

Radio Guide

Radio Technology for Engineers and Managers

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May 2004

Volume 12 Issue 5

NAB 2004: Focus on Digital Radio



NAB 2004 – Reports by Rob Meuser and Cornelius Gould

Pages 4/6 – At the 2004 NAB engineering sessions, presentations dealt with an improved PDM AM transmitter, reducing incidental phase modulation and improving AM transmitter bandwidth to support EER. There were new improved receivers, magic chipsets and the broad-banding of antennas.

The Radio Guide Tech Initiative

The advancement of our industry depends upon each of us "giving something back." Whether it is training others, sharing our experiences, or just helping our colleagues, radio engineering is better off when we share.

Radio Guide has undertaken a "Tech Initiative." The initial information about the program and some of the manufacturers who have offered to help is on page 5.

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Radio Guide

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A Logger's Tale

Page 13 – One of the things that separate Canadian and U.S. broadcasters is the use of logger machines to record everything that goes "over the air." I guess it is no secret that we use loggers north of the border, because we *have* to.

Radio in Motion

Page 20 – The Remote: taking the radio station out on the road. Anyone who has worked a remote broadcast knows for sure that when you leave the cozy and comfortable studio, anything can happen – and usually does.

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Radio Guide

Volume 12 Issue 5

May 2004

A Technical Initiative

A common complaint heard these days is how difficult it has become for engineers to network and learn from one another. There are a number of reasons for this view:

1. Heavy workloads.
2. Fewer opportunities for education.
3. Companies which discourage information sharing.
4. Engineers who do not know how to contribute.

The SBE is planning some efforts to improve the education available to working engineers. But with reduced technical staffs and fewer engineers attending the major trade shows, it is difficult to find a good venue to share information on the new technologies beginning to permeate the field, such as digital audio and RF systems.

Corporate policies can make things harder, as more and more restrictions are placed on engineers, lest they divulge some arcane "trade secret" such as their normal Plate Voltage. Already some folks are having a harder time getting re-certification points, as they find the "publishing" door closed to them by corporate edict.

Are we in danger of having engineers from one company forbidden to talk to those of another company? Or discouraged from being SBE members, since they might divulge some "proprietary" information like the type of transmitter their company is buying?

The advancement of our industry depends upon each of us "giving something back." Whether it is training new ones, sharing our experiences, or just helping our colleagues, radio engineering is better off when we share.

Radio Guide has undertaken to try to help improve the situation. We call it our "Tech Initiative." In the coming months, we hope to engage your support on our quest. The initial information about the program and some of the manufacturers who have offered to help is on page 5.

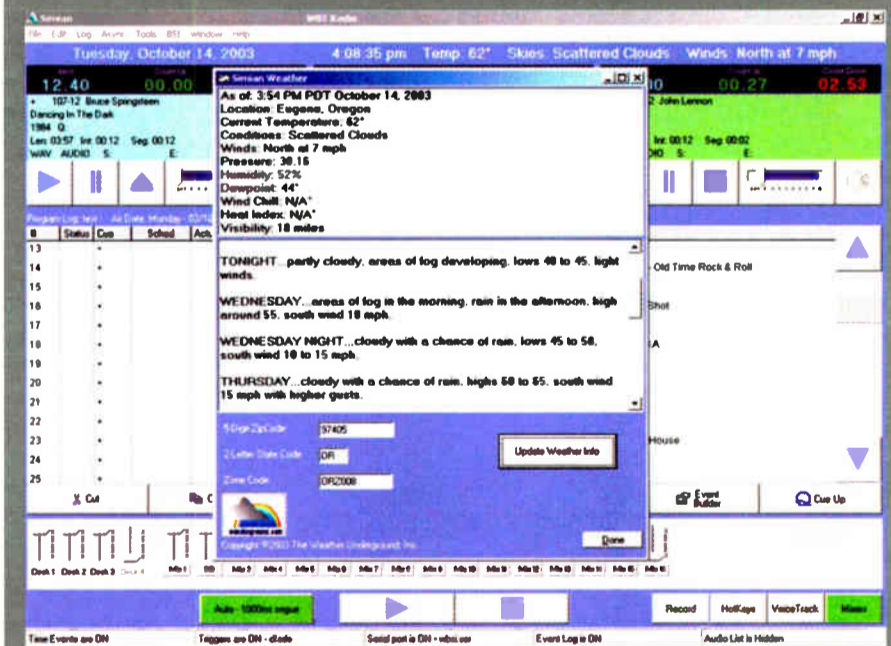
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Being Digital in Vegas NAB 2004

by Robert Meuser

[LAS VEGAS, Nevada - May 2004] At the 2004 NAB engineering sessions, presentations dealt with an improved PDM AM transmitter, reducing incidental phase modulation and improving AM transmitter bandwidth to support EER. There were new improved receivers, magic chipsets and the broad-banding of antennas. Wait, this must be NAB 1984 and we are talking about AM stereo. No! It is 2004, and we are embracing digital radio.

BACK TO THE FUTURE

Digital was the focus of the technical presentations and the trade show at NAB 2004. Digital radio broadcasting uses a form of QAM for transmission regardless of the system used. It is necessary to apply advanced AM techniques to transmit the signal. On medium wave frequencies this requires a very clean transmitter, and manufacturers are responding with newer designs to achieve this goal.

DRM and IBOC have virtually the same requirements and transmitter manufacturers are addressing both markets. A paper presented by H. Donald Messer of the IBB/VOA described an in-band on-channel version of DRM that can deliver the digital signal with much higher power than IBOC, thus improving the reach of digital radio.

Since very linear transmitter performance is crucial in digital transmission, Tuesday's papers addressed the various aspects of this at both AM and VHF frequencies. Phil Schmitt of Harris compared the spectrum of various types of transmitters using both IBOC and DRM. He also showed methods of expanding two-tone IM tests, which will expose poor out of band performance. For IBOC in the FM band, the digital component needs a linear amplifier. David Maxson of Broadcast Signal Labs showed some of the effects of not having enough linearity in the transmitter.

NEW PRODUCTS ON DISPLAY

Every major manufacturer had HD ready transmitters – some had second-generation exciters. Of note is the new DRS Continental 5 kW solid state FM specifically designed to handle IBOC requirements and the Harris series of low power linear transmitters for those broadcasters who require a separate IBOC transmitters for either combined or separate antenna applications.

ERI displayed their dual feed antenna, backed by a paper discussing the test results of the antenna. A unique power distribution scheme allows digital and analog transmitters to feed the same side mount antenna without a high level combiner.

Next year, we should see higher efficiency combined FM/IBOC transmitters and exciters that do analog and digital in one box, perhaps including the new MPX interface (developed by Omnia Audio and Nautel) which sends a digital composite signal from a processor to the exciter without the need to reprocess inside the exciter.

A lot of product is available to build new digital studios to go digital. Telos, SAS and Klotz each offer solutions all but eliminating massive amounts of cable – cutting build costs and reducing construction time while making the digital plant far more flexible.

DIGITAL ON THE AIR

Texas Instruments is aggressively addressing digital receivers. They presented a paper on a DSP solution that is a complete digiceiver for analog transmission as well as decoding the digital signal. A software radio built around a DSP core, it addresses all forms of digital broadcasting. A receiver using the technology for IBOC reception showing improvement of analog AM reception will come along with digital reception and improved analog FM.

What about IBOC in the real world? Tom Ray of WOR shared his experience in driving around the New York area with an off-the-shelf consumer grade IBOC receiver. To paraphrase Tom, the "Wow!" factor on AM is apparent – improved fidelity. But what about FM? Tom shared his observations of drastic improvement of FM on the multipath laden West Side Drive in New York City.

However, real world IBOC has another side. Herb Squire of DSI RF systems revisited dueling algorithms in digital broadcasting. Tapes of various cascades of coding schemes with real over the air IBOC signals reveal much work needs to be done on the studio and distribution side. Squire suggests linear coding the entire chain right up to the IBOC encoder.

Among potential incentives to drive a digital conversion is 5.1 surround sound as demonstrated live at the LV Hilton by Omnia Audio and the PBS "Tomorrow Radio" Project. They demonstrated two separate program streams, complete with separate metadata for each program, over one 96 kbps IBOC stream. Harris provided the hardware and Dalet had a system to deliver the two programs plus the streaming metadata. Other potential applications would use as much of the digital stream as possible to push data.

LOOKING AHEAD, LOOKING BACK

How successful will the digital transition be? There are almost as many answers as NAB attendees. Despite many new and exciting possible features, we already can see the Eureka 147 system is not attracting listeners in many places, except where new content is being delivered. IBOC, with the exception of the "Tomorrow Radio" concept, does not have the capability to deliver separate programming.

Many think features will drive a transition to new radios. Others believe good quality inexpensive radios powered by inexpensive DSP chipsets will cause IBOC demodulation to be delivered to all new radios by default, permitting broadcasters to turn on digital as easily as buying a new audio processor. Others have concerns about interference or the inability to interest the general public with the same old programming. Only time will reveal the true outcome.

Looking back on the show, what was learned? Better transmitters, and better, broader antennas are being built. We can build a digital plant with less time and cabling than analog. Better DSP based radios are here. Will the digital transition happen? The debate rages, but these same technologies make for much better analog radio. It appears radio will be better off either way.

Robert Meuser is a long time radio engineer and consultant based in New York City. He can be contacted at: robertm@broadcast.net

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The Radio Guide Tech Initiative

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

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



- Audion Labs VoxPro Digital Audio Editor
- Broadcast Warehouse DSP-X Digital Processor
- Comrex DH-20 Digital Phone Hybrid
- Henry Engineering Studio Drive Mixer
- rfSoftware rInvestigator (full package)
- Orban Optimod 1100 Processor Card



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



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Digital Advances at NAB 2004

by Cornelius Gould

[LAS VEGAS, Nevada - May 2004] Along with many of the 97,544 (according to the official NAB figures) attendees at NAB 2004, as you can imagine I was greatly interested in what is happening on the digital radio scene both here and abroad.

While IBOC was a major focus at NAB 2004, DRM continues to roll out on Shortwave and Medium wave services worldwide. The latest DRM advancements involve encoding techniques to provide IBOC style compatibility with existing analog radio services, only using the open source DRM technology for transmitting the digital portion of the programming.

The nice thing I find about DRM is that it is a world wide standard (including here in the States), and if AM-HD does not catch on for whatever reason, there is still DRM left to try. With the latest advancements in the works, it seems to be shaping up to be a real alternative if need be!

WILL THE LISTENERS GET EXCITED?

Among the interesting things I heard discussed at the various digital radio seminars was Philip Laven's presentation. Laven is the Technical Director of the European Broadcasting Union. The stories he shared of his experiences with rolling out DAB in the UK, during his tenure with the BBC, were interesting. One story in particular interested me a great deal: How did the general public react to digital radio?

One of his stories seems to agree with some predictions made about the future of the IBOC system over on this side of the pond. He noted that early on in the rollout of the digital radio service, the BBC and other broadcasters were basically simulating existing services over their digital channels. During this time, the general public had a "ho-hum" reaction. As soon as radios became available, there was some interest in DAB.

However, it was only when broadcasters began transmitting programming you could *only* get on the DAB service that things started to take off for DAB in the UK!

Now, the DAB service used in the UK is quite different than what we have here with IBOC, but the BBC's experience can be a lesson for us in the US: IBOC needs something to set itself apart from its analog service. For AM IBOC, it is the promise of better (FM-like) sound. For FM, it has been better sound, but not much of a noticeable difference for most people.

