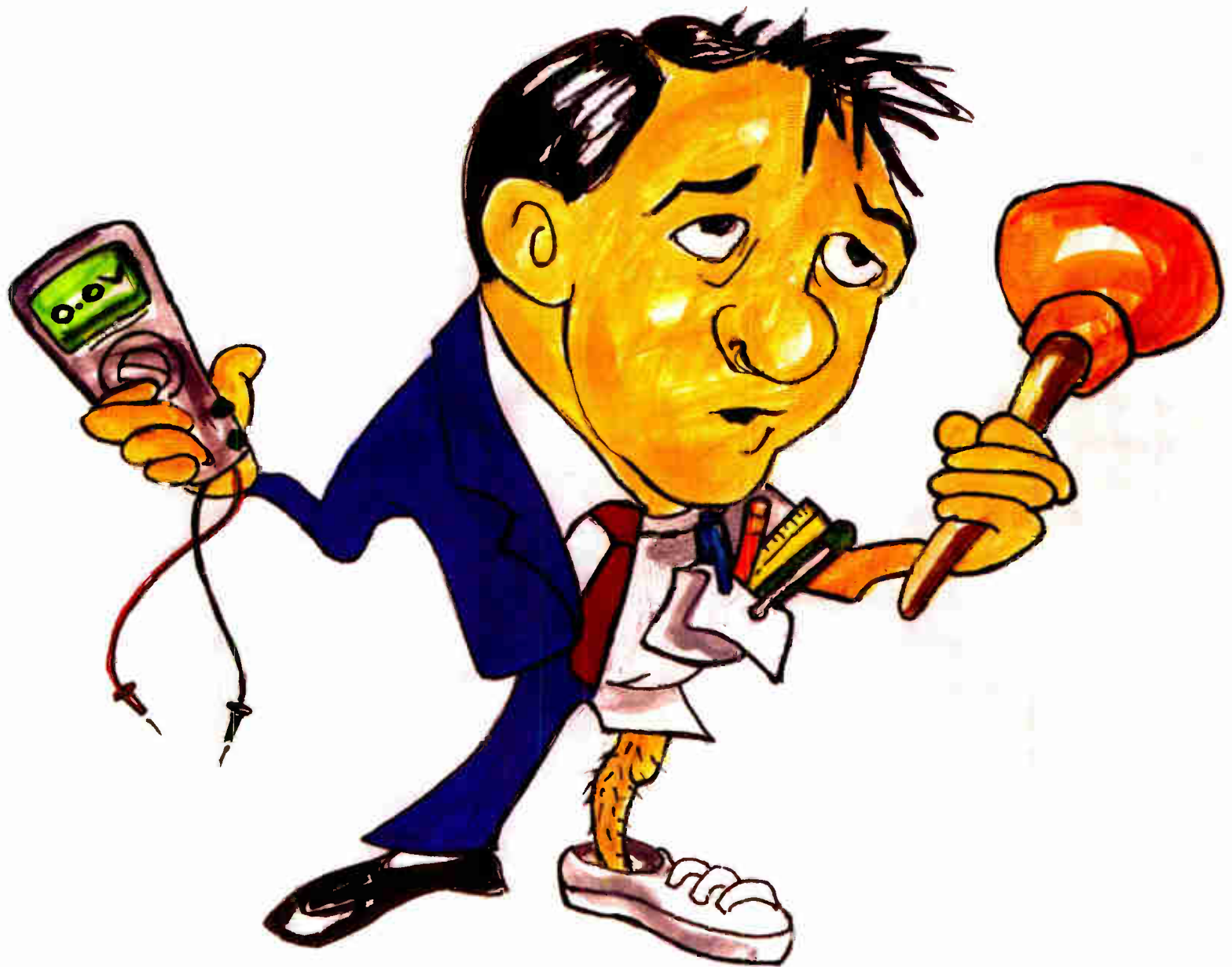


Radio Guide

Radio Technology for Engineers and Managers

September 2005

21st Century Engineering One Foot in Management - One Foot in the Trenches



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Radio Guide

When I first started in radio back in the 60s, it was easy to spot the Chief Engineer. He (it was always a guy) wore a white shirt, carried a slide rule, and spoke in a language that most of us programming people did not understand.

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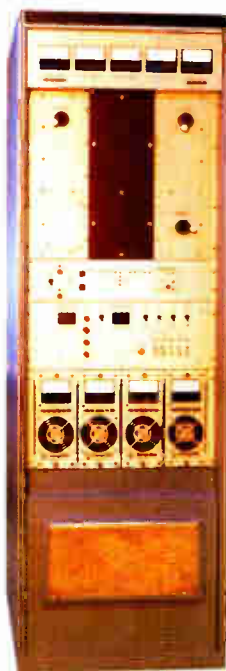
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Living With Emergencies

As this issue goes to press, Hurricane Katrina is bearing down on New Orleans and the Gulf Coast, already having dropped a bundle of water on Miami and southern Florida.

Most of us can only sit and watch, grateful the disaster predicted for the Gulf Coast is not going to affect us (oil prices notwithstanding). Others are being prepared by their companies to move in as soon as the weather passes and help "clean up" any damage.

Nevertheless, at some point we all are affected by weather or other factors. The August 2003 Northeast Black-out was a "call to arms" for many stations and, according to some reports, the broadcast industry installed more generators since then than in any other comparable period.

You need more than a silence sensor to keep your programs on-air. For some excellent points to use in developing a generator acquisition plan, be sure to read Scott Cason's series, starting on Page 8.

Over the next few weeks, manufacturers certainly will be busy helping stations get their facilities back to "normal." Most of them will ask that you be patient if they cannot solve your problem instantly. So, as an aid to speed things along, we offer you Jeff Welton's tips (Page 10) on how to get the best service from Tech Support folks.

Later on, after emergency conditions recede and things calm down, many stations will reflect on how their engineers performed service "above and beyond" to get back on the air.

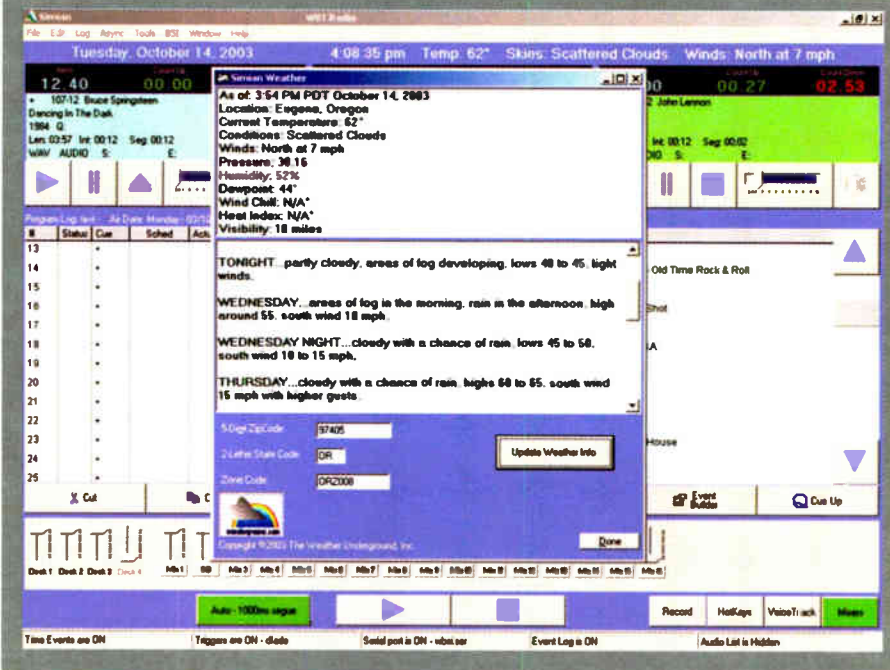
While some think such engineers are a dying breed, one thing is clear: the Broadcast industry still needs great engineers – folks who live radio. For a look at just who these folks are and why they do what they do, we invite you to turn the page and consider, with Donna Halper, just who are the modern Chief Engineers. – Radio Guide –

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

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The Chief Engineer Today:

"It's Not a Job, it's a Life-style"

by Donna L. Halper

The radio engineering profession has been in transition for some time. From combo announcers with "Six Week Wonder" licenses to the elimination of the First Phone to the consolidation of stations into large clusters, the Chief Engineer's life has changed a lot. We asked Donna Halper to look into how happy engineers are with their jobs—and themselves—today. The responses were, as anticipated, very interesting.

[QUINCY, Massachusetts] When I first started in radio back in the 60s, it was easy to spot the Chief Engineer. He (it was always a guy) wore a white shirt, carried a slide rule, and spoke in a language that most of us programming people did not understand.

THEN AND NOW

We rarely saw the Chief Engineer, since he worked late at night. But we knew how to contact him: the daily log had a page for "discrepancies," and if something was not working right, that is how we contacted him—and he would mysteriously appear to make things right.

Fast forward to the year 2005. It takes a far different skill set these days to be a Chief Engineer if the help-wanted ads are any indication.

I checked several radio magazines and found that station managers want more than technical expertise and prior experience. The Chief Engineer should be "a strong leader," "a take charge individual," someone with "excellent people skills."

MORE THAN A TECHNICIAN

The ideal candidate should be "willing to work nights, weekends and holidays," "on call 24 hours a day," and "able to handle a crisis." Oh, and by the way, he or she may be expected to take charge of more than one station—in the ads, some owners said the Chief Engineer would be responsible for between three and seven stations. (Sometimes inflated, once on the job.)



Slightly Schizoid? Sometimes it is hard to tell if the Chief Engineer is a manager or worker in the trenches.

At least these days no one expects the engineer to sing. Back in radio's early years, if a guest failed to show up, the engineer was expected to entertain the audience, and having musical talent was a definite plus for anyone who wanted to get hired.

Today, however, it is not about having musical talent. But at some stations, it also is not uncommon for the engineer to be treated like a janitor: called to change light bulbs in the lobby, mow the grass, even unclog the women's toilet. That is, after patching the loose shingles on the roof, fixing the broken lock on the back door and repairing the laser printer in the sales department—sometimes on three hours' sleep, after working all night at the transmitter. Maybe things were better when they just expected the engineer to sing!

HANDLING THE CHALLENGE

While preparing this article, I spoke with Chief Engineers and consulting engineers all over the United States. These are men and women who are dedicated to broadcast engineering, who have earned the respect of their colleagues. But even those who were generally pleased with their own job situation still had concerns about where the industry is headed, and they saw problems that remain unresolved.

Perhaps the most common problem mentioned by Chief Engineers relates to the effect of media consolidation. Even at the best companies, engineers are expected to do more and more with fewer resources, and often with little help.

Margaret Bryant, who is Director of Engineering for ABC Radio Networks in Dallas, explains, "While I have one of the best engineering jobs, I hear about some of the worst engineering 'situations' from our affiliates. I had one affiliate that was asking my opinion about the salary they were offering for an engineer. It was about \$45,000 in a small town. That's not horrible, I thought.



Margaret Bryant

"Then they told me how many stations the person would be responsible for, and then how many miles apart they were. I told them that to be responsible for several stations, each two or more hours apart from each other, they didn't need a higher salary, they needed *more than one engineer!*"

MORE WORK, LESS FUN

Jeff Glass, Chief Engineer of Northern Public Radio's WNIU and WNIJ in DeKalb IL, agrees. He too has a stable job and no complaints about the boss. And yet, he says, "Radio is not as fun now as it once was. For me, one reason is that all of the equipment that's my responsibility is scattered all around northern Illinois.

Glass continues: "It is not at all uncommon that I have to drive 140 miles round-trip to push a button. This situation frustrates my efforts to get projects done, because I can't be in two places at once. Back in 1980, this station was all on site: one station, one transmitter, everything in *one* place. Now 20 years later, we have two studio sites, four transmitter sites, one translator and one site where all of my STLs are located. I spend more of my time traveling than anything else."

As Glass and others noted, travel time is seldom considered by managers when they think about how many engineers are needed to keep a station or a cluster running smoothly.

A CHANGED ENVIRONMENT

To some degree, how engineers are treated has been affected by the highly competitive nature of media today. "Radio has changed," says former CE Tom Osenkowsky, who now works as a consulting engineer.



Tom Osenkowsky in a new studio he built for WVOF, Fairfield University in Connecticut.

"It's now an entertainment business with competition from two satellite providers, iPods, Internet-only radio, the Internet itself plus all forms of video. Advertising dollars are now divided among the aforementioned plus cable TV and print media," says Osenkowsky.

And that, says Dana Puopolo, can play a part in whether an engineer's work is valued or not. Puopolo is another former CE who became a consulting engineer. "The current crop of owners and managers see engineers as bad. [Engineers] bring them bad news, which always costs them [money.]"

In such a competitive media universe, the drive to save a few bucks often impacts the engineering department. Puopolo is certainly not the only one who has noticed it. Several engineers remarked they had been asked to defer what they felt was important maintenance, or they were told to spend less on it.

"There's much more of an obsession with the bottom line than there used to be," says Sid Schweiger. He became an engineer in 1978, and works for the Entercom cluster in Boston. "Too many owners treat engineering as an expense rather than a necessity—that's one of several reasons why there are fewer engineers."

NEW TECHNOLOGY'S EFFECT

In fact, frustration about owners who are "penny wise and dollar foolish" was a commonly expressed sentiment. And this is where the new technology has been a mixed blessing, as some owners seem to believe that new equipment should never break down.



Frank Foti is a former CE who is now president of Telos Systems/Omnia Audio. "Equipment in the 1980's was the first to be viewed as "trouble-free" (well sort of), and this [has] hurt engineering. Many radio stations figured that their transmitter would play on without the need of a full-time body to oversee it."

(Continued on Page 6)

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The Chief Engineer Today:

"It's Not a Job, it's a Life-style"

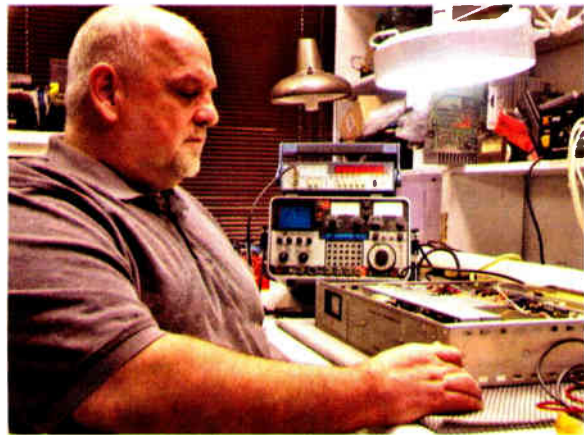
Continued from Page 4

Even today, some station owners fail to understand the importance of regular maintenance, and believe they can get by with only a part-time engineer.

Not all of the conversation about the new technology was negative. A number of engineers praised its ability to simplify their jobs and make the station run more smoothly.

Among them is Willie Barnett. He has spent 18 years at WFIF in New Haven, where he is both an announcer and Chief Engineer. "When I started, we had one satellite-fed program, fed live. Everything else was on cassette or reels. Music was on vinyl. Spots, promos, jingles were on carts. The transmitter was an all-tube beast. Now it's all solid state, not a tube in the place. No more carts, no more vinyl, and no more reels. All of the national programs are on the bird, digitally recorded overnight."

Most engineers praised the features of today's automation equipment, but a few still recalled the "good old days" fondly. Mike Holderfield is the CE of Styles Media Group, with stations in Alabama and Georgia. He remembers how when he was starting out, the passion level seemed to be higher and radio felt more like a family thing. Equipment wasn't as advanced or as reliable and required more attention, but there was still plenty of time to homebrew or modify or experiment."



Mike Holderfield, Chief Engineer for Styles Media Group

DEVELOPING NEW BLOOD

Today, there seems to be less experimenting, because modern equipment performs so many more functions than anyone thought possible 20 years ago. The specialized knowledge needed to work with today's automation makes Jeff Glass more reticent to hire inexperienced students as board ops.

"Nowadays, a young kid could take down the AudioVault by accidentally deleting one file," Glass said. "Carelessly connecting his/her laptop to the AudioVault network could cause a virus infection that would corrupt three AV systems here. ...It is much easier to really screw up the radio station's automation system and the final air product by making a mistake."

A related problem which worries the engineers is that not enough young people are entering the business the way did in years past. Partly that is because of low entry level salaries for engineers, compared to salaries in other technology-related fields. As Dana Puopolo says, "If I have to have big time people skills *and* computer skills *and* RF skills *and* audio skills, etc. then I'm qualified to make three times as much as I do in radio - doing something else!"

The engineers all agreed that somehow new people must be encouraged to come into the profession.

There there were few suggestions about how to keep them from getting frustrated and quitting.

R-E-S-P-E-C-T

In addition to the need for better pay, there was a consensus that engineers do not receive the respect they deserve. In some cases, this is because the sales and programming departments still are not entirely aware of what a good engineer can do for a station.

But in other cases, engineers contribute to their own image problem, says Gordon S. Carter, CE of WFMT in Chicago. "Too many engineers act like they don't respect themselves these days. They dress sloppily, talk and/or act like they are poorly educated, and charge too little. As a result, employers (those who write the checks) don't respect engineers in general, and the cycle continues. When engineers begin to act like they respect themselves, others will begin to respect us."

WHAT TODAY'S ENGINEERS LIKE MOST ABOUT THEIR JOB:

- Having the best sounding audio in the market
- Fixing equipment that was supposed to be impossible to fix
- Problem-solving; exchanging ideas with other engineers

WHAT THEY LIKE LEAST ABOUT THEIR JOB:

- Driving for hours to do maintenance at all the stations in the cluster.
- Being taken for granted by station management.
- Not being paid what they deserve.

Tom Bosscher is the Director of Engineering for Cornerstone University Radio in Grand Rapids MI. Bosscher agrees that a professional attitude is needed. He also talks about how engineers should set limits on their time.

"A very common "boss" mode is to push and push a person to see what they can get away with," Bosscher said. "Most engineers will keep working more and more hours, thinking they are a failure if they can't handle a seven station cluster in 60 hours. Hint: you can't. Do you think they have one salesperson for all those stations? Just stop when you hit your 40-50 hours. Most everyone will understand."

Bosscher suggests that engineers should not be afraid to be their own publicist. "Keep notes on what you have done, and write a report every month that goes to *all* department heads. Most have no idea what you are doing for them."

