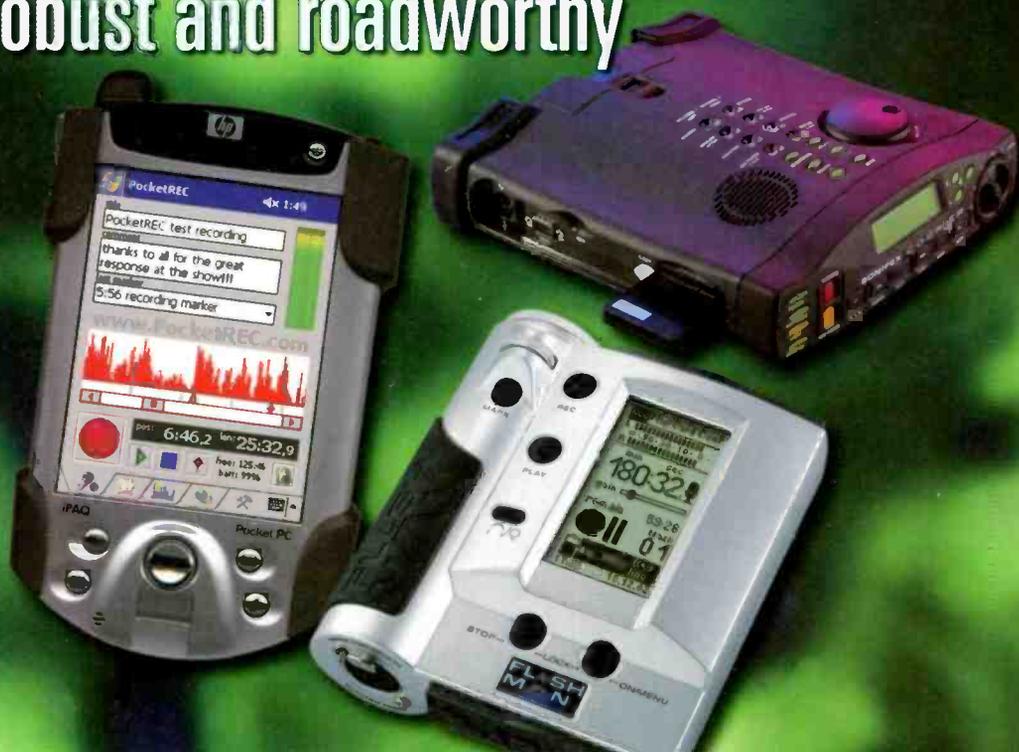


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## Scott Studios

### RF Engineering

Useful feedback  
Page 10

### FCC Update

Update of RF exposure  
Page 14

### Facility Showcase



A new home for the Big  
One and its sisters  
Page 28

### Field Report

Audemat-Aztec FMX480  
Page 36

### New Products



New gadgets for a new day  
Page 38

### Sign Off



The dawn of digital  
recording  
Page 50



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## Features

### 16 Trends in Technology: Portable Recorders

by *Chriss Scherer*

Big sound in a small package

### 28 Facility Showcase: Clear Channel Cincinnati

by *Alan Singer*

Several legendary call signs get a new home in the Queen City.



## Columns

### Viewpoint 08

by *Chriss Scherer*

Watch out for big brother.

### RF Engineering 10

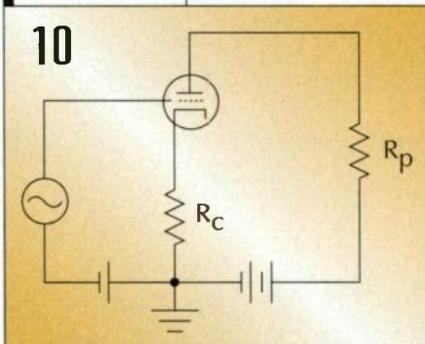
by *John Battison*

Useful feedback

### FCC Update 14

by *Harry C. Martin*

Revising RF radiation limits



## Departments

### Online 06

at [www.beradio.com](http://www.beradio.com)

### Field Report: Audemat FMX480 36

by *Roswell Clark*

### New Products 38

by *Kari Taylor*

### Classifieds 48

### Contributor Pro-File 49

Meet John Buffaloe

### Sign Off 50

by *Kari Taylor*

An early effort at a digital cassette recorder



36



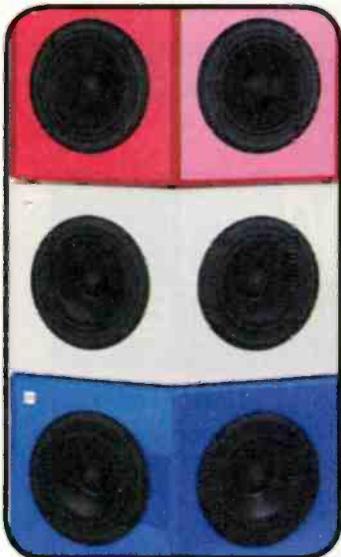
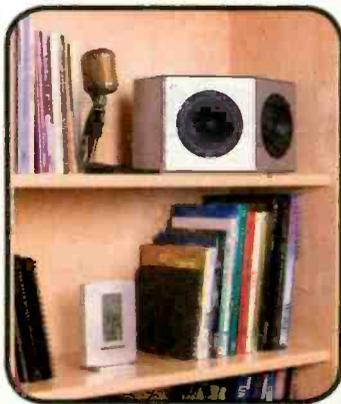
38



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## Currents Online

Highlights of news items from the past month

### NRSC Completes Gen 3 Eval of IBOC

The final step in the evaluation process examined the HDC audio codec.

### Senate Committee Passes LPFM Bill

The bill that could remove the third-adjacent channel restrictions is on its way to the full Senate.

### Logitek Ships 600<sup>th</sup> Audio Engine

Logitek has also shipped more than 900 console control surfaces.

### Clear Channel Accelerates IBOC Rollout

Kevin Lockhart has been appointed as the senior VP of technology development to oversee the rollout.

### IEEE Starts BPL Standard

IEEE P1675 will create the Standard for Broadband over Power Line Hardware.

## Site Features

### Engineer's Notebook

This handy collection of tips, tricks and formulas can help you resolve lots of problems. Just added: A handy T- and H-pad calculator.

### Portable Recorder Comparison

Access the August Trends in Technology article online and download a PDF with more comparative data on portable recorders.



### IBOC Update

This twice-monthly e-mail newsletter keeps you up to date with the latest HD Radio news.

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## Shades of big brother

In late June, the FCC released a Notice of Proposed Rulemaking that sought to require broadcasters to retain recordings of on-air programs. Specifically, the FCC is interested in verifying that stations are not broadcasting indecent material outside the safe harbor hours from 6 a.m. to 10 p.m.

With the passionate interest in eliminating material that could be considered indecent from the airwaves, this action adds yet another item to the agenda. When the NPRM was released, FCC Commissioner Michael Copps issued a separate statement, which makes it rather obvious that he is the one pushing this item through.

From the FCC's point of view, there is no additional work for the other commissioners. Barring any compelling opposition, what will probably happen is that the rule will be added. For the commissioners, it's easier to let it go through than fight it. And like so many other issues that relate to moral opinion, it will only make the opposing commissioner look bad to a segment of the public.

In his statement, Copps mentions that under the current rules, the person filing an indecency complaint is asked to also supply a recording of the event or it will be dismissed. According to Copps, this procedure "ignores that it is the Commission's responsibility to investigate complaints that the law has been violated, not the citizen's responsibility to prove the violations."

In every legal proceeding, it is up to the accuser to provide the evidence to prove the guilt. If mandatory logging is added to the rules it will provide the means for a licensee to provide the material that may incriminate itself. In other words, prove your innocence, but if you can't provide the recording, then you are guilty of violating the rules. It seems that there would be no way for the licensee to win.

As it is, even if a recording exists, the content is still subject to interpretation as to

whether or not it is indecent. So while a licensee may protect itself by providing a recording that it believes exonerates any wrong doing, the interpretation of the material may be to the contrary.

Depending on the potential fines, a licensee may pick and choose which recordings to provide and which to hide to better his chances of receiving a lesser fine.

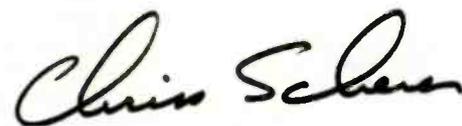
Indecency has no place on the public airwaves. I think anyone will agree with that. Licensees should take responsibility for their programming. But as I said, there is no clear-cut definition of indecency.

With all this said, I should note that broadcast logging is a common practice in other countries. Does required logging violate free speech rights? That is a major point that will be debated, and the FCC specifically asked about this matter. Along this line, I recently read about a 1970 action by the U.S. Court of Appeals for the District of Columbia that declared unconstitutional a law requiring the Public Broadcasting Service to retain tapes of controversial programming. This new NPRM sounds similar in scope, and even if the FCC approves it, the courts may overturn the decision.

I have heard complaints from stations that required logging will present a financial hardship on some stations. Creating some kind of logging system is not difficult and does not need to be overly expensive. With a little creative thinking, a system can be created on a minimal budget.

For a station, logging also has its benefits. The recording can be used to verify that something was played on the air. Smarter logging systems can also be used as skimmers to aid in announcer reviews.

In the end, it doesn't bother me if required logging is instituted. A licensee can take advantage of a logging system. A responsible broadcaster won't have anything to worry about anyway. However, easy public access to required logs could too easily be abused, in which case the requirement would become a hardship for stations. This could spiral into a never-ending set of rules that dictate a relatively minor concern in the overall goal of responsible broadcasting.



Chris Scherer, editor  
cscherer@primediabusiness.com



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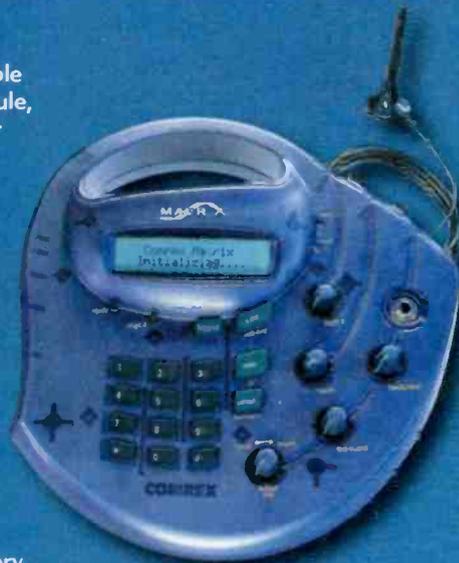
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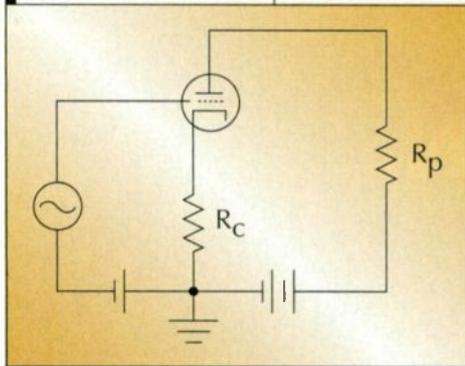


## Electronic feedback

By John Battison, P.E., technical editor, RF

**M**ost of the radio transmitters in use today depend on feedback, negative or positive, for their successful operation. Positive feedback can be found in the RF side of transmitters and negative feedback in the audio portion. However, as equipment designers become more esoteric in their circuitry we sometimes find feedback voltages of unexpected sign in unusual places and doing unusual things.

