

IN REVIEW: 15 DIGITAL AUDIO WORKSTATIONS

E

THE PROJECT
RECORDING
& SOUND
MAGAZINE

AUGUST 1995

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RECORDING TIPS

MAINTAINING
YOUR ADAT

BELA FLECK
TECHS THE STAGE

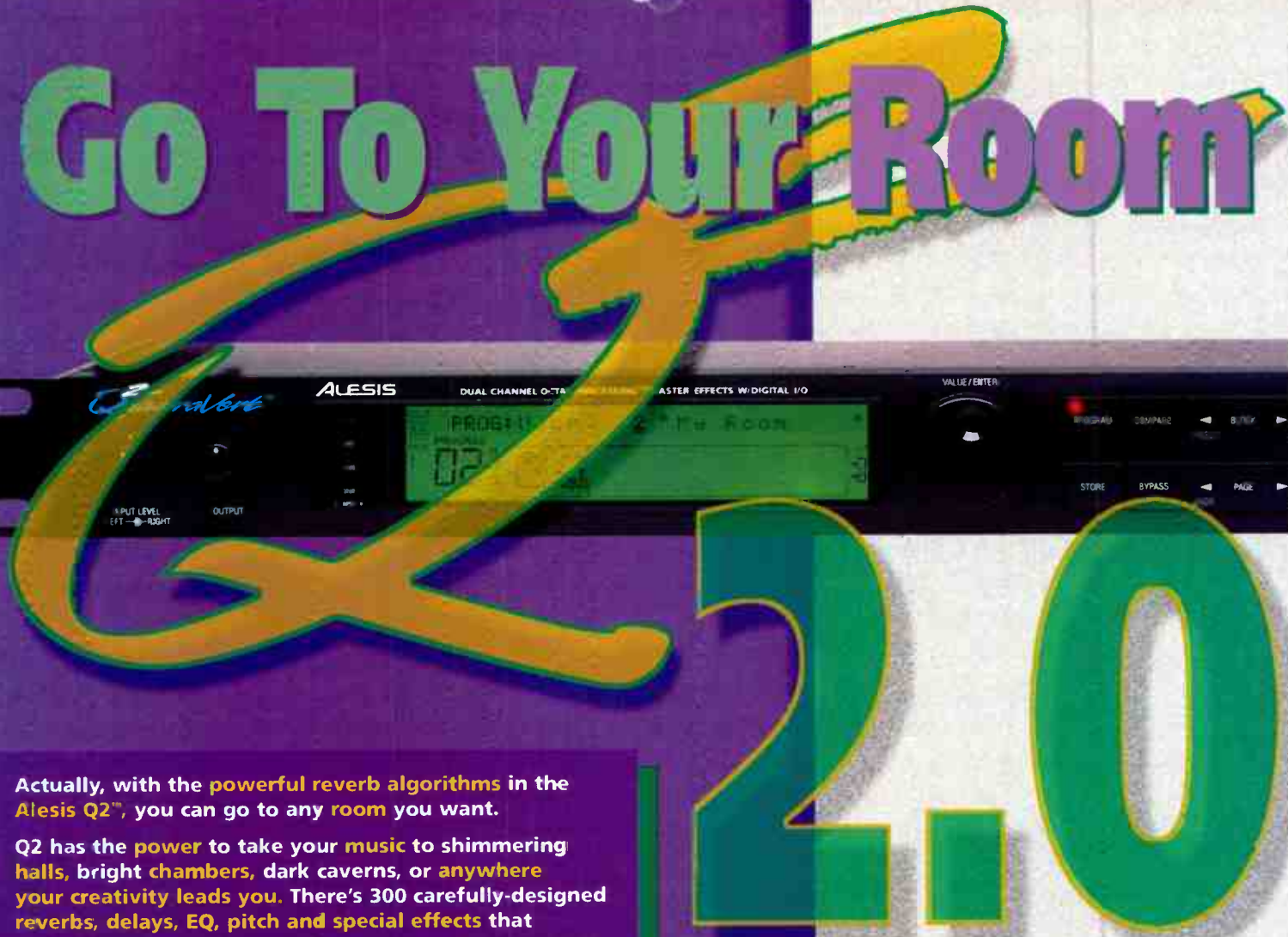
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EQ

PROJECT RECORDING
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VOLUME 6, ISSUE 8
AUGUST 1995



ON THE COVER:
NBA pro, rapper, actor, and
videogame star Shaquille O'Neal sits
behind his Soundcraft DC 2000 in his
Florida-based project studio. Photo by
Robert Peak.

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Fifteen of the newest and most popular DAWs are examined (and, in some cases, re-examined) by EQ's investigative team. If you are even *thinking* of buying a DAW, don't miss the special report, which includes DAWs from Akai, Digidesign, Digital Audio Labs, Fostex, Innovative Quality Software, Micro Technology Unlimited, OSC, Otari, Roland, SAIDiE, Sonic Foundry, Soundscape, TimeLine Vista, Turtle Beach, and Vestax. (Whew!)

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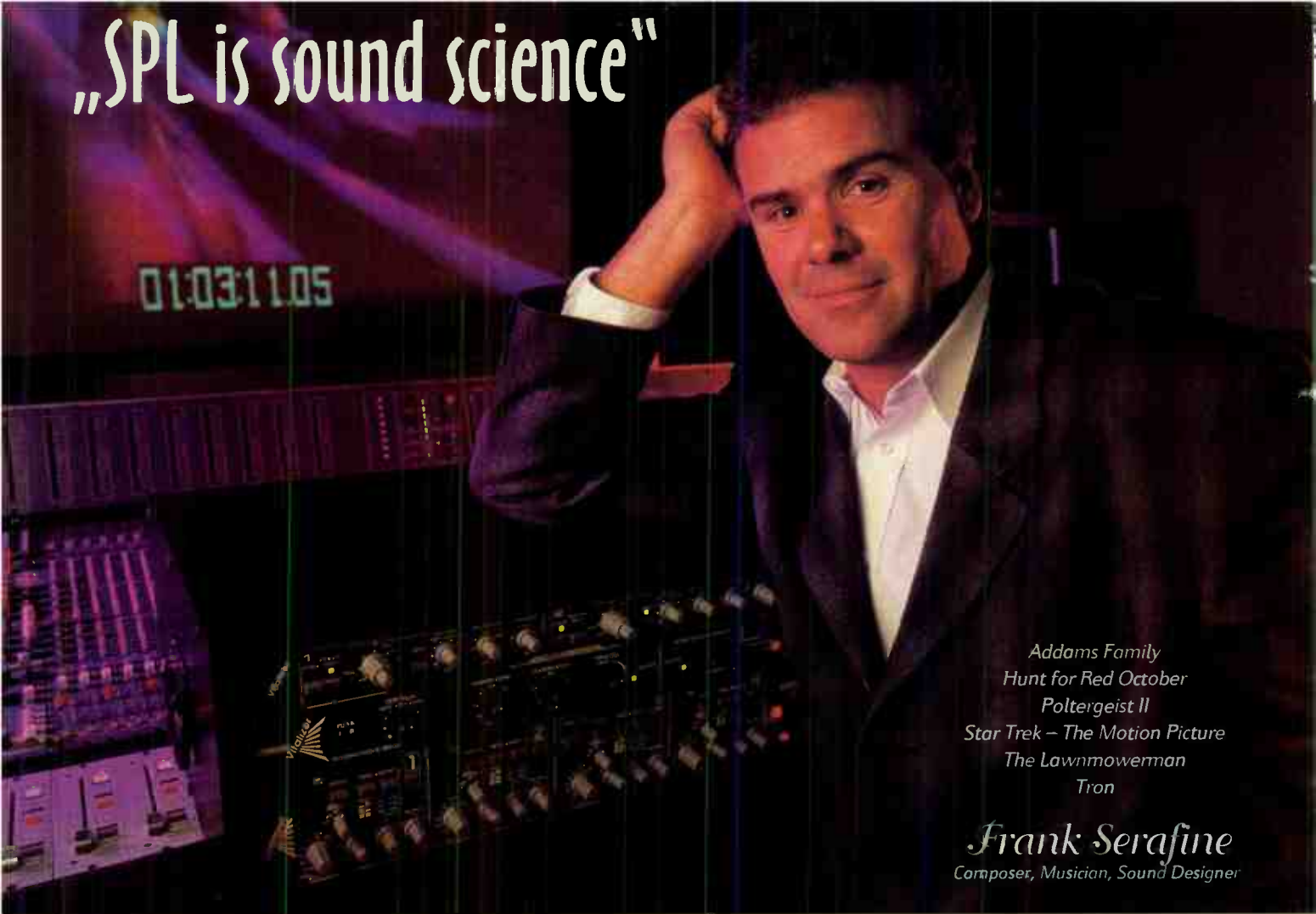
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The EQ Express

IF EVER there's been a product that defines an audience, while simultaneously being defined by that audience, it is the digital 8-track. ADAT and D8 technologies would most likely still exist without the explosive project arena, but its rising ubiquitous nature would not were it not for the project room. Those of us who grew up on multitrack cassette recorders have been sucked into the digital 8-track vortex like Deadheads to a Jerry Garcia poster giveaway. Now capturing creativity cleanly is not limited quite so much by the fatness of our wallets.

Because of the digital 8-track's importance, I have for the past few months been in discussion with the upstanding purveyors of these affordable tools. The objective was to make *EQ* Magazine Digital 8-Track Central. That is, to have *EQ* further solidify its position as the main stop for information, news, and techniques for the digital 8-track user. Since *EQ*'s readers are primarily responsible for the growth of affordable digital, what better place for these manufacturers to spread the word via user tips, news, and software updates than in these pages? The Gang of Four — Sony, TASCAM, Fostex, and Alesis — have sent *EQ*'s Mr. Maintenance, columnist Eddie Ciletti, machines, test tapes, schematics, and assorted nuts and bolts — everything he'll need to perform routine and exotic maintenance and in-use tests. The results will be passed on to the rest of us in his monthly columns.

This issue begins our digital 8-track watch. First, in what will be a continuing series, Eddie discusses how to use an oscilloscope to get familiar with the inner workings of your ADAT, DA-88, RD-8, or PCM-800, as well as your DAT machine. Then check the "ADAT in the Trenches" workshop by Bennet Spielvogel for a step-by-step look at replacing worn parts and other cool ADAT-related tips.

If readers have any questions or article ideas about digital 8-tracks (or DAT), *EQ* is where you get onboard. We're listening.

As if the above features weren't enough for your entertainment dollar, ogle the DAW (Digital Audio Workstations) extravaganza. Affordable DAWs of all speeds and track capabilities are now out there. *EQ* rounds them up here into a manageable one-stop source. (If we missed one of your affordable DAW favorites, here or in past issues, nothing personal, so get in touch.) Although many consider digital tape and hard disk recorder/editors to be straight competitors, there's room for both. The joy of printing to tape (analog too...) and then editing on hard disk has a best-of-both-worlds feel to it. Our DAW section should further open you up to the digital potential at hand.

Stay tuned. We'll keep you ahead of the curve.
Until that time...

Hector G. La Torre
Executive Director



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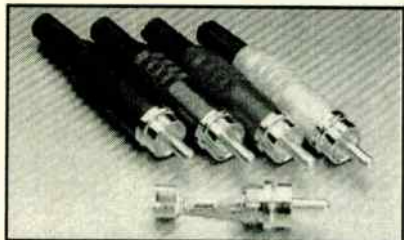
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LETTERS TO EQ

WHAT DO YOU EXPECT?

Re: June 1995 — "What Happened to My Digital Tapes?"

It is good to see that someone is forthcoming with information to assist those who have fallen into various traps in methods of handling digital tapes. This is especially true when related to techniques of archiving their precious masters and productions.

From my point of view, the reference to using F-1, as well as certain other formats for archiving, is a precarious position on behalf of the user. This format is even more disastrous for recording original works. Let's admit the facts: The F-1 was never intended to be a professional format, therefore, one should not expect professional results. However, I have heard of and seen studio after studio attempting to get into the digital market think that they are saving money by using the F-1 format. At the same time, they expect to "compete with the big boys" that were using professional digital formats. Even more horrifying, they expect the same standards and results, often taking their troubles to the manufacturer of the equipment. The ending consequence is a poor compromise at best.

In the past, having personally been associated for 15 years with a major studio and more recently associated with the service side of a pro audio company for 15 years, there are two things I have learned. One: I am old. And two: as they say on the farm, if you can't run with the big dogs, stay under the porch. To translate that statement for the readers: If they are not willing to buy or cannot afford professional equipment, they should not expect to get professional results. I realize that today's studios generally operate on a shoestring budget and a small margin of profitability; and often with staff that is basically "nontechnical." While there is nothing wrong with this approach and, on a positive note I must say, these businesses do serve a well-positioned purpose in the market. At the same time, they should be willing to accept a compromise in results and accept the responsibility for the results they achieve (or more appropriately do not achieve) when they use equipment originally intended for the high-end consumer market. After all, I do not believe that one would trust their medical problem diagnosis to an intern. Instead, we go to a true MD for

the highest confidence. The same principle applies to pro audio equipment.

R.E. McGraw
Pompano Beach, FL

A SWAL JOB

In the EQ Live article entitled "Hard Workin' Men," engineer Bob Butler mentioned he was having some problems controlling the low frequency energy that "shoots up in the room, hits the ceiling, and wraps around the stage." He further states that this energy and its level are "acoustically out of phase with what is coming out of the PA and tends to slur my low end a little bit."

He has experienced the same sound problem as I did, which became my prime motivating factor for the creation and development of our Studio Wavelength Absorbing Linear Structures (S.W.A.L.S.).

Three years ago I set out to develop a portable "sponge," if you will, that was not only capable of absorbing energy in a linear manner, but at a higher dB level than was currently available on the market.

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OUT OF TIME

Q I usually run my ADAT at 48 kHz since the higher sample rate gives (at least in theory) a better high end. I also sync a MIDI sequencer to the BRC to provide virtual tracks. However, I've read in EQ about the possible perils of digital audio sample-rate conversion, so I thought I'd try recording at 44.1 kHz instead to maintain the same sample rate from ADAT, to DAT, to CD.

Only problem is that dropping to 44.1 kHz also slows the sequencer, even though the sequencer still shows the original tempo. Is the problem with the ADAT, the BRC, or the sequencer? Is there any way to get the correct sequencer tempo when running ADAT at 44.1 kHz?

Will Gilman
via America OnLine

A ADAT's timecode is referenced to its sample rate, so when you change the sample rate, you change the timecode reference as well. You have two options:

1) Develop sequences while synched to ADAT at 44.1 kHz. The sequencer tempo indication will not be accurate, but all you care about is setting a tempo that sounds right — it doesn't matter what the sequencer calls that tempo.

2) If you develop a sequence while running off the sequencer's internal time reference (or synched to ADAT running at 48 kHz), and then, for some reason, need to drop ADAT down to 44.1 kHz, increase the sequencer tempo by 108.84 percent. This multiplies the sequencer tempo by the amount needed to compensate for the change in ADAT sample rate.

Craig Anderton
Technology Editor
EQ Magazine

CLONE RANGER

Q When cloning (digital to digital) DAT tapes, is it better to use the original DAT master tape or use a more recent clone? Assuming I hear no noise

artifacts in either, does it matter which one I use? Also, to be safe, how often should I clone tapes again for archival storage (long-term) purposes?

Linc Chamont
Brooklyn, OH

A In theory, it is always preferable to use the master tape as one's best source for subsequent copies of a DAT tape. In actual practice, however, the master tape retains its data most accurately if it is minimally used. Plus, keep in mind that machines have occasionally been known to eat master tapes when you least expect it. Therefore, the general practice is to make a half dozen or so first generation clones which then function as the "dubbing masters." These are the tapes that will then be used by dubbing facilities for the purpose of making copies while the source master spends its time in the vault.

The issue of how often a DAT should be cloned again for archival purposes is a favorite subject for debate within our industry — stemming from the fact that the format hasn't been with us long enough for anyone to genuinely know. There are facilities that currently backup everything to both digital and analog. The thought behind this procedure is that as analog tape experiences degradation, you at least still get something to play back. With digital, once a tape degrades past a certain threshold, you get nothing. By having backups in both formats, these facilities plan to check up on their libraries every 10–20 years, or as needed, to ensure accurate playback of material.

Roger M. Maycock
Marketing Support Representative
TASCAM

SILENCE IS GOLDEN

Q The production chief at my new job tells me that voice audio, specifically radio drama, requires more sensitive equipment than does music audio. He claims this is so because of the softness and nuances of voice vs. music and the inherent background noise, hiss, etc., that becomes obvious during silences — silences that tend not to occur in music. Therefore, he says, 16-bit sound editing using Macintosh NuBus card-based computers can't produce the quality he needs. He has shown

me that noise from the monitor and the CPU's box is substantial, and that this noise can't be effectively controlled.