5.1 OVER THE AIR

The Fraunhofer Group (FhG) may have hit on something that could work quite well for FM-IBOC. The transmission of 5.1 surround sound. There is an ever-increasing library of albums produced (or being re-mastered) in 5.1 surround sound, and the production quality on the majority of releases is quite amazing. An interesting trend these days in car audio is to have a DVD video system installed, and (naturally) people are wanting to take their 5.1 surround movie audio with them.

As these people start to take these 5.1 digital albums on the road, they will no

doubt be amazed at having the "entire band" in the car with them. Now FM radio has the chance to bring the same experience to them with FM-IBOC.

I had a chance to hear the demo, and what 5.1 surround sound for music solves is that "hole in the middle" effect. Now until you hear albums re-mastered in 5.1 surround, it is kind of hard to imagine what the big deal is. Once you hear it, it will change things big time for you!

A NEW WAY

My first impression: it will change the way we do audio processing, as that "hole in the middle" – the lack of a center channel – is what we are really trying to "fill in" when setting up liberal amounts of audio processing.

Recommended listening: Steely Dan's 5.1 version of the "Goucho" album. It is well worth the test drive!

The way the better 5.1 masters work is this way: The three front channels (the left/right/center) speakers set

up the forward sound stage. The two rear channels are basically used for the stereo left/right effects. This setup can also produce effects where sounds surround you and "spin around your head." Quite amazing.

I was never really impressed with quad. The effects that quad was able to produce were less than spectacular to my ear. In contrast, the FhG/Telos demonstration of Fraunhofer IIS's proposed FM-HD 5.1 system was quite impressive, and can work with the existing FM-HD CODEC. This could be something that could get people excited enough to run out and buy IBOC radios!

Finally, I would like to say that it was really great meeting many of our readers, and I have enjoyed hearing all the positive responses on my audio processing series. I enjoyed hanging out and learning the latest technical news/advancements happening in our industry both here and abroad. Perhaps we will meet there next year.

Cornelius Gould is a regular contributor to Radio Guide.



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Field Guide

rflnvestigator

by Dana Puopolo

[SANTA MONICA, California - May 2004] rfSoftware has released version 2 of rflnvestigator. This amazing program allows anyone to become an expert on FM studies.

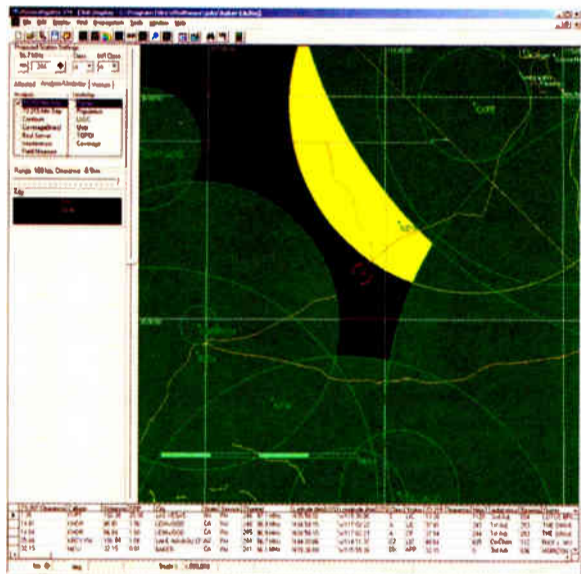
Yes, it has the features common to many other programs (spacing studies, interference studies, etc.) but that is where the similarity ends. This program is by far the most intuitive of the bunch. I was able to use it five minutes after dropping the program CD in my PC (it ran quite well on a P4 1.5 gig with 256 megabytes of RAM running Windows XP Pro for my operating system). I have spoken with rfSoftware and know it also runs well on Windows 2000 and 98.

TEST DRIVE

Though there is a lot of documentation for the program (both written and in the help files), I immediately wanted to play. Within 10 minutes I had identified several FM vacant allotments where I thought none had existed.

Doing an FM spacing study is simplicity itself. First, you put in either a set of coordinates or a city and state. If you do the latter, it automatically searches its database and lists all the facilities from that city, allowing you to easily use any of them for its reference coordinates. Next, you select 73.207 spacing for your study, the class of station you want – it handles all FCC FM station classes including LP-100, LP-10 and all Canada and Mexico classes of stations – and finally tell it to find all available channels.

Within seconds, a tabulated list pops up showing all FM channels, tabbed by clearance. Also, a map appears for each channel showing all the stations involved and their distance circles. Each is in a different color. You can also color the entire area within each curve, making it easy to find the “black hole” areas between them. As you move the mouse on this map, the longitude and latitude change at the bottom of the page.



Updating the study for each particular channel is as simple as putting the mouse somewhere on the map and left clicking. Within seconds a new study is created. This makes it very easy to find open allotments. In several cases, I found open channels that literally fit by one geographic second.

The software also allows you to set an offset (the FCC requires a petitioner to round up or down to the nearest kilometer when doing a spacing study). It is fascinating to watch the software do its thing, which it does quickly and accurately. Finally, it automatically saves each job on your hard disk. The program is worth buying for just this part.

CAPABILITIES

Okay, I can hear some of you saying: “Great, but the software I have now can do that stuff already. What’s so

special about this program?” First off, these days, just doing a distance separation study is not enough; the FCC will return any Petition for Rulemaking if there is any terrain blockage between the reference coordinates and any part of the proposed city of license.

Determining this with rflnvestigator is a snap! You simply hold down the left mouse button while moving the mouse to the desired city boundary (which can easily be seen on the map). Releasing the mouse button results in a window opening that shows a terrain profile and the distance between the two points!

You can even add in height to model the tower elevation. This one tool can eliminate hours of work that you would have to do using other programs. Thirty second terrain data is standard; three second is available as an option to the program.

The second thing on which the FCC is cracking down on is City of License coverage. The 70 dBu contour circle had better cover every single inch of the COL or the FCC will return the Rulemaking Petition (I found this out the hard way when one of my rulemakings was returned – because it only covered 99.85% of the proposed COL!). With rflnvestigator, a few mouse clicks are all that is needed to confirm city grade coverage. Each city boundary is accurately identified on the screen map. Everything is tabled for you automatically.

With this software, I was able to prepare a Rulemaking Petition from scratch in under 10 minutes. It is that good. One thing I would recommend is a mouse with high resolution; most standard ones will not do this program justice. I used it with a drafting tablet and was able to get resolutions better than one geographic second.

POSSIBILITIES

Okay, maybe you already have your FM station. You could care less about doing a rulemaking for a new frequency. Or, you are a non-commercial broadcaster looking to find or upgrade a station. Perhaps you are looking for a space to site a translator. rflnvestigator will prove its value even more when doing these tasks.

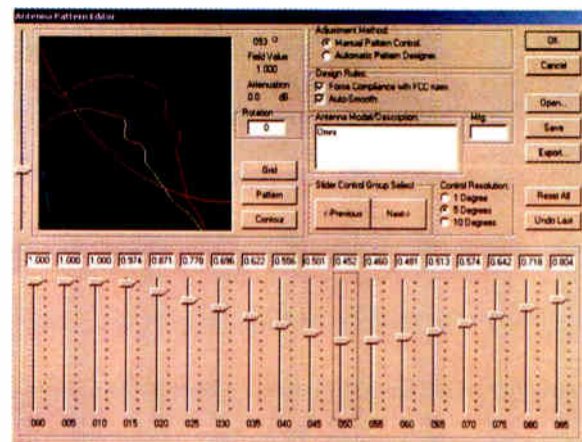
Doing an FM interference study is just as easy as doing a spacing one! When in the interference mode, you can choose your existing contours or elect to short space. The same interactive mapping is used when doing these studies. White area, coverage area and population counts can be added with a few mouse clicks. Nearby AM station towers can be shown with the required limiting circles (.8 km for ND; 3.2 km for DA).

Again, for an engineer like me, it was cool to just sit there and do “what ifs” for stations I have worked for (or would like to work for). You would be amazed at how many FM stations can upgrade, but have no idea of what is possible. I was even able to confirm that a full power non-commercial station fits in my old back yard in Massachusetts!

GREAT ANALYZER FEATURE

The good news is that I have saved the best part of this software for last – the main thing that sets this program apart from all the others: its directional antenna modeling. When you select this option, you open the most powerful desktop FM contour analyzer I have ever seen.

You use the program by moving a set of sliders that literally allows you to create a pattern as simply as changing EQ curves on a graphic equalizer! Move one slider back and forth and the contour moves in and out in real time. The software automatically adjusts the null curve(s) for the FCC limit of 2 dB per 10 degrees of azimuth. All necessary contours are automatically shown and computed. Also, coverage area and population counts are automatically generated in real time.



It can do any (or all) of these calculations using FCC methodology. The interactivity of this is just amazing! It does in a few minutes what used to take a consulting engineer many days to do! Do you think your FM station is maxed out? This program might well cause your eyes to open wide! Indeed, doing just one custom DA at one station can easily justify the cost of the entire program many times over.

The rfSoftware web site (www.rflnvestigator.com) has a movie available for downloading that shows just how easy this feature is to use. I highly recommend going there and taking a look.

ERROR CORRECTION

I know it sounds like I am describing the perfect program; actually it is only close to perfect. Its main shortcoming it shares with all the other standalone software programs: reliance on FCC databases. As you may know, FCC databases have an annoying number of errors.

rfSoftware corrects the ones they discover and it is easy to update a database entry from the program (which will be stored in the database file), but it is just not possible to find every error and invariably they creep in. All software programs like rflnvestigator share this “feature.” rfSoftware updates their databases daily and sells them for a nominal fee, or you can buy their optional DB-Builder module and download data direct from the FCC at any time. I was provided a copy of DB-Builder and found it works smoothly and well.

This software can be used for just about any aspect of an FM station. It even has the capability to do STL shots (remember, they are much more complicated to file these days).

From what I can see, the only persons who will not like this program are the Consulting Engineers, who stand to lose a lot of business because of it. Of course, they probably own a copy already. If I owned a group of stations (more than two), I would buy this program just to have it ready. Its reasonable cost is a great investment in your FM station.

TALKING TO THEM

Finally, my experience with the gang at rfSoftware has been great. They have bent over backwards to explain things to me about the program, and offer help whenever I have asked. They always quickly respond to emails and phone calls.

Of course, being a reviewer makes me wonder if they treat every customer as well. While at the NAB show, I went over to their booth several times and my suspicions were happily confirmed; every person who showed up was treated with courtesy and enthusiasm. It is quite obvious to me that Joe and Jennifer are quite excited about their “baby,” proudly showing off its features to anyone and everyone who was interested. Indeed, at one point the hall had closed and Joe did not want to stop.

After seeing them (and the program) in action, I have no doubt whatsoever that any customer will receive outstanding service both before and after the sale from everyone at RF Software.

I highly recommend this software. It is easy to use, yet incredibly powerful. If Clear Channel, Infinity, Cumulus, Entercom and Citadel do not already have it, why not? It is the best “bang for the buck” you can possibly buy. My only regret is that my demo was time limited, (though I was begging Jennifer for more time).

In short: Highly Recommended.

Dana Puopolo is the Los Angeles Chief Engineer for Multicultural Radio Broadcasting Inc. He can be reached at dpuopolo@usa.net

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Line Sweeping

by Gary A. Minker

[LAKE WORTH, Florida - May 2004] OK, so you have been in the broadcasting business all your life and you have "been there, done that and seen it all," right? That is like telling an avid Amateur Radio Licensee that Ham Radio suffers from a lack of new things to do or learn. In this case, let me introduce you to Line Sweeping; it is more than just fault locating.