Feedback is simply described as the transfer of controlled amounts of energy or data, from the output of a stage back into its input circuit so that the output and performance of the device are affected by the feedback signals. These signals may be in phase or out of phase, i.e. positive or negative, depending on the purpose of the feedback system.



An example of a basic inverse feedback circuit.

### The good and the bad

If the feedback signal is in phase it is known as regenerative because it adds to the signal passing through the stage. Unless properly controlled, this can lead to instability and oscillation, and is normally undesirable except in particular cases such as stages that are required to oscillate and produce RF or AF voltages.

RF amplifiers are particularly susceptible to undesired feedback through internal input and output capacitances in the electron device. This is counteracted by a neutralizing circuit, which generally requires readjustment or re-neutralizing, when a tube is changed.

A second cause of undesired feedback is magnetic (mutual coupling) feedback between the input and output circuits in an amplifier. This occurs when plate voltages that are 180° out of phase get into the grid or input circuit.

If the stage amplification factor is greater than the attenuation of the out-of-phase signal, the stage will oscillate at a frequency

other than the desired operating frequency. This will be unstable and lower than the tuned tank-circuit frequency. This kind of undesired feedback is eliminated in the circuit design by careful shielding and inductance layout.

Inverse feedback, often called degenerative, has the opposite effect and is useful in transmitter design. In this case, the out-of-phase voltage tends to oppose or reduce the desired signal. However, not only is the desired signal reduced, but undesired voltages such as noise and hum are reduced. A secondary benefit is often an improvement in the frequency response of the stage because low levels of feedback at certain frequencies result in low gain reduction. This increases basic gain at these frequencies and tends to improve the overall response. At higher audio frequencies up to 30dB of feedback can be used. As audio frequencies increase the output and gain tend to decrease. Sometimes a sudden, quick rotation in the phase shift occurs due to resonances in transformers and stray capacities. This may result in phase lag, which can slow the feedback signal and cause oscillation at supersonic frequency, which may be as high as 50kHz. This, of course, can result in distortion, overload and possible damage to the transmitter caused by the spurious signal.

As would be expected the stage gain is reduced. This means that the input voltage has to be increased to compensate for the stage gain loss. The degree of gain reduction is noted in decibels. For instance, raising the input by 14dB to maintain the same output indicates the presence of 14dB of inverse feedback.

### Feedback in transmitters

The method and component values required to produce this desired feedback are determined by the transmitter design engineer. If the component values of the feedback ladder are changed by the user there will be a discrepancy from the manufacturer's specifications. This important point can be easily overlooked. The consequence may be complaints from the program director or general manager that the signal is noisy and has hum. Sometimes component values change with continued operation and slow deterioration in signal quality is not noticed. Check a few component values and run a resistance and capacitor check at maintenance time to ensure that no substantial changes have occurred over the passage of time.

The application of inverse feedback in a transmitter design offers several advantages to the circuit engineer. Apart from minimizing distortion it can also be used to minimize hum. Power tube filaments can produce a surprising amount of hum if proper precautions are not taken, especially in old transmitters.

The heavy current flow in the filament of a large power tube produces a strong magnetic field, which can slightly

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deflect the electron path in the tube. Because this magnetic field varies at the power line frequency, the electron flow is modulated at this frequency and an ac hum develops in the carrier. Many years ago, before inverse feedback was developed, it was standard practice to use a dc source for the filaments to eliminate PA hum.

Fortunately, inverse feedback can be applied to most of the transmitters currently in use today. This includes all transmitters in which the modulated RF output envelope is strictly in phase with the modulating signal at the point of feedback injection. It is essential that the phase of the feedback signal agree with the phase of the audio signal, otherwise the benefits of inverse feedback will not only be lost but audio quality will be affected.

To produce the necessary in-phase copy of the modulating audio signal a small sample of the modulated RF output is rectified and an audio voltage replicating the RF envelope is produced. This is applied at the input of the modulator stage.

The major characteristic required for successful inverse feedback application is a modulation envelope, which closely replicates the phase of the audio signal at the point of feedback injection. A problem can arise in plate-modulated transmitters because the inevitable phase shift that occurs in modulation and driver transformers makes it difficult to apply inverse feedback over the whole stage. This excessive phase shift occurs at higher audio frequencies.

Because of this excessive phase shift caused by the various transformers and other iron-cored devices, feedback is normally only used in the modulator stage and excluding the modulation transformer. This will correct distortion and hum produced in this stage, but not any produced in the RF stage.

Inverse feedback can be applied in most transmitters in use today, provided that audio phase remains constant over the whole audio frequency range in use. It can be used with the Doherty system, grid modulation and class B linear amplifiers and circuits where phase relationships can be precisely maintained so that gain and noise reduction benefits will result.

Feedback is not a panacea that will correct an improperly tuned or misadjusted transmitter. It will not cure distortion resulting from negative overmodulation. Instead, it merely causes heavier negative overmodulation.

E-mail Battison at [batcom@bright.net](mailto:batcom@bright.net).



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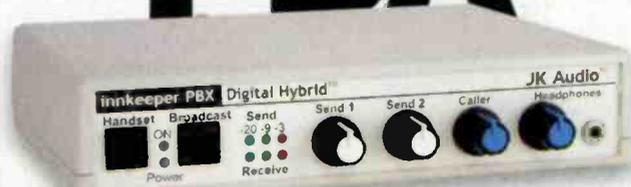
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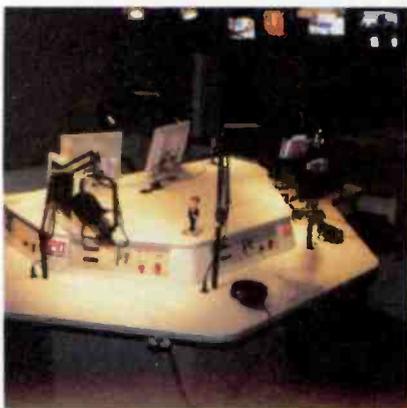
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## FCC revising RF radiation rules

By Harry Martin

**T**he FCC expects to issue an order this fall revising some of the radio frequency (RF) radiation rules applicable to broadcast stations. In a proceeding that commenced last summer, the FCC is considering modifications to some of its RF evaluation and measurement procedures, addition of more specific definitions regarding "occupational" exposure, and elimination of inconsistencies in the RF radiation rules. The proposed rule will include revised procedures for determining whether a station is excluded from the requirement to evaluate RF radiation, a revised definition of the people to whom occupational/controlled exposure limits apply, and revised procedures for use of spatial averaging to show compliance with exposure limits.

- Who will be subject to routine RF evaluation? All broadcast stations currently are required to perform routine RF evaluations at certain times. The only proposed change would affect LPFM stations (because they operate at a maximum power of 100W). The FCC is considering excluding from the routine evaluation requirement those LPFM stations that have a separation distance of at least 3 meters between any portion of the radiating structure of the transmitting antenna and any area accessible to the general public or workers not meeting the criteria for the higher occupational/controlled RF exposure limits.

For experimental broadcast stations, FM translators and FM boosters, the rules currently require routine RF evaluations if the power is greater than 100W. The FCC has proposed to require, in addition, routine RF evaluations for these stations that operate with 100W or less power if the distance separation is less than 3 meters. In this connection the FCC has asked whether it should adopt different distance separations for different frequencies for these stations.

- Definition For Occupational/Controlled Exposure Limits. The RF radiation rules contain two sets of exposure limits. Higher occupational/controlled exposure limits apply to workers who are fully aware of the potential for exposure and can exercise

control over their exposure. These higher limits also apply to transient individuals (i.e., those who pass through a controlled area subject to the higher limits) if they are made aware of the potential for exposure.

For individuals meeting the occupational/controlled criteria, the FCC proposes to define "fully aware" as having received written and verbal information concerning the potential for RF exposure and training regarding appropriate work practices for controlling or mitigating exposure. Additionally, the term "exercise control" would be defined as the ability to reduce or avoid exposure by administrative or engineering work practices (as personal protective equipment or time-averaging exposure).

- Spatial-averaging. Spatial-averaging is an RF radiation measurement technique used to determine the amount of RF exposure at a particular spot by averaging the electric and magnetic fields (squared) over an area equivalent to the area normally occupied by a standing human body. The FCC believes that there has been confusion about when the use of spatial-averaging is appropriate. It expressed concerns about situations where a localized (spatial peak) field intensity exceeds the exposure limits near an antenna (which is potentially accessible to workers or the public) despite the fact that the spatially averaged measurement over the area indicates compliance with exposure limits. The concern is that localized hot spots could lead to exposure in the body of a nearby person that exceeds the partial-body limits while not exceeding the whole-body limit. The FCC is seeking comments on how to ensure compliance in such situations and, in particular, when reliance on spatial-averaging is appropriate. Comments filed in the rulemaking suggested that spatial peak measurements alone may be sufficient to show compliance with exposure limits. The FCC is also seeking comments on procedures and techniques for whole-body spatial averaging, including the positioning of the observer relative to the antenna.

*Martin is president of the Federal Communications Bar Association and a member of Fletcher, Heald & Hildreth, Arlington, VA. E-mail martin@fhhlaw.com.*

### **Dateline:**

Aug. 19 is the deadline for filing 2004 annual regulatory fees. On Oct. 1 radio stations in Iowa and Missouri must file their renewal applications and ownership reports with the FCC and place their annual EEO public file reports in their public files and post them on their websites. Also on Oct. 1, radio stations in Colorado, Minnesota, Montana, North Dakota and South Dakota must begin their renewal pre-filing announcements.

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By Chriss Scherer, editor

# Portable Perfection

## In pursuit of practical performers

**R**ecording audio outside the studio presents several challenges to the radio station. The ability to make a high-quality recording is not so difficult, but finding the right device to handle the task requires attention to several factors to be sure that the correct choice is made. There is a broad range of portable choices to capture recorded sound. Whether your need is an interview recorder or a multi-track concert system, there are plenty of options to consider.

One of the first decisions to make will likely be determined by the intended use. In general, portable recorders can be grouped into two broad classes: hand-held and portable deck. Both are compact and easy to carry, and the physical size difference usually carries increased capabilities.

