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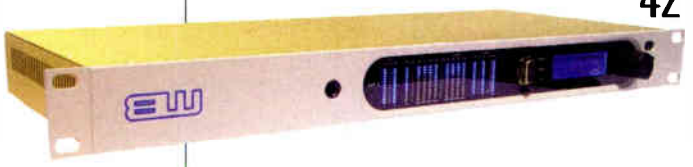

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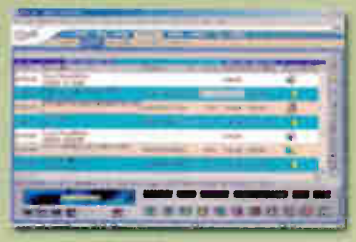

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DEMO ROOM

Currents Online

Highlights of news items from the past month

NAB2004 Attendance Up from 2003

The convention attendance was recorded at 97,544. The attendance in 2003 was 88,020.

ATI Marks 25 Years

Founded in 1979, ATI has distributed more than 75,000 units to a worldwide customer base.

Crystal Radio Award Winners Announced

10 stations walked away as winners.

Belar to Offer IBOC Modulation Monitors

Belar is the first company to license the technology for such a purpose.

List of Licensed IBOC Stations Online

The list can be found at www.HD-Radio.com.

SBE Launches Education Initiative

The SBE Education Committee held its first meeting at NAB2004.

Site Features

IBOC Update E-newsletter

This twice-monthly e-mail newsletter follows the latest news and technology developments for HD Radio. Subscribe today.

Applications & Solutions

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Today in Radio History

What significant event in radio's history occurred today? Look here to find out.

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What's in a name?

As the evolution of IBOC technology continues, we will need to supplement our own understanding of the technology and add the concepts and principles to our engineering skills.

With the new technology comes new terms. In our twice-monthly e-mail newsletter called *IBOC Update—Insight to HD Radio*, we have highlighted some of these new terms. By now you're already familiar with low-level combing, high-level combining, primary sidebands and latency. Some newer terms that you might be learning are telematics, program-associated data (PAD) and advanced application services (AAS).

Familiarity with these terms and knowing what they mean is an important part of understanding IBOC. But with using any technological terms comes the proper use of the language. By spouting too much jargon it quickly becomes technobabble to the non-technical listener. So, while you learn the new concepts, also learn how to explain their meaning in plain language.

As we learn to work with the new terms, I'm hearing a frequent misuse of the most basic term dealing with IBOC. The term isn't a technology phrase, which makes it more interesting that it is so frequently misused. This troublesome term is actually a trademark of Ibiquity: HD Radio.

Branding the in-band on-channel radio transmission technology was a smart move by Ibiquity. Part of this is just standard practice in our modern, marketed society. We frequently apply trade names to products, services and inventions. The processor in your computer is called a Pentium processor because Intel could trademark that name. The heart of the system still started with a 586 processor.

We use trade names in other parts of our lives as well. If you cut yourself on your insulated beverage container, you might first use a facial tissue to attend to the wound before applying an adhesive bandage. Then again, you might cut yourself on a Thermos and then use a Kleenex before applying a Band-aid. Trade names have a way of becoming part of regular grammar, which delights the trade name owner in some ways, while simultaneously reducing the uniqueness of that name in the process.

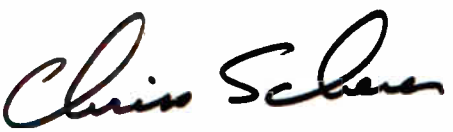
The synonymy of the terms HD Radio and IBOC is growing. Granted, there is only one in-band on-channel system in widespread deployment that is being watched by the FCC and the NRSC, so it's a little different than Kleenex or Thermos, but there are established guidelines for the proper use of the term HD Radio. It's the increased frequency of the improper use that bothers me.

I'm the first to admit that I don't like the trade name HD Radio. Obviously it was chosen because of the consumer acceptance of HD as it relates to television. In this case, the HD in HDTV stands for high-definition. In video, this is true. There is a greater resolution in an HDTV picture than there is in its analog counterpart. However, HD Radio is not high-definition radio in the same sense. Ibiquity even states that the trade name is not a short hand for high-definition. Yet I see "HD" being used to mean HD Radio or IBOC.

I came across the Ibiquity style guide that outlines the proper use of the term HD Radio. This guide clearly describes the proper use of the term in several contexts. The first is that HD Radio should be used as an adjective and not a noun or a verb. Without making this a language lesson, the short rule is that you cannot buy an HD Radio, but you can buy an HD Radio receiver. Likewise, your station can transmit an HD Radio signal, but it cannot transmit HD Radio.

The style guide goes on to state that HD Radio should never be abbreviated. It is not HDR or HD. Also, it is properly written "HD Radio," not "HD radio," "HDRadio," "HD-Radio" or "HD/Radio."

Why the nit-pick? It's my job. Seriously, while my background is broadcast engineering, my daily work is that of an editor. I believe that it is important to use the new terms of this broadcast technology properly. Doing so will help consumers to better understand what is being offered and what it means, without blurring the difference between other forms of digital radio and other uses of the letters HD.



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Safety first

By Kevin McNamara, CNE

It may seem that a typical broadcast facility doesn't have all the safety concerns of a construction site or a manufacturing facility, but accidents happen. Here are a few important safety tips that bear review.

Electrical safety

Accidental contact with electrical currents can cause injury, fire, extensive damage and even death.

Use a grounding stick. The high voltage present in the cabinet of a transmitter is lethal. Even in the case of solid-state transmitters, where the dc voltages are low, you can be injured or killed if you happen to touch a live supply. The capacitors in dc power supplies can hold charges for long periods of time. Electrical codes require that fail-safe switches or interlocks are provided on all access doors and panels that would permit inadvertent contact with high voltage components. Don't rely on these switches. Be sure that all power is discharged using a grounding stick and subsequently hanging the ground stick on the appropriate point while performing any work.

Electrical equipment should be grounded. Properly grounded electrical equipment can offer protection if the equipment should malfunction. If the electric tool states that it's doubly insulated on the manufacturer's tag, this means that there is insulation on the inside of the tool to protect the user from shock. This type of tool will only have a two-prong plug. If the tool does not state that it is doubly insulated, then there must be a third prong on the plug. This third prong, or ground prong, connects the tool to ground or earth so that in the event of a malfunction, the electricity will go through this ground prong to the earth and bypass the user's body. If the prong is broken off, the user has no protection and all the electricity will go through his body. A Ground Fault Circuit Interrupter should be used where there is a chance of contact with the moisture on the ground, such as working outside.

Wear protective clothing. Wear rubber gloves and rubber-soled shoes or boots, especially if you are working around electricity in a damp environment. Everyone knows that water and electricity do not mix, but how often do you think about other liquids, such as grease, oil or solvents? Operating a drill with sweaty hands can also be a potential for electrical shock.

Never throw water on an electrical fire. As mentioned, water and electricity do not mix. In fact, water is an excellent conductor of electricity, and if water is thrown on an electrical fire, it will only spread the fire. Instead, use a chemical fire extinguisher.

Practice good housekeeping. Ensure that you can get to the main power source as quickly as possible, without climbing over obstructions in the event of an emergency. Keep the aisles and walkways clean and clear of garbage. Make sure all flammable liquid is stored away from the area where any electric tool will be operated. Many electric tools produce sparks, which could ignite the flammable liquid's fumes and cause extensive damage.

RF safety

One of the realities of working around high-powered (and even most low-power) transmitters is that there is a high likelihood of some RF exposure. This is particularly true on certain rooftops, antenna farms (especially those with shorter towers) or perhaps near active AM antennas. Most of us have been through the training, performed the measurements and have documented proof of the hazardous areas in and around the station, but you should never assume a work area is safe without the proper measurement, or at the very least based on the calculations and charts provided in OET-65. Pocket monitors are currently available that will provide an aural and visual indication that high RF fields are present.

RF energy is odorless, colorless, tasteless and has similar properties to light energy. The good thing about RF energy is that, at this time, the only known health effect related to RF overexposure is heating. It does not hurt to be exposed. It is only when the exposure exceeds the federal limits that health affects can occur.

When the body or its parts are overexposed to RF energy from communications antennas, molecules within the organs and tissues start to move faster due to molecular excitation. This in turn causes heat. When the body becomes overheated, the symptoms resemble flu, or heat exhaustion. These symptoms may include a headache,

nausea, vertigo, confusion, sensation of non-routine heating, a metallic or bad taste in the mouth and sandy-feeling eyes or blurred vision.

In severe overexposure scenarios, symptoms similar to heat stroke can occur. This is extremely rare and only happens when personnel are too close to high power broadcast or radar antennas.

The good thing about RF, if the overexposed person removes himself from the RF field before the body core temperature or tissue temperature reaches 106 degrees Fahrenheit, the body will cool itself through natural biological processes such as increased blood flow and have no permanent damage.

Hearing protection

Broadcast facilities have several sources that might generate noise in excess of safe recommended levels such as transmitter sites, studio monitors, headphones and the use of certain power tools. Here are a few facts:

- Exposure to noise levels above 90dB will cause temporary or permanent hearing loss in humans.
- Depending on the exposure level, the hearing loss can occur over a short or long period.
- After exposure to high noise levels, people may experience ringing in the ears, earache or discomfort and the inability to hear or understand a normal conversation.
- Workers do not frequently understand they are permanently and irreversibly damaging their hearing. The process occurs over a long period of time and may not become apparent until later in life.
- Excessive noise can cause irritability, stress and distraction that may contribute to other accidents.

Wear ear protection whenever there is a chance that you will be subjected to noise that could exceed prescribed safe limits.

Accident prevention

Consider the underlying accident causes described. Have you been guilty of any of these attitudes or behaviors?

Taking Shortcuts. Every day we make decisions we hope will make the job faster and more efficient. But, do time savers ever risk your own safety or that of other crewmembers?

Being Overconfident. "It will never happen to me" is an attitude that can lead to improper procedures, tools or methods in your work, leading to an injury.

Working with Incomplete Instructions. Don't be shy about asking for explanations about work procedures and safety precautions. It isn't dumb to ask questions; it's dumb not to ask.

Failure to Pre-plan the Work. A job hazard analysis is an effective way to work safely and effectively. Being hasty in starting a task, or not thinking through the process, can put you in harms way.

McNamara is president of Applied Wireless, Elkins Park, PA.

Relaxed LPFM interference rules

By Harry Martin

In a February report to Congress, the FCC recommended the elimination of the third-adjacent distance requirements that are currently holding back hundreds of low power FM (LPFM) applications. If Congress accepts these recommendations, the fledgling LPFM industry may soon begin to flourish, much to the chagrin of some full-power stations and networks.

In January 2000, the Commission authorized the new LPFM service and imposed minimum distance separation requirements for LPFM stations consistent with existing FM protection standards on the same and the two immediately adjacent channels, but not third-adjacent channels. The first applications were filed in May of 2000. In response to continuing complaints from the NAB, NPR and others, and after determining that LPFM stations would not cause unacceptable interference to stations operating on third-adjacent channels, the Commission adopted complaint and license modification procedures to ensure that significant third-adjacent channel interference problems would be resolved expeditiously.