What is it? What do you do with it? What can you learn from it? What earthly good does it do for you to bother having it done? Questions, questions. So, even if you have been in the R.F. business all your life and you truly are the know all, see all, and tell all, continue reading these next several articles and we will see if we can teach you a thing or two.

WHAT WE USE

Before we can get to the technical part, we need to know something about the equipment that will be used. The most basic of test sets is known as the Time Domain Reflectometer or TDR. This device comes in two basic flavors: half sine pulse and stepped (or square) pulse types. The half sine pulse models are good for telling you whether an object in the line is inductive, capacitive, or just resistive – and it does an A-OK job of telling you where that bump in the line is.

The stepped/square pulse models will tell you the actual impedance of the transmission line, and the impedance of that little anomaly that you just located. The step pulse units tend to be a bit more accurate but both are very commonly used in the practice today. Unfortunately both of these units do not offer testing in the frequency domain and utilize a complex characteristic called the surge impedance of an object which is very much related to a DC response. Frequency sensitive parts all come out testing like big lumps, which is nice if you like your mashed potatoes that way and are only looking to identify "things" in your line.

The big gun of testing is the Vector Network Analyzer with an accompanying "S" parameter test set. This unit comes in only one basic flavor: expensive. Here are two examples of such of units.



This type of analyzer will deliver 14 types of graphs and tell you virtually everything that you could possibly need to know about your system.

LINE SWEEPING BASICS

Let us spend a brief moment on the basics, for those souls that do not have the experiences of a lifetime. Line Sweeping is the art of testing a transmission line (of any kind) and the load (of any kind) for proper

operational characteristics as far as the electrical specifications are concerned, covering the absolute impedance as far as 50 j0 Ohms is concerned (which is the theoretically perfect number in a typical 50 Ohm transmission system).

Line Sweeping can also be used for other impedance systems: wave guide, twisted pair, small diameter coaxial cables and every other concentric type of distribution system known on the planet – even open wire feeders for you AM guys. The type of system involved and the operating criteria will dictate the type of testing equipment to be used and the test parameters that need to be utilized. We will talk briefly in this article about the basic types of line testing equipment and the goals for this exercise.

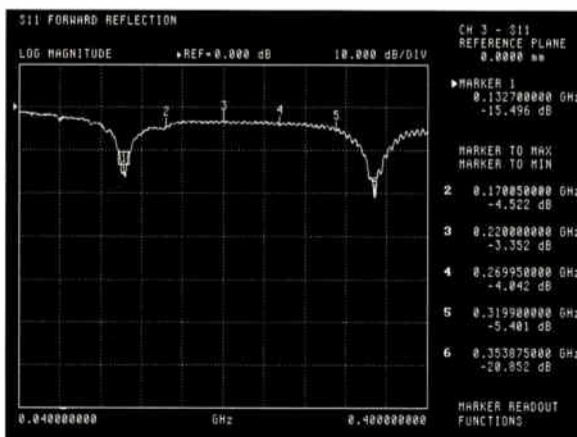
Among the important questions you should ask when considering doing a proper line sweep are:

1. What do I look for in a Contractor?
2. What kind of equipment should he have?
3. Does he have the right kind of equipment?
4. Does he know how to use the equipment?
5. Does he have references?
6. Does he display knowledge about your type of system from experience?
7. What are my responsibilities to this endeavor and how can I make the experience count and maximize the effort on every ones part?
11. What do I know about my own system?
12. Do I have adaptors that might be required to test my system?
13. Will I need to shut down any systems on my tower or other adjacent or co-located systems nearby?
14. What Impedance is my system? (No, that is not a joke question.)

These and many more questions will be touched upon as we move along. We will concentrate our initial focus on coaxial systems.

LOOKING AT A SWEEP

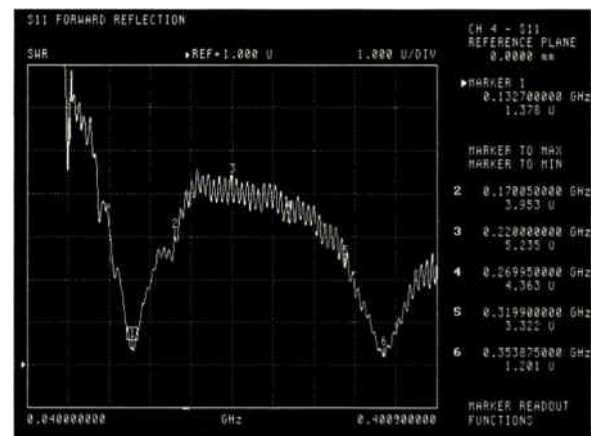
In a perfect world a great line sweep will tell you two things: the quality and characteristics of the transmission system in question – and it will do it with four basic types of print outs. The first, the Log Magnitude Return Loss graph, answers "What is my VSWR?"



This graph has a scale that runs from 0 dB toward the bottom of the graph with increasingly negative numbers to indicate better responses. You can expect a negative number such as -15.7 dB for a translated VSWR of nominally 1:1.5 – or in English 1.5 to 1. This Log-Mag graph is set up in frequency from lower to higher (left to right) and from the top of the scale being 0 dB or infinite VSWR downward to the better num-

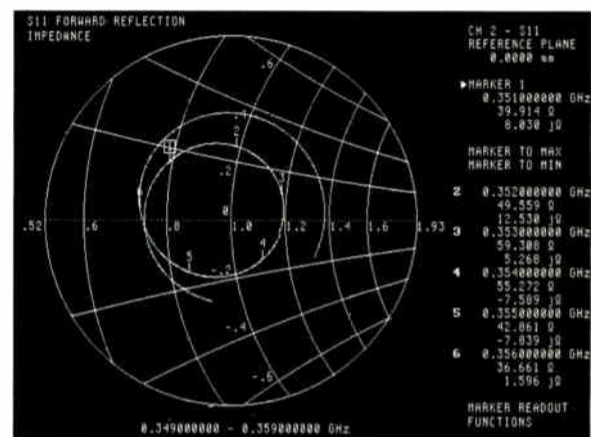
bers. The bigger the negative number, the better your line. -37 dB is a very nice number.

The next graph will be the simple VSWR graph. This graph is also set up from lower frequency to higher frequency, however unlike the Log-Mag graph, the reference line is at the bottom of the graph.



Excursions toward the top of the graph are bad and amblings around the base line are good. VSWR readings of less than 1:1.1 or (1.1 to 1) are considered good, with typical readings of 1:1.02 being much better.

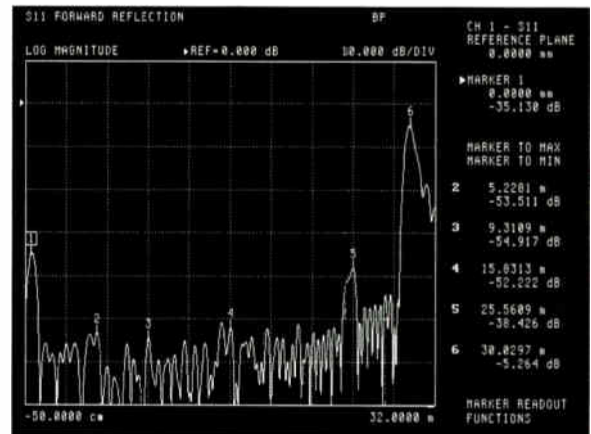
Our third graph is a very technical graph but it will tell you a great many things about your system. This graph is the mysterious Smith chart, displayed in impedance.



The theoretically perfect system will display nothing more than a small dot or very small arc or circle. This small arc or circle will be in the very center of the graph at the region known as 50 j0 Ohms. This graph will tell you the real impedance of the system along with the actual capacitive or inductive reactance.

The fourth Graph is in a Log-Mag format but the lower left to right graph is in distance or in time.

This graph is generically referred to as the TDR or Time Domain graph. This graph will tell you the relative health and return loss of every component in your system both in band and out of band.



It is amazing, with four simple pieces of paper the entire mystery of your antenna system is laid out before you. So, you have these four graphs and hopefully your new friend the line sweeper will be able to answer all of your questions about the system he has just shot. OK, in defense of all line sweepers around the world. We are not clairvoyant. We need some help from you, the system engineer.

(Continued on Page 12)

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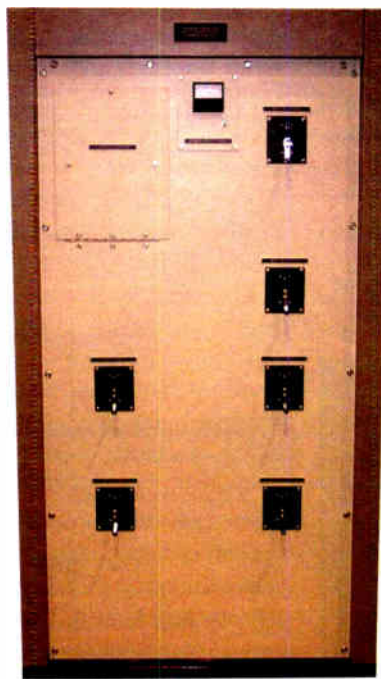
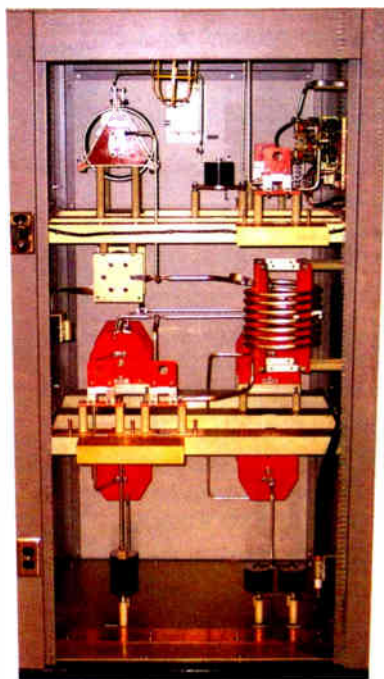
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PCN, Six Months Later

by Dane E. Ericksen

[SAN FRANCISCO, California - May 2004] It has now been about six months since the FCC turned down the SBE request for a second six-month stay of the requirement to apply Section 101.103(d) Prior Coordination Notice (PCN) frequency coordination protocols to 950 MHz aural Broadcast Auxiliary Service (BAS) stations. The SBE requested a second and final stay because the BAS records in the Universal Licensing System (ULS) continued to have around a 30 percent error rate (mostly due to missing data) and a lack of established frequency coordination criteria for 950 MHz aural BAS stations.

Although SBE filed an *Application for Review* of this denial of a second and final stay, the FCC has taken no action on that filing, and it is now clear that, for better or worse, radio stations have been living in a PCN world since Oct. 16, 2003. This article will address some of the fallout of this major change in the licensing of Part 74, Subpart E, aural BAS stations.

NEW WORLD OF PCN

Under the PCN protocols, all aural BAS applications must now include a frequency coordination exhibit. That exhibit must list the call letters of all studied stations and certify that the proposed new or modified facilities will protect (*i.e.*, not cause interference to) all existing stations and pending applications.

Section 101.105(c) of the FCC Rules suggests, but does not require, conducting interference studies pursuant Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB10, "Interference Criteria for Microwave Systems." However, this rule goes on to state, "Other procedures that follow generally acceptable good engineering practices are also acceptable to the Commission." In effect, the Commission has provided a "safe harbor" for PCN studies: If done pursuant to TSB10, then you should not be second-guessed by the FCC.