What specific Macintosh NuBus card-based hardware (brand and model) will I need for my Quadra 650, running System 7.5.1, 32-bit clean to effectively edit and mix voice audio (drama)? How about for a Macintosh IIx? What type of software (brand and model)? What compression software will yield the least degradation of finished digital audio voice? I understand MPEG is the standard, but are there viable options?

Tom Klein
Sedro-Wooley, WA

A The assertion that voice recording per se requires more sensitive equipment than music recording is certainly debatable. Looking strictly at frequency response, the human voice only requires part of the frequency bandwidth offered by today's recording gear. There certainly are a number of recording engineers who'd argue that classical music, with its wide dynamic range, is, in fact, the most demanding engineering challenge.

Nonetheless, I think your production chief is making a very important point about silence. Recording silence is the real test of any recording technology, analog or digital. If your system (or recording environment) is noisy, you'll suddenly hear that noise in stark isolation.

Computers are inherently noisy machines, with their cooling fans spinning and disk drives crunching. Plus, components such as the computer's power supply and monitor throw off lots of radio frequency interference (RFI), which can find its way into your recordings. Fortunately, you can take some steps to combat these problems:

Isolation: You wouldn't put an analog 24-track in a live room, you'd keep it in the control room, away from the open mics. The same applies for hard disk recording systems. If it's not feasible to physically isolate the computer and monitor, try using an acoustic enclosure (essentially a "soundproofed" box; make sure it's well ventilated) for the computer, which should dampen most of the mechanical noise.

Externalization: The problem of RFI is a little trickier than mechanical noise, but not insurmountable. The crux



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of this issue is that the analog-to-digital converter (A/Ds) found in "semi-pro" sound cards (or built-in to the Power Mac and Quadra/Centris AV models) is generally not well shielded. That means the analog stage of your system could be picking up RFI "under the hood" of your computer. Note that this is only a problem in the analog stage; once audio has been converted to a digital bit stream, it [theoretically] is immune from interference or degradation.

The solution is to get that analog circuitry away from all the RFI and into its own shielded enclosure. We're talking external A/Ds here, and you have a couple of options: You can go with a system that offers dedicated A/Ds in an external box (such as Pro Tools), you can use a stand-alone A/D device (Symetrix has some offerings in this category), or you can even use a garden-variety DAT machine. If you're going the stand-alone or DAT machine

route, you'll want to use a sound card with digital inputs and outputs, such as the S/PDIF found on Audiomeia-series cards or the optical connector found on NuMedia cards to get the bit stream into your computer.

By adopting these twin strategies of isolation and externalization you should be able to configure a system that has an extremely low noise floor. I'm not going to step out on a limb and say any specific configuration is more quiet or better sounding than analog tape with Dolby SR as I don't care to touch off a firestorm with the analog adherents out there. I merely suggest that you follow the steps I've outlined above, perform rigorous testing on any system you're contemplating purchasing (possibly using a test tone generator or reference disc), and always let your own ears be the final judge.

As to your hard disk recording options for the Quadra 650 and Mac IIx, you'll need (at very least) a 16-bit NuBus sound device such as the Audiomeia II, NuMedia, MediaTime, Sound Tools II, or Pro Tools. OSC's Deck II software supports all these cards, as well as the built-in 16-bit sound hardware found in the Power Macintoshes and Quadra/Centris AV models. Depending on the card you choose, you'll be able to configure a system around Deck II that will play back between four and eight tracks (in real time, no premixing), which is certainly sufficient to mix and edit voice plus background music and effects.

Your final question regarding compression is one we're frequently asked. As there is currently no such thing as a "lossless" form of compression, we strongly recommend using no compression on audio files. MPEG has indeed become a compression standard, and we'll probably see other standards come and go over the next few years, but the bottom line on MPEG or any other current compression scheme is that you will take a hit in sound quality.

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OSC

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AMEK

The EQ

The tradition The pedigree

System 9098 Equalizer by Rupert Neve the Designer



"The SYSTEM 9098 EQ is a high performance Equalizer and Preamplifier designed to originate microphone signals of the highest quality and to process signals generally in terms of frequency response. The circuitry is based on the research I put into the 9098 console and the approach bears many similarities to that used in the 9098. Paramount importance has been given to the sonic quality of the audio path, taking great care to retain the highly-prized musical character of the famous old designs of this pedigree.

The SYSTEM 9098 EQ embodies the original curve shapes now enhanced by improved circuitry which provides swept frequency bands in place of the discrete switched steps of the past. Thus the EQ has become even

more powerful yet remains a subtle and creative tool, using the same basic circuit configurations which have been successful over many years. However, new amplifying devices and better quality components have resulted in lower noise, lower distortion and the ability to handle higher frequencies.

The result is an equalizer which has the solidity and sound of Class A without the cost, heat and weight penalties and thus provides the 'best of both worlds'. We have also left behind cumbersome and expensive hand cabling, noisy connectors, heavy separate power supplies and outdated assembly techniques which contribute nothing but nostalgia. Apart from the robustness, repeatability and reliability, we have now made one of my designs more affordable than ever before."



The System 9098 EQ is a Stereo 1U 19" Patch Rack unit and 2 Units are shown here.

UK Head Office, Factory & Sales:
Telephone : 0161 834 6747
Fax: 0161 834 0593

AMEK US Operations:
Telephone: 818 508 9788
Fax: 818 508 8619

AMEK Germany/Mega Audio:
Telephone: 06721 2636
Fax: 06721 13537

AMEK Asia:
Telephone: 65 251 1629
Fax: 65 251 1297

EQ NAMM REVIEW

NAMM's Summer Session cooked — and we're not just talking about the 93-degree Nashville heat. Here are some of the products that adorned the show floor and should be making their way into your project studio any day now...

SON OF SENNHEISER

Sennheiser has expanded its modular electret capsule line with the ME64 cardioid mic capsule. It's the newest addition to the Sennheiser K6 modular condenser mic system. The mic has been designed for studio recording and sound-reinforcement work. Powering of the capsule is achieved with either AA battery power or phantom power. Also featured is a bass roll-off switch. For more details, contact Sennheiser, 6 Vista Drive, P.O. Box 987, Old Lyme, CT 06371. Tel: 203-434-9190. Circle EQ free lit. #101.



DIVINE PROPHECY

If you're looking for a synthesizer that doesn't merely play, but that also shapes sound, check out Korg's latest synth called the Prophecy Solo Synthesizer. Prophecy features Korg's recently developed DSP-based Multi-Oscillator Synthesis System. It is capable of creating and combining synthesized models, including Physical Modeling, Analog, and Variable Phase Modulation. The 37-key Prophecy is equipped with pitch and modulation wheels, a dynamic ribbon controller and arpeggiator, and dynamic effects with real-time effects control. For details, contact Korg, 89 Frost St., Westbury, NY 11590. Tel: 516-333-9100. Circle EQ free lit. #102.

31 FLAVORS

Peavey's latest EQ, the Q431F, offers 31 mono bands of graphic EQ in two rack spaces and is combined with an automatic feedback



locating system and has been designed for use in both live and studio applications. When feedback occurs, the automatic feedback locating system will illuminate an LED over the appropriate slider. The LED will stay lit for a few seconds if the feedback stops before an adjustment is made. For details, contact Peavey, 711 "A" Meridian, MS 39301. Tel: 601-483-5365. Circle EQ free lit. #103.

C'MON GET HAPPY

Like the Partridge family, DigiTech has quite a talented family of Vocalists. The newest addition to this family is the MV-5 MIDI Vocalist. It utilizes much of the same technology as found in the DigiTech Vocalist VHM-5 and Vocalist II. The MV-5 was designed for keyboard players desiring to plug in and have instant vocal harmonies without programming. It automatically creates up to five-part vocal harmony from one voice input. Detuning provides instant four-voice thickening of vocal lines, while Vocoder harmonies allow musicians to play vocal harmonies desired on the keyboard. Then there are Chordal harmonies, which change the harmonies to fit the chords played on a MIDI keyboard. The Scalic harmonies just require users to input the key and scale, and the MV-5 will do the rest. Real-time control is achieved via MIDI continuous controllers. The MV-5 comes equipped with both XLR and 1/4-inch line level input jacks. Output can be either mono or stereo. The MV-5 also allows the user to bypass the harmonies using an external contact switch. For details, contact DigiTech, 8760 South Sandy Pkwy., Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #104

A STELLAR CONSOLE

D&R North America has introduced the Orion LCRS "Surround Sound" recording and mixing console. The Orion LCRS is an in-line format design with extra features on the monitor such as 60 mm faders, up to six aux sends, patch inserts, and automated mutes. Each channel has fader and mute automation, 4-band sweepable EQ (operating over a range from 10 Hz to 22 kHz), 16-track bussing, true left-center-right panning, stereo-in-place and PFL solo system, and optional VCA, moving fader, and dynamics automation. The 32 x 16 x 32 console with 12 stereo returns, 88 mix inputs, and an internally wired patchbay sells direct for less than \$35,000. For more information, contact D&R North America, Route 3 Box 184-A, Montgomery, TX 77356. Tel 409-588-3411. Circle EQ free lit. #105.



IMPRESSIVE COMPRESSION

Anthony DeMaria Labs' new ADL 1500 stereo tube compressor delivers a frequency response of 15 Hz to 30 kHz with a two-channel, all-tube design. Features include opto attenuators for "invisible compression," eight vacuum tubes, balanced in and outs, a stereo link switch, and adjust pots on the front panel. The ADL 1500 works for analog and digital recording as well as live sound. For more details, contact Anthony DeMaria Labs, 95 Dubois Rd., New Paltz, NY 12561. Tel: 818-340-0228. Circle EQ free lit. #106.

GRITTY GUITAR

The DOD FX7 guitar effects processor and preamp is a multieffects pedal that features an analog compressor and two analog distortion types, Overdrive and Grunge. Effects include a noise gate, EQ, a modulation section, 500-millisecond two-tap delay, and reverb. The modulation section can be assigned to function as a chorus, flanger, phaser, tremolo, detuner, two-octave pitch shifter, or wah. The FX7 comes equipped with 30 factory presets and memory locations for 30 user-defined programs. A Jam-Along-Jack allows users to plug in a tape or CD player and play along with the program material. Other features include connections for a volume pedal, headphones, and L/R outputs. For information, contact DOD, 8760 South Sandy Pkwy., Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #107.



ADDING COLOR

If you're looking to add a little color to your music, check out the new additions to the Vox family of amplifiers. The AC30/6 Tan Top Boost and the Limited Edition AC30 Purple maintain the same detail and specs as the renowned AC30. They house the traditional Celestion G12 Vox "Blue" speakers with alnico magnets. The authentic Vox oval die-cast "Egg" footswitch is also included. For details, contact Vox

Amplification, 89 Frost St., Westbury, NY 11590-5038. Tel: 516-333-9100. Circle EQ free lit. #108.



RANE GEAR

Rane is finally shipping the much anticipated DMS 22 dual-channel studio-grade mic preamp/stereo mixer. The unit includes 48-volt phantom power on each of the channels for use with condenser microphones, polarity invert switches, and input gain controls. Independent line level outputs with level controls are available for each channel. Pan controls (defeatable) send to a separate balanced stereo line mix output. A 3-band accelerated-slope equalizer section for each channel (defeatable) provides selectable high and low shelving frequencies and controls and a parametric midrange filter controls. For details, contact Rane, 10802 47th Ave., West Mukilteo, WA 98275-5098. Tel: 206-355-6000. Circle EQ free lit. #109.



EQ NAMM REVIEW

MEGAMIX IT UP

CTI Audio strikes back with the CAD/MegaMix M1600. This third-generation M1600 is a single-rack-space, 16-channel automation system that plugs into the insert points of any mixing console. Its class A VCA adds virtually no noise and distortion over the entire attenuation range and does not require adjustments to "tweak in" the lowest distortion available. The specially designed circuits eliminate click sounds and give 256 increments of fader resolution. A dip-switch configuration allows operation from the bundled software or from standard MIDI continuous controller commands. The M1600 includes MegaMix software for use on the Macintosh computer, but can be integrated into an existing system and software that follows MIDI specification. Software features include fader moves, mutes, solos, and groups, and such advanced features as off-line mode, trim, snap, and automated panning. The user can synchronize to MIDI clock, song position pointer, or to MIDI timecode, and utilize graphical moving faders on screen for real-time automated mixing. For more information, contact CTI Audio, Inc. 341 Harbor St., P.O. Box 120 Conneaut, OH 44030. Tel: 216-593-1111. Circle EQ free lit. #110.



IN SEQUENCE

Yamaha's latest General MIDI sequencer, the QY22, has a built-in tone generator and retails at \$595. The unit follows in the footsteps of Yamaha's QY20, but has upgraded features — one of these being a totally General MIDI-compatible sound set. The QY22 offers 128 General MIDI voices, 8 drum kits, and 25 chord types, tempo, and key signature settings, all of which are programmable. The new Auto Bass Chord feature provides instant accompaniment when controlled by any external MIDI controller. As far as tracks are concerned, there are four accompaniment and four sequencer tracks for eight tracks of operation. For more details, contact Yamaha, P.O. Box 6600, Buena Park, CA 90622-6600. Tel: 714-522-9011. Circle EQ free lit. #111.

BE ILLUMINATED



- When feedback occurs the Feedback Locator™ automatically lights an LED over the correct slider. The LED will stay lit for a few seconds if a feedback stops before an adjustment is made. If the feedback frequency is between two sliders, the Feedback Locator will light the two appropriate LEDs, with variations in LED intensity to indicate if the feedback frequency is closer to one slider or the other. And if a different feedback occurs while an LED is lit, the Feedback Locator instantly lights





RIGHT ON KEY

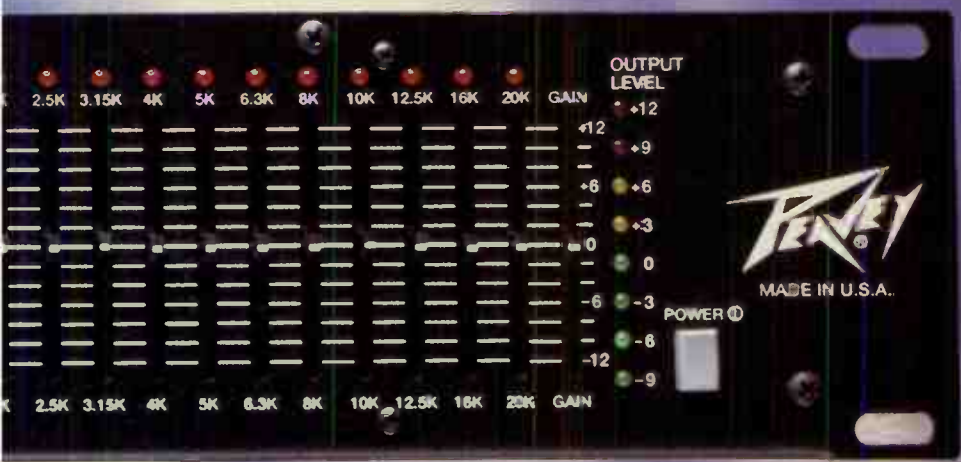
Fatar has added the new Studio-1100 to its popular Studio Controller Series. This mid-priced, 88-note, weighted-hammer action keyboard controller has the same mechanical action as its predecessors. Features include 32 presets that can be stored via sys ex, bank select, and pitch and modulation wheels. Any of the 120 controller values can be assigned to a programmable slider and a programmable control voltage pedal input. Also standard are four programmable zones, each with program change, channel assignment, relative volume, transposition, and velocity scaling. The Studio-1100 lists for \$1895 in the road case and \$1680 in the cabinet version. For further information, contact Fatar, distributed by Music Industries Corporation, 99 Tulip Ave., Floral Park, NY 11001. Tel: 516-352-4110. Circle EQ free lit. #112.

FOUR PLAY

The latest addition to Alesis's MicroVerb family of processors is the MicroVerb 4, and it comes with some advanced features. For example, users can edit and store their own programs by using two real-time edit controller knobs on the front panel. The MicroVerb 4 is the first MicroVerb to offer multi-effects capabilities. The effects algorithms are based on the Alesis MidiVerb 4 and QuadraVerb 2. There are 100 preset and 100 user-editable programs, many effects in true stereo, and several configurations offer up to three effects simultaneously. For more information, contact Alesis, 3630 Holdrege Ave., Los Angeles, CA 90016. Tel: 310-558-4530. Circle EQ free lit. #113.