Congress then stepped in, enacting legislation requiring third-adjacent channel minimum distance separation requirements for LPFM and mandating that the Commission conduct an experimental program to determine whether LPFM stations would cause interference to existing FM stations if the LPFM stations were licensed without third-adjacent channel protection requirements.

In July 2001, MITRE conducted LPFM tests and concluded that LPFM-induced third-adjacent channel interference occurred only when the test receiver was in close proximity to LPFM transmitters. It therefore followed that, if reasonable transmitter emissions standards were established, third-adjacent channel interference would have relatively little impact on full power FM stations.

After reviewing the MITRE report and comments from 24 parties (18 of which supported elimination of the third-adjacent standard), the Commission concluded in February that there was no public interest reason to retain the third-adjacent minimum distance separation requirement for LPFM stations. As a result, the FCC recommended that Congress re-address the issue and modify the statute to eliminate the third-adjacent separation requirements for LPFM stations.

LPFM applicants are hopeful that their pending applications will begin to move, especially in light of Sen. McCain's (R-AZ) support for the change. But Sen. Gregg (R-NH) criticized the MITRE report as "flawed," and containing "several technical and methodological errors." Some full-power broadcasters, with the backing of the NAB, still complain that LPFM should be held to the third-adjacent distance separation standard to avoid harmful interference; they also criticize the MITRE report's methodology. LPFM proponents, on the other hand, insist that the MITRE report is definitive proof that the interference complaints are unfounded and that the only thing that larger stations fear is competition.

It is unlikely Congress will act on the FCC's recommendation during this election year. Indeed, given industry opposition to relaxation of the third-adjacent channel protection standard, the matter may not see the light of day in the foreseeable future. In the meantime, third-adjacent channel protections remain in place.

Enforcing renewal filing deadlines

The FCC plans to fine broadcasters who file their renewal applications late—even if the applications arrive at the FCC well before the station's license expires.

If you miss the deadline for renewal applications but still get an application on file before the license expiration date, you likely would be fined, but you would still be permitted to continue to operate your station under your previous license. However, if you file after the license has actually expired, you will be subject to a fine for late filing plus you will be required to apply for a special temporary authorization (STA) to permit your continued operation while the FCC processes your late-filed renewal application.

Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail martin@fhhlaw.com.

Dateline:

Radio stations in Michigan and Ohio must file their renewal applications on or before June 1. August 1 is the renewal deadline for radio stations in Illinois and Wisconsin. EEO program reports and ownership reports are due on June 1. Also on June 1, stations in Illinois and Wisconsin must begin their pre-filing renewal announcements.

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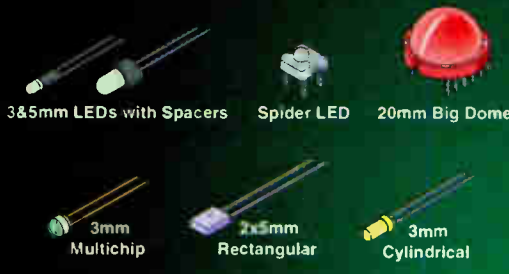

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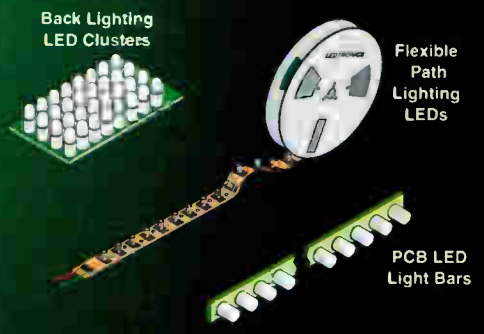

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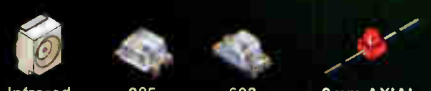

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Mic processors and preamps

By Chriss Scherer, editor

The ins and outs of amplifying and tweaking a mic's sound

The microphone is the first element in the broadcast chain. In our January issue, Trends in Technology looked at this leading element and provided some ideas and tips on making the right selection. Now that the selection has been made, what's next?

Connecting the studio mic to the on-air console or routing system is a simple task, but it's likely that you'll need to do more than that. While the console may have its own mic preamp, this preamp may not provide the quality you need or want. Using an external preamp may provide the extra edge you seek. But if you're going to add a separate preamp, consider that no two voices, and to a lesser degree, no two microphones are the same. Judicious use of mic processing can dramatically improve the sound and consistency of the voices on the air.

Mic preamps and mic processors are separate devices, but one is a subset of the other. All the mic processors I have found include a quality preamplifier. The preamp itself has an operational consideration too. While by definition a preamp adds gain to a signal, there are two approaches applied to a mic preamp design. One design makes the preamp as transparent as possible, using the lowest noise components and adding the least amount of color to the signal. The other design takes advantage of the electronics chosen to add a desirable color to the signal. One example is the tube-base mic preamp. Because most common

Resource Guide

Some manufacturers and dealers of mic processors and preamps

While the Resource Guide is far from a complete list, it should provide enough basic information to help you get started.

The **Sonifex RB-DMA2** dual digital microphone amplifier consists of two independent, low-noise mic pre-amplifiers with AES-3 and S/PDIF digital outputs and analog outputs. The unit can be used as two independent mic amps or one mic input can be copied to both channels of the digital output. Inputs are electronically balanced. The input gain for each input is adjusted on the front panel. Each channel has a selectable high-pass filter and 48V phantom power. A TTL word clock sync input is also provided. The EIN is 130dB. A tri-color LED indicates the audio level.

Also available: RB-MA1 and RB-MA2

www.sonifex.co.uk
207-773-2424

The **Toolvox** from **Omnia** features specialized compressor ratios and time constants coupled with a slow gain-riding AGC and a smart freeze. The de-esser uses Fast Fourier Transform (FFT) analysis to find and remove unwanted sibilance. The processor features three bands of parametric EQ, each with adjustable filters and shelving; built-in phase rotators and Trueverb from Waves; security features to prevent unauthorized tampering; an Ethernet connection for network control; a stereo output; and analog and digital signal outputs. The unit is set up via the Windows remote application. Presets are recalled with the front-panel controls. Presets can also be recalled across the Ethernet connection for use in other studios.

www.omniaaudio.com
216-241-3343

Key: preamp processor

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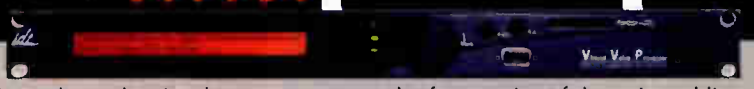

The **Virtual Voice Processor** (VVP) from **IDT** uses Fast Fourier Transform (FFT) in DSP. The FFT analyzes the signal, concentrates on the frequencies of the voice adding the effects that have been programmed. A PC can be used to customize presets via IP. All the parameters can be stored on a compact flash card and shared with other units. There are 24 contact closure inputs as well. It uses an internal sample rate of 96kHz at 24 bits. It features analog and digital inputs and outputs. Digital audio connections are selectable for 16-, 18-, 20- or 24-bit resolution at 32-, 44.1-, 48- or 96kHz.

www.Idt-fr.com • +33 472 1819 20

The **Crane Song Flamingo** is a two-channel, discrete class-A microphone preamplifier. It can be operated as a transparent amplifier or it can be used to emulate vintage sounds or distinctive new ones. Gain is adjustable in 6dB increments from up to 66dB of gain. Each channel has independently switchable phase and phantom power. The 22-element VU meter with overload indicator shows levels. The Iron switch increases harmonic content on low frequencies, while the Sound switch adds second and third harmonics across the spectrum. The unit has transformerless balanced inputs and outputs.

www.cranesong.com
715-398-3627

The **Apogee Electronics Trak2** begins with a discrete microphone preamplifier that is accessible via rear-panel XLRs or the front-panel XLR/TRS connectors. An insert point is included. The analog signal is converted to digital through a 24-bit converter that runs at 44.1, 48, 88.2 or 96kHz. The unit also includes Apogee's Soft Limit process to prevent digital overshoots and the Apogee Soft Saturate system, which simulates analog tape compression. Either feature can be switched in and out on one or both channels. Two Apogee Multimedia Bus (AMBus) slots are provided to add Pro Tools, ADAT, TDIF, SDIF-II, SSL Hiway and other output standards.

Also available: Mini-ME, Mini-MP

www.apogeedigital.com
310-915-1000

The **Aphex Systems 1100 MKII** builds on the 1100 and offers a wider feature set and lower noise floor. The unit has a wide dynamic range microphone preamplifier that features patented technology in a discrete class-A tube design with an integral 24-bit 192kHz A/D converter. It boasts an EIN of better than -135dBu. Connections include a stereo, optical S/PDIF and AES-3 digital audio output, and separate ¼" insert point jacks. The Mic Lim optical attenuator, located directly on the mic input line, limits the microphone's output signal according to the Mic Lim peak detector's control current, detecting the preamplifier's output signal and instructing the input attenuator to proportionately reduce the microphone's output level just enough to prevent clipping.

Also available: 207 dual-channel preamp, 1788 eight-channel preamp

www.aphex.com • 818-767-2929

tube designs favor even harmonics (whereas solid-state designs favor odd-harmonics), they have a unique sound, which is often described as warm. It is this sound that gives a tube preamp its aural quality, which some recordists highly covet.

With the increased use of centralized audio routing systems that use a core audio engine as the primary audio input, it may be necessary to send the mic source audio over a greater distance than a few feet. Because mic-level signals are so low, distributing mic-level audio is not a preferred method. This is another advantage to using a mic preamp.

The mic processor adds additional power to the preamp. Typical stages include a gate or expander, limiter, compressor, de-esser and equalization. Each stage can be used for a particular benefit. Just like an on-air processor, these stages of a mic processor each have their own operational benefits. To get the best use of an on-air processor you learn how each stage acts and interacts. The same is true with a mic processor. While the individual parameters may not have as many variables as an on-air processor, knowing how each stage functions will simplify the process of getting the ideal sound.

Some mic processors have the option of changing the order of the various processing stages. In most cases the preset order will likely prove satisfactory, but experimentation may offer some unexpected results. Compressing an equalized sound has a different effect than equalizing a compressed sound.

Mic processors and preamps

The **SBS Mic-IT** is a dual microphone preamplifier with multiple output modes. The line level outputs may be summed to create a two-input microphone mixer. A sum-and-difference mode provides an output for mid-side recording. Front-panel switches assign 48V phantom power, and a high-pass filter can be applied to one or both of the inputs. The unit is packaged in a metal case suited to mounting on rack shelves, beneath woodwork or inside rack cabinets. It features electronically balanced inputs and outputs, an EIN of -129dB, THD at 1kHz of 0.005 percent, and a maximum output level of +26dBu. Distributed in the United States by Broadcasters General Store.

