

Radio Guide

Radio Technology for Engineers and Managers

November 2006

Talking About Radio Talk



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Getting Started

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It started, as it usually does, with a bunch of rumors. A format change was coming.

The GM/owner was hoping for an increase in the value of his facility. The PD was looking for a big increase in AQH's. And the sales manager was chomping at the bit so she could entice a whole new segment of the advertising community to buy in to the station's programming.

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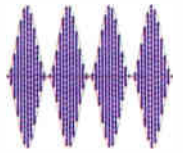


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FINDING AN EDUCATION

A large part of the joy of radio engineering is the satisfaction from observing a problem and solving it – or finding a better way to accomplish the job.

Of course, since few of us want to “re-invent the wheel,” we need time and opportunity to continue our education. With the rapidly changing technology of digital radio, such education is all the more important, even if finding time to grab that education is sometimes difficult.

Radio Guide continues to be committed to helping you get the education you need. We present authors who want to share their experience and knowledge with you. These fine folks are or have been where you are, in the daily job of radio engineering. The passion they have for radio is evident.

Education works best when someone shows you *how* to do something and then lets you try it yourself. In other words: hands-on training. It is not always easy to get such help, especially on today's modest budgets.

With that in mind, *Radio Guide* has seen the need and arranged for a three-day AM Transmission Seminar, to be held in Orlando, Florida in mid-February 2007. You may notice the information over on the bottom of the facing page.

The goal was to find a relatively inexpensive destination airport, some excellent instructors (Alexander, Alsobrook and Rackley) with a good program, and no snow. We worked it out to keep costs as low as possible. You can even bring your family for a weekend vacation – we've negotiated some very economical room rates for the entire weekend.

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– Radio Guide –

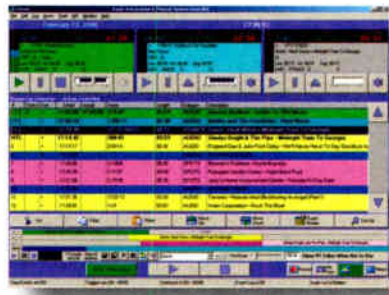
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Talk Show Tech

Getting Started

by Ted Alexander

It started, as it usually does, with a bunch of rumors. A format change was coming.

The GM/owner was hoping for an increase in the value of his facility. The PD was looking for a big increase in AQH's. And the sales manager was chomping at the bit so she could entice a whole new segment of the advertising community to buy in to the station's programming.

THE MISSION

And now, just as you guessed, it was going to happen. The station will be doing local talk from 6:00 AM to 7:00 PM. As the meeting with the GM and PD concludes, you have your marching orders: build the new studios.

It now is up to you to deliver a working talk show studio, with facilities for up to five guests, a call screener, and some kind of "computerized" control for the talent to use.

Of course, if you are "budget and time challenged" and plan on using a 111C coil to tap across the telephone set earpiece to get your calls on the air, then this article is not for you.

START WITH A PLAN

On the other hand, if you can use this opportunity to enhance the service your station provides to the service area and provide a substantial increase to the bottom line through proper facility improvement, then please do read onward.

Once the meeting is over, it is time to do the serious planning, planning, and planning. Did I mention the need for planning? There is no question – by stopping to plan before doing anything else, you will save time and money.

Even if you only have a small facility, you should plan for your ideal installation, and then – if you really must – pare it back, bit by bit, until you have the minimums you need to get your product on the air with good quality.

LEARN FROM YOUR NEIGHBORS

If you have the time and opportunity, you should arrange for a visit to a working talk station to see just how that station is set up. You can also look around at various websites and publications to see what others have done.

In doing this, you will very likely see at least one great idea which had not occurred to you. The end result: a much better facility that allows your air talent to do their best work.

One talk programmer once said to me, "Build the studio as if it were for a Top 40 station without the music." That helped me understand what the PD needed and wanted, and I could anticipate the kind of talent he was planning on bringing in.

STUDIO LAYOUT CONSIDERATIONS

Now it is time to scout around as to where this studio is going to be located. If you are lucky, you will start with an empty room. If you need to modify a music studio, things could get a bit more complicated.

One major consideration is to be sure you will be able to "fit in" the required equipment and leave room for the anticipated number of people, *including guests*. By the way, do not forget space for the screener.

Most often, the talent will be the one to "punch up" the calls on the air. But in some major market and/or network situations, there also may be a board operator.



The WRUW talk studio at Case Western Reserve University in Cleveland.

In such studios the screener is usually in a separate room to provide sound isolation. That means you need an intercom of some sort and possibly an intercom feed to the talent's headphone.

SOFTWARE AND DISPLAY

Depending on your kind of operation, you may choose to have the screener punch up the on-air calls. Check out the use of a "screener" program on a computer, so you can let the talent know who is on screened hold and also to get text messages to the on-air personality.

Some software also interfaces with the electronics of the talk show phone system to let you "point and click" to place a call on the air. On some occasions, especially at small stations, the on-air talent is a "one man show," either taking calls unscreened or screening and holding upcoming calls during breaks.

The key point is that your installation will need to be designed around your choice of staffing and budgeting.

TECH AND PHYSICAL SPECS

Next it is time to assess the equipment you have on hand, or in the existing studio, and prepare the "want list" for the additional capabilities.

An empty 10 foot by 12 foot room looks big, but when you install the equipment and put six or seven people in there, it gets really cramped really fast. For a show this size we recommend a studio with minimum of 200 square feet.



A comfortable and spacious talk studio with good sight lines (note the recessed monitor).

Go for the biggest reasonable size your facility will allow. Then, consider the other physical needs: will the screener/producer have an isolated room within eyeshot of the main studio? Will there be a need for a separate news booth? What about HVAC considerations? Most talk show hosts I know like the studio to be cold enough to see their breath.

A good idea, before you begin any installation, is not only planning it all out on paper, but having it agreed to by management, programming – and sales. (After all, your sales manager may want to invite in a potential new client for an "interview." Would it not be a nice way to seal a deal by welcoming the client to a comfortable studio and have them talk to several listeners over a clean and clear connection?)

STOCKING THE STUDIO

You will need to have an audio console with at least one channel to be used for a mix-minus. More are even better; three mix-minus busses will make life even easier – for example, just in case you need an additional mix-minus to allow for doing a talk show remote.

Among the essentials, *do not skip the profanity delay!* Even if you are a religious broadcaster and your regular listeners would never think of saying "%\$#@!" on the air, you never know what nut case is trying to get through to your airwaves. \$325,000 for one "%\$#@!" is not worth it when a good profanity delay costs less than 1% of the fine.

You will need as many microphones as your anticipated number of guests, plus one for the talent, and possibly one or two more for a news person/sidekick/etc. There will also be a need for just as many headphones, so they can hear the program.

Add up the required microphone channels, inputs for the telephone hybrids, computer, CD player, aux/remote inputs, add in one or two more for the "future," and you will have the number of input channels you will need on the board.

TELEPHONE INTERFACING

If all you need is to take an occasional single call, a low-cost single hybrid connected to a single line may be all that is required.



A single line hybrid from Telos.

Most probably you will want to be able to have the capability to place at least two calls simultaneously on the air. Ideally, each caller should be put on the air through their own hybrid. That provides the best quality and allows individual control of the callers.

For a smaller operation, where the usual case would be to take one caller at a time, a single hybrid is most economical, but would require a "mashing" of two (or more) lines to take two calls on the air simultaneously – fine for occasional use, but not as good for top sounding day-in and day-out operation.

CONNECTION CHOICES

There are several options these days for the call-in lines to the station. You have good old fashioned POTS ("Plain Old Telephone Service"), BRI ISDN, a channelized T-1 (or PRI – Primary Rate Interface) lines. You will need to consider this together with your selection of a Talk Show System, since not all systems support all the types of lines.

POTS (e.g. analog loop-start) lines are still the most common lines most stations use for their talk shows, but these days POTS can mean several things.

The best way to implement a POTS system is to install the line directly from the telco central office and *not through a PBX or some other switch* after the CO. ISDN provides a higher quality on-air line since all audio is digital from the central office to the station's demarc and any POTS deterioration is minimized. Of course, ISDN is becoming a bit more difficult to arrange in some areas.

When using a PRI, particularly when sharing it across multiple stations, there are additional considerations with regards to configuration of trunk groups. In this case you will need to consider how many call-in lines, hot lines and warm lines will be dedicated to each station.

(Continued on Page 6)

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COMREX

Talk Show Tech

Getting Started

by Ted Alexander

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Whatever type of lines you choose, keep the telephone company informed and involved right from the beginning.

DEALING WITH THE TELCO

Be upfront with your telco and work with them for most consistent service. Develop a relationship; invite your local telco representative to the station so you can discuss, on site, the kind of use you anticipate on your lines.

As you progress, you will want to confirm these details in writing, in advance, so that should there be problems the telco cannot claim you attempted to deceive them. Keep in mind that broadcasters are not the typical business telephone users, so odds are good the people at the telco will not understand your needs. Be skeptical of their replies, and continue the discussion.

For example, if you want ISDN and it is available for others in the area, do not take "no" for an answer. If this technology is available to other customers, it is reasonable for you to wish the same level of technology – why should you be limited to 100-year-old analog technology just for the telco's convenience?

LINE LOADING

Another important word about planning with your local telco: in many cases telcos require that broadcast users have their service from a so-called "choke exchange." This is a special central office that has a unique three-digit prefix and has very limited trunking into it from surrounding areas.

The idea is to return all trunks busy (e.g. fast busy) from the dialing end without using up talk paths. This prevents contests and other broadcast traffic from interfering with service to non-broadcast facilities.

If you have an AQH of 80,000 and plan on giving away \$10,000 to the 150th caller, expect that the telco will be "blown out" if you are not using a choke exchange.

On the other hand, if you are a small station, in a small market with an AQH of 1,200, and you are talking about cattle futures, you probably will not need a choke exchange. In fact, in small markets, the telco representative may not even know what a choke exchange is.

When using a PRI, particularly when sharing it across multiple stations, there are additional considerations with regards to configuration of trunk groups. In this case you will need to consider how many call-in lines, hot lines and warm lines will be dedicated to each station.

MORE OPTIONS TO CONSIDER

For the station with multiple simultaneous calls, you may need two or more hybrids, a dozen lines, multiple screener and talent work stations, and the capability to use the phone system in two or more studios.

I have found that working out a block diagram and flow chart of a proposed system, shared with management and programming, is the best way to determine what the station needs to produce its product and work within limitations of space and budget. If everyone is "on the same page," no one is surprised and everyone can come to an agreement about the install.

Some other things to consider: If possible, install the same kind microphones throughout the studio – and be sure to use shock mounts. Individual microphone pro-

cessors will help "control" enthusiastic guests and host's levels into the board. A cough button and headphone level control for each host/guest position is a great creature comfort.



A Telos 2X12 Talk Show System with multiple capabilities.

THE SAFETY VALVE

For the profanity delay, installing a big fat "mushroom" push switch to eliminate the "%\$#@!" makes it easier for the talent or producer to find and hit the button when the undesired word(s) are uttered.

Here is why: if it takes three to four seconds for the talent or producer to find the "dump" switch, and the profanity delay is just seven seconds long, you may get uncomfortably close to not "dumping" the unmentionable. In fact, you may well want to consider a profanity delay with at least 12 seconds in the buffer.



Along with the microphone processors, telephone hybrids and switchers, do not forget the delay unit and accessible "dump" button.

Even more delay might be advisable if you plan on airing *really* controversial material with a big opportunity for "%\$#@!" to get on the air. You may wish to go to an "overkill" setup using two separate profanity delays, separately controlled, in case the first one's buffer has not fully caught up when the next "%\$#@!" is uttered.

CALLER SOFTWARE

For a small, simple installation, you may wish to use an uncomplicated software text program and simply outfit a computer for two monitor operation. That gives you a basic text display for the talent and is certainly easier than ordering a large quantity of Post-It notes.

The next step up is two or more computers networked and running a general purpose chat program. There are also several commercially available software packages available specifically for talk show use, some include the ability to control the hybrids with a "point and click." Your complexity and budget will help determine what works for you.



Assistant Producer software from Telos.

Recently, several software packages such as Neowinners™ have become available; these integrate call screening, contest recording, and caller database management into one sophisticated program.

Caller database features vary from none at all, to simply logging information about callers, to real-time access by caller ID. If you need these sophisticated features, you will need to verify that both the hardware and software have the features needed.

Ease of use is always a factor. You should look at contrast, text size and similar ergonomics. If the screening software allows remote control of the phone system itself then, to avoid unnecessary confusion, it is important that the mode of operation (e.g. line status and selection) is similar to that of the Talk Show System.

TRAINING IS PART OF PLANNING

Consideration should also be given to training. Some of the more sophisticated systems benefit from installation by factory-trained technicians who can also train you on the system.

Of course, it is essential that the operators are trained to understand how the system works and how to use its features to operate it efficiently. Depending on your staff, and the complexity of the system, you may do this training yourself or bring in someone.

FINALIZING THE PLANS

Now that the preliminary sketching out of the requirements is done, you can begin the serious planning and design stage. Seek as much input as you can get from those who will be using the facility and share the "almost final" plans with them. Make any needed changes now, *before* the cabinets and wiring are half-way installed. Get the equipment list together and discuss it with your vendors.

As noted, there are many fine facilities now on the air which can serve as idea starters for you to customize your installation. Look through our industry publications and cruise the Internet for information. It only takes one great new idea to make your studio much easier to build and much easier for the staff to operate.

Plan, too, for after you complete the new studio(s). Take some extra time to show everyone who will be working in there exactly what does what and how to use their new "tools" to bring out their finest performances. That young talent you just brought into your new studios may be the next Art Bell!

If you did your planning and homework properly, when you get everything together that is needed for your project, everything will go smoothly – at least until Murphy shows up! Next time out we will discuss the preparing of the room, installation of the new equipment, wiring the studio, connecting the lines, air-checking calls, audio storage – and the "mystery" of mix-minus.

Some more reference material on Talk Show Systems and Screener Software: <http://www.telos-systems.com/techtalk/3-10.pdf> This URL, and others in this issue are found at www.radio-guide.com/URL.htm

Ted Alexander is part of the technical support team at Telos-Omnia-Axia as well as an experienced engineer in the Cleveland market. Contact Ted at talAlexander@telos-systems.com



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The Ribbon Microphone

The three major groups of microphones are the dynamics, condensers and ribbons. This month George Zahn finishes his overview of the three groups by discussing the ribbon family.

In our first two installments, we examined the two most predominant families, the dynamics and the condensers.

As a rule, the cost of microphone families runs from lowest to highest: dynamic-condenser-ribbon, with the caveat that you will generally find overlapping cost and quality on the cusps of these families. For instance, a really “dynamic” dynamic microphone might cost a bit more than a really cheap condenser and so on.

Based solely on such cost considerations, most broadcast stations and remote audio crews will have an arsenal largely stocked with those two families. Advancements in dynamic and condenser microphones and the resulting lower price points have really crowded out the third, but most wonderful and historic family, the ribbon microphones.

VELOCITY IS KING

In actuality, most of us in radio and television will deal with the first two microphone families about 98% of the time. But there are some high-end studio applications or visually aesthetic designs that might require you to work with the ribbon, or velocity, microphone.

Ribbon microphones quite possibly can be the most transparent and perfect of all microphones. From its earliest design in the late 1920's, the ribbon microphone has been revered as the family with the truest frequency response and, while no microphone is perfect, the ribbon's design plays upon one of the tenets we have discussed all along: the lighter the moving part of the element, the less inertia and therefore the greater the ability for the element to move at higher frequencies as it reacts to acoustic sound waves.

The ribbon microphone is aptly named. Its moving part is an ultra thin, corrugated metal ribbon suspended between the poles of a rather large stationary magnet. When the ribbon vibrates, it disturbs the magnetic field and a current is created in the ribbon.

This very light element generally creates a very low audio signal, so older classic models in the family often had additional transformers built in to increase output signal.

The earliest ribbon versions from RCA resembled a square box, but later designs are easily recognized symbols we relate to radio's Golden Age. In fact, a quick background on ribbons cannot be separated from the history of broadcasting.



An early RCA microphone.

HIGH PROFILE

You most certainly have seen some of these microphones. The microphone on Johnny Carson's desk most

of those years was a ribbon (he loved the warmth provided by his Shure SM-33) and David Letterman kept a prop model of a pill-shaped RCA 77-DX class ribbon microphone on his desk as homage to Carson who helped give him (Letterman) his start.



Familiar microphones: a 77-DX and an SM-33.

A note of trivia on Carson and the Tonight Show: It is said that only two Shure SM-33's were ever used by Johnny. *Mix Magazine* reported in 2005 that the original microphone presented by Shure to Carson fetched nearly \$51,000 at auction in Dallas.

The classic RCA's have reportedly brought consistent bids in the \$1,000 to \$2,000 range when at auction. Indeed, because of their iconic value and performance, ribbons are a favorite of many collectors. Even Gary Owens is remembered with a cupped hand over his ear on *Laugh In* as he dripped his golden tones into an RCA 44-BX, in tribute to classic radio announcers.