THE Q 431F EQUALIZER WITH AUTOMATIC FEEDBACK LOCATING SYSTEM



\$299.99

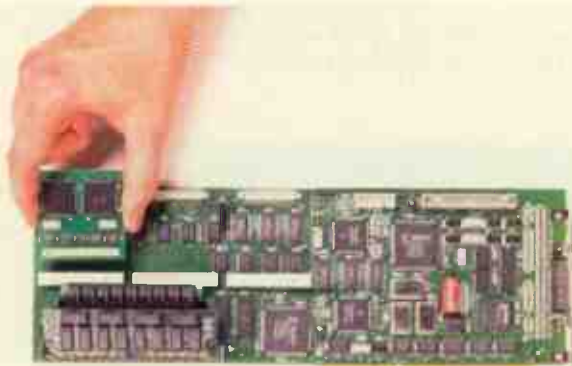
- 31-bands of 1/3 octave graphic equalization, standard 150 centers, +12dB cut/boost.
- Low cut filter and Bypass switches with LEDs.
- 20Hz to 20kHz bandwidth.
- Independent overall gain control.
- Two rack spaces.
- Shielded internal power supply.
- +18 dB max input/output levels.

the other LED. • The Constant Q filters control slider frequency-band width so slider adjustments won't affect adjacent slider frequencies. Constant Q filters also improve headroom at high cut/boost levels. Compare to other EQs using inferior gyrator circuitry which doesn't limit band width.



DAW OF EVOLUTION

E-mu Systems has introduced the DARWIN 8-track digital audio disk recorder. DARWIN is a stand-alone unit featuring screen-based digital audio workstation (DAW) style recording/editing, which delivers tape-based system ease-of-use at a price point competitive with modular digital multitrack recorders. Operation is intuitive through the unit's dedicated tape machine-style control buttons and straight-ahead operating system/graphic user interface. Dedicated control buttons such as transport, jog/shuttle, track arm, and monitor mode switches, combined with multipurpose softkeys, give functionality and versatility. Darwin also uses .WAV format for storing audio. Standard features include 10-segment LED meters with clip and peak hold, 44.1 kHz and 48 kHz sample rates supported, MS-DOS compatible file system, four analog balanced audio inputs (expandable to eight), eight balanced analog audio outputs, switchable +4/-10 dB operation, S/PDIF digital I/O, and five rear-panel and two internal option slots. For more details, contact E-mu, 1600 Green Hills Road, Scotts Valley, CA 95066. Tel: 408-438-1921. Circle EQ free lit. #114.



I COULD'VE HAD A V8

Digital Audio Labs has announced that its upcoming V8 digital audio workstation can be configured for up to 16 real tracks. The V8 audio processor card plugs into an IBM-compatible computer and records or plays up to 16 simultaneous channels of audio. Different from other PC-based systems that interface to an external hard disk, the V8 records directly to the computer's hard disk. It uses a modular design that allows users to configure a system tailored to their specific needs. Included with the V8 are two Motorola DSPs, and a total of eight DSPs can be added to the V8. Both analog and digital interface cards can be used with the V8. For details, contact Digital Audio Labs, 14505 21st Ave. North, Suite 202, Plymouth, MN 55447. Tel: 612-473-7626. Circle EQ free lit. #115.

It's Sleek.
It's Reliable.
It's Ergonomic.
It's Dead.

Presenting Foundation 2000RE. The ultimate recording/editing platform, and a darn good mousetrap for just \$9,000. Foundation is the fastest, most intuitive non-linear audio platform on Earth. No cursor. No mouse.

Just an amazing array of delightfully direct controls, including a solid brass jog wheel and touch-sensitive screen. The 2000RE features Fostex's powerful event-based audio editing software.

Timeflex time expansion/compression, LTC/VITC synchronization, and superb 16-channel audio quality.



Need more tracks? Cascade multiple

COVER ALL BASIS

Steinberg's new Cubasis Audio integrates MIDI sequencing, notation, and hard disk recording. Cubasis works with ordinary MME sound cards without the need for expensive dedicated hardware. MIDI information records into the program and is edited and arranged to create music or viewed in standard music notation with printed lyrics. CD-quality information is recorded using an ordinary sound card into the same arrange screen. Four independent, stereo channels of audio may be recorded on most sound cards. The MIDI data is graphically edited using the key editor, numerically edited using the list editor or as musical notation. The program synchronizes to MIDI clock and has support for GM/GS/XG devices. Cubasis Audio retails for \$299. For more information, contact Steinberg North America, 9312 Deering Ave., Chatsworth, CA 91311. Tel: 818-993-4091. Circle EQ free lit. #116.



WARE IT'S AT

Opcode Systems has introduced Audioshop 2.1 and DigiTrax 1.2, two new recording and editing programs for the Power Mac. The updated 2.1 version of Audioshop processes audio files even faster and is able to convert any audio file to or from .WAV format. Audioshop also loads and saves digital audio tracks in many other formats including AIFF, Hypercard, Macromedia Director, System, and Quicktime. Audioshop comes with two disks of songs and sound effects. DigiTrax 1.2 is multitrack digital audio recording and editing software. Its studio-like environment and intuitive user interface facilitates the use of automated mixdowns, unlimited track bouncing, and nondestructive editing. DSP routines such as normalize, reverse, and invert are plug-in modules, so expansion is easy. The retail price for Audioshop 2.1 is \$149.95, and for DigiTrax 1.2 is \$199.95. For more info, contact Opcode Systems, Inc., 3950 Fabian Way, Suite 100, Palo Alto, CA 94303. Tel: 415-856-3333. Circle EQ free lit. #117.

2000REs together. Got another session? The RPE™ removable disk system loads your next project in seconds. Need machine control? Use the Sony 9-pin, MIDI or ADAT Sync—the 2000RE does it all. With Foundation's bulletproof software and rugged Fostex hardware, each job gets done simply, quickly and reliably.

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on a solid Foundation? Call 1-800-7-FOSTEX or 1-212-529-2069 for a demo or free video tape. Discover for yourself what makes the Foundation 2000RE such a killer system.

Fostex



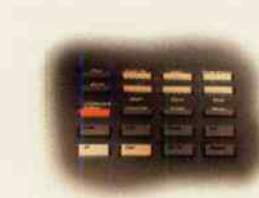
One wheel everyone can get behind.

Grab hold of the solid brass jog wheel and feel the track. Foundation's unsurpassed audio scrubbing resolution sounds and feels like magnetic analog, so you'll park at exactly the right point—without circling the block.



The ultimate screen test.

Simply use your finger to select a waveform, edit envelopes, library information, and much more while you're recording or playing back. Foundation even lets you output your display to any video monitor.



The keys to your success.

Don't wait, do it now. Ergonomic controls unlock your creative power. Dedicated editing buttons give you fast single stroke cut, paste, fade and trim functions.



Work with the biggest names in the business.

Keep it digital as you control and transfer from the most popular multitrack formats to Foundation, the ultimate front end editing system. Foundation speaks to all the right stuff.

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Kinetic Energy

Ex-Policeman Stewart Copeland has a multipurpose project studio that works in many ways

STUDIO NAME: Kinetic Studio

LOCATION: Culver City, CA

KEY PERSONNEL: Stewart Copeland, owner; Jeff Seitz, chief engineer/coproducer; Stephanie Post-Pollard, Copeland's assistant

PROJECTS/ARTISTS RECORDED: Well known as composer for such memorable films as *Wall Street*, *Rumblefish*, *Highlander II*, and last year's *Rapa Nui*, Copeland has just finished the score for *There's A Girl In My Room*, starring Winona Ryder. His TV work includes the series *The Equalizer*, original title theme for *Babylon 5*, and recently *White Dwarf* for Francis Ford Coppola. His most recent solo album project is an orchestral work recorded with The Albany Symphony Orchestra.

CONSOLE: Euphonix CS2000D 72-channel with DSC Digital Studio Controller and two sets of 8-channel ES-108 Dynamics

SYNTHESIZERS: Fairlight Series III; Kurzweil K-250, K-1000, and K-1000 PX synth/samplers; E-mu Proteus-1

MONITORS: JBL 4513B; Alesis Monitor One; Yamaha NS-10

AMPLIFIERS: Crown PSA-2; Perreaux 3000B

COMPUTERS AND SOFTWARE: Macintosh IIfx with MOTU Professional Performer; Digidesign Sound Tools; Linn 9000 drum computer

RECORDERS: Otari MTR12 w/4-track 1/2-inch and 1/4-inch stereo heads; 16 tracks Alesis ADAT with BRC controller; Fostex 16-track; Maxtor optical disc; Nakamichi CR-4A cassette; Sony PCM-701 processor and PCM-3348 hired on demand

VIDEO: Sony SVO-9600 with Microlynx synchronizers

OUTBOARD GEAR: Kepex noise gates; Lexicon 244 digital reverb; Klark-Teknik

DN-60 spectrum analyzer and DN-27 graphic equalizers; Orban paragraphic equalizer; Drawmer DL221 gates and compressor/limiters; Bel Electronics digital delay; Roland SR55 echo and Jazz Chorus; Yamaha SPX-90 and SPX-90II reverb/delay

MICROPHONES: Neumann U87 and TLM-170; AKG D12 and C414; beyerdynamic M-260N(c); Shure SM81 and SM58; Sennheiser MD-421

STUDIO NOTES: Jeff Seitz states: Our studio is a long room with the new Euphonix console and the outboard gear on one side opposite an isolation area enclosed by sliding glass doors. Stewart composes in there with his Fairlights, his Macintosh, and the video monitors. With the CS2000, we can work on two projects simultaneously by feeding Stewart what he needs while I am mixing and editing other work. We've got a nice, meaty-sounding drum booth for his percussion work, and we also do a fair amount of vocal and overdub work as well. With the Euphonix, we can easily switch from one session with mic inputs to another with line inputs. The DSC controller is useful for observing where different frequencies cross each other as you're boosting or cutting EQ.

EQUIPMENT NOTES: Stewart Copeland adds: My last console was ten years old, and when we checked out what was available we found everything except the Euphonix seemed to be from the previous generation. The CS2000 has an entirely new brain architecture, and with the processing done in a separate enclosure, the console is no longer like a furnace generating heat. With the Total Automation we can go from a symphonic album to a film score and all the settings come up effortlessly. I can finally switch between projects and mix as I go, which has always been the way I preferred to work. I start out composing with my sequencer, then get a mix up that I like that also rides the levels of the dialog. It's a basic mix to which I add overdubs as I go and mix them in to where I like them. Most of the overdubbing is done to the ADATs, with the 3348 brought in for the final mixing.

EQ





COOKING STEW: Copeland uses his project studio to create music for television, film, and albums.

Photo by Ed Colver

IT'S UNLEASHED MORE CREATIVITY THAN

The Mackie CR-1604 16x2 mic/line mixer is getting dangerously close to becoming a pro audio classic.

Not because it has the most mic inputs, knobs, buses or switches — others have long since topped us for sheer numbers of doo-dads and thingamabobs.

No, the CR-1604 has ended up in so many studios and on so many stages because it sounds good. And because it's downright easy to use.

More than any other component, your mixer is the focal point of all your creative efforts.

If it's complicated to operate, you've just erected a frustrating barrier between you and your music. If it's noisy, everything that's recorded will be noisy, too.

When you're looking for an affordable, compact mixer that's good enough to regularly record complete albums and primetime TV soundtracks, call us toll-free (M-F 8:00 AM to 3PM PT).

You'll talk to a real person who'll send you our 40-page color tabloid complete with a 16-page hook-up and applications guide.

Then start exercising your musical creativity with the mixer that's becoming a classic for all the right reasons.

EXTREMELY RUDE, BLINKING SOLO LIGHT.

Sounds like a minor detail until some night at 2AM when you can't figure out why there's no sound coming out of your monitors.

BEEFY HEADPHONE AMP WITH SEPARATE VOLUME FADER.

Instead of the usual wimpy amp, the CR-1604 has a separate, high-gain headphone amplifier section with enough gain to drive any brand of headphone to shock volume levels that will satisfy even a drummer. Also has more than enough gain to drive any monitor amplifier.

INSIDE: QUALITY COMPONENTS

like double-sided, through-hole plated fiberglass circuit boards with solid brass stand-offs, gold-plated interconnects and sealed rotary potentiometers that resist dust & liquid contamination.

BEST RFI PROTECTION OF ANY COMPACT MIXER.

No matter how quiet a mixer's internal circuitry is, it can be sabotaged by external radio frequency interference. RFI is created by broadcast stations, cell phones, computers and even that expensive radio-controlled car your kid got for Christmas. RFI gets into a mixer via the input jacks where it uses the internal circuit traces as miniature antennas to produce noise ranging from a low-level hiss to actual, audible voices and music.

The CR-1604's 1/4" jacks use a shunting capacitor to stop RFI before the main circuit traces. Instead, RFI is re-routed back through the metal jack body and washer, then dissipated via the mixer's outer chassis.

XLR inputs are likewise protected from RFI via ferrite beads.

Next time you see a mixer with plastic 1/4" jacks, remember what you just learned.

DUAL PURPOSE METERING SYSTEM. Besides showing main L/R output level, the LED ladders are used to establish input levels. Set a channel fader at Unity, press the channel's SOLO button and set input trim level. This approach achieves very high headroom and low noise at the same time. Plus you have 20dB MORE GAIN above Unity.

INSTANT HANDS-04-ACCESS to constant power pan controls, musical 3-band equalization, ALT 3/4 extra stereo bus, stereo in-place solo, seven high gain Aux sends per channel (via four controls) and four high gain stereo Aux returns (20dB more gain above Unity).

MULTI-WAY CONVERTIBLE PHYSICAL DESIGN.

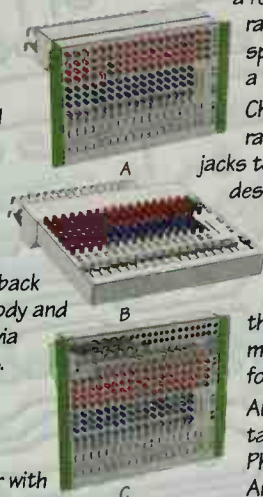
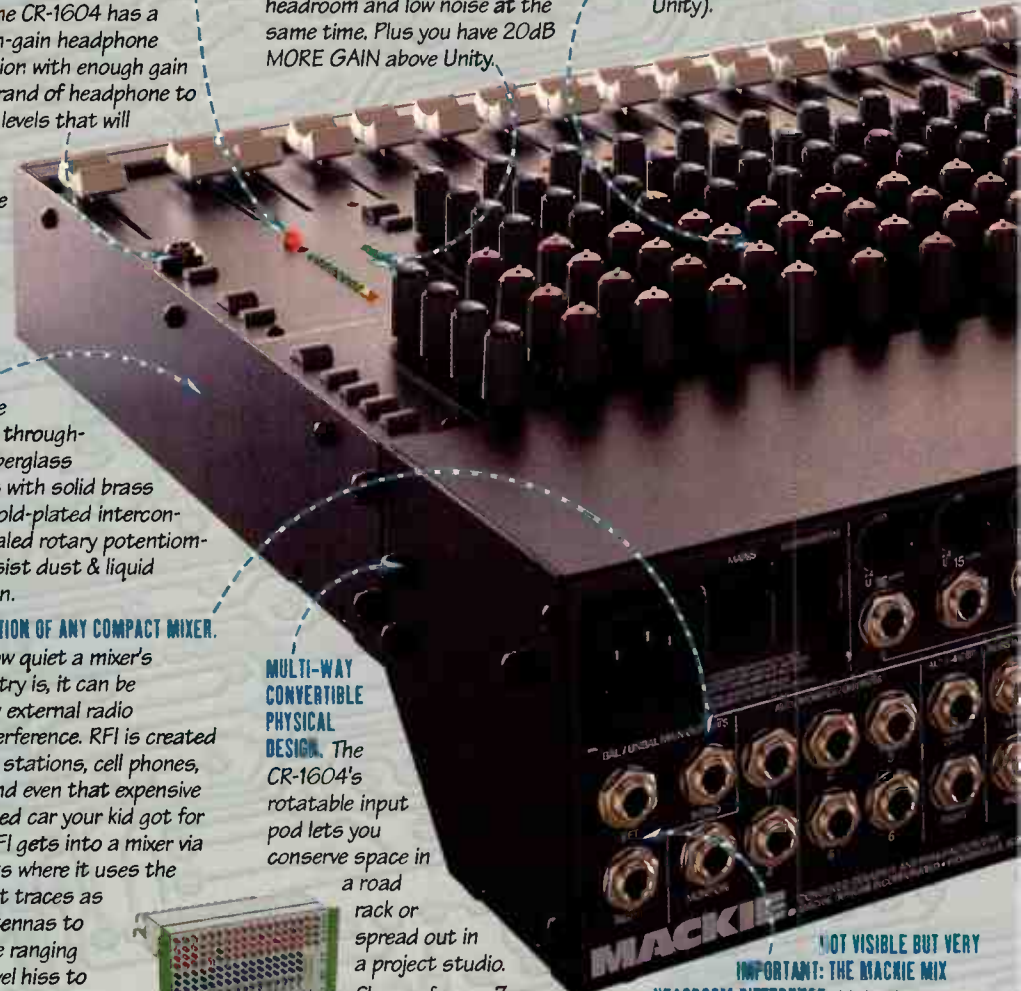
The CR-1604's rotatable input pod lets you conserve space in a road rack or spread out in a project studio.