The hand-held systems are ideal for one-on-one short interviews or in places where a recorder can be placed on a podium during a press conference. Their small size allows them to be placed in a pocket or travel bag quite easily. A built-in or plug-in mic makes it an all-in-one unit without the need for extra cables.

With a slight increase in size, the portable decks usually offer greater battery capacity and might provide a second media slot, which is ideal for built-in backup or long sessions. Likewise, enhanced controls and indicators and a greater number of connection possibilities may be included.

One constraint of a smaller package is the reduced area to house connectors. The XLR has proven itself as a reliable and robust audio connector. Except for pulling the audio cable out of the connection,

## Resource Guide

A comparison of some of the available portable recorders

The Resource Guide is a partial list to help you compare various models. A more detailed list is available by accessing this article online at [beradio.com](http://beradio.com).

Manufacturer/ Model	Media	Media Capacity	Media Slots	Stereo/ Mono	Size inches, wdxhd	Weight lbs. (w/o batteries)	Inputs	Outputs	Power	Extras
Core Sound • <a href="http://www.core-sound.com">www.core-sound.com</a> PDAudio-CF	PDA recorder hardware	depends on hardware	*	depends on software	*	*	3.5mm S/PDIF, AES-3	*	*	
Denon • <a href="http://www.usa.denon.com">www.usa.denon.com</a> DN-F20R	Compact Flash	2GB	2	both	8.2x1.7x6.3	2	XLR mic, RCA line	stereo RC line	6 AA	monitor speaker
Digigram • <a href="http://www.digigram.com">www.digigram.com</a> RCX220	PCMCIA	any	1	both	7.5x3.25x1	1	DIN mic or balanced line		5 AA	USB, Xtrack LE editor
Fostex • <a href="http://www.fostexdvd.net">www.fostexdvd.net</a> FR-2	PCMCIA	any	1	both	9.8x3x8.6	3.3	XLR mic, AES-3, S/PDIF	stereo RCA line, AES-3, S/PDIF	8 AA	monitor speaker, USB
PD-6	DVD-RAM, internal HD	1.46BG (DVD), 40GB (HD)	1	up to six tracks	13x4.3x9.5	7.7	6 mic/line XLR, DB25 digital	6 line XLR, DB25 digital	NP-1	six-ch. mixer, USB, Firewire
HHB • <a href="http://www.hhbusa.com">www.hhbusa.com</a> Portadrive PDR2000	hard drive	40GB	1	up to eight tracks	13.1x4.2x8.8	11.6	6 mic/line XLR, AES-3, S/PDIF	dual stereo XLR line, AES-3, S/PDIF	NP-1	monitor speaker, record buffer, USB
Portadisc MDP500	MiniDisc	N/A	1	stereo	10x2.2x7.1	4	2 mic/line XLR, S/PDIF	stereo RCA line, S/PDIF	8 AA	monitor speaker, record buffer USB

\* - parameter depends on hardware used

table continued on p. 20

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- Multipoint intercommunication and easy multi-studio management capabilities.
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# Portable Perfection

which is possible on any audio connector, the XLR is almost indestructible. It also provides a built-in connector lock to keep it in place. Its drawback is that it is comparatively large. Smaller audio connectors, such as 3.5mm phone-style connectors, are convenient, but are prone to breaking or being pulled from their jack. Newer designs are incorporating locking mechanisms to keep them in place.

The decision between a hand-held and a deck may be determined by the available features more so than the form factor. Smaller housings may mean smaller



courtesy of Mayjah

**Removable media can be transferred to a PC for file download and editing.**

buttons and operating indicators. When considering any recorder, look at the transport controls and how they are laid out. For some, a valuable feature is the ability to lock the controls while it is in use to prevent unintentionally stopping the recorder or changing settings.

## Mixed media

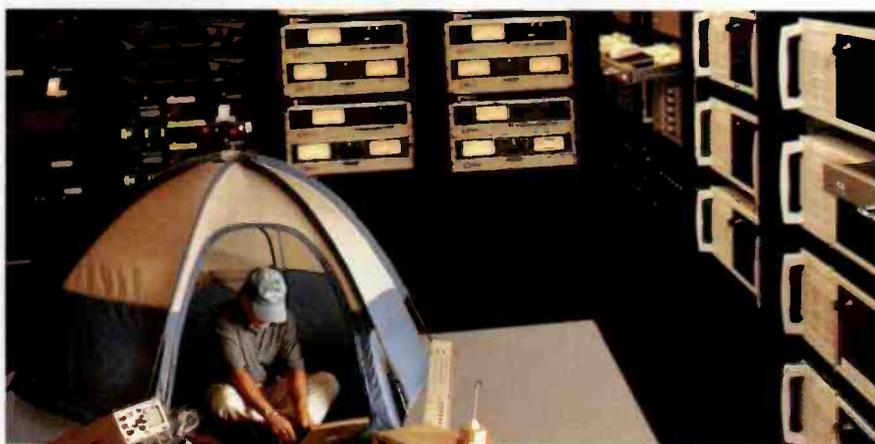
One important consideration is the recording media. Mechanical media, such as cassette, DAT, Minidisc and hard drives, are all established and proven formats. More recently, solid-state media have become popular, largely because of their use in consumer electronics.

Solid-state media have no moving parts and have long life spans. Because of the consumer demand, the available storage capacity continues to rise as the price falls. Mechanical media also provide long storage capacities, but will see a finite life. Also, mechanical media tend to cost less than the equivalent capacity of solid-state media.

Media availability should also be considered. Most media is available through traditional dealers or online, but when a user is in the field, the ability to buy additional media on short notice is a consideration.

Compact Flash cards, which are the most popular solid-state media used in portable recorders, are available at almost any consumer outlet with any electronic products. The same is true of cassette and CD/DVD recordable media. PCMCIA flash media is not as common, but most devices that use this media will accept a PCMCIA adapter for Compact Flash cards. PCMCIA hard drives are available at computer and bigger electronics stores. Minidisc can be found, but not usually in any great quantity. DAT is almost impossible to find anywhere but in a music (as in musical instrument) store or boutique electronics store.

The type of media also dictates what can be done with the recording once it is completed. The solid-state media recorders



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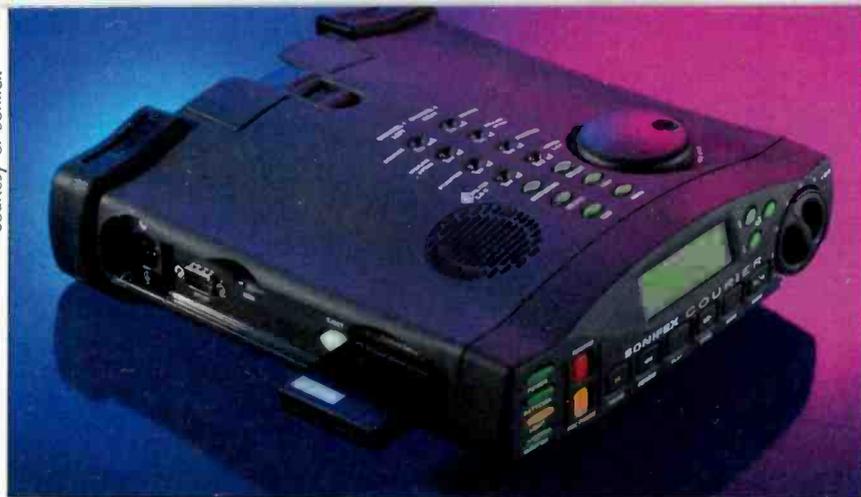
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Easy-to-access, clearly labeled transport controls ease operation.

typically store the audio as data files. If the recorder has a USB or other data connection, it can connect to the PC and act like an external drive. Without the data port, the media itself can be transferred to a media reader and the files can be retrieved.

Reading and transferring files takes less time than copying the audio in real-time. While DAT and Minidisc media can be transferred to other machines, retrieving the audio file requires a real-time transfer. In DAT's infancy, there were efforts to use computer DAT drives to read the audio data, but data DATs did not see wide use, and the copying schemes were not reliable.

**More in store**

The basic function of a recorder is to record and playback audio. With digital recorders, the file format may be a consideration, especially if the audio will pass through additional data-reduction coding before it is put on the air. Ideally, a linear file format would be used, but at the expense of storage capacity.

A recorder's extra features may suit a particular need. Stereo recording, additional inputs, selectable mic or line inputs or the ability to change encoding parameters are valid considerations.

On-board editing may be useful, particularly for a field reporter filing a complete story. Most on-board editing is limited to basic cut-and-paste functions, but this is effective at re-ordering elements and adding interstitial material. The on-board editing can save the user the time of transferring the audio to an audio editor to complete the element.

Some recorders provide a means to transfer audio via a telephone connection. Marantz and Nagra offer units that provide POTS connectivity. Sonifex, Orban, Nagra and Maycom have units with ISDN connectivity.

While Compact Flash and other solid-

*continued on p. 22*



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# Portable Perfection

Manufacturer/ Model	Media	Media Capacity	Media Slots	Stereo/ Mono	Size inches, w×h×d	Weight lbs. (w/o batteries)	Inputs	Outputs	Power	Extras
Marantz • www.d-mpro.com PMD670	Compact Flash	2GB	1	stereo	10.4x2x7.3	2.87	XLR mic, stereo RCA, S/PDIF	stereo RCA, S/PDIF	8 AA	record buffer, monitor speaker, edit s/w, USB
CR300	CD-R, CD-RW	700MB	2	stereo	11x4x9	7	2 mic/line XLR & 1/4", S/PDIF, RCA line	RCA S/PDIF, dual stereo RCA	external battery	internal mic, monitor speaker,
PMD221	Cassette	any	1	mono	9x2x6.5	2.9	1/4" mic, 1/8" mic, RCA line	RCA line	3 D	monitor speaker, mic, 3 heads
PMD222	Cassette	any	1	mono	9x2x6.5	2.9	XLR mic, 1/8" mic, RCA line	RCA line	3 D	monitor speaker, mic, 3 heads, telco
PMD101	Cassette	any	1	mono	9x2x6.5	2.9	1/8" mic, RCA line	RCA line	3 D	monitor speaker, mic, 2 heads
PMD201	Cassette	any	1	mono	9x2x6.5	2.9	1/8" mic, RCA line	RCA line	3 D	monitor speaker, mic, 2 heads

It always makes sense to have a "Plan B"

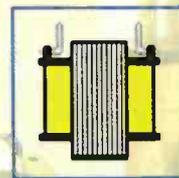
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Manufacturer/ Model	Media	Media Capacity	Media Slots	Stereo/ Mono	Size inches, w×h×d	Weight lbs. (w/o batteries)	Inputs	Outputs	Power	Extras
Mayah • www.mayah.com Flashman	Compact Flash	256MB	1	both	5×2.1×5.8	1.3	XLR mic, 3.5mm mic 3.5mm S/PDIF	3.5mm line, 3.5mm S/PDIF	4 AA	
Maycom • www.maycom.nl Easycorder	internal solid-state, PCMCIA slot	any PCMCIA	1	both	7.5×2.4×9.5	5.3 w/ batteries	2 mic/line XLR, cinch S/PDIF	2 XLR line, AES-3, S/PDIFcinch	8 C	monitor speaker, editing, ISDN
Handheld II	Compact Flash	512MB	1	both	7×2.5×1.2	0.66 w/ batteries	2 mic/line	2 unbalanced line	4 AAA	monitor speaker, mic, docking station
Nagra • www.nagraaudio.com ARES-P	PCMCIA	any	1	both	7.5×3.25×1	1	mic, line		5 AA	
ARES-PII	PCMCIA	any	1	both	7.5×3.25×1	1	mic, line		5 AA	monitor speaker, USB
ARES-C	PCMCIA	any	1	both	11.4×5.6×3.6	6.4 w/ batteries	2 XLR mic, DIN-15 line	AES-3 XLR	4 D	POTS, ISDN, editor
ARES-BB	PCMCIA	any	1	both	6.3×6.6×2.2	2	2 XLR mic		6 AA	USB

table continued on p. 24

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# Portable Perfection

state media are becoming more popular and offering greater storage capacities, keep in mind that the recorder may not be able to recognize the extended storage, depending on how the unit accesses the storage. The latest mega-memory card may not work. The manufacturer should be able to provide information on this limitation if one exists.