Also available: Mic Lim-IT

www.sbsfm.com
352-622-7700

The **Aircorp Pro-Announcer 500PH** features remote-adjustable input levels, providing equalization without further adjustments. The compressor/expander combination reduces room noise and equipment noise, while providing level control and increased loudness for the announcer. The three-section variable boost and cut equalization allows for easy setup

without increasing low frequency room rumble and system hiss. Other features include symmetry correction, dynamic control coupling of the compressor and expander to eliminate flanging effects, a popless insert point for an effects device, simultaneous mic-level output and line-level output to feed the console and telephone hybrid, a remotely controllable de-esser, a buffered headphone jack for setup without being on air, a DB-25 for all logic functions and 48vdc phantom power.

www.aircorp.biz
972-304-0455

The **Behringer VX2496** is based on the VX2000 and provides 24-bit/96kHz performance. It features an AES-3 output and features an opto compressor, dynamic enhancer, expander, de-esser and tube simulation. The output sampling rate is adjustable and can be tied to a clock reference. There is a discrete ultra low-noise mic/line input

stage with soft mute, 48vdc phantom power. The tube emulation circuitry provides tube and tape saturation sounds, and the true RMS expander offers smooth noise reduction. An opto compressor provides dynamic control and creative signal processing options. A voice-optimized equalizer was specially designed for voice enhancement.

Also available: Ultragain Mic 100, Ultragain Mic 200, Ultragain Pro Mic 2200

www.behringer.com
877-672-0816

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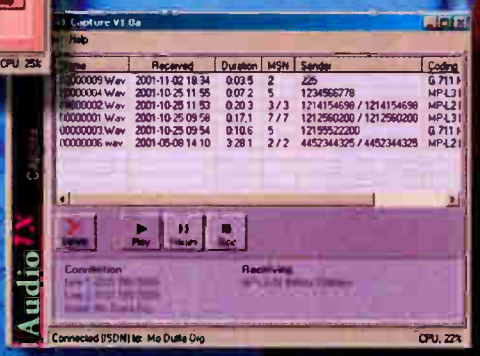

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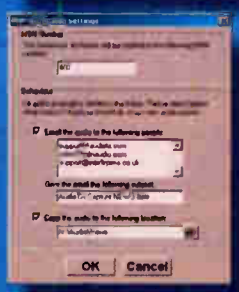

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Mic processors and preamps

The **Great River Electronics MP-2** and **MP-4** are two- and four-channel mic preamplifiers. Each channel is a transformer-coupled class A discrete solid-state design. All switches, relays and internal connectors have gold-plated contacts. Each channel has a rear-mounted, XLR, balanced input jack and a front-mounted ¼" high-impedance input jack. Each channel also has a 15dB pad, polarity control, 48V phantom power, an overload LED and a 24-position gain switch. The 1RU unit has an internal power supply. Frequency response is from 10Hz to 30kHz, ±1dB for the mic input. - **Also available: ME-1NV and MP-2NV**

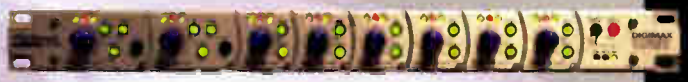
www.greatriverelectronics.com • 651-455-1846

True Systems offers the **P2 Analog**, which has two mic inputs and two instrument direct inputs. It features a M-S (mid-side) decoder, stereo phase correlation display, selectable high-pass filters, relay-switched signal routing and dual gain range. The unit's frequency response is from 1.5Hz to 500kHz (-3dB). The maximum output level is +31dBu with an EIN of -132dB. The THD at +26dBu is 0.0008 percent. True Systems products are distributed in the United States by Neumann USA.

Also available: Precision 8

www.neumannusa.com
860-434-5220

The **Presonus Digimax 96k** has class A discrete input buffers followed by a dual-servo gain stage to provide 60dB of gain with 52dB of headroom. It is electronically balanced and features phase reverse on the first two channels, as well as a 20dB pad and selectable 48V phantom power on each channel. The EQ



Enhance contours the EQ curve. It uses RMS compression and peak detection to limit transients. It has eight XLR mic inputs, two ¼" instrument inputs, eight balanced TRS analog outputs, a 24-bit ADAT lightpipe output and four stereo S/PDIF digital outputs. All outputs can be used simultaneously.

www.presonus.com
800-750-0323

Open Mic

Robert Orban
Vice president, chief engineer: Orban/CRL

"Of all the possible elements of a mic processor, which one stage can be used to reap the maximum benefit?"

If all the desired benefits could be provided by one stage, mic processors wouldn't have so many stages. Each stage contributes something unique to the final audio texture. However, if I were forced to choose one, it would be a gated compressor.

The need for EQ can be minimized by choosing a microphone with frequency response that's close to your desired EQ texture. Any competent mic preamp, used below clipping, is good enough for broadcast use. Adequate circuit headroom after the mic processor precludes the need for a peak limiter. However, no outside substitute can provide the consistency and punch of a compressor.

In an ideal world, the talent would work the mic so skillfully that no compression was required. But with all of the tasks that today's talent are expected to perform routinely, a compressor smoothes things out. Moreover, in high-energy formats, the mic chain compressor adds energy and excitement to the presentation by adding voice processing that is congruent with the processing that the recording and mastering engineers typically apply to the music that these formats play.

In any format, the mic chain's compressor provides consistent levels that make life easier on the final transmission audio processor. The transmission audio processor can be optimized for the format's music, and the mic processor's compressor can then be adjusted to complement the transmission processor's sound.■

Open Mic

Frank Foti
President: Omnia Audio

"What's the most common mistake made when setting up a mic processor?"

Setting up microphone processing for broadcast needs to be thought of in at least two contexts: On-air and production. There are distinct differences.

First and foremost, the main on-air processing needs to be set with respect to music, as that is usually the predominant content on the air. Because on-air processing can be set over a diverse wide range, from Bach to hard rock and anything in between, it doesn't make sense to just dial in a mic processor setting that worked at some legendary station 20 years ago. It's not possible to understand the intricacy of the former facility when working to achieve optimum performance in a new environment.

This is the key reason as to why it's critically important to set the on-air processing first and then work on the mic processing. Too often the mistaken desire to tweak the main processing is based on the combination of the last song played and subsequent jock break. Either the music will sound great but the jock doesn't cut through, or jock sounds good and the music is dull and lifeless.

Make the on-air processing sound good with music first, then lock it down and work your way back to the mic processor. Many times you'll find that the mic processor will need to be reset with respect to EQ and compression. Start with less processing/EQ and dial more in as needed. Don't work in the other direction.

Another common mistake is to set the processor based on preconceived notions. Set the processing for what sounds good, not based on how the dials are set at the station across the street. There many variables that will effect the on-air mic presentation. This is why there are not really any secret mic processor settings.

The most common mistake made in the production studio is to apply a stock setting for every user. Production facilities are set up to create whatever effected texture is required for the segment being produced. If an element is needed that replicates the on-air sound, then adjust the production mic processing to reproduce the air studio sound. If the content is to be used for an agency or multiple outside stations then adjustment should follow a more conservative path. In the end, the ears need to be the judge so that the processing is not overly done. ■

The **Yellowtec VIP Digital** is a DSP-based mic processor with two mic inputs and 48V phantom power. The mic preamp uses a 24-bit converter and features low latency. Processing stages include a compressor, expander, AGC with freeze function, a de-esser that uses FFT analysis, parametric EQ, built-in phase rotators, VIP Verb reverb, an audio delay line and a subsonic filter. The Sound Control Software allows for drag-and-drop selection of any of the processing elements in any order. GPI and GPO provide remote control functions. Presets can be recalled from a Smartcard inserted into the front via the front-panel controls.

www.yellowtec.com
+49 2173 967336

The **ATI ML200** is a compact and portable dual mic preamplifier. The outputs are servo balanced line outputs capable of delivering +22dBm. The front panel has two pushbutton switches for each channel: one selects the

preamp gain range and the other selects phantom power. The front panel also has an peak-level LED indicator. The ML200 has two female XLR balanced inputs and two male XLR balanced outputs. The mic input EIN is -124dBm. The unit operates on 22Vdc to 30Vdc. Measuring 1.75" H x 5.6" W x 5.75" D it weighs 1.25 lbs. As many as three units can be mounted side-by-side in a 1RU space.

Also available: MMA800-XLR,

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Mic processors and preamps

The **TC Electronic Gold Channel** is a digitally enhanced microphone preamplifier and a signal refinement toolbox. It uses 24-bit A/D converters, and features DSP control of expander, compressor, equalizer, de-esser and an M-S encoder/decoder. As many as 100 user presets can be stored.

The I/O includes an analog mic or line-level input, an analog line-level output, AES-3 input and output, S/PDIF input and output, optical S/PDIF or ADAT input and output, a word clock input and MIDI in/out/through. All audio outputs are available simultaneously. A PCMCIA card can store settings.

www.tcelectronic.com • 805-373-1828

The **DBX 286A** has a mic preamp and five processors that can be used independently or in any combination. Switchable 48V phantom power, an 80Hz high-pass filter, the DBX Over-Easy compressor, a frequency-tunable de-esser, a high-frequency enhancer, low-frequency detail control, and an expander/gate are included in the feature set. Levels are shown on the meter and status LEDs. A floating, balanced XLR input accepts balanced or unbalanced inputs. An additional 1/4" TRS phone jack can accept balanced or unbalanced line-level signals. An insert jack is available between mic preamp and signal processing section.

Also available: Pro Vocal, 786 and Mini-Pre

www.dbxpro.com • 801-568-7660

Open Mic

Marvin Caesar
President:
Aphex Systems

"What is your top tip for getting the best sound from a mic processor?"

It is hard to specify the top tip for getting the best sound from a mic processor because there are no 'generic' mic processors. Each one has its weaknesses and, hopefully, its strengths.

I believe that one of the most critical parts of a mic processing chain is the compression. I often see voice compressors set more like limiters—high compression ratios with fast attack and release characteristics.

Intelligibility is dependent on consonant recognition. Consonants, especially in languages such as English, typically have a high leading edge. If the processor crushes those edges there is a loss of intelligibility, so even if the voice is loud there is a lack of clarity. This effect is exacerbated with digital processors that use look-ahead processing.

I believe that a compressor with a lower ratio and soft knee is better. That way there is no dramatic pull back or sucking effect just above threshold. Attack times should be set so that they are slow enough to allow the natural percussives in the voice to pass through untouched or enhanced, but not so long as to create an overshoot that could overload the following input stage. Release time should be fast enough so that the signal has more in your face and a phatter presence without obvious distortion.