RICH SOUND – RICH HISTORY

Media Heritage, Inc. radio historian Mike Martini – also a program host at WMKV – informs us that the RCA 44-BX was indeed the workhorse of radio in the 1940's.

Each major network performer or program usually had its own unique microphone positioning set-up, too. For Jack Benny it was two 44's set up on stage with Jack and his wife, Mary Livingston, facing each other on the left-most microphone. Announcer Don Wilson and any other characters shared a 44 on center stage and the band was set up on stage right.

For “Fibber McGee and Molly,” Molly (Marian Jordan) would sit at a table on stage left with a 44 on a boom stand while Fibber (Jim Jordan) and other characters would share a 44 at center stage. The RCA-44 was versatile because the actors could face each other and speak with no loss of volume and yet the



RCA 44-BX

microphone seemed to ignore things it was not supposed to pick up, like excessive audience noise or paper shuffling.

POPULAR EVERYWHERE

Martini adds that on the local level, most stations of any significant size usually found the money to purchase at least one or two RCA 44's.

However, the bulk of the day-to-day work usually was done with the microphone's little cousin, the RCA-74. At half the size, and using a swivel mount instead of a yoke, the 74 was a lot more affordable and practical for small studio situations. RCA had many other ribbons of various shapes and sizes, but these did not turn up in radio studios too often until the late 1950's or 1960's.

Earlier I mentioned the aesthetics of using ribbon microphones. A number of years ago, I assisted on a television broadcast in Cincinnati in which we needed multiple ribbon microphones to recreate an “old radio broadcast” atmosphere. We were able to borrow two (owned by collectors) in the city, and we used four other condenser microphones with metal, box-shaped “ribbon-look” covers that made the condensers look somewhat like RCA 44's!

A BIPOLAR EAR

Because of the vertical orientation of the microphone and the ribbon being suspended between the poles of a magnet, an unmodified ribbon microphone design is inherently bidirectional.

For example, if you speak from the front or the back of the microphone, it picks up perfectly. But as you approach the side (90 degrees or 270 degrees off-axis as we call it), the sound arrives at the ribbon from both front and back – and the opposing pressures on the ribbon cancel each other.

This bidirectional aspect not only allowed two actors to face each other, but also in an alternative audience studio setting, an actor could face one side of the microphone and the other sensitive side of the same microphone could face the audience to pick up laughter or applause.

Bi-directionality was not always a welcome feature, so RCA made several modifications to its designs. As Jim Webb points out in *“Twelve Microphones That Changed History,”* the RCA 77, designed by Dr. Harry F. Olson “utilized double ribbons combining a pressure unit with a velocity unit to achieve the unidirectional pattern.” Making the ribbon directional allowed audio engineers the best of both worlds: incredible fidelity and more control over their audio mix.

RIBBON AND BLUES

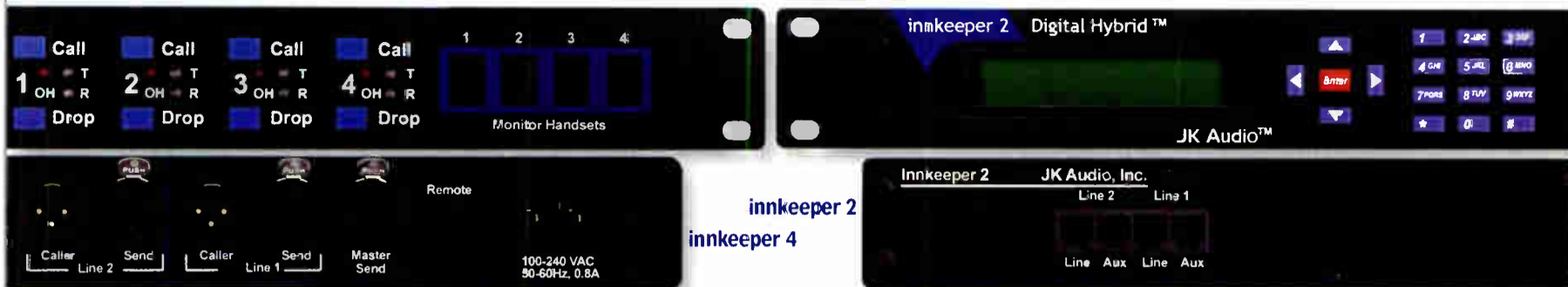
They create great audio and we can even find unidirectional versions, so why are these ribbon microphones not everywhere in the broadcast and recording industry? Ribbons have two major drawbacks.

First of all, they are by far the most fragile microphones of all the families. If you want a couple of CLMs (Career Limiting Moves), you could place a ribbon microphone in front of a kick drum or blow into one while doing a microphone sound check.



AEA R44 microphone ribbon element
(Courtesy: Wes Dooley)

As you can see from the picture, the ribbon (as mentioned above, it is actually a strip of ultra thin, corrugated metal) is attached to the magnet assembly. Since the reproduction of the higher frequencies is, in large part, based on the thinness of the ribbon and its ability to vibrate at those high frequencies, you can see why the ribbon is a very fragile item. Hence, although wind filters are usually built in for protection, careless use can quickly destroy the ribbon. (Continued on Page 10)



REMOTE CONTROL. PHONE BOOK. FLASH MEMORY. AUTO-ANSWER.

Innkeeper 2 & 4 multiple digital hybrids kinda redefine the entire concept of "work..."

The remote interface provides remote control of the Call and Drop buttons, as well as providing LED confirmation of the keypad.



There are times when a single digital hybrid just isn't enough, but rack space is at a premium. No sweat. Innkeeper 2 and Innkeeper 4 squeeze two or four independent digital hybrids (respectively) into a 1U rack space.

The front panel keypad, display, and handset jacks provide easy speed dialing and call setup. Digital hybrids allow you to send signals into the phone line while maintaining excellent separation between your voice and the caller. The balanced XLR output jacks contain only the

caller's voice. The Digital Signal Processor (DSP) continuously monitors both the phone line and audio signals to deliver excellent separation. This proprietary, dual-convergence echo canceller algorithm can achieve excellent separation without any setup and without sending a noise burst down the line.

Innkeeper 2 and 4 feature Auto-Answer/Auto Disconnect for use in on-air applications such as telephone interviews and talk shows as well as behind the scenes applications

like intercom, monitoring and conference room full duplex applications.

When your application calls for multiple digital hybrids that are smart enough to know how to handle the workload, Innkeeper 2 or Innkeeper 4 are your best choice - by a long shot.

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The Ribbon Microphone

– Continued from Page 8 –

This is especially true on older versions of ribbons, where loud sound pressure levels or strong winds can dislodge the ribbon and lead to expensive repair bills. There are a number of companies who specialize in the repair, and even complete restoration (element and body), of classic ribbon microphones. One such company is run by Wes Dooley at Audio Engineering Associates (www.ribbonmics.com).

Secondly, the ribbon family as a whole is the most expensive family of microphones. You are likely to find them more in very high-end recording studios or in private collections. Because of the cost and the fragile nature, you are not likely to find many in your local P.A. companies' road kits.

MODERN RIBBONS

Not all ribbons are vintage microphones. Several models are still manufactured today; their durability is generally better and their output is hotter, obviating the need for extra transformers.

Among those available today are various models mainly from three companies: Royer, beyerdynamic, and AEA, although Samson also makes one model. While the vertical, or axial, orientation is still popular in these microphone designs (as well as with many upper end condensers), some of the newer ribbons are oriented in a radial or horizontal hand-held fashion.

You will find the list price range for modern ribbons to start as low as \$600 and run all the way to a high end approaching \$4,500.

According to Mike Martini, "One of the most interesting products on the market are "new" 44-clones manufactured by Audio Engineering Associates, who have taken original RCA schematics and are producing modern clones which, other than the logo, are identical in looks and sound to the original. They are pricey (\$3,000-\$4,000), but many musicians swear by them. I guess the engineers from the Golden Age weren't so dumb after all."

OF MICS AND MEN – A SUMMARY THUS FAR

In our first three installments, we have armed you with enough information to markedly improve your on-air sound and recording. Remember what I said at the outset of the series: Almost all audio you hear on the air or in a film originates at a microphone, and microphones are not just interchangeable parts in the recording or broadcast chain.

Each family of microphones has its own benefits and drawbacks and – within each family – you will discover models which excel at a musical instrument but may not perform as well on vocals or "voice versa" (sorry about the pun). The bottom line is that the microphone you choose for each recording or broadcast can have a profound impact on the overall quality of your product. If a really poor

microphone choice is made, there may not always be a way to "fix it in the mix" no matter how creative your producer or technical engineer.

If you are reading this as a manager, make sure your facility has the right microphones to do the job correctly, and remember the most expensive microphone is not always the best microphone – or even the best choice! If you are an engineer, I hope you have a better feel about recommendations and implementation of the microphones you already have in house.

LISTEN BEFORE BUYING

A quick note on the process of microphone acquisition: If you deal regularly with one or a just few equipment vendors, inquire about "loaner" microphones which you might be able to try before you sink \$500 into a microphone you have only heard about. Companies might be more likely to loan microphones to regular customers.

Microphones are the most subjective choice you will make in the audio chain. Before deciding between two comparable microphones, make sure you are monitoring their performance in the most controlled circumstance possible – and on the same monitor system.

Next time, we will bundle up for a tour of a microphone's polar region and give you a close-up on proximity effect. To take some liberties with a favorite quote from Edward R. Murrow: "Good Mics and Good Luck!"

George Zahn is the Station Director at WMKV-FM in Cincinnati, OH. George can be contacted at GZahn@lifesphere.org

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Monitor

Guide

by Lyle Henry

Part 3: FM and SCA Modulation

In the August 2006 *Radio Guide*, Lyle Henry commented on some of the issues related to measuring modulation in this age of deregulation and now digital transmissions. This month he returns with some ways to ensure your FM and SCA transmissions are as good as possible.

Sometimes it can be a real challenge to know exactly what modulation level is being produced by your transmission system. That should not stop you from measuring and controlling it.

THE RIGHT TOOL

In my August article, I stressed the necessity of using the best tool for measuring FM modulation. We noted that most modulation monitors and transmitter modulation meters respond much too quickly.

We also saw that the more complex the modulation, the more important it is to use peak weighting to obtain all the modulation to which a station is legally entitled. Factors contributing to small peaks with little energy which can be ignored by peak weighting are: transmitting a pilot, significant L-R energy, RDS or other 57 kHz energy, analog SCAs which are usually at 67 or 92 kHz, and high-speed digital SCAs.

Modern monitors like the ModMinder, Wizard, and others with peak weighting capability can help increase station loudness by permitting an increase in modulation.

PRECISION READINGS

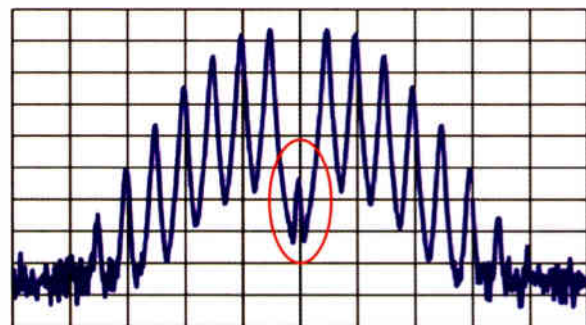
Sure. We can know our modulation *precisely*. This procedure has been discussed by others, but I will briefly describe it here so everything can be in one place as much as practicable.

Basically, you can use a general coverage communications receiver or spectrum analyzer, set up an oscilloscope, look at the demodulated FM signal, and do a Bessel null to calibrate the scope or any modulation monitor for 75 kHz deviation. (Bessel nulls – carrier or sideband disappearances – are created by certain modulating frequencies, amplitudes and modulation indexes.)

A sine-wave audio oscillator is used to modulate the exciter. The frequency must be known precisely. Set up a spectrum analyzer with a fairly narrow I.F. filter (5 kHz or less) to look at the FM signal. This is usually done at the FM frequency itself, but the measurement can also be done at the 10.7 MHz I.F. of a receiver tuned to the FM signal. (A communications receiver can be used instead of the spectrum analyzer; choose an AM or SSB selectivity setting.)

NOW YOU SEE THE CARRIER, NOW YOU DON'T

It conveniently happens that by using an audio frequency of 31,185 Hz and increasing its level into the FM exciter, a point will be reached at which the carrier will disappear! That is a Bessel Null.



The carrier disappears when you reach a Bessel Null.

At 31,185 Hz, this occurs at a modulation index (75 kHz divided by the audio frequency) of 2.405. When this happens, the deviation will be precisely 75 kHz. Neat, huh? Now we can use that to set our oscilloscope to a convenient display range or calibrate our modulation monitor and peak flasher.

A lower frequency, 13,587 Hz could also be used. Just increase the level till the second null, 8,666.5 Hz and the third null.

SCA monitors can be calibrated in the same way using the appropriate audio frequencies. Standard deviations for 100% SCA modulation are 6 kHz on 67 kHz and 7 kHz on 92 kHz. You will find a Bessel Null table for FM, TV-MTS, and SCA/PRO channels at <http://www.bext.com/bessel.htm>

LOOKING AT REAL WORLD MODULATION

Now we can put normal modulation on the air and see exactly where our *real* peaks reach.

But since the FCC does not count a peak as a peak till it is a full millisecond (ms) long and it appears that one can have five of those within 5 ms, that means a 5 ms peak weighting can make a useful difference – very useful, in some cases.



A Belar Wizard system.

Notice the readings on my Belar monitors, for example. Here we can see an SCA indicating 9.7% injection on the SCMA-1 (top unit), left channel and unweighted total modulation on the FMSA-1 (middle), and the effect of weighting on the total as displayed on The Wizard at the bottom of the stack.

The SCA being monitored in this photo is an FMeXtra digital signal which is operating in a mode that is about twice as wide as the maximum SCA bandwidth (16 kHz) of the Belar. So it reads about half the actual RMS injection of 20%. The reading of 151% SCA modulation is meaningless since the monitor is looking at a digital signal, which appears as noise.

AVOIDING OVERSHOOT

The signals mentioned earlier are not the only factors which can create extra modulation peaks. Inaccurate peak control in the audio processor, as well as exciter and composite STL overshoots are other important factors, and the latter tend to be wide, low-frequency peaks which will not be removed by a peak-weighted modulation monitor.

To avoid tilting a 50 Hz clipped waveform more than 1%, for example, the frequency response must extend down to 0.16 Hz! Greg Ogonowski has written extensively about this and even formed a company to modify older equipment to remove this source of trouble. See <http://indexcom.com> and click on the Technical Papers button.

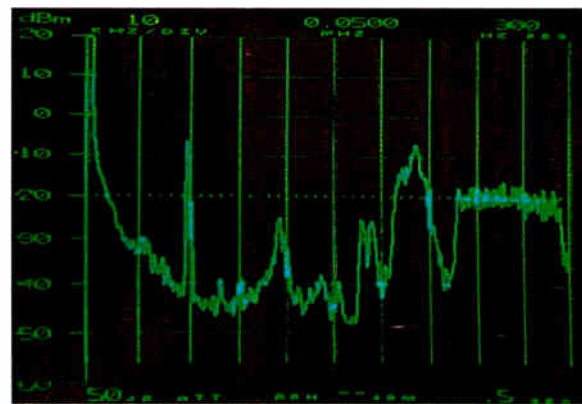
THE RIGHT MEASURING POINT

Once you have gotten tight peak control in your processor, cleaned up exciter and STL overshoots, and have a high quality peak-weighted modulation monitor at hand, how can you use them to make the most accurate measurements?

The simple answer is to measure *at the transmitter*. And the most accurate way to do that is to connect the monitor to a forward power RF port on the transmission line. This will minimize SWR related reflections which can raise the modulation readings somewhat.

Measuring modulation at the studio will never be as accurate due to multipath reflections which tend to raise the indicated modulation. That is why you want to place your best monitor at the transmitter – or at least take it there

when you want as much accuracy as you possibly can get. If you must measure at the studio, be sure to use a broadband directional antenna such as a log-periodic.



A Spectrum Analyzer showing a "fully loaded" station: baseband with L+R, Pilot, L-R, RDS, 67 kHz analog SCA, and 92 kHz digital SCA.

Employing an older monitor at the studio to keep tabs on what is happening is helpful, too. At least you will be able to see if anything has significantly changed. Just being able to see the pilot level will often tell if there has been a system gain change.

UNDERSTANDING THE MODULATION

Now what about those more esoteric terms we hear regarding FM: Incidental AM, Synchronous AM, Asynchronous AM, and Group Delay? These can all have an effect upon signal quality. Most baseband modulation monitors have a position or two for checking AM noise. All of these measurements must be made at the transmitter.

With tunable transmitters, usually tube types, synchronous/incidental AM that bounces with modulation can be reduced by careful tuning. IPA adjustments typically have the most effect. Combined transmitters, tube or solid-state, must be adjusted for minimum reject load power – as well as low AM noise – so it gets more critical.

The RDL ACM series of Amplitude Component Monitors are a fine tool for this. And in the October *Radio Guide* (Page 20), Tom Bosscher described minimizing AM noise using a computer.