Unfortunately, the latest edition of TSB10 is version F, published back in June 1994. That standard is now almost 10 years old and is definitely "long in tooth." It does not address modern-day 950 MHz aural BAS applications that can range from single-channel FM monophonic analog STLs with no subcarriers to dual-channel FM analog stereo STLs with multiple subcarriers to digital STLs. Rather, TSB10F is more keyed to common carrier, multiple-voice and paging channel applications, and to TV FM video STL applications.

Although work is underway to create an updated TSB10G, addressing modern-day BAS applications including hybrid analog-digital TV STLs, that work is going very slowly, so do not look for the release of TSB10G anytime soon.

Section 101.105(c)(2) of the FCC Rules states that "...where the development of the carrier-to-interference (C/I) ratio is not covered by generally acceptable procedures, or where the applicant does not wish to develop the C/I ratio...", a co-channel C/I ratio of 90 dB, and an adjacent-channel C/I ratio of 56 dB, must be used. Thus, it would appear that 950 MHz aural BAS PCNs would be obligated to use these extreme, default C/I criteria. Is that, in fact, happening? Only the commercial microwave frequency coordinators (CMFCs) would appear to know, and they are not telling.

PCN PROBLEMS AND GAMES

Recent PCNs seen by this writer only claim to meet "generally accepted engineering criteria," a wonderfully vague term that can mean anything. And, it appears that the FCC is accepting such PCNs. What is the CMFC's

basis or source for these "generally accepted engineering criteria?" Why does not the PCN simply state what co-channel and adjacent-channel C/I criteria have been applied?

Perhaps stations receiving such vague PCNs should routinely respond with an objection on the basis that the PCN fails to explicitly state the interference criteria being applied and fails to explicitly state the C/I ratio calculated for the notified station. Such a practice, if widespread, would quickly put a halt to such vaguely-worded, could-mean-anything PCNs.

Another problem experienced by this writer is the use of "shotgun" PCNs: a PCN is mailed to all BAS licensees within a given radius (or keyhole distance), even if their BAS link is neither co-channel nor adjacent-channel to the proposed operation. This approach appears to be based on de-sensitizing notified stations with a blizzard of PCNs. The result may be that a station receiving a PCN for a new or modified operation that really would be co-channel or adjacent-channel will escape a careful review by the recipient.

Indeed, this writer is aware of a case where a major market TV station received a PCN, which was forwarded by the station manager to the station's engineering consultant (me) with a request to review the proposal. Since the PCN failed to identify the call letters of my client's BAS link(s) that had supposedly been studied, a search of the ULS had to be made to identify the co-channel or adjacent-channel BAS link(s) that had supposedly triggered the sending of a PCN. But, no such co-channel or adjacent-channel links could be found.

Somewhat mystified, an email was sent back to the general manager asking him to identify the BAS links that were involved. The mystery was solved when the station chief engineer responded with an explanation that the station had no fixed microwave links in the 7 GHz TV BAS band in question. At this point, it became clear that CMFC had mailed PCNs to all TV stations in the market, regardless of whether the TV station had a co-channel or adjacent-channel TV BAS link. This episode cost the TV station an unnecessary hour of my time, all because the CMFC was cutting corners in the PCN process.

RESPONSIBLE PCN

The PCN process does not mean that an applicant selects a path, frequency and polarization without benefit of a detailed engineering study and waits to see if notified stations undertake (or have their engineering consultant undertake) their own independent engineering study to see if the notifying party got things right.

Rather, it is incumbent on the applicant to first satisfy itself that the proposed new or modified path will not cause interference to any existing or already applied for link, before burdening third-parties with a PCN mailing. Section 101.103(d)(1) gives guidance in this regard where it states, "...however, the party being coordinated with is not obligated to suggest changes or re-engineer a proposal in cases involving conflicts," but unfortunately does not caution against the sending of PCN "spam" to an unnecessarily wide number of stations.

This writer believes such a practice is contrary to the intent of the PCN process, and if some CMFCs continue to do this, a rule change may be needed to make it clear that an applicant's PCN "homework" is to be done first, and that only potentially affected co-channel and adjacent-channel links are to receive such notices. Of course, this pre-PCN homework should include checking to ensure the proposed new or modified link will not receive interference from any existing BAS link or pending BAS application. Although the FCC only cares that interfer-

ence not be *caused*, and not whether interference might be *received*, the party retaining the CMFC certainly cares.

DEALING WITH MISSING DATA

Another issue is what to do when a to-be-protected link is missing critical information in the ULS. Does that mean the existing link need not be studied, or that some arbitrary receive location, height, of dish type can be assumed? This writer believes that an existing BAS link, even one with missing data, is nevertheless entitled to protection.

While parameters such as receiving antenna height and receiving antenna type can be conservatively estimated, generally that is never the case for missing or bogus geographic coordinates (e.g., alpha data or out-of-range data). For example, if assuming a tall receiving antenna height and a minimally-directive, parallel-polarized receiving antenna for a protected station still shows no predicted interference, such an approach is conservative to the protected station and acceptable. But if the receive-end geographic coordinates are missing or bogus, this data must generally always be obtained, even if that requires considerable effort.

The FCC website has a listing of CMFCs, at <http://wireless.fcc.gov/microwave/coordinators.html>. However, a new CMFC has begun offering PCN services and does not appear on the FCC list: Terrestrial RF Licensing in Tulsa, OK (www.RFLicensing.com - a subsidiary of Clear Channel Communications).

With about 1,200 radio stations in the United States, Clear Channel decided to do its own PCNs rather than retain the services of one or more CMFCs and has now apparently decided to offer CMFC services to stations not owned by Clear Channel. Their brochure suggests that they understand the steps required of a properly done PCN, and this writer wishes them well.

Dane Ericksen, P.E., CS RTE, is the Chairman of the SBE FCC Liaison Committee, as well as Senior Engineer, Hammett & Edison, Inc., Consulting Engineers, San Francisco, California. He can be reached at dericksen@h-e.com

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Radio Puts on a New Look for NAB2004



A New Transmitter from our Old Friend
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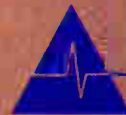


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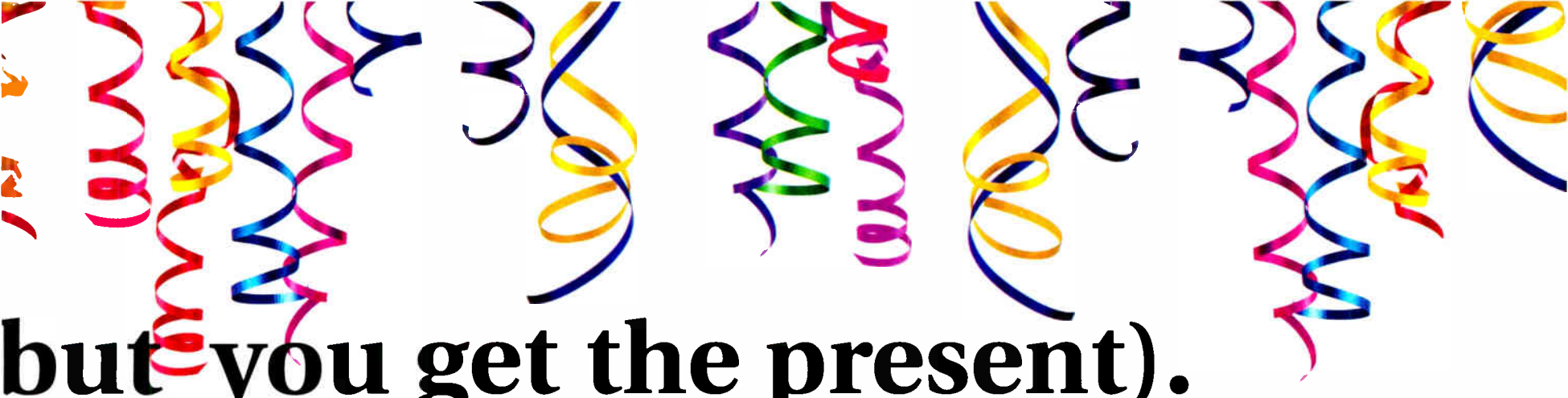
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EAS Watch

EAS: Can't Live With It; Can't Live Without It

By Mark Allen – WSAB President and CEO

[OLYMPIA, Washington - May 2004] It has often been said that America's form of self-governing democracy is the worst political governance system in the world – except for all the others. Much the same can be said of the Emergency Alert System and its highest profile application, the AMBER alert.

Those of us who work with EAS and AMBER alerts every day see the system from the inside, and we notice all of the warts and shortcomings. We hear activations with poor audio. We experience tests in which equipment or operator error causes problems. And while we sometimes wonder if it is not more trouble than it is worth, it really is not our judgment to make.

THE SYSTEM CAN WORK

Ask the families of kids who were recovered because of an AMBER alert. They will tell you this is a terrific system. And countless thousands of people in the Midwest owe their lives to the EAS – those people who raced to higher ground just ahead of floodwaters because they were notified by their local broadcaster through an EAS activation – they are grateful for EAS warnings. These are just two examples.

On the other hand, if you ask the folks in Yakima about the eruption of Mount St. Helens, the things they say about EAS's predecessor (EBS and its infamous "daisy-chain" architecture) are not pleasant. A systemic failure resulted in their learning of the disaster from clouds of ashes raining down on them!

Rather than throw the baby out with the bath water, we need to continue to identify problems and work toward

solutions. The EAS is a very complicated, high-tech endeavor. Few of us recall the problems that seemed so monumental when we first began to design Washington's Emergency Alert System; most of them seem trivial now.

Still, the EAS is so complex, with so many people and emergency response agencies having access to activate the system, that we have created a lot of opportunities for failure. We can only identify so many of them in advance; we need to fix those and aggressively attack the unanticipated problems.

Meanwhile, the use of EAS for AMBER alerts has had an unexpected benefit, which will help further fine-tune the System. For the first time, management and programmers have the EAS on their minds. They are beginning to become engaged in learning about the EAS, its capabilities and its limitations. And they are actively engaged in forging solutions.

Washington recently revised its AMBER Alert State-wide Plan with the input and participation of a number of broadcasters, from management to programming to engineering. Station engineers will now be getting more attention when they press for assistance with EAS.

New opportunities for enhancing the EAS are on the horizon. Washington and Arizona broadcasters are leading in the development of an AMBER Alert Web Portal to serve stations directly from local law enforcement, using "push" technology to deliver information and notification to broadcasters and others who are involved in AMBER alerts.

Satellite delivery of EAS is a reality in some states and is on the agenda in others, including Washington. And the Partnership for Public Warning has issued a lengthy critique of EAS, suggesting a number of improvements that could lead to the integration of several warning systems into one "all-hazards" warning system.

BALANCING THE MISSIONS

Free, over-the-air broadcasters have two conflicting missions – with a certain tension between them. On the one hand, broadcasters must serve the public interest. Delivery of emergency information ties each and every local station

directly into its community. EAS may not always work the way broadcasters would prefer, but when it is used, citizens and public policy makers quickly realize the value of their local broadcasters.

On the other hand, radio and television stations are businesses that must make money to stay in business. It does not help when EAS sometimes does unpredictable things that have a detrimental effect on the ability of a station to be self-sustaining. It is true – you have to do well in order to do good.