One very important thing to remember is that the loudness will come from your on-air processor. Do not expect your mic processor to do too much, otherwise your voice talent, your management and your listeners will complain. ■

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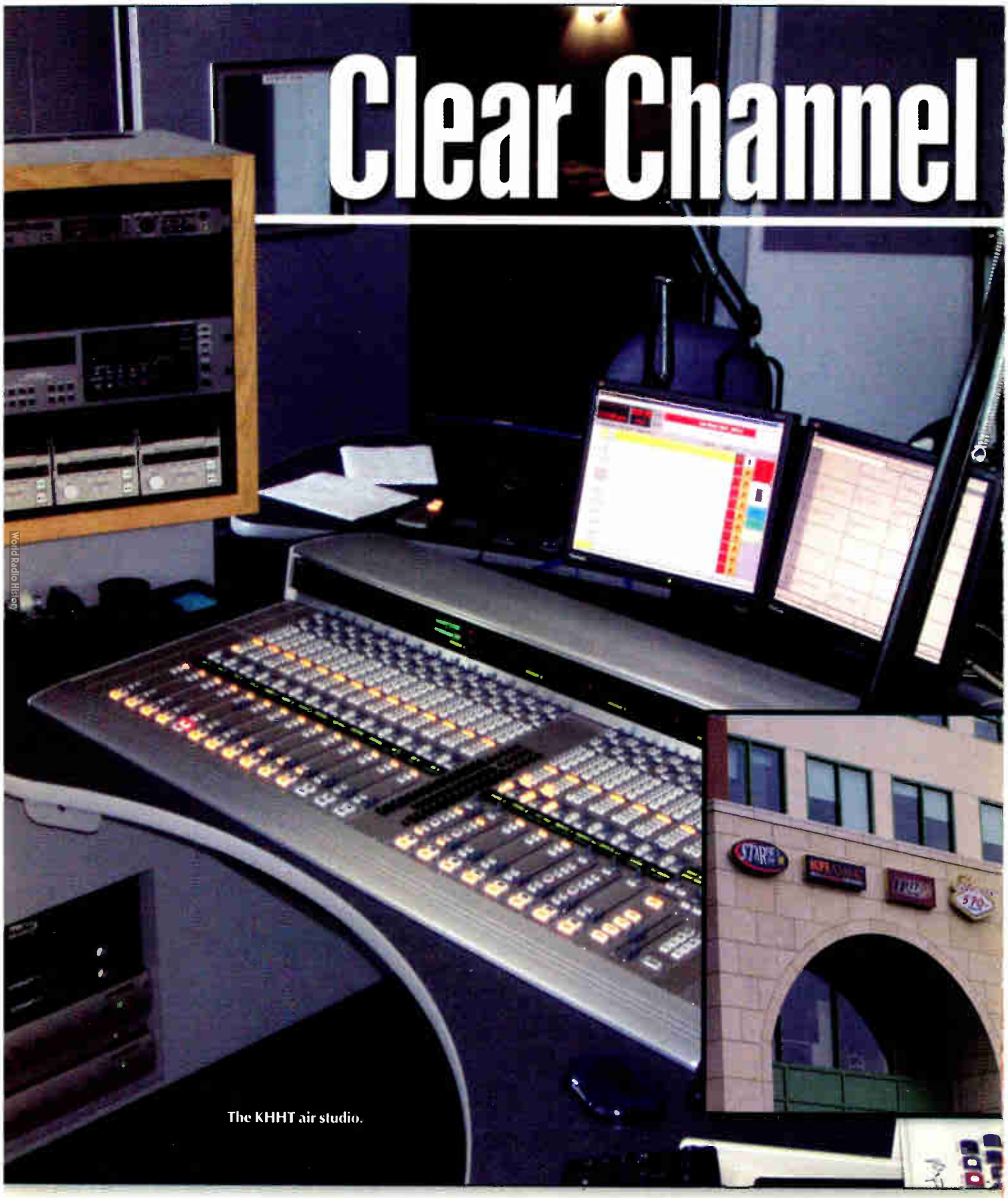

The KHHT air studio.

LA brings it all together

By Chriss Scherer, editor

A top-market consolidation project takes time and planning to accommodate the unforeseen possibilities.

A licensee consolidating its stations into a single facility is not a new idea. A facility consolidation offers operational efficiencies. But the decision to consolidate is a choice that requires careful attention and planning. Most studio projects are driven by one of three forces: time, budget or desired performance. In the case of Clear Channel Los Angeles, time was the driving force.

Clear Channel LA owns eight stations in the market: FMs KBIG, KHHT, KIIS, KOST and KYSR, and AMs KFI, KLAC and KXTA. Timing was what motivated this project because the KIIS and the AM station leases were due to expire in 2004. In a process that began in 2001, the site selection and subsequent studio build have taken shape, although not without a few hitches along the way.

The eight LA stations occupied four facilities around the LA metro. KIIS and KHHT were in one facility. KYSR was by itself in a building next door to KIIS. KBIG and KOST were together in Glendale, and KLAC, KXTA and KFI were in yet another location. Arranging the final steps to move these stations without losing air time—and revenue—was going to be a challenge.

The search begins

A desirable location with central access in the metro was important, as was the ability to establish STL paths to all eight transmitter sites. After considering several possibilities, the first location viewed was the one that was finally chosen. This was not the first choice, however.

Clear Channel also owns Premier Radio networks, which has its main facility in Sherman Oaks. A building across the street from the Premier was the primary choice for the Clear Channel stations. While this location would have provided some convenience for the co-owned divisions, geographical reasons made it an impractical choice. Los Angeles is in an earthquake zone. If a seismic event were to strike the area with the two broadcast facilities, the chance of both facilities being lost was unacceptable. Instead, the location in Burbank was chosen.

The radio station complex and the Premier facility also provide backup for each other, so the distance separation improves the likelihood of at least one facility being useable after an emergency. In addition, the stations have backup facilities at two of the transmitter sites.

The Burbank location is in a media-friendly area. The NBC studios are next door, and several other broadcast and media facilities are in the area. The chosen location also provides good STL paths to each station's transmitter site.

The radio facility occupies three floors in the building. The third floor hosts the sales, traffic and continuity departments and has the smallest floor space. The fourth floor houses the technical operations center (TOC), the AM studios and operations and the accounting department. The fifth floor is home to the FM studios and operations, and the FM administration offices.

The stations began moving into the facility one at a time. The first station to move in was KSYR at the end of January 2004. Then KIIS, KHHT, KBIG and KOST moved in during February and March. KLAC and KXTA joined the group in April, and KFI will move during May.

The order of the stations moving in was not the order of the original plan. KIIS and the AMs had leases that were nearing their end so they had higher priorities, but as often happens with any plan, adjustments had to be made along the way.

The move for KIIS was rescheduled because of the change in the morning show from Rick Dees to Ryan Seacrest. KIIS had planned to bring several analog studios for Rick Dees, but following the change, these studios were not built to the original plan. Seacrest's show originates from the same Hollywood facility as the television show, and the audio is transmitted the main Clear Channel studios via T-1. The Seacrest studio is a self-contained operation with its own Prophet Systems automation.

KFI was last on the list to move because of the complexities of the news operation. The news prep areas, wire services and other elements in daily use must all be in working order before the station can move in.

Additional support

Clear Channel contracted Harris to assist in the facility installation. In most cases, each station's existing studio equipment was newer, so a complete studio equipment purchase was not needed. But because it had to start somewhere, the KSYR studios has the most new equipment because it was the first to move. As other stations moved, their equipment was shuttled and installed as needed.

Each studio has a similar layout.

One exception to the new equipment pool was the on-air consoles and audio router. Clear Channel already owned three Harris BMX Digital consoles. Harris supplied 28 more consoles to complete the facility. In addition, a Vistamax router was added to the audio infrastructure.

All the studios were initially designed with a common layout and theme so users could use any studio with little introduction. To add some personal touch, each studio was customized for its own needs from there. In addition, the furniture trim color was changed for each station to provide a personal identity. The chairs for each studio were matched to this trim color, which also eliminates the problem with borrowed-but-never-returned chairs.

The similar furniture designs also facilitated the furniture construction. Because a single shape was used, the countertops could be cut from the same CNC program, saving time and cost.

Flexibility was a key design concern. Before the move, some stations did not have any audio routing beyond patch bays. Clear Channel looked at all the available choices and wanted to avoid analog wiring bundles and traditional punch block closets. By using the distributed router approach and a digital infrastructure, the amount of wire needed was reduced. In addition, the Gepco CAT-5 cable is smaller in diameter, so it occupies less space. All the CAT-5 cable originates in the TOC. The amount of CAT-5 cable used in the facility would stretch about 110 miles.

The open furniture design uses a wiring trough along the underside of the console top. Because of the digital routing, the amount of wire needed has been greatly reduced, making it easier to conceal the wiring in this trough.

Variations on a theme

Each station has an air studio and an imaging production studio, which also serves as the backup air studio. The FMs each have a

commercial production studio.

KHHT and KYSR also have a syndication studio. KIIS has space for a syndication studio, an additional production studio and another support studio that were not built after the change in the morning show.

KFI has a news studio and a talk studio that looks into the control room. KXTA has a talk studio and a voice booth. KLAC has a sports studio.

A spare studio, called the farm-out studio, was built on the fourth floor for visiting stations to use when they come to LA. The fourth floor also features a news bullpen with five workstations and a sports bullpen with three workstations. The news bullpen also has two news prep studios. There are seven voice-tracking booths on the fifth floor.

The large studios are centered around the BMX Digital consoles. The news and sports workstations and news prep studios use a rack-mount VSDM from Harris. The voice-track booths use a low-profile desk-mount VSDM.

The TOC houses all the behind-the-scenes equipment including the Prophet Systems servers. The Vistamax router handles all the audio and all the control and logic signals.

The TOC houses 96 racks in seven rows.

Required backup

While it is impossible to expect that equipment will never fail, the stations have made efforts to ensure a high on-air reliability. If a router or console goes down, the station cannot afford the lost revenue or listeners.

The Prophet Nexgen provides a mixed output of the audio feed. As a backup, each station's mixed audio feed is sent to each console directly for use when needed. Likewise, a direct feed from the console is routed to the TOC. This protects the stations in case of a router failure. If a console fails, the Nexgen output can also be routed directly to the on-air processor. This system was used during construction in overnight maintenance sessions when the Vistamax was loaded with programming updates.

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Vic Jester, Market DoE, Radio One, Atlanta

"We sent stereo music and two presenter microphones into the Zephyr Xstream and applied basic limiting using the built-in processor — the mixer is very flexible and easily configurable, making it simple to set up in the field."

Alex Lakey, Chief Engineer, Virgin Radio

"Xport's audio quality is outstanding. The *aacPlus* algorithm provides great fidelity... Every hit, the metal sticks hitting each other, conversations from the field, all were reproduced with great clarity over the POTS line."

Michael Black, GM, WEOS, Geneva, New York

"I was wary of using a compressed link, but the Zephyr Xstream's AAC algorithm is incredible. The on-air audio is the best we've ever had ."

James Turvaville, Chief Engineer, WAY-FM Media Group

"We were out in the mud [at the Bonnaroo Music Festival] and the phone line had been run over by a thousand cars. But the Zephyr Xport worked great!"

Jake Glanz, Engineer, Sirius Satellite Radio

"Zephyr Xstream is in a class of its own, the only codec really worth having for main broadcast ISDN."

Graham McHutchon, Senior Sound Supervisor, BBC News

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Clear Channel LA

Another step taken to ensure on-air reliability was to route the telephone service feed directly to the TOC without allowing access from the common building areas. This eliminates the chance for a telephone installer to unintentionally interrupt a station line.

For power, the on-air operations are fed by a dual 96KVA UPS running in parallel. Under full load, this UPS would provide power for 10 minutes. Current usage is much less than full load. In addition, an 800A service is provided from the building generator, which has a 24-hour fuel tank.

The Star Lounge performance studio can accommodate a small performance for an audience, and does so with an interesting design flair.