Whatever features are chosen, be sure that the intended user can easily understand the controls. The perfect feature set is useless if the user can't arm



courtesy of Foster

In addition to audio connections, USB, time code and other connectivity increase flexibility.

the machine and record. Also, the additional features must also be easy to use and understand.

The final consideration is the robustness of the unit itself. The recorder will be bumped and banged quite often, and probably dropped at least once.

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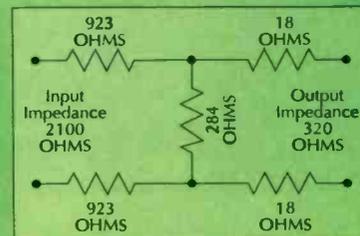
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## Tech tip

When a stereo recorder is used in an interview, the mono audio is usually fed to both channels. With tape, this provides some backup in case one side of the tape is damaged. With flash media, it merely doubles the size of the recording.

If the interview will be edited in a way that the interviewer and interviewee will be separated in the final production, it may be advantageous to feed the two channels separately, with the host on one channel and the guest on the other. Some audio leakage will occur between tracks, but it will provide a cleaner sound of each voice.

If the interview will be left intact, the second audio channel can be used for a safety copy of the interview. Feed the mono audio to both tracks, but reduce the level of one input by 15dB to compensate for a loud response, laughter or other unexpected audio burst.



Recorders with separate level controls for each channel can be set to accommodate this setup. For units with fixed input balances, a Y adapter with a pad in one output can be made. The pad can be installed inside an XLR shell.

The figure above shows a 15dB pad that can be used to build the adapter. The input impedance of this pad is about 2.1kΩ. The output impedance is 320Ω. You may need to adjust these values to account for the output impedance of your mic and the input impedance of your recorder.

More information on designing and building pads can be found in the Engineer's Notebook at beradio.com. ■

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**Remora-4:** four faders with controls for input assignment, monitors, and console functions

**Remora-10 (shown):** addition of six-fader module brings additional mixing capability with another stereo LED meter

**Remora-16:** incorporates Remora-4 base unit with two 6-fader modules

**Remora-22:** incorporates Remora-4 base unit with three 6-fader modules

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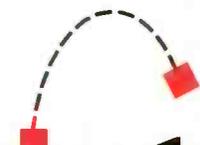
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# Logitek

Console Router Systems

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# Portable Perfection

Manufacturer/ Model	Media	Media Capacity	Media Slots	Stereo/ Mono	Size inches, w x h x d	Weight lbs. w/o batteries	Inputs	Outputs	Power	Extras
Orban • www.orban.com Opticodec	PCMCIA 7000	16MB to 80MB	1	both	6x9.5x2.375	3.2 w/ batteries	2 XLR mic/line	2 XLR mic/line	7.2Vdc LI-ion	ISDN, editor
Pocketrec • www.pocketrec.com Pocketrec	PDA recorder software	depends on hardware	*	mono	*	*	*	*	*	
Sonifex • www.sonifex.co.uk Courier	PCMCIA	any	1	both	9.5x3.1x10.25	3.3 w/ batteries	2 mic/line XLR w/ phantom	2 line XLR, AES-3 XLR	camcorder battery, 6 AA	monitor speaker, POTS, ISDN
Sony • www.sony.com/professional PCM-M1	DAT	120 mins	1	stereo	3.15x4.6x1.15	0.64	3.5mm TRS mic/line	7-pin digital	2 AA	
Sound Devices • www.sounddevices.com 722	internal HD, PCMCIA	20GB HD	1	both	1.65x7.58x4.41	2.2	XLR mic/line, TA3 line, AES-3, AES3-ID	AES-3ID BNC	onboard battery,	record buffer Firewire
	744T	internal HD, PCMCIA	40GB HD	1	1, 2 or 4 channels	1.65x7.58x4.41	2.3	XLR mic/line, AES-3, AES3-ID	2 AES-3ID BNC	onboard battery
Tascam • www.tascam.com DA-P1	DAT	120mins	1	stereo	10.2x2.125x7.375	2.6	XLR mic/line, stereo RCA, S/PDIF RCA	stereo RCA, S/PDIF RCA	battery pack	

\* - parameter depends on hardware used

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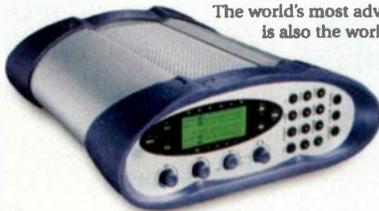
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# Leading POTS Codecs Compared.

	Comrex Matrix	Tieline Commander	Zephyr Xport
Audio Bandwidth @ 24 kbps @ 19 kbps	14 kHz 11.2 kHz	15 kHz 9 kHz	15 kHz 15 kHz
Direct Internet Software Updates	No	No	Yes, via Ethernet port
Digital PC Audio Input	No	No	Yes, via Ethernet port and supplied driver
Audio Metering (XMIT/RCV)	Transmit only	One-at-a-time	Simultaneous
Audio Processing	None	Simple AGC	Digital multi-band AGC with look-ahead limiter by Omnia
Remote Control	No	RS-232 and dedicated computer	Ethernet via Web browser
Auto Dial Storage	19 Numbers	50 Numbers	100 Numbers
Frequently-Used Settings Storage	none	none	30
Standards-based POTS Codec	No - Proprietary	No - Proprietary	Yes - aacPlus (MPEG HEAAC)
Transmit-Receive Quality Display	No	Yes	Yes
Contact Closures	2	2	3
Display Resolution	120x32 LCD	120x32 LCD	128x64 LCD
Analog Cell Phone Interface	Optional	Standard	Standard
Mixer Inputs	1 mic, 1 mic / line	2 mic / line	1 mic, 1 line
Phantom Power	No	No	Yes - 12 volt
Automatic Voice-Grade Backup	No	No	Yes
Power Supply	External	External	Internal auto-switching
Local Mix Audio Outputs Headphone Line Level	Yes Yes	Yes No	Yes Yes
Direct Receive Audio Output	No	Yes	Yes
Uses ISDN at the Studio Side for More Reliable Connections	No	No	Yes - your Zephyr Xstream becomes universal POTS and ISDN codec.
Available ISDN Option	\$850.00 (adds MPEG L3 & G.722)	\$850.00 (adds G.722)	\$495.00 (adds G.722 & state-of-the-art AAC-LD for high fidelity and low delay)
List Price:*	\$3,700.00	\$3,650.00	<b>\$2,495.00</b>



The world's most advanced POTS codec  
is also the world's lowest priced POTS codec.

*Telos*  
AUDIO | NETWORKS

\* Refers to base MSRP without ISDN option as of 5/1/04. The Telos logo, Zephyr, Zephyr Xstream, Zephyr Xport are all registered trademarks of TLS Corporation. © 2004. aacPlus (TM) Coding Technologies. Comrex, Tieline and associated trademarks are property of their respective owners. Product specifications quoted from manufacturer's most current published documentation at time of printing.

# The routing switcher gets a new twist.

(About five twists per inch, actually.)

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

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



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

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

An expensive proprietary router isn't practical for smaller facilities. In fact, it doesn't scale all that well for larger ones. Here's where an expandable network really shines.

Connect eight Axia 8x8 Audio Nodes using Cat-6 cable and an Ethernet switch, and you've got a 64x64 routing switcher. And you can easily add more I/O whenever and wherever you need it. Build a 128x128 system... or 1024x1024... use a Gigabit fiber backbone and the sky's the limit.



### Are you still using PC sound cards?

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



*There's a better way to get audio out of your PC: no more consumer grade 1/8" connectors — with Axia your digital audio stays clean and pristine.*