As the congressional lobbyist for Washington's local broadcasters, I can tell you there is more discussion now about the public interest obligations of broadcasters than ever before. No one – certainly not broadcasters – is talking about doing away with stations' responsibility to deliver timely emergency information.

However, what they are talking about ought to put our concerns about the EAS's warts into perspective. There are other delivery systems for emergency information out there. Policy makers are aware of them and they are looking at how they can be integrated into the existing emergency warning structure.

One possibility is they could decide to ignore broadcasters and go around us, warning the public without broadcasters' assistance. We should be most concerned about that development because it will weaken the link we have with our viewers and listeners, and to the opinion leaders and elected policy makers in our communities. It is the first step onto a slippery slope that ends in the destruction of the fundamental principle of American broadcasting: Localism.

We are not likely to see a new self-governance model for America anytime soon. So, we will struggle along with the worst system in the world – except for all the others. We do have the opportunity to persevere in the continuous quality improvement of the EAS. It is fundamental to the survival of local broadcasting because it is one of the strongest connections we can make to our community.

Mark Allen is the President & CEO of the Washington State Association of Broadcasters in Olympia, WA. Allen can be reached via email at wu-broadcasters@earthlink.net

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Radio History

A Short Trip Back to 1953

by Clay Freinwald, CPBE

An old magazine, a few minutes to relax, and out comes an interesting look at radio history!

[SEATTLE, Washington - May 2004] Sometimes, it seems the older we get the more we enjoy looking back. Mind you, I am not admitting anything! At any rate, a co-worker recently handed me a stack of magazines, and to my delight I found a *Radio & Television News* from September 1953 – just over 50 years ago. Thumbing through this gem brought back memories of how things were when I was a lad, dreaming of one day working in this field (I started in 1959).

Fifty years ago, Television was new and there were few lines separating Amateur Radio, Broadcasting and Radio TV servicing. Come with me and share the many delights found in this old publication as we reflect on some of the many changes that have taken place.



desk are three phones. My goodness, were multi-line phones not yet invented?

Just inside is an ad for the National Radio Institute. One section reads: "Radio is bigger than ever with over 3000 Broadcasting stations on the air making good jobs. Now there's Television, too. About 200 TV stations are on the air with many more being built." Wow, have things changed – we have just a few more stations today!

Page four carries the masthead for the publication where they use the terms, "First in Radio-Television-Electronics." The term "electronics" was just starting to be used; prior to that the word Radio was used alone. With TV coming along, a new term was required that included all those "new-fangled" things.

MORE ADS

The ad for Bell Telephone Laboratories (remember them?) shows pieces of wood sitting in a jar filled with a solution they were developing to preserve telephone poles. One can only guess the EPA had not yet come along – they would sure have a cow now!

Hallcrafters had a full page ad for their Ham Radio receivers, showing how Ham Radio was very much included in the mix back then. I remember years ago a local TV station here in Seattle would not hire an engineer unless he had a Ham License; the rationale then was the "ham" did not think of working with equipment as just a job. Today's equivalent would be hiring a fellow to do IT because he has been playing with computers for years.

Electro-Voice was advertising a new line of UHF-TV Converters. The device promised to add all UHF-TV channels to VHF sets, from 14 to 83. This was before the

All-Channel TV law; back then it was expected that all the TV channels would fill up quickly. Unfortunately, that did not happen, and this set-aside spectrum would become a source of resentment by those in other services, who would grow to think of broadcasters as spectrum hogs. Eventually their argument got traction. As we watch the roll out of DTV, it is likely the once mighty chunk of the airwaves set aside for TV will undergo the axe.

"HI-FI" STANDARDS

Next in the magazine is an interesting editorial regarding the term – "Hi-Fi" – relative to various tape recorders then available. The good ones claimed a response all the way up ... to 10,000 cycles. (Yes, they still said "cycles" in 1953.) Many companies then were jumping on the new term trying to convince consumers their gear was meeting the "new-standards." Hi-Fi has a new meaning – state-of-the-art, cool, Digital. Why else do we have Digital Microphone Cable and Digital Speaker Wire?

On the facing page is an Allied Radio ad. I can remember getting one of those catalogs when I was a kid and pouring over every page, learning about the parts and pieces used to put "stuff" together. Remember their answer to the Heathkit? It was the Knight-Kit. And what is now at 100 Western Avenue in Chicago?

Page 12 had a "two-color" ad for Raytheon. It is hard to remember print ads with just two colors, but in 1953 this was a big, eye-catching deal. Among my early memories of Raytheon gear was traveling to a market about 100 miles south of here to work on a station where a friend had just become manager.

In the control room was a huge Raytheon console. The transmitter was also a Raytheon, an RA-1000 if I recall; it had push-button motor tuning, 833 tubes and a push-pull final. I still have, in its little envelope, a mint condition Raytheon CK-722.

Stay tuned for another installment of how radio was fifty years ago.

Clay Freinwald enjoys reflecting the history of broadcasting and how some things have changed over the years, while other things have not changed at all. Contact Clay at K7CR@wolffnet.com

TURNING THE PAGES

The cover picture features a fellow setting in a radio studio in the Radio-TV building at the L.A. County Fair grounds. The old RCA Console is flanked by pedestal mounted 16-inch turntables, and lots of patch bays – something that snowed most DJs. To the right is tape equipment made by Magnecord and Concertone. On the

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Radio in Motion

Planning Successful Remotes

by Mike Erickson

[NEW YORK CITY, New York - May 2004] The Remote: taking the radio station out on the road. Anyone who has worked a remote broadcast knows for sure that when you leave the cozy and comfortable studio, anything can happen - and usually does.

Nevertheless, successful remotes are not impossible. The keys to having a successful remote are planning and preparation.

"THE REMOTE IS WHEN?"

If you are lucky enough, you will have sufficient advance notice of the remote. This is paramount for radio stations relying on ISDN and POTS (Plain Old Telephone Service) codecs to deliver audio to the studio. (In this article, we will focus on remotes using ISDN and POTS as opposed to RPUs.)

In New York City, for example, you need to order the circuit *at least* a month before the show. If you do not have enough time to order ISDN, there are a number of quality POTS codecs on the market with audio quality that is more than acceptable for a remote broadcast. For flexibility, you might consider having both ISDN and POTS gear on hand.



Engineer Russ Skadl shows off one of the tools of the trade.

By the way, if you plan on using a cell phone with a codec, be sure there is sufficient system capacity so that you are not tossed off unexpectedly, or suffer audio degradation. Sometimes other local engineers can and will volunteer information on what local systems are especially good - and which are drop-out prone.

THE SITE SURVEY

As soon as feasible, schedule a site survey to get the layout of the venue. If you can, take the PD or someone from promotions along on this trip; let them decide where they want to place the set-up. It will make things move much more smoothly if your site survey trip includes someone at the venue (in a management position) who can make your needs happen. You do not want to be dealing with someone who is not qualified to get your requests approved.

As you look over the on-site accommodations, make sure they have enough phone lines for your needs - and that the phones are compatible with your equipment. For example, avoid those digital "dial 9 to get out" in-house systems. Many of these will make POTS codecs unstable or they may not work at all. What you want to find is good old regular POTS.

Another point: Check for power. Make sure they can supply enough to run your equipment, plus anything else you may need to power (like a Public Address system, or

lights). Speaking of the PA: many places will have one in place. Inquire about it and see if it meets your needs.

BE CERTAIN WHERE IT IS

Make sure the phone company knows where the remote is located. It is always easier when the venue can order lines, but sometimes the radio station picks up the tab and it is up to the engineer to make sure the phone company knows where. They also need to know *whom* to call; make sure you let the venue representative at the meeting know that they will be the contact for the phone company, *and* that they understand where you need the lines installed.

Get contact names and numbers for everyone at the venue with whom you think you will need to remain in contact. Print it out, and leave a copy at the studio. If the remote is outside, decide in advance on an emergency indoor location for regrouping in case of weather problems.



Remote mixers - then and now.

ORDERING THE LINES

Once you have scoped out the location, it is time to prepare the needed gear. If the venue can supply the phone lines you need, that is best. But, since most places do not have ISDN service, you will probably have to order it. Indeed, there will be times when you will have to order *everything*.

Give the phone company the correct contact name and number at the venue. If possible, try to be at the site when the phone company comes to install (this is not always possible with tight schedules). If you cannot be on the site the day of the install, the venue representative that attended the meeting should know where you want everything installed.

Consult your ISDN codec owner's manuals so you order the correct type of ISDN service. *Do not forget* to make sure you have *long distance* capability if you are outside your local area. There is nothing as frustrating as getting to a remote and finding out you cannot dial the station.

COVER ALL THE BASES

Take down *all* the information relating to the line when you place the order. Many times all the necessary information on the circuit will not be available right away, but the phone company will be able to supply an order number so you can call back and reference the order. Remember to tell the phone company the date you want service *connected* (3-5 days before the remote) as well as the date you want service disconnected. (The bookkeeper will not be your friend if bills continue arriving for phone lines from old remote sites.)

The phone company needs contact information, too. Give them a call back number and/or a cell number that will either have a human or machine pick up during business hours. Sometimes you can also leave an e-mail address so they can email all the circuit/phone information to you. Do not forget the name of the operator who took the order. Usually it is a first name and an ID/Badge number. This

way, you can get back to the same person should an emergency arise.

You should call the phone company back after a day or so if they do not call you. By now, they should have more information on your order. For ISDN, you will want to know SPID numbers, circuit ID, switch type. For POTS phone lines, area code and number.

AFTER THE PHONE LINES ARE INSTALLED

It is important to keep following up; you should make it a point to get out to the venue and check the lines. Do not forget to bring your paperwork (with SPIDs and contact numbers). If you can, plan to be there when the lines are actually installed. If not, schedule to be there for a test through to the station as soon as possible. Stay in contact with the phone company should there be any problems with the circuit or phone lines.

PACKING FOR THE REMOTE

The best thing is to think ahead: take the time to make sure you have not forgotten anything. Since different remotes call for different equipment, it might make sense to develop a couple of different "checklists."

When packing for the remote, include plenty of adapters cables, extension cords *and* your backup POTS codecs and couplers; you never know when your main path may give up! If your setup location is some distance from where the talent is, an audio snake makes life a lot easier for sending audio back and forth. Although a lot of codecs have built-in mixers, some do not have enough inputs or outputs. By planning out all the audio paths at the remote ahead of time, you will know if the built-in mixer will be able to handle what you need to do.

Another contingency to consider: if you are doing a remote at a big event, someone may want a feed of your audio. Make sure you have the ability to accommodate most requests; if you have the feeling that your built-in mixer will not cut it, drag along another mixer of your choice. I think your best bet is an A/B mixer or a stereo mixer where you can pan the channels.

If you are outdoors and have an indoor emergency location in mind, bring along a mini set-up so that you can get something on the air quickly should bad weather arise.

No matter how many you pack, extra headsets and/or microphones are always needed, including one for yourself. And you can

never have enough power strips. The best clocks are digital with seconds display; during the setup, ensure it is synchronized with the clock at the station (and that the battery is not dying). If your station does not operate in delay,

a tuner can be a good backup for audio return from the station should you end up on a one-way coupler. If it operates in delay, make sure the console is configured properly for mix minus.

Do not forget your PA if one has been requested. Also, do not leave it to programming to remember to request any extras they might expect you to bring - things such as fax machines or computers. Sometimes they will need special items like wireless microphones.