To secure the occupancy permit, the Burbank electrical inspectors wanted all the equipment to carry UL approval. Unfortunately, not all broadcast equipment is UL approved; however, most broadcast equipment is CE approved, which is acceptable. In one case, an inspector had the station open a Prophet server to see that all the internal components were UL or CE listed.

Looking into the performance studio from the fifth floor lobby.

Other zoning and approval issues were not a source of trouble for Clear Channel, likely due to the presence of other electronic media outlets in Burbank. On the roof, the STL dishes had to be painted to match the color of the building parapets to make them blend in with the building.

Clear Channel Los Angeles is now a showcase in this leading market.

More online

Access this article online at www.beradio.com to see floor plans and more photos of the installation.

Information provided by Terry Grieger, Clear Channel, and Scott Russell, Harris. Photos by Terry Grieger.

Equipment List

Adobe Audition
Acoustics First sound panels
Broadcast Tools 6X1 switchers
Broadcast Tools 8X1 DAS switchers
Comrex Hotline, Vector and Matrix codecs
Crown power amps & headphone amps
Denon DN-2500F dual CD players
Denon DN-2600F dual CD players
Denon DN-951FA CD players
Denon DN-961FA CD players
Digidesign Pro Tools
Digigram VX222 sound cards
Electro-Voice RE-27
Gepco/Quabbin 5100 CAT-5 cable
Hafler power amps
Harris BMX Digital consoles
Harris Smoothline furniture
Harris Vistamax router
Harris VSDM mixer
Henry Engineering Matchbox
JBL 4412
Krone blocks
Mackie HUI
Middle Atlantic racks
Moseley 9003
Neutrik connectors
Orban Audicy
Panasonic SV-3700 DAT
Panasonic SV-3800 DAT
Panasonic SV-4100 DAT
Panduit wire management
Prophet Systems Nexgen
SAW Studio
Sennheiser MD-421
Shure SM5B
Sony CDR-W33 CD recorders
Sony MDS-E12 Minidisc
Sony PCM-R700 DAT
Starguide III receivers
Symetrix 528E
Symetrix headphone amps
Tascam 122 MKIII cassette
Telos 2×12 phone system
Telos 2101 phone system
Telos Zephyr Xstream codecs
VoxPro editors

Facility Focus
the technology behind Clear Channel LA

Broadcast Tools 8×1 DAS

The 8×1 Digital Audio Switcher routes any one of eight AES/EBU digital inputs to three outputs. It includes a programmable or last-selected source memory, a safety lock out, output muting, remote control and status display and multi-drop

RS-232 and RS-485 serial ports. Two versions are available: a balanced 110Ω version with XLR connectors, or unbalanced 75Ω with BNC connectors. The programmable power-up selection stores setting of inputs-to-outputs switching configurations. The front panel controls and indicators include the input selectors and mute selection switches with LED indicators, as well as a label strip to identify the sources. Selectors can provide pulsed or latched open-collector outputs. All the front-panel functions can be accessed via the rear-panel connectors.

www.broadcasttools.com
877-250-5575

Comrex Matrix & Vector

Nobody does remotes like Comrex. That's why leading broadcasters and broadcast facilities like Clear Channel put Comrex on the line. Whether it's the versatile Vector POTS audio codec or the multifunctional Matrix POTS/ISDN/GSM wireless

audio codec, Clear Channel LA depends on rock-solid connections with up to 15kHz frequency response over standard POTS and ISDN lines. While the Vector offers the functionality of a four-channel mixer with a built-in POTS codec, the Matrix offers a two-channel mixer with simple plug-in modules that add ISDN and GSM wireless functionality to its standard POTS codec. The Matrix rack-mount POTS/ISDN/GSM wireless audio codec is the perfect studio-side solution for remote broadcasts because it is compatible with all Comrex codecs and those from most other manufacturers.

www.comrex.com
800-237-1776

Prophet Systems NexGen Digital

Prophet Systems is a complete digital technology company specializing in broadcast automation management and control. NexGen Digital provides several hardware and software configurations scalable to any size station. Clear Channel Los Angeles has integrated this technology to suit its more than 60-studio facility. NexGen complements the high energy site with reliability and efficiency. System management is worry free with minimal time spent configuring and maintaining the network. Features in NexGen include WANcasting, which allows stations to share resources, Digital Reel-to-Reel, which allows time shift recording of up to four programs simultaneously on one computer, and CDX/AFC, which is the most powerful and full-featured CD Ripper and Automatic Format Converter available.

www.prophetsys.com
877-774-1010

Digigram VX222v2

The VX222v2 is part of Digigram's range of professional sound cards that has been setting the industry standard in broadcast for over a decade. The VX222v2 features 2/2 balanced analog I/Os and 2/2 AES/EBU I/Os, as well as Digigram rp, Wave, ASIO, DirectSound, Core Audio, and Linux drivers. It is designed in the compact short-length PCI format and compatible with 5V and 3.3V PCI and PCI-X buses. The sister product VX222-Mic extends the VX222's feature set with a high-quality phantom-powered microphone preamplifier. Linked with an analog compressor-limiter-expander, it enables direct mix of voice and another audio source without the added burden and expense of external devices. Additionally, the VX222-Mic features a three-band parametric equalizer and a "maximizer" that increases the average output level.

www.digigram.com
703-875-9100

The ice shield should be secure and capable of holding the weight of ice or snow. Otherwise, it will cause damage to the antenna it is supposed to protect.

Getting the most from TOWER inspections

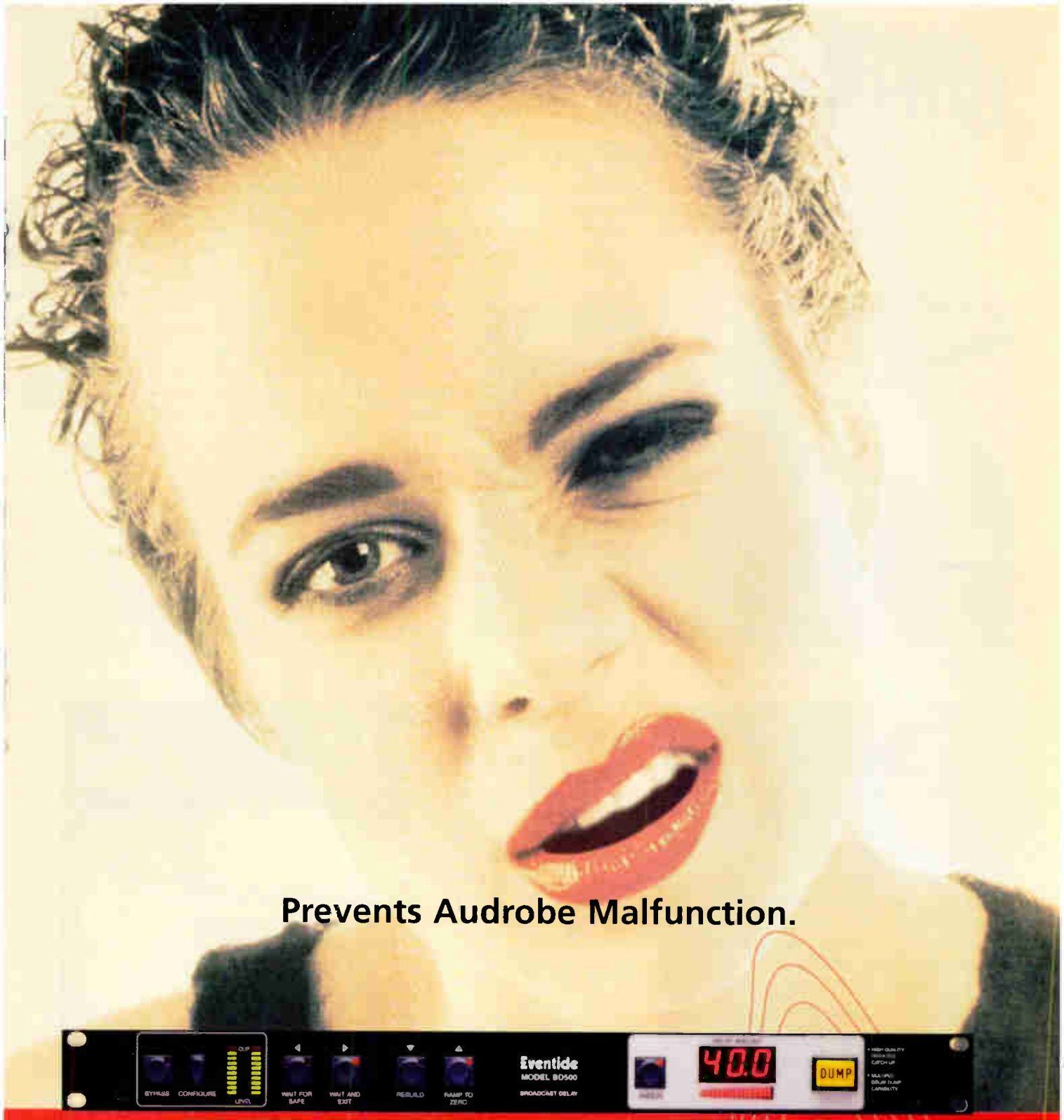
By Rolin Lintag

Tower inspection expenses are small compared to the financial consequences of not spending the money on one. However, make sure that this is actually a preventative measure that is worth the money spent. These inspections are designed to help broadcasters comply with government and safety regulations, catch present and potential problems that compromise the integrity of the tower and verify the accuracy of drawing plans on hand. The latter objective becomes particularly useful to tower upgrades as we install new digital antennas and their corresponding appurtenances. Accurate information as to tower-member dimensions and orientation at the level where the digital antenna will be installed will be required by the antenna manufacturer for side-mounting considerations.

Qualified tower inspectors

Inspections need to be performed by qualified tower inspectors. By qualified I mean someone with enough experience in tower installation and maintenance. The inspector should be skilled in the use of the dynamometer and surveying transit and knowledgeable with OSHA, TIA, FAA and FCC rules and standards. An inspector is definitely more than just a tower climber.

Engineers from other stations may be able to make recommendations from working experience with specific tower companies or individuals. It also helps to call and interview previous clientele of the tower company being considered. It is up to the owners and station engineers to make sure that the job gets done right and that the stations gets the most out of the company expense.



Suffering from Cursing Callers? Foulmouthed Fanatics? Lewd Loudmouths? Obscene Orators? Profane People-in-the-Street? The Eventide BD500 profanity delay cures all of these ills!

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BROADCAST DIVISION

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www.eventide.com
broadcast@eventide.com

TOWER inspections

There are several questions that should be asked and details that should be defined from prospective inspectors during the request for quotation (RFQ) process.

· Obtain a checklist of what is included in their inspection. It should include tests on the tower lighting to ensure that the remote monitoring and alarm actually work.

· Require a detailed report be provided, complete with pictures and recommendations of actions to be done in order of priority.

· For FM, have the tower inspector equipped with a personal RF radiation monitor when he goes up the tower. Broadcast time is costly, so minimize reduced power or off-the-air intervals to when the climber is in the RF hazard levels of the tower. AM towers will probably be cold when being climbed, but additional equipment may be installed.