Asynchronous AM is power supply related and is observed without modulation.

GROUP DELAY

Group delay has to do with whether all frequencies from low audio to high subcarriers pass through the transmission system at the same rate. It turns out that getting this right is somewhat more important than minimizing incidental AM noise. Fortunately, however, they tend to track each other.

Group delay is not listed as a test choice on modulation monitors. Nevertheless, we can use our stereo monitor to minimize group delay errors. Feed a very low distortion sine wave at exactly 9.5 kHz into the composite input of your exciter and increase modulation up to 100% as you progress with this test. Set the stereo monitor to observe the pilot and increase the sensitivity as necessary. No other modulation should be present.

Tune the transmitter(s) for minimum indicated pilot. You are looking at the 2nd harmonic of your audio oscillator. Geoff Mendenhall described this method some years ago. Fortunately, this and all of the above procedures are simpler in practice than to describe.

DIGITAL MODULATION

Digital exciters generally allow you to set the modulation for a full scale (0 dBfs) maximum when all the bits are turned on. It is literally impossible to overmodulate, but you can make it sound terrible very fast when you hit that digital brick wall.

With FMeXtra, the SCA encoder is set for the percentage of RMS injection desired. Modulation on the subcarrier itself is maxed out again when it hits 0 dBfs.

All in all the result of carefully monitoring your system is to allow you confidence that your facility is modulating with maximum effectiveness, within the limits of the FCC Rule and Regulations. Then, too, the next time I am within range, I might just be checking out your signal myself.

Lyle Henry, aka The Radio Doctor, is a Los Angeles-based engineer with extensive experience consulting FM and SCA stations around the world. Contact Lyle at lylehenry@fastmail.fm

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Transmission Guide

by Adam Jones
Shively Labs

It's Time to Define Coax

During maintenance or construction of a transmission system, there is a nasty problem that can pop up and really bring things to a halt – coax connectors suddenly do not mate properly. The result can manifest itself as a pressure leak – or as two pieces of coax that just will not come together.

In this article, Adam Jones explains why this can happen, what you need to know to avoid unexpected hassles, and what is being planned to help make handling coax connections easier in the future.

Since the last update or renewal of the Electronic Industries Alliance (EIA) rigid coaxial transmission line standards – RS-225 and RS-259 – nearly 30 years ago, tremendous change and innovation has occurred in broadcast industry. The net result is that these documents (and the standards) became obsolete.

HOW IT HAPPENED

In fact, several years ago, the EIA withdrew both RS-225 and RS-259. The reason: no one from the broadcasting industry had renewed or re-affirmed them *in over twenty-five years*. Since such documents must be revised or re-affirmed every five years to remain as a viable standard, the EIA presumed that no one used or followed these standards anymore.

The tragedy is that many manufacturers still follow what they understand to be the current standard. The result has been the creation of many popular rigid transmission line sizes which have been supplied to the broadcasting industry with little assurance that there would be compatibility with similar products from other manufacturers.

Because of this, the coax manufacturers have been forced to create adapting devices to connect their equipment to other manufacturer's components.

THEY JUST DO NOT FIT

Here are some examples of incompatibility in the broadcast industry:

- 4-1/16 inch, 50-Ohm transmission line and 7-3/16 inch, 8-3/16 inch, 9-1/8 inch and 10 inch, 50- and 75-Ohm transmission lines.

There are no flange, bullet, or tube size definitions for this product in any US-based standard and the European standard, IEC-339-2, establishes sizes that are not followed by all US manufacturers.

On the 4-1/16, 50-Ohm transmission lines, there are two thicknesses of inner-conductor walls that are in use today: .025 and .040 inch. The thickness difference creates a great potential for failure when a bullet designed to fit one thickness is used with the other inner-conductor thickness.

- 6-1/8 inch, 75-Ohm transmission line.

Because this line size uses the same inner-conductor as the 4-1/6, 50-Ohm transmission line, the same inner-conductor situation exists as above. Flange compatibility is not an issue, as this is defined in the 50-Ohm standard for 6-1/6 line.

BRINGING THE STANDARDS UP TO DATE

This will be changing in the near future as the EIA has just endorsed the creation of a committee. The purpose of the committee is to revise and release new versions of the RS-225 and RS-259 rigid coaxial transmission line standards.

The purpose of this effort is an attempt to bring about a consensus among the various manufacturers on the details of importance. If a compromise cannot be made on certain details, different delineations will be made so the broadcaster can readily identify if there are compatibility issues with the nominal coax size.

Most importantly, the committee's goal is establishing standards with which all manufacturers can comply. This will give broadcasters the confidence that, regard-

less of where the product was purchased, it will reliably connect to other manufacturer's transmitters, antennas or RF systems.

CALL FOR ASSISTANCE

We are seeking your participation and help in this endeavor. While standards such as this are typically written by industry, public participation is needed to assure that your interests are considered.

Please contact me, Adam Jones, at Shively Labs either at 207-647-3327 or ajones@shively.com via email with any questions or for information on how to join the committee.

DEFINITIONS

RS-225 – The standard establishing the inner- and outer-conductor size and flange dimensions for 3/8, 7/8, 1-5/8, 3-1/8 and 6-1/8 inch, 50-Ohm rigid coaxial transmission line.

RS-259 – Similar to RS-225, this standard is for 75-Ohm coaxial transmission line.

"EIA Flange" – The generally used term to advertise a manufacturer's compliance with either the RS-225 or the RS-259 standards.

EIA – The Electronic Industries Alliance.

Expansion Line – A coaxial transmission line that includes a specialized connector which can mechanically and electrically compensate for the thermal expansion differences between the outer- and inner-conductors.

Bullet – otherwise know as connector or male connector; used on inner-conductor to bring together two separate inner-conductors either at the flange (with an insulator) or in the piece of line. A bullet can be single or double ended, it is a male match to a cup or tube.

Connector – See Bullet.

T/L – Line, Rigid Coaxial Transmission Line.

Cup – The female mate to a bullet. The cup must comply with the dimensional standards of the coaxial tube to maintain the appropriate insertion force.

Insertion Force – The amount of force needed to install a bullet into either a cup or inner-conductor tube.

Adam Jones is the Mechanical Engineering Manager for Shively Labs in Bridgton, Maine.

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by Mike Callaghan

Taking the Music to the Streets

Are CD players and Street Teams compatible?

KIIS sends out station vans with Street Teams to stop and make appearances at high schools, shopping malls, and other crowded places. At each stop a portable rack mount Public Address system gets unloaded, set up and special "mix" music gets played. At the end of the appearance, everything gets "gently replaced" (sometimes right-side up!) in the back of the van until the next location is reached. This can happen a dozen times a day.

The special "mix" music came from a rack-mounted CD player that is part of the PA system. And the player failed with amazing regularity. It is really not a surprise – few precision devices can handle that abusive treatment.

A BETTER SOLUTION

The solution is to replace the CD player with something more rugged. How about a "no moving parts" MP3 player? For maybe 1/3 the cost? www.outpost.com (it is really Fry's) sells a player that is perfect for the task.

It is precisely one rack-unit tall, uses an easily-swapped Secure Digital card, and even has a display to show the track number. It is very easy to operate and should last virtually forever. It runs a good nine hours on a AAA battery. The player is usually \$30, but is frequently on sale for half that. Their Model # is MP-1003 and the Stock # is 4710459.

The player is mounted in the center of a 1-3/4" rack panel, with a notch in the bottom edge for the output cable to pass through. Use Velcro to fasten the player down. It makes it easy to remove and also spaces it out for easy access to the controls.



This small MP3 unit attaches with the Velcro and is ready to go.

I also mounted an empty "AAA" holder to the panel to carry spare batteries.

LOADING THE BOX

The production people will have to lay the audio down as MP3 files. The player comes with a cord to allow dubbing in from your computer's USB port. It simply appears as an external drive with its own drive letter. Or

you can use an external card reader to load the SD card, which can be up to 1 GB, which is over 15 hours.

Operation is just too simple. Push the center button once to start the audio, and twice to stop it. Track selection is on the left rocker and volume is on the right. This also fast-forwards and rewinds through cuts. The default EQ works perfectly for us, but there are four more options to try if you like.



An easy way to carry a lot of music out to remotes.

The change solves a lot of problems. CDs never gets lost or scratched. The player is ultimately reliable and, if need be, is easily replaced without tools. The Street Team loves the simplicity, dependability, and convenience. Ten hours of music fits in a shirt pocket. There really is no downside.

Mike Callaghan is the Chief Engineer for Clear Channel's KIIS in Los Angeles and a long time Southern California Radio Geek. He is always finding innovative ways to solve problems. Mike is at mikecallaghan@clearchannel.com

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A Manufacturer's Perspective

by Bob Tarsio – Broadcast Devices

In our industry there has always been a long standing idea that support is virtually forever. Well, one has to ask how long is forever?

Is five, ten, or – heavens! – twenty years the appropriate period? Ten years is a long time these days. I will bet there are many of you reading this that were still maintaining cartridge machines ten years ago. (Remember cart machines?) Now it seems that technology is obsolete as soon as the next operating system is available.

A company's product is more than just a box. Support is an integral part of the total product. But, what is a realistic level of support?

REALISTIC EXPECTATIONS

It is important to be realistic about support. For some capital expense items like transmitters, a longer support time may be appropriate. Replacing a transmitter is not something you do on a whim. (On the other hand, those 1940s transmitters really are ready to be replaced.)

At the same time, supporting a \$99.00 headphone amplifier for twenty years or more may not be reasonable.

There are many factors that can affect product support aside from the replacement cost. Here are two quick examples: parts availability and the manufacturer's longevity.

"LIFETIME"

In many ways, the lifespan of the product often equals the lifespan of the devices inside it.

A good recommendation for anyone buying a transmitter today: it really is a must to get the spare parts kit if you plan to maintain a transmitter for the life of the amortization schedule. Furthermore, not only semiconductors but any parts specially made by the transmitter maker should be considered for spare stock if deemed likely to break or fail over time.

When parts start to go on the endangered species list this should set off an "alarm bell" from engineering to management that it is time to look at new equipment.

At BDI we try to anticipate what parts we will need to keep on hand even after a product ceases production. In fact, we have many products, now out of production, that we can still support in part because we anticipated the number of parts that we needed to keep on hand.

THE PARTS PROBLEM

Much of what BDI has built over the years uses generic parts that are widely available. Of course, this is getting to be less and less the case as we design more

complicated systems. Unlike tube transmitters where most of the parts were generic and could be purchased from multiple sources, this is not the case for a fair number of semiconductor devices.

Such parts do not have the product life span that an 807 had, for instance. Nor are there as many generic replacements for a lot of this stuff. Motorola made a lot of RF devices that were popular with transmitter makers and exclusive to their product line. A hiccup in production could be devastating to the industry.

Worse than that, spun the business off so you are now at the mercy of new management as to whether the device that you need will still be available in the future.

Perhaps you have a transmitter, like the Harris MW series, a Gentner remote control, or one of several audio processors that can no longer be supported because critical IC chips are just no longer available.

I think a good rule of thumb is to expect about five years of post warranty support for any product. After that it becomes difficult to have parts on hand. And things are going to be even more difficult with the advent of RoHS compliance.

A FURTHER COMPLICATION

For those of you who may not be aware, the European Union has instituted a "Reduction of Hazardous Substances" requirement on most electronic products imported to EU countries. This has made many semiconductor parts, passives, and other material obsolete.

Soon some replacement parts just may not be available if a company decide to stop producing non-RoHS compliant parts. The big offenders are lead, cadmium, and certain materials like hexa-valent chromium. Up until recently this stuff was in everything.

(Continued on Page 18)

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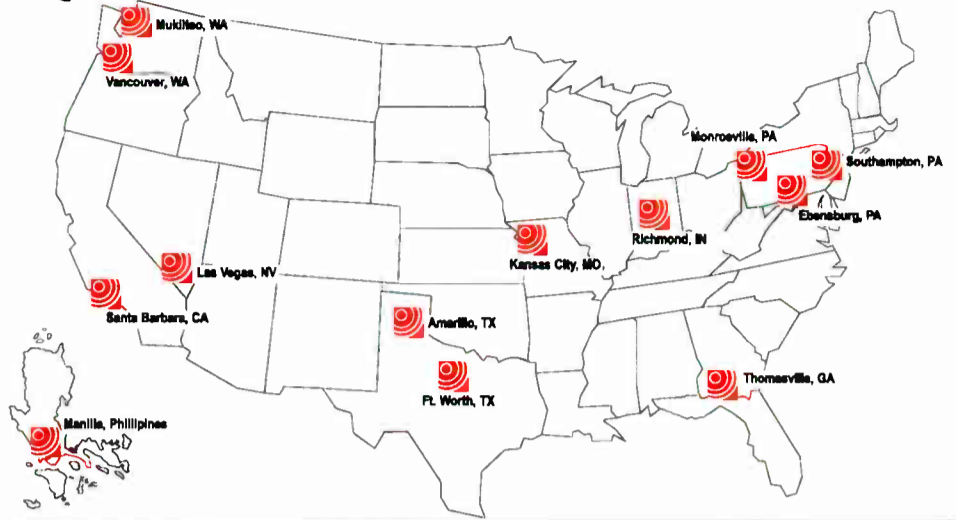


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Tech Support

Product Support on the Long Term

Continued from Page 16

Lead is used in the production of printed circuit boards, semiconductors, passive conductors – and nearly everything else with which a soldering iron comes in contact. Cadmium is used mostly in rechargeable batteries. Hexa-valent chromium is used as a finish on chassis as it has conductive properties which made it an excellent finish for chassis parts that needed to be electrically mated together.

PRODUCTION CHALLENGES

Substitutes have to be found for all of these materials. All of this will likely make support a dicey thing for a while.

Anybody who thinks that manufacturers charge what they want for stuff needs to understand some of the difficulties that we have in being able to produce products in this new environment. As an example: the new replacement solders that we now use are about *four times more costly* than the good old tin/lead solder.

We do the best that we can to hold prices down but all of this stuff adds up. Support is also a part of the original purchase price of equipment. You may not think so but the money to support products down the road in or out of warranty has to come from someplace.

LIFE OF THE COMPANY

Another important issue is the lifespan of the manufacturer itself. Some stations try to keep a product going beyond its useful life span, either because of limited (or no) budget, or stubbornness. Not only does the advance of technology makes it hard to justify support of some gear, but the vulnerability of holding onto old equipment was demonstrated to me years ago.

I worked at a station that had an AEL 15KG transmitter. I blissfully thought I could keep the old girl running indefinitely until one day when I needed some mechanical parts for one of the tuning sliders.

AEL had stopped answering the phone years before on customer support for its broadcast line, so now I was faced with having to scare up these parts. It turns out that AEL relied heavily on the James Millen Company for a lot of these parts. I thought that National owned them at the time. Well I got routed around and ended up talking to an older guy who had retired years before from National and had bought up the old Millen stock from National.

I managed to get what I needed but there is a point to this long and involved story: AEL as a broadcast manufacturer is gone, National is gone and any remnants of James Millen Company are gone. How many items are in your plant from companies that no longer exist?

PROTECT YOURSELF

Do not let this happen to you. Identify marginal items in your plants and make management aware of their vulnerability. Unfortunately, many managers will not

listen until it is too late but you can cover yourself by giving them advance notice.

Also, when shopping for equipment look at a company's past track record for providing parts and support. Some companies can support just about everything they have ever built – and some use cutoff dates when support is going to end.

Both policies are fine – *as long as you know what to expect*. When a company arbitrarily decides to cut off support, be concerned.

TIME AND SUPPORT

Another thing to consider is your time. My little story took probably many hours and days to resolve. I hear it all the time from my customers that they simply do not have the time to chase this stuff down. They need to rely on good customer service and support.

Indeed, how much of your time as a customer is spent trying to get support? Less is always better.

Today, the Internet helps a lot. Technical manuals and support answers can often be gotten without even picking up a telephone. This has helped manufactures remain competitive and speeded up repair times for many customers.

Nevertheless, there are still going to be times when contacting the company is necessary. Remember the companies that still do telephone support well. And if a product must go back for repair, whether in or out of warranty, how much turnaround time is there? You can draw much from your past experiences on these issues.

In the end, quality companies will always provide appropriate support. An engineering manager's job is to seek these companies out and do business with them when they can.

Bob Tarsio is President of Broadcast Devices, Inc. in Cortlandt Manor, NY. You can contact Bob at (914) 737-5032 or via email at Bob@Broadcast-Devices.com

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Survival Guide

by Rich Wood

Is There a Life in a Cluster?

Astronomers have it easy. They look for life in the universe with very expensive equipment. My charge was to find if there might be signs of life in a radio cluster. My equipment was a telephone.

At the outset I have to inform you that no one interviewed for this article was willing to allow his or her name to be used. Most of us know better than to discuss how heavenly it is to work for an employer while still employed.

STAFF? WHAT STAFF?

Where once it required several engineers per station (WOR, New York, had 155 engineers on staff in earlier times), today one man is often responsible for more stations in greater disrepair than any of us could have imagined. And the transmitter sites are often widely scattered.