Change from a 7-rack-space mixer with jacks to back (A) to a tabletop design with jacks to top (B) in minutes. Add our optional RotoPod bracket (C) and rotate inputs and outputs to the same plane as the mixer's controls (a favorite for small SR set-ups).

Any of these conversions takes just minutes with a Phillips-head screwdriver. And our XLR10 10-mic-preamp expander can be added in any of the configurations.

NOT VISIBLE BUT VERY IMPORTANT: THE MACKIE MIX HEADROOM DIFFERENCE.

Nobody uses just one channel of a mixer (although most headroom specs are stated that way). In any mixer, the mix amp stage combines signals from ALL inputs at once. If it overloads, you can't back off the master fader because it comes AFTER the the mix amp. So audible distortion results when the mix amp gets bogged down with multiple hot inputs. Mackie's unique mix amp architecture provides as much as twice the mix headroom of conventional designs. No wonder it's a favorite of top electronic percussionists.



ANY OTHER COMPACT MIXER.

ULTRA-LOW NOISE. When you compare noise specs, look for the one that counts: all 16 channels up at Unity Gain — not one channel at Unity gain. No other compact mixer beats the CR-1604 when it comes to low noise floor.

MULTI-FUNCTION AUX SEND SYSTEM WITH LOADS OF GAIN. AUX 1 on each channel can be used either for effects (post-fader/pre-EQ) or switched to monitor sends for stage monitor or headphone cue signal (pre-fader/pre-EQ). AUXs 2 thru 6 are post-fader/post EQ. AUX 3 and 4 knobs can be shifted to AUX 5 and 6 at the touch of a button.

MUSICAL 3-BAND EQUALIZATION. The CR-1604 redefined equalization points for compact mixers: 12kHz Hi EQ (instead of 10kHz) for more sizzle and less aural fatigue, 2.5kHz Mid (vs. 1kHz) for better control of vocals and instrumental harmonics, and 80Hz Lo EQ (instead of 100Hz.) for more depth and less "bonk." Others have copied these EQ points, but none have successfully emulated our quality equalization circuitry.

It costs us more, but the result is zero

phase distortion and a sweeter, more musical sound. It's another reason that the CR-1604 is a favorite of TV and film soundtrack scorers.

LEGENDARY MICROPHONE

PREAMPS. Instead of sixteen "acceptable" integrated circuit microphone preamps, the CR-1604 features six big-console-quality preamps...the same mic preamp design that's on our acclaimed 8*Bus consoles. You get tremendous headroom and bandwidth with less noise and distortion. If your particular application requires more mic inputs, simply add our XLR10 10-Mic-Preamp Expander. Both it and the CR-1604's internal mic preamps have real and verifiable specs of -129.5 dBm E.I.N., 300,000Hz bandwidth and 0.005% THD. No wonder several of the world's top microphone manufacturers use Mackie Designs CR-1604s to demo their finest condenser mics at trade shows.

INPUTS AND OUTPUTS AT PROFESSIONAL — NOT

HOBBYIST — SIGNAL LEVELS. The CR-1604 operates internally at industry-standard +4dBu levels to help reduce noise. But it can also handle the weaker -10dBV levels found on some digital multitrack machines and other equipment.

¹This is no idle boast. Consider these tours for starters: Madonna, Rolling Stones, Boyz II Men, Whitney Houston, INXS, Janet Jackson, Peter Gabriel, Bette Midler, Bruce Springsteen, Paula Abdul and Moody Blues. Mention in this list denotes usage by band members or tour techs and in no way constitutes an endorsement by the artists mentioned.

²More fine print: Mention in this ad denotes usage as reported to Mackie Designs and in no way denotes endorsement by the artist, program or production company listed.

Split monitor configurable for easy 8-track digital tracking & mixdown

Used on more superstar world tours in the last three years than all other compact mixer brands combined¹

Legendary studio-quality discrete microphone preamps

Used by members of the Tonight Show band, David Letterman band, Conan O'Brien band, Saturday Night Live Band²

Expandable with XLR10 Mic Preamp Expander & Mixer active combiner

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Special mix amp architecture for twice the mixdown headroom of other designs

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ADATs, DA-88s AND HARD DISK RECORDING SYSTEMS. We'd dearly love for you to buy one of our 8*Bus in-line consoles, but the CR-1604 makes a very effective 8-track recording mixer. The CR-1604's first eight channels have post-fader channel inserts (channel access). This VERY important feature is found on few other compact mixers. It lets you create a "split console" so that you can simultaneously track on eight channels and monitor/mixdown on eight more.

EXPANDABILITY. If you add a second or third digital multitrack, you can use one or two additional CR-1604s with our MixerMixer active combiner. It lets you run 32 or 48 channels without having to "cascade" the mixers.

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World Radio History

CIRCLE 38 ON FREE INFO CARD

Vintage Neumann

These classic Neumann M49's are a pair of mics with plenty of HIStory — just ask owner and user
Bruce Swedien

MICROPHONE NAME: Neumann M49

PRICE WHEN NEW: \$489 (list price in the late 1950s)

FROM THE COLLECTION OF: Bruce Swedien
PROJECTS USED ON: Used to mic the Andre Crouch Choir on Michael Jackson's "Man in the Mirror." Also used on all the choir parts on Quincy Jones's *Places You Find Love*, as well as on the songs "Earthsong" and "You Are Not Alone" from Jackson's latest album, *HIStory*.

TYPE OF MICROPHONE: Vacuum Tube Condenser

POLAR PATTERN: Switchable: cardioid, omnidirectional, bidirectional

FREQUENCY RESPONSE: 40 Hz to 16,000 Hz

SENSITIVITY: 0.7 millivolts/dyne/square centimeter

RATED SOURCE IMPEDANCE: 200 ohms

MAXIMUM SPL: 125 dB (for .5% distortion)

OUTPUT LEVEL: 0.45 mV (omni), 0.6 mV (cardioid), 0.8 mV (bidirectional)

TOTAL HARMONIC DISTORTION: Less than 0.6% (up to 114 dB SPL)

TOTAL NOISE VOLTAGE: 14 μ V or less

WEIGHTED NOISE VOLTAGE: 4 μ V or less

TUBE COMPLEMENT: AC 701k (one)

POWER REQUIREMENTS: Neumann NN 48b power supply

DIMENSIONS: 163 mm (length) x 80 mm (diameter)

WEIGHT: 0.8 kg

MIC NOTES: The output impedance can be changed to 50 ohms by moving two links on the output transformer.

USER TIPS: Bruce Swedien states: I use my two M49's set to omnidirectional in an X-Y position. To record a choir,

I'll have them stand in a 30-foot diameter circle around the mics — so I need a good-sized studio. By using the X-Y position, I get a very wide space, and the phase coherence is great. The arrival time is so close it's almost identical. On top of all that, it goes to a wonderful mono for broadcast.


I take a very classical approach when using the M49's — no compression, EQ, or any of that stuff. I put them through my Neve 1084 Class A modules and then straight to tape. I love those 1084's.

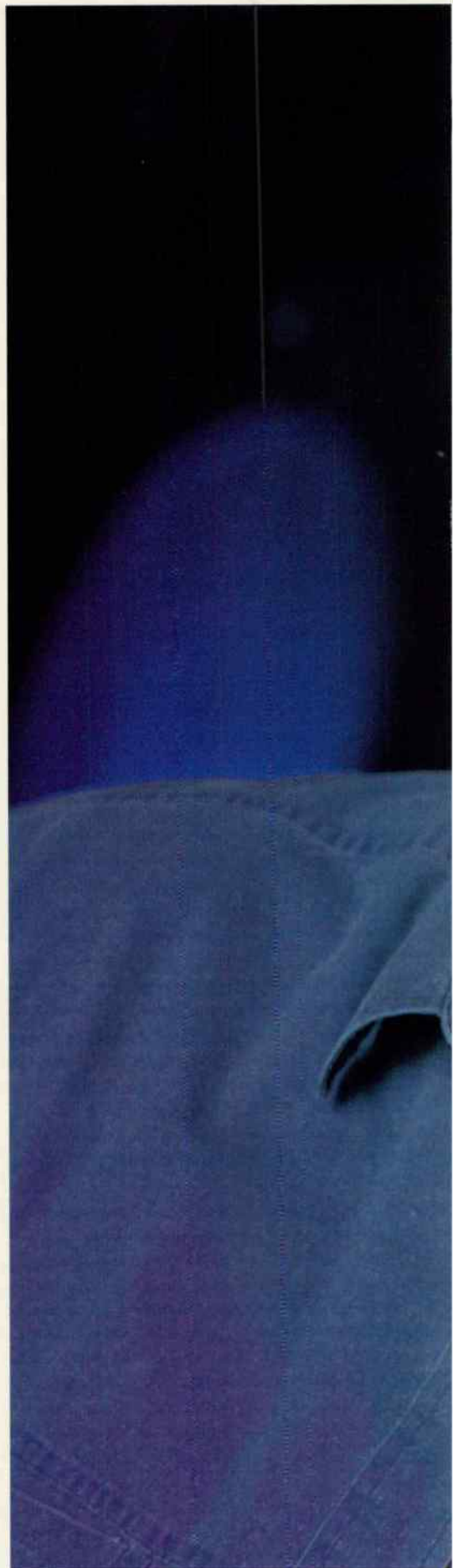
HISTORIC NOTES: After World War II the Allies restricted German use of AM radio in an effort to limit widespread communication as used by Hitler to help gain power in Germany. This led to an increased interest in FM radio, not considered a great communication medium due to its limited range. German engineers found FM broadcast to have a greater potential for high-quality sound and thus became concerned with the quality of the microphones used to capture sound for broadcasting purposes. This was a major factor in Neumann's development of the M49 in the late 1940s.

The M49 was introduced to the European audio community in 1951 with the MSC2 tube and a gold-deposited PVC diaphragm. Shortly after the mic's introduction the tube was changed to the AC 701k to conform with a standard set by the German broadcasting union (the union wanted a minimum of parts to deal with and decided that all broadcast mics would have to use the AC 701k).

In the late 1950s, Neumann introduced the M49 to the United States market. In 1960, the diaphragm base material was changed to Mylar, which remained until 1974 when Neumann stopped manufacturing the mic.

FUTURE PLANS: Neumann is currently working on a successor to the M49 with a nearly identical sound inlet basket and large-diaphragm capsule.

Swedien is currently using both microphones on Quincy Jones latest project. 



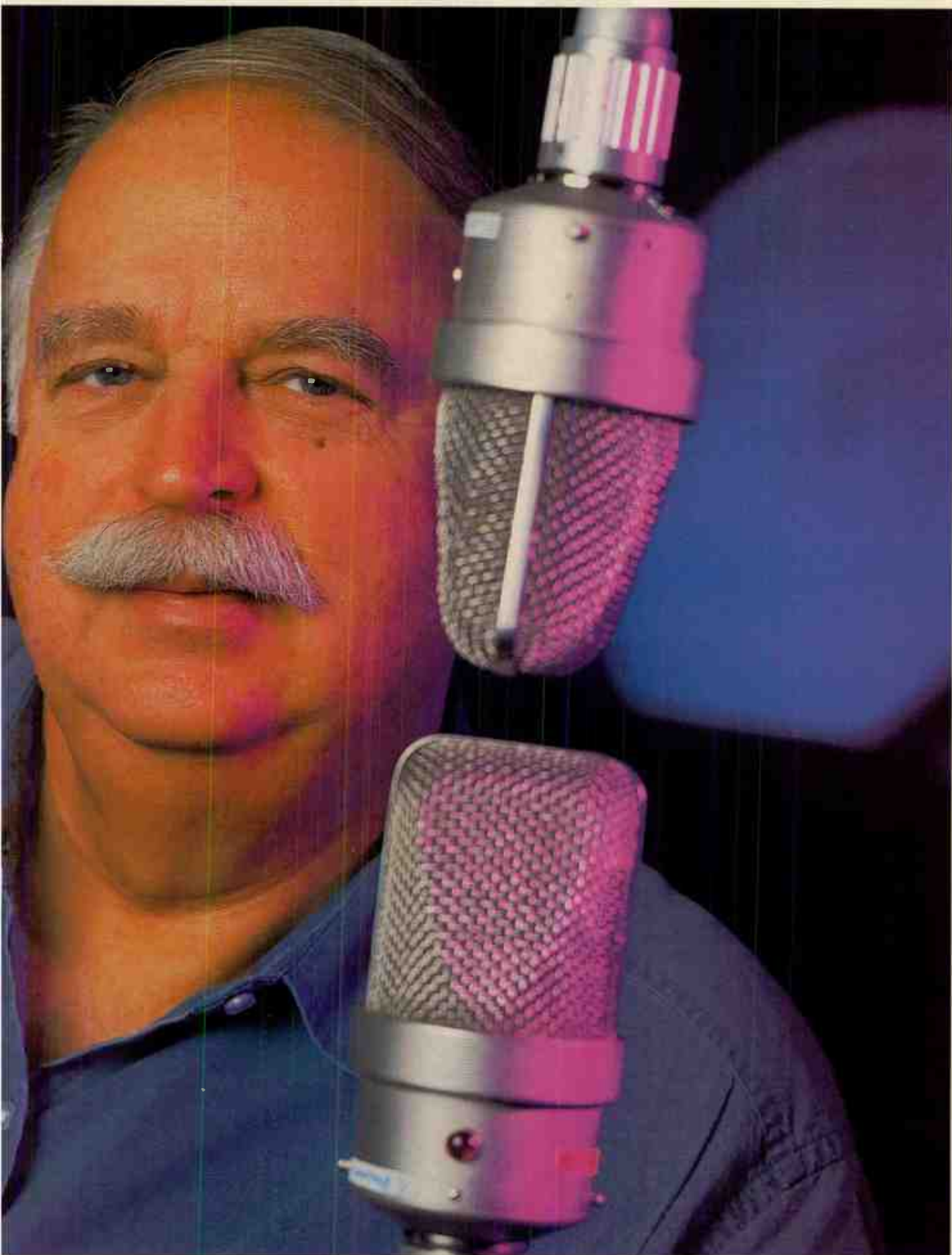


Photo by Julian Jaime

Natalie Merchant's "Carnival"

Engineer John Holbrook gives a guided tour through "Carnival," Merchant's first solo release

EQ: Since there was no producer for this album (*Tigerlily*), did that give you more creative freedom in the recording process?

John Holbrook: Natalie wanted to go for that classic sound such as Fleetwood Mac and Van Morrison as opposed to using all the flash, and being trendy. This was perfect for me because that's my background. I was able to have more creative input and

was sort of 1/3 creative producer. Natalie being the executive and Peter Yanowitz, the drummer, being the other 1/3. If I felt strongly about something, I voiced it and everyone respected that.

Was the track an analog or digital recording?

The entire album was analog all the way. We used master and slave 24-track Studer 800's. One was used for recording basic tracks and the other was used to record the overdubs. Then we mixed everything down to analog 1/2-inch. I recorded at 30 ips and mixed at 15 ips. I chose these speed settings because they really helped emphasize the bottom end and add that "warmth" that Natalie wanted.

Tell me about the street noise at the end of "Carnival."

Natalie had wanted some street ambi-

ence in "Carnival" to fit with the song's theme. We tried to mike sound effects off records and played around with walkie-talkies to emulate police car sirens. Needless to say, they all sounded hokey. When we got to Sony Studios in New York for the final mix-down, Natalie took to the streets with her Sony portable DAT recorder and mini mic under her coat. She came back with some very New York street-sounding material. We took that and striped it onto four tracks of the multitrack tape at Sony. Then it was blended in the mix.

Did the band play live for this song, or was there a lot of overdubbing?