And, in addition to all the programming gear, make sure you have a toolbox with the essential tools to handle problems that crop up, and they will. A tone generator is very helpful to zero out the level, and you might include a feedback destroyer if you are using a PA that can be turned up to 11. Having someone technically competent back at the studio during setup is a major plus, not to mention a helper (perhaps even an intern) on site. Ten minutes into the remote, it will be clear "something" was forgotten.

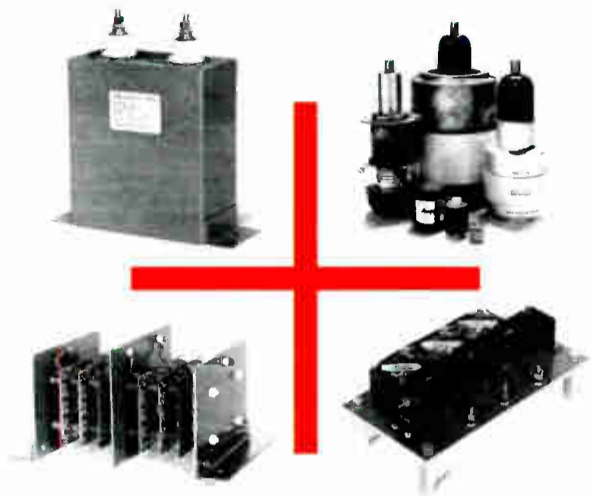
A reminder: before you leave the station, *remember to take your paperwork!* You never know when you may need to call someone for assistance. And that photocopy of the contact numbers you left at the studio can be a "remote saver" if they need to get in touch with you.

(Continued on Page 22)



It is always a good idea to pack food for the remote. You never know when you will eat again, and the author does not like to miss a meal.

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Radio in Motion

Continued from Page 20

MAKING THE REMOTE HAPPEN

It really is a good plan to be at the remote two to two and a half hours before airtime. This allows you plenty of time to set up the gear correctly and avoid most common problems. Get your main and backup audio paths going (ISDN/POTS codecs) so you know your lines are working. Now you are free to set-up the rest of the gear.

You will want to feed the talent the entire mix: the local audio at the remote, and the mix-minus audio coming back to the remote from the station. What works best for me is to pan all the microphone channels A/B (center) while panning the return to the B side. You can feed the B channel (local audio plus the return audio) to the talent and the PA, while the A side (microphones only) is fed back to the station. It is important that the console at the studio is configured for the proper mix minus.



The author is caught on the phone deep in remote. "Is it too late to get these lines activated? We're on the air in 30 minutes."

Position your PA so your audience can hear the broadcast, but far enough away so it does not introduce feedback. Testing the PA with all the microphones open will help to detect any possible areas of feedback. Use your feedback destroyer to tweak if you need to do so. Make sure your backup indoor site (if you are outdoors) is OK, and you have a plan for what to do so you can change locations with minimum downtime.

Once your talent has arrived, get them into position and run the microphone checks. Remember, however, actual on-air levels will be different than the whispering microphone check that is usually given.

All that is left is the countdown to "showtime." That and time for a quick prayer! If you planned and prepared, everything should flow without a hitch and you can be proud of a job well done.

AFTER THE REMOTE

Try and pack up as neatly as possible. We know you want to get out of there. But just tossing everything into the van is the best way to damage something – and you know it will bite you at the next remote.

If you are doing another remote later from the same site (and the venue is outside), secure the phone/ISDN jacks in a plastic bag to protect from the elements. Canvass the area and make sure you did not leave anything behind (like the wireless microphone system I forgot at one remote when security moved us out in a hurry). That is much better than having to explain the expense to the bookkeeper.

As you head back to the station, you have a few minutes to go over everything in your mind, and take care of any loose ends. What went well, and what needs some repair attention? Remember to call the phone company and confirm the line disconnection. If the station is automated, is it back to "normal operation?" It is now officially time to heave a large sigh, and head for the barn. Get ready to relax and enjoy some refreshment.

Of course the next remote is coming up soon, with its own special challenges. Be prepared, and you will survive!

Mike Erickson is a veteran of many remote broadcasts, from all sorts of locations. He even has had successful remotes. Contact Mike at wirelessmediata.computermail.net

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Tech Tips

Battery Test Circuit

By Dave Dunsmoor

[MINOT, North Dakota - May 2004]

This tech tip idea came from watching a friend checking car batteries at an alternator shop. Using a carbon pile load, he took a fully charged battery, loaded it down to 10 V, then checked the current delivered at that voltage. That told him whether or not the battery could deliver the proper current, regardless of its open circuit voltage reading.

We have a policy of replacing the backup power batteries in some of our equipment every two years whether they need it or not.

Otherwise the "need" for replacement is determined by running the equipment on a battery, with the AC mains off, for a given amount of time.

The problem with running equipment on battery power is if the batteries are not up to the task, one could have an unscheduled outage, and on some equipment that is not acceptable - ATCT communications control for example.

Not having a carbon pile load, I set about to make a variable DC dummy load. It seemed to me that by carefully biasing a power transistor, I could create a variable "resistor."

The entire project was designed mostly with available parts; I started out with a 2N3055, but ended up burning them out. Although I was exceeding neither the voltage or current ratings, the power dissipation rating was not sufficient. I settled on a

300 watt unit that seemed to work just fine, fused the collector current at 15 A, and made the ammeter read full scale at 10 A.

I limited the base voltage to 3.3 V (eb max voltage is 5 V) with a zener, put a thermal cutout on the heatsink and placed it in series with the base current. I put a variable resistor in the base current path, and I now had a variable 300 watt load, that could actually handle up to 24 V at 10 A.

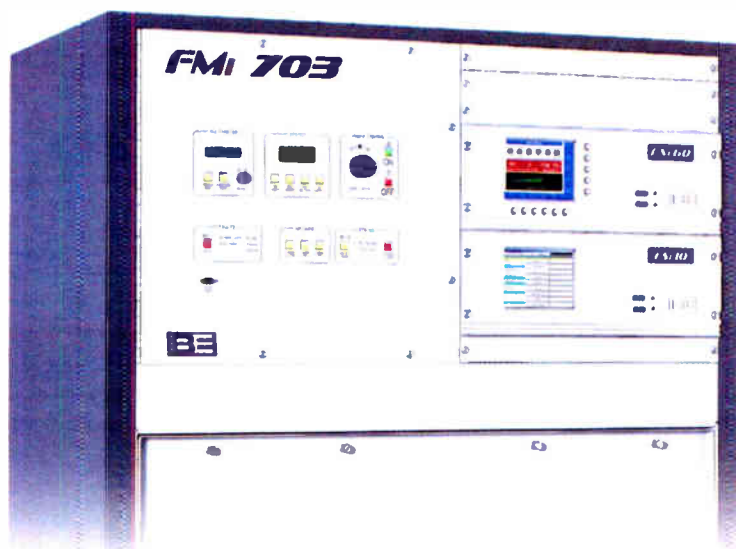
The ammeter is a 0-100 mA unit, shunted with 20 gauge enamel wire. I took a headlight, ran it off a power supply, and using a Fluke meter for the calibration standard, I trimmed the enamel wire to a length that would make the ammeter read the same as the Fluke (100 ma = 10 A).



Now I can check the batteries (12 V gel-cell types) quite easily. I put a couple of voltage test points on the unit to be able to monitor the battery voltage as I vary the current. If one wanted to double the power handling capacity, adding another transistor (and much larger heatsink) would be the ticket, using the same (common) base current control circuitry.

Battery Tester schematic found at:
www.radio-guide.com/tips.html

Dave Dunsmoor is a contract engineer in the Minot, ND area. Email: mrfixit@min.midco.net



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	50 kW	1987	Harris MW50C3
	50 kW	1986	Nautel AMPFET 50
FM Transmitters	1.5 kW	1987	BE FM1.5A
	2.5 kW	1978	Collins 831D2
	3.5 kW	1988	BE FM3.5A
	3.5 kW	1992	Harris HT3.5
	5 kW	1983	Harris FM5K
	10 kW	1980	Harris FM 10K
	10 kW	2000	Harris ZD10CD
	20 kW	1978	Collins 831G2
	20 kW	1982	Harris FM20K
	20 kW	2000	Harris ZD20CD
	25 kW	1980	CSI T-25-FA (amplifier only)
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BCRA and the Public File

by Ken Benner, NCE

[TUCSON, Arizona - May 2004] Once again the Washington FCC legal profiteers have been busy complexifying the FCC legal requirements and a making a bundle off of it. And once again it is time for dear ol' Dad here to hop up on his soapbox and see what we can do to expose some or all of this grossly over-complexified gobbledygook.

This time it is the "Political Broadcasting Requirements" for the Public File mandated by Section 305 of the recent "Bipartisan Campaign Reform Act of 2002" (BCRA), which just became effective to cover this year's elections. Woe be unto you if you are not fully up to speed on BCRA. So let us delve deep into the pit of requirements relating to these new FCC Political requirements.

STANDARD DISCLAIMER

Please understand the complexification of all this is *not* the FCC at work but rather the likes of the legendary FCC law firm; (CCBM&B, LLP) Confusum, Conum, Bilkem, Milken & Bamboozlem, LLP. I am just a really humble sort of a guy out here in Tucson who, after 45 years in broadcasting, is sick and tired of seeing my colleagues bilked out of millions of dollars each year by the Washington FCC legal lobby.

Trust me. The FCC folks do not engage in the intentional over-complexification of the FCC rules and regulations. They are good people, trying to do a good job, but who are dependent upon the whims of several dim-witted congressmen upon whom the FCC is dependent upon for its funding.

OK, soapbox pontification completed, let us go to work: First, we will review just what hoops we must jump through to be "politically correct" with the upcoming political season. Please understand, most of the following has been mandated by weak-kneed politicians who have absolutely no comprehension of the fact that American Broadcasting for the most part is dependent upon its advertising revenue to pay the bills.

KEY POINTS TO REMEMBER:

- 1) You must fully identify the sponsor of political spots.
- 2) You may not "censor" political spots, no matter how preposterous they may be.
- 3) "Equal Access" to your air-time must be given all legally qualified candidates.
- 4) "Federal candidates," if legally qualified, must now be given "reasonable access" to your air-time.
- 5) Sponsors of any political ads must be identified.
- 6) Lowest unit rates must be given to qualified candidates 45 days before the primary and 60 days prior to the general elections.
- 7) Carefully maintain a "political" Public File folder detailing your compliance with what you have done to achieve compliance.

With this in mind, on your letterhead, type up a Candidate's Information Request Form for political broadcast policy and rate information with blanks for the following items:

- 1) Date & time of request.
- 2) The candidate's name.
- 3) The name of his political party.
- 4) The office candidate is seeking.
- 5) The name of candidate's authorized committee (or agency) with its address and phone number.

- 6) The name of the actual person requesting time or information.
- 7) The type of information requested – for example: availabilities or rates, rate classes, preemption policy, etc.
- 8) The disposition taken: accepted or rejected. (If rejected, attach an explanation.)
- 9) The rates charged.
- 10) The classes of time purchased.
- 11) A confirmation of the disclosure statement that was provided.
- 12) BCRA certificate provided (for federal candidates only).
- 13) Any other information requested and provided.
- 14) The name of who processed the inquiry (name of account executive).

After the spots hit the air be sure you complete your Public File record for that candidate by including the schedule of dates and times when the spots ran, charges made, classes of time, memo of any rebates paid, identification of the candidate or organization responsible for purchase of the spots – this is almost identical to the "printout" you normally provide to any co-op advertiser in the form of an affidavit.