In the 155-engineer days it was worthwhile for a union to represent the engineering staff. With one or two technical people there are more folks negotiating than are being represented; most are considered some form of management, so union representation does not have much appeal to NABET or IBEW.

The question I posed was: "How does an engineer ensure that he avoids being a slave to his job and succeeds in having a life and a family?"

INSECURITY REACHES THE TECH SIDE

I found a variety of attitudes among engineers. Some felt they were of such value to the company that they could come and go as they please. "They can fire me if they don't like it" was common. Of course, some of those engineers are currently searching for work.

Others, mostly with families and houses they rarely visit, were less cocky about refusing an employer's demands.

Another issue is relocation. With so many stations in so many markets we seem to have accelerated the industry's reputation for insecurity. Like the Military, we might end up anywhere. This has always been a risk for talent. Now engineers move up or move out.

DANGER, WILL ROBINSON!

The modern engineer faces another issue: personal danger, both in terms of physical safety, but increasingly in terms of family life.

Though we constantly deal with utility-level power, we often do it alone. Since residential power can kill, it would seem prudent to have a second, trained, technically-savvy person nearby in the event of a transmitter emergency. Yet, in reality, how often are two engineers sent to a transmitter site to troubleshoot a problem? And how many engineers are so fatigued from long hours and emergency calls that their judgment is dangerously impaired?

Then there are the many quality of life issues. Under most conditions an unmarried engineer's attempt to find social companionship is also dangerously impaired. A wife is often used to, but not happy with, an absentee husband.

Nature has made too few potential mates who will put up with a remote control unit that pages at the slightest swing of a parameter out of tolerance. Quite rapidly, their tolerance swings with it too. No second date.

ENLIGHTENED MANAGEMENT

Since engineers are represented by no one but themselves, the solution is being able to enlighten management. Developing a relationship of trust is critical.

I know of engineers who arrive daily at 9:00 AM, take lunch and leave at 5:00 PM. When a breaker trips and they spend the night at the transmitter, management understands and lets them sleep late. Such enlightened managers are usually in major markets.

In those cases it can be considered self-serving enlightenment. Every minute off the air costs a fortune in lost revenue. The engineering cost center suddenly becomes the station's salvation. Good managers understand the "always on call" nature of engineering and support their local wizard.

Unfortunately, enlightenment is on a case-by-case basis, even within a company. I know of engineers who were fired for "excessive transmitter maintenance" or for refusing to expose themselves to serve life-threatening situations, such as natural disasters still in progress.

THE GOVERNMENT IS NOT HERE TO HELP

One would hope there would be an organization like the SBE, NAB, or governmental regulations that paid attention to, at the least, the safety issues involved in engineering. A group with teeth would be nice. However, the current political climate favors the corporations. Just follow the money.

The SBE and the NAB, even if they wanted the job, have no authority within any corporation. OSHA is about as close as we can get. Truckers and pilots have safety regulations that are usually enforced. In Broadcast Engineering only one life at a time is at stake. Other than where you place fire extinguisher signs, OSHA will not be much help.

This is where social skills really shine. Your willingness to take a personal risk is important, too. Generate trust with management. If that fails, be prepared to change professions – and make more money.

Rich Wood has worked in tech, programming, and management at local stations and network operations. You can contact Rich at Rich Wood Multimedia headquarters: richwood@pobox.com

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Public File Compliance Issues and Programs

While doing the Alternative FCC compliance certification inspections, I have found one item that seems to be a frequent source of FCC fines due to a misunderstanding of what is required by the Rules and why.

COSTLY TROUBLE

Indeed, several stations over the past couple of years have paid eight to ten thousand dollar fines for not being compliant with the Public File folder "Issues and Program Reports" (IPR) as required by Section 73.3526(e)(12) for commercial stations and 73.3527(e)(8) for non-commercial stations.

Several of the fine-related instances with which I am familiar involve non-commercial stations, usually student-operated college stations run by kids who have little or no comprehension of what is required in the Rules or why.

Just this month alone, \$10,000 fines have been assessed to a few such non-commercial stations for failure to be compliant. Worse, the fines came as a result of self-admissions on the renewal form that the Issues and Program reports were missing! But it is easy to avoid such a situation.

DOCUMENTING SERVICE

The Issues Public File folder is mandated by the Commission to encourage stations' local involvement and to prove such with entries to this effect in their Issues/Programs File. Over the past couple of years an increased fine-focus has evolved to encourage station to seriously program for their communities.

Let us not forget the purpose for which every broadcast license granted "is to serve its community's public interest, convenience and necessity." At license renewal time we are required to establish to some extent how we have achieved this mandate. We accomplish this with a history of compliance documented in the Issues/Program Public File folder.

On the other hand, many stations now operate totally unattended, sometimes for day on end as permitted by the FCC, as long as the EAS system is left in the "auto-forward" position, so local emergency announcements will be broadcast during these periods.

TIGHTENING UP

After a few years of permitted unattended operation the Commission realized many stations were seriously negligent in their requirement to "Serve the Public" and thus began serious enforcement of the Issues and Programs Public File folder.

That explains the current attention to this issue. Some stations have paid fines, others have had their license renewals delayed. In some cases, new station owners have found themselves responsible for paying the fines for their previous owners. In almost all of these cases it was determined to be cheaper to pay the fines than hire legal assistance to argue the case.

Frequently it is small non-profit stations that fall victim to these requirements. Non-commercial, religious stations have been fined usually because they are run by volunteers who have no idea of what Public Files are all about nor where to go to find out.

MAKING IT EASY

It is certainly not rocket science to be compliant with this requirement. For those of you who have suffered through one of my Alternative FCC compliance certification inspections you are familiar with a simple means of being compliant with the Issues and Programs Public File folder.

Using an 8-1/2 x 11 sheet of paper in the landscape format, create a form similar to **Figure 1** below.

Make room for 12 or 13 lines so an issue for each week of the quarter may be listed by your news director.

Following the end of the quarter and within ten days (i.e. Jan 10th, July 10th, and Sept 10th), place the completed sheet in the "Issues/Programs" folder of your Public File.

FILL IT, FILE IT

Hundreds of stations around the country are using this simple means of being compliant with this FCC requirement. A specific minimum number of issues are not defined in the Regulations but the method described here has been provided to the Commission where Staff have indicated they have "no problem with it."

The preceding is a good faith effort as a part of the Alternative FCC Inspection Certification Program to explain and simplify FCC regulatory compliance. It is not to be construed as professional legal advice.

Ken Benner thinks that, for the most part, you should keep your money and not send it to anyone in Washington. Of course, if you really need to send it somewhere, send it to Ken! Email contact: bennerussoc@comcast.net

Quarterly Issues/Program List for Station: _____ **Figure 1**

Quarter: 1st 2nd 3rd 4th of Year: _____

The following is a list of some of the more significant community issues addressed by this station for the quarter specified. This list is by no means complete, nor is the order in which these issues appear intended to imply any degree of priority of significance of the issues.

Issue Description:	Program Segment:	Date/Time:	Duration:	Description of Segment:
Example: Dog leash law.	Ken's 7:00 AM News	7:00 AM 11/13/06	:45	Tape of Mayor Jones' endorsement.
1. _____				
2. _____				
3. _____				

(add 10 more lines)

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by Warren Shulz

Avoiding "Enhancements" that Diminish EAS

Recent government actions to revise/enhance/expand EAS, along with the repeated false alarms, testing errors, and misuse of the EAS protocols have provided another opportunity to reflect on where things stand... and where they are headed. Here are some thoughts from Warren Shulz, a state EAS Chairman about the recent efforts to "re-invent" EAS for the digital age.

Last summer, when a tornado went through Springfield, IL the only surviving voice was the local broadcaster station. Power was out, newspapers stopped printing (no power), the Internet stopped, even state government stopped. A simple area-wide power outage can bring civilization to its knees.

The wireless broadcast sector is the survivable component of our communications infrastructure. And yet I am afraid that the glitz of high tech draws the attention away from the fact that, after Hurricane Katrina hit the Gulf Coast last year, WWL-AM New Orleans was the only working signal when the chips were down. What is not obvious about that?

Nevertheless, we must look back at the current Emergency Alert System (EAS) and think about the fact we have not made what is already in place work.

BUREAUCRATIC FAILURE

Adding more layers will not make it better. An alert system is only as good as the managers behind it. No amount of Report and Orders nor Federal agency policies are going to make any improvement in the

EAS if all the components in place do not work as a unit—and having an active manager standing behind the components.

In Illinois, we have a City of Chicago E911 Center that is still trying to get a signed local EAS plan for distribution – four years have passed since the Mayor announced an EAS plan to connect himself with the public on 1/15/02. As E911 personal changed, each visit we made (to move the plan along) was like a PC cold re-boot.

The Illinois State EAS Plan has yet to be completely signed-off despite five months of pushing. The City of Rockford will not talk about an EAS plan to the local EAS chair. And on it goes. We are not linking what is in place.

Recent plans in the works to use cell phone emergency text messaging is another agony of mine. Based on what we have seen in past emergencies, these cell phone text alerts and the ensuing usage overload will take down the cell system for hours. So much for the cell phone as an emergency link in time of stress.

COMMUNICATION DISCONNECTION

Emergency Manager's see HazCollect and EMNet, and yet they do not get it. Grants funds in Illinois purchased about 300 EMNet terminals at about \$3,500 a copy plus a \$35 per month (every month, forever) fee to make it work. It was to be rolled out to LP (Local Primary) stations – but there the rollout stalled.

Meanwhile, NOAA's HazCollect is free for the asking. You have got to ask why we are not getting what is already in place to work before we add more onto the pile?

My hat is off to NOAA Weather radio for stepping up to the plate to endorse the "All Hazard" banner. NOAA weather offices are manned with staff to push out our emergency alerts of any kind.

That is the sort of government/broadcast initiative that should be expanded and enhanced. Illinois is one of 22 states who adopted NOAA Weather to push out

Amber Alerts. That route makes use of an existing path to broadcasters, cable operators, newsrooms (via AP bulletin) and the general public at no additional cost to the taxpayers.

PROPER EMPHASIS

Another success story is DuPage County in Illinois. They have had a local plan in place since 1998. This county is on top of EAS with origination equipment and a manager who is the spark plug. Will County, IL and Kane County, IL also have local plans in place.

While this addresses the EAS, it still leaves 99 other Illinois counties in the dust. What is the difference? Managers who step up and see the need to get prepare emergency communications paths now.

BUILD ON WHAT WORKS

The future systems need to be declared as "door bells" or a survivable component. The survivable component needs to be wireless, independent of the power grid and other "delicate" infrastructure needs.

I agree with Ann Arnold of The Texas Broadcast Association – Broadcasters are the First Responders. Yet many in charge of planning do not seem to get it. Are special interests being served and the public dis-served?

Glitz technology only works when power is up, systems are in place and life is good. An alert system should, at the least, not depend on local power. When events happen, the react portion is going to need a communications path – which brings us back to wireless solutions and batteries (at least for the short term).

The AM radio link is already in place with a huge imbedded receiver base, including most automobiles. The battery operated sector offers a link when the power grid is down. My quote: "You will hear the end of the world over an AM radio as you lay face down in the dirt listening with your last working set of AA batteries."

Warren Shulz is Chairman of the Illinois EASSECC. He can be contacted at Warren.G.Shulz@abc.com



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Parts Guide

Keeping the Parts Bin Full

One of the biggest problems any working engineer has is locating needed replacement parts and information. Perhaps your shelf is stocked right now. But then again, where would you go to get a 4-500 tube these days, much less an 8008?

Our goal here is to help you find the things you need, or at least point you in the right direction.

AUTOGRAM CONSOLES

Ernie Ankele has finally sold Autogram, so he and his dear wife can take a well deserved cruise.

Meanwhile, the Autogram name will live on, as CRL has purchased the Autogram line and will continue to manufacture and support the current lines. The Autogram/CRL manufacturing plant has been moved from Plano, TX to Benton, Arkansas.

Sales and Technical support are available at 480-893-7080. There is also a web site, but it is not yet linked into the Orban/CLR site. You will find it at <http://www.autogram-crl.com>

IC AND AC CONSOLES

For those who have those IC and AC consoles – you know, the ones you just cannot kill – there is an additional source for parts support. John Lackness acquired the available inventory of amplifier and mixer modules from Autogram and has them available at his new company in Cibolo, TX – ConverseRF.

Those needing modules or information about them can contact John at ConverseRF, www.converseRF.com or call 210-775-2725.

EAS PRODUCTS

One of the constant needs in any station (aside from those who have hooked external printers up to the EAS boxes) is more EAS paper. Most stations eventually need more of those little rolls of paper, for example, but do not know of the various alternatives in acquiring them.

There are many places to purchase the paper (and ribbons, in some manufacturers' models) used in your EAS box at reasonable cost. Sometimes just knowing a substitute product can save significant time and money.

The following information has been compiled from a number of reports, but you are encouraged to double-check before ordering. If you find some good alternatives, or especially good pricing, please let us know.

PAPER AND RIBBONS

There quite a few sources of paper, some are perhaps as near as your closest office supply store. Here are some stores and the stock numbers for you to check out.

Sage ENDEC Systems:

Sage boxes use 38mm x 4M coreless thermal paper. In most cases, Canon TP-6, TI 5000 or 5008, Sharp 8180 or Casio FX-802 paper will work.

- RELIABLE OFFICE SUPPLIES – Stock #5228. Phone: 800-735-4000
- STAPLES – SKU #8924305228
- SEIKO – SS038-009A
- QUILL – Stock # PMF5228. Phone: 800-789-1331
- PAPER ROLLS PLUS – Part# 15XS (Paper Rolls Plus sells a 12 roll case – 18 feet per roll, five feet more than the Canon TP-6 - for \$19.50. www.paperrollsplus.com/thermalpaper.htm

TFT 911:

According to TFT, the 911 “uses standard large hub adding machine paper, available at any drug store or office supply store.”

The TFT 911 is not a thermal printer. Again according to TFT, “it uses a standard Epson ERC-09, cartridge available at computer supply stores and lasts about two years.” These commonly cost around \$5 to \$6 each.

It was also reported that the Nu-kote NK-267P ribbon, which can be found at Office Depot for \$4.59 will also produce acceptable output.

BURK EAS:

Burk units use much the same paper and ribbon arrangement as the TFT. In fact, several of the cross-reference part numbers are the same.

Here are some suggestions received that appear to work for Burk owners:

- The Epson ERC-09 ribbon is said to be the same as the NuKote NK267P, which is available at Office Depot, among others for \$4.59 each.
- A generic version is noted at inkoasis.com for \$2.99 each.
- Another ribbon mentioned by some is the Porelon PR2076.
 - At Office Depot the part # for Porelon is 060-651-463.
- Radio Shack catalog number: 65-715 appears to work for several folks. (At last report, this cost about \$3.00 for three small rolls.)
- Omni Pro in Texas has carried both the ribbon and paper.
 - Paper stock #DPA-046-NR1 was about a buck a roll at last report.
 - Ribbon stock #DPN290BL \$5.80 each
 - The minimum order at Omni Pro is \$25.00. You can call and check Omni Pro prices at 800-926-8926 or 972-713-9000.
- The Epson HX20 has been recommended by some.
 - <https://priceless-inkjet.com>, was reported having the Epson HX20 at six for \$14.97 (\$17.82 total + shipping).
 - Other sites show \$22.00 to 26.00, plus shipping.

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Playing Nice: Adobe Audition 2.0

Perhaps the toughest part of making new technology "play nice" in a broadcast studio is integrating it with existing technology, some of which may be crucial to the backbone of the studio or entire station's operation.

As broadcast engineers, we are challenged with the duty of keeping more than our transmitters operating. Our Audio Vaults, our Scott Systems, our Simians, and our Enco DADs must be up and running continuously around the clock, with or without a human present.

There is a close correlation between equipment stability and maintaining a positive cash flow. An automation system that goes down on a whim without a back-up is no better than a transmitter with the same attributes.

And the same applies in the room where all the money making spots are produced: the Production Room.

PLAYING NICE

A "playing nice" attitude between equipment means things like the satellite receiver sending all the right cues to the automation computer. If we have done our job properly, the computer is interpreting the information and integrating it correctly with everything Traffic, Sales, Production and the air talent have scheduled during a given hour. With well-designed software of today, it is actually simpler than it sounds.

Of course, the quality of the production software has a large effect on the quality of the air product. Using the right software on the right platform goes a long way toward playing nice. And, periodically, software upgrades improve reliability, add features, or fix minor bugs.

More often than not, the automation companies also build or at least pre-configure the hardware to their specific requirements to maximize reliability. Of course, this is in the interest of having everything play nice with their product. Typically, various modules perform specific tasks. Third or fourth party software schedules music, monitors equipment and/or edits the audio.

As upgrades are often on-going, it is also not unusual for stations to also pay a yearly fee to cover those upgrades and technical support. These companies typically test specific hardware, including audio cards and specific motherboard combinations before installing them in a box and putting their name on it.