As specified by the FCC, proper signs should be posted on the tower or near it, aside from those in plain view by the public at the gate of the premises.

· Ask if the inspector will check for coaxial line leaks as part of the inspection. Some inspectors would even do minor touch ups on cold galvanizing for free as long as the work does not exceed the maximum two man-hours. Some pro-bono items may include replacement of obstruction lights as part of the inspection package.

When the work is awarded and the job is scheduled, ensure that driving directions to the site are communicated. Ask for the mobile phone number of the inspector who will do the work. Coordinate possible off-air times, and have the tower drawing plans ready for reference and review by the inspector. Be sure that the areas to be inspected are clear from bushes and are readily accessible.

Ensure that the inspector has hand-held transceivers for coordination. It's a good idea to have your own set of binoculars so you can observe the process and perhaps see for yourself whatever the climber wants to show you when he is up the tower.

Guy anchor showing the turnbuckle safety in figure-eight formation as required by TIA/EIA 222.

Verifying this information ensures clear communication and will allow you to compare individual quotes on an equal basis.

General site conditions

RF warning and FCC tower registration signs need to be properly posted as per FCC and OSHA standards. The inspector should be able to spot this on entering the site premises and be able to recommend how to properly comply. In cases where there are gray areas with regards to compliance to rules, it is best to be at the safe extreme rather than risk being found deficient.

The inspector should also check the integrity and continuity of the security fence around the tower and guy anchors. Locks should be operational and chains used should be strong enough to provide protection. He should also be able to determine if tall trees around guy anchors can pose a hazard during inclement weather. Soil erosion due to drainage passing through guy anchors or tower base could possibly weaken the soil bearing. Excessive growth of vegetation can hinder visibility and prevent access to the tower base and anchors.

Corrosion due to rust is perhaps the biggest enemy of guy anchor components. Cotter pins, clips, turnbuckles, anchor rods and plates need to be inspected for signs of corrosion. Preformed guy grips should be prevented from unraveling with tie wires. Safety wires should be installed on turnbuckles to prevent them from turning. TIA/EIA 222F requires that these safety wires be in a figure-eight formation. A security fence should surround the guy anchor to protect it from grazing animals and as a visual warning to people operating farm equipment and other vehicles.

Tower structure and guying

Guyed towers need to be vertically plumb from top to bottom. The inspector uses a surveying transit on at least two observation points that are 90 degrees from each other with respect to the base of the tower as shown in Figure 1. The tower should be sighted at each guying level and approximate the deviation from vertical compared to the leg of the tower. The findings at each level should be recorded.

The results gathered above will give the inspector an idea of the tensions of the guy wires. A tower that is not plumb within the width of the leg of the tower must have a loose guy wire on one side and a tight

guy wire on the other side. A dynamometer is used to determine the guy-wire tensions. The inspector should use the right correction factor for each guy wire size and type. He should also be able to verify and update the plan as to the type and size of guy wires used on the tower.

The inspector may also be the climber or another one who is trained to spot rusted bolts, members and girths of the structure. Signs of corrosion, bends or dents should be noted and photographed for your reference. Loose or missing hardware included in the report should be fixed with due diligence.

Stainless steel cotter pins are best. This anchor plate is cold galvanized for protection from rust.

Lighting and grounding

The inspector should check the tower obstruction lighting system for FAA compliance and test the alarm system and monitoring. The flash head units on the tower should be checked for signs of lightning damage and corrosion. Painted towers should be checked for flaking and fading as compared with the FAA color chart. This includes coaxial cables if run on the outside of the tower.

Lightning prevention systems are only as good as their grounding. Ground rods should be inspected for electrical and mechanical integrity. There should be no sharp bends or discontinuity on the ground wire from top to bottom. All cables should be grounded on the tower with grounding kits as specified by the cable manufacturer. The inspector should take note of deficiencies should he find missing or faulty grounding apparatus on any cable, guy wire or fence.

All hardware attached to the tower should be secured and all bolts tightened. The inspector should take note of any signs of dents or bending or anything that may hinder

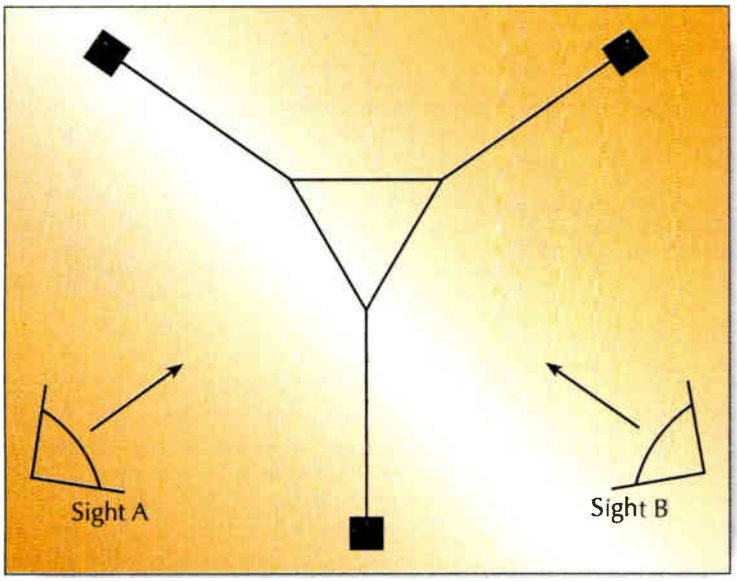

Figure 1. A minimum of two sightings should be used to check the plumbing of a guyed tower.

the proper electrical performance of the antenna or transmission lines. He should check for weep holes on microwave dishes, leaks on connectors or antenna tuning slugs, signs of overheating or warping on any connector and presence of weather proofing on connectors. The inspector should also take note of the presence or integrity of ice shields.

Verify the location of lighting conduits and coaxial cables on the tower, especially if future antenna installations are planned. The inspector should be able to update or correct any documentation you need on the actual tower installation.

Frequency of inspections

It is beneficial to have a tower inspection after every winter or spring to check for possible damage due to ice or thunderstorms. Another general inspection before winter for preventative purposes is also useful. However, station engineers can conduct most of the inspections on the ground on a bi-monthly basis. This can form part of the preventive maintenance schedule done on-site by station personnel. With the help of a checklist, the job will not be as hard as it seems.

When the inspection report arrives, it should serve as a point of action to rectify whatever deficiencies has been found. Be sure to make good use of this inspection report.

Rolin Lintag is an RF engineer in Little Rock, AR.

Broadcast Warehouse DSPX

By Doug Irwin

We are far beyond the time that we allowed DSP audio processors prove themselves. There is no doubt that the power available through DSP has been the best thing that ever happened to audio processing. Yet, for the most part, most of the DSP-based audio processors available up to this point have been beyond the economic reach of many stations in smaller markets. Broadcast Warehouse, an English company has introduced the DSPX, the first DSP-based audio processor designed and fabricated in the United Kingdom. It has most of the features of the more expensive entries to the field, yet it is more in line with smaller market budgets.

The unit itself occupies one rack unit of space, with a depth of 7.5". The analog inputs and outputs, along with the AES in and out all use XLR connectors. All processing adjustments are made on the front panel via a control knob and three soft-keys. There is a convenient headphone output located on the front panel as well. Navigation of the menu tree is possible via a front panel LCD display. The processing parameters are also available via computer control, either via a serial connection or an Ethernet connection. All the critical processing activity can be viewed at the same time by a quick study of the front-panel LED displays, which are the blue ones.

Performance at a glance

1RU DSP-based audio processor
Analog and digital inputs
Analog, digital and composite outputs
Front-panel LCD menu-tree
Dual audio control paths
19 factory presets
Communication via serial or Ethernet

The basic processing chain is straightforward and should be familiar to audio processing veterans. Adjustments to the processor are easily done because the control features are intuitive and will be familiar to anyone that has used an LCD display and menu tree combination.

The top of the menu tree consists of four adjustment menus: input, process, output and system. By rotating the knob to highlight the menu and then pressing the knob, you open that menu, allowing access to more specific functions. For example, the process menu allows access to the parameters of the wideband AGC, the low frequency enhancement, the multi-band AGC, the multi-band limiter and the virtual mixer. Escaping to the last step up the menu tree is accomplished with one of the soft keys.

The low frequency enhance menu controls the low-frequency processing in the DSPX. Low-frequency shelving (a 12dB/octave shelf with up to 12dB of boost) and a peaking bass amplifier are available, which is essentially a parametric EQ. There are four choices for the peak frequency, four Q settings and variable gain that can be changed in 1.5dB increments from 1.5dB to 6dB. Each of the four bands in the multi-band AGC section has the following adjustments: drive, attack speed, release speed, compression ratio, gating level and RTR level and speed. RTR simply means return to rest, which is the point that the AGC will seek when gated. Each of the four bands in the multi-band limiter section has the following adjustments: drive level, threshold, peak attack, peak decay, average attack, average decay and hold. My experience with the DSPX is that the multi-band limiter threshold adjustments are the most effective means by which distinctive changes in the sound of the unit can be made.

Getting to know it

One of the important features of the DSPX is its second peak-control path known as DR (for digital radio). This is the preferred output path to use in the event that the DSPX is used to drive a bit-rate-reduced audio codec. Instead of clipping a signal, the DR path uses look-ahead limiting, eliminating distortion products that waste bits in the output data stream. The first peak control path, called FM, uses conventional techniques and always feeds the stereo generator. The user chooses which peak control path is used to feed the analog outs and the AES out.

While testing the unit, I was informed that a new version of its software was available, and I downloaded it with a link supplied by the manufacturer. In the event that future software updates are made available, they can be uploaded in to the DSPX easily and rapidly via the front-panel RS-232 connector.

Sound testing

All potential users want to know how the DSPX sounds, so I set up a standard test just to judge it for myself. I took the composite output of the DSPX, ran it through a coaxial switch and out to a late-model analog exciter. I then sampled the RF output with a standard run-of-the-mill FM tuner, and took the output of that tuner to an amp, driving both speakers and headphones. The other input of the coaxial switch was the composite out of a famous, high-end audio processor. The music source was a classic-rock format from one of our stations in Seattle. Bar-graph metering on the exciter allowed me to match the composite levels exactly, thus affording me an apples vs. apples test.

I found that the DSPX is easy and quick to adjust, but I also found the best results were achieved when I started with one of the 19 factory presets. By doing some EQ tweaks, and moving the thresholds of the multiband limiters, I achieved a respectable and competitive sound with this unit. It was close, in practice, to the sound of a much more expensive unit. Its dual outputs are useful in this day and age of streaming audio and IBOC. If you are in the market for a DSP-based audio processor, this unit deserves your attention.

Irwin is director of engineering for Clear Channel Radio in Seattle.

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Editor's note: *Field Reports are an exclusive* Radio *magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio *magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* Radio *magazine.*

Omnia Audio Omnia-6fm

By Michael Rogers

In the spring of 2003, Union Broadcasting acquired KZPL-FM—The Planet—a 50kW station that serves the Kansas City metro. Prior to the acquisition, the radio station had been on the air for just a couple of months with program feeds originating from the Best Broadcasting Studios in Dallas via a T-1. When Ed Treese and I, the contract engineers for Union Broadcasting, walked into the transmitter site, we saw our first Omnia-6fm processor. As usual, the station's program director and operations manager wanted the sound of the station to be open and loud, so I started working on finding the station's signature sound.