THE NEW REQUIREMENT

As a result of the BCRA (Bipartisan Campaign Reform Act) becoming effective during this year's elections, the following additional form for certifying a legitimate federal candidate is suggested:

I, [Name of Candidate], hereby certify that the programming to be broadcast on station [station call] complies with all requirements of the Bipartisan Campaign Finance Reform Act of 2002. Specifically, I certify the programming does not (or) does refer to an opposing candidate and contains the mandatory disclosure statement. In the event of a radio broadcast this mandatory disclosure consists of an audio statement voiced by the candidate that (1) identifies him or herself, (2) discloses the office being sought, and (3) states the candidate has approved the broadcast. If a television broadcast, the mandatory disclosure consists of a photograph image or similar image of the sponsoring candidate that occupies at least 80% of the vertical screen height for a period of no less than four seconds, and simultaneously displays a clearly legible printed statement that (1) identifies the candidate, (2) discloses that the candidate (and/or the candidate's authorized committee) has paid for the broadcast, and (3) states that the candidate has approved the broadcast.

[Signature of candidate or authorized committee person]

[Printed name of candidate or authorized committee person]

[Date of signing]

To cover myself, it is suggested that I urge you to get a copy of the latest political advisory material from the NAB to stuff in your Public File folder for each candidate or candidate's representative that darkens your door, telephone, fax, or email. Be sure you get a large pad of their grossly overpriced, copyrighted, PB-16 political forms!

PROFITABLE TIMING

Meanwhile, broadcasters fully attuned to the current requirements can smile all the way to the bank with scads of money as long as they know how to cope with all this.

A fairly new gimmick in recent years with which many stations have really made a bundle is pre-emptable

rates. This allows you to exceed – by far – your lowest unit rate by offering candidates the opportunity to "bump" spots from other candidates who purchased spots at your pre-emptable lowest unit rate. One television station I recently inspected went from \$500,000 to \$1.5 million using this opportunity in one season alone.

Hey c'mon gang, if the political turkeys are willing to be plucked, why not pluck 'em? Just make sure you do *not* discriminate in your plucking. All candidates must be plucked fairly, without discrimination and you must cover yourself with a political policy statement for each inquiry and keep a record of each party you have provided with such a statement as required under §73.3526(2)(e)(6) & §73.1943(a) & (b).

ENSURING COMPLIANCE

Now take heed, for this is important: that last paragraph reads in part "(a) Every licensee shall keep and permit public inspection of a complete and orderly record (political file) of *all requests* (my emphasis) for broadcast time made by or on behalf of a candidate for public office, together with an appropriate notation showing the disposition made by the licensee of such requests, and the charges made – if any – if the request is granted. This "disposition" includes the schedule of time purchased, when spots actually aired, the rates charged, and the classes of time purchased..."

If you are curious, and you should be, look all this up at www.fcc.gov by entering those paragraph numbers for more info. The point I want to make here is that your Public File covers you in the event some politician or his representative tries to claim you gave his opponent a better rate that you gave him. So be sure you obtain a memorandum of disclosure from anyone inquiring about political advertising whether he actually makes a time purchase or not.

This memo should include the following information: The name of the candidate or his representative, how the station's political policy statement and rates that were made available, for example; by fax, in person, by mail, phone, e-mail, language, etc. signed by the candidate or his representative if in person, certified-mail-receipt, fax receipt etc. Do not let some politico and his lawyer try to sue you following an election claiming you or your account executive misled him inadvertently by supplying your standard rates when, as he claims after losing an election, he was really looking for your "lowest unit" political rates.

ADDITIONAL ITEMS TO NOTE

It would be wise to obtain a copy of one of the political policy statements, re-write it to meet your rates and other policies defining among other things, lowest unit rate, defined qualified legal candidate, classes of time, non- and pre-emptable time, classes of time, 45 days prior to the primary and 60 days prior to the general during which lowest unit rates apply, policy of required payment prior to the airing of the spot, timely payments for rebates (i.e. if station is off air or spot is lost, etc.), and anything else you want to chuck into this thing to cover yourself from any possible real or fabricated allegation of political discrimination.

"Reasonable Access" can be a real can of worms and the Washington legal lions would pounce on me with vigor for tramping on their territory if I tackled that in here. Therefore, contact your State Broadcasters Association (SBA) to get the scoop on that. The information is likely to be available on your SBA's website. Several associations have done a very good job of providing this for their members.

Most SBAs have, are or will soon provide political seminars further defining all of this complexification. Also there are several excellent political policy manuals available on the internet from Washington FCC practicing law firms. It is likely your SBA has one of these available on their website.

Ken Benner, who cannot wait to hear all the political ads this year, is an active AIP inspector. Ken can be reached at bennerassociates@aol.com

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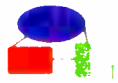


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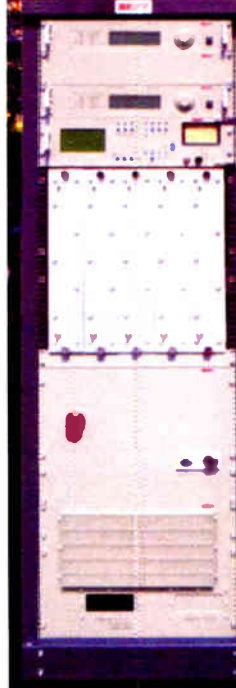
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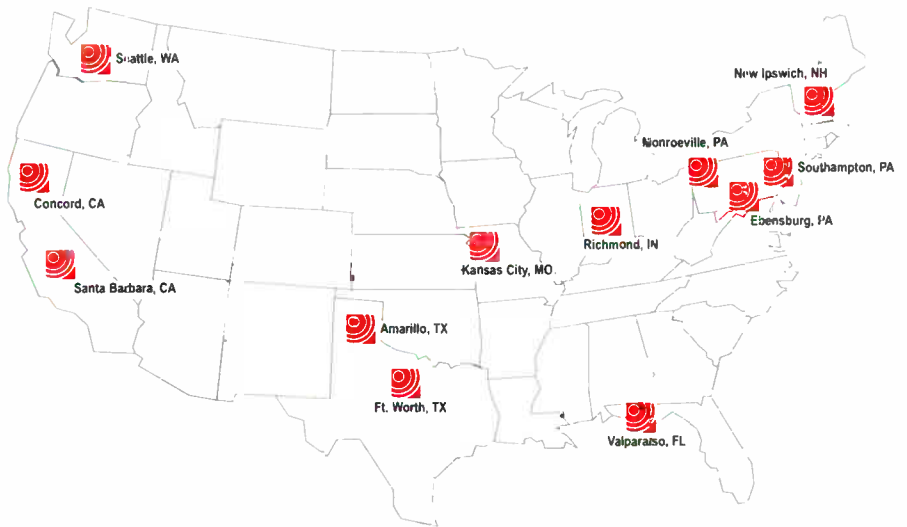
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Low Power Pitfalls

by John Devecka

[BALTIMORE, Maryland - May 2004] One of the great things about low power broadcasting is that *anyone* can do it. Or, so the salespeople will tell you. It is a fairly easy thing to get into and to do legally, but there are a lot of "gotchas" out there waiting to snag the unwary, less cynical and naïve among us. So, let us cover up some of those pitfalls and make your startup a bit safer. Warning: This column will contain a lot of required reading and the FCC has the right to administer a pop quiz!

WISHFUL THINKING

When I was doing sales and system design for Part 15 equipment, it never ceased to amaze me how many people came to the table with bad information. It used to be word of mouth, but the advent of the internet has allowed an exponential growth in the spread of bad information. The most common questions people ask me stem from misinterpretations or misrepresentations made on the internet. It seems the more they wanted it to be true, the harder they argued that it was so—even when I read the Rules out of the book.

For the sake of generalization, we will drift around various systems under Part 15. There are AM and FM systems, antennas, radiating cables and carrier current options. We have gone through all of this in past columns (which you can find on the **Radio Guide** site) so there is no reason to repeat all the system details. But, we will talk about the Rules, equipment choices, installation issues, finding help and what to watch for when doing all of this. I feel the need to hammer on some of this information because it keeps coming up and it keeps getting misread.

ARM YOURSELF

Let us start with an easy one: Read Part 15. Yes, it is that simple. There are several searchable versions of it available on the web, for free, or you can purchase a printed copy from <http://bookstore.gpo.gov/sb/sb-281.html> (Parts 0-19 for \$61). The October 2003 version has just been released.

The fine folks in DC have made the whole Code of Federal Regulations available on line, at http://www.access.gpo.gov/nara/cfr/waisidx_01/47cfr15_01.htm, while the ever generous Harold Hallikainen has also created a free, easily searched version of the regulations on his site at <http://hallikainen.com/FccRules/>. You probably should also read the referenced sections of Part 15 and Part 2, which cover some of the equipment manufacturing regulations, like connections and such.

The FCC has also provided their interpretation of the Rules at <http://www.fcc.gov/mb/audio/lowpwr.html>. These are important to read and understand. *Before* you head off to buy any equipment, learn the Rules and the way the Rule enforcers interpret them; you will know more than many of the people trying to sell you things!

Perhaps we should clear up the biggest issue first – FM. I will repeat something I said in a previous column because it is *always* getting misprinted on the web: *There is no Rule that allows 100 milliwatt FM transmitters.* Any salesperson that tells you otherwise is *wrong*. You, having read the Rules before you went off in search of new gear, already know this and can ask them to cite the Rule that allows this. When they cannot, you either can hang up on them, or read them the Rule so that they will be better prepared next time.

The Rule is Part 15.239 for FM systems and it is a field strength Rule. To reach that field strength limit with a common radio antenna (about 32 inches) you need about

18 milliwatts. Much more and you will go right on past the field strength limit and be illegal. The confusion stems from Part 15.221, which covers 100 mW transmission on AM *only*. But you are not confused any more, are you?

BADGES?

YES YOU NEED STINKING BADGES

All equipment operating under the Part 15 Rules requires FCC Certification in an independent test facility. This is no longer true of Part 73 and other devices, which only require Verification by the manufacturer. But this helps you make sure you are not getting yourself in trouble. Certified units are required to carry an FCC ID number that you can verify.

When someone prints that their equipment "Meets or Exceeds the FCC Part 15 Rules," ask them which one it is. You want one that "meets" them, is Certified, and has an FCC ID number to prove it. The ID number is *required* to be printed on the device. If they do not have an ID number, or sound fishy when trying to find it for you, ask them their registered name and look it up. The FCC has a database on-line: <https://gulfoss2.fcc.gov/prod/oe/ef/eas/reports/GenericSearch.cfm> that allows you to search by ID number, manufacturer name, etc.

Please do that. It will give you a couple of pieces of good information. Not only will you be able to verify the ID number given is real, but you will be able to verify the manufacturer or company that submitted it for Certification, and the date when this was done. All of this information will help you make sure that you are dealing with a legitimate legal product and a legitimate manufacturer or vendor. If you do not find the ID number, walk away from the deal – no matter how good it seems – it is not a good one.

As an example, I did a random web search and found the FCC label below. It shows you exactly what should be included - the FCC ID number, and the Part 15 compliance statements as well as any additional information for Canadian or other certifications.



When one submits a device for testing, you create and submit the intended ID number for reference during testing. You are not to use that device (or ID) for sale unless it passes the testing. I know of one manufacturer that sold their products using a test ID number, despite the FCC having rejected the device! But you would only know it if you checked up on them. The FCC knew about this situation, and (I was told) requested the company cease. The company went on to sell hundreds (at least) of these units with the ID number printed on them, and claimed the device was legal.