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

### Put your preamps where your mics are.

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



### Put your snake on a diet.

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



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



Scott Studios



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

### With a little help from our friends.

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



### Would you like some control with that?

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

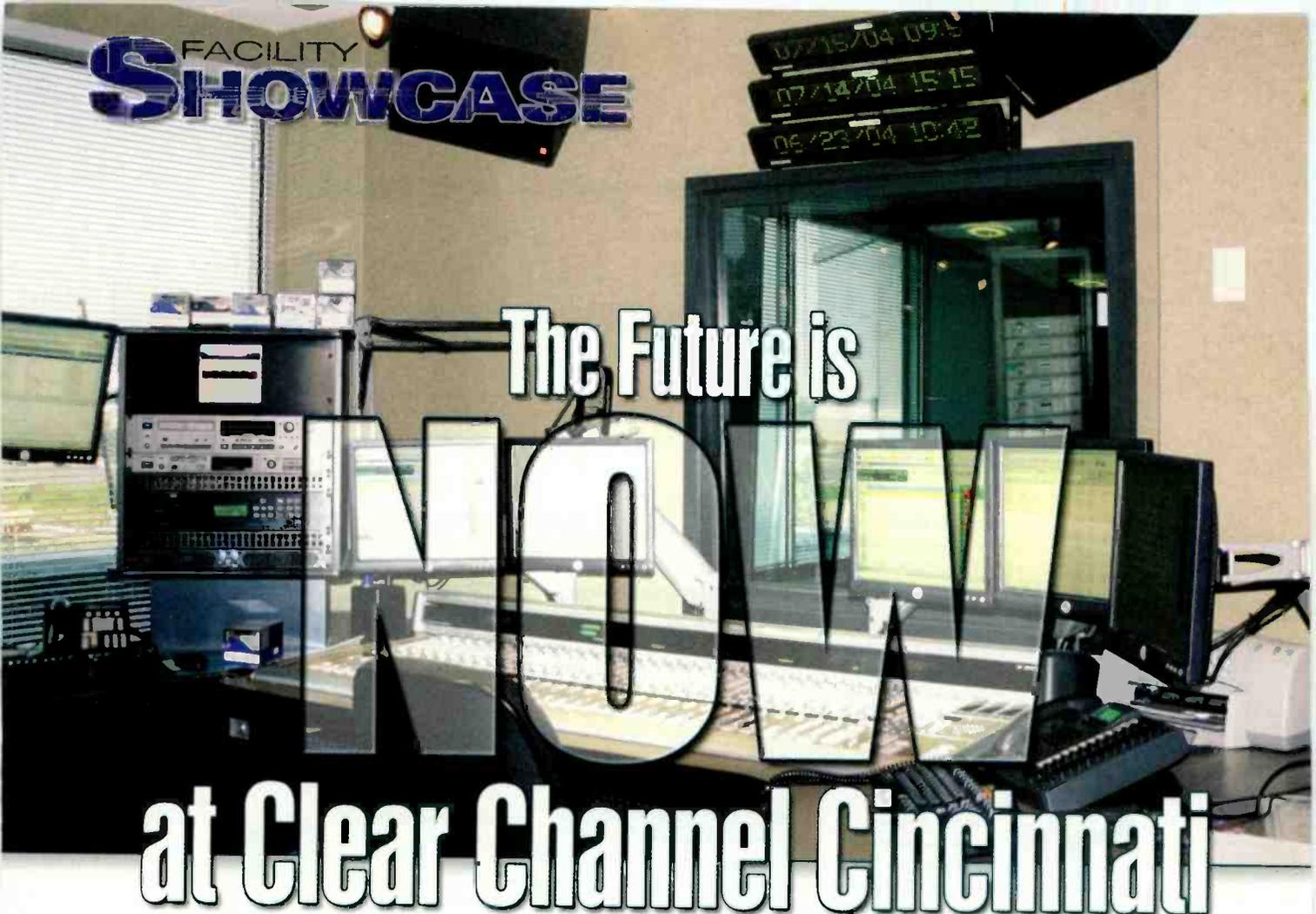


*Control fronts of the world, rejoice: intelligent Axia mixing surfaces give talent complete control of their working environment. Reconfigure studios instantly and assign often-used sources just where they're most useful.*



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





# The Future is **NOW** at Clear Channel Cincinnati

By Allen J. Singer

## A long-overdue studio build brings a high-tech look

**A**fter spending 15 years high atop Frog's Mountain, Clear Channel has successfully moved its four AM and two FM stations plus five radio networks out of Mount Adams in Cincinnati. This quaint hilltop suburb filled with Victorian houses, gaslights and narrow, hilly streets hosted the old Clear Channel studios in three cramped floors in an office building that had long since been outgrown. This summer the rock jocks, talk show hosts, production crew and salespeople stepped into their shiny new high-tech facility in the nearby suburb of Kenwood, and at the end of July, two more stations located in another part of town joined them. Now that the feat is complete, 250 personnel, including 75 on-air and engineering staff, will all create the magic of radio on one floor under just one roof.

Clear Channel Cincinnati was required to be out of its old building by June 30, or else the company would have had to pay a penalty of \$1 million to the landlords. Given the recent severity of the fines, they were well-advised to move their 26 studios by the deadline, because Clear Channel corporate would not have reacted favorably to paying this penalty. After searching Cincinnati for suitable space, local and corporate management chose a building in Kenwood. This location was centrally located and offered the required square footage; although nearly any building around town would have been better than the one previously occupied for a decade and a half.

Fifteen years ago, the Jacor-owned WLW AM and WEBN FM were located on one floor in a Mount Adams office building on St.

Gregory St. Over the years, more stations were bought and sold, Clear Channel bought Jacor, one floor became two, two floors became three, and by 2004 the three floors held six radio stations and five networks. The company had also bought two more stations that were located across town at a Clear Channel television facility. Consolidation for all eight stations was an overdue necessity, and it wasn't going to happen in Mount Adams.

Mount Adams is a tightly arranged, upscale, historic district situated on top of one of Cincinnati's seven hills. Narrow steep streets wind up and down rows of century-old homes, buildings, bars and shops. Available on-street parking is a rarity, and only a few parking garages serve the area. It was here that WEBN radio staff called their home Frog's Mountain (Frog being the station's mascot), and by 2004 their building housed 11 broadcast entities: WEBN-FM, WOFX-FM, WLW-AM, WSAI-AM, WCKY-AM and WKRC-AM, as well as the Bengals Radio Network, the Reds Radio Network, the Truckin' Bozo Network, the Burbank Broadcast Network and the WKRC Weekend Network. WVMX-FM and WKFS-FM were located in Clear Channel's Channel 12 building in Mount Auburn.

The old facility occupied 28,000 square feet, with 26 studios spread across the three floors. New studios were built as each station was added over the years, and in the end the staff had to contend with tangled mazes of wiring and outdated analog equipment mixed with modern digital equipment and computer networks. This entire mess was crammed inside an outdated building in desperate need of repair. The overcrowded Clear Channel staff yearned for a change.

# Flushing Away Your Audio Quality?

Swishing and swirling audio is the sad result of bit rate reduction combined with the wrong processing. Unless all sources, storage media and transmission systems are linear the audio will be bit rate reduced at least once, probably several times. Each pass generates more artifacts. Lower quality processing, multiband compression, limiting and clipping can make those artifacts even more apparent. But level control is still essential.

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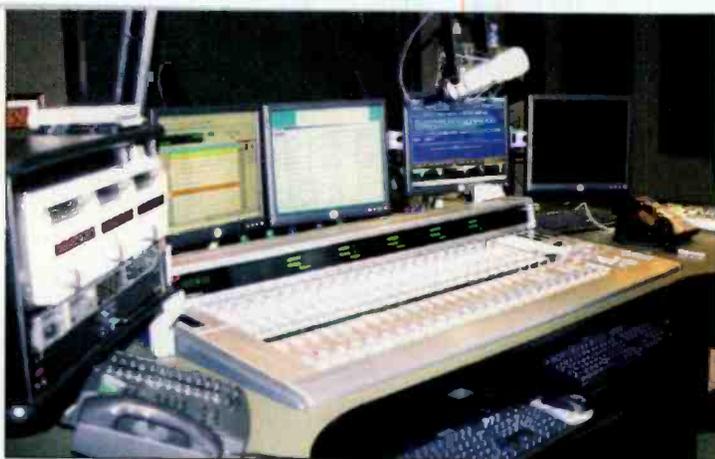
# Clear Channel Cincinnati

## Location, location, location

Kenwood is a sprawling upscale suburb on flat ground, conveniently located off I-71. The staff finds it much easier to get to work now, and will no longer need to drive four-wheel-drive SUVs uphill during the winter months. The location also offers plentiful parking, no steep hills, an abundance of restaurants for everyone's tastes and loads of office space. By the way, did I mention that there are no steep hills?

After Clear Channel chose the Kenwood office building and signed on the dotted line, it hired the Luckett and Farley Architects of Louisville, KY. This firm's daunting task was to plan how to efficiently fit 41 studios and offices into 50,000 square feet of space on the entire sixth floor. Duke Construction was brought in next, and spent four and a half months in demolition and construction of the new facility. Finally, to put the jewel into the crown of Clear Channel, Harris came in and spent two and a half months in systems integration.

Harris' team of five cabinet fabricators and four wiring techs built studio cabinetry and equipment racks, pre-wiring nearly everything at the Harris shop. A team of three installers arrived to put in the racks and equipment, and run the wires down hallways into the rooms. As a result of their careful planning and detailed work, the installation went smoothly and no unexpected problems occurred



All the control rooms have layouts similar to the WEBN control room shown here.

during the build-out. In the end, each station went live without a hitch. Clear Channel was more than pleased with all of Harris's hard work, especially since the whole project came in on budget.

## Inside the facility

Technical operations occupies 25,000 square feet, and an additional 25,000 square feet is on the administrative/office side. The studios are arranged in a U pattern with the main equipment room located in the middle. The terminal room holds 52 equipment racks, structured entirely around the Harris Vistamax Audio Management System, a futuristic routing device designed like a computer network. There are 24 audio consoles and four VSDMs (Very Small Digital Mixers) in the facility that are networked through the Vistamax. This machine binds logic to audio over a single CAT-5 cable, and allows all sources to be available to all

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consoles over a single line. This is a system Harris has adopted for all of its installations.

Outputs and inputs of every piece of equipment are terminated in the rack to a CAT-5 punch block. Coming out of each rack is at least one 25-pair CAT-5 multi-line laid into overhead wire racks, and terminating to a series of punch blocks on the back wall. All cross-connects for the equipment are done at the punch block wall. Unshielded CAT-5 was used, so ground loops were avoided.



Some studios, like the WOFX control room, have Airwave consoles that will be replaced by RMXdigital consoles next month.

Designers called for wire trays in the facility for several reasons. The costs were much higher to install computer floor, there were other offices in the lower levels, the building featured high ceilings and installers needed easy access to run cables to the roof. Besides, once the wiring was all in place, it would never have to be accessed again.

Two racks hold the Prophet production machines to be used by production personnel, which are accessible from the hallway. The Prophet audio servers and local workstations for all stations and radio networks are in an additional eight racks. An entire center row of racks holds the IT infrastructure, and several other racks hold satellite receivers, three KU uplinks for the networks, two-way and RPU equipment, and eight more racks store the air chains for each station. Two racks containing public codec equipment, Hotlines, ISDN equipment and Vistamax control, face the hallway available to staff 24 hours a day.

Exposed wire trays are affixed to the walls of the hallway about 10 feet off the floor. This arrangement allows engineering staff to easily add more wires in future expansions without having to remove ceiling tiles. Wires enter each studio off the trays through four-inch conduits. Aesthetically, wire trays in the hallways are acceptable provided the wires are not sloppily laid in the trays. Detail-oriented cable

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# Clear Channel Cincinnati

installers made sure that would not be an issue.

The new facility contains eight on-air control rooms, five radio networks, 12 production rooms, four voice-track rooms, various control rooms, talk studios and networks to make up the 41 studios. Every studio uses a heavy IAC soundproof door, which nearly completely muffles all sound (except for the loudest music blasting in the studio). The walls are treated with Acoustics First sound dampening panels, color coded similarly for each studio and its adjacent control room. The equipment in the studios ranges



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The WLW talk studio, with a closer view of the host position (bottom).