"YOU CAN'T BEAT THAT"

Despite the concerns the engineers expressed about their jobs, none of them said they would want to be anything else. Mike Holderfield states that "I still love it and have never regretted my choice of vocation."

Kent Winrich of Clear Channel's Milwaukee cluster tells how his stations reward innovation and creativity. Contrary to some of the negative press about Clear Channel, he says he is very well treated. "Risk takers are rewarded. And [Clear Channel] invests to ensure quality broadcasts."

Bill Croghan of Lotus Broadcasting in Las Vegas also praises his ownership. "I've never been happier ... I work for VP/GM Tony Bonnici, who is the best GM I've worked with in 40 years. I'm not the highest paid guy around, but I'm doing better than a lot. My skills and input are respected ... and rarely do I have a major expense turned down."



Bill Croghan, Lotus Broadcasting, Las Vegas

And Gary Blau, Director of Engineering for Jefferson/Pilot's Miami stations, loves the "constant challenge" of his work. "I'd say you have to have a really big passion for radio to sustain you through the 80% BS that you will face along the route to enjoying the 20% that really turns you on. But that's probably true of any gig."

However, broadcast engineering is not just any gig. As Gordon Carter says, "Would I chose any other job? Not on your life. Every day is different. Some are boring, some are exciting, but it's never the same twice. That's the fun of it. Besides, I get paid for doing what I like to do. You can't beat it."

THE REMAINING ISSUE

A common question surfaces in discussions: when these experienced engineers retire, will there be a new crop to keep the stations sounding good and running smoothly? And will they share Carter's enthusiasm for the profession? Perhaps organizations like SBE can train and nurture tomorrow's engineers, or perhaps they will come from colleges of engineering.

But wherever they come from, radio desperately needs more of them, since contrary to what some owners believe, good audio does not happen all by itself.

President of Donna Halper and Associates in Quincy, MA. Donna consults stations all over the country. Her email address is dlh@donnahalper.com

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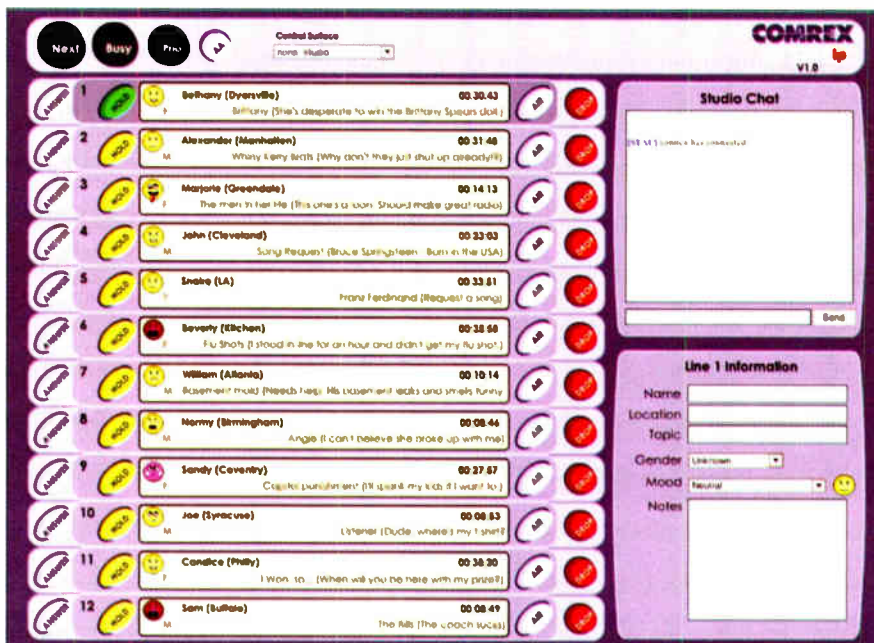
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World Radio History

Maintenance

Guide

by Scott Cason

Keeping the Power On

Part 1: Transmitter Site Generators

[LOUISVILLE, Kentucky] Any radio station owner who takes their service to the public and service to their advertisers seriously has a back-up generator.

While there may be a couple of stations out there that could run off solar cells, the reality is that without power, things get very quiet. And that is not good for broadcasting.



Definitely not desirable!

Most gensets are found at the towersites, since studios are normally located in an area where the power is somewhat reliable. If it is not, it will not take very long for an owner to consider getting a generator for the studio site as well.

Most industries cannot tolerate lost power for any length of time; broadcasting is among them. For most stations, especially in the large markets, being off the air due to a power outage simply is not an option.

QUICK LESSON

For those who need a lesson, all it usually takes is a ruined remote or two, costing a few thousand dollars a throw, before most owners are screaming for quotes on a generator. Another prompt is when construction starts in the area of either studio or transmitter and “backhoe fade” suddenly becomes a factor.

It is worthwhile to recall the blackout of large portions of the Northeast in the summer of 2003. Hundreds upon hundreds of radio stations – many who have slogans proclaiming how they are there “to serve the community” – were off the air – silent – because they either did not have a generator or their generator failed due to lack of maintenance.

Fortunately for many stations, there has been a real push in recent years (especially among the major corporations) to install generators at the transmitter sites. The aftermath of last year’s hurricane season in Florida convinced many GMs that it finally was time to bite the budget bullet and get a generator in place.

MORE THAN A LUMP OF METAL

Up until about ten years ago, I never had the joy of ordering a generator. The stations under my care either had a generator or they did not care about it. When I did get the opportunity to buy one – let me tell you, it was a learning experience.

The transmitter site for the station was at the end of a circuit which passed through an industrial park. Anytime there was a problem, from a squirrel getting across a transformer to a vehicle taking out a pole, this station was off the air. And the summertime sags were something to behold.

What finally convinced the owner to purchase a generator was going off the air one Friday night during a high school football game. High school football is big in the south, and the game was sold out. Running make goods and refunding money caused him to “see the light,” which led to him phoning me and asking about installing back-up power at his transmitter.

NOT TOO SMALL, NOT TOO BIG

Making sure you get the right genset that can be counted on to pull the transmitter when the power goes out is no easy task, nor should it be taken lightly. Get a generator that is too small, and you will waste your money on equipment that will never work, nor will it ever be made to work unless you are willing to accept reduced TPO while you are on generator power.



A modest-sized generator for broadcast use.

On the other hand, if you get a generator that is too large, you will be throwing money away on excess capacity and possibly see reduced generator life since they do not like to be run with a lot of headroom. They have a load rating for a reason.

Another reason to pick the right size generator: since you cannot simply go to the local Home Depot and pick up one of these puppies off the shelf, a generator is a long term investment that, when done properly, will give you years of worry free service.

DOING THE HOMEWORK

There are so many types of gensets to choose from that it is a good idea to do some research to know which is the best for your situation.

Is it going to be inside a building or do you need a weather proof enclosure? Gas? Propane? LP? Diesel? There are the three big makers of gensets, Cummins, Generac and Kohler. Some are better suited for the loads found at transmitter sites, others are better suited for loads found at studios.

If you ask four engineers what is their favorite generator, you will get five different answers. But it still helps to ask around. A good way to find out about the reliability, ease of maintenance, and local support for different models is by asking around at the next SBE meeting.

After you have done the initial risk assessment (what it takes to ensure no power outages, period), then figured the degree of standby power protection required (minimal backup, substantial power for short outages or total standby for extended periods), you then have to figure out what kind of load you will be expecting the generator to pull.

ANALYZING THE LOAD

At an FM transmitter site, it is relatively easy to figure loads because the load is quite constant. Your TPO is 17 kW and it stays 17 kW day or night or no matter how loud the PD likes the sound.

At AM sites, the load can change dramatically if the AM has nighttime power changes, for example. With TV, the load changes slightly for tube transmitters based on average picture luminance and the effect it has on visual plate current.

The main transmitter is often (though not always) the biggest load. Then you add any and all terminal equipment: things like processors, STL receivers/transmitters, RPU receivers, remote controls, burglar alarms and both tower lightning and work lighting.

Do not forget those tower lights! You certainly do not want to be a sitting duck during a power failure with a dark tower. A small tower with one flashing beacon is not much. A taller tower with multiple flashing beacons – especially when they are all flashing at once – is a major load factor to consider. Sometimes the beacons even can end up consuming more than the transmitter power.

The next time you get a chance, place a clamp-on ammeter on your beacon lead. You might be surprised how big the swing is while the beacons are flashing. If you have multiple beacon levels on your tower, multiply that by the number of beacons. Seeing a load rise and fall like that will send some generators into fits trying to keep up.

KEEPING YOUR COOL

You might also want to take into account any ventilation needs. Although you might be able to get by during a short power outage during the summertime without your air conditioning (as long as you have some type of fresh air back up system), I have seen “springtime” thunderstorms leave the power out for several days.

Also, do you want to be working during the wintertime with no heating? If your transmitter is big enough, and you have the exhaust ductwork fitted to blow hot air in the shack, you might be able to get by without adding the heating unit to the load. But if yours is a solid state class A FM with low heat output, or if your bigger transmitter has the exhaust ducted outside, you might want to add heating units to the overall load for the generator.



WKBI's large 800 kW Generator. Note the cinderblock needed to reach the door.

The next thing to consider is your back-up transmitter. Under normal conditions, you would not be running your main and backup at the same time. That is, unless your main took a hit during the storm and you are working on it into the dummy load. I always like to err on the side of caution.

If you are considering IBOC for the future of your station, you will want to factor in the load for a digital transmitter when working up an order for a new genset. It will not be of much help if you find out the genset you ordered six years ago cannot pull the new 5 kW IBOC transmitter.

ADDITIONAL POTENTIAL LOADS

Other things to consider at the transmitter site include tenants, both present and future. Back-up power makes your tower very attractive to others who are looking for tower space to rent.

It also means you can charge a few bucks more per month to locate their antennas on your tower and their equipment in your building. If you get a chance, look at the base of a tower that has cell antennas on it. Nearly all the major cell phone operators have back-up power for their cell sites.

For current tenants, you can give them an option. Get on a back-up power circuit for a few more bucks per month or stay off back-up power with the rent staying as it is. If they agree, make sure it is added to the lease agreement you have with them *before* the changeover. This protects you from lessees who may try to put a little shuck and jive on you come rent time. If you have it in writing, with their signature on it, they cannot deny it.

As you add up the total load requirements, double-check to make sure you have not left anything out. In our next installment, we will look at the different load requirements for a studio site, and determine what to order.

Scott Cason has over 25 years of experience in radio and TV. He is currently President of LaGrange Communications, a contract engineering firm, in Louisville, KY. Contact Scott at: scott@lagrange-com.com

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by Jeff Welton,
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Please listen in with me as I take one of those calls that come in all too often:

HELLO? HELLO?

Friendly Customer Service Rep (FCSR): "Good Afternoon, Customer Service, this is Jeff."

Disembodied Voice (DV): "Hello *szzzttttt* is Joe from *crackle* *pop.* I've got a problem with *ssssssss*"

FCSR: "Could you repeat that, sir? I'm having trouble hearing you."

DV: "*crackle* *snap* from the WOOPs stations. I've got a *sssssszzzztttt* kilowatt transmitter that won't turn on."

MORE CLARITY?

At this point, let me turn on the magical "garbled cell phone translator" for your convenience.

FCSR: "OK, Joe, what does the problem seem to be?"

DV: "I don't know, I'm at the studio just getting ready to head to the site and wondered if you had any ideas."

FCSR: "Well, the first thing that comes to mind would be to make sure you jot down the alarms when you get to the site, then call back before you touch any buttons, so we can try to reconstruct the chain of events. What did you say the call sign was?"

DV: "Well, this week, it's WOOPs AM, but that was just changed last week and the call sign before that was only with us for a month - we had an ownership change, you see. I think the original call sign may have been WHY, but I don't know for sure; I've only been here three days."

FCSR: "OK, when you get to the site, take a look at the back of the transmitter and note the serial number so you've got it when you call us with the list of alarms. That way we can figure out exactly which transmitter we're looking at."

The above is a fairly accurate recollection of a call I took last week - as well as one the week before that and the week before that, etc. Sometimes the caller gets upset, feeling he did not get our full customer service effort in his case. But, with just a slight change in the way things are handled, we can have a better conversation.

SUPPORT DOS AND DON'TS

Here are some suggestions to ensure that all the "Joes" out there get the best support we can provide.

- **DO** remember that cell phone audio is not always clear at the other end. While you may be in a difficult location (due to either low signal or excessive RF), take a moment to find the best available calling location.

- **DON'T** forget that noisy environments can cause the AGC in the phone to do funny things. If we ask you to repeat

something, it is usually because ducking or distortion has made your words difficult to understand.

- **DO** tell us what is wrong with the unit, including any symptoms that were exhibited prior to the problem, at least to the best of your knowledge. "Doesn't work" does not help us.

- **DON'T** assume we know your current Call Sign. Stations change call letters these days faster than my four-year-old changes girlfriends. Give us the serial number of the transmitter, as well as good contact information (your preferred email address or phone number).

We do record all contacts pertaining to our equipment or our customers, to help us track any potential "problem children;" it sure speeds up entry of the data if we know where to enter it. Do give us your current call - even if it has recently changed - we will update our system. But the best is always the transmitter serial number.

WE DO UNDERSTAND YOUR PAIN


* Please **DO** realize that for every problem out there someone will hear, "Gee, never heard of that problem before."

Give us a little leeway if you can. We realize that if you are off-air the GM is calling every three minutes to find out when the problem will be resolved and the PD is calling in-between the GM's calls.

All of the guys who provide phone and email tech support in our office do or have done field work - we do know what it is like out there - and will do our level best to help you. Please be patient while we ask our questions - some of them are to gather more information, some are just to solidify details as we start to formulate a plan of attack.

Remember: by the time you call us, you have known about the problem for awhile. On the other hand, we only have known about it for a couple of *seconds*.

(Continued on Page 12)



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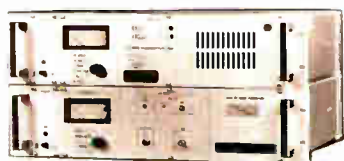


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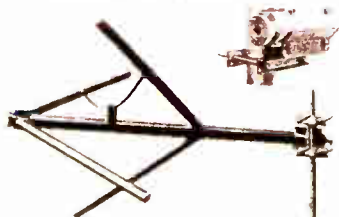
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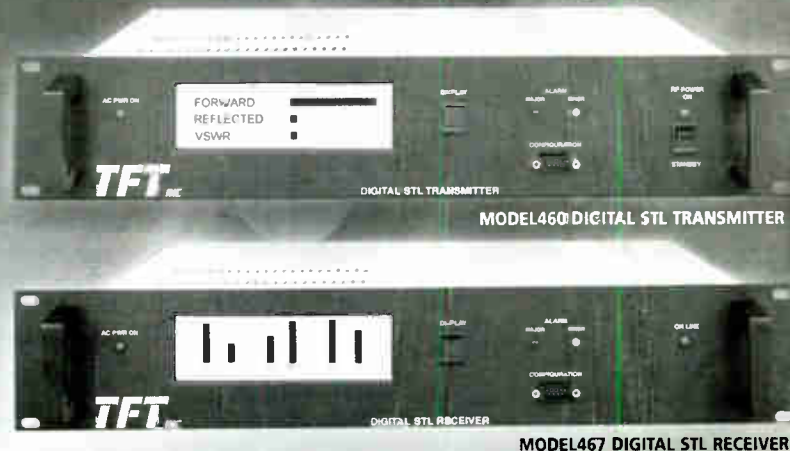
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Continued From Page 10

Even on a familiar sounding situation, we are going to want to be sure we are applying the correct solution.

- **DO** be aware that one of the reasons we ask so many questions at the onset of the call is psychological. You are off-air and it is a high pressure situation. Part of our job is to calm things down a bit so we do not go rushing around and connect you across the wrong points; remember, we cannot see the transmitter – you are our eyes and hands. We have not fried a customer yet (to the best of my knowledge) and we would just as soon not start with you.

PREPARE TO HELP US HELP YOU

- **DO** have at least some basic test equipment available. As a minimum, almost every support call will require use of a multimeter. If you have a problem that is not purely power supply related, the odds are good that we will ask for at least one measurement that would cut down on support time – if we only had an oscilloscope available.

- **DON'T** assume that since we were in the office when you called from the studio we will still be in the office once you have arrived at the site two hours later.

We do provide 24/7 tech support, but the support schedule is done on a rotating basis and the person you spoke to at 15:45 to alert about the problem may not be the one that answers the phone at 18:30.

Normally, we all will do our best to let the next support guy know of any impending calls, but this does not always happen – so please be patient with the support guy if he repeats questions you already answered for someone else. In many cases he may be trying to confirm something that seems out of the ordinary is really the problem and not just a case of erroneous communication.

- On the topic of 24/7 tech support, please **DO** realize that we are usually not in the office after hours. In addition, many of us have wives and families, just like you. We do not like 2:00 AM calls to order fuses because your spares are getting low any more than you like 2:00 AM calls because the on-air light in the standby production room is not working.

That said, if you have any transmitter problems whatsoever, please *do not* hesitate to pick up the phone and call us *at any time*. It is usually more productive to get us going on a solution right away than to wait until you have tried to resolve it for six hours without bothering us, and are tired, frustrated and half an hour short of morning drive.

SHIPPING TIPS

- **DO** give us a return address if you end up returning something for repair. We frequently have received modules by mail with no information inside the package and no return address on the package. We will hold on to them for

awhile (I think the record is about seven years), but not telling us where to ship it waives your right to tell us it did not get back to you fast enough!

- Also on the topic of returns, **DON'T** assume that sending it back with all of the wires disconnected and all of the hardware in a plastic bag taped to the side of the box will make the repair faster by reducing disassembly time.

While a couple of wires being disconnected will not slow us down much, it is nice if you mention them in the note. Yes, that would be the note that tells us what is wrong – you know, the one you are going to include *next* time!

- **DO** call ahead of time to let us know if a module is coming back. This allows us time to bake it a cake and arrange the “welcome home” party.

Seriously, we have implemented an RMA system to help us to track repairs and having an RMA on the package will help to shorten the time the

module spends with us. Additionally, in the event there is any urgency to the repair, we can frequently pre-arrange tech time if we know something is on its way, getting it back to you that much faster.