Performance at a glance

- 96kHz, 24-bit sampling rate
- Output sampling rates of 32kHz to 96kHz, user-selectable
- Composite, analog and digital outputs available simultaneously
- Comprehensive stereo and bass enhancement controls
- Ethernet, dial-up and serial remote control options
- 3RU height
- Upgradeable to Omnia-6EX

It takes about five minutes to set this unit up and make it operational by using one of the many presets. Just plug it in, connect the input and output, select a preset and go. But if you have a working knowledge of processing audio, the 6fm will give you control beyond your wildest dreams. The good news is that this processor provides the control and performance of a Ferrari. The bad news is that if you are not used to driving a Ferrari, you can hit the wall.

The unit features 24-bit resolution and a 96kHz sample rate. After the input level was set, I looked into the settings for the first stage wideband AGC, the five-band crossover for the five-band AGC, the mixer circuit that combines the signals from the five-band AGC, the bass and stereo enhancement section, the six-band crossover for the limiter sections, six limiters, the final summing mixer and multiple clipper stages at the output. I can say with confidence that the unit provides control of the audio comparable to, if not greater than that of a recording studio. Some presets can even bypass the wide-band AGC and multi-band AGC stages for use with pure formats such as classical or traditional jazz.

The Omnia-6's AES/EBU audio inputs will work with sample rates from 32kHz to 96kHz. Connections are simple too, with XLR female and male connectors for analog and digital I/O and BNC connectors for composite outputs. The Omnia-6EX has parallel processing paths individually optimized for conventional FM audio and digital transmission chains.

I was asked whether different modes could be activated; for example two-band AGC instead of five. The lower priced Omnia processors, Omnia-3 and Omnia-5, can use two-band AGC, but Omnia-6 can't be throttled down, and frankly I can't imagine why anyone with an Omnia-6 wouldn't want to take full advantage of all five bands.

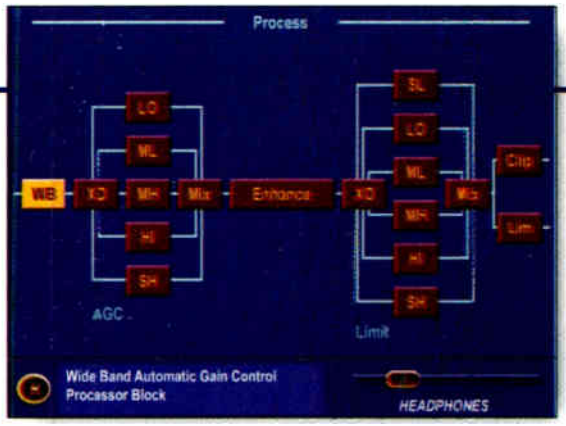
All of this control sounds pretty complicated, but it's actually easy once you get into the right mindset. I find it beneficial to think of the nine stages of the Omnia as a digital language. The trick is to think digitally in the first place, not think analog first and then translate to digital.

I also found that after about 30 minutes or so of maneuvering the thumb wheel, I could move anywhere within the unit in seconds. I can change the current setting, rename, save and engage that setting in as little as 20 seconds. The Omnia has two screens: the one on the left shows metering and the one on the right shows movement through the various stages with a Dorrough Loudness Meter at the top. Everything is clearly displayed at all times; the metering screen shows everything. It is hard to get lost in the menus or mess up any settings. The Omnia-6 also includes Ethernet remote control capability that makes off-site adjustments a breeze.

Other nice touches are daypart-programmable timed processing changes that let you switch presets on a schedule, and the ability to download new presets from the Omnia website that you can load, share with other Omnia-6 users or store for later use. This is a pretty easy process; the Omnia Remote software transfers downloaded presets into the unit with little effort. The system can store as many as 50 presets on a removable PCMCIA memory card.

There are a lot of features in this unit. One useful feature is the parallel processing structure for analog and digital FM transmission. The HD side passes the full 20kHz HD Radio bandwidth and uses look-ahead limiting to make sure the digital peaks are controlled properly. We don't plan to transmit IBOC in the immediate future, but when we do, this feature will make the change easy, because we won't have to change or upgrade our processing—the capability is right there, waiting.

Since we installed the Omnia, we have found that our listeners are tuning in for longer periods of time and they are even commenting on how much better we sound compared to other stations in our market.



The setup screen shows the unit's signal flow, which provides access to each section's individual parameters.

Omnia Audio

P	216-241-3343
F	216-241-4103
W	www.omniaaudio.com
E	info@omniaaudio.com

Rogers is a contract engineer in Kansas City.

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New Products

By Kari Taylor, associate editor

www.beradio.com

15kHz stereo POTS codec
Tieline America

G3 Imix: With this six-input digital remote codec/mixer, left and right audio channels can be phase locked over two telephone lines to deliver 15kHz stereo programming. Also available is the provision for a dual 15kHz mono transmission from a single POTS codec. This third-generation design incorporates an expansion slot that allows users to select from a range of new hardware modules to suit individual remote applications. The modules include GSM to land-line wireless, stereo/mono ISDN, stereo or dual-mono POTS plus new IFB and telephone talkback caller facilities.

888-211-6989; fax 317-913-9615
www.tieline.com; sales@tieline.com

Digital STL
Broadcast Electronics

Big Pipe: Big Pipe is a different kind of studio-transmitter link. With scalable, bidirectional capabilities, up to 45Mb/s, analog and digital audio, HD Radio data, Ethernet, serial data and telephony can be interchanged via a wireless or wireline path. This STL works for studio facility interconnects and other media transport needs.

217-224-9600; fax 217-224-9607
www.bdcast.com; bdcast@bdcast.com

Portable label printer
Kroy

K5100: The K5100 hand-held portable label and wire-marking printer replaces the K2500. New features of this printer include autosizing, faster print speeds, self-contained battery charger, quicker response time, downloadable fonts and symbols, added memory and a print resolution of 300 dpi.

216-426-5600; fax 216-426-5601
www.kroy.com

Upgrades and Updates

Digigram has released a new driver set v2.00g for its Mixart 8 range of multichannel sound cards, which includes the Mixart 8, Mixart 8 AES/EBU, and Mixart 8 CN. The driver set features an ASIO driver in addition to the existing .WAV and Digigram np drivers.
www.digigram.com

DG Systems has implemented a third pathway to deliver audio spots to radio stations. The system uses the Internet and is called DG Online. The additional pathway complements the two existing methods DG uses to deliver radio advertising: its dedicated telecommunications network, where a proprietary DG server receives and manages spots sent through a secure virtual private network, and by DG's compact disc overnight distribution service.
www.dgsystems.com

DK-Audio has released a remote sensing platform for its modular MSD600M family of audiometers. The platform features a 19" frame that allows the audio signal connections and the sensing modules to be separated from the user.
www.dk-audio.com

The Soundelux E49 large diaphragm condenser microphone, based on the original 1952 German IRT design, is now shipping. The Soundelux E49 is a remote variable pattern tube mic that uses Soundelux's KK47 large diaphragm capsule.
www.soundeluxmics.com

Omnia Audio has released Omnia-3fmt, a new version of the existing Omnia-3 processing platform, which provides three additional bands of AGC/compression to the three existing bands of limiting currently found in Omnia-3fm.
www.omniaaudio.com

Steinberg Media Technologies has released the latest version of Wave Lab audio editing and mastering application. Wave Lab 5 shipped to Steinberg resellers in April.
www.steinberg.net

The Symetrix Air Tools 6100 is now shipping. The unit is a 24-bit profanity delay that provides as much as 20 seconds of delay time.
www.symetrixaudio.com

TC Electronic has released a new software version for the Reverb 4000 and a Macintosh-compatible version of the TC Icon editor program used to control it. The version 1.10 update and Mac Icon editor are available as free downloads.
ww.tcelectronic.com

Audemat-Aztec is now shipping the AM Fieldstar, which features a calibrated AM receiver, an integrated GPS receiver and rotating, directional, calibrated antenna.
www.audemat-aztec.com ■

Flat-panel speakers
Carlsbro Electronics

Nlightn: This flat-panel speaker doesn't need a woofer, tweeter or crossover. Just a tiny magnet, a moving coil motor and a resin-infused paper membrane mounted on an aluminum panel. The conventional crossover is eliminated. The speaker uses a rigid panel, or membrane, which serves as a diaphragm. The diaphragm is actuated by the tiny vibrations of five moving-coil motors. The motors vibrate in microscopic motions, never exceeding 40 microns. Instead of moving in unison, the panel diaphragm, responds with a series of bending waves in chaotic patterns that cover the entire surface. It approximates the resonance patterns of the musical instruments producing the sound with its chaotic bending wave resonance.

+44 1623 753902; fax +44 1623 755436
www.nlightnspeakers.com; sales@carlsbro.com

DAW remote control
Advanced Digital Systems

Red Rover: The USB device features standard multitrack transport controls that interact with and control Adobe Audition's on-screen displays. In addition, the control unit provides unlimited access to 128 tracks of possible audio on Audition. This software controller works with any sound card and lets the user track and control any number of tracks.

800-888-5244; fax 562-926-0518
www.adstech.com; sales@adstech.com

Dynamics processors
Behringer

Pro XL series: All the processors in this series feature an Interactive Dynamic Enhancer, which compensates for the compression-induced loss of treble energy. The three models share the Interactive Ratio Control expander, which automatically adjusts the ratio setting for inaudible noise suppression. The Interactive Gain Control offers dual-stage peak-limiting circuitry that combines a clipper and a program limiter. The Autocom and the Composer have an all-new switchable voice adaptive de-esser. The VAD differentiates between male and female voices. Additions include LED displays to set the de-esser levels and a switchable enhancer.

877-672-0816; fax 425-673-7647
www.behringer.com; support@behringer.de

Portable micro-mixers
Soundcraft USA/BSS Audio

Compact 4 and Compact 10: These micro-mixers are suited for applications that require simple mix facilities in a compact size. Both mixers feature mono mic or line inputs, direct instrument inputs, stereo line inputs and equalized phono inputs. A complete monitor section provides a separate mix of external inputs or playback combined with the console mix, which is useful for remote broadcast setups requiring a mix-minus feed. The Compact 4 features two mono inputs and two stereo inputs, while the Compact 10 features four mono inputs and six stereo inputs. Additional features include three-band EQ on the inputs, phantom power, balanced and unbalanced record and playback connections, dual independent headphone outputs and monitor outputs.

818-920-3212; fax 818-920-3208
www.soundcraft.com; www.bss.co.uk
soundcraft-usa@harman.com bssaudiousa@harman.com

Two- and three-conductor mic cable
Heil Sound

Heil Wire: This is a specialized audio and control cable. The unit can also carry dc control lines from a push-to-talk circuit or a computer keying system. The key to this new wire is to reduce the capacitive coupling between these two signals and shield the sensitive audio lines from the outside RF environment to reduce interference that the transmitter may create. This product contains two 18-gauge audio leads residing in a silver-braided shield. Along the side of this shield is another pair of 18-gauge control wires that can carry the push-to-talk circuits and keep the dc components away from the ac audio signals. The outer jacket is a PVC jacket that was designed to fit into the cable clamp system of the eight-pin Foster plug. No extra fill grommets or heat shrink is necessary to make the Foster clamp work.