## Installation Team

### Clear Channel Radio

**Project Manager:**

Chris Zerafa

**Prophet Integration:**

David Abbott

**Engineering Staff:**

Ted Kerdrick, Ted Ryan, Jim Eberhart,

Dave Smith, Rob Mueller,

Jeremy Harrison, Steve Bradford,

Todd Jellison, Andrew Costa

**Regional VP, Engineering:**

Dan Mettler

### Harris Broadcast

**Project Manager/Engineering**

Design: Paul Barzizza

**VistaMax Integration:**

Joe Perez

**Cabinetry Design:**

Nick Van Haaster

**Factory Integration:**

Arnel Reyes, Willy Delarosa

**Lead Installer:**

Dennis Mathers

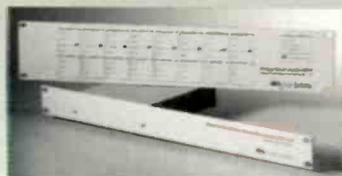
**District Sales Manager:**

Scott Berger

**Director, Radio Systems:**

Rich Redmond

## Product Showcase



### Model RFC-1/B Remote Facilities Controller

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The cable trough runs down the hall, so neat cable installation was important.

## Equipment List

- Adobe Audition
- Drawr D-75 power amps
- Electro-Voice RE-20 mics
- ESB master clock system w/ GPS
- Depco 5100 wire
- Harris PR&E Airwave consoles
- Harris PR&E BMXdigital consoles
- Harris PR&E Impules consoles
- Harris PR&E Integrator racks
- Harris PR&ERMXdigital consoles
- Harris PR&E Smoothline furniture
- Harris PR&EVistamax
- Harris PR&EVSDM mixers
- Li ad i 25-pair CAT5e
- BL 44-8 speakers
- BL 44-10 speakers
- LP3 Si ent Booms
- Omnia processors
- Propheta Systems Nexgen
- Sony MDS E12 Minidisc
- Symetrix 528E mic processors
- Te cast Adcer 161
- Te os 01 telephone system
- Denon DN951-FA CD players
- ✓ Cox Pro editors
- ✓ Wire Ready editors
- ✓ Wire ready news editing

from basic to complex, depending on the needs of the station and particular studio. The sports booths, for instance, simply have Wire Ready and Prophet machines, and a Harris VSDM that accepts outside sources like a Minidisc deck so announcers can record and mix their actualities quickly and easily.

All studios are wired and laid out nearly identically to give them a consistency that was sorely lacking in the old Mount Adams facility. The stations have all been given the digital consoles. WEBN, WLW, WKRC, WCKY, WSAI and the Network Master Control room (which takes care of the Bengals Network) are all equipped with the new Harris BMXdigital consoles. The 12 production rooms as well as WOFX, WVMX, WKFS, WEBN news, WLW news,



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The WCKY talk studio provides ample room for guests, and the full windows keep the room bright and open.

beams the digital signal to the transmitter site using Moseley and Marti devices, and T1 and fiber lines using QEI Catlink and Telecast Adder act as backups for all stations.

When the studio build-out was complete WEBN and WOFX were switched over first, without any glitches or problems. Over the course of the next few days, WLW, WKRC, WCKY and WSAI went live. As with the first two stations, nothing went wrong. Since the change, no studios have reported any major problems.

All the stations' staff members have jumped right in and embraced the new facility. They have handled the change professionally and

enjoy working in the new setting and modern studios. WLW talk show host Bill Cunningham feels as though he is onboard the Starship Enterprise, as he acclimates to all the new, high-tech equipment. Programming has commented that the stations all sound dramatically better since the first day of broadcasting from the new facility. In its new, all-digital environment, ClearChannel Cincinnati has definitely become the radio station facility of the future.

At the end of July WVMX and WKFS moved from Mount Auburn. The Bengals Radio Network will go live in August; its console and studio cabinets are wired and ready to receive equipment. Through August, Harris will implement the Vistamax Intercom system, and by September all the currently used Airwave Digital consoles will be replaced with the Harris RMXdigital consoles.

Thanks to the diligent efforts of Harris, the eight stations and five networks of Clear Channel Cincinnati now broadcast in clean digital sound. And just as important, the staff now works more efficiently with modern equipment in fresh, new and spacious surroundings. After 15 years, the Frog has found its new mountain.

*Singer is a freelance writer and former radio engineer in Cincinnati.*

# Facility Focus

## the technology behind Clear Channel Cincinnati

### Prophet Systems NexGen

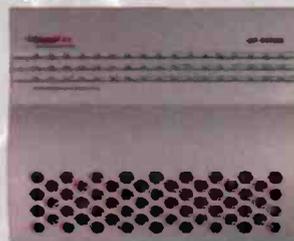
Clear Channel Cincinnati uses NexGen Digital features to complement the high-energy shows at its 25-plus-studio facility. System management is worry-free with minimal time spent configuring and maintaining the network. Features in NexGen include WANCasting, enabling stations to share resources, Digital Reel-to-Reel, for time shift recording of up to four programs simultaneously on one computer, and CDX/AFC, the most powerful and full-featured CD ripper and automatic format converter available. 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.



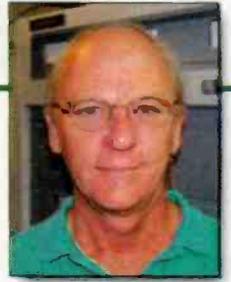
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### Harris VistaMax

The VistaMax networkable audio management system has one aim: to improve the bottom line by maximizing the value of equipment and audio assets. VistaMax establishes an intelligent hub that enables all connected consoles and audio assets to be shared across the entire network. Creating a simple and elegant resource-sharing platform, VistaMax eliminates or greatly reduces the need for stand-alone routers, distribution systems, and multipair bundles. Such consoles as Harris' popular BMXdigital, its new VistaMax Small Digital Mixer and its new RMXdigital are connected to the hub via simple fiber and/or CAT-5e cables. There is virtually no limit on VistaMax's expandability. Among its benefits, VistaMax accommodates program or format changes on the fly, allowing an entire networked facility to be reconfigured quickly and easily.



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## Audemat-Aztec FMX480

John A. Buffaloe

# W

we are embarking on a complete upgrade to our 15-year-old analog facilities in preparation to transmit an HD Radio signal. Part of this work is preparing the artist and song data to be transmitted. Station management and programming requested the ability to scroll song titles and artists, along with call sign identification for our country station, KSON-FM. We also needed to convert our composite digital STL to one that would accommodate an AES digital stream as well as the RBDS data. I have always preferred to have the audio processing at the studios, so to accomplish the task I needed a stereo generator and RBDS encoder at the transmitter site. These

input to our exciter. We are not using the other features of the device at this time.

When we first received the unit, we elected to operate it on the bench for two weeks, while observing the output on a Tektronix 2710 spectrum analyzer. We downloaded the upgraded software and installed it while the unit was running to see if it would cause any glitches in the audio while processing the new data. It ran flawlessly. Setup and programming of the RBDS and stereo generator functions was straightforward, though somewhat complicated. The manual is 125 pages and full of information. Certain functions and input commands are highlighted in yellow to indicate critical information. There is a front-panel display to select various programming functions and parameters of the unit, but you really must use a serial port from your computer to properly program the device. You



### Performance at a glance

- Clear, well written manual
- Easy to set up and program
- Multi-function device in 1RU
- Good factory support
- Easy access to input/output connections
- Attractive design

needed to accept the AES signal being sent from the studios. In speaking with other engineers and vendors, the FMX480 was highly recommended as the solution to the problem.

The FMX480 is a 1RU device that includes an RBDS encoder, DARC encoder, stereo generator, multiplex optimizer and multiplex limiter. It will accept analog left and right audio as well as an AES digital stream. We feed the AES output of our STL directly into the digital input of the FMX480, along with the serial data stream from our DAD-Pro32 storage and playback system. The FMX480 generates the stereo composite signal and encodes the RBDS data for the

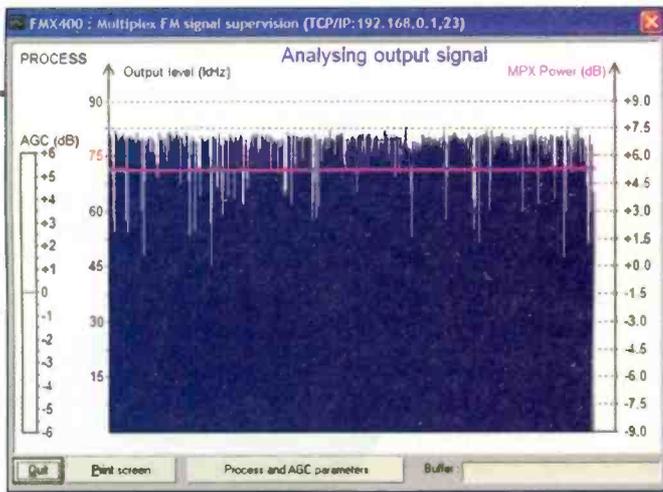
can do this with a direct connection to the unit, as well as through full remote access via its embedded Web server supported by TCP/IP, Telnet and FTP. The manual provides good and clear details on the various programming functions, as well as instructions on interfacing your automation to provide scrolling data. Along with the thorough manual comes quick setup instructions to get you started.

When programming the scrolling data, you have the option of running eight characters at a time for a predetermined period of delay, or of running whole word text so that one full word (up to eight characters) will appear at a time. We chose the latter. Typically, you'll see something to the effect of "The (scroll) Dance (scroll) by (scroll) Garth (scroll) Brooks (scroll) on KSON." This presents a nice, clean image for the listener to see on his receiver.

### In operation

Audemat-Aztec uses kilohertz deviation when referring to injection levels as opposed to percentages. This takes a little getting used to, but is simple once you grasp the concept. For instance, pilot injection is referenced as being deviated at 6.8kHz, which equals 9 percent injection level. All levels are referenced in this manner, and are easily adjustable to match your system.

One of the best features of the device is an active graphical representation of total and average modulation when connected to a PC or laptop. The display is much like a spectrum analyzer working in real time, but it shows peaks and averages as the audio moves across the screen.



This is certainly useful for comparing against the readings shown on your modulation monitor, as well as for adjusting your audio processing.

Having pre-programmed and observed the unit in operation on the bench, installation was simple. Plug it in, make the connections and adjust the levels. That was it. The stereo field is excellent in listening tests. I haven't made measurements yet, but my ears tell me that it's good.

Serviceability is an issue in that it is such a complex device contained in such a small package, that a component failure would most likely involve the replacement of the troublesome board, or return for repair. Our unit has operated flawlessly since installation, but I have backup systems in place.

### Ins and outs

It is an attractive unit aesthetically. The front panel design is clean and uncluttered, and the rear panel offers plenty of finger room to get to the various input and output connectors. The rear panel includes a ground post for a solid connection, which is a nice feature.