WORKING TOGETHER SPEEDS THE PROCESS

By taking the two or three minutes to observe the above suggestions, you will definitely speed up the processing time for repairs, and will usually end up in faster problem resolution on your tech support calls. Also, you may even reduce the chances of us telling stories about you in the lunch room.

Jeff Welton, senior Customer Support Technician at Nautel, Ltd., is always ready to help customers. Although he speaks with a Canadian accent, he is easy to understand. You can email Jeff at jwelton@nautel.com – or call him anytime ... unless it is about fuses.

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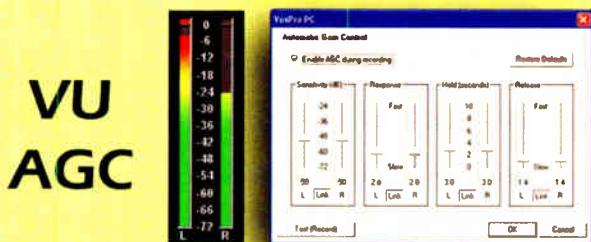
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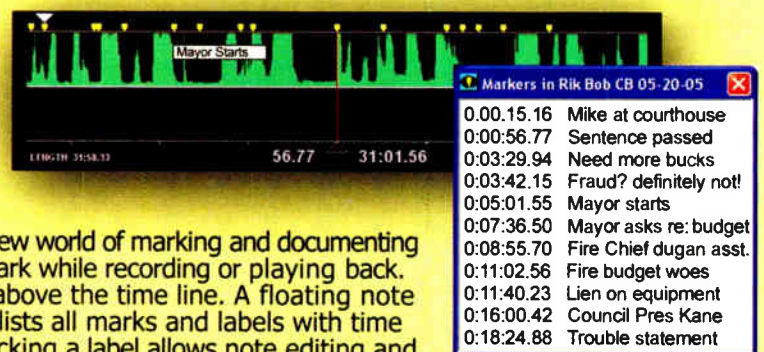
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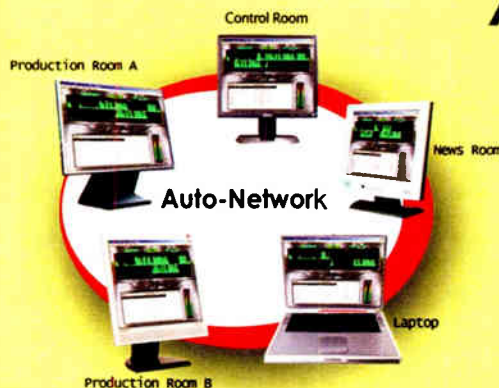
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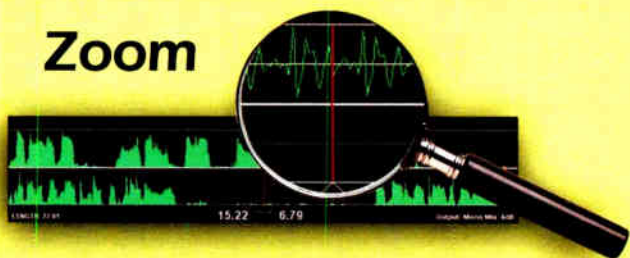
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How Vector Analysis Works

[SARASOTA, Florida] **Question:** Is it possible to use vector analysis for adjusting the far-field radiation characteristics of a directional antenna even when factors beyond the theoretical parameters of the array – such as nearby reradiating structures and/or radial propagation anomalies – are modifying the shape of the pattern after the radiation leaves the site?

Answer: Directional antenna patterns must be adjusted to produce their required measured radiation values along the radials on which proof-of-performance field strength measurements are made, as defined by the shape of the FCC-authorized standard pattern.

While directional antenna patterns are calculated using vector addition of individual tower fields to determine the vector resultants in various directions, such analysis fails to take into account any of several factors that can cause measured radial field values to depart from their theoretical values.

EXTERNAL FACTORS

These factors include reradiation from sources outside the array, propagation anomalies that modify the fields measured at ground level so that they are not representative of the radiation that is actually leaving the transmitter site, and differences between antenna monitor parameters and the actual fields produced by the array elements due to “real-world” influences.

It is not uncommon to find vectors being used for reference during directional antenna adjustment efforts. Instructions for graphing vectors that represent theoretical directional antenna parameters taking into account the phase differences that occur along radials due to array geometry have appeared in several publications over the years.

However, while these vectors would be all you need in a perfect world – where the measurements along each radial are representative of the theoretical pattern for the parameters to which the array is adjusted – they are of limited analytical value when other factors are involved. Most of the time, other factors are involved.

THE OLD WAY

Using traditional methods, measured radial field values are viewed as scalar (one-dimensional) quantities because field strength meters do not give phase indications like antenna monitors do.

This means that attempts at adjustment of pattern shape using traditional methods must be undertaken somewhat “in the dark.” Only far-field radial radiation magnitudes can be calculated using common field strength measurement analysis methods, while they are actually vector quantities having both magnitudes and angles just like the individual tower fields that sum to produce them.

This can lead to an inordinate amount of random effort to try to experimentally find “what works” when adjusting directional antennas. There is a better way to get the job done.

VECTOR ANALYSIS

A method of viewing the measured radiation in each radial direction as a vector quantity – with a derived phase angle to go along with the observed magnitude – has been developed for adjusting directional antenna patterns. It makes possible a more scientific, less random approach than has traditionally been used. Its advantages are particularly important when adjusting complicated patterns having multiple nulls with deep suppression.

Viewing the measured radial radiation values – or even, when necessary because of severe “scatter,” the radiation values indicated by individual radial points – as vector quantities derived using “complex-plane mapping” techniques makes it possible to approach the questions of what parameters are required to produce a desired pattern shape and what points are valid for use in its proof-of-performance with mathematical sophistication of the same level as is employed for theoretical pattern design.

Computer modeling can be used to predict the measured field values to be expected with antenna monitor parameter changes, avoiding time-wasting random adjustment efforts. Situations where scatter – due to nearby structures or terrain features – is a significant factor, can be readily analyzed to determine if the directional antenna pattern can be “tuned around” the scatter or if further corrective measures are required.

THE UNDERLYING CONCEPT

To introduce the concept of “complex-plane mapping,” we might use a scenario stated in non-RF terms. This will promote a more tangible understanding.

Assume that you are lost in the woods because the screen on your GPS receiver that shows the bearing to/from the reference point you are trying to reach has stopped working. The screen showing the distance still works, but all it tells you is how far you are away and you have no idea as to the direction toward the reference point. In other words, it gives you the radius of the circle, centered on the reference point, on which you are located.

Fortunately, all is not lost. You have other tools – a long tape measure, an accurate compass, a pencil, a straight edge and some polar graph paper – so you can find the direction to the reference point after a little experimentation. Here is how:

1. Start by observing that the GPS receiver says you are 1,000 meters from the reference point.

2. Choose an appropriate scale for your polar coordinate graph paper and pencil in a circle with a radius representing 1,000 meters. You know that you are somewhere on that circle – with the reference point at its center. Since you have a known distance, you call your starting point “Trial A.” Label the circle with an “A.”

3. Use your compass and tape measure to walk 500 meters in a known direction – say due east, at 90 degrees. At this point, make no attempt to guess the direction to the reference point, because you have no information to help you even make an educated guess. You need to patiently do some experiments that will let you figure it out later.

4. Observe your distance from the reference point on the GPS receiver. It is 866 meters. You may call this first experiment “Trial B.”

If the distance had been 500 meters (or 1,000 meters minus 500 meters), the answer would have been easy – you would have gone in exactly the right direction right off the bat. Likewise, you would only have to turn around and walk in the opposite direction if the distance had been 1,500 meters, or 1,000 meters plus 500 meters – because you would have walked exactly 180 degrees from the direction of the reference point.

In general, though, some more work will be required before you can know the direction.

5. At this time, take your piece of polar graph paper and pencil in another circle representing 866 meters and label it “B.”

TWO POSSIBILITIES

6. You will find there are two possible starting points on the A circle where going 500 meters in the 90-degree direction would land you on the B circle.

To assist in doing this, draw a vector to represent the distance and direction that you walked for Trial B and, since it represents the difference between the Trial A and Trial B distances, you call it the B minus A difference vector (Figure 1).

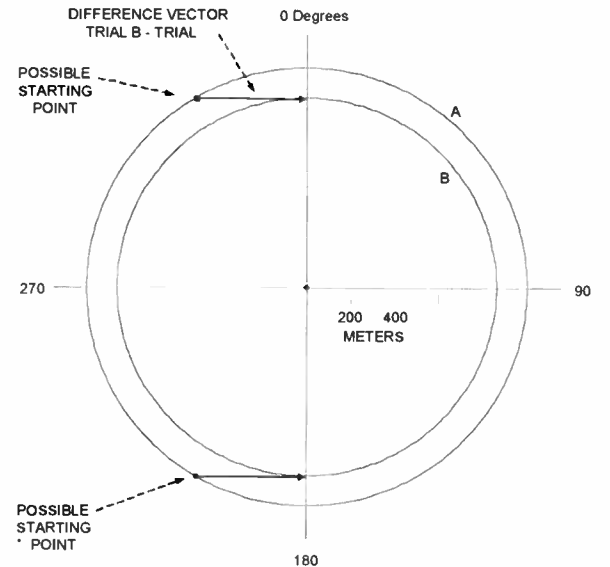


Figure 1: After the first test walk.

7. Now walk back to the point where you started – before you walked 500 meters in the direction of 90 degrees for the first experiment. Then choose another direction for the second experiment. For reasons that will become apparent later, it is best to go in a direction close to perpendicular to the direction you went for “Trial B” this time; a good choice then is to walk in the 180 degree direction for “Trial C.”

8. Using your compass and tape measure, walk 500 meters in the 180 degree direction.

A SECOND TEST WALK

9. According to the GPS receiver screen, you are now 620 meters from the reference point. You call this second experiment “Trial C.”

10. You may now pencil in a third circle with a radius representing 620 meters and label it “C.”

11. Draw the C minus A difference vector and use it to determine which of the two possible starting points that were identified in the Trial B analysis was the actual position of your starting point.

12. As you can see from Figure 2, you now simply look to see which one of the two possible points, with the difference vector added to it, lands you on the C circle.

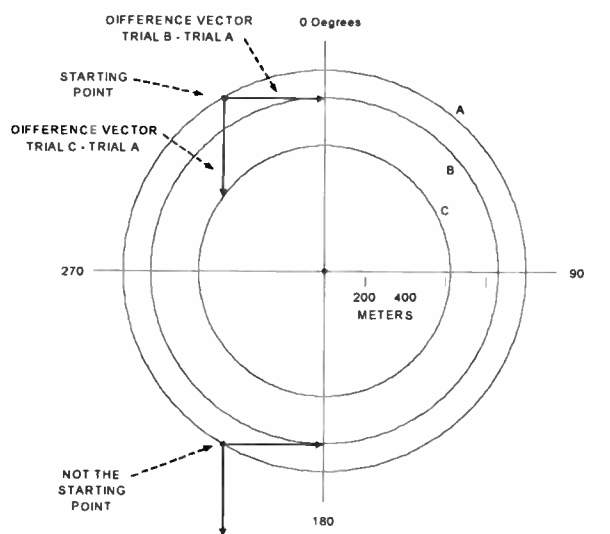


Figure 2: After two test walks, only one result works.

It is now an easy process to read the bearing off the polar coordinate graph paper, return to the starting “Trial A” point, and walk 1000 meters in the direction of the inverse of the vector pointing to the derived “Trial A” starting point (the Trial A vector with 180 degrees added to, or subtracted from, its angle), arriving at the reference point.

(Continued on Page 16)

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Continued From Page 14

USING IT WITH A DA

Now let us apply the method to analyzing the radiation from a Directional Antenna. The logic leading to the solution is essentially the same.

1. The meters of distance in the example correspond to mV/m un-attenuated field.

2. The reference point in the example corresponds to the zero-field or absolute null condition for the DA.

3. The difference vectors for a DA are calculated from experimental changes in antenna field parameters that are made for trial adjustments.

4. For a DA, you have a different polar graph for each radial and, except for symmetrical radials on in-line arrays, the difference vectors for given sets of parameters will change from radial to radial.

In an upcoming second part to this article we will take a look at some real world examples and see how the vector analysis method works in solving DA adjustment problems.

USEFUL FOR MANY ARRAYS

Complex-plane mapping can be used at different levels. As long as the measured radial field strengths remain coherent – with the points along each radial moving more or less in unison as the parameters are adjusted – vectors can be derived to represent the radial fields by graphing the measured field values corresponding to trial parameters, determined by whole-radial analysis, for each measurement radial.

The whole-radial approach is useful for adjusting systems having differences between their antenna monitor parameters and the actual fields produced by the array elements and those having reradiation sources located nearby. With reradiation, complex-plane mapping can be used to determine whether or not the nulls can be adjusted sufficiently low – by changing the tower ratios and phases – without detuning the nearby source(s) of scatter.

When scatter is of a general nature in the area surrounding a transmitter site, causing incoherent behavior (some points on a null radial going up and others going down) with each parameter adjustment, complex-plane mapping may be used to analyze the behavior of individual measurement points to determine which ones best represent the radial and what parameter adjustments will be necessary to bring them down.

In extreme cases, the “talk-down” approach may be used to find parameters that reduce individual points on a null radial to near-zero field and their “apparent resultants” – what the radial field would be if all of the points behaved like the one being observed – can be calculated by adding 180 degrees to the angle of the difference vector corresponding to the parameter change which nulled the field at the point.

A VALUABLE TOOL

Complex-plane mapping is an extremely useful tool for directional antenna pattern adjustment. It is effective for find-

ing correct adjustment parameters where they can be found and, where they cannot, for knowing that without undue experimental effort as well.

Vector analysis methods employing complex-plane mapping techniques have been in use for many years by consulting engineers who specialize in adjusting highly critical directional antenna systems in difficult environments, but remain virtually unknown outside of that small and mysterious group.

Hopefully, the non-RF based explanation will promote a wider understanding of the principles that are involved for everyone who might benefit from the use of these complex-plane mapping techniques.

Ron Rackley finds directional antennas fascinating, and is happy to share his thoughts. Ron welcomes your suggestions for future topics; please send them to editor@radio-guide.com. However, due to his existing commitments and travel schedule, he regrets personal replies are not always possible.

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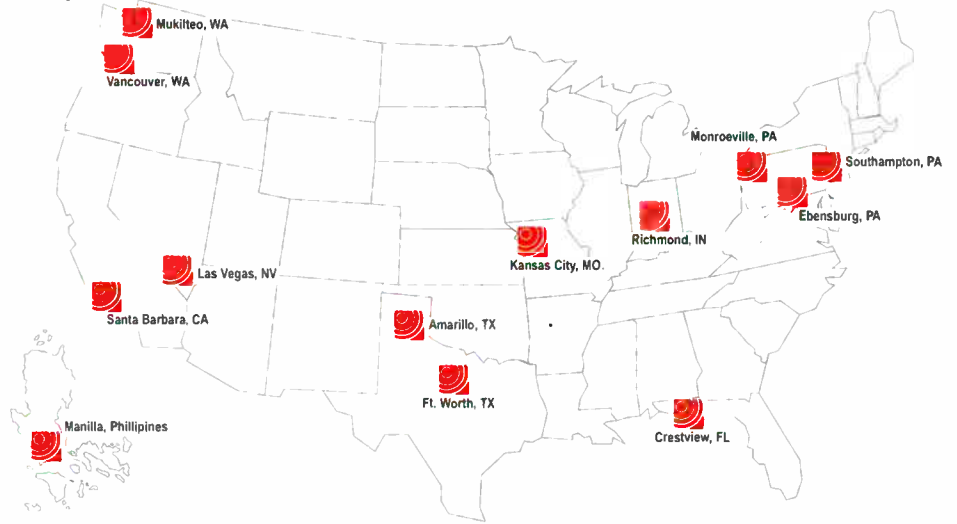
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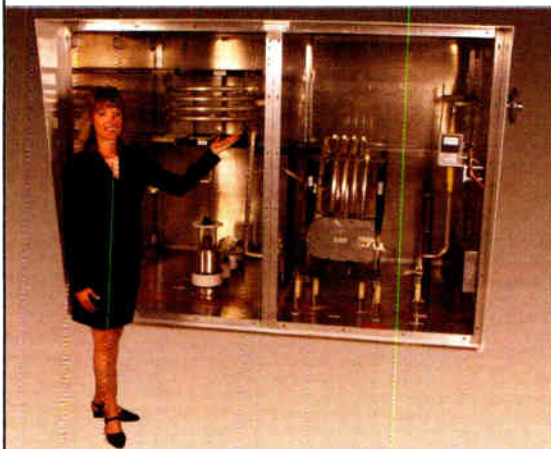
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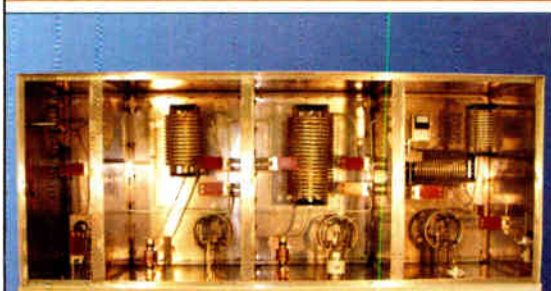
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Remote Guide

by Fred R. Morton, CSRE

Any Given Sunday

An Insider's Look at the NFL's GDC Program

[HOUSTON, Texas] It is late summer. Days are warm, vacations are in progress, and fans are turning their thoughts towards ... football!

Yes, it is that time again: back to school and the NFL's pre-season football is ready to kick in with 32 teams around the country starting to get their players in shape and reviewing new game plans.

ANOTHER TEAM SUITS UP

Besides the media, fans and teams, there is another group at every NFL game that is equally excited about getting back into the fray. But instead of being armed with footballs or play books, they have frequency counters, two-way radios and the most up to date event specific frequency coordination software available today.

Although they work behind the scenes, at times they can be found surveying the sidelines to assist or certify coordination efforts. They are responsible for making sure that the large number of RF devices – any device that generates an RF signal other than cellphones, pagers or Family Radio Service Walkie Talkies – can operate as interference-free as possible at every NFL game.



On site and in the air.

This means coordinating a large number of users, in spite of the fact that with the loss of the 700 MHz band, as well as migration in the UHF-TV band out of the higher UHF channels (TV 54-69), the spectrum just gets more and more crowded.