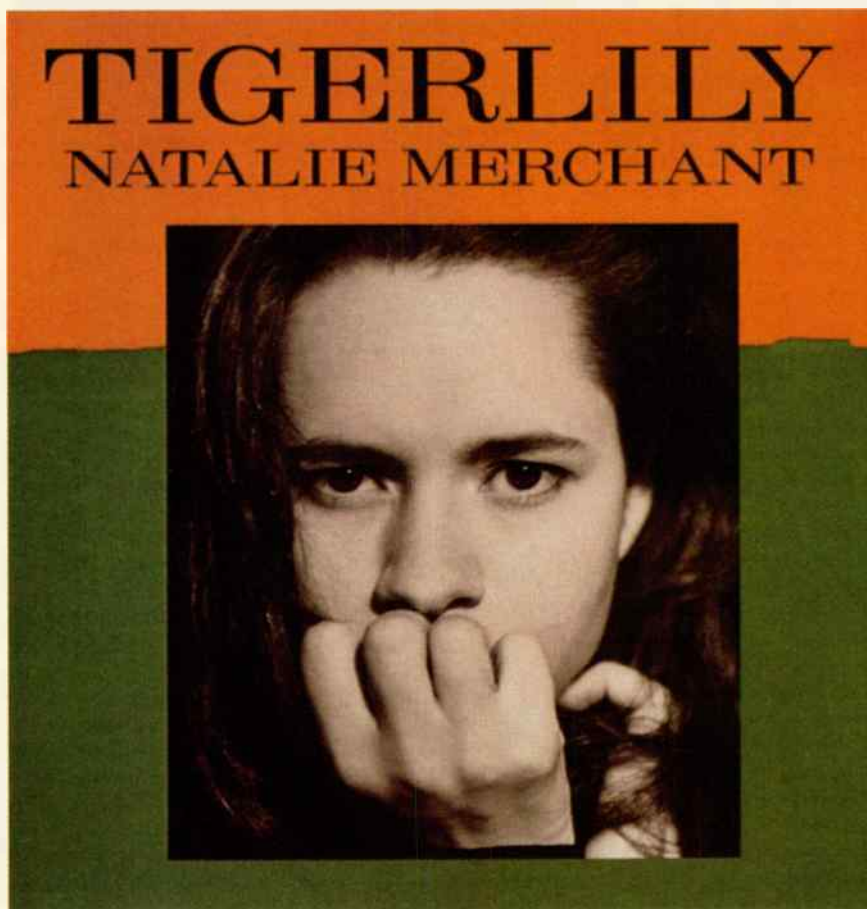
The guitar, bass, and drums were recorded together live. Natalie's Hammond B3 and vocals were overdubbed later on. On the B3, I used a pair of beyerdynamic 160's on top and a Neumann U47 on the bottom. The conga parts were overdubbed as well, and I used an AKG C24 on them. For bass, there was a combination of a direct box and miked cabinet. The bass cabinet was located in this "hut" of gobos in a balcony just above the live room and was miked with an E-V RE-20. The guitar cabinets were in an iso booth, and the drums were recorded from the live room where the band members were sitting. So the parts were well separated.

Describe the recording process for Natalie.

Natalie's vocals were recorded at a studio called the Club House, whereas the band's tracks were recorded at Bearsville Studios. We used a tube Neumann U47 on her exclusively. The board at the Club House was a Neve 8058, and the onboard preamp was used going through an LA-2 limiter. Natalie does have a tendency to peak once in a while, so I did some manual channel gain riding during vocal tracking. There was some vocal comping, but overall we tried to use the most of one single take.

It sounds like there is some doubling on Natalie's vocals...

Yes, there was. Once we had the final lead vocal, we decided that certain



EX-MANIAC: Natalie Merchant goes it alone on *Tigerlily*.

aspects would benefit from some doubling. So we ran down the vocals, picked out these parts, and then doubled them.

The electric guitar sounds very vintage and warm. Explain its miking and recording setup.

Jen Turner, the guitarist, played through two amplifiers — a Marshall and an old Fender. We had her amps set up in one of the iso booths, and I close miked each one. The amps were positioned side by side, and on the Fender there was a Neumann U87 (which was modified by a company called Innertube that takes stock U87's and replaces the inner electronics with tube technology), while a U67 miked the Marshall. The guitar was recorded onto two tracks going through two dbx 160's set moderately at 3 or 4:1, just to keep her guitar smooth.

So how did you separate the two amps from one another?

Didn't bother, I just let them go. We weren't really looking for separation. There was a certain degree of difference in sound between the two amps, lending to the guitar's overall sound. During mixdown, I panned them out a bit, but we wanted to maintain a nice blend of guitar sound.

The drums sound like a sequenced loop, fess up...

The drums were live. In sections of the song, it may sound like a loop, but the dead giveaway is the ritard at the end — you'll hear Peter slow down with the rest of the band. The kick drum had an RE-20 on it, while the snare had a Shure SM57 on top and on its inside was a miniature Countryman mic. The three toms each had a U87, and for the overheads I used an old AKG C24 stereo tube mic. On the hihat was a KM86. I like to record as flat as possible, but I did do some EQing on the drums. For the cymbals and overhead, I took out a lot of the low end. I used a Pultec equalizer on the snare drum to add some bottom, and 10 kHz at the top to make it a little wider. For the kick and toms, I cut around the 400 Hz range from the board (Neve 8078 with 4-band EQ) EQ, and added a touch of high-mid to keep them from sounding "cardboardy."

—Liana Jonas

Stick Your Pole Into a "Stubby-Sub"

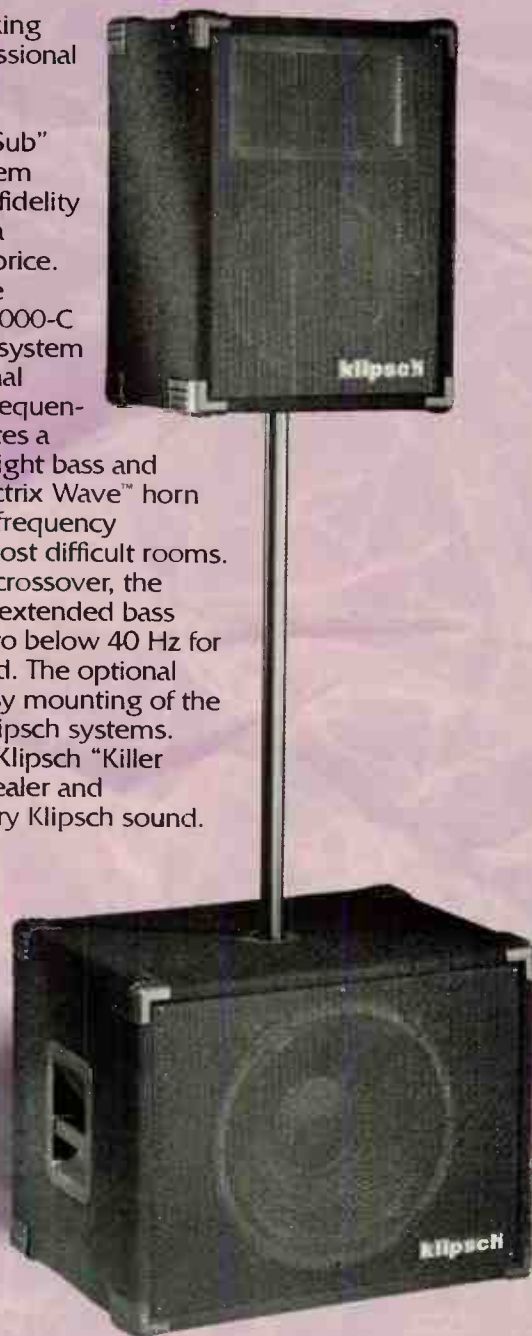
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PROJECT STUDIO?
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MATT**

SHAQ RATTLE & ROLL

“LIFE IS A SPORT, DRINK IT UP” is much more a Shaq-ism than a reflection of Mike Jordan’s philosophy. At 23 years young, Shaquille O’Neal has had two platinum rap records, starred in a movie, is starring soon in a sure-fire blockbuster, and is the feared nemesis of an NBA team in a city near you (that is, if you don’t live in Orlando, FL). On any given night you can actually hear Shaq coming from 1/2-mile away in his maroon Chevy van, slammin’ and jammin’. This cat likes low end. There is a story that Shaq had his van fitted for some kind of super-amazing stereo system with a couple of gazillion watts only to have it catch fire when he turned it up a little too loud.

Two years ago I was minding my own business on a Friday at Full Sail when my assistant came in and said, “The Big Guy is here.” Above my door in the window, looking a little shy, was Shaq. He said in his low, quiet voice, “I’ve got a record deal with Jive and I need your help, I hear you’re the man.” Now, I’m a regular white boy

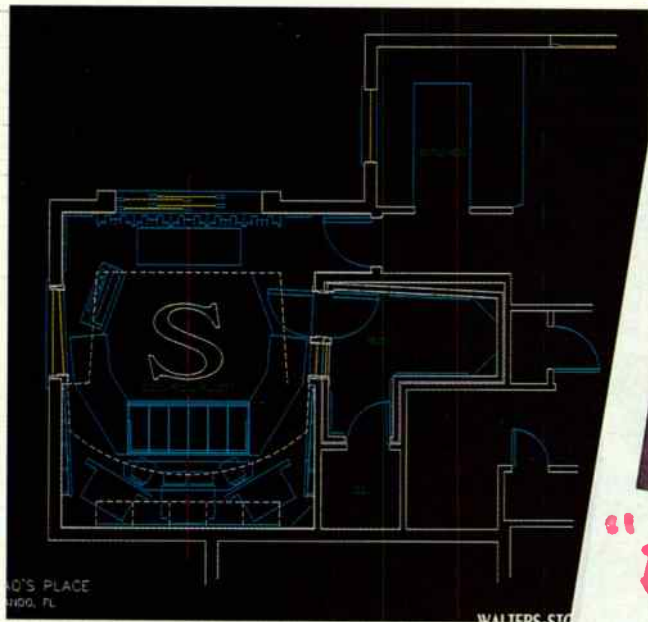
from Cincinnati, OH. I’ve cut lots of great R&B, from Ohio Players to Bootsy to Prince, but not too much rap...OK, not *any* rap. It’s a totally different scene. So, I told him, “Shaq, I’m the wrong guy. I can make it sound sweet, but I’d hold

you back in production.” So, I wound up engineering for him, and in the process met some of the best rap producers on the planet. I became a student and a fan of rap — and gained Shaq’s trust in the process.

It was probably that trust that prompted him to call one day to tell me he wanted a project studio in his house and could I just “make it happen.” I surveyed his property and decided that the best place was in an apartment in the pool house next door. Next was, “So how much do you want to spend, Shaq?” The reply, “200, but I want those faders that move, man.” Proceeding an explanation of how much a 60-input Neve like the one at Full Sail where he’d recorded his music might cost, Shaq said, “I don’t like to write those big checks, no way. Better get something else.” Well, we edged it up to \$250,000, but that was for the whole enchilada, acoustics included.

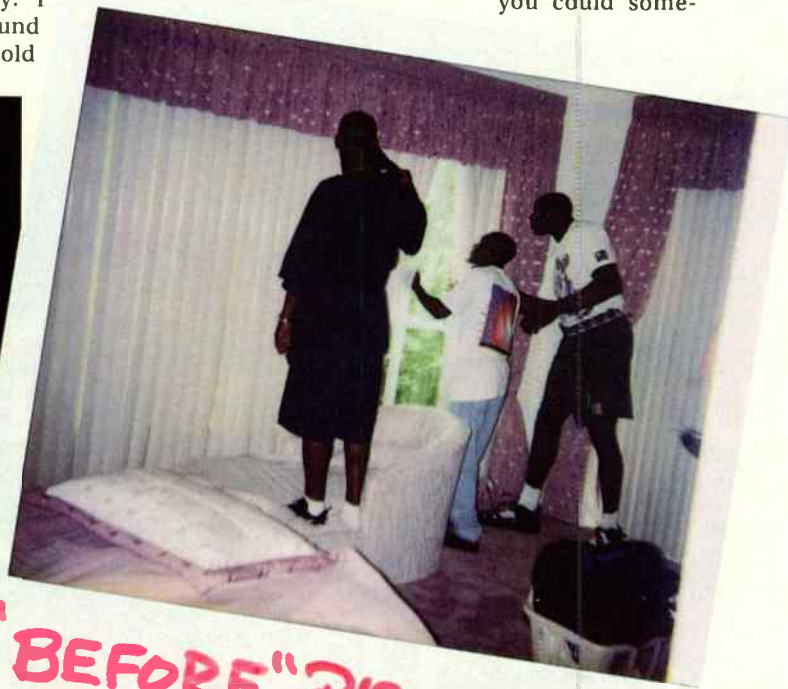
Now, I can specify the appropriate gear and tell you something about acoustics but I don’t consider myself a “master acoustician.” Like music, if you could some-

Photo on previous page by Robert Peck



O'S PLACE
1100, FL

ROOM TO GROW: Shaq's studio (above) is a far cry from the guest room it once was (right).



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CIRCLE 43 ON FREE INFO CARD



SHAQ RATTLE & ROLL

how hire Hendrix to play guitar, why wouldn't you? Working with my long-time friend John Storyk is akin to just that. I honestly feel privileged to have experienced many of his amazing studios and realized that this project needed his signature. I put together a list of needed equipment and turned to John to put together the room design.

BREAKING THE MOLD

One night, just before the actual build-out began, John and I stopped at Shaq's house to make a final check. We walked into the poolhouse apartment we planned to use for the studio and discovered that the walls were covered with black mold and melting wall paper. "What the hell happened here?" asked John. "Pool party," said Shaq's long-

time personal assistant and pal Dennis Tracey. "Cranked the pool thermostat up to Jacuzzi level, melted everything." This was certainly cause for alarm, so John had his ace HVAC man, Marcy Ramos, fly in from New York to devise a plan for proper ducting and sealing so a meltdown of the studio area wouldn't happen again. "It was actually a blessing," John would say later.

There is only one "moving fader" console with all of the features and price that I knew would satisfy Shaq; the Soundcraft DC 2000. It has moving faders, tons of flexibility, and it is an incredible value. But was it ready? I asked Tom Weeber from Harman North America about the updates to the DC 2000, and, after a demo, he made a believer out of me. The console

and automation are working beautifully. The dedicated internal computer with touch screen makes it efficient to operate. We set it up so that the second-channel fader derives the feed directly from the equipment around the studio. Shaq is an Akai MPC-60 expert, so all of the outputs arrive at the console where his in-house engineer (and Full Sail grad) Fred McGinn simply assigns them to the TASCAM DA-88's for recording while he monitors the outputs on the main channel faders. The DC 2000 has plenty of effects sends, a 4-band sweepable equalizer, automation on faders and mutes (channel and monitor, as well as aux sends and returns), and it's easy to understand and move around on.

Another plus of the DC 2000 is its flexible aux section that lets you place the six sends into many combinations — either pre- or postfader — to channel or monitor paths. It also has this useful bounce facility that lets you send grouped signals off tape to a spare track when track space becomes tight.

The facility has three TASCAM DA-88's with the RC-848 remote and an ADAT as well, in case a producer brings in either format. Samplers include E-mu IIIx, Roland 760's, Kurzweil 2000's, and tone modules from Moog and Roland. Three Technics 1200 turntables are at the heart of his sampling system. The Roland DM-80 digital workstation, MPC-60, and TASCAM remote sit atop the racks of outboard equipment, which feature the Lexicon PCM-80 reverbs, Eventide 4000 Harmonizer, DigiTech TSR 24, and Yamaha SPX-1000. Eleven compressors and eight gates round out the package.

SIZE DOES MATTER

The ergonomics of the studio were one of the most important aspects that needed to be addressed because the room had to be tailored to Shaq's height of 7 feet 3 inches. One of the problems with a guy that tall is that most studios are rather uncomfortable. John set up the console 10 inches higher than normal, creating a perfect balance for Shaq's long legs. Engineers and producers sit on stools to elevate them to the correct "Shaq" level. Since Shaq likes to occasionally crank it up pretty hot (an understatement), a



DOUBLE TEAMING: The Soundcraft DC 2000 console shows Shaq means business, while the SuperShaq logo shows the All-Star's playful side.

Photo by Robert Peak

FORWARD THINKING

STUDIO NAME: Tisway Productions
LOCATION: Phoenix, AZ
MAIN MEN: Wayman Tisdale; Otto D'Agnolo
PROJECTS RECORDED: SWV; Waymon Tisdale, *Power Forward* and the Phoenix Suns opening theme
CONSOLE: Soundcraft 6000
KEYBOARDS: Ensoniq TS-12 and SD-1; Roland JD-800, D-70, JV-880, and JD-990; Moog miniMoog; Peavey Bass module; Korg M1R; Oberheim OBX; Fender Rhodes piano; E-mu Proteus
SAMPLERS: Akai MPC60 II and S-900; Roland S-750
MONITORS: Tannoy Gold; Yamaha NS-10M
AMPLIFIERS: Haffer Pro 5000 and TransNova 9303
COMPUTERS & SOFTWARE: Macintosh; Opcode Vision
RECORDERS: Alesis ADAT [3]; MCI 24-track (2-inch)
DAT MACHINES: Panasonic SV-3700 [2]; Sony DATman
OUTBOARD GEAR: Symetrix 525; Lexicon Alex; Barcus Berry BBE 422A Sonic Maximizer; Alesis QuadraVerb [2]; Lexicon LXP-1; Millennia Media mic preamp
MICROPHONES: Audio-Technica AT4033; Shure SM87
STUDIO NOTES: Wayman Tisdale is a forward for the NBA Phoenix Suns, as well as an accomplished bassist.