ADDING MORE APPLICATIONS

That this all happens smoothly and without unnecessary trouble becomes more important in cases where a computer may be called upon to do two or more tasks, all of which are considered "mission critical." And station needs as well as hardware capabilities do vary greatly depending on when the hardware was purchased or last upgraded.

A commonly installed application on many station computers is the audio editor. Adobe Audition became a favorite with broadcasters a few years ago. Its ease of use, a relatively short learning curve, robustness and reliability were among the top reasons broadcasters liked it.

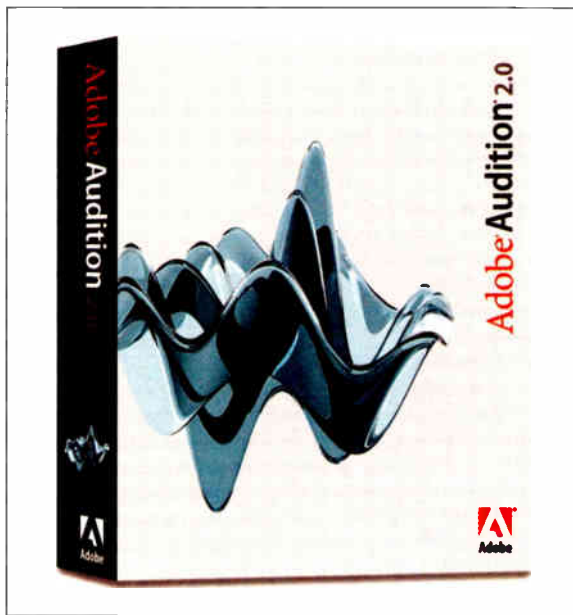
It also played nice with the popular broadcast automation software and ran without a hitch on hardware built by those companies.

While some stations with larger operating budgets may install a broadcast industry specific editor like *Pro Tools* in a production studio (or one of the lesser known packages), Adobe Audition more or less has become the defacto standard "for the rest of us."

Adobe is legendary for its top notch graphics software. Publications such as the one you are reading (and everything I have ever done myself for print) would not have been possible without software from Adobe.

AUDITION

Audition is a more recent addition to Adobe's software line-up – and their first major entry into audio. It has evolved from version 1.0 (which was basically a repackaged Cool Edit Pro) to 1.5, and now to Version 2.0, which was released early in 2006.



Adobe Audition Version 2.0

Like you, I want my favorite software to play nice with whatever computer and other software I use on it. However, Microsoft has done several major overhauls to its Operating System in recent years. This means software companies like Adobe have a difficult challenge as to whether to support older versions of OS and hardware (sound cards, etc) or move forward.

Many broadcast software companies like Enco Systems were slow to adopt Windows XP, until Service Pack 2 became available. In fact, some shipped and specified Windows 2000 Professional long after XP became available, preferring to wait until Microsoft got its act together – or at least until they could certify their software would play nice with XP. Today, even a brand new XP computer typically can require installation of more than 50 security patches before it is truly "safe" to put into service. This is "normal."

On the other hand, Adobe moved forward. There are many reasons: some older cards do not have drivers to work with newer sound cards, while improvements in technology have brought newer sound cards to support. Meanwhile, even the motherboards are changing fast. Decisions on what to support and how had to be made.

The bottom line: If you do not have Windows XP, Audition 2.0 will not play nice. In fact, it will not even install. Stay with 1.5

A MAJOR CHANGE

With all this in mind, it should be no surprise that Adobe Audition 2.0 has its share of conflicts and unsupported cards. In fact, with certain broadcast configurations, it can be hard to configure properly, meaning you should check your sound cards and do careful pre-testing as you install.

As noted, if your Production or On-Air computer is still running Windows 2000 (or anything other than XP),

Audition 2.0 will not run until you upgrade the system. Whether an across-the-plant OS upgrade may or may not be within the budget is another matter. But it is true: we have to move forward sooner or later, as the cost of maintenance exceeds the cost of equipment replacement. If that were not the case, we would still be changing 12AX7 pre-amp tubes in our consoles and those 5-500 tubes in our transmitters.

PLAYING NICE?

Assuming the timing is right, you can make the upgrade, and decide Adobe Audition 2.0 is definitely something you or the staff wants, the biggest concern is if it will interfere with the stability of your most critical software. Your next concern will be whether or not it will work with your existing hardware.

Because my On-Air and Production systems are still running Windows 2000, I was unable to test Audition completely, although I did have a variety of computers available in our test environment with similar hardware that did run XP.

On the other hand, some of my colleagues in other markets have commented they were not immediately making the upgrade to Audition 2.0 due to sound card compatibility issues, one of the problems I had with Audition 2.0.

My four test computers were all of relatively recent vintage. All except one had Digigram sound cards of various types including current models. One was a Dell about two years old, another Dell was a brand new computer. The third computer had been custom built by myself for earlier versions of Audition. And finally, a Gateway laptop with on-board sound.

HARDWARE NOTES

Adobe made extensive use of Dell hardware at the NAB 2006 convention in Las Vegas, so it seems logical they would encourage the use of Dell hardware.

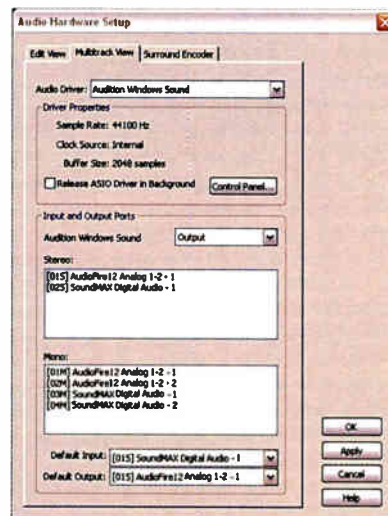
My custom audio workstation was built around a Pentium 4, 3.0 gig processor and 2 gigs of memory. It used a motherboard brand from a company that supplies OEM parts to companies like Dell. The newest computers of my test group were a Dell and Gateway laptop. They were Pentium 4, 2.8-GHz, 512K, and a 2.0-GHz (64 bit) laptop, with 1 GB of memory respectively.

Adobe's minimal requirements indicate version 2.0 will run on a Pentium 3 with 512 MB of memory (although 1 GB is recommended). As you might expect, maximum performance or reliability is not possible with the minimal configuration. I have also confirmed this with Adobe. You may need to replace your computer if you want Audition to run at its best.

SOUND CARD HASSLES

Although I had some installation problems with one of my test machines, the biggest hassle was not rooted in the type of processor but in sound card driver compatibility.

Although Adobe recommends ASIO sound card drivers, there are certain legacy sound cards commonly used in broadcast hardware (including those manufactured by OEM suppliers Digigram and



The Audition Windows Sound Driver can solve some compatibility issues. that will be affected unless you disable the ASIO drivers. Whether this limitation will affect your broadcast installation depends on your configuration.

(Continued on Page 26)

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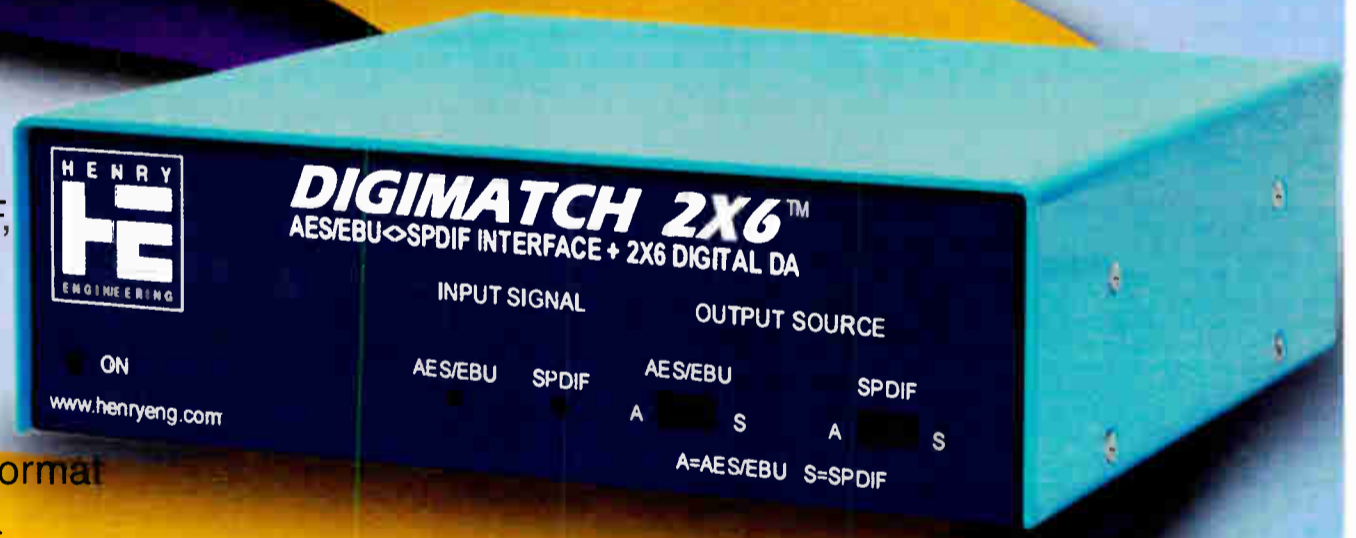
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Field Guide

by Bob Burnham

Playing Nice: Adobe Audition 2.0

Continued from Page 24

As it turns out, *Audition 2.0* has a built-in "Audition Windows Sound" driver option that can be used instead of the ASIO sound card drive. I found use of this driver (instead of ASIO) solved most of the stability and system freeze problems that plague computers running common broadcast sound cards such as those from Digigram.

According to Adobe, this allows version 2.0 to utilize the sound card in the same way that previous versions used it. Adobe states there is no loss of sound quality using the *Audition* Windows Sound driver, although there is a slight compromise in latency. I noticed this as well although it is not too bothersome. (It was most noticeable when zooming in on tight edits.)

A FEW MINOR NEGATIVES

Among the issues noted with Version 2.0, and acknowledged by Adobe, was one dealing with the Batch Converter. If certain options were checked that were not necessarily needed, the function will not work – in fact, the computer may freeze. This particular bug was common to all my test hardware. The work-around is simply to make sure you use the correctly checked options to avoid that software freeze and have *Audition* stop responding.

Version 2.0 adds a CD burning "view" to complement the "Edit" view and "Multi-Track" view – if you are familiar with earlier versions or "Cool Edit Pro." Actually, CD burning first became available with Version 1.5, and while adequate, it was of only average performance at best.

I also found the CD burning function at various times simply did not work with Version 2.0. When it did work, it was sluggish. Firing up Nero 7.0 CD/DVD burning software on the same computer provided flawless 40X burning. (I would recommend the Nero package over using Adobe's CD burning function.) Sony burners are also supplied with an OEM version of the Nero software which I found completely adequate.

WHERE IT SHINES

So what is *good* about Adobe *Audition 2.0*? Several really nice features.

First of all, unlike Microsoft, Adobe is one company that tries to "get it right" with each major upgrade, rather than issuing a very large number of patches when bugs are uncovered after the fact.

Overall, the sheer complexity of the software and the number of unknown factors obviously are bigger factors than inadequate testing, especially from reputable and well-established software companies. With this in mind, I think we can cut Adobe some slack if, on rare occasions, they do not get it "quite" right.

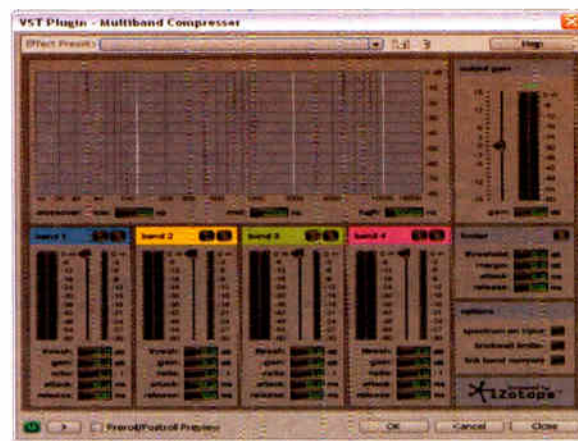
Audition Version 2.0 offers certain new features specifically designed for broadcasters. Some may not be fully un-

derstood by the average Production Director. However, the Chief Engineer who understands audio processors, or true audio fanatics in other fields, will embrace these features.

BUILT-IN SURPRISE

Sometimes one might wonder about the needs versus the "cool" factor. For example, why would you need a piece of production software to have the capability of doing something that is normally handled "on the fly" by a multi-thousand dollar piece of hardware sitting next to the transmitter?

The obvious answer is if one of your jocks is working on a mock demo show in the Production studio (to send as an audition tape) and wants to make the audio sound like it came off the mod monitor – or if you are a Broadcast School where students are trying to land their first job in radio – this feature just might be quite handy (at least if they know how to use it).



A full featured compressor is part of *Audition*.

I speak of the "Multi-Band Compressor" built-in to Version 2.0, which features a pre-set simply called "Broadcast." A little tweaking, and you can make your
(Continued on Page 28)

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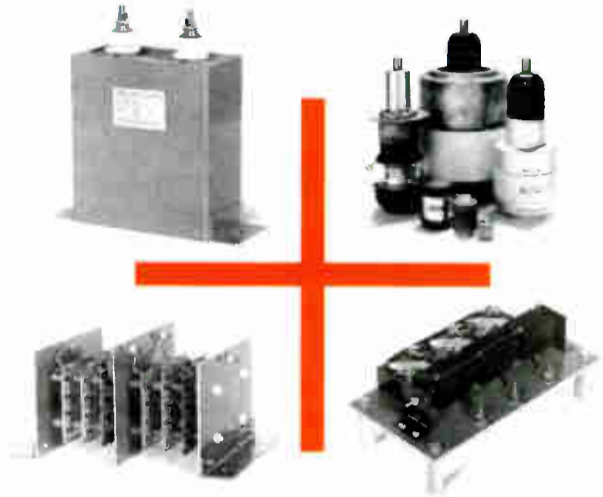


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Field Guide

by Bob Burnham

– Continued from Page 26 –

audio sound very close to an Orban Optimod in any format flavoring of your choosing.

The *Audition* Multi-Band Compressor is one *very* cool feature.

REVERSE PROCESSING

Obviously, you absolutely do *not* want your station spots run through this software-level processor only to be doubly crunched when it hits your air chain. Nevertheless, do not dismiss its usability just yet. The “Multi-Band Compressor” can do a lot more than merely imitating a piece of hardware. One very cool pre-set is called “Kill the Harshness.” Now, this one really is useful!

We have all heard it when digital audio has that nasty harsh “edge” that sounds like distortion. This pre-set compresses certain frequencies in a way that effectively helps audio achieve a “warmer” sound, depending upon how poor the source audio is. It achieves this without losing the crispness and clarity of the sound. Definite kudos to Adobe for this one!

I would almost say this feature *alone* justifies the cost of the software.

There are other “Multi-Band” pre-sets that enhance bass, treble or certain other aspects of the audio. With this collection of pre-sets, Adobe has also found a way to make this feature appeal to a wider spectrum of users besides broadcast audio fanatics.

So yes, the “useful” factor actually does exceed the “coolness” factor with this feature addition. Way to go, Adobe!

WHERE ART AND SCIENCE MEET

Whether busy production personnel will grasp the features of *Audition* the way an engineer will (or someone in the recording industry) still remains the question.

For example, here is another feature I really like about *Audition 2.0*: the ability to view, modify and edit material *only* within a certain frequency range.

For example, a great demo at NAB used a classical music section where someone coughed during a quiet passage. Using the Spectral view (within the Edit view), it was easy to identify the frequency of the cough and take just that sound out – without harming the rest of the spectrum or the timing as you would if the entire wave was edited.

I found this feature to be very handy, works well, and is pretty easy to learn. Whether it will be used, understood or needed by the average production dude or dudette, I give it high marks for both usability and the coolness factor.

The fact is audio is both a science and a form of artistic expression. As the tools become more advanced, it forces those with primarily artistic tendencies to stray into the technical area to keep the sound of their station competitive. Adobe has given us that tool with *Audition, Version 2.0*. If you want to keep it simple, you can, but it is so much more fun to take it to the next level.

And why not? What is cooler than hearing that cutting edge spot on the air that was created in a few minutes that might have taken several hours a couple decades ago? Or, if you are nostalgic for the “scrubbing” sound of rocking reel-to-reel tapes back and forth across the heads – and aurally rather than visually editing audio – now you can do that too, with *Audition 2.0*.

A DIFFERENT LEARNING CURVE

To get back to basics, if you are familiar with previous versions of Adobe *Audition* or *Cool Edit Pro*, unfortunately some of the specifics of what you already know will need to be re-learned – and the learning curve is steeper with this version.

Adobe is generous with the education however and for those who have time, two DVDs comprising Adobe’s “Total Training Workshop” are included with the basic retail package. Several hours of how-to information are bundled.

The basics of production and editing are the same. Editing is possible in either the waveform or multi-track view, although I think most editing should be done in the waveform view. In fact, it is possible to rapidly knock out a “quick and dirty rush job” spot for radio, by using only the waveform view, where you can burn a CD even without saving the file.