The company has since changed ID numbers and sells slightly different equipment (I assume it is now within FCC spec). The only way you, as a buyer, could know this would be to check the FCC on-line database – or if the FCC actually raided and shut down the company – which happens very rarely. And then there are the folks who will be straight with you about their legal standing – I will not print the URL for a pirate shop – you can find them quick enough with a search engine.

LET ME SHOW YOU THIS BRIDGE

Another common bit of misinformation practiced by some folks is the modification of antennas so devices that were compliant with the Rules are no longer – but hey, they get much better coverage now! The FCC is pretty clear about detachable antennas, amps and the like (Part 15.203 & 15.204).

Some companies sell a legal device (or close enough that no one bugs them) but then offer "after market" kits for them. Common ones are long transmission lines and rooftop antennas, or in-line amplified antennas, for devices that were Certified by the FCC labs *without* these additional components. Remember that *you* are responsible when the Federales come knocking. Yes, the ID number may be on the device, but it is not on that nifty ground plane antenna with a ton of gain! The golden rule remains, "If it seems too good to be true, it usually is."

The Rules for FM and AM devices specify the types of connections, the lengths of antennas, the lengths of grounds and transmission lines. Again, since you read the Rules first, you will know this information and be able to run rings around the salesperson. Make them explain to you just how their additional cables and antennas are compliant with the FCC regulations.

THE TRUTH IS OUT THERE

If you want the "complete" view of the FCC on the issue of low power transmission systems, you need to download and read their Bulletin 63 from The Office of Engineering & Technology, which you can do at http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oe63/oe63rev.pdf. Please note that it is very dated in some areas, having been last revised in 1996. It does, however, provide a nice overview of the whole concept of low power systems.

Another nice resource – Compliance Engineering Magazine has a set of helpful rules at <http://www.ce-mag.com/99ARG/Gubish31.html>. Although it does include other parts, it gives a nice comparison of the Canadian and US Low Power Unlicensed Rules and reviews some of the more important technical issues. I have not delved into Industry Canada certifications, but they are very similar to FCC Part 15 Regulations and you can often find devices that are dual certified (folks like Decade, for example, have FCC and RSS ID numbers on their devices).

Use the internet to learn about different installations and their success. There are a lot of low power sites out there, many with forums to chat about ideas. Remember, though, *you* are now armed and dangerous. Share your knowledge and your resources by gently correcting errors and quoting sources!

EVERYTHING IS POSSIBLE ... WITHIN REASON

There *are* limitations to low power broadcasting, and they stem from a simple fact: a licensed station will always blow you off the dial. They simply have more power and the legal freedom to do things you cannot. So what? Kick them in the kneecaps – or wherever else you have to – to gain an advantage. They probably will not be interested in "local" and "community" issues and service. You can – and should be. As you start to win the audience away from the voice tracked automation station on Main Street, they will try to stop you with their main weapon: The FCC.

But you, unlike them, will actually have read this column, used the links and done your homework. The FCC will come in and say, "Wow! You have a nice setup here and it's perfectly legal." And then they will be on their merry way – unlike when you ask them to look at that "local" automated station with no EAS, no Public File, and a light out on the tower.

John Devecka is trying to cause trouble. Just ignore him. He is the Operations Manager of WLOY at Loyola College in Maryland. If you want to talk low power, email him at wloy@loyola.edu for more.

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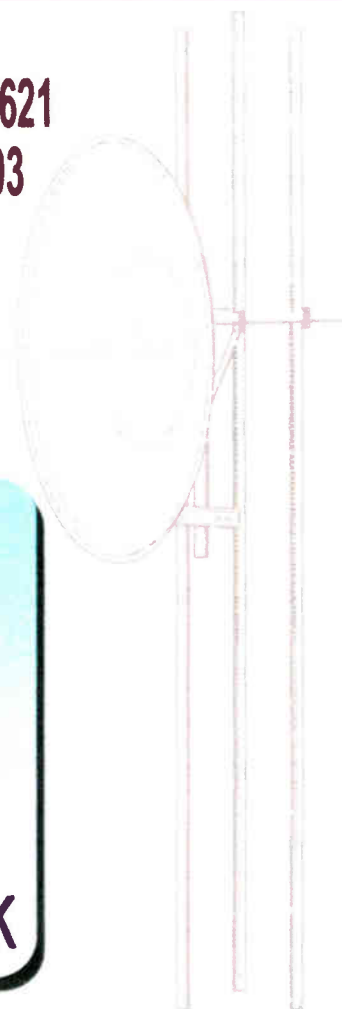
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People in Radio

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Jim will be representing all SCMS product lines from the Syracuse, New York area.

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Digital Radio

Panasonic's First CD Receiver with HD Radio Capability Hits Store Shelves

SECAUCUS, NJ (April 6, 2004) - Panasonic announces the availability of its first mobile CD receiver to include iBiquity Digital's HD Radio technology. The new CQ-CB9900U CD receiver includes:

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Sound Control EQ – Allows users to compensate for the auto environment and to personalize the system according to their sound preference. Referred to as SQ7, this seven-band graphic equalizer provides additional adjustability and one-touch equalizer settings, such as Rock, Pop, Vocal and Flat.



The receiver has a black chrome faceplate that sits flush against the vehicle's dashboard, metallic rotary control knobs with blue backlighting and a large, easy-to-read LCD display.

Features: HD Radio capable; MP3 Playback w/ CD Text; WMA Playback; CD-R/CD-RW Playback; HD with 3DDM; Day/Night Design; DSP, SQ7, 2-Preouts (5 volt/60 ohm); Subwoofer Out (5 volt/6 ohm); Auxiliary Input; Remote Control included. Suggested retail: \$999.95

This unit can play CD-DA format audio CD-R and CD-RW. It may not be able to play some CD-R or CD-RW due to the condition of the recording.

HD Radio is a trademark of iBiquity Digital Corporation.

Panasonic

Website: www.panasonic.com

Letters From Our Readers

Dear Editor:

I could not agree more with Gary Stigall's comments in *Radio Guide* "Final Stage" (pg 30, March 2004). At one time the ease of firing off a message was a benefit. There seems to be another issue that affects mail proficiency besides incoming spam and spam filters affecting outbound mail.

I've noticed that although a lot of people get E-mail messages, they simply ignore the message without merit. For example, I will send a message to a person in which I need an answer, or verification. For example, "I need more paper rolls for the Sage. OK to purchase?" Silence.

It's not uncommon for people in E-mail lists to post messages to a group, yet trash the majority of the messages without reading. It's their choice, but how many times have you seen someone post a question or comment about something that was just posted a week before.

Then there are distributors and manufacturers of equipment I use. Their addresses are published, and they seem to indicate that this is an acceptable method for contacting them for support and questions. But how many times have you written only to get an "autoresponder message" or no reply at all. I noticed this trend last year, and while home sick one week I crunched the statistics on the efficiency of E-mail over one quarter. 1,035 messages. 187 were business in nature requiring a confirmation, assistance (support), or inquiry on a product or service. Of the 187, only 46.5 received replies. A 33% of those were Autoresponders, and of the 33% autoresponders only 50% had someone follow up. In technical support, only 52% of the E-mails received a reply. Shocking when you consider that all were for support or help on a product, some of which was days old ... *continued*

Letters Continued ...

I honestly feel that some companies use E-mail support as a way to get away from the customer rather than dealing with a problem. And at some companies, it seems that whomever answers the E-mail never reads what you wrote. Instead, you're sent on a wild goose-chase. Perhaps this is the birth of a new business practice to distract the customer so they just go away.

I think that people are getting desensitized by E-mail. I honestly feel that folks who once thought of E-mail as efficient, look at it as several levels lower than a postcard or junk snail-mail. I know I fight this feeling every day when I paw through 50 spams only to find 2 or 3 E-mails with some productivity or use.

And I admit, I hesitate before replying to a message that someone writes seeking my time and efforts as I don't know if the hour of research will even be acknowledged. Perhaps, E-mail's time has come and gone. Oh, I do read and reply to every letter ... except the ones from Publisher's Clearing house.

Fred Vobbe

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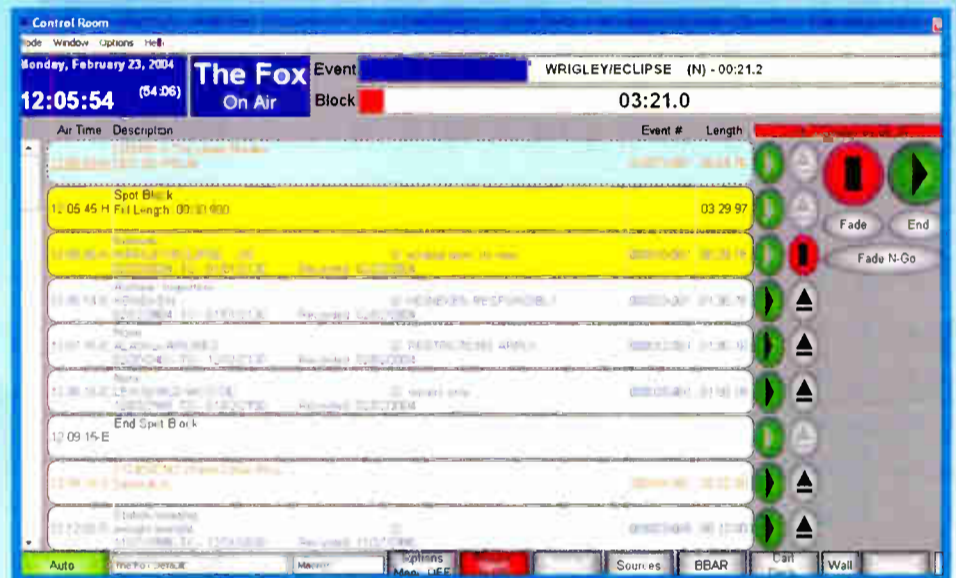
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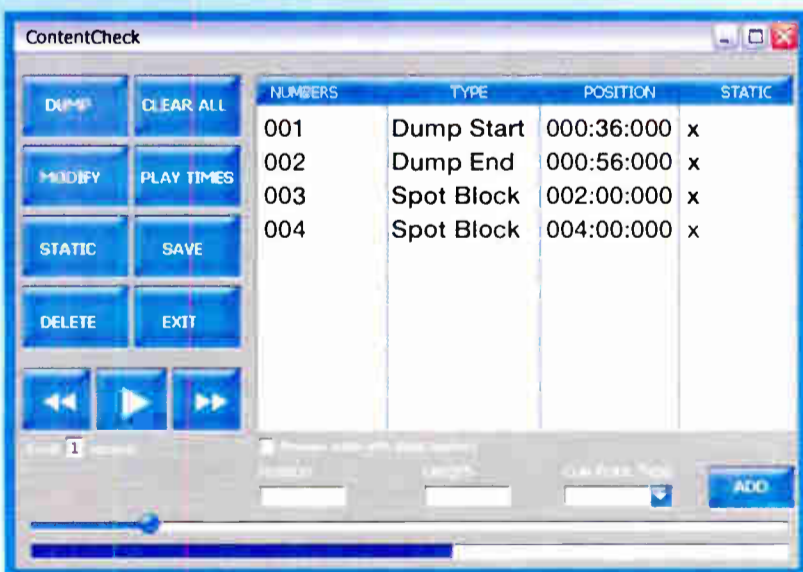
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