Photo by Richard Avolio

Wayman's first solo album, *Power Forward*, is now available on Motown's jazz label Mo' Jazz. Seven songs from *Power Forward* were cut at Tisway Productions.
EQUIPMENT NOTES: Tisdale states, "I like to record direct to tape through a Millennia Media preamp and a Summit tube compressor. Sometimes we use an Eden Electronics bass amp with four ten-inch speakers." Speaking of amps, Tisdale comments, "The Hafflers are the cleanest sounding amps I have ever heard." The power forward also notes the history of Tisway Production's console: "The Soundcraft 6000 that we have here was used on SWV's double-platinum debut for RCA. I co-wrote one of the tunes from that CD."

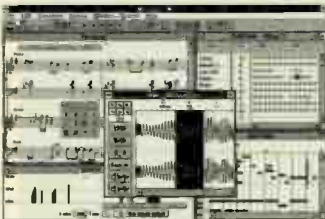
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SHAQ RATTLE & ROLL

The vocal booth was a real challenge. A fairly large bathroom off of the original bedroom was transformed into a vocal booth. The challenge was to create a small quiet vocal room at a very close proximity to a pair of audio monitors. The key was to leave space around the inside of the new walls and seal the door tightly. A closet was made into a small central machine room where amps and noisy electrical devices are kept cool and quiet from the control room. AKG 414's, a Neumann 170, and Audio-Technica 4050 mics are used for vocal sessions.

SHAQ TO THE FUTURE

Over a few beers one night, my associate-engineer-friend, Ken Latchney, suggested we put the "SuperShaq" logo on the floor. John completed the thought with a basketball hoop in the front of the studio to add a touch of fun.

It is hard to fathom the kind of talent for music, acting, and sports that Shaq embodies. I asked him one time what was most important to him, music or b-ball. He replied that without a doubt the NBA was absolutely the most important, that it brought

him the opportunities for other successes. Somehow, I have a feeling that his project studio is the beginning of an entertainment empire he is patiently cultivating.

Gary Platt is Senior Vice President of Education at Full Sail, Orlando FL. His numerous recording credits include Adrian Belew, Midnight Starr, Spyro Gyra, Bon Jovi and Shaq. When he's not educating, he's producing his pal Jon Phelps.

T.C.'S ELECTRONICS

Shaq isn't the only studio player in the NBA: Terry Cummings (also known as "T.C.") is a forward on the San Antonio Spurs and will be starting his fourteenth year as an NBA player. Since his days studying broadcast radio and television at DePaul University in Chicago, T.C. has been involved in music as a producer, arranger, songwriter, keyboard player, engineer, and vocalist. This strong interest in music production ultimately led T.C. to form Cummings Entertainment Group (CEG). In 1994, Cummings moved CEG into a 17,000 square-foot building that now includes two recording studios, a television/film/video editing suite, and a 6500-square-foot sound stage. CEG also offers staff producers, engineers, and musicians that can help artists do anything from film scoring to arranging background vocals for recording sessions.

CEG is located in San Antonio, TX, where many of the better recording rooms are for private use and are not available to artists who need studios-for-hire to complete albums and video or film projects. It has two main music recording rooms, Studio A and Studio B. Studio A currently is home to a DDA console, two MCI JH24 2-inch, 24-track recorders, three Alesis ADATs and an assortment of outboard gear that includes dbx 160 compressors, AMS and Yamaha digital reverb units, Manley and Summit tube processors, and Focusrite mic preamps and equalizers. According to the room's designer, David Hampton, the room is scheduled for a renovation that will include an SSL console with G-Series automation and two Studer 24-track analog tape machines.

Studio B currently contains a DDA console and five Alesis ADAT machines, but Hampton plans to install a Soundcraft Sapphyre recording console and possibly two Otari RADAR systems. Hampton explains, "The B room is designed for cutting tracks where automation is really not a necessity. The Sapphyre has clean mic

preamps and built-in gates on every channel, so it's a cost effective way to have a clean recording path and still leave some money left in the budget for reverbs and other outboard gear."

The video/film editing suite at CEG is a full-service editing and production room capable of editing 16 and 35mm film as well as various videotape formats. While the suite currently contains Sony and JVC video editing equipment, the company plans to add either an SSL Scenaria or Avid Audio Vision system shortly, making it capable of editing video via computer.

On the court, Terry Cummings currently ranks eleventh among active NBA players in total points. Off the court, Cummings has written theme music for shows on Black Entertainment Television (BET), as well as a script for a full-length film entitled "A Street Called Persuasion." T.C. is also working on his debut album, which was scheduled for release during the summer of '95. This will be the first release from CEG's new label, Absolute.—Steve La Cerra



Photo by Roberta Barnes

FLYING THE EUPHONIX

5 MINUTES IN THE PILOT'S SEAT

Take a seat at the Euphonix CS2000. Seventy-two faders are in reach without stretching or moving your chair. The top knob on the channel strip is adjustable without bending your back. The surface is cool and comfortable and the large color flat screen casts a warm glow on your face.

Load the 'title' you started last week into the console from the removable cartridge disk. All those hours of meticulous work have been carefully preserved. Hit the console 'locate' button and select the top of the piece. Forty-eight tracks of digital tape are commanded to the cue. Press 'play' and the room instantly fills with the familiar mix - same EQ's, same dynamics, same reverbs and delays, same everything. Last week suddenly seems like a just few seconds ago. As you listen to your work you can't help thinking "without a Euphonix, I'd still be twiddling console knobs and resetting my outboard gear!"

Forget about SnapShot Recall and Total Automation for a minute and just listen to the sound. That's where the Euphonix really soars - that smooth, rich, high-resolution, analog sound. "How do they do it?" you ask yourself, "Euphonix has built a high-end analog desk that has everything you thought you needed digital for." You already know that Euphonix consoles are found in many of the world's finest studios and have earned a reputation for unbeatable sound quality.

Back to work. You make some minor adjustments to the overall balance. **Faders, pans, mutes, and solos are all where you would expect them to be on the desk in front of you - no awkward paging or techno interfaces.** This console feels like most traditional consoles for basic mixing. But when you need to get a little deeper into individual tracks there's nothing like it.

Without moving from the center mix position you reach over and solo a track. The track needs a little improvement in this passage so you set the tape machines to cycle with a couple of key presses. It sounds wrong, too

aggressive. Glance at the screen and you'll notice a sharp peak in the track's EQ response curve. Grab the 'HM gain' knob and back off the boost a little. Then take the 'HM Q' down a little. It sounds much better and the curve doesn't look so radical anymore. Now the smoothness is there but it still sounds a little squashed. Hit the 'Dyn' button and back off the compression ratio knob a little. The GainBall on the screen isn't pumping so hard and now it sounds perfect. With automated SnapShots enabled, those EQ and dynamics adjustments are automatically saved just before the next cue. **No tricky key press sequences are required - no hassle.** As the tape rolls through the next cue, a new set of EQ's and Dynamics are instantly recalled. They sound just like they did last week - perfect. How did you ever manage without this feature?

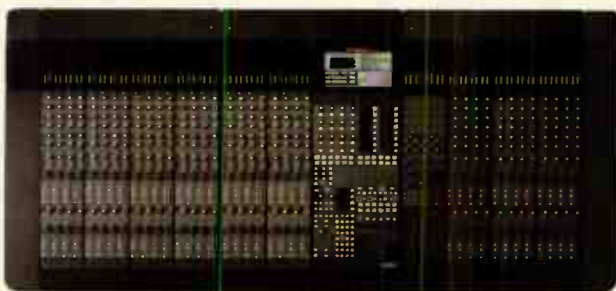
Next challenge. A track needs editing and you need to do it on the workstation. **Since your favorite workstation is communicating with your console this is going to be easy.** Without moving from the center of the mix position you locate the track to the problem spot, route the audio over to the workstation input and hit record at the appropriate time. Roll your chair over to the workstation and make your edits. As you play back the track from the workstation, both tape and console instantly locate and play exactly as they did when the track was on tape. Move back to the center of the desk, assign the workstation track back to tape, locate the machines, and drop it back in. It's Fixed.

Now you realize the plate reverb effect at the next cue isn't quite right. Again, you cycle the tape through the cue. **While the piece is continuously cycling you hit the program change button for your favorite digital reverb right on the desk in front of you.** Step through a couple of algorithms until the right one fits. Finally it sounds perfect so you turn off the cycling and let the tape roll into the next cue. The reverb program change is automatically saved.



Your five minute session is nearly over and you still need to fix that automated ride on the voice track. The moves were perfect but the overall level isn't up enough in the mix. Hit the 'trim' and 'write through' buttons and then punch in on the voice fader. As you trim up the fader on the channel strip you notice the central assignable moving fader playing the same moves, just offset a little higher. The overall level is now exactly where you want it. Hit the 'stop' button and your trim is automatically saved as a new pass.

Your time is up. Press the 'save title' button and your work is neatly buttoned up and put back on the removable disk. Congratulations! You've landed safely after completing more work in five minutes than you ever thought possible. The studio is now free for the next quick-turn project and you're free to go to the beach.



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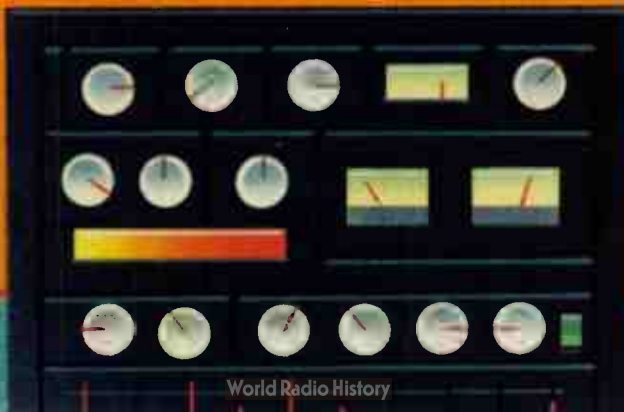
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Whether you **love** them or fear them, they are here to stay (although changing often). We're talking 'bout

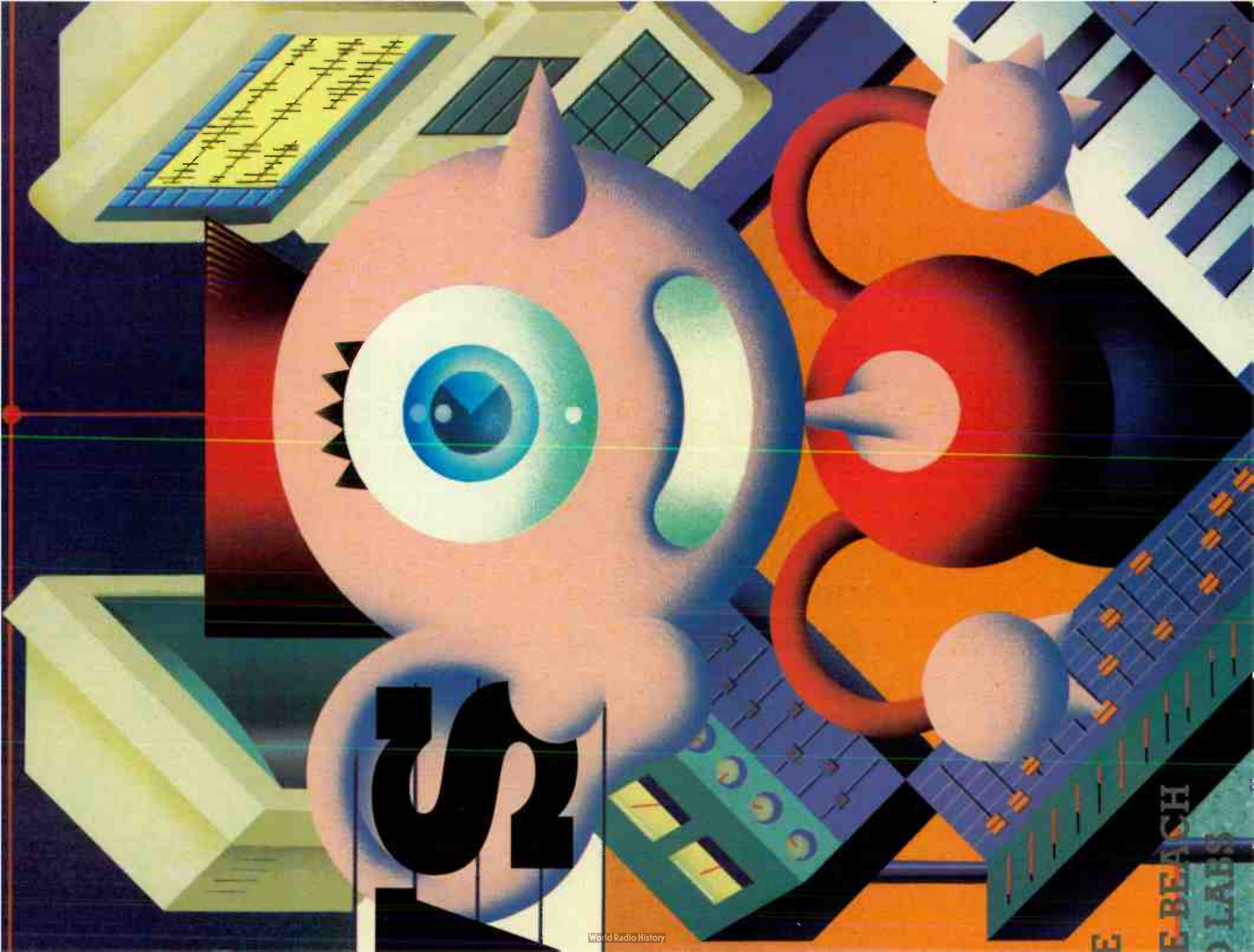
DAW

DAWs, the acronym for digital audio workstations, always makes me think of Daws Butler, the "voice" of Yogi Bear. Yogi, though, had it easy — the tools of his trade were picnic baskets. For the rest of us, however, DAWs are becoming more a part of our daily lives. If you haven't yet logged flight time on any workstations (and sometimes even if you have), the choices may seem staggering. Here are a few tips:



AKAI OSC
DIGIDESIGN
SOUNDSCAPE
VESTAX TURTLE
DIGITAL AUDIO

MICRO TECHNOLOGY UNLIMITED
FOSTEX
OTARI ROLAND
SOUND FORGE
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SR

DAWS

Illustration by José Cruz



For starters, workstations basically come in three flavors: (1) dedicated hardware (DH); (2) computer-controlled hardware (CCH); and (3) plug-in cards (PIC) for your computer. (The accompanying chart separates workstations into these three categories and indicates standard and optional features.) The uninitiated will be presented with a whole new glossary of terms for both the gear, its peripherals, and the software "tools."

What might at first be disconcerting is that your workstation interface may not be obviously labeled "Play," "Stop," and "Record." Users do have the option of using either a pointing device (mouse, trackball, etc.) or QWERTY keystrokes to manipulate audio just like a word processor manipulates text.

Almost everyone accustomed to the analog approach will, at first, want the ability to "scrub tape." But waveform editing is a far easier way to determine the precise location of an edit point. In addition, most systems provide on-the-fly "markers" to indicate potential edits that need to "feel" right in the event that visual clues are less than obvious. The beauty of any nonlinear system (NLS) is the creative freedom it unleashes. Edits can be undone, slid, and/or crossfaded until

perfect — something that would destroy a piece of tape, or at least your motivation to experiment.

Another nonlinear concept is that of real time. A digital signal processor (DSP), such as the Motorola 56001, is limited to a finite number of tasks.

To get around such limitations, operations such as mixing, EQ, or denoising may be done either as a background operation or in something other, but never faster, than real time. Of course, everyone in the time business has got a new chip or hard drive that promises to half the time, double the number of tracks or the space to record them.

KNOW WHAT YOU NEED

The most affordable audio editors are based around a single plug-in card. Not just any PC or Mac has enough open slots or the power (electrical or otherwise) to manipulate multiple tracks of digital audio. Consult the card manufacturer for minimum requirements. Data communication between the DSP and the system hard disk may push a computer to its limits or limit the possibility of, for instance, simultaneously running a sequencer.

For quality audio, the most important option is a digital interface. If the only access is via analog ports, the signal may be compromised by low-level data hash radiating from the computer circuitry. (There is no way to completely shield the analog circuitry.) This may be fine for non-critical applications, though.

At the opposite end of the spectrum, the Sonic Solutions NuBus card for the Mac has only digital ports. Both Sonic and Digidesign can boost signal processing power by adding more cards. To avoid system compromises, the aforementioned manufacturers, as well as the folks at SADiE, let its DSP cards communicate directly to dedicated hard drives that are not part of the computer's operating system.

Of course, there are many shades of gray in this business. Micro Technology Unlimited

has a plug-in card that can mix a whole pile of tracks in real-time from the PC's system disk. It also has a SMPTE interface card (as does SADiE), but more on that in a moment.