There are other features Adobe added specifically for broadcast use, but for the most part, I found they do not affect the very basic functions of editing audio.

WHERE IS THAT BUTTON?

At first look, I might have had a tendency to call the *Audition 2.0* workspace cluttered and at times confusing.

Some of the functions, by default may not be where you expect them to be – or where they were in a previous version. I might have said this, except that the workspace can be customized. The various features, including tear-off tabs, can be re-sized, relocated, or even hidden then saved.

The big question is how easy and intuitive is it in learning how to do this? Like many other aspects of this version, at first, not very intuitive at all. For example, someone who had never used a computer in the past, but was a master of razor blade editing, would *know* what they wanted to achieve. It would, however, take some time to for them to figure out *how* to do it – on *any* software-based editing program, no matter what the version.

But as I said, Adobe chose to move forward. There is a delicate balance that software (and for that matter hardware) has to achieve between user friendliness and powerful and customizable features. When push comes to shove, *Audition 2.0* tends to favor the power features over intuitiveness.

SUMMARY

Improvements I appreciated:

- The Rebuilt engine runs faster with hardware that is up to the task.

- Greatly improved/expanded filters, processing and related user interface.

- The ability to view, modify and edit just within a frequency range.

- Scrubbing makes its triumphant return to audio editing.

- “Total Training” provided with the product on DVD is a plus (if you have time!).

- Spectral and phase displays and editing provide advanced tools for analyzing and tweaking audio.

- Extensive file format compatibility and saving/conversion options.

Changes I did not like:

- Compatibility issues with certain legacy broadcast hardware, especially when some Audio Sciences and Digigram cards required a different driver than other applications on the same computer.

- A significantly higher learning curve.

- Customizable features (such as arranging workspace) are not immediately intuitive, or moved to a different location compared with previous versions.

- Options for changing sound card inputs and outputs are cumbersome.

- OS and hardware requirements rule out a lot of older computers and sound cards.

- The bug in the Batch Converter needs to be fixed.

CHANGE CAN BE GOOD

On a recent user-forum post, referring to *Audition 2.0*, someone lamented “Why oh why did Adobe have to re-invent the wheel?” Friends, the little program we knew and loved called *Cool Edit* is in the past.

If you do not have *Pro Tools*, you still might want to try *Adobe Audition Version 2.0* with or without all the things that have not been perfected. Adobe offers a free “try-out” version on their website (www.adobe.com/products/audition/). Sometimes change is good.

However, if you are still using Windows 3.0 or DOS-based software on-air, perhaps you simply do not have the budget to make a change. If you still have a well-maintained Bauer 707 as your main transmitter and your 486-based computer hardware is still working reliably, then perhaps we can cut you some slack if everything is still playing nice after all these years.

So, perhaps if you run *Adobe Audition 1.0* or *1.5* for another year or so, it is certainly understandable. But the future is already here: For broadcasters, it may not be perfect in all areas, under all conditions, but I will take it any day over that Tascam 4-track reel-to-reel machine.

Bob Burnham uses Adobe Audition extensively for audio restoration and mastering, multi-track mixing and teaching the basics of broadcast production. He can be reached at the Specs Howard School of Broadcast Arts at bburnham@specshoward.edu

– Techie Stats – Adobe Audition 2.0

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- Microsoft® Windows® XP Professional or Home Edition
- 512MB of RAM (1GB recommended)
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- 1,024 x 768 display (1,280 x 1,024 recommended)
- Sound card with DirectSound or ASIO drivers (multitrack ASIO sound card recommended)
- CD-ROM drive (DVD-ROM drive recommended for installing optional audio clips)
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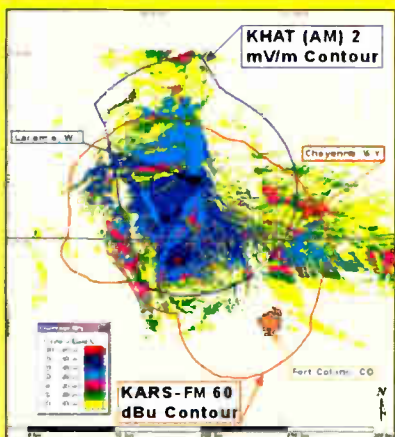
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Service Guide

ENCO DAD Software Versions and System Reference Chart

Service Guide is a new regular feature of Radio Guide. The goal is to help you to ensure your gear and software is running on the latest information, factory bulletins and updates.

This month we feature the very latest information on the ENCO DAD Digital Audio Delivery software from Mister ENCO himself, Eugene Novacek.

"The current version of ENCO's flagship Digital Audio Delivery product, DAD, is 5.1d, released October 16, 2006. Version 5.1d includes a new look and feel that is based on user feedback. ENCO typically creates four to six major releases per year," said Novacek.

EVEN OLD USERS CAN UPGRADE

It is interesting to know that users covered by a support/update agreement are entitled to use any update version posted on the ENCO site. These updates consist of a number of items including: new features, refinements of existing features, corrections and performance enhancements.

To arrange a support/upgrade agreement, just call ENCO at 1-248-827-4440.

DAD highlights include added support for Branch (time) Events in the Live Assist/Automation AirPlay virtual machine, added "?" and "-" buttons for on-line help and machine minimizing, plus a number of enhancements to StreamLine, according to Novacek.

COMPLETE OVERHAUL

Novacek noted that Version 5.1, introduced this year, saw a complete facelift of the somewhat dated user interface as well as an overhaul of the size and number of

database fields used for maintaining metadata. Support for "StreamLine," ENCO's real time integration protocol between DAD and Music and Traffic Scheduling systems, was also added.

A tighter bond between DAD and ENCO "utility" applications was another goal for the 5.1 series. Many powerful features were added thru DCL (DAD Command Language), DPL (DAD macro Programming Language) and Right Click options.

Recent versions of DAD require Windows XP-Pro based workstations (Service pack 2) or Windows 2000 (Service pack 4). When running on a shared network, ENCO recommends using Windows 2003 based servers," Novacek concluded. Windows NT Workstation will support up to Version 4.3f only.

MOST RECENT VERSIONS

The current version of ENCO's intelligent file transfer utility, Gateway, is 5.1h, released August 16, 2006.

The current version of ENCO's audio conversion and automatic import utility, DropBox, is 6.3g, released on August 8, 2006.

All of the ENCO "utility" packages have had update releases issued.

TRACING THE VERSIONS

Thousands of changes have been made over the years in dozens of releases. Here is a chronological list of the releases and their service dates.

DAD (the "pro32" was dropped with Version 5.0C, as was NT Support)

Versions 5.0c thru 5.1d 9/05-10/06

Hardware	O/S	Computer (netbios) Name	DAD Workstation Name	Location	DAD Version	Dongle Number	Other Software

DADpro32 (Windows NT 4.0, Windows 2000)
 Versions 4.0a thru 4.3f 12/01-7/05
 Versions 3.1a thru 3.3f 2/00-7/01
 Versions 3.0a thru 3.0g 10/99-12/99
 Versions 2.0a thru 2.5g 5/98-8/99
 Versions 1.1a thru 1.2g 12/97-5/98 (DADpro32 for Windows NT 4.0 released)

SUPPORT KNOWLEDGEBASE

Details of the various issues affecting all ENCO products are available in the "Support" section of the ENCO web site: www.enco.com. This is of great help, especially for those night and weekend hassles, when it is hard to get a live person, as you can get many questions answered immediately.

Additionally, notes on the upcoming versions of DAD are posted, explaining both new features and problems solved.

Furthermore, ENCO maintains an email-based forum (the ENCO Users List Server) with an archive of questions, answers and comments dating back to June 1997. The archive currently has approximately 13,000 entries. Information about and access to the listserver can be found at: <http://www.enco.com/new/Listserver.htm>

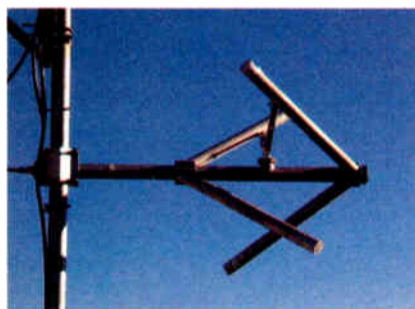
A USEFUL CHART

The following is a chart that we hope will be useful to those maintaining an ENCO system. The chart may be copied (expanded), filled, and placed near the equipment for quick reference. A .doc file containing a full page-size chart and some explanations can be found at www.radio-guide.com/encoform.htm

If you would like to see the current information on any of your equipment or software, let us know at service@radio-guide.com



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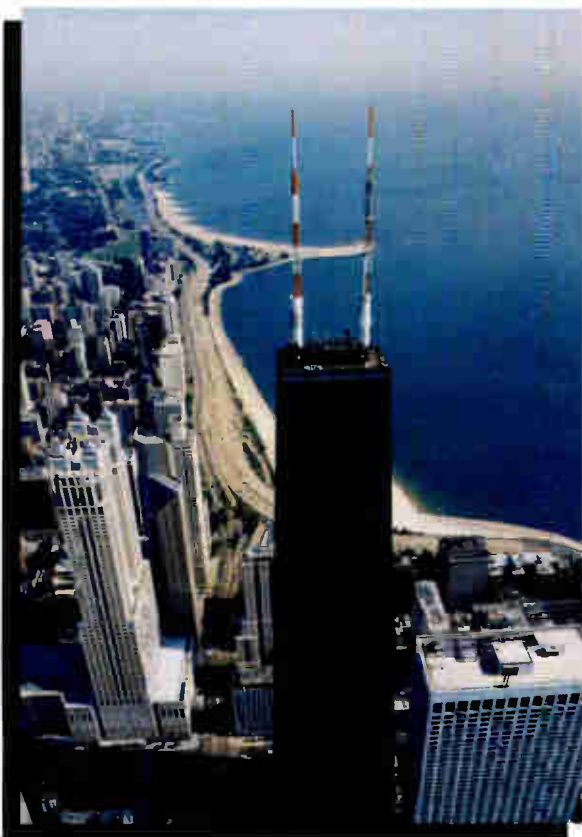


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Radio History

by Kevin Webb

Tesla's Coil

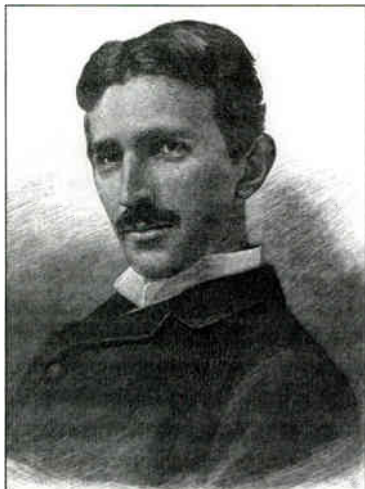
Harnessing and Broadcasting Power

Perhaps you thought Kevin Webb had run out of stories about Nikola Tesla. Not quite yet! In fact, some of you probably have been waiting for this one – after all, the first thing that pops into peoples' minds when they hear the name is "The Tesla Coil."

Clearly, Tesla was a genius, way ahead of his time, whose accomplishments affect our lives every day.

One of the best books on Tesla written by Margaret Cheney titled "Tesla: Man Out Of Time" is recognized as one of the best biographies on this gentle genius.

It would be a wise investment for you to order this book and then set aside a weekend to read and reread.



Nikola Tesla

THE COIL

If you are involved in broadcasting you should know that the Tesla Coil was named for inventor Nikola Tesla who invented the coil in 1891. It broke ground in wireless telecommunications and is still used today in one form or another in radio and television sets and other electronics equipment.

As an example: a form of the Tesla Coil is the Flyback Transformer inside every cathode ray TV and monitor screen used today. Tesla also described the principles of a vacuum tube which later became the Audion Tube.

In fact, virtually all the basics of broadcasting – both radio and television – were outlined by Tesla many years before anyone else tried to take the credit. Not only that, but Tesla even set out the design of an antenna which could broadcast many frequencies from one element, now known as multiplexing (Tesla called it multicasting in the early 1900's). Tesla even loved working with automation.

Heck, if he had invented the General Manager, Program Director and the Sales Manager – he was already the Chief Engineer – he would have invented today's radio station.

BIGGER COILS

Put simply, the Tesla Coil is an air-core transformer with primary and secondary coils which are tuned to resonate. This is a step-up transformer which takes low-voltage high current to a high-voltage low current state at high frequencies – try operating a transmitter without it.

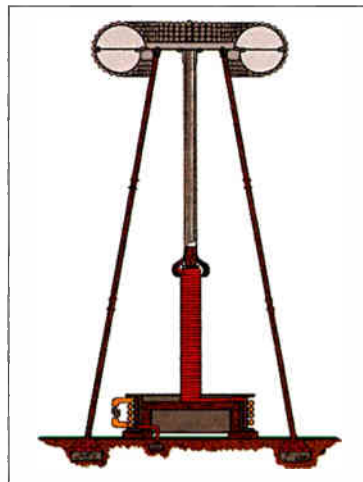
In a series of patents starting in 1891, Tesla described his coils, growing bigger and with more capacity until, in 1914, he received US Patent #1119732 for his *Apparatus for Transmitting Electrical Energy*. It was described as a "High-voltage, air-core, self-regenerative resonant transformer; Oscillator for wireless transmission of electromagnetic energy."

It is no great leap to say that the Tesla Coil is actually responsible for the subsequent creation and/or inspiration of not only the entire broadcasting industry as

we know it today. At the same time, his work also led to many other industries and disciplines.

Among the outgrowth of Tesla's work are quantum physics, diathermia, SETI (as in listening for ET to "phone home"), cryogenics, early regenerative detector receivers, RADAR, plasma physics, buried transmission lines, superconduction, the AC-powered alarm clock (keeping accurate time from 60 Hz power), centralized broadcasting and multicasting, super-colliding atom smashers, and even – as if his real inventions were not amazing enough – time-exposure trick photography.

(Continued on Page 34)



A drawing of the Tesla Coil

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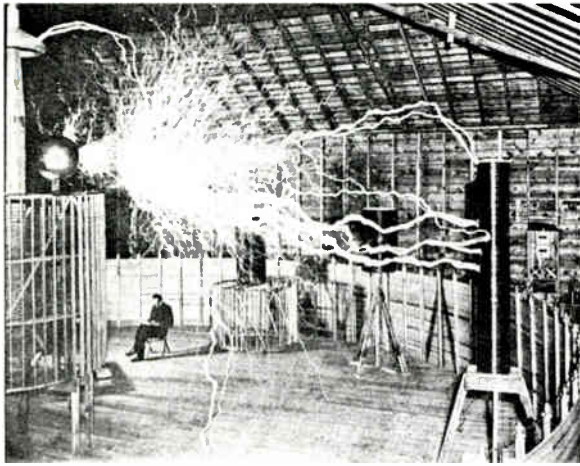
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Radio History

by Kevin Webb

– Continued from Page 32 –

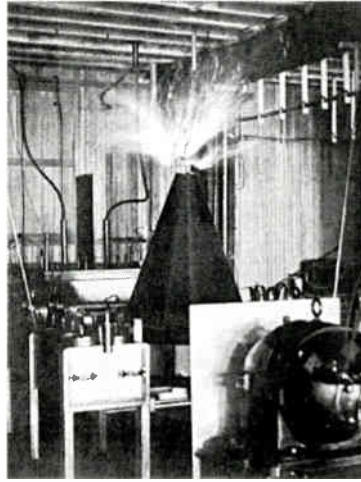


Long before PhotoShop, Tesla knew how to “enhance” pictures.

In the *Electrical Experimenter*, May, 1919, Nikola Tesla wrote an article entitled *The True Wireless*. In the article he said: “Suitable high frequency generators and electrical oscillators had first to be produced. The energy of these had to be transformed in effective transmitters and collected at a distance in proper receivers.

“Such a system would be manifestly circumscribed in its usefulness if all extraneous interference were not prevented and exclusiveness secured. In time, however, I recognized that devices of this kind, to be most effective and efficient, should be designed with due regard to the physical properties of this planet and the electrical conditions obtaining on the same.”

It is not well known exactly what Tesla accomplished in Colorado Springs since his diary was very short of details and notes during this period. This much we do know: Tesla’s main endeavor was to test high-powered oscillators, transmitting and receiving mes-



An 1895 magazine picture shows Tesla’s experiments in action.

sages, transmission of raw power wirelessly and related effects of high-frequency electric fields.

Tesla’s giant coil was capable of generating as much as 10-12 million Volts onto his antenna. Later he recalled achieving as much as 20 million Volts. We also know from his experiments there that his mastery of wireless transmission – evident as early as 1893 – was proven true.

AN IMPRESSIVE DISPLAY OF POWER

Many locals noted that he created lightning bolts 135 feet into the air with thunder that could be heard 15 miles away in Cripple Creek. Newspaper writers of the day testified to the fact that Tesla succeeded in wirelessly lighting a bank of two hundred 50-watt incandescent lamps – from 26 miles away!

Nearby the Tesla plant, horse’s hooves would draw a stream of electricity as their feet would leave the ground as they walked, causing them to gallop away in abject fear. Witnesses recall drawing sparks a foot long with a metal object held close to a fire extinguisher.