MANY BALLS TO JUGGLE

It is this environment in which the Game Day Coordinator (GDC) works, educating and coordinating all users that bring RF devices to each NFL event.

The GDCs are managed by the founder of the program, Jay Gerber, Manager of the NFL Frequency Organization Group, with help from others, including Technical Advisor to the NFL, Karl Voss (KPNX-TV), GDC IT Liaison to the NFL, Dan Collins, and SBE's Frequency Coordination Committee Chairman, Ralph Beaver.

Radio and television broadcasters who broadcast the game locally are major users of RF devices. Yet their usage may be relatively small (perhaps some parabolas on the field and sideline microphones) as compared to that of a major television network that operates with up to a hundred RF frequencies.

Another extensive and primary user is the game operation itself. A few examples would be the referee's microphone, the wireless communications from the sidelines to the sideline coaches as well as those in the press box, and the all important coach to quarterback system – a system which allows the coach to talk directly to the quarterback and enhances the strategy of a team's play as well as helps speed up the game.



Checking the frequency of a wireless microphone.

All of this needs coordination to prevent massive conflicts and "jamming." The GDC team is tasked with smoothing out the problems by communication and cooperation.

PRE-GAME PREPARATION

A typical week starts with the GDC receiving email requests for both specific and general frequency ranges needed by those organizations having NFL licensing agreements or news-related functions to cover the game.

The RF user tells the GDC how many wireless microphone channels it needs to cover the game and what types of equipment it will be bringing. Included should also be the names and contact numbers of the crew coming to the game. The GDC also gathers any other information they might consider necessary to take care of the customer's request.

In effect, the GDC coordinates not only the FCC Part 74 (Broadcast Auxiliary Frequencies) but also acts as a clearinghouse for FCC Part 15 (license-free devices) and Part 90 (Private Land Mobile) frequencies at the event location. Usually, these requests are handled on a first-come, first-served basis wherever possible.

The GDC continues coordinating frequencies as the requests come in, giving special consideration to game day operations (coach to quarterback, referee's microphone, PA wireless units, etc) with the objective of keeping other users away from them (and each other).

JUST A FEW USERS TO COORDINATE

Generally, a GDC may deal with between 300 to 350 separate wireless channels at a given game. By comparison, at a typical Super Bowl, the number of wireless frequencies can exceed 1,200 – in use by more than 5,000 wireless devices.

At a regular season game, the GDC crew usually consists of the primary GDC, and a back up coordinator as compared to the last Super Bowl where there

was a staff of 29 comprised of both engineers and a few runners.

Regular coordination ideally is completed 24 to 48 hours prior to game day. Typically, the GDC will arrive at the stadium two to three hours prior to kickoff, and leaves thirty minutes to an hour after the conclusion of the game.

WHY A GDC?

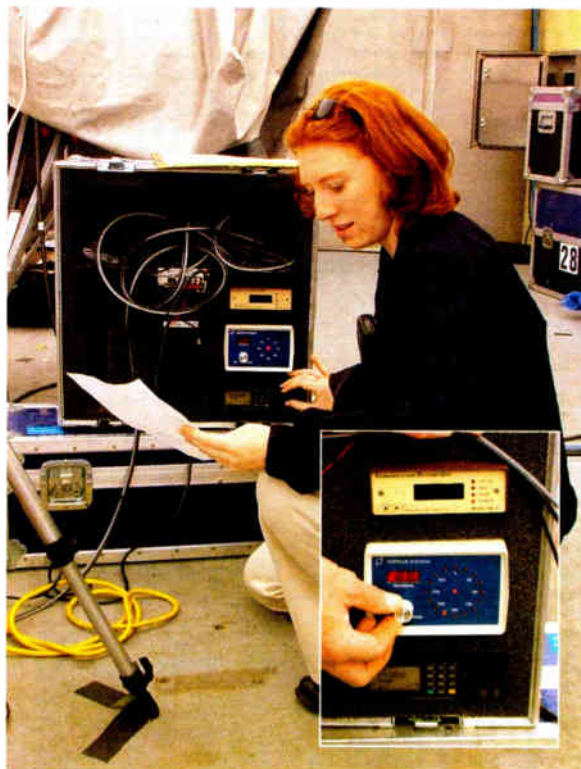
One common misconception is that the GDC is part of an FCC licensing enforcement group often referred to as the "frequency police." This is very far from the truth.

To the contrary, the GDC program was designed as a cooperative effort between users to allow everyone to coexist. The program's intent was not designed as a search and destroy mission whether an uncoordinated or unlicensed user is or is not creating RF interference. Rather, it was designed to help everyone "do their job" by allowing RF users to coordinate and work together in an interference free environment.

Although it is an NFL league policy and mandated that users coordinate with the GDC prior to arriving at the stadium on game day, it is also possible (but not acceptable) to do on-site coordination for those who, for whatever reason, failed to make the coordination request ahead of time. This on-site coordination is noted in a special database and tracked for repeated violations, which will be dealt with severely by the NFL.

MEETING THE DEMAND FOR FREQUENCIES

The GDC has numerous pieces of equipment to help with the coordination process, including a laptop computer with proprietary frequency coordination software, a frequency scanner, a frequency counter, a two-way radio tuned to the national GDC frequency (available to anyone that needs to contact the GDC) and a custom-built directional antenna with a switchable RF attenuator.



Casey Knoettgen programming the directional finding gear.

As more DTV stations go on the air in each market, the spectrum available to place wireless users shrinks. The GDC is responsible for checking his/her market to make sure that any changes in the RF environment have been noted in the coordination software.

This usually involves making sure that all DTV operations are taken into consideration; any new LPTV operations have been found and noted (and

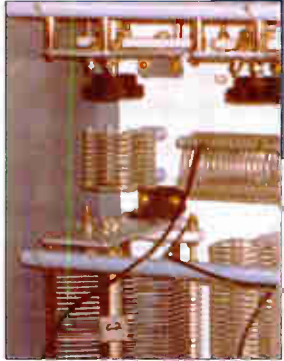
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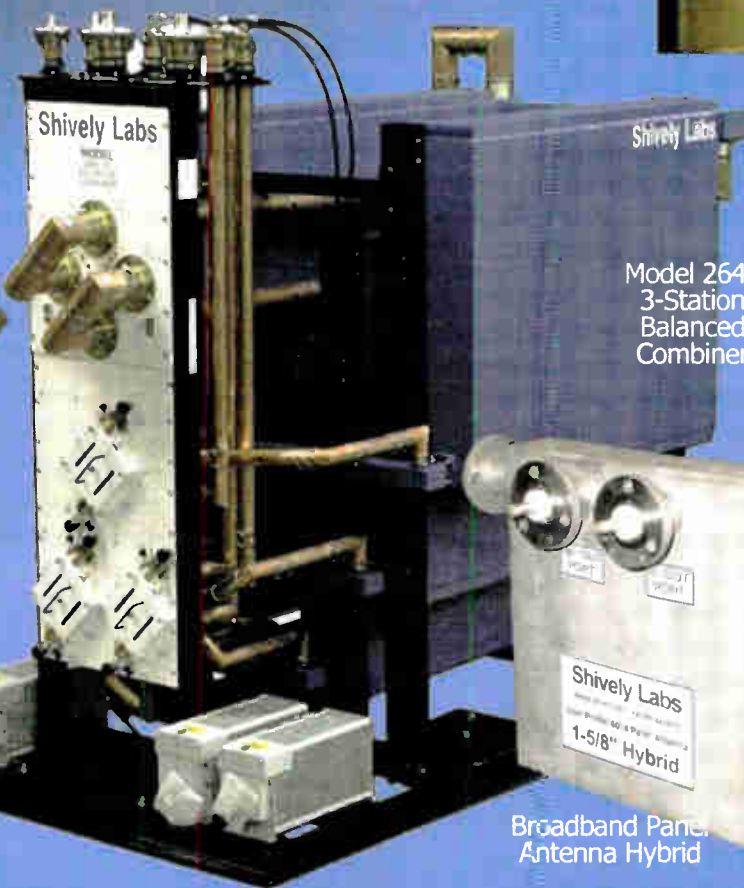
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Remote Guide

by Fred R. Morton, CSRE

Continued From Page 18

their impact on wireless usage at the stadium are checked) as well as any other RF changes in the stadium and surrounding area.



Casey Knoettgen and Ralph Beaver discuss the coordination program.

After all coordinations are completed, users have been identified and potential conflicts resolved, the GDC relaxes – for a few seconds anyway – and waits for the start of the game.

Ever vigilant, the GDC stands by telephone and radio should his/her services be needed. Besides the game, interestingly, half-time shows can be either complex or simple, depending on the usage of RF involved in the presentation, and a complex coordination effort unto itself.

FOLLOWUP AND RESOLUTION

At the conclusion of the game, the GDC typically checks with RF users to see if there were any problems; users may work out minor problems themselves and stop them from escalating into major issues.

Later, the GDC will email a post-game wrap up and forward it to all of the NFL GDCs via a national email reflector. The GDC will describe the game, any problems that came up, identities of those who did not coordinate, and any other information that the national GDC community would find of interest.

“EXTRA SPECIAL” EVENTS

The GDC’s function includes preseason, regular and post season games. Depending on his/her team’s performance, they might find themselves in a play-off game for which coordination would also be necessary.

For the Super Bowl, the GDCs from both competing teams will travel as guests of the NFL and assist with the large coordination effort, which is handled differently than a regular season game and is a story unto itself.

The GDC program also includes the Pro Bowl in Hawaii. As it is everyone’s wish to coordinate that game, the NFL has a drawing to decide which GDC will be lucky enough to get the job. GDCs winning the drawing are eliminated from future drawings until all GDCs have been there. (There are 32 primary GDCs in the NFL who are eligible.)

Photos courtesy of Ralph Beaver.

Now into his fourth year of participation in the GDC program, Fred Morton is a contract engineer as well as partner in two FM stations in Texas and Oklahoma. Fred’s email is: radioguy@airmail.net

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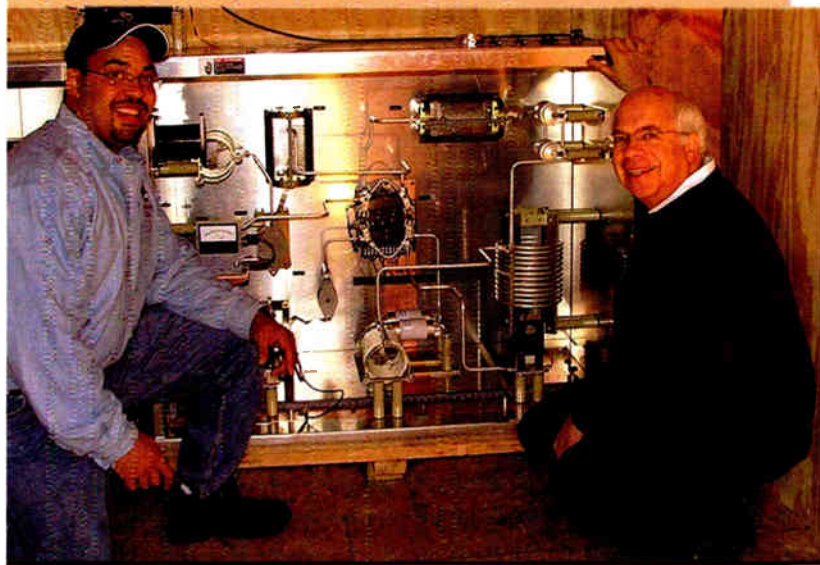
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“Unless we could quickly build out new studios and antennas, our station would go silent.”



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The Worst I've Ever Seen

A Visual Display of the Good, the Bad, and the Plain Hard-to-Believe

A "Two-Legged" Tower

Inspecting a tower is an important part of regular maintenance and not a five-minute operation. Just think of all the aspects that need to be checked:

- The tower base itself.
- The base and guy insulators, if used.
- Condition and tension of any guy wires and their anchors.
- The condition of the paint coat.
- The tower structure and members.
- The tower lighting system.

Don Barber of L&S Enterprises in Titusville, FL shares pictures from a tower with a member that literally "melted."

Don relates: "This is a 302' tower with a double unipole antenna on it. The owner was changing this configuration as well as replacing the obstruction light wiring and painting the tower. We headed to the site all set for a few days' work, but it all came to a halt quickly."

About 250 feet up, Barber's workers found what was somewhat carefully described as a "minor" problem.

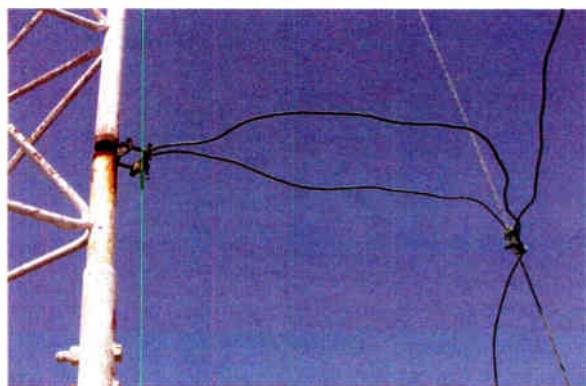
interaction just "ate away" the tower leg. By the time Barber's crew was on site, pretty much the only thing holding the tower leg together was the bracket.



Yes, the climber retreated quickly. And, yes, the tower has since been repaired.



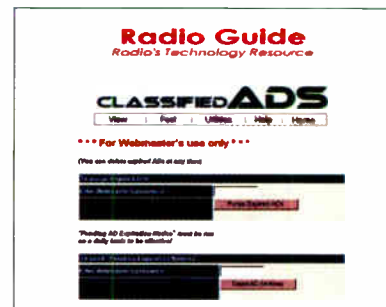
However, this is a good example of why regular tower inspections are important. After all, a few more months, and this station could well have had more than "a short pause for station identification." — Radio Guide —



Getting a closer look did not make the climber any happier. It appears that, over time, the electro-chemical

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The BDR is an ongoing effort to provide useful tools, information, and history of interest to broadcasters.

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

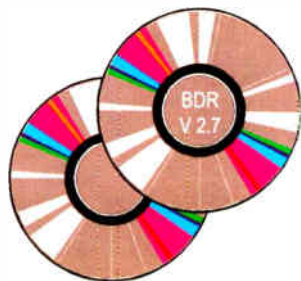
Recent additions include the archives of the BROADCAST mailing list from www.radiolists.net, going back over seven years. Using your reader, lots of tech tips from the field and other helpful info are quickly searchable.

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

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Operations Guide

by Bob Burnham

How to Syndicate Your Own Radio Show – Part 2

[SOUTHFIELD, Michigan] In the preceding article (*Radio Guide*, August 2005), among other tips we gave you a “Big 10 List” of items needed if you want to “do it all” from your location. This time we will follow up by elaborating on some items and adding a few more tips on achieving success in setting up a syndicated radio program.

A REALISTIC PLAN

Some of the tools and technology that are crucial to syndication will be mentioned along with some comments on getting the show off the ground with a realistic attitude. The broadcast industry constantly benefits from advancements in technology and syndicating your own show is no exception. These advances not only make the show easier to produce, but can reduce the costs.

Nevertheless, this is *not* an inexpensive undertaking. Make sure you have enough dollars set aside to sustain the show for at least a year (preferably *two* years).

As far as tools go, we mentioned, for example, the need for ISDN (*integrated service digital network*) lines, which are basically digital copper provided by the phone company. Unfortunately, if the phone company gets its way, ISDN will not exist in a few years. There is a solution for this issue, which we will get to shortly.

SHIPPING THE AUDIO

The need for ISDN is based on the concept that someone – other than you – needs to put the show on a satellite transponder so your affiliate stations can receive it. Companies like ABC Globecast routinely rent blocks of time on satellite transponders to independent program producers and small networks.

A basic broadcast codec from either Telos, Comrex or Tieline will work well to get your audio from point A to point B.

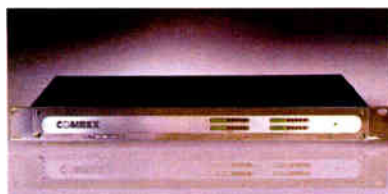
Transponders for mono talk shows can be less expensive than music-oriented shows because only one channel is needed, and a narrower bandwidth will suffice. But again, realize you have to deliver that audio to *their* master control in pristine quality sound. ISDN is one of the most reliable standards but, as noted, it is on the way out.

USING SUFFICIENT BANDWIDTH

The basic Comrex product is slightly less expensive than some of the alternatives. However, it relies on an older protocol that cuts off at 7.5 kHz, using one half of the ISDN line. You can get 15 kHz out of them, but only by using both halves of the ISDN line, which essentially doubles the cost if it is a long distance connection.

The long-time industry standard is Telos’ “Zephyr,” although the basic model has been discontinued in favor of their “X-Stream” model. The X-Stream features several different protocols including MPEG Layer 3. If you plan to do a music show, this may be the best way to go as it is capable of delivering stereo on a single ISDN channel. Of course, for maximum bandwidth, you still may want to use both halves, anyway.

One of the most interesting new products, however, comes from Comrex. The “Access,” which will begin shipping December 2005, can use



Comrex Access

the public Internet (i.e. DSL, Cable and even Plain Old Telephone Service – POTS) to convey audio from point A to point B.

Comrex claims their product will deliver reliable service. If these claims prove true, one of the biggest day-to-day costs of producing a syndicated show will largely be eliminated! Consider, for example: if you are hosting a three hour show, Monday through Friday, and you are sending the audio from Chicago to your satellite uplink service provider in New York; you will be paying for 60 hours of long distance service per month. Depending on the time of day the show airs, this can add up.

A SOBER-EYED VIEW OF COSTS

A quick comment on costs in general may also be in order. Those who are new to the broadcast industry tend to over-simplify the process of getting a show on the air – and especially how it becomes profitable.

The bottom line is an unproven show *must* develop a track record and develop some appreciable *cume* over a period of time before the first nickel of advertising can be collected. If a friend or local advertiser wants to give you the “gift” of buying a spot package, you may be able to cover some of the initial costs. But in general, it is a waste of time to approach advertisers at least during the first year or so of operation.

There may be some exceptions. For example, if you happen to be carried on a highly rated station in one of the top ten markets, you might be able to sell some ad time based on *their* listenership. However, if you are *buying* time on an *unrated* station (no matter how big the city of license), you have *no* proof of listenership and no advertiser in their right mind will buy spots – unless they are a personal friend – or it is *your* business buying the time.