Factory support has not been an issue, as we

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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.

had no problems with the programming or installation of the unit. I was contacted by the company almost immediately on receipt of the unit with updated software and suggestions for use of the eight digital inputs for remote control and e-mail alarm functions using the embedded SMTP server. The updated software allows the word scrolling to be programmed.

The FMX480 has proven to be an excellent solution to getting the AES stream on the air for KSON-FM, while allowing the audio processing to remain at the studio location. The artist and title scrolling works beautifully. I look forward to using this system on our other three FMs in the San Diego market.

*Buffaloe is the engineering manager of Jefferson-Pilot Communications Company of California.*

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# New Products

By Kari Taylor, associate editor

www.beradio.com

## Stereo sound card Digigram

LCM220 version 2: Replacing the LCM220, the LCM220v2 sound card offers 2/2 balanced analog I/Os. The new board is targeted at broadcast automation, permanent playback, logging and other pro audio applications. The card offers simultaneous and independent record and playback capabilities, as well as real-time, simultaneous MPEG Layer I and Layer II compression and decompression during record and playback. New features include 24-bit converters, analog and digital level control on the outputs, short length PCI format (or 6.875"), as well as Universal PCI bus (5V, 5V+3.3V, or 3.3V) and PCI-X bus compatibility. Additionally, the card is compliant with Digigram's recently launched PC codec MP3.

703-875-9100; fax 703-875-9161  
www.digigram.com; input@digigram.com



## Vocal eliminator Alesis

Playmate Vocalist: This vocal remover and microphone processor with a built-in CD player can adjust music tempo and pitch independently. This allows a vocalist to sing any song in the optimal key and to slow down complex passages for easy learning and singing in different key ranges and tempos. The system also includes 100 reverb algorithms, allowing the user to match the ambiance of the music, or use reverb effects more creatively. Other features include the ability to transpose music  $\pm 7$  half-steps, and adjust pitch  $\pm 18$  percent; adjust tempo from 50 percent to 150 percent; digital vocal effects processor with selection of reverbs and an XLR microphone input.

800-5-ALESIS; fax 310-255-3401; www.alesis.com



## Audio level Interface Aphex Systems



228: By converting eight channels of unbalanced -10dBu audio to balanced +4dBm audio this interface allows multiple audio channels to be converted without the need for multiple discrete interfaces. The front-panel extended-range VU meter provides calibration and monitoring of each channel individually. Eight two-color signal presence/clip indicators show signal presence and overload conditions. Front-panel gain trims for all eight channels are provided. The front-panel indicator lights can be dimmed if desired. All connectors are gold-plated.

818-767-2929; fax 818-767-2641; www.aphex.com; sales@aphex.com

## Multi-track DAW Sadie

PCM-H64: This system's TNG3 processor card is capable of editing, equalizing, controlling dynamics and mixing into full surround of as many as 64 channels of 48kHz/24-bit audio, or as many as 16 channels at 192kHz/24-bit. A fully modular system, its inter-card bussing enables complex mixer structures to span multiple processing cards. Input/output options include analog, digital and MADI at standard or higher sample rates. As many as four cards can coexist in the same system. The hardware is supported by Sadie V5.3 software.

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### Mic/line mixer Intelix

8002MCB-FP: With the upgrade of this front-panel control mic/line mixer, features include eight inputs by two outputs, bus selectors per channel, low cut filter and front-panel channel gain and mic/line pad. The mixer was designed for broadcast vehicles and other applications where rear-access to the mixer is limited. Eight-channel, dual bus mic/line mixing, studio quality compression and limiting, actively balanced inputs and outputs, a dual-function LED VU meter, phantom power, a headphone out, ac or dc power and XLR connectors are also features of this product.

608-831-0880; fax 608-831-1833; [www.intelix.com](http://www.intelix.com)



## Upgrades and Updates

Pulse Communications (Pulsecor) has upgraded the Program Channel Access Unit (PCAU) for stereo. The updated feature set ensures that the stereo imaging between the left and right audio channels is retained. The Pulsecor PCAU was developed in conjunction with APT.

[www.aptx.com](http://www.aptx.com)

Lynx Studio Technology has released the OSX Core Audio drivers for the company's Lynx Two, L22 and AES16 products. The final release allows the Lynx products to use Apple Computer's Core Audio protocol, and operate with all G5 model computers.

[www.lynxstudio.com](http://www.lynxstudio.com)

Mackie is now shipping the dxb\*200 and dxb\*400. Both products provide a tactile surface to operate a DAW via Firewire and the Mackie Control Universal logic.

[www.mackie.com](http://www.mackie.com)

Disc Makers has introduced a USB 2.0 connect for its line of Reflex duplication towers. The Reflex USB 2.0 connect package is included on the Reflex1 duplicator and can be added as an option to the Reflex Pro4 and Reflex Pro7.

[www.discmakers.com](http://www.discmakers.com)

Moseley now offers SL9003Q configurations allowing up to six channels of linear 32kHz or four channels of 44.1kHz uncompressed audio in standard 950MHz STL allocations.

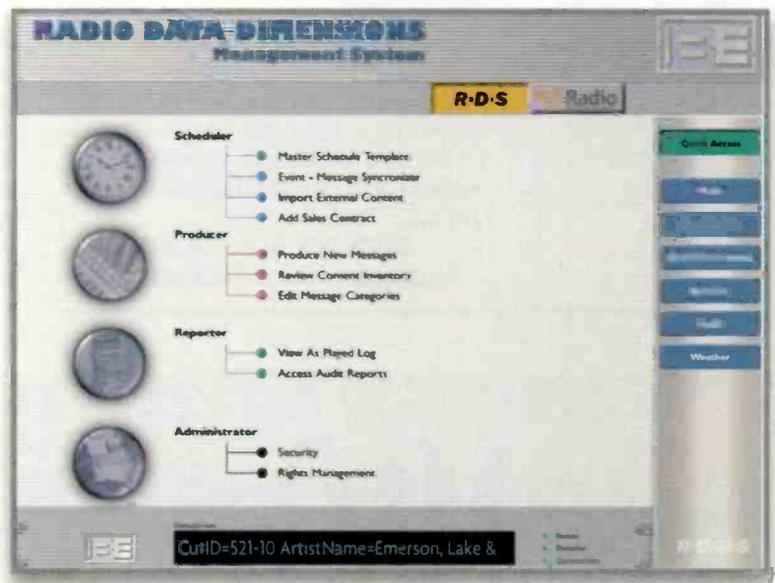
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RCS Mobile has exclusive availability of the SMS short code 22022 and other memorable short codes to radio station programmers in the United States.

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# New Products

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## Console controller Broadcast Tools

CC-5: This controller allows non-broadcast consoles or digital workstations to interface to any type of studio. The switch console and controller may be separated. The unit includes five channels of insert switching to turn on or off console input channels or other source equipment. Channel LEDs that may be programmed to flash when activated. The controller also offers balanced stereo monitor amplifier mute control and the ability to program channels 3, 4 and 5 for momentary operation, which is useful for intercom and special mute functions when activated. Additional features: stereo balanced internal or external monitor switcher; the controller may be purchased separately and controlled from user-supplied switches and indicators.



Additional features: stereo balanced internal or external monitor switcher; the controller may be purchased separately and controlled from user-supplied switches and indicators.

877-250-5575; fax 360-854-9479

[www.broadcasttools.com](http://www.broadcasttools.com); [bt@broadcasttools.com](mailto:bt@broadcasttools.com)

## Mic preamp Mackie



Onyx 800R: The 1RU Onyx 800R features simultaneous analog and 24-bit/192kHz digital connectivity via ADAT Lightpipe, AES/EBU and S/PDIF to work seamlessly with analog and digital systems. The front panel provides easy access to useful features such as selectable mic/line inputs per channel, and two instrument input jacks, replacing the need for an outboard DI box.

800-898-3211; fax 425-487-4337

[www.mackie.com](http://www.mackie.com); [productinfo@mackie.com](mailto:productinfo@mackie.com)

## Ripper Tunetracker Systems

Tuneprepper: Tuneprepper rips songs from CDs, locates them online in a CD database, normalizes the cuts, removes the silence from the front and back of each cut, encodes them to one of more than a dozen possible formats, copies the CD database information to its corresponding file attributes and stores them in the location of your choice. When the ripper has finished with the songs, they are prepped and ready for broadcast in Tunetracker or any other radio automation software that supports the MP3 format.

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## Modular on-air console Studer

### On Air 500 Modulo:

Based on the On Air 500 in its fixed-frame version, this console also offers the ability to place individual modules wherever is most convenient for the users. The console consists of one or two fader modules, one master module, the meferbridge and a 19" electronics rack, resulting in either a 6- or 12-fader mixing desk. Technical specifications and configurations remain identical to those of the standard Studer On Air 500.

818-920-3212; fax 818-920-3208

www.studer.ch; sales@studer.ch; kholmes@harman.com

## Kit for concrete shelters Andrew

**Hip Roof Kit:** Suitable for areas where regulations require that the shelter roofline match that of surrounding buildings, this kit contains the materials necessary for constructing a hipped roof, including trusses, roof decking, nails, clips, shingles, felt, lumber, anchors, tapcons, ridge vent, fascia board, vinyl soffit and paint. The hip roof materials are shipped to the shelter site in kit form.

800-DIAL-4-RF; fax 708-349-5444

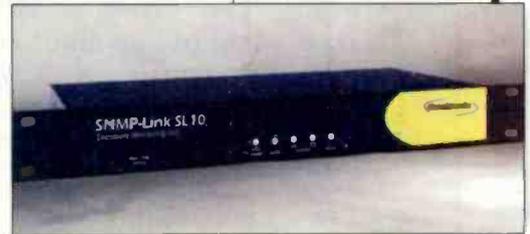
www.andrew.com; rose.wolski@andrew.com

## Remote monitoring Omnitronix

**SL-10:** The unit's small size and -48Vdc operating voltage can monitor environmental conditions within the cramped quarters of pole-mounted, surface and subterranean enclosures at microwave relays, transmitting stations, fiber-network hubs and cable booster sites by converting contact closure inputs, voltage inputs, temperature and humidity into SNMP trap alarms. The monitor offers additional utility to telecoms, cable companies and broadcast operators who have equipment functioning in -48Vdc environments, as the unit has a power output function (up to 9Vdc at 1A) that can drive low-cost routers, hubs or other low-powered network components at the site.