Immediately upon arriving back in New York in 1900, Tesla began filing patents for radio and energy transmission based on what he learned at Colorado Springs. He envisioned a “world system of intelligence transmission” based on a centralized radio center delivering news, stock market reports, synchronized timing of clocks, interconnected radio and telephone networks, pocket receivers, even a means of private communications much like today’s cell phones.

KEEPING IT COOL

Since those millions of Volts generated quite a bit of heat, especially in the wiring, one of his patents was to cool the wires of his coils to lessen the wire’s resistance. This is the precursor of superconduction.

Tesla’s work on this issue resulted in additional patents, among them the ability to bury transmission

(Continued on Page 36)

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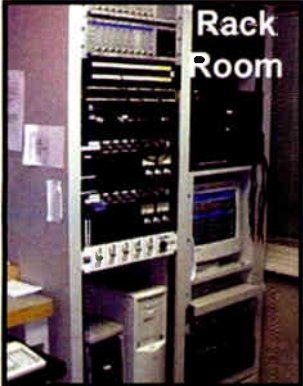


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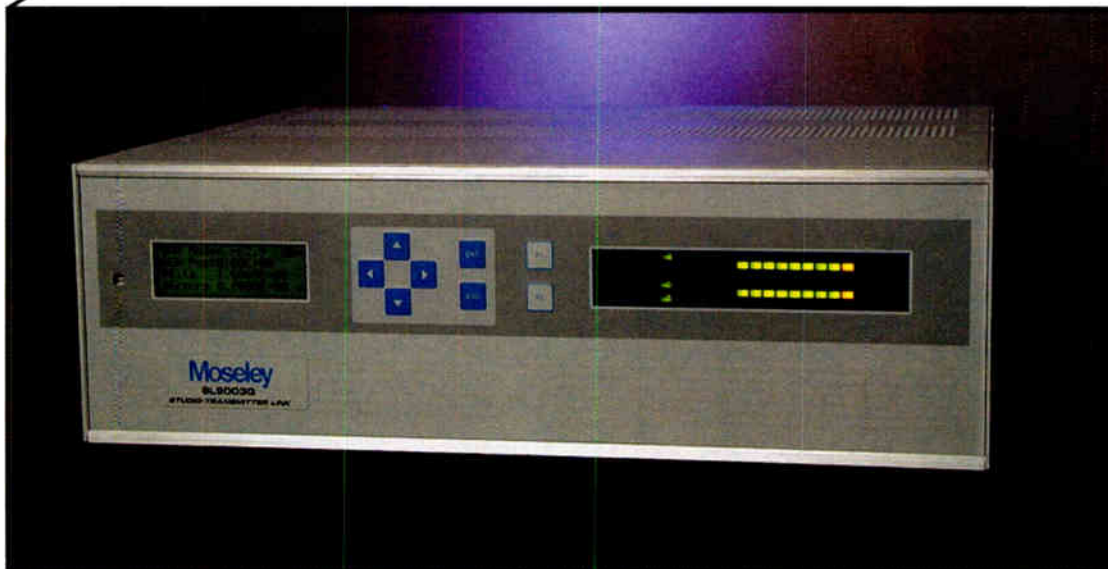


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Radio History

by Kevin Webb

– Continued from Page 34 –

lines and freeze the surrounding dielectric medium with a “gaseous” coolant. Thus he was one of the early creators of cryogenics engineering. And this is only part of what he was inspired by when he set up the behemoth Tesla Coil in Colorado Springs.

Tesla is almost certainly the first human being on earth to receive and detect radio signals coming from space. It was the summer of 1899.

LISTENING CAREFULLY

Put yourself in his position, alone at night in his Colorado Springs lab, listening with his regenerative detector, “My ear barely caught signals coming in regular succession which could not have been produced on earth ... they seem to suggest a numerical code, one - two - three - four. “

Tesla even hypothesized (and was widely ridiculed for doing so) that if intelligent beings on other planets would communicate with us it would be with mathematics. What is important to point out is that the signals were repeated and that there existed *no* transmitters of any kind on earth at that time that could have generated signals as described by Tesla.

He went further and suggested that we should continue to search for signals sent by intelligence from outer space. No doubt you have heard of SETI or “Searching for Extra-Terrestrial Intelligence.” And if you have ever tried to expand the reach of an AM station around the area north

of Denver you have no doubt run into the “Quiet Zone” because of the SETI receiving dishes located northwest of that city. All this came from Tesla’s work.

Today it is so commonplace to listen for signals from outer space that you can participate simply by downloading free software. And today, mathematics is recognized as the most likely form of universal communication, just as Tesla suggested.

SUB-SPACE COMMUNICATIONS?

There seems to be a very sound explanation for what Tesla claimed. An article originally published in 1996 entitled “Nikola Tesla and The Electrical Signals of Planetary Origin” by Kenneth L. and James F. Corum, Ph.D., go into amazing detail which basically summarizes Jovian radiation from Saturn, Jupiter and its moon Io could have been the source of the signal.

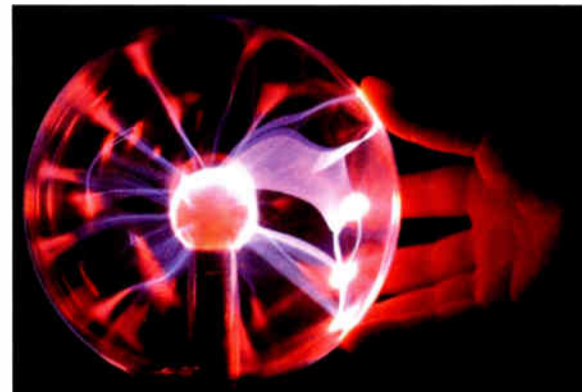
Specifically Jupiter and Saturn radiate RCP (right-handed circular polarized) waves “at the very frequencies where Tesla’s receivers were the most sensitive, and where a VLF ionospheric radio astronomy window exists during a solar minimum.” Take *that* Marconi!

As further evidence, Dr. Kraus of the Ohio State Radio Observatory reported the following in 1956: “While monitoring for radiation from Venus, I also heard signals that came in distinct separated pulses. They seemed to be strongest when Venus was in the beam and seemed to follow Venus across the sky.”

MAN FROM MARS

Ironically, Tesla was a genius operating on such a different level intellectually that many in his time thought he was truly an alien (as in from another planet); some said he was from Mars. Plus Tesla believed the signals he heard from space emanated from Mars. (Could this be the inspiration for *Women Are From Venus, Men Are From Mars*?)

If you would like to see a cousin of the Tesla Coil, take a look at the Plasma Globes you have seen at department stores or perhaps at Radio Shack. Fingers of electricity dance within a small globe.



A plasma lamp – Luc Viatour

The plasma lamp was invented by Nikola Tesla after his experimentation with high frequency currents in an evacuated glass tube for the purpose of studying high voltage phenomena. Tesla called this invention an *Inert Gas Discharge Tube*.

MEASURE OF THE MAN

I have always said that the truth will always come out. Tesla himself said it best: “Let the future tell the truth and evaluate each one according to his work and accomplishments. The present is theirs; the future, for which I really worked, is mine.”

(Continued on Page 38)

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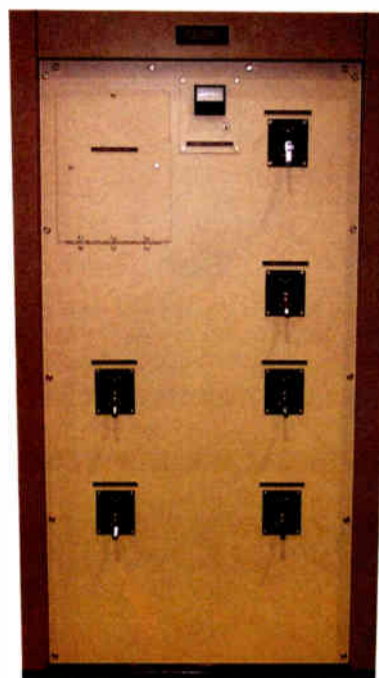
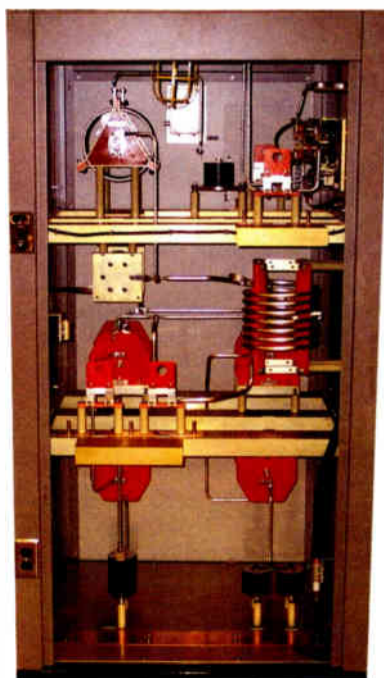
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Radio History

by Kevin Webb

– Continued from Page 36 –

There were contemporaries who spoke well of Tesla. E.F.W. Alexanderson, designer of the Alexanderson alternator, said: "In almost every step of progress in electrical power engineering, as well as in radio, we can trace the spark of thought back to Nikola Tesla. There are few indeed who in their lifetime see realization of such a far-flung imagination."

And, Chauncey McGovern, an English journalist of the time, wrote: "Fancy yourself seated in a large, well-lighted room, with mountains of curious-looking machinery on all sides. A tall, thin young man walks up to you, and by merely snapping his fingers creates instantaneously a ball of leaping red flame, and holds it calmly in his hands. As you gaze you are surprised to see it does not burn his fingers. He lets it fall upon his clothing, on his hair, into your lap, and, finally, puts the ball of flame into a wooden box. You are amazed to see that nowhere does the flame leave the slightest trace, and you rub your eyes to make sure you are not asleep."

Nikola Tesla was, without doubt, an exceptional scientist, inventor, and thinker.

More interesting reading on Nikola Tesla and his coil:

- Nikola Tesla and The Planetary Radio Signals: www.teslasociety.com/mars.pdf
- Tesla, Nikola, *Talking with Planets*. Collier's Weekly, February 19, 1901
- Corum, K. L., J. F. Corum, *The Electrical Signals of Planetary Origins*. 1996
- Tesla's patents: http://en.wikipedia.org/wiki/Tesla_patents
- A neat demonstration of the Tesla Coil at a trade show: <http://www.mgvolt.com/exhibitions.htm>

Kevin Webb, General Manager for Tieline USA in Indianapolis, is definitely enthusiastic about Nikola Tesla and his achievements. You can contact kevin at kevin@tieline.com

2006 – The Year of Tesla

The governments of Croatia and Serbia, as well as the United Nations Educational, Scientific and Cultural Organization (UNESCO) have proclaimed 2006 "The Year of Nikola Tesla."

Among the events marking the 150th anniversary of Tesla's life on July 10, 2006, his hometown village of Smiljan was reconstructed (it had been destroyed in the civil wars in the 1990s), along with Tesla's home (and accompanying monument), which is now serving as a museum.

Furthermore a new multicultural center was dedicated to showing – complete with replicas of his inventions and an almost complete set of every paper every published by and about Nikola Tesla – and explaining Tesla's life and work.

Befitting the renewed interest in Tesla in his homeland and around the world, other museums, memorials and web pages have been built to explain his life and inventions.

Nikola Tesla and his coil figure prominently in the new movie, "The Prestige." The actor playing Tesla will surprise you; according to all accounts he "nailed" Tesla's mannerisms. It is almost as if you were right there with Tesla himself. Look for someone walking through an active Tesla coil field – it is really spectacular to witness. A thoroughly enjoyable film.

Missing Some of Your Radio Guides? Get Them All on the BDR

Sometimes that magazine you lent out does not come back. Or, you left it at the studio – and need it at the transmitter. Version 2.75 of the Broadcaster's Desktop Reference (BDR) now includes every issue of **Radio Guide** from January 2003 to the present. Plus, there is an index for the PDFs, for easier location of older articles.



The CD includes several sets of Radio Utilities, an AM and FM/TV database viewer (including DA patterns), as well as the FCC Self-Inspection booklets, EAS printer paper sources, project schematics, historical data and pictures. Lots of tech tips from the field and other helpful info are included.

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

The proceeds from this CD fund both future improvements of the BDR as well as helping the efforts of olderadio.com to document the industry's history.

There is no set price for the BDR; many find \$15-\$20 appropriate to cover the costs of materials, time, and shipping. If you wish to offer a little extra for funding improvements, it will be put to good use.

If you have wideband Internet, we can now make arrangements for you to download the BDR that way.

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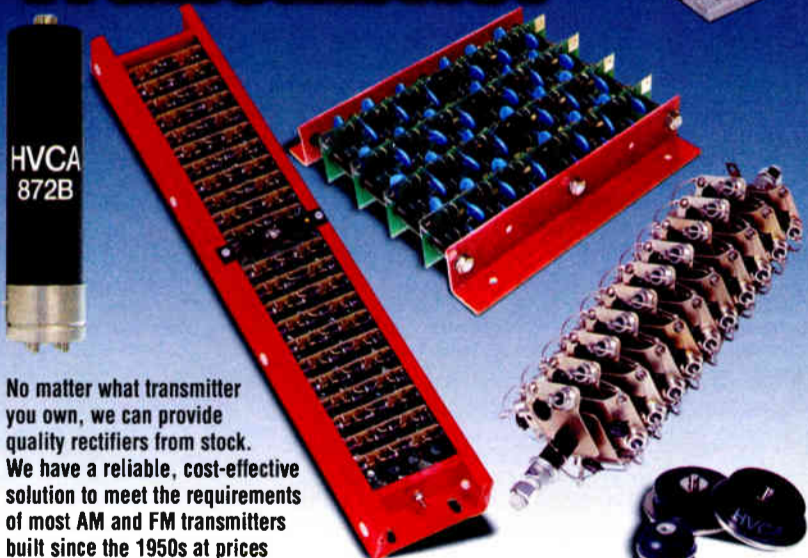
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“We outgrew our old studios. With Axia, that won’t happen again.”

“Kaya FM is a trailblazer. We were the first independent radio station licensed in South Africa after apartheid. We invented our own unique format, a mix of music and



talk. We grew into one of the most popular stations in Johannesburg. And we completely outgrew our original studios.

“Moving to Newtown, the city’s cultural and entertainment center, required ‘showcase’ facilities; **dynamic, striking studios** that



mirrored the buzz and excitement of our station and community.

“We also needed a routing system that would **seamlessly link all of our studios** and news facilities — cost-effectively, of course.

“Our equipment search began with the usual suspects, but nothing clicked until we saw Axia. Using Ethernet switches and CAT-6 cable to share audio between destinations makes a lot of sense, and costs a lot less than those expensive mainframe routers. Axia is **more flexible, too.**



“This is a **system we’ll never outgrow**, because we can expand it by plugging in more audio nodes wherever we add new inputs.

“The on-air **staff loves the Axia consoles**; they’re very flexible and easy to operate. Powerful, too: you can store custom show setups and call them up with one button. This really simplifies switching between talk and music shows — just load the show profile you want and the board is ready in seconds! And no more worries about setting up mix-minuses when doing remote broadcasts; the surface takes care of all that for you no matter how many callers or remote lines you have.



“I think **Axia was the perfect choice** for Kaya FM. We have all the functionality we wanted, and we got it for half the price of systems with less features. In fact, we’ve already ordered another new Element control surface! Axia is a technical dream... I can’t imagine a better fit for our station.”



— Russell Pope, Operations Manager
Kaya FM, Newtown, Johannesburg, South Africa



www.AxiaAudio.com

by Peter J. Turpel

Constructing Economy Studios with Professional Sounding Results

Phone-on-Hold Marketing recently relocated to larger facilities to accommodate the tremendous increase in our On-Hold Messaging, In-Store Broadcasting, and Virtual Voicemail service business.

Our service is remotely loaded using land line or IP interfaces giving us instant access to a client's many locations at once. This provides production delivery time in minutes instead of days.

BALANCING PERFORMANCE AND PRICE

To accomplish this task it is necessary to have state-of-the-art recording studios and recording techniques to deliver the best product possible to our discerning customers. Coming from a broadcasting background, I wanted to construct two mirrored "dream" production studios that would fill our needs for the present and future.

Of course, economics played an important role in the decisions we made regarding equipment and construction. Performance and appearance were both important factors, and being able to construct the studios from the ground up allowed us to really dictate how we could accomplish both.

Determination of studio size was made by taking into account comfort for both the operator and a guest – and all of the equipment and furniture required for each studio.

BASIC CONSTRUCTION

The walls of the studios were constructed using the "box within a box" technique of staggered studs and using sound absorbing materials between the inner and outer walls to prevent sound conduction from the outside office area walls and adjacent studios.

Double layers of wallboard were used throughout each studio. Additional sound absorbing material was attached to two interior walls of each studio, including the adjacent walls and an attractive porous tongue-in-groove wood stripping was placed over the sound absorbing material. A dual-pane glass window was installed between the studios and sound absorbing foam was placed on the walls opposite the window to prevent reflections.