In general, we tell clients to expect their show will *not* break even during the first year. The *second* year depends on the show itself and several factors.

CONNECTING THE CALLERS

In the golden old days, all it took to get a call on the air was a transformer connected across the phone lines. Today’s programming demands high end solutions. A simple one-line hybrid, all by itself, just does not get the job done. A product called “TeleSwitch” – long discontinued – was a popular option and less expensive than the full blown broadcast phone system. But that device is in the past.

Ten years ago, one of the industry standard broadcast phone systems was Gentner’s TS-612, which featured first generation dual digital hybrids. Other excellent systems are made by Telos Systems. Comrex later acquired the product, but discontinued it in favor of their STAC phone system.

Call screening software is actually fairly important in a talk radio environment. Gentner had “ScreenWair,” a slightly clunky, DOS based package for the TS-612. This package also included a proprietary hardware interface that allowed the PC to talk to the mainframe of the phone system through its serial port. It actually worked better if you used a “junk” computer without Windows installed!

Later, a Windows-based version became available, as well as screening software developed by third parties, but of course, we were stuck with the mainframe hardware of the original product, although there were some firmware fixes released for the earliest production run.



Gentner TS-612 and ScreenWair interface



Once you coaxed them into working, they really worked well. Many TS-612s remain in service today, and they actually do sound really good over the air. However, it is 10-year-old technology. I mention this system only because if budget is a factor, you should be able to pick up a used TS-612 for a fraction of the original cost.

NEWER CHOICES

The STAC (Studio Telephone Access Center) from Comrex uses a standard web browser for call screening. It does everything the TS-612 does, only better; it is easier to use, too. The price is in the same ballpark as the original Gentner system. A similar product from Telos, the “TWOx12” will deliver equal results.



Comrex STAC



Telos TWOx12

Which is better? You decide. Do you drive a Ford or a Chevy? Weigh the options and check pricing from your favorite broadcast vendor. The STAC has a unique look. If you prefer a more traditional-looking phone control panel, get the Telos product.

Another product pioneered by Telos a few years ago used ISDN for dial-up lines – an impressive concept. With that device, you pay for *one* ISDN line every month rather than six or twelve dial-up lines. But again, a caution that ISDN is headed south in the not too distant future – and will not be back once it is gone.

SIMPLE TASK AUTOMATION

In the past, the use of audible and sub-audible tones at 25 and 35 Hertz were the norm, requiring some combination of either home-brew or otherwise unreliable electronics to generate those tones.

While it is also possible to secure contact closures on the Telos grade of codecs, more often than not your first few years of affiliates will be in small and middle markets. They may only have the older equipment – including satellite receivers that may produce nothing but audio, and they probably still have the sub-audible decoders controlling whatever software they have for programming.



Sub-audible tone generator.

With the advent of modern audio workstations, it is a simple matter to create half-second recordings of those sub-audible tones. Simply integrate those tones with your normal programming. For example, fire a 25 Hertz tone at the end of a local spot break which hopefully will put you back on the air on your affiliates.

As your show grows, integration of digital closures via a Telos codec (it is not an option on most other brands) may make it necessary to support *both* the older and current types of automation.

I hope these ideas and tips will help you to achieve your goal of producing a successful syndicated program service.

Bob Burnham maintains 25 broadcast studios at the Specs Howard School of Broadcast Arts and operates BRC Broadcast Services in the Detroit area. He can be reached at bburnham@specshoward.edu

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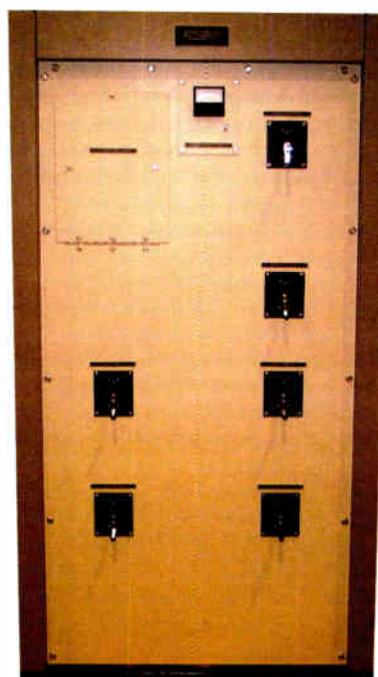
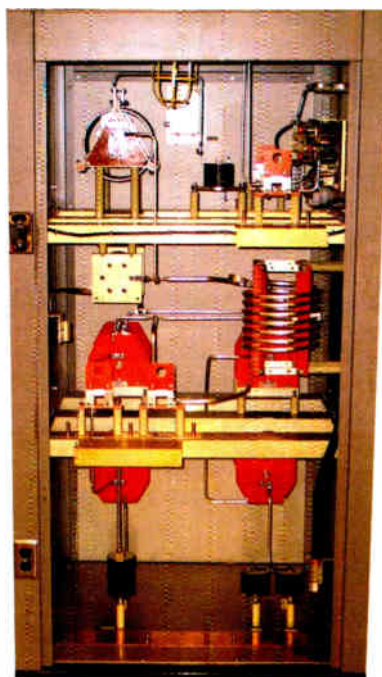
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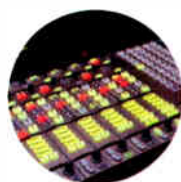
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SYSTEMS & SERVICE

by David Arendt

Keeping Track of Important Things

Finding a simple – but easy – way to keep track of important tasks and time spans often takes us back to what might be called “low tech.” A PDA with an alarm is nice, but having a full overview of reminders also can be as easy as opening the door to the office or transmitter building.

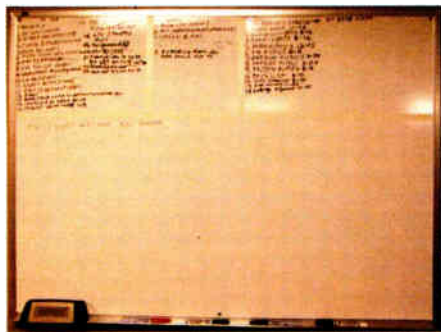
[HARRISBURG, Pennsylvania] Trying to remember what tasks need attention sometimes can be quite a challenge, especially for engineers who these days might shuttle between as many as six or eight (or more) sites.

OPEN DOOR, SEE TASKS

At my transmitter site, I have installed a large dry erase board, mounted to the side of my TV transmitter, which is in plain view of the door to the building so I see it as soon as I walk in. This way, I see it often and therefore do not forget to do the “little things.”

On the board is listed everything from weekly items that need to be completed to the “every-so-many-year” items. I also set aside space for a “to do” list of things that are broken or need attention.

When an item is completed I just erase the date and put in the new date.



I use tape to section the board to my liking for the various subjects. I usually like to use a narrow tape, but at this site, I only had wider tape on hand. You also can use a marker to make the lines, but they usually get messed up when you need to erase something.

EVERYTHING IN ITS OWN PLACE

The left-most section of the panel is a list of projects that are mostly long term or those for which I am waiting parts or equipment to complete. I usually just cross an item off of the list when it is completed. When I have a fair amount of them completed I erase the section and rewrite the list – that way it keeps the board looking neater since it is difficult to try to erase one entry between two other items.

The next section has a list of things needed at the site. I find it convenient to write them on the board as I think of them, then email myself the list at the end of the day, so I can bring them with me the next time I am at the site.

The right side is a list of on-going maintenance or checks that need to be completed. After I perform the check or maintenance I erase the date and put the new due date in its place. I did not do it with this one yet, but I usually color code the dates for daily, weekly, monthly, and yearly checks.

CONVENIENT “NOTE PAD”

One other thing I do is to leave a fairly large blank area on the bottom portion to write up what I am doing when repairing a piece of equipment, so I can transcribe it to the log book later. I just put down quick thoughts in short phrases so I can keep working, but they jog my memory enough so I do not forget to put anything in the log.

Also, if we go off the air, I have a convenient place to put record of what I did. The ability to make quick notes in a predictable location is especially welcome after a good lighting storm – remembering what I did to four transmitters can get confusing!

Later, I can write up the transmitter log about what I did without having to try to recall it all from memory; and I even can write the email that goes to my supervisors from the notations. Afterwards I just erase it and it is ready for the next time.

The board also comes in handy if I need to draw a

figure or schematic to explain something to anybody else who might be coming to the site.

David Arendt (KA3VEI) has been engineering at WITF-TV/ FM in Harrisburg, PA, for almost eight years. If you have a suggestion on other uses for the note board, let David know at: ka3vei@gmail.com

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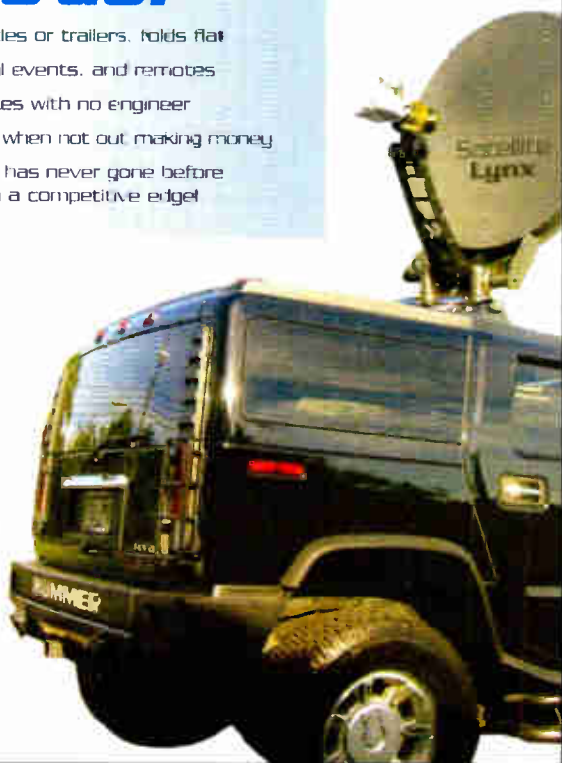
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Tower Site Guide

by Michael Millard and Gary A. Minker
Towerswitch, LLC

Making Tower Sites a Safer Working Place

[DEERFIELD, Florida] Fatality rates for tower contractors, according to recent OSHA reports, indicate that workers at tower sites are ten (10) to one hundred (100) times more at risk than workers in other industries.

How safe is your site?

TOWER SITE HAZARDS

Tower sites present many different and variable hazards to employees and to the public. These hazards include falling from significant height, shock and electrocution, exposure to hazardous materials, trenching/excavation, excessive exposure to non-ionizing radiofrequency radiation, unstable working surfaces and other recognizable hazards.

Unattended radio and television tower sites pose a particularly problematic situation due to their remote location. Even worse, the average tower site or rooftop antenna facility, whether leased or owned, is typically unmanned and visited infrequently by a relatively large number of unknown persons for maintenance and other reasons.

These visitors include radio repairmen, tower crews (tower light repair, antenna installations, etc), landscaping crews, the "bug guy," and in the case of rooftops: windows washers, air conditioner repairmen, roofers, and the occasional sun-bather. The simple fact is many of these visitors are rarely trained for dangers they might encounter on site and are therefore unaware of the hazards present.

Another source of concern is trespassers, such as base-jumpers or off-road drivers, who could not only hurt themselves, but cause damage to the structure, even to the point of bringing a tower down.



Lack of information or undesired intruders can result in loss.

UNWITTING DANGER

The obligation to maintain a safe facility is a shared responsibility. This responsibility must be shared by the transmitter owner/operator, the site management company (if any), and the property owner. Visitors also have important obligations when it comes to overall site safety.

For example, a tower owner might contract with a lawn maintenance company to keep the weeds down at a remote tower site. The landscape crews may have been OSHA trained for issues one might reasonably expect them to come into contact, such as exposure to gasoline vapors and fumes, poison ivy, bee and wasp stings, use of professional lawn equipment and so on.

But these workers are very likely not made aware of the unique hazards associated with radio and television towers, such as the possibility of loose bolts or other equipment falling off the tower, electrocution

hazards, lightning, or non-ionizing radiation hazards. In addition, it seems unlikely that the landscape employer would be in a position to adequately inform his employees of the hazards, as he is not an expert in the field of radio and TV towers.

COMPREHENSIVE WARNINGS CRITICAL

In a perfect world, all site visitors would be highly trained professionals who could easily recognize the various safety hazards (some are invisible!) before they are exposed to them. However, this is hardly the case.

Without proper signage or an aural device such as the TowerSwitch it is possible for workers to be exposed to recognizable hazards without adequate warning. The legal and liability issues are evident.

On the other hand, a well planned warning system incorporating visual and aural information can eliminate the issue of providing site-specific safety hazard information, even if multiple subcontractors are working on the site simultaneously ("multi-employer work site").

A review of some of the more common hazards and problems associated with towers, antenna rooftops and other transmission facilities will be instructive.

ISSUE #1- LACK OF SITE SPECIFIC INFORMATION

Usually, tower site owner/operators employ subcontractors to perform maintenance and installation work activities since few tower site owner/operators have enough full time crew or staff. For the most part, tower crews are professionals who are trained and equipped to perform these hazardous work activities.

However, the time subcontractors are on site can vary from a few hours to several days. Consequently, a typical tower crew does not have the benefit of detailed information regarding either the current equipment inventory or safety information that can often be particular to each unique tower site structure.

ISSUE #2 - MONITORING SITE ACTIVITY

The difficulty in monitoring the activities of employees and subcontractors who perform work activities on the tower property is one significant issue that contributes to workplace accidents at tower sites.

In many instances, landscapers, repairmen or even a tower crew may begin work activities on a tower site without any knowledge of either the electrical equipment installed or safety hazards present.

Some facilities use motion detector or infrared detectors to set off alarm functions on remote control units indicating that "someone" is on site. However, it does not tell the studio who is there, nor why.

ISSUE #3 - LACK OF INFORMATION IN ADEQUATE LANGUAGES

A particularly large number of Hispanic workers are injured in the construction sector according to OSHA reports. Over the period 2000 to 2001, the annual fatality rate for Hispanic workers increased by seven percent (7%).

OSHA attributes this increase in fatalities among Hispanic workers to the lack of information based on language barriers encountered and the fact that Hispanic populations often are employed disproportionately in high-risk industries and trades.

ISSUE #4 - LACK OF SITE-SPECIFIC EMERGENCY RESPONSE PLANNING

Due to the temporary nature of on-site work activities, it is not uncommon for work to commence without a proper emergency response plan. Even if there is a plan, it is so often not needed that it may be forgotten or crews may become careless in their recognition to periodically test their emergency response plans.

Unfortunately, many accident investigations detail the fact that tower crews are often unable to provide ambulance dispatchers with the correct tower site street address because they had not bothered to ascertain this information prior to commencing their work activities. This can result in significant delays in obtaining medical and rescue assistance at a time when every second can mean the difference between life and death.

Towers also can be so remote they do not have street addresses per se, making it all the more important to have specific directions to provide to rescue workers.

ISSUE #5 - LACK OF PHONE ACCESS FOR WORKERS OR VISITORS

Most of the time, any on-site telephone or first-aid kit is generally behind a locked door because tower crews often do not need full access to the facility, just to the tower. Even cellular or PCS phones (if service is available in the area) may not work due to high radio frequency interference coming from the tower.

If the tower crews are the only personnel on-site while work activities are underway, they often are on their own should an accident occur. The situation is obviously much grimmer in the case of a two-man tower crew, where the injured, bleeding and dying must be left in place while the other person summons help.

It is natural for employees to panic in emergency situations. Specialized employee training can minimize these effects.

ISSUE #6 - "CRITTERS"

These include: snakes, bees, rodents and the occasional two and four-legged predators (use your imagination...)

ISSUE #7 - WORKERS ONLY ON SITE FOR A SHORT TIME

Since most current tower projects are relatively small, a tower contractor often is on a tower site for a maximum of only two or three days and in some cases, barely a few hours. This short time at the job site makes the ability to inspect a tower contractor's work for safety and other issues difficult.

Often times the tower owner really does not have a desire to inspect a tower contractor's work and is only interested in a completed project in order to generate revenue. Also, short duration work projects make it difficult for the OSHA compliance inspectors to meet with tower crews at the tower site.

Of course, these few examples represent only a small fraction of the ordinary day-to-day hazards which may exist at any given transmitter site. It is important to remember that every communication site is different and while each may have similar hazards associated with it, these hazards are dramatically different at other locations. Extreme caution must be exercised at all times.

SIGNAGE ALONE IS NOT ENOUGH

Typically, the use of appropriate signage is employed to alert personnel to important safety concerns. And in fact, both the FCC and OSHA mandate the use of such signs. Research has shown that when employees are informed of the specific safety hazards that injury-accident and fatality rates are substantially reduced.

A few common examples include "Danger," "High Voltage" and "No Trespassing" signs. Or, you might want to use a "Warning," "Caution," or "Notice" sign, for example.

(Continued on Page 30)

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Tower Site Guide

by Michale Millard
and Gary Minker

Continued From Page 28



Other important warnings might include:

- Required use of 100% fall protection (safety climbing cable, etc..)
- "Ride the Line" prohibited.
- No digging or trenching without permit/authorization
- Hard hats required.
- Biohazards (snakes, bees, wasps, fecal matter, etc...)
- Don't touch hot AM tower.
- Non-Potable water.
- Chemical storage issues / prohibitions.
- Secure gates & doors. (or set the alarm panel)
- Fuel spills (emergency generator).
- What to do if the tower lights fail.
- Housekeeping and HVAC problems.
- Door locks behind you.

Of course, sites with too many access points can make it impossible to properly sign them. Indeed, too many signs will likely lead site visitors to ignore any signs. And what if the intended reader cannot understand the language in which the sign is written?

DIFFICULT SITES

An example of the difficulties faced in properly warning site visitors is shown by the citation recently received by a broadcaster in Tampa, FL, cited for inappropriate signage.

Although a sign indicated RF exposures were expected to exceed the limits for an uncontrolled population (which was indeed the case), because there were several ways to gain proximity access to the antenna – and an extreme increase in energy imparted to a roof top visitor – the signage on the site was rendered meaningless and insufficient.

The Tampa facility was a rooftop, but like the average tower, (including candelabra-style towers having catwalks or platforms) it represents a very complex environment. Conceivably, it would take hundreds of signs to address the many boundaries of occupational and non-occupational exposures, caused by the near "porcupine appearance" of antennas present.