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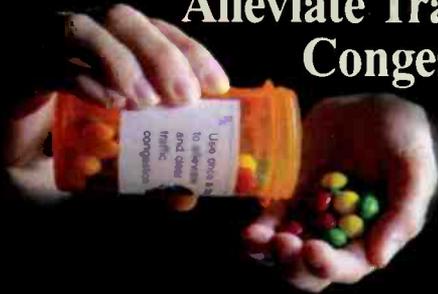
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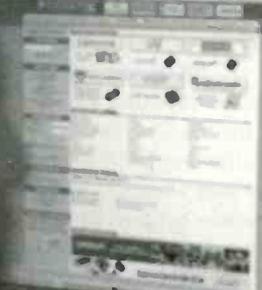
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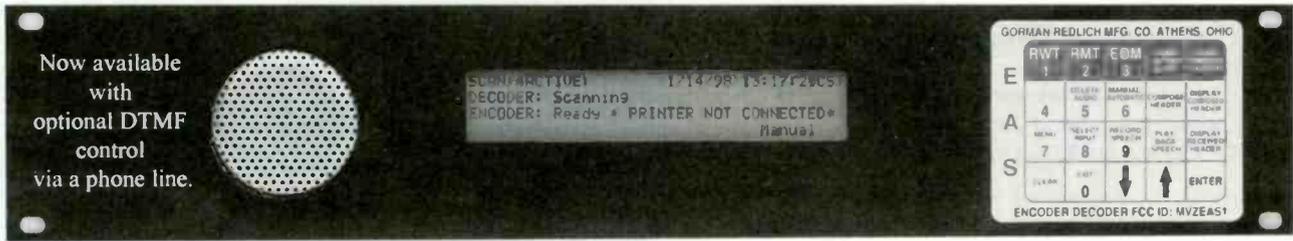
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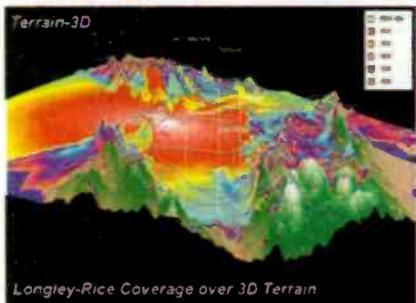
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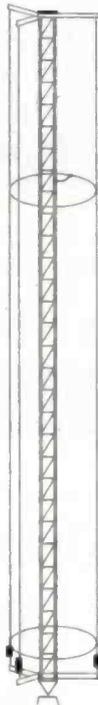
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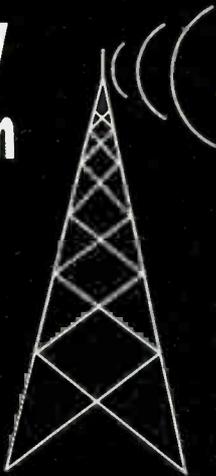
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Technical Editor, RF - John Battison, P.E., [batcom@bright.net](mailto:batcom@bright.net)  
Associate Editor - Kari Taylor, [ktaylor@primediabusiness.com](mailto:ktaylor@primediabusiness.com)  
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# Contributor Pro-file

Meet the professionals who write for *Radio*.  
This month: Field Report, page 36.



**John Buffaloe**  
Chief Engineer, Dir.  
of Engineering  
Jefferson-Pilot  
San Diego

Buffaloe has been in his current position for 19 years. Previously, he was the operations manager for

Noble Communications in San Diego for 10 years. He started his career as a part time weekend announcer on WGCM-AM in Gulfport, MS, and continued as a DJ on WZZQ, Jackson, MS, and KPRI in San Diego. He has also held positions as a production director and music director. He has built several studio and transmitter facilities for various companies. He holds an FCC General Class license and has attended the NAB Directional Antenna Seminar. Buffaloe is a private pilot, sailor, golfer and blues guitarist.



Written by radio professionals  
Written for radio professionals

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# Sign Off

By Kari Taylor, associate editor

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## Do you remember?

An early effort at creating a digital audio cassette format, the SV-P100 digital cas-

sette recorder used Pulse Code Modulation to digitally encode audio and store it on a standard



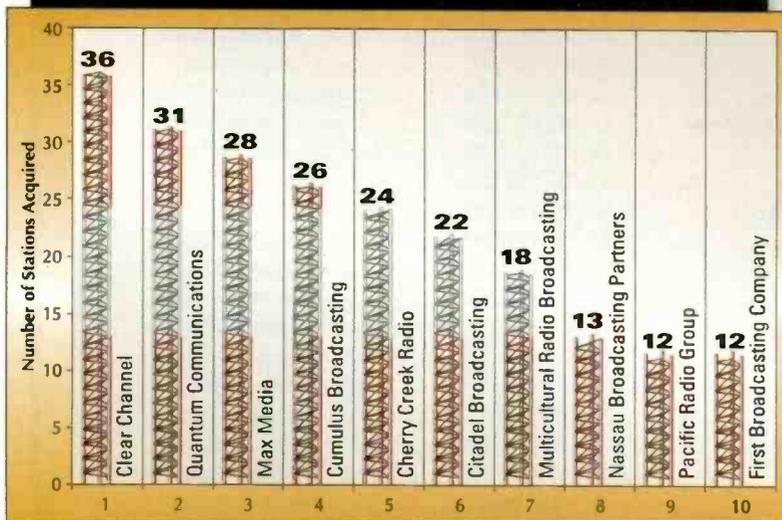
VHS cassette. According to the product literature, the videotape transport mechanism brought "the convenience normally associated with conventional front-loading cassette decks to a digital application." The digital audio signal was recorded on the video track. Tape loading was automatic and an LED panel displayed the operating status.

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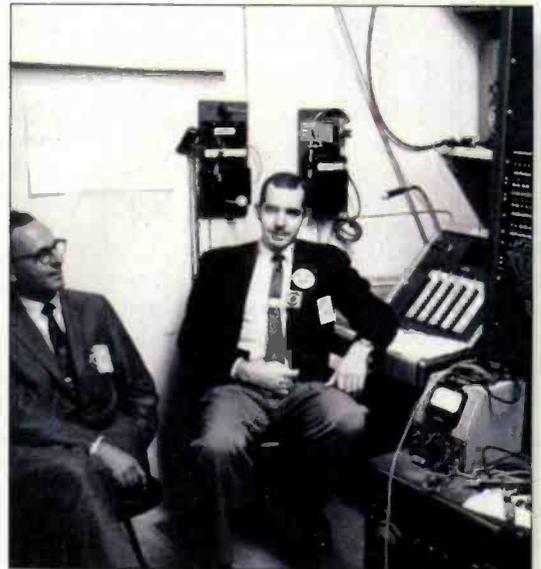
The top 10 radio station acquirers in 2003 were mostly smaller ownership groups

### Radio Station Acquisitions in 2003



Source: BIAfn's Media Access Pro, April 2004.

## That was then



This picture is from the 1960 Democratic Convention held that year in the Los Angeles Sports Arena. KPOL was a Mutual Broadcasting affiliate at the time and Marvin Collins (on the right in the photo) was assigned to the audio pool at the convention. Collins' duty was to switch the floor microphones during the delegate roll call using the switch panel to his left.

Source: KPOL Photo Archive #1. Photo and description by Marvin Collins. Posted and edited by Steve Blodgett at [www.earthsignals.com/Collins/0025/](http://www.earthsignals.com/Collins/0025/)

# D-8000

## Digital Radio Console

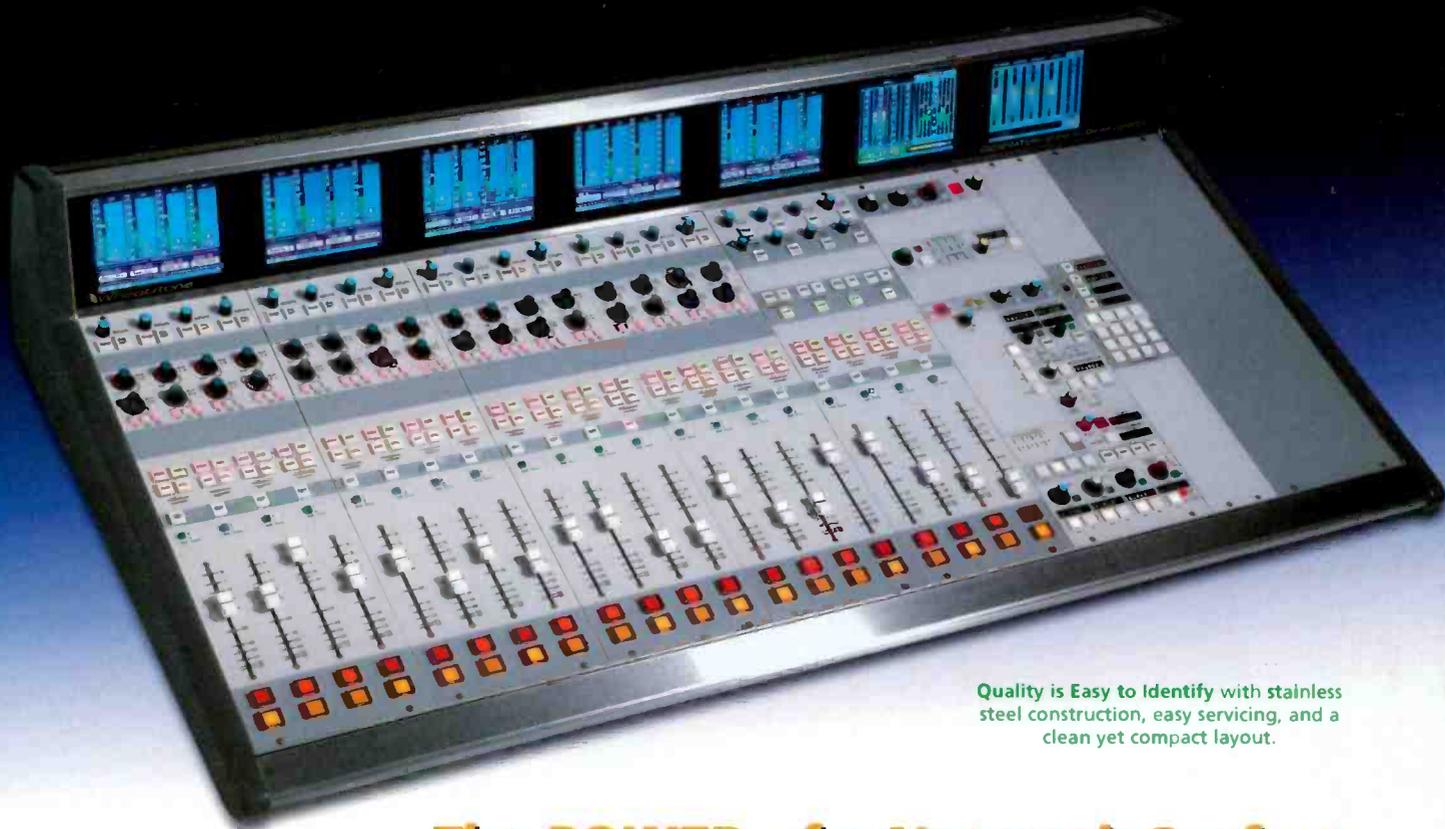
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