TRULY DEDICATED

With but one purpose in mind, dedicated hardware means minimal waiting and the likelihood of an interface that resembles a tape machine remote control.

Computer-controlled hardware offers the best of both worlds. The computer primarily provides a graphic user interface (GUI) and a means of getting software updates to the hardware. The Soundscape SSDR1 for the PC and the SoftSplice for the Mac are the best examples of this implementation. Another advantage to CCH is the ability to simultaneously run other programs such as a sequencer along with the audio software.

INTERFACE AND ACCESSORIES

When making comparisons between systems, the accessories can make the difference between go and no go. For example, not all systems have the ability to read, write, and chase timecode out of the box. While some manufactures sell their systems complete, others take the à la carte approach. If you choose the latter, make sure to make fair comparisons based on similar features.

Machine control is one feature that facilitates the link between audio and video hardware. Professional video decks have an RS-422 port that serves not only as a remote control port, but also as a path for SMPTE communications.

FINALE

All right, that's the facts. Now read through the following reviews to find out what DAW is right for you. And don't forget to check out our updates on previously reviewed DAWs — these things change at a rapid rate, but we will keep you up to date. —Eddie Ciletti

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Roger Nichols summed it up this way in *EQ Magazine*: "*Spectral, Inc. Remember that name... Spectral is going to be the company to deal with in the DAW market.*"

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Digital Audio Labs CardD



I hate to call the Digital Audio Labs CardD system an entry-level system because it does as much, if not more, than most expensive systems did just a few years ago. If you want to edit sample files, digitally mix two stereo sound files together, perform digital domain level changes for all or part of a sound file, use broad band EQ to brighten up your mix, or fly background parts with MIDI or SMPTE triggers, then the Digital Audio Labs CardD and EdDitor Plus software may be all you need.

BASIC SYSTEM

The basic board that plugs into your PC is the CardD Plus, which provides

A/D and D/A conversion at +4 dB or -10 dB levels. The CardD comes with software that can record and play sounds to the PC's hard disk. If you also want to perform editing with visual display, you need to add Fast Eddie editing software or the EdDitor Plus editing software.

If you want digital inputs and outputs, there are two choices: You can add the I/O CardD to a CardD Plus, which will allow you to have analog

and digital I/O; or you can get the Digital Only Card, which, as its name implies, provides you with no analog I/O, but you can connect it to your trusty DAT machine.

FEATURES

I mounted CardD in a 486/66 and a 386/40 for testing. The faster computer was better, but the work got done with the slower machine. Both editors require Windows 3.1 or better for operation. Here is a list of the features available in both editors.

Available in Fast Eddie and EdDitor Plus:

- Four clipboards for multiple Cut and Paste operations.
- Built-in Linear and Log fades, manual crossfades, plus "Draw Your Own" fade curves.
- Two-band EQ with Gain Change and Normalize.
- 300 markers with names for locating and editing.
- Sample rates of 11.025 kHz, 22.05 kHz, 32 kHz, 44.1 kHz, and 48 kHz.
- 16-bit and 8-bit sound files (.WAV format).
- Playlist from region editor.
- Catalog editor allows fast access to any sound triggered from mouse or MIDI inputs (for sound effect triggering or station IDs).

Additional Features only in EdDitor Plus:

- Simultaneous play and record.
- Punch-in to record from playback.
- Insert Silence and Trim Silence commands.
- Scrub for simulation of rocking reels of analog tape.
- Lock Waveform Display locks two stereo files for virtual 4-track playback.
- SMPTE Trigger with SMPTE reader board.

FADING OUT

The DAL CardD system is a well-engineered product with bullet-proof software. If you want to see what you're missing in the world of digital audio editing, Digital Audio Labs can get you started.

—Roger Nichols

CARDD FACTS

MANUFACTURER: Digital Audio Labs, 14505 21st Avenue N., Suite 202, Plymouth, MN 55447. Tel: 612-473-7626.

APPLICATION: Digital audio editing.

SUMMARY: Great entry level system for PC.

STRENGTHS: Inexpensive; uses PC hard disk, no second hard disk required.

WEAKNESSES: No DSP functions; no multitrack capability (beyond four tracks).

PRICE: Digital Only CardD: \$495; CardD Plus: \$795; I/O CardD: \$295; Fast Eddie: \$129; EdDitor Plus: \$349

EQ FREE LIT. #: 119



OSC Deck II

The first version of Deck was released in 1990. Deck allowed you to simultaneously play back and record audio on separate channels, just like a multitrack tape recorder. Version 2.2 of Deck will support add-in audio cards such as Digidesign's Audiomedia cards, Sound Tools II, Pro Tools II (not Pro Tools III), RasterOps Media Time, and Spectral Innovations' NuMedia system.

Deck will run on Power Macs, the Quadra 840AV, and 660AV without any additional hardware. You can get 12-track performance on a Mac 8100/80, 10 tracks on a 7100, and eight tracks on a Mac 6100. The 840AV is also fast enough so that you can play back eight tracks at once. The 660AV will manage six tracks. If you add OSC's "8 Track Tools" program to Deck, you can play back eight tracks of audio with the Pro Tools II board from Digidesign. All in all, a pretty powerful piece of software.

Deck will allow an unlimited number of "virtual" tracks, but the maximum number of tracks that you can play back at one time depends on your hardware configuration. (Incidentally, OSC says that its Multitrack Tool, scheduled for release in the fall of '95, will allow owners of Power Mac computers, Audiomedia, Sound Tools II, or Pro Tools to premix from 8-24 Deck tracks in Apple Sound Manager, and feed those mixed tracks to

Digidesign hardware outputs. It sounds like a good alternative to costly hardware upgrades.)

One little problem that I did run across is that the Power Macs only support 44.1 kHz without an audio card plugged in. The 660AV and 840AV will support 44.1 kHz and 48 kHz. I am not exactly sure why yet, but I have spies at Apple working on it. Be careful, if you have 48 kHz audio files, you can't open them if the computer only supports 44.1 kHz.

The fact that Deck will run on a computer without extra hardware allowed me to take audio files home for editing without transporting an entire Pro Tools system back and forth every night. The amount of studio time I saved more than made up for the cost of the software.

To touch on some of the other Deck features, how about automated mixing with 24-bit resolution? This comes in pretty handy when mixing sound effects and music to picture. The end results of your mixdown session can be 8-bit audio with dithering for direct import to multimedia applications. No automation on your mixing board? Maybe automated level changes on a vocal track and riding the guitar solo will help.

Since multimedia has become a household word, you will be happy to know that Deck supports QuickTime

2.0, allowing you to synchronize QuickTime movies to audio. When you scrub the digital audio, the picture scrubs right along with it. You can select an audio region and then scrub the picture to find the spot where you want the audio to play.

MIDI data can be recorded and played back from Deck II without any other programs running. This could allow automated changes of outboard gear or other MIDI tasks.

An editing command that I use quite a bit is "Strip Silence." The Strip Silence command in Deck works slightly different than the same command in Pro Tools. Deck searches until it finds audio that is above a user-selected threshold and marks it

DECK II FACTS

MANUFACTURER: OSC, 480 Potrero Avenue, San Francisco, CA 94110. Tel: 415-252-0460.

APPLICATION: Digital audio editing.

SUMMARY: Great entry level system for PC.

STRENGTHS: Inexpensive; uses PC hard disk; no second hard disk required.

WEAKNESSES: No DSP functions; no multitrack capability (beyond four tracks).

PRICE: \$399Plus: \$349

EQ FREE LIT. #: 120

as the beginning of a new region. It then searches until the audio falls below the threshold and marks this as the end of the region. This part works just like Pro Tools. The difference is that Deck sets a "Pre-Roll" before the beginning of the region. This means that you can set the threshold higher than you would in Pro Tools without clipping any of the attacks at the start of the region. This one feature alone cut my editing time in half.

Virtual Mixing is an added feature of Deck II. When Virtual Mixing is turned off, you can only play the four to twelve active Play tracks. With Virtual Mixing turned on, any of the Work tracks can be mixed back to the hard disk. If you have eight tracks of vocals and can only play back four at once, then Virtual Mixing will allow you to mix all eight tracks down to a

stereo pair to make room for more tracks.

Crossfading in and out of regions or between two adjoining regions is an amazing help. After using Strip Silence to segment a guitar track, I found that I had a little click at the beginning of each region. I highlighted the entire track and automated the crossfade command. After a slight pause, the start of each region was faded in and the end of each region was faded out. No more clicks. Deck offers a virtual plethora of fade shapes that can make edits seem like they don't even exist.

Moving sessions back and forth between Pro Tools and Deck is easy with OSC's Trans•port software. At the studio I was working with Pro Tools because of the additional hardware I/O. I wanted to go home and edit the files, but I did not have

another Pro Tools system in the home Mac. I used Trans•port to translate the Digidesign Pro Tools session into a Deck session. I performed edits at home and then used Trans•port to port them back to Pro Tools. Trans•port supports the OMF file specifications that will ultimately let you get audio into Sonic Solutions, Dyaxis, or Avid from Pro Tools without an act of Congress.

In the final analysis, OSC has a winner here. In most applications Deck will outperform Pro Tools by doubling the tracks with the same amount of hardware. It will work on some Macs with no add-on hardware. If you are looking for a Mac-based solution that costs almost nothing and does almost everything, I think that OSC is the place to start looking.

—Roger Nichols

Turtle Beach Quad Studio

The Turtle Beach Quad Studio builds on this company's history of audio boards and postproduction tools dating back to its 56K digital recording system released in 1990. The Quad Studio is a complete hardware and Microsoft Windows-based software package intended for use as an entry-level audio workstation. Quad centers on a tape-recorder metaphor and essentially assembles four audio files (akin to four independent mono audio tape recorders) that are synchronized and controlled from a single interface. Tracks can then be offset according to SMPTE timecode values and can also be synchronized with music sequencers using MIDI timecode.

Quad Studio is intended for PC users who are authoring multimedia productions for business presentations, layering .WAV files, or updating their multitrack cassette recorders. The user interface is intended to provide basic tape recorder/mixer controls and does not include the nonlinear visible sound chunks approach of many multichannel systems. To visually edit a track, it must first be loaded into an audio editor program (Wave SE is included with Quad) and then manipulated.



Quad Studio includes the Turtle Beach Tahiti sound card (see sidebar for specs), which is installed into the ISA bus of a PC-compatible computer. This provides stereo input and output (analog only) to Quad and uses the proprietary Hurricane Architecture to allow simultaneous record (on up to two tracks) and playback (on all four tracks). Installation of the hardware and software is straightforward, with all hardware settings except bus address accessible from the driver setup software in Windows. There is even the option of adding a second Tahiti sound card to provide four

simultaneous analog audio outputs.

Quad offers users a familiar-looking face with buttons and faders that can be used for much of the tasks in mixing the audio. Each fader represents one of the four channels of audio accessible during a session. There is a Solo and Mute button for each channel in addition to an Edit button. The Edit button loads the audio file for that track into Wave SE, a very comprehensive audio editing program that includes digital parametric equalization, level adjustment, fades, FFT frequency analysis, crossfades between soundfiles, polarity inversion, and

QUAD STUDIO FACTS

MANUFACTURER: Turtle Beach Systems, 52 Grumbacher Road, York, PA, 17402. Tel: 800-645-5640 or 717-767-0200.

APPLICATIONS: Multitrack recording package for Windows-based computers.

SUMMARY: A 4-track hard disk recorder and soundfile editor that bring sophisticated features to entry-level users.

STRENGTHS: Comprehensive sound editor and feature set; uses common .WAV file format; high-quality audio card.

WEAKNESSES: Quad allows only one soundfile per track; no edit list or dragging audio chunks around on-screen; the Wave SE editor allows only one level of undo.

PRICE: \$499 (\$199 software only — for owners of existing TBS MultiSound, Multisound Monterey, and Tahiti sound cards)

EQ FREE LIT. #: 121

TAHITI SOUND CARD SPECS

Sample Rates: 44.1 kHz, 22.05 kHz, 11.025 kHz

Resolution: 16-bit or 8-bit

A/D Converters: 64-times over-sampling sigma-delta, 16-bit

D/A Converters: 8-times interpolating filter, 64-times over-sampling sigma-delta, 18-bit

Signal-to-Noise: 91 dBV (A-Weighted)

Total Harmonic Distortion: less than 0.005% (A-Weighted)

Frequency Response: DC to 19 kHz, +0/-0.2 dB; DC to 20 kHz +0/-2 dB

Stereo Crosstalk: 100 Hz: -100 dBV; 1 kHz: -80 dBV; 10 kHz: -60 dBV

Digital Signal Processor (DSP): Motorola DSP-56001, 24-bit internal data processed at 20 million instructions/second (MIPS)

Audio Connectors: 3.5 mm stereo jacks (Input, Aux/CD In, Out)

MIDI Connector: 9-pin Sub-D with adapter to standard MIDI IN, MIDI THRU and MIDI OUT DIN jacks

Minimum PC Requirements: 486/33 SX or faster processor; Windows 3.1 or 3.11; 3/4 or full-size 16-bit ISA card slot; hard drive with an access time of 16 ms. or faster

many other digital sound tools.

It is possible to work on stereo or mono soundfiles in a wide range of formats, including, .WAV, Macintosh AIFF, VOC, raw PCM, and compressed Microsoft ADPCM. Conversion between file formats and sampling rates (with optional anti-aliasing filters) is also supported, as all files must be converted to .WAV format for use within Quad. Wave SE is a very complete and well-developed tool for visually editing soundfiles. Markers can be inserted into the file and named; ranges and zoom regions are simply selected by dragging the mouse; and the program even offers the user a pencil to edit waveforms at the sample level. Some people may find the destructive-editing format of Wave SE familiar to their experience in the analog world.

In Quad, an unlimited number of soundfiles can be stacked below the current one as alternate takes, variations, or submixes, but only four mono soundfiles (two stereo soundfiles or two mono and one stereo file) can be active during a session. To create complex productions, it is possible to bounce any combination of the four channels down to one (mono) or two (stereo) tracks and thereby free up tracks. You will lose the ability to remix those channels but, unlike analog systems, the sound quality is unchanged.

All soundfiles in a session must use the same sample rate. The Quad software separates stereo soundfiles into two mono files during the loading process.

This makes editing stereo files awkward after loading them into Quad, and any edits to a file that change its length will make the tracks fall out of sync.

The soundfiles are saved independently from the Quad data files, which include the automation (called Turtle Recall, a complete dynamic automation of the faders, panning, and muting); grouping of faders, pans and mutes; automated record punch-in/out settings; and file offset information. Quad also supports external MIDI control and MIDI Machine Control using any Windows MIDI interface, including the one packaged with the Tahiti sound board.

Quad is not intended to compete

with high-end audio postproduction systems, but does bring much of Turtle Beach's power and sophistication to users that can work in a more piecemeal fashion on audio projects and do not expect to compile entire 60-minute CD projects using it. However, the audio quality of the Tahiti sound card and the power of its onboard DSP make this aspect of Quad equal to nearly anyone's digital audio system. During the review I was able to use a prerelease of Quad version 1.1, which included additional features and fixed many of the bugs I found in Version 1.0. Quad V1.1 should be shipping by the time this issue of EQ hits the streets. —Wade McGregor

UPDATE

Sonic Foundry Sound Forge

MANUFACTURER: Sonic Foundry, 100 South Baldwin, Suite 204, Madison, WI 53703. Tel: 608-256-3133.

PRICE: 32-bit version, \$595; 16-bit version, \$495; upgrade from 16-bit, \$99.

EQ FREE LIT. #: 122

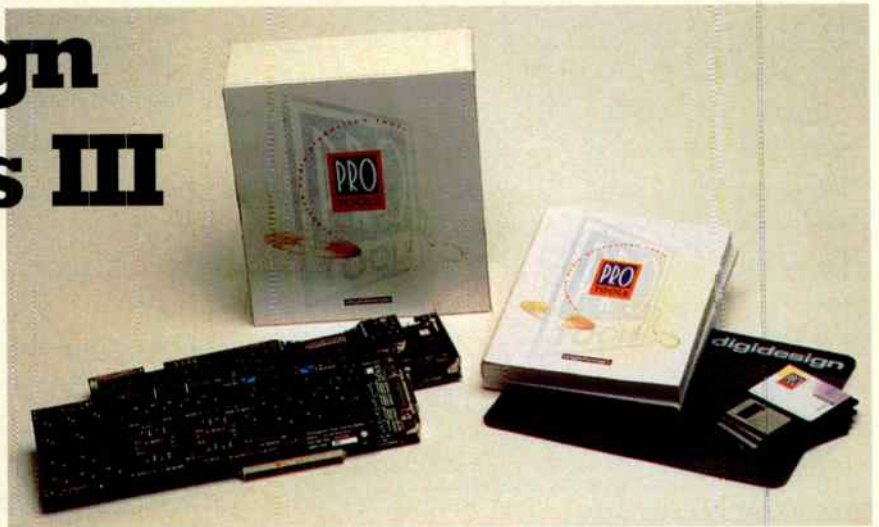
Since our recent review of the Sound Forge Version 3.0 for Windows in the April '95 issue, Sonic Foundry has introduced Sound Forge for 32-bit Windows. This software version has been designed to take full advantage of the increased processing and file access speeds that occur when operating under true (native mode) 32-bit Windows, Windows NT, and Windows '95.