ADDING AUDIBLE INFORMATION

Considering the various dangers, signage alone may be insufficient to address the multitude of issues (both safety and otherwise) present at the average tower site simply because so many hazards are present. In fact, research has demonstrated that a written safety sign is much more effective when coupled with a verbal instruction.

One way to augment the written warnings is with a product like the TowerSwitch box, which provides audible hazard safety information and instructions to on-site personnel prior to exposing them to the safety hazard. Using solar power to provide energy at any location, Towerswitch automatically plays back a digital recording whenever the button on the box is pressed or the system detects a visitor from a magnetic door switch, pressure switch or motion detector.

The safety warnings are then audible without any user intervention or need for them to see a specific sign. This can serve well to reduce injury and fatality rates. The system is also designed so it can alert the tower owner in real time that someone is on site, so they can investigate unexpected visitors before damage or injury occurs.

Especially valuable is the capability of the TowerSwitch to inform workers of workplace safety hazards in more than one language. The TowerSwitch provides this information via verbal warning messages played through a high-output audio system. Safety messages can be easily recorded in English, Spanish or other languages, as required by local demographics.

IN CASE OF EMERGENCY

Even more useful is the ability of the TowerSwitch to provide additional and essential information in the event of an emergency.

On the front panel, there is a large red button marked "Emergency." When a tower crewmember or on-site visitor presses this button several things happen. First, a loud emergency message is played three times through the front panel speaker. This unique message, written and recorded by the tower's owner, provides information such as the tower's physical address, and directions to the nearest hospital and pay phone.



Emergency information at the touch of a button

Next, it alerts the tower owner that there has been an emergency at the site. The tower owner or other notified person or group is generally in a position to summon assistance on behalf of the tower crew. And lastly, it makes a date and time-stamped entry into the device's permanent event log for later use by accident investigators.

FCC CONSIDERATIONS

In June of 2003, the Federal Communications Commission issued a Notice of Proposed Rule Making (NPRM) under ET Docket 03-137 which proposed to mandate written *and* verbal instruction as it relates to the RF exposure issue. While this NPRM has yet to become law, it at least recognizes (finally), that RF compliance is difficult to achieve at the site level.

The new Rules would create a definitive "separation distance" concept, where all fixed transmitting facilities (antennas) less than three meters away from publicly accessible areas would require routine evaluation for safety compliance. Evaluation and certification would also be required for facilities up to ten meters away from a visitors' access point for those antennas having an ERP in excess of 100 watts.

Essentially, the FCC, recognizing how difficult it is to maintain RF safety compliance on multi-tenant towers and rooftops, is proposing to eliminate all the power, frequency, mounting heights, and antenna pattern considerations from the determination process.

In short, there are a lot fewer things to consider before you determine a particular antenna's emissions should be studied further. If you can get closer than 30 feet, it is better to evaluate the situation.

For most AM, FM and TV broadcasters, this new Rule is actually nothing new. This makes sense because a tower climber probably could not safely get much closer than 30 feet to an energized antenna system, even with the old Rules. But the new verbal notification requirement is still there.

ACCESS CLASSIFICATION

As a practical matter, unless only one transmitter and antenna is in use, all site visits would have to be considered "non-occupational" under Federal guidelines.

This is because no single site visitor would know their exact exposure *and* be able to control it. (Visitors typically do not have the authority to adjust output power on transmitters belonging to other stations – assuming they even know which stations are present. This includes all the two-way stuff too.)

Regarding transient visitors, such as property maintenance personnel, Hammett & Edison, Inc., Consulting Engineers said it best:

"It is impractical to the point of being impossible for FCC license[e]s such as those above, who are simply one of many tenants at a site, to have advance notice of access by workers to areas near its antenna(s).

"Typically, those workers are hired by the landlord or property management company; especially for infrequently needed services, such as roofing or HVAC repair, the contractor hired may not be the same one each time their service is needed, and certainly the employees sent to the site may not be the same ones each time.

"Therefore, the likelihood is low that the FCC licensee can actually provide such workers with the "comprehensive training" envisioned..." Source: Reply Comments ET Docket 03-137)

WIDER CONCERNS

RF compliance and people falling from towers are important issues. But they are not the only concerns for a station, tower owner or property owner.

Basically, this same situation applies to just about any safety issue when multiple persons are "responsible" to ensure a safe working environment.

One such situation relates to the use of tower elevators. Not many towers have elevators, but those that do create a whole new set of serious liabilities for all involved.



Making important information available.

Here again, safety signage is greatly improved when accompanied by verbal instruction. A larger listing of the various issues that might be involved with broadcast sites are detailed in the TowerScript software application, available for free download at www.towerswitch.com/towerscript.zip

Mike Millard and Gary Minker are the principles of Towerswitch, based in Deerfield Beach, FL. You can contact them at info@towerswitch.com



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Radio History

Introduced by Stanley Adams

The Story of WOR's Original Transmitter

One of Stan Adams' hobbies is collecting information about and pictures of some of the oldest transmitters used in broadcasting. A discussion about one transmitter was interrupted by an amazing email and historical document. We asked Stan to tell the story.

[MEMPHIS, Tennessee] I have this strange habit of studying the history of early Western Electric transmitters, and there appears little that modern science can do to correct this horrible fate.

A FORTUITOUS EMAIL

It was during the late winter and early spring of 2005 when Barry Mishkind and I were musing over the early history of Western Electric broadcast equipment, some of which he has on display at his website - www.olderadio.com. And then a wonderfully strange thing occurred!

One of the pages we were discussing dealt with WOR radio. Some pictures of WOR's early transmitter facility had been supplied by WOR CE Tom Ray. However, during one exchange, I noted there were inaccuracies in the captions of some of the pictures.

While this sharing of this history was going on, Barry decided to "lay on me" an unlooked-for email directed to him from Cliff Uzmann of New York City who also took issue with the same pictures of the WOR radio transmitter that prompted my original discussions with Barry.

However, Cliff not only questioned the accuracy of the photo description, but included some pictures with a story from his own grandfather, George Uzmann, wherein the "correct" description of the first WOR transmitter was made known. Talk about strange and wonderful coincidences! (Barry has explained this strange thing as something that "happens" to him from time to time - almost a "manna from heaven" scenario).

EYEWITNESS ACCOUNT

Uzmann was apparently a writer of a number of articles for the New York Sun Radio Section, the paper being affiliated with the early workings of the International News Service (started in 1909 by W. R. Hearst). INS later became part of United Press (of Scripps-Howard birth) and thus came the United Press International with which we have all been familiar.



George Uzmann. His grandson Cliff shares this picture and the text: "In Memory of my grandfather George Uzmann who dedicated his life to the developing world of radio."

In speaking with George's son, Cliff Sr., who is about to turn 75, I was informed that his dad was considered a ship wireless expert at the young old age of 18. He was a

compatriot of Harry Houck (of E. H. Armstrong and Measurements Corporation fame). Uzmann traveled much of the world as an early shipboard operator and in later life worked as a press person. He was also a writer.



George Uzmann was the right man at the right time to help us to tie together some of our early communications history and I thank young Cliff and his father with sharing this important family story.

Cliff Uzmann writes: "The following story was written by George Uzmann who wrote the radio section for the New York Sun in 1929. A note from the editorial department reads 'please hold till our situation clears up.' I found this among some of his many personal letters and articles from that time period. I believe that this paper will be of some interest to those who enjoy the history of the radio today."

For my part, I think it is also especially fitting that we introduce this story in the same season which introduced the commemoration of Howard Armstrong and his monumental FM invention.

There is absolutely no other possible way, in my humble opinion, but to let George Uzmann, himself, tell the story of the first WOR transmitter. (The following words are those he typed for a 1929 edition of the New York Sun - transcribed, but otherwise essentially unedited as they echo to us over 76 years.)

WOR'S FIRST TRANSMITTER

by J. George Uzmann

Lounging away in my easy chair and smoking, as usual, while listening to the evening's radio productions, I stopped a while to enjoy a WOR feature. Shortly before midnight on Washington's Birthday an announcement was made to the effect that WOR would hold an informal birthday party in recognition of the entry of that station's eighth year of broadcasting. The listening in invitation proved intriguing, and I settled back to a comfortable position to enjoy it.

WOR, like old WJZ, together with the principle transmitters within the Metropolitan area, I well remember back to the first days of their operation. I looked backwards to the original tests conducted on the low powered WJZ transmitter installed in the Westinghouse E. & M. Co. Newark plant, while their engineers endeavored to let a favored few hear results of the Dempsey-Carpentier fight in Doyle's Thirty Acres back in 1920, and then to think of the rapid strides since made, is to know that these few years have spelled a radio life-time.

And so it goes with WOR, too. Mr. J. Poppele, Chief Engineer of WOR, pointed out during their birthday party that the station originally went into operation with a transmitter such as today might be considered a mere play-toy. He briefly mentioned that it consisted of two 250-watt

tubes; and a reception report saying that their signals were heard in Connecticut brought untold joy to the staff.

"The Old Transmitter" story provided interest to the writer; for he too coaxed the "old brute" along many a night in effort that its transmitted signals might be heard at distant points. And with this thought in mind let us look over the historical background of the first WOR transmitter.

Today WOR operates a standard five K.W. Western Electric Company transmitter. Its signals frequently carry to all ends of the country while a friend of the writer's generally reports good reception as far East as the English Channel. The quality of transmission is likewise of the highest character and perhaps only a few transmitters such as the new 50 K.W. Crosley and 3XN, Bell Laboratory, Whippany, N.J. stations, which employ so called 100% modulation systems, are theoretically capable of producing better quality.

The present WOR installation is the third transmitter, if the writer is not mistaken, employed by that station. The first one was of 500 watt rating, but ratings back in those days meant little. The second consisted of a standard 500 watt Western Electric set which was operated for several years until its present five K.W. equipment was installed at Kearney, N.J.

Now let us go back to the original transmitter and compare that little "bundle of junk" with present day apparatus. Of course, the complexity of broadcast transmitters has gone through the same growing pains as receiving equipment. Once a crystal or single tube receiver together with a pair of head phones made up a "set" - now think of our present day broadcast receivers with their six to ten tubes, their complicated circuits, etc. and we have a picture of the rapid strides radio has made in less than a decade. But let's not get away from our WOR story.

While WOR was one the very first stations within the New York City district to transmit, I do not recall ever seeing a photograph or other descriptive matter covering their first transmitter. And since Mr. Poppele rightly mentioned its atrocious quality of transmission, the writer feels that the following remarks may prove interesting reading material.

For the first year or two of broadcasting, commercially built sets could not ordinarily be obtained before the Western Electric Company developed a 500 watt unit. The de Forest Company, on the other hand, manufactured several experimental models and it was one of these that made up the early WOR transmitter. It continued in operation until their half K.W. Western Electric set was installed. The new transmitter completely overshadowed the old in quality of transmission, distance, etc. "The old set" was then sold for what it would bring and it brought plenty even back in those early days.

In Figure 1, we see what the original WOR transmitter looked like. The photo shows its utter simplicity, and is complete with the exception of the microphones. A few weeks after going off the air on WOR's wave - 360 meters - it was purchased by the International News Service and again placed in operation, not as a voice transmitter but for telegraphic code signal work. Its day as a broadcaster finished up with WOR; but for a considerable time afterwards the writer employed the same transmitter in conjunction with development work and for which purposes it gave good results.

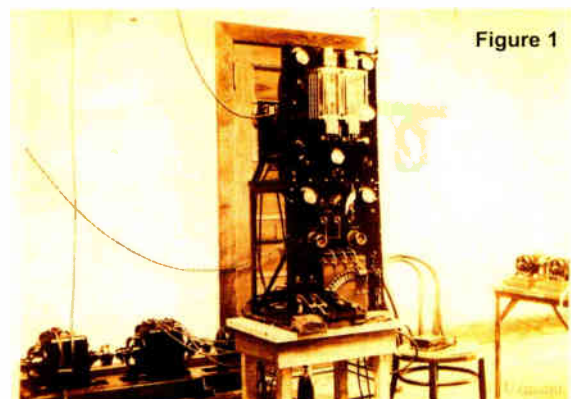


Figure 1

WOR's DeForest Transmitter

Re-installed at 59th Street and Broadway, New York City, the photo shows how simple the apparatus of "modern" broadcast transmitter was back in 1921. This early de Forest Company development employed two 250 watt

(Continued on Page 34)

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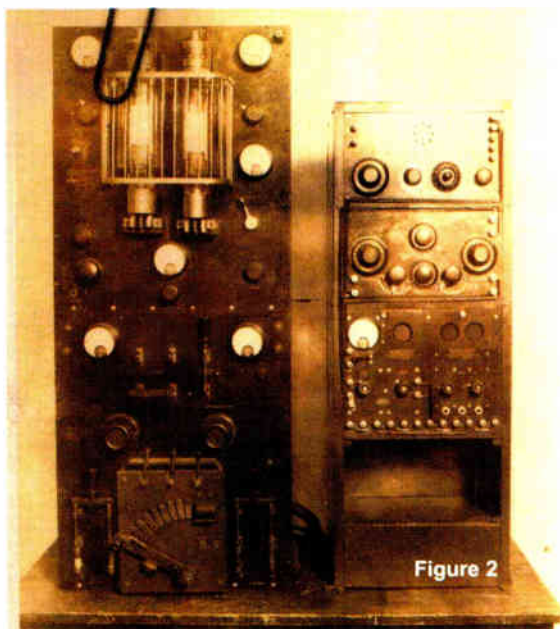
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Radio History

Introduced by Stanley Adams

Continued From Page 32

transmitter tubes, which received plate and filament energy from the three unit motor generator, seen in the background, developing 2000 volts D.C. for the tube plates and 20 volts D.C. for the filaments.



The DeForest transmitter and receivers.

To place the "plant" into operation, one need only to close a supply switch and pull up the manually controlled motor starter. Then the station was "on the air." The little

cam-box seen on the chair was the counterpart of the present day "control room" – the two cam positions determined which of the two microphones were in operation; or another adjustment placed the set as to adjust the circuit so that it would function as a radio telegraph transmitter. You see from the photo that a so called "technical staff" was hardly necessary back eight years ago because the circuits were [of a] most elementary order. The panel was about 24 by 60 inches; controls were few and a quick glance at the six small meters told the story.

Compare this work with present day apparatus employing pick-up equipment and amplifiers, line compensators or "pads," speech amplifiers, monitors, oscillators, modulators and power amplifiers; now add a number of motor generator sets, storage battery, power and supply switchboards, and we again note the rapid advance made in the art in less than ten years.

Once the old transmitter moved away from New York City and was taken up to Yonkers. A close-up of the transmitter together with an associated piece of apparatus is shown in Figure 2. But it soon returned to New York City, where it remains today and is still in operation, good as the day it was built as a continuous wave transmitter operating at a wave length of approximately 1100 meters and never again shall it broadcast "this is station WOR, Newark, N.J."

*J. Geo. Uzzamm,
439-78th Street,
Brooklyn, N.Y.
March 1, 1929*

EPILOG

What a truly unique picture of the early years of both broadcasting and communications!

This early transmitter was more than likely built at the Highbridge (2XG) shop of Dr. de Forest and was sold with the 1D (250 watt) tubes. It was in this time frame that Dr. de Forest left the northeast for the far west of San Francisco, where he opened his own experimental shop and retail outlet.

de Forest furnished similar transmitters during the early 1920's to some of the first stations along the west coast. He was able to build transmitters rated up to one kilowatt in power. But let it be noted that the ratings were not reliable ratings for these early modulated oscillators.

It was not long before RCA introduced their UV204 triode which helped to improve the quality of power and Western Electric soon sold WOR a WE 101A transmitter (500 watts). Just a few years later the transmitter became a WE 105B making WOR a 5 kW station. With the improvements from Dr.'s Heising, Colpitts and later Doherty, among many others, there was no way that Dr. de Forest could continue in the radio business and subsequently he took this opportunity to begin his work with "phonofilm."

Jack Poppele was the Chief Engineer of WOR and an early radio expert. A collection of papers, which are based on an oral history, exist at Columbia University as part of the WOR Project. They detail much of Poppele's work. He was a long time member of the Radio Club of America.

The son of a Cincinnati broadcast engineer, Stanley Adams is a systems specialist with Sprint in Memphis, TN. If you share his interest in older transmitters, you can contact him at: stanleybadams@yahoo.com

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[TUCSON, Arizona] You can always tell from the panic-stricken e-mail we get which states are up for license renewal.

RENEWAL ANXIETY

Question number four on license renewal form 303-S is generally the most frequent cause of such distress. Then comes EAS compliance, followed by Public File concerns and a variety of other issues.

Once again for the record, I do not have a lawyer's shingle, I am just a meek and humble grandfather out here in the toasty Tucson desert struggling to feed the wife, dog and provide the grandchildren with their Christmas lump of coal.

I am however a trained inspector, and in the course of dealing with over 4,000 inspections, have become quite familiar with the correct interpretation of the FCC Rules that govern our industry.

HONESTY IS NOT ALWAYS EXPENSIVE

If you are up for license renewal you should review my *Radio Guide* column from December, 2003. It dealt with the addition of "that question" on the license renewal form asking if you are aware of any violations during your present license period.

In other words renewal time should be considered confession time for every nit-picking regulatory thing that went awry during the past eight years.

For those of you who have been around awhile, you know full well the FCC has, in the past, leveled a few hefty fines for some stations that have discovered some minor violation and – fearing the wrath of the FCC – promptly headed for the FCC confessional.

While this unwarranted fear has contributed generously to the retirement funding of some DC attorneys, there is no reason for you to worry unnecessarily – unless you just are not paying proper attention to your facility.

EXPENSIVE CONFESSIONS

If question four of your license renewal is bothering you – knowing you have sinned during the past license term – please recall from FCC directive (DA 03-1437 of April 30, 2003) that an application is required to disclose only those violations of the Communications Act of 1934, as amended, or the Rules of the Commission that occurred at the subject station during the license term, as preliminarily or finally determined by the Commission, Staff, or a court of competent jurisdiction.

This includes Notices of Violation, Notices of Apparent Liability, Forfeiture Orders, and other specific finding or Act or Rule violations.