All required wiring was ducted for both studios within the walls, taking into consideration future needs, and keeping the appearance of both rooms clean. Microphone input jacks were located in the rear of each studio and in the hallway outside of each studio, along with earphone feeds with gain controls for versatility in group recording environments.

Attractive paint and carpeting completed the job. The overall effort resulted in excellent acoustics and a quiet atmosphere for recording.

MODEST BUT EFFICIENT STUDIOS

Attractive and functional pre-designed equipment consoles were selected with enough built-in rack space to house the equipment required for our current and future needs as well as a retractable keyboard and mouse platforms.

Consideration was given to the overall height of the equipment console to assure a convenient operator viewing angle for the computer monitor.

The computers for each studio were located outside of the studios in the common hallway area in their own air conditioned glass fronted cabinets, along with a storage area for required studio supplies. We selected

the Cool Edit editing program for both the ease of use and economics.



An air conditioned cabinet for the computers.

BUILDING WITH PRO-AUDIO

Studio equipment was the next consideration. With the proliferation of pro-audio and consumer grade equipment and components with specifications equaling, and in many cases exceeding those of professional broadcast counterparts, we decided to opt for pro-audio/consumer equipment where feasible.

Of course, the heart of the studio is the mixing console. After shopping various brands we decided on the Behringer UB2222FX-PRO. They are so economical that we bought three, two for use and one as a spare.



A Behringer console controls the studio.

The Behringer had all of the features we could want except one – something missing in all of the economy mixing boards we checked out – there was no way to turn on and off the microphone, leaving the microphone gain fader at a pre-determined level, mute the speakers, turn off the phone ringer, and turn on the "Recording" sign.



SOLVING THE MICROPHONE PROBLEM

My consulting engineer, Dave Mandelbaum of DM Engineering (www.dmengineering.com), stated that he had just the thing. He described his *Mic Pro* system, consisting of a small LED-lighted silent microphone switch control module. It attached to the side of the mixing board right next to the fader.

The lighted switches dramatically increase in intensity when pressed showing the mic off-on status at a glance.



The *Mic Pro* system solved all the microphone-related issues.

This control module in turn operated the *Studio Slave Auxiliary Relay Pack*, a device that controlled the microphone on-off function for both microphones 1 and 2, muted the monitor speakers and phone ringer, and provided power for lighting and controlling the blinking LED's located in the "Recording" sign located in the hall outside of the studio complex (to show which studio was active).



The *Studio Slave Auxiliary Relay Pack*.

The *Mic Pro* system along with the low cost mixing board gave us the utility and features of having a "Professional" console at a bargain price. One comparable "Professional" console would have cost as much or more than our total equipment outlay for both studios.

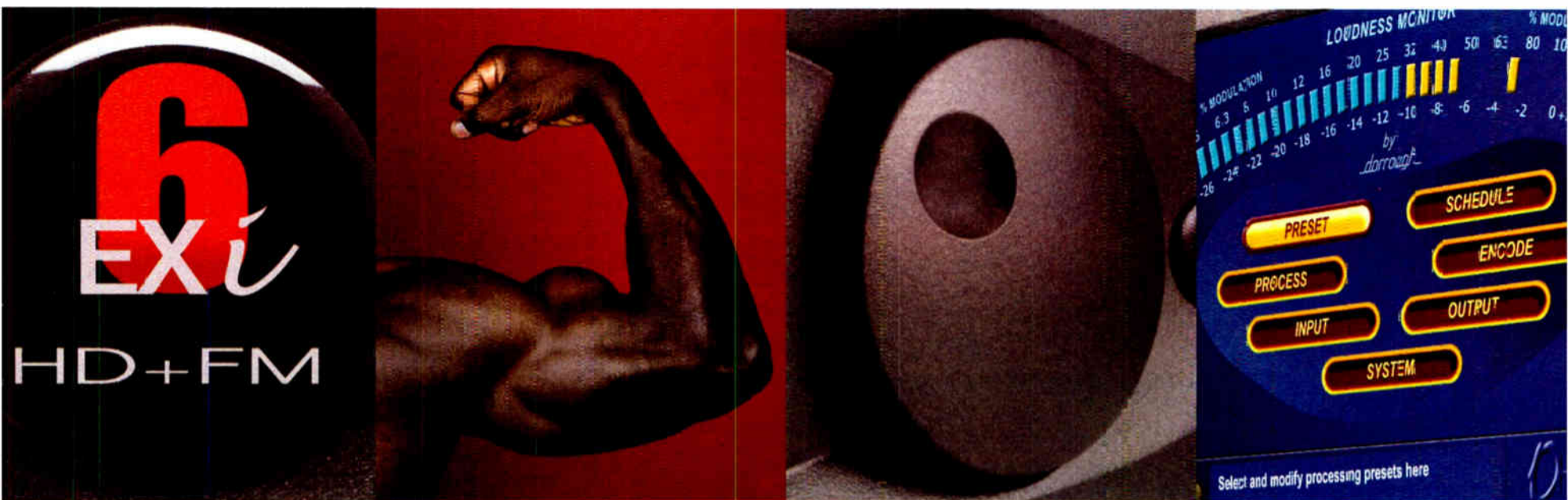
OTHER GEAR CHOICES

Other equipment selected consisted of Radix DA 1600 distribution amps, Marantz PMD-510 dual cassette decks, Gemini CDX01 CD players, Crown D75A and Parasound HCA600 monitor amplifiers, Rolls HA43 headphone amps, and a Telos One phone patch in studio A. Behringer bookshelf speakers were hung from the ceiling using rubber isolators to minimize physical sound conduction to the ceiling.



These types of economy studios really lend themselves to home studio environments as well as small production studios like ours and get the job done extremely well. What used to cost tens of thousands of dollars now can be done on a "shoestring budget" with user friendly and easy to operate equipment and professional sounding results.

Pete Turpel is the President of Phone-on-Hold Marketing Systems. He can be reached at pete@phoneonhold.com



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So why do broadcasters love Omnia-6? The *sound*. The clean, pure, crystal-clear sound (bone-shakingly loud, if you want) that's become the choice of #1-rated stations in New York, Los Angeles, Tokyo, Paris, London, Rome, Sydney and Beijing. The other guys tried to match its winning sound... and failed. So they've settled instead for trying to copy its innovative features.



Features that Omnia pioneered — like dual, simultaneous processing paths for HD Radio™ and conventional FM at no extra cost. The world's first non-aliasing digital clipping system, with composite clipping for the ultimate in competitive loudness. The high-precision Multi-Band Look-Ahead Limiter (invented by Omnia) for perfect HD Radio processing. The six-band limiter for conventional FM, with adjustable crossovers for surgically-precise control over your signature sound. An integrated Dorrrough™ Loudness Meter. And of course, the groundbreaking 96 kHz, 24-bit platform that delivers full 20 kHz bandwidth for HD Radio broadcasts. Always innovating.

Which is why the **new Omnia-6-EXi** makes perfect sense. With **integral HD Radio Diversity Delay** that helps digital broadcasters eliminate analog connections to the HD exciter, ensuring independent analog and digital program streams. And the exclusive new **LoIMD Clipper** that actually **suppresses intermodulation distortion** to deliver audio that's cleaner, clearer and more detailed than ever — no matter how aggressive your processing. (If you already own an Omnia-6, don't worry — there's a low-cost upgrade to give your processor full-fledged Omnia-6EXi power.)

A lot of muscle? You bet. No wonder the competition is running scared.



Tool Guide



Test, Tools, Tips and Applications

CardScan Tames the "Card Stack"

We have all been there. A trip to NAB. A state trade show or two. Dealing with a variety of local contractors. And before you know it, you have a huge stack of business cards.

And then there is the sales department with its combined "collection" of business cards and other contact information.



PARSING THE STACK

It seems like there should be an easy way to handle these stacks and turn them all into one complete, accurate, and safe system for scanning, compiling, and making information access quick and easy.

Getting contact information organized is an admirable ambition but a daunting task for most of us – the desire to organize can be fleeting. The process must be quick, easy and maintainable. Otherwise, the stack just grows taller.

"Inputting the telephone numbers and addresses that make mobile technologies truly indispensable can take valuable time – time that busy people don't have," says Tom Stearns, director of marketing for CardScan, which makes the leading business card scanner in the market.

ORDER FROM CHAOS

With a CardScan product, it is easy to make quick work of most any stack on hand. Just plug the scanner into the USB port of your computer and insert the cards.



The CardScan Personal Scanner

There are three levels of scanner products: Personal, Executive, and Team, depending upon your exact needs. Each reads the cards and inserts the data into the full featured CardScan application. Data can then be used and synchronized with PDAs or exported to other contact applications.

Tools include the ability to add notes, custom categorize and sort data, scan in the back side of cards, even drag and drop contact information from emails and websites, for example. It is easy to eliminate duplicates or view two separate cards and select the best information from each. CardScan will even store a protection copy of your data on their secure server.

Using the Executive and Team scanner products adds the ability to scan in color and share the database easily with any number of people. For example, the Sales Manager could administer the data for the department and assign the contacts to the appropriate person. With multiple databases, there is great flexibility.



KEEPING DATA FRESH

The fact is that 33% of all the contact information you have right now will be obsolete within a year. CardScan has a feature that can automatically update your information periodically so you will only have to go through the process of entering a contact once.

No matter what contact system you use, the risk of mistaken deletions or lost data looms. By backing-up information to a secure web site, CardScan offers the added convenience of being able to access the information from any browser anywhere.

CardScan products are easy to use, reliable, accurate, updateable and secure. CardScan products are available online at www.cardscan.com and from retailers nationwide.

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2006 - 2007



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National • Regional & State • FCC Applications & Deadlines

- 2006 -

4th Annual Ohio Broadcast Engineering Conf.

December 7, 2006
Columbus, Ohio
www.oab.org

- 2007 -

IEEE Annual Conference

January 12-24, 2007
See website for location.
www.ieee.org

Consumer Electronics Show (CES)

January 8-11, 2007
Las Vegas, Nevada
www.cesweb.org

AM Transmission Seminar (by Radio Guide)

February 14-16, 2007
Orlando, Florida
www.radio-guide.com/amseminar.htm

National Assoc. of Tower Erectors (NATE)

February 12-15, 2007
Nashville, Tennessee
www.natehome.com

National Religious Broadcasters NRB2007

February 16-20, 2007
Orlando, Florida
www.nrb.org

Country Radio Broadcasters Convention

February 28-March 2, 2007
Nashville, Tennessee
www.crb.org

Great Lakes Broadcasting Conference & Expo

March 13-14, 2007
Lansing, Michigan
www.michmab.com

AM Transmission Seminar (by Radio Guide)

March 28-29, 2007
Orlando, Florida
www.ieee.org/organizations/society/bt

National Federation of Community Broadcasters

April 11-14, 2007
New Orleans, Louisiana
www.nfcb.org

NAB 2007

April 14-19, 2007
Las Vegas, Nevada
www.nabshow.com

OAB Annual Convention and Engineering Conf.

March 16-17, 2007
Tulsa, Oklahoma
www.oabok.org

SBE22 Broadcast & Technology Expo

October 16-17, 2007
Verona, New York
www.sbe22expo.org

SBE Certification Exam Dates

Exam Dates	Location	App. Deadline
Feb 9-16, 2007	Local Chapters	Dec 29, 2006
April 17, 2007	NAB Las Vegas	March 2, 2007
June 1-11, 2007	Local Chapters	April 20, 2007
Aug 10-20, 2007	Local Chapters	Jun 8, 2007
Nov 9-19, 2007	Local Chapters	Sep 21, 2007

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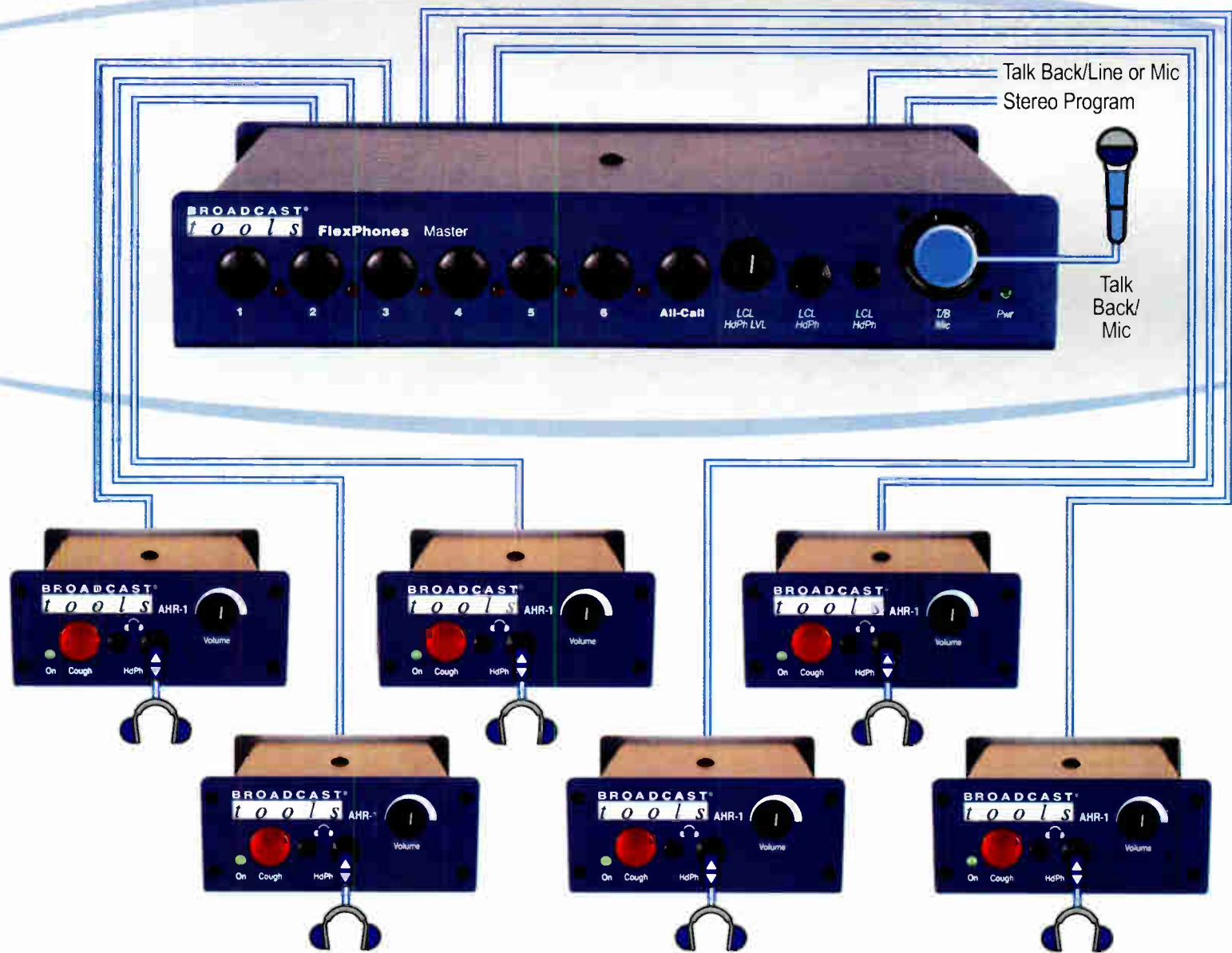


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FlexPhones Master

The FlexPhones Master is a professional Broadcast/Studio six channel distributed headphone system with independent talkback capabilities. Each of the six channels provides stereo program monitoring and selective talkback with interconnection via CAT5 cable to multiple Active Headphone Remotes (AHR-1) and/or Monitor Selector Interface (MSI). Multiple masters may be cascaded to form larger systems.

The FlexPhones Master is equipped with inputs for stereo program and talkback audio. Rear panel program and talkback trimmers are provided to pre-set maximum input levels. The microphone/line level talkback input is available via a rear panel plug-in euroblock connector, while the front panel XLR connector facilitates the use of a user-provided gooseneck microphone or headset. The front panel is equipped with a level control for local headphones with both 1/4" and 1/8" stereo headphone jacks. The six front panel talkback switches allow the user to independently communicate with each AHR-1 listener and can be configured to insert talkback audio into only the left or both ears and dim either or both program channels. Any combination of switches may be pressed, while the "All-Call" interrupts all listeners. The Talkback function can be remotely controlled. Six RJ45 jacks are provided to distribute audio and power via CAT5 cable to the AHR-1's, which conform to the Studio Hub format. Low-Z balanced audio distribution is used to preclude audio degradation with long cable runs.

AHR-1 Active Headphone Remote

The Active Headphone Remote (AHR-1) contains a stereo amplifier designed to work with any combination of high-efficiency headphones with impedances between 24 and 600 ohms. The AHR-1 is equipped with 1/8" and 1/4" headphone jacks, level control, user-configured utility momentary pushbutton and LED indicator. Two rear panel RJ45 jacks are provided for connection via CAT5 cable to the FlexPhones Master. The AHR-1 may be desktop mounted, under counter or with the optional HR-1/MP or HR-1/MP-XLR mounting plates, which may be turret or counter-top mounted.



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