618-257-3000; fax 618-257-3001
www.heilsound.com; info@heilsound.com

$ 400

NEW! CircuitWerkes Telephone Solutions

The TelTap - Manual Telephone Coupler & Passive Tap Interface

The The TelTap is a versatile and inexpensive telephone coupler. Once connected to a standard RJ-11 plug, the you have a choice of seizing the phone line or just tapping the line. The TelTap can be used to either send or receive audio regardless of which mode is selected. A ring LED indicates the presence of an incoming call. The TelTap lists for just $89.00.

The Telco-6 - Ringer Relay

Calls come in, you get relay outputs. It's that simple. Accepts up to six independant telephone lines. Each incoming ring closes the associated relay. Each relay has two sets of form "c" contacts. Relays stay steady on during rings. All interface connections on screw terminals.

For complete information about all of our products, including downloadable tech manuals, brochures and pricing for all of our products, visit our website at www.ciricuitwerkes.com.

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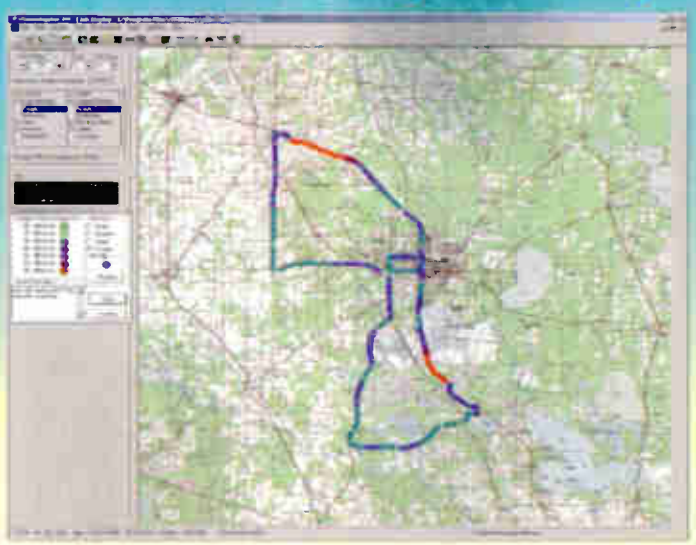

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Digital snake
Whirlwind

E Snake: Using a 48kHz sampling rate and a 24-bit word length, this audio transport device is not affected by interference and is not subject to ground loop problems. The snake's lightweight cabling network adds flexibility for routing the cable overhead, around obstacles or underground. Set up and tear down are faster and splits can be accomplished with standard Ethernet switches to connect multiple receivers. This router is a combination of an E Snake Frame and E Snake Control software for managing the system. Each ESF consists of a motherboard that can accept as many as four input and ouput cards. This modular design allows each ESF to transmit and receive as few as eight or as many as 32 channels of real-time audio.

800-733-9473; fax 716-865-8930
www.whirlwindusa.com; sales@whirlwindusa.com

Wall cabinet
Middle Atlantic Products

EWR series: This series of wall-mount cabinets feature the Tool-Free Quick-Mount system, which is a hinge pin system that allows the rack's center section to be mounted to the backpan on the wall without using tools. The center section can easily be mounted by one person by connecting the top and bottom pivoting corners to the backpan where the hinge pin is inserted and simply tightened by hand. Cable management capabilities featured on the wall cabinet include multiple electrical knockouts at the top and bottom of the backpan as well as UHF/VHF antenna knockouts. A larger laser knockout in the backpan permits a 10½" × 10½" pull-box sized opening for convenient cable passages. The EWR series is optimized for passive thermal management, featuring strategically positioned vents at the top and bottom of the center section to maximize passive convection of the enclosure.

973-839-1011; fax 973-839-1976
www.middleatlantic.com; sales@middleatlantic.com

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New York City

The first is the ***Broadcast IT Manager***, who is responsible for all computer based systems which include ENCO, Pro-Tools, Encoda (Automation), Pro-Bell & Trilogy (Audio Routers/Intercom), PACE (a CBS News Edit system), Metro Source and all desktop applications. This person is the manager of one full time assistant.

We also have the ***assistant position*** open, who will focus mostly on desktop and user support but also assist the manager on projects related to the above systems.

If interested please email resume to:
Conrad Trautmann, SVP Engineering • ctrautmann@westwoodone.com

Valencia, CA

In Valencia, CA (1 hour North of LA) we have an ***ENCO Systems Support position*** open. Enco Systems Support - assist in the maintenance of On-Air Enco systems automation, includes configuration, operation, and maintenance of our Enco DadPro32 system. Need to verify daily operations and troubleshoot reported problems.

If you are interested, please submit your resume to:
Larry Wilson, Westwood One, 25060 W Ave Stanford, Suite 100,
Valencia, CA 91355 Email address is lawilson@westwoodone.com

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Contributor Pro-file

Meet the professionals who write for *Radio*. This month: Tower Inspections, page 34.

Rolin Lintag
RF Engineer
Victory Television Network
Little Rock, AR

Lintag is a graduate of B.S. in Electronics and Communications Engineering (1984) from Mapua Institute of Technology in Manila, Philippines. He joined the Far East Broadcasting Company where he served as engineering director of the AM/FM/HF network for the last eight years of his 10-year stint until 1995. He coauthored the *Technical Standards for Radio* in the Philippines before joining the UHF TV network (Studio 23) of ABS-CBN, where he spearheaded the nationwide installation of 27 UHF-TV transmitter sites. He moved to the USA in 2001.

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Written by radio professionals
Written for radio professionals

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Advertiser Index

This index is a service to readers. Every effort is made to ensure accuracy, but Radio magazine cannot assume responsibility for errors or omissions.

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Sign Off

By Kari Taylor, associate editor

www.beradio.com

Do you remember?

In 1981 Applied Technology offered two audio processors with digital control capabilities.

The Maximod digital peak limiter used a digital processor for peak limiting control. It was designed to enhance the overall loudness of the sound, or to clean up the audio. The Discriminate Audio Processor III offered multiband leveling. Settings for the crossover, compression, attack and release were variable.

Radio magazine is looking for more information regarding these products. If you have additional information, please send it to ktaylor@primediabusiness.com. Note: These products are not connected to Dorrough Electronics. We already tried that.

That was then

In this 1947 photo, Jack Mullin (left) shows Murdo MacKenzie, Bing Crosby's technical producer, how to edit tape using a pair of scissors. The equipment shown in the photo is the Ampex model 200 prototype.

In 1945, Mullin had sent two German AEG Magnetophons and 50 reels of BASF/Agfa tape home to San Francisco, where he modified them with ac bias as well as made other improvements. Mullin's Magnetophons later inspired that first Ampex machine.

It all began when Mullin was stationed in England during WWII. Then-Lieutenant Mullin was assigned to help improve the performance of Allied radar and other electronics, working mainly on solving a series of radio-frequency interference problems.

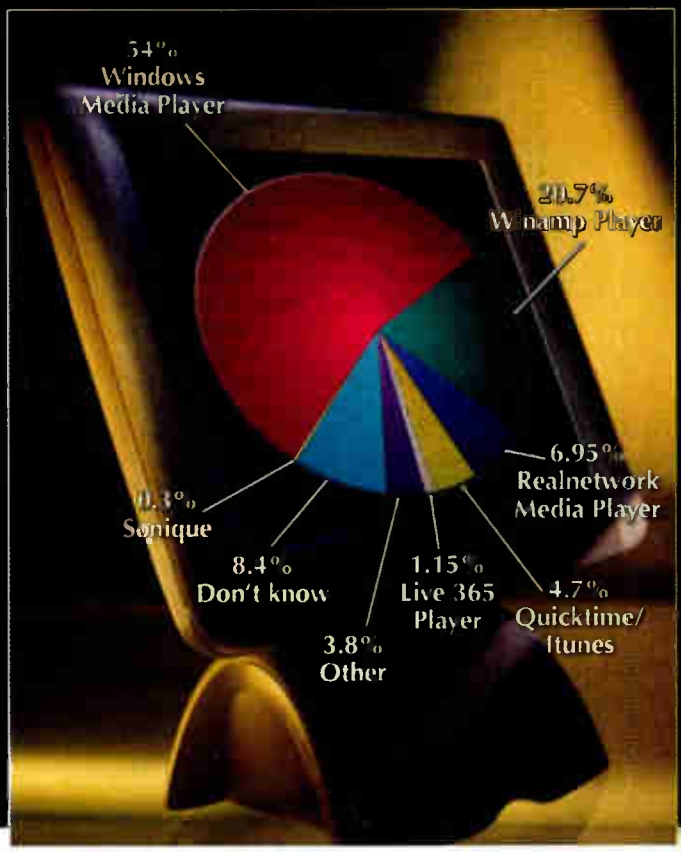
In January of 1946, the electrical engineer entered into a business partnership with filmmaker W. A. (Bill) Palmer, a pioneer of 16 mm sound-film, who provided financial and mechanical engineering assistance for their project: to greatly improve Magnetophon performance.

Bing Crosby's technical producer, Murdo MacKenzie, heard about the Mullin-Palmer machines from two of Bing's agents and arranged for the singer, his manager-brother Everett Crosby, and the rest of Bing's organization to hear the recording breakthrough.

Source: http://www.tvhandbook.com/History/History_mullin.htm

Sample and Hold

The technology behind online consumer listening



Source: RRadio Network "Survey 21" - 2,000 respondents, Jan. 2004.

Wheatstone Corporation

D-8000

Digital Radio Console

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sales@wheatstone.com
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GENERATION-8: The On-Air Control Surface for High-Traffic Studios

Quality is Easy to Identify with stainless steel construction, easy servicing, and a clean yet compact layout.

The POWER of a Network Surface with the FEEL of a Traditional Console!

ONE CAT-5 WIRE conveys all the control from this surface to Wheatstone's Bridge System. You can bring any system source (inputs or mixes) to any console fader or monitor pot (source visibility software controlled). You can set destinations for mixes, aux sends and MXMs to anywhere in your facility. For example, you could allow (or software disallow) your news console to go to your on-air chain, or feed any mix desired to a talent or remote position.

THIS MAJOR MARKET CONSOLE can handle all the call-ins and remotes you'll encounter. Four faders dedicated specifically to phone segments provide errorfree interface to four callers or remotes, each with independent caller and fader feeds, user selectable talkback communication and adjacent channel linking. A dedicated LCD display screen keeps the operator informed and in control.

YOU CAN STORE AND NAME switch and fader settings for each operator's task and recall them by simply spinning an encoder and hitting a TAKE button. And like our larger G-9, the G-8 has 12 user programmable switches for salvos and intercoms plus additional programmable TALK buttons for IFB functions. And with full color LCD display screens the operator will know for certain that his signal is clean, his sources correct, and his preset signal is ready and waiting. *The G-8 has the layout and features to let your operators work fast and accurately!*

Wheatstone the digital audio leaders

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