The important part of the directive continues – and this is very important – *It does not include violations identified by the station itself or in conjunction with the station's participation in an Alternative Broadcast Inspection Program. (Italics indicate my emphasis).*

PUBLIC FILES HELP YOU

We have discussed Public Files before. Remember the purpose for your Public File is to provide a standardized means of defense in the event that your license is challenged during the renewal process.

Simply punch up the FCC website and pull a copy of the Self-Inspection Checklist applicable to your station and you will have all the answers you need to be legal in that area.

For example, the Ownership Report lets the public know if you have any bin Laden types running things; the Issues and Program Reports illustrate your dedication to addressing items of concern to your community; the Political File establishes that you do not rate-discriminate among politicians.

Make sure all your file folders have something in them, if even only a note saying, "This folder's category does not apply."

LOGS AND OTHER DOCUMENTATION

If ever there was an area in stations that could benefit from some attention, it probably is the matter of the Station Log.

True, about the only items required to be logged regularly these days are EAS tests, tower light observations, outage reports and quarterly tower lighting inspections. Nevertheless, you would be surprised to see how many stations fail to have complete logs, much less clear and legible entries.

What about the failure of your local primary station to forward its required monthly test? Cover yourself by calling the station you are monitoring and log what you are told (or what you determine caused your failure to receive the test) and what you did to prevent such failure in the future.

One of my favorite old quotes is, "If it ain't in black 'n white, it ain't!" For example if I am addressing something a tad controversial it will be by fax or by affidavit – trust me you can never do any harm by having a good faith paper trail.

DOCUMENTS THAT SAVE MONEY

A recent topic of discussion was the Florida tower owner who was fined and paid \$10K for violations. Over two months later, the FCC sent another notice demanding full payment and threatening action from the Department of Justice. Fortunately, the station had a copy of its cancelled check to resolve the matter.

Another example was the new station employee who reported to the FAA a mid-level tower light outage – which was *not required* and advised as such by the FAA Flight Service. Nevertheless the employee carefully logged the outage and his conversation with the FAA.

A few days later a small plane that had no business flying in heavy fog clipped a guy-wire, and almost before the four victims hit the ground lawyers were beating a path to the station, knowing full well a *light* on the tower was out.

Fortunately, the over-diligent employee's log sent them on their way scampering for some other accident upon which to capitalize.

The moral in all these cases is: by being careful and clearly documenting as much as possible you will avoid most hassles with the FCC inspectors.

Retired from a career in radio and television engineering, Ken Benner has been actively inspecting stations under the Auxiliary Broadcast Inspection Program for over a decade. If you have questions about the issues above or ABIP inspections, contact Ken at bennerassoc@comcast.net



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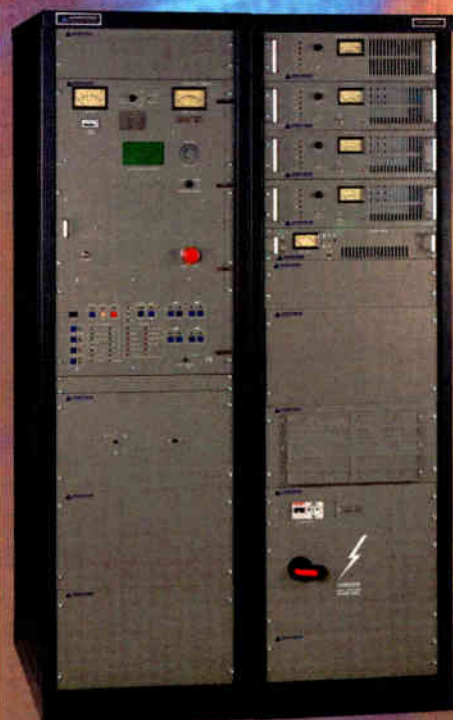
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Every day, more than 750 broadcasters rely on TWOx12 twelve-line phone systems to insure their critical talk radio programming. Two advanced digital hybrids deliver the best caller audio possible, thanks to our famous Digital Dynamic EQ. Status Symbols visual call management (a Telos exclusive) helps producers screen calls easily, without guesswork.

Planning a big, consolidated build-out? Consolidate your phones as well with Series 2101, the world's only multi-studio talkshow system. Series 2101 lets you expand your facility's call capacity when needed — allows control of up to 96 callers and 32 studios. Not only that, Series 2101 uses high-quality digital phone lines to deliver caller audio that's next-room clear (and help reduce Telco wiring, too).

At Telos, we're all about choices. Take our Desktop Director (right); it works with TWOx12 and Series 2101 systems, can be expanded to control up to four hybrids or up to 24 lines when used with Series 2101, and has a built-in handset, speakerphone and headset jack. Or, choose the new Call Controller (left) and "bring your own phone" for screening... even works with wireless phonesets.

ONE-x-Six is perhaps the world's most popular auto-nulling multi-line phone system. Also the world's most affordable! Like all Telos talkshow systems, ONE-x-Six integrates with our optional Assistant Producer software to allow fast, intuitive remote screening via LAN or WAN connections.

Naturally, we are obligated to protect the identity of clients who use Telos talkshow systems. We would no doubt get a Stern warning from any user whose name we revealed.

But rather than Rush to superlatives, let us just be Frank'n get to the point. When you're ready for the world's best talkshow system, the answer is Clear; it's as easy as ABC. Whether your station is located in Salem or Susquehanna, Telos has a broadcast phone system just right for you. Why, the possibilities approach Infinity.

In our eyes, reliability is King. After all, if there's a failure, you can Kiss your ratings goodbye. You need your phone system to be a Citadel of Mega reliability. Not to Mix metaphors, but you need something Hot, Lite on the pocketbook, and full of Power. Really, it's Radio One-oh-one.

And unlike gear with tech as dated as an old Bonneville, Telos talkshow systems undergo constant improvement. With us, it's a never-ending Saga of advancement.

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by Tren Barnett

The Power of Virtual Private Networks

[TUCSON, Arizona] Technology is quickly expanding the office of yesterday into the home of today. Thousands of employees across this vast country of ours go to work Monday through Friday like the rest of us, yet never leave their homes.

This is not just because small businesses are thriving, but because technology is now in place to enable secure business communications across the internet. VPN (Virtual Private Networking) is used everywhere from small connections used to monitor equipment to large networks.

BRINGING EVERYTHING TOGETHER

A few years ago, network communication across the country and even sometimes across a state was out of the question. Invisible lines were drawn all over the country by the FCC requiring everyday carriers to use outside sources to tie together networks and voice communications that could otherwise occur without undo burden.

It did not matter if your carrier was the same on both sides of the line, you had to use another carrier to cross the line. The FCC effectively placed Wide Area Network (WAN) communication out of reach for many mid-sized companies, because of these invisible lines. Third party carriers knew this and would charge outrageously exorbitant prices to tie remote sites to their corporate point of presence.

However, while the FCC permitted this situation to flourish, the Internet was quickly developing and allowing communication to occur quickly around the world without these long distance carriers.

A BETTER (CHEAPER) WAY

It soon became apparent that communication and data transfer could happen quickly by simply bypassing the

communication carriers of yester year, and using the Internet. Technology was quickly expanding to resolve the problems that stymied business communication at reasonable prices.

Today with the aid of the Internet, large and small companies move data around the world at fractions of prices that were available 15 years ago. With the growth of technology, soon voice over IP (VoIP) was a reality. With streaming video and audio, corporate meetings could occur in multiple cities instantaneously, thus reducing the need of travel lodging and food – all a boon for mid-size company budgets.

However we all know data on the Internet is less than secure; there are many eyes out there seeking to pry into what is not theirs. A means to allow communication to occur without privacy invasion was needed. This required encrypted protocols – that is, a means to communicate while keeping data secure.

This by no means was the birth of encryption, but encryption and communication would now be filling another need – the need of secure data.

HOW VPNs WORK

Because secure transactions were needed to accomplish busy communications over a non-secure mechanism, certain things had to happen. "Tunnels" were needed that would allow communication to happen to specific points, thus limiting to a degree who could receive the encrypted data.

Using PPTP (Point to Point Tunneling Protocol) control could be put in place to help secure the data sent back and forth. Tunnels could be formed controlling the connection and denying all outside communication. In theory data transfer was becoming secure.

Of course, we are not endorsing any particular method of encryption, nor even suggesting that all encrypted communications today are secure and hack-free.

PUTTING IT TO WORK TODAY

VPN is in wide use today around the world. Many companies support it. Whether software-based, server-based or hardware-based is up to the end users. Linux, NT4, Windows 2000, Windows 2003 can all host VPN

connections tying remote users to your network at next to no cost, assuming that you already have one of these systems in place.

Small devices from Linksys, Netgear, and Cisco are available to handle VPN through hardware. Depending on your need, all work well and reliably.

VPN can be used over dial-up connections thus making it possible to dial into an ISP and establish a tunnel over the Internet connection provided by the ISP to your private network. Unfortunately, many ISPs, hotels and motels allowing high speed Internet connectivity now are disabling the ports used to VPN.

If you are looking to utilize VPN connectivity, verify with the provider ahead of time that they will support your usage of these ports. Since ports are only an identifier to the devices communicating, with most devices any port can be reassigned to the tunnel.

For a successful tunnel to be established, you must know the address of the device to which you will be connecting. At least one static Internet address is recommended. For constant two-way traffic two static addresses are preferable; DHCP addresses can work for one client with VPN tunnels. Most all devices support demand dialing, yet unless a request is from the DHCP client side, connectivity cannot be reliably guaranteed.

A TECHNOLOGY WORTH KNOWING

With VPN in use, we can work from home, transmitter site or anywhere else and connect to our networks exactly as if we were there in person. The connections limitations are mainly the limitations imposed through the hardware or software used for the tunnel, and the connection types being used.

Since VPN tunnels are stable and can remain connected for days on end, most all network applications that work while you are connected directly to your network likewise work as well over these tunnels. From VoIP to streaming audio and video, VPN tunnels are proving extremely valuable for communication.

Tren Barnett is a Systems Administrator and programmer based in Tucson, AZ. He can be contacted at tpb@ironmind.net

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The routing switcher gets a new twist.

(About five twists per inch, actually.)

Everybody needs to share audio. Sometimes just a few signals — sometimes a few hundred. Across the hall, between floors, now and then across campus. Routing switchers are a convenient way to manage and share your audio, but will your GM really let you buy a router that costs more than his dream car? Unlikely.

If you need a routing switcher but aren't made of money, consider Axia, the Ethernet-based audio network. Yes, Ethernet. Axia is a *true network*. Place our audio adapter nodes next to your sources and destinations, then connect using standard Ethernet switches and Cat-6. Imagine the simplicity and power of Ethernet connecting any studio device to any other, any room to any other, any building to any other... you get the idea.



Routers are OK... but a network is so much more modern. With Axia, your ins and outs are next to the audio, where they belong. No frame, no cards, no sweat.

Scalable, flexible, reliable... pick any three.

An expensive proprietary router isn't practical for smaller facilities. In fact, it doesn't scale all that well for larger ones. Here's where an expandable network really shines. Connect eight Axia 8x8 Audio Nodes using Cat-6 cable and an Ethernet switch, and you've got a 64x64 routing switcher. And you can easily add more I/O whenever and wherever you need it. Build a 128x128 system... or 1024x1024... use a Gigabit fiber backbone and the sky's the limit.

Are you still using PC sound cards?

Even the best sound cards are compromised by PC noise, inconvenient output connectors, poor headroom, and other gremlins. Instead, load the Axia IP-Audio Driver for Windows® on your workstations and connect directly to the Axia audio network using their Ethernet ports. Not only will your PC productions sound fantastic, you'll eliminate sound cards and the hardware they usually feed (like router or console input modules). Just think of all the cash you'll save.



There's a better way to get audio out of your PC. No more consumer grade "I" connectors - with Axia your digital audio stays clean and pristine.



Put an Axia Microphone Node next to your mics and send preamplified audio anywhere you need it, over Ethernet — with no line loss or signal degradation.

Put your preamps where your mics are.

Most mainframe routers have no mic inputs, so you need to buy preamps. With Axia you get ultra-low-noise preamps with Phantom power. Put a node in each studio, right next to the mics, to keep mic cables nice and tight, then send multiple mic channels to the network on a single Cat-6 cable. And did we mention that each Mic Node has eight stereo line outputs for headphones? Nice bonus.

Put your snake on a diet.

Nobody loves cable snakes. Besides soldering a jillion connectors, just try finding the pair you want when there's a change to make. Axia Audio Nodes come in AES/EBU and balanced stereo analog flavors. Put a batch of Nodes on each end of a Cat-6 run, and BAM! a bi-directional multi-channel snake. Use media converters and a fiber link for extra-long runs between studios — or between buildings.



An Axia digital audio snake can carry hundreds of channels of digital audio on one skinny CAT-6 cable. We know you're not going to miss soldering all that multi-pair...



Axia is already working with some great companies. Like Enco Systems, Scott Studios, Radio Systems, Balss Technology Group, and of course Telos and Omnia. Check AxiaAudio.com/partners/ to find out who's next.

With a little help from our friends.

A networked audio system doesn't just replace a traditional router — it *improves* upon it. Already, companies in our industry are realizing the advantages of tightly integrated systems, and are making new products that reap those benefits. Working with our partners, Axia Audio is bringing new thinking and ideas to audio distribution, machine control, Program Associated Data (PAD), and even wiring convenience.

Would you like some control with that?

There are plenty of ways to control your Axia network. For instance, you'll find built-in webservers on all Axia equipment for easy configuration via browser. PathfinderPC® software for Windows gives you central control of every audio path in your plant. Router Selector nodes allow quick local source selection, and intelligent studio control surfaces let talent easily access and mix any source in your networked facility.



Control freaks of the world, rejoice: intelligent Axia mixing surfaces give talent complete control of their working environment. Reconfigure studios instantly and assign often-used sources just where they're most useful.



"This sounds expensive." Just the opposite, really. Axia saves money by eliminating distribution amps, line selectors, sound cards, patch bays, multi-pair cables, and tons of discrete wiring — not to mention the installation and maintenance time you'll recover. And those are just side benefits: our hardware is about half the cost of those big mainframe routers. That's right... *half*. Once you experience the benefits of networked audio, you will never want to go back. AxiaAudio.com for details.



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Tool Guide



Test, Tools, Tips and Applications

DL1 Digital Audio Digilyzer from NTI

In field operations, it's hard to say whether it is more inconvenient to make a measurement on the digital audio or to try to monitor it. NTI's DL1 "Digilyzer" is a handheld tool that allows you to do both easily. Although weighing less than one pound, the DL1 is a complete digital audio analyzer and digital audio monitor, with inputs for AES3, SPDIF, TOS-Link and ADAT audio signal interfaces, together with an internal DAC and amplifier/speaker/headphone jack.

This tool is designed to be very easy to use at the top level by just plugging into a signal and immediately seeing some measurements. But there are also more sophisticated functions available after you learn the basics.

The Digilyzer measures the digital interface carrier signal as well as the embedded audio, and even senses analog audio. For example let us say you are engaged in some "rack crawling," needing to check an AES/EBU digital signal which is somewhere on a panel. When the DL1 is connected, it will lock on to a digital audio signal and display the sample rate, interface voltage level and other details automatically, as well as giving you a converted monitor feed of the embedded audio.

Not only that, but if you have accidentally connected to an analog connector, it will automatically switch over to its auto-ranging analog monitor mode and also inform you on screen that there is no digital carrier and that you are listening through the analog monitor. The aural monitoring is available either through a small built-in speaker, or for better quality through a headphone jack. Another feature which ties in to the monitor use is a VU+PPM mode, which also includes max level indicators and other information about the digital audio.

Back to the measurements, the DL1 not only makes the familiar ones, but also has some other useful troubleshooting tools for those who are able to take a little time to learn them.

First the basics: At the interface level (AES/EBU/SPDIF-IEC/ADAT) the Digilyzer measures and displays sampling frequency and carrier level, decodes the channel status bits (pro or consumer) and also displays data in a "bit meter" mode. That Bit Statistic mode displays audio data bits and auxiliary bits, indicates actual audio word length, includes VUCP bit indicators, and still has room for bargraphs showing the audio level dynamically.

Then at the audio level, the DL1 measures the level, THD+N (w/automatic nulling) and frequency of the embedded audio signal. It can also capture and plot a frequency response graph from an externally-generated audio sweep such as from a test CD or other source.

Some digital audio faults occur very rarely, but when they do they're problematic. The DL1 Event Logger function monitors many different aspects of the digital signal, recording changes ("Events") at a programmable interval. The recorded changes are grouped into Carrier-based, Frame-based, Signal-based, Channel status-based and Consistency-based Events.

Just a few examples are a change in sample rate frequency of more than 1%; a frame CRC or Parity error; or biphas coding errors. There are over 20 different possible Events, which makes this a very sophisticated diagnostic tool for digital audio.

Finally, the DL1 may be fitted with the optional MiniLINK USB interface and Windows PC software, which adds the ability to store test results on the instrument and later

transfer them to your PC; full remote control, and a convenient on-line firmware update capability so your Digilyzer is always running firmware with the latest features from the wizards in Liechtenstein, where it is manufactured.

DL1 Digilyzer, Digital Audio Analyzer – \$1,499. MiniLINK, USB interface, cable and Windows PC software – \$325. Belt Pouch – \$21

NTI Americas Inc.

Phone: 503-684-7050

E-mail americas@nt-instruments.com



Digilyzer DL1

View the entire line of NTI Products at:
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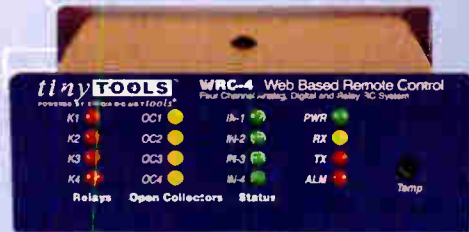
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Control Freaks



VAD-2

The tiny TOOLS VAD-2 is a user programmable two-input multi-number voice/pager auto dialer with integrated stereo silence sensor, designed for dial out paging and/or voice message notification. The VAD-2 is equipped with two dry contact inputs and stereo silence sensor, which, when tripped, will sequentially dial a pager and/or up to four different phone numbers and play back a user recorded message corresponding to the tripped input. The VAD-2 also provides two SPST one amp relays for the control of external equipment.



WRC-4

The tiny TOOLS WRC-4 is a fresh approach to remote site monitoring and control, or providing an inexpensive solution to Internet enabling your present remote control system. The WRC-4 combined with web access and your favorite web browser brings you the following features; A powerful built-in web-server with non-volatile memory; 10/100base-T Ethernet port; four each channels of 10-bit analog inputs with a large monitoring range; optically-isolated status (contact closures or external voltages) inputs; normally open dry contact relays; open collector outputs; front panel status indicators, a single front panel temperature sensor and 4-email alarm notification addresses. The WRC-4 is also SNMP enabled. The WRC-4 has carefully been RFI proofed, while including the accessories other manufacturers consider optional. The WRC-4 is supplied with removable screw terminals and loaded with a generic web page that may be easily edited by the end user.



Time Sync Plus

The tiny TOOLS Time Sync Plus provides four separate GPS time referenced outputs. The first is a SPST relay, which pulses at 12:00, 22:00, 42:00, 54:30 each hour and is user programmable in each of four locations for any minute and second each hour. The second output is an active high driver with a 100 ms pulse each second, while the third output is a 4800-baud, RS-232 serial port providing a time zone adjustable hours, minute and seconds time code. The fourth output provides an active high driver in the ESE TC-90 serial time code format. Indicator LED's are provided to display power/valid GPS data, programming mode and time sync relay operation. A Garmin 12 Channel GPS receiver with embedded antenna is supplied.

tiny TOOLS
POWERED BY BROADCASTtools®



SRC-2/SRC-2x

The tiny TOOLS SRC-2 interfaces two optically isolated inputs and two SPST relays to a RS-232 or USB port, while the SRC-2x does this via a 10/100baseT Ethernet port. Both the SRC-2 and SRC-2x can notify a user's PC software program that any of two optically isolated inputs have been opened or closed and allows your software to control two SPST, 1-amp relays. The SRC-2x is also able to send an email when either of the two inputs change state. The user may also add up to 48 ASCII strings per input and 16 user defined strings per relay. Communication with the SRC-2(x) is accomplished via short "burst" type ASCII commands from the user's PC. Also, two units may be operated in a standalone mode (master/slave mode) to form a "Relay extension cord," with two channels of control in each direction. The SRC-2 communicates using RS-232 at baud rates up to 9600 and the SRC-2x via 10/100baseT Ethernet. The SRC-2(x) is powered by a surge protected internal power supply. Either unit may be rack mounted on the optional RA-1 mounting shelf.



ESS-1

The ESS-1 provides a cost-effective, small profile solution for standard serial-to-Ethernet connectivity. Designed with the broadcaster in mind, the ESS-1 is equipped with extensive RFI protection. It is ideal for applications requiring data support for both RS-232 and RS-422 communications. The ESS-1 allows any device with a serial port, Ethernet connectivity and is ideal as a serial bridge/tunneling or applications where a COM port, TCP Socket, UDP Socket, or UDP Multicast functionality is needed. The small profile of the ESS-1 makes installation hassle-free.



AVR-8

The AVR-8 is a voice remote control system that automatically reports changes detected on any of its eight status inputs to a remote telephone and/or pager. After speaking a greeting message that may identify the source of the call, the AVR-8 then speaks a unique message for each status input. The user may customize each factory-recorded message. After reporting, the AVR-8 is ready to receive commands through your telephone keypad. Functions include telling the AVR-8 to report on the input state of any of the eight status inputs, commanding the AVR-8 to pulse any one of its four SPDT relays for 750 ms and/or turning any one of the relays on or off. When a relay command is given, the AVR-8 speaks the relay 'name' followed by the 'on' or 'off' message.

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Ariane

Sequel – Digital Audio Leveler

www.translantech.com • 212-222-0330

The new Ariane Sequel Digital Audio Leveler is the heavy hitter of AGC levelers.



The Sequel continues the tradition of the original Ariane's unique stereo matrix processing plus a host of new features only possible with an all-digital signal path. The Sequel also operates in conventional left/right stereo and dual mono with independent processing. Being all digital, the Sequel features adjustable sample rate and conversion on its AES/EBU inputs plus savable user presets and complete remote control via TCP/IP, RS-232 and contact closures.

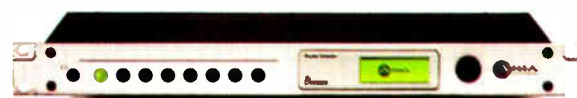
The multi-band, release gated, "windowing" feed-forward RMS control enables the Sequel to create consistent loudness artfully yet powerfully. The Sequel is perfect for controlling sloppy board operators prior to final processing, and for IBOC, streaming and webcasting. Anywhere you need powerful yet unobtrusive leveling – the Sequel has no equal.

Axia Audio

Axia – Audio Router

www.axiaaudio.com • 216-241-7225

Axia makes it easy to build an excellent routing switcher – as big or as small as you



like. It is as easy as adding Axia Nodes (audio network adapters), one or more Ethernet switches (depending upon the size of your desired network), and our PC-based router control package. Build a router as tiny as 16x16 or as large as 1028x1028 or more: the Axia networked approach is modular and so scalable.

Getting your audio into the network could not be easier. Connect your source to an Axia audio node; there are models for use with both analog and AES sources. There is even an Axia node that works just like a traditional X-Y router control panel, but with a big difference: audio in and out is available on the same box. Getting audio from PC workstations is even simpler: using Axia, PCs send and receive audio directly to and from the network – without soundcards or audio converters.

Axia costs a lot less compared to old-fashioned TDM audio routers. Since there is no mainframe, the base cost is low – you can make a small system at very reasonable cost and expand it over time.

Broadcast Devices

CDS-300 & CDS-302 – Audio Switchers

www.broadcast-devices.com • 914-737-5032



The CDS-300 and CDS-302 composite audio switcher distribution systems are designed to switch and distribute TV and FM base band stereo, sub carrier, RBDS, and SAP signals. A brand new option is the CTD-1 module that turns your existing CDS-300/302 switcher into a composite-to-AES converter.

When installed, the CTD-1 bridges the selected composite input and converts it to a pair of AES3 streams available from the rear panel. Continue to use your composite output processor or STL for digital applications such as IBOC. Sample rate is DIP switch selectable. 75 uS de emphasis is jumper selectable.

All CDS series switchers feature a DC coupled signal path, RBDS loop through, and front panel test points. Standard on all BDI products is worldwide standard power entry. Each unit they build is designed to operate on 120/240 VAC, 50-60 hertz.

Broadcast Tools

SS16.16 – Audio Router

www.broadcasttools.com • 360-854-9559

The Broadcast Tools SS 16.16 provides audio routing of 16 stereo inputs to 16 stereo outputs. This type of routing allows



Broadcast Tools SS16.16 Audio Router

any one stereo input to be assigned to any or all stereo outputs. The SS 16.16 may be controlled via front panel encoder controls and/or a multi-drop RS-232 serial port.

A 40 x 4 LCD back lit display provides for input descriptions and macro setup. Additional features: headphone amplifier with front panel jack and level control, front panel monitor speaker with mute switch and level control, internal audio activity/silence sensor with a front panel ACT indicator and rear panel open collector, and a 16 x 16 GPIO port.

Free Windows Net Switch remote control software, which supports both serial/USB and Ethernet with the optional ESS-1 Ethernet to serial converter, is available for download. Installation is simplified with plug-in Euroblock screw terminals.

BW Broadcast

DXPS Mini – FM Broadcast Processor

www.bwbroadcast.com • +44 208-683-6780

BW Broadcast (AKA Broadcast Warehouse) has announced the release of a new low cost FM broadcast processor, the DSPX mini. The mini follows the original DSPX with a 4 + 4 AGC and Limiter processing architecture but with a slightly cut back feature set. While the mini does not offer the analog and digital outputs of the other processors it does however contain the same top specification stereo encoder. At \$1,700, the DSPX mini is arguably the lowest cost EVER DSP FM processor.



The mini is available in a version without the multiband processing. Composite clipping and stereo separation in excess of 75dB are standard. This version is ideal for stations who process at the studio but require stereo generation and peak control at the transmitter site. This version sells for only \$1,150.

For broadcasters at the other end of the scale, the BW Broadcast DSPXtra is a top of the line fully featured processor that contains the world renowned "award winning" Ariane RMS leveller and a new 6 band limiter section.

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www.inovon.com • 831-458-0552

Third-generation "DAVID" processing brings the FM broadcaster affordable,



comprehensive audio processing in a simple, easy-to-use package. The firm's original DAVID was launched in 1992 and followed by the popular DAVID-II in 1995. Features of this updated product include "gain-riding" AGC, 3-bands of compression and EQ, the firm's patented PIPP (Polarity Independent Peak Processing) final limiter, and pilot-protected composite clipping.

Spectrum-subtraction frequency division guarantees that the outputs from the three bands combine with flat response and without "crossover swishing." PWM (Pulse-Width Modulation) gain control techniques avoid certain shortcomings of analog VCAs and ensure minimum audio coloration.

The DAVID-III is built entirely from "generic," multiple-sourced and commonly-available parts, an important consideration for field service in out-of-the-way places. Although Inovonics warmly embraces the latest digital technologies, experience has proven many instances of "simpler is better."

Harris

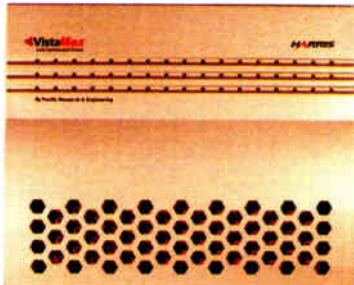
VistaMax™ – Audio Management Platform

www.broadcast.harris.com • 800-622-0022

The heart of Harris' studio product portfolio is its popular PR&E VistaMax™ family of products. The VistaMax platform simplifies network audio management by allowing radio stations to connect sources and destinations to the system over the shortest path, eliminating or reducing stand-alone routers, distribution systems and long multi-pair bundles.

Harris offers a vast range of VistaMax networked products, including the new VistaMax Control Center software panels for commissioning and management of the VistaMax networked audio management platform. The new software panels provide access to VistaMax switching over an individual PC workstation or across a corporate LAN, further increasing user flexibility and saving valuable rack space.

Several Harris PR&E consoles connect to VistaMax. Users can incrementally grow the number of consoles within a VistaMax system and mix and match different sized consoles for maximum flexibility.



Henry Engineering

USDA 2X4 – Stereo Distribution Amplifier

www.henryeng.com • 626-355-3656

Henry's USDA 2X4 is a versatile and compact stereo distribution amplifier for analog audio signals.

USDA 2X4 has two balanced inputs and four balanced outputs

(two stereo pairs). Each stereo output pair has a Stereo/Mono mode switch, and can operate in either Stereo or Mono output mode. From a stereo source, USDA can produce two stereo outputs, four mono outputs, or a combination of both. A mono source will produce four mono outputs. Each output has a Level adjustment for calibration of output level.

The USDA 2X4 is powered with a built-in AC power supply (no wall wart), and is 1/3 rack width. It can be rack mounted using the optional rack shelf, which holds up to 3 units in 1RU. Henry Engineering will soon announce Digi-DA 2X8, a new 2-input, 8-output distribution system for AES/EBU digital audio signals.

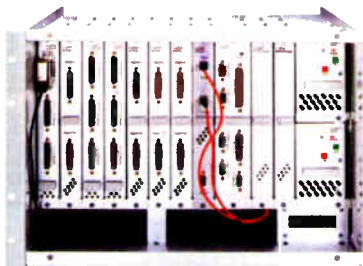


Logitek

Audio Engine – Audio Router

www.logitekaudio.com • 713-664-4470

The Logitek Audio Engine is an expandable, networkable router with analog or digital inputs/outputs. It provides up to 24 mix-minus busses per control surface, EQ and dynamics processing, simple assignment and selection of audio sources, and (unique to Logitek) full scripting capability enabling execution of complex commands on a single button press or contact closure.



Logitek Audio Engine

The Audio Engine now supports 16-character source names for all of its controllers including the digital console line, enabling the use of "meaningful" names rather than abbreviations. Control surfaces include the Mosaic, Numix and Remora digital consoles; router control heads for selection of sources and destinations include the Route3, the Route-XY, and the Button-12.

A variety of "virtual" PC-based controllers is also available including the vMix control surface, vScreen drag-and-drop interface, vRoute and other software options.

Omnia Audio

Omnia 6 EXi – Audio Processor

www.omniaaudio.com • 216-241-3343

Omnia EXi processors enhance and simplify the HD Radio audio chain and add essential new tools for HD Radio broadcasts, while simultaneously increasing the clarity and listenability of conventional AM and FM broadcasts: an onboard Diversity Delay method which simplifies and protects the broadcast signal of HD Radio for AM and FM, and an advanced new clipper design engineered to help eliminate Intermodulation Distortion (IMD).



The Omnia-6 and Omnia-5 EXi audio processors combat the problem of synchronizing the analog and HD Radio signals in the receiver with the built in Omnia Diversity Delay feature, incorporating Diversity Delay into the audio processor and moving it out of the HD Radio exciter.

The Omnia LoIMD Clipper works through the use of "intelligent" algorithms that actively adapt to signal content and density, producing sustained audio signals that don't inter-modulate among other spectra. The overall effect is retained loudness and punch, along with the clarity and detail that listeners demand.

Orban

Optimod-FM 5300 – FM Audio Processor

www.orban.com • 480-403-8300



The New Orban Optimod-FM 5300 put coveted five-band and two-band Optimod processing into a single rack unit package and brings it to the market at the most affordable price ever. Quality sound is what 5300 is all about, sound that attracts audiences by providing a polished, professional presentation regardless of format and source material.

Exceptional versatility allows stations to adjust the processor's audio texture to brand the audio, knowing that the resulting signature sound will remain consistent, cut-to-cut and source-to-source. Branding builds businesses and no other processors have the consistency to brand sound like Optimods.

With the 5300, signature sound is just a preset away. An easy, one-knob Less/More adjustment allows stations to customize any factory preset, trading cleanliness against processing artifacts according to the requirements of the market and competitive environment.

Orban

Optimod-FM 8500 – FM Audio Processor

www.orban.com • 480-403-8300

Introducing Optimod-FM 8500: Orban's new flagship processor and the next step beyond the Optimod-FM 8400. The 8500 builds on the



proven, competitive sound of 8400 version 3 while adding features that make it the ideal choice for FM stations simultaneously transmitting iBiquity's HD Radio®, Eureka 147, or a netcast (where it works particularly well with Orban's aacPlus® Opticodec-PC® LE). "Under the hood," we redesigned all of the circuitry using the latest components. We also doubled the DSP power, so the DSP not only supports the new features but also provides comfortable headroom for future DSP improvements.

Featuring versatile five-band and two-band processing for both analog FM transmission and digital radio, the 8500 provides the industry's most consistent sound, track-to-track and source-to-source.

The New Orban Optimod-FM 8500 provides stereo enhancement, equalization, AGC, multiband compression, low-IM peak limiting, stereo encoding, and composite limiting.

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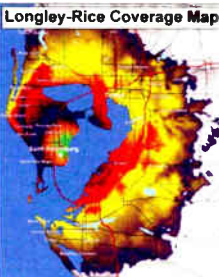
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2005 Radio Guide Event Calendar

List your radio or broadcast events, meetings and conventions here.

Email your information to:
radio@rconnect.net

2005 NAB Fall Radio Show

September 21-23 – Philadelphia – www.nab.org

33rd Annual SBE Chapter 22 Broadcast Expo

September 28 – Verona, NY – www.sbe22.org

Audio Engineering Society (AES) Convention

Oct 7-10 – New York, NY – www.aes.org

Madison 2005 Broadcasters Clinic

Oct 11-13 – Madison, WI – www.wi-broadcasters.org

SBE National and 2nd Annual Engineering Expo

Oct 19-20 – Grapevine, TX – www.bee2005.org

Pittsburg Chapter 20 Regional SBE

Oct 20th – Pittsburgh – www.broadcast.net/~sbe20

Boscon 2005 Boston SBE Regional Convention

Oct 25-26 – Marlborough, MA – www.bos-con.org

Collegiate Broadcasters Inc. (CBI)

October 27-30 – Hyatt Regency, New Orleans, LA
www.collegebroadcasters.org

SBE Chapter 16 Regional Convention

October – Seattle – www.broadcast.net/~sbe16

Pennsylvania Assoc. of Broadcasters Eng. Conf.

November 3 – Hershey, PA – www.pab.com

CAB-2005 Canadian Assoc. of Broadcasters

November 6-8 – Winnipeg – www.cab-acr.ca

3rd Annual Ohio Engineers Conference

November 14 – Columbus, OH, Marriot Airport
Patricia Geary – 614-228-4052

New Software Release for Axia SmartSurface

SmartSurface has a new software feature guaranteed to warm the hearts of control freaks everywhere. SmartSurface version 2.5 software adds dynamic voice processing – compression, de-essing and noise gating designed by Omnia Audio – to supplement the SmartSurface 3-band parametric equalization features.

SmartSurface gives talent the power to customize the control surface, choosing where to place often-used sources, or assigning favorite monitor sources to headphones and speakers. Now, talent can also customize their mic channel to suit their personal preferences and recall their personal “Show Profile,” complete with voice settings, for use anywhere within the facility.



Other new features in SmartSurface v2.5 software include enhanced control of automated playout systems, even more powerful set/save/recall functions, and the ability to stop and start multiple pre-defined audio sources with a single button-press – perfect for morning-show or talkshow producers.

The award-winning SmartSurface Studio Control surface resembles a traditional on-air console, presenting operators with familiar controls while providing dynamic new functions that help automate and streamline fast-paced radio production. SmartSurface has 16 fader channels which can be instantly assigned control of any audio source in the networked studio complex, providing near-complete control for mixing, routing, playback, recording, editing, phone control, remote codec operation and more.

SmartSurface works with the Axia IP-Audio system, which allows broadcasters to build audio networks of any size using standard Switched Ethernet to connect a few rooms – or an entire facility. Because an Axia audio network can carry hundreds of digital stereo audio channels over standard CAT-6 cables, much of the cost normally associated with wiring labor and infrastructure is eliminated.

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The all-digital 8400 offers unbeatable consistency from source to source.

Optimod-FM 8400
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Consistency, in terms of both tonal balance and loudness, is what makes a radio station's programming flow, giving it the polished, produced sound that says "big-time" to its audience.

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For more information on complete end-to-end digital radio solutions including the Orban Optimod-FM 8400 *Signature Series* call us today at 1-800-622-0022.

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