For the greatest degree of compatibility between various types of computer systems, the 16-bit version of Sound Forge is probably your best choice. If, however, you have a high-powered system that's currently working under Windows NT (and looking forward to bumping up to Windows '95), the 32-bit version will greatly increase your overall processing speeds. Existing 16-bit users can upgrade up to the 32-bit version for \$99. —David Miles Huber

Digidesign Pro Tools III

YOU know, sometimes equipment reviews are easy; sometimes they are hard. The Pro Tools III review is one of the hard ones because of all of the equipment choices that you have to make. The choices are necessary because of the modularity of the system. You can have lots of virtual tracks, or lots of physical I/O channels, or lots of DSP power, or lots of everything. All you need is lots of money.

Pro Tools III adds some new and important features such as expandability up to 48-track recording and playback, 64 channels of physical I/O, DSP software plug-ins and interconnection of hardware cards from third-party vendors (such as the Lexicon NuVerb card), virtual digital mixing, use of the audio I/O for sends and returns when mixing, 16 internal mix



busses, the ability to mix external sources with hard disk audio, and support for Digidesign's ADAT interface.

HARDWARE

Before we go any further, I think it is important to explain each card option and how they all fit together. It took me awhile to figure it out, but maybe you can grasp all of this a little quicker.

- **Disk I/O card.** The Disk I/O can store 16 channels of audio to its connected SCSI hard disk. Only eight channels are coming in from the audio interface (882 I/O or 888 I/O). If you want to record all 16 tracks at once, you need the next group of items.

- **Bridge I/O card.** The Bridge I/O connects to another 882 I/O or 888 I/O to get the additional eight channels of audio. That's all it does.

- **DSP farm.** This card provides the DSP horsepower to perform EQ, reverb, noise reduction, mixing, Apogee UV-22 processing, and other DSP plug-ins that become available.

- **Expansion Chassis.** If you run out of card slots in your Mac, this box provides 12 slots to fill with Digidesign cards any way you wish.

Pro Tools III is sold as a Core System. The Core System supports 16 channels of record/play and eight channels of I/O. The Core System includes all software, Disk I/O, and DSP Farm. The user has a choice of the 888 or the 882 I/O. The Pro Tools

Expansion Kit (Disk I/O card and DSP Farm, no software) adds 16 disk tracks and eight channels of I/O. With two expansion kits you would have 48 tracks of record/play and 24 channels of I/O.

The top of the line 8-channel audio I/O box is the 888 I/O. It is two-rack-spaces high, has excellent metering, XLR inputs and outputs, and eight channels of AES digital I/O. The 882 I/O box is one-rack-space high, uses 1/4-inch TRS jacks for analog I/O, and only allows two channels of S/PDIF digital I/O. If you have a 442 system, the 442 card and audio interface can be used to add four I/O channels to the Pro Tools system.

So, basically, if you want lots of tracks recording at the same time, get more expansion kits. If you want more physical audio ins and outs, get more Bridge I/O and audio interfaces. If you want more EQ or more mixing power, get more DSP farms. You are allowed to have more audio I/O than track recording ability, and you can have 48 tracks of record/play with only eight channels of I/O. Additional audio I/Os are used for effects sends and returns to the outside world. Additional I/O can also be used to bring external audio into the Pro Tools mixing environment.

Earlier Pro Tools systems recorded audio onto hard disks connected to the Mac SCSI bus, but Pro Tools III only stores audio on the hard disks connected to the Digidesign SCSI bus. Digidesign says that 19 hard drives (including Seagate, Micropolis, Quantum, IBM, and Connor) are supported, but, as things usually go, the \$5500

PRO TOOLS III FACTS

MANUFACTURER: Digidesign, 1360 Willow Road, Suite 1101, Menlo Park, CA 94025. Tel: 415-688-0600.

APPLICATION: Multitrack digital audio editing; post-production audio for video; radio show production; radio commercial production.

SUMMARY: Modular digital audio editing with hardware and software options for everyone.

STRENGTHS: Modular; third-party DSP plug-ins; expandable to 48 tracks with 64 physical I/O channels; optional Mac expansion chassis.

WEAKNESSES: Third-party software requires updated versions to work with Pro Tools III; does not support 20-bit recording.

PRICE: Pro Tools III Core System (with all software, Disk I/O, DSP Farm): \$6995; Expansion Kit (contains Disk I/O, DSP Farm only): \$4995; DSP Farm: \$2495; Bridge I/O: \$1495; 888 I/O: \$2995; 882 I/O: \$995; ADAT Interface: \$995 (requires cable kit, \$195); 442 Core System (original Pro Tools 4-channel system): \$4995

EQ FREE LIT. #: 123

worth of 4 gigabyte drives I just purchased were not among those that worked, so check with Digidesign before you plunk down your hard-earned cash on a 4 GB SCSI hard disk.

SYNCHRONIZATION

Digidesign relies on the Mac for time-code information. This is fed into the Mac serial port as MTC, or MIDI Time-code. Any external SMPTE-to-MTC converter connected to the Mac will provide the data. I prefer to use the Digidesign SMPTE Slave Driver interface for increased SMPTE timing accuracy. The SMPTE Slave Driver will generate "Super Clock" (256x sample rate) derived from the incoming SMPTE to clock the audio playback. This means that if you vari-speed the analog tape machine, Pro Tools will stay locked and speed shift by the same amount.

Everything I ever recorded into Pro Tools was synched to SMPTE. Recording and playback were flawless. I was guaranteed sample-accurate lock every time.

EDITING

This is why we use hard-disk recorders: nondestructive editing. Impossible edits are now commonplace. If you are editing between different takes of a vocal, for instance, and the word you want to use won't work because it was sung early, just move it later by dragging it with the mouse. Try doing that with a razor blade.

The basic Pro Tools building block of audio data is the Region, which is a piece of audio or MIDI data that can be played back at any time reference desired. Regions are just pointers to the audio file and are non-destructive. Regions are then strung together in a Playlist and displayed in Tracks on the Pro Tools desktop.

When discussing the number of tracks available, keep in mind that Voices are the number of audio events that can be played back at one time, while Channels are the number of physical I/O ports or individual outputs. It is possible to have 48 Voices and only eight Channels. This would be fine if you are recording only eight tracks at a time and using Pro Tools to mix the digital audio to a final stereo mix. It is also possible to have 64 Channels with only 16 Voices. Maybe

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EQ/AAO

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EQ AUGUST 67

you want a lot of external effect loops but only need 16 events playing at once.

Editing with Pro Tools is semi-painless. You use the mouse to mark the start and end of a Region and then Capture it to the Playlist. A command called Strip Silence will automatically search the audio track and mark Regions when the audio level gets above a user-defined threshold. This is like running the audio through a gate. Audio information below the threshold will not show up in the Track.

I used the Strip Silence command extensively when moving piano parts to match Rhodes parts. The channel to be moved and the reference channel were recorded into Pro Tools synchronized to SMPTE. Strip Silence was

used to create regions of all the piano licks. I moved the piano licks to visually line them up with the track above it. I then crossfaded all regions created to get rid of any clicks caused by the edits. I transferred the piano licks back to the 48-track synchronized to the same SMPTE. Perfect!

I also used the Strip Silence command to build regions of drum hits, bass lines, guitar licks, and percussion parts that are then reassembled to form track loops. Digital audio loops have less slop than MIDI, and with Pro Tools I have more tracks available than I do with programs like Studio Vision or E-Magic Audio.

Pro Tools allows seven different types of fades for fade-ins, fade-outs, and crossfades. Crossfade times can

be set by graphically selecting the crossfade area (select from four time/grid modes) or entered in milliseconds. Fade-ins and fade-outs can also be graphically dragged to the correct amount.

DSP

The DSP Farm cards perform all of the DSP functions in Pro Tools. Adding extra DSP Farms adds extra horsepower. You can dynamically allocate DSP resources for your project. If you don't need much EQ, you can mix more tracks together. If later you find that you need some reverb, you can give up some mixing power or install another DSP Farm.

Third-party vendors provide DSP tools that can be used with Pro Tools. There are reverbs, compression algorithms, noise-reduction software, and even bit-mapping plug-ins like UV-22 from Apogee. The sky is the limit.

UPS & DOWNS

There is a downside to Digidesign's products. For example, the Pro Tools III system will not record more than 16 bits. If you need 20 bits, then you have to use the Sound Tools II card (SA-2 NuBus card) with a Pro Master 20 interface even if you are going in digitally from a 20-bit converter. Some third party software will no longer work under Pro Tools III, such as Deck II from OSC. Check with the software vendor and find out ahead of time if they will be offering Pro Tools III compatibility.

On the upside (in addition to the features), I run across more Digidesign systems than any other hard-disk audio editing systems installed. It seems as though every studio and almost every audio postproduction facility has at least one Pro Tools system. I really do personally own three Digidesign systems: an early Sound Tools system (2-channel only) that is in my wife's project studio; a Sound Tools II system with the ProMaster 20 interface for 20-bit recording; and a Pro Tools 442 system that allows four channels of recording at a time that I use for Steely Dan track editing.

The bottom line is that Digidesign systems have, for the last six years, saved my butt more than once in the studio.

—Roger Nichols

UPDATE

Innovative Quality Software SAW

MANUFACTURER: Innovative Quality Software 2955 E. Russell Rd., Las Vegas, NV 89120. Tel. 702-435-9077.

PRICE: SAW/SAW Utilities, \$599; SAW Plus, \$999; SAMM, \$499.

EQ FREE LIT. #: 124

Since our review of Software Audio Workshop (SAW) in the October '94 issue of EQ, a number of features have been added to this impressive Windows-based digital audio-editing software. In order to assist with the real-time mixing of up to eight virtual hard-disk tracks (configured as four-stereo pairs) to the two outputs of any IBM-compatible multimedia sound card, five signal processing plug-in modules are now available. These non-real-time processing utilities include File Format Converter (for converting files or edit lists between various sample and bit rates, as well as between stereo and mono file formats); Audio Compressor/Limiter; Noise Gate; ParaGraphic Equalizer (offering seven EQ bands with variable "Q" bandwidth controls and user-definable presets); stereo Echo Effects Generator; and an Auto Panner. These utilities were originally sold separately, but are now included free with SAW.

A new IQS product now available is SAMM (Software Audio MIDI Mixer), which emulates an audio console on your video monitor. The first edition of this product — designed for the Yamaha ProMix 01 digital mixer — can be configured to run up to 16 ProMix consoles from a single PC. (For more details, see the First Look on SAMM in our June '95 issue.)

Another product from IQS soon scheduled to hit the streets is SAW Plus. This professional editor is similar in form and function to SAW except that it can mix up to 16 mono or stereo soundfiles (in a virtual environment) to multiple sound card outputs for the IBM-compatible PC. One of its most impressive functions is the ability to convert between sample rates, bit rates and stereo/mono file formats on-the-fly. Simply put, any number of sample, bit, and channel file formats can be placed into an open edit playlist and the system will automatically convert them to the selected output format for playback in real time! In addition, the system's 16-track software mixer offers pan, solo, and mute functions, while all five of the aforementioned SAW plug-in DSP modules have been directly built into the SAW Plus software.

—David M. Huber

Project Studio Paradise



In this age of digital audio, the "golden oldie" processors of yore don't cut it, with their excessive coloration, high noise levels and poor resolution. Nor does the waning breed of studio multi-effects, with their swiss army butter-knife, blah-for-the-buck limitations. The project studio producer/musician must answer to the increasing sonic awareness and demands of the digital age. RSP Technologies understands and embraces this with a line of processors specific to the audio and economic realities of the project studio. From our revolutionary **Circle Surround™**, to the flexible **Intelliverb™** and the incredible **Reanimator™**, RSP makes the project studio a paradise of processing.

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World Radio History

Roland DM-800

The DM-800 from Roland is an 8-channel hard disk recorder (four discrete inputs/outputs) and digital mixing system that has been integrated into a portable 26-inch x 11-1/4-inch housing. The right-hand side of the control surface houses the transport and system controls, a 1-1/2-inch x 5-inch LCD readout display window, time readout indicator (in SMPTE, min/sec, or measure/beats), alpha dial, and a data entry keypad. On the left-hand side are analog input gain trims and headphone level, an 8-channel mixer with eight input faders, active status buttons, pan pots, two auxiliary returns or line inputs, and a 2-band (high and low parametric) digital EQ control section.

Since the DM-800 is totally self-contained, its persona is very different from most computer-based DAW systems. The "all-in-one-box" aspect of



the DM-800 is intriguing, and, of course, the ability to record and mix in the digital domain is quite cool.

The DM-800 system worked quite well when used to lay down individual tracks to a MIDI sequence (and also would be good for laying down additional tracks to a multitrack tape or

video/film soundtrack). The various types of SMPTE and MIDI sync formats (including bar and beat/tempo map editing) are well implemented and extremely easy to use. For those who want to concentrate on intricate music and effects editing, however, I found the DM-800's waveform display



GREAT CHAMBERS, ROOMS, GATES AND PLATES, AND ALL YOU NEED IS ONE OF THESE ...

DM-800 FACTS

MANUFACTURER: Roland Corporation US, 7200 Dominion Circle, Los Angeles, CA 90040-3696. Tel: 213-685-5141.

APPLICATION: Good for tracking vocals and instrumental parts in the recording studio or for the recording and placement of dialog and effects in audio-for-visual or broadcast production. Provides for add-ons for interfacing with ADAT, DA-88, and RS-422.

SUMMARY: A portable, integrated, 8-channel hard disk recording and digital mixer system.

STRENGTHS: Self-contained portability; houses up to two internal

SCSI drives; useful triggering of soundfile segments from the keypad surface; high-quality audio performance; tape recorder-like operation; 100-layer per track recording and easy-to-use automated digital mixer.

WEAKNESSES: Accurate waveform editing isn't always easy due to small display window and unorthodox scrub function; on-board digital EQ isn't the greatest.

PRICE: \$6295; \$7495 (with two 500 MB, factory-installed drives)
EQ FREE LIT. #: 125

window (when using either the LCD or external video monitor) to be a bit too small and to have a resolution that was too low to get in and do any serious editing at the sample level. Roland's philosophy is that your ears should be the final judge, so depending on your work style, the display window may or may not be a drawback.

The DM-800 doesn't have true waveform scrubbing as most of us know it. Instead, an audition "scrub" function continually loops through short segments of audio (up to, through, or from the cursor point), giving you repeated "snippets" of audio at the current position. Although this audition function pro-

duces a totally wild effect in and of itself, I had a hard time accurately locking in on edit points when using different music styles. However, I've since discovered the DM-800's Preview functions, which let you audition a user-defined segment of audio up to, through, or from the current cursor position, and that might make all the difference when zeroing-in on specific edit points. ("Preview" locates edit points in real-time and real pitch. "Scrub Preview" is used for dialog editing and locating start points.)

For those who like to grab their edit points on-the-fly, the system's marker/auto-locator section makes it possible to mark and/or access up to

eight location points on-the-fly with remarkable speed and accuracy. This feature, along with the system's soundfile management structure, makes the unit right for certain project studios, as well as audio-for-film, video postproduction and broadcast facilities.

Roland's soundfile structure of opening a "Project" and recording "Takes" that can be broken into multiple "Phrases" seems to be well suited for dropping dialog, ambiance, and effects into the track window at specific SMPTE cues. For similar reasons, the DM-800 would be great in the recording studio for tracking vocals or other instrumental parts during a session. A



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loop-recording function makes it possible for a section of audio to continuously loop, while automatically punching in and out of record at specified times. Each take can then be recorded to disk, allowing you to choose the best take or to create a composite from several takes. Another handy feature is the DM-800's trigger mode. Using this feature, up to eight soundfiles can be instantly triggered at any time by pressing a key on the data entry keypad.

The 8-channel mixer section is fairly straightforward. In manual mode, the mixer's settings are WYSIWYG (What You See Is What You Get); however, since there are no moving faders, all automated mix moves (and present mix settings) must be viewed from the LCD's or external video monitor's mixer screen page. This presents no real problem, and creating an automated mix is both intuitive and reliable. I didn't find the system's two-band digital EQ section to be very musical in nature. Although the EQ can be used to fix obvious problems, it might be best to have additional console and outboard EQ on hand.

After tackling the usual learning curve, I found the system's basic operation and the navigation of soundfile data within the waveform display window to be reliable and fairly direct. Since mistakes are a simple fact of life, I wish that the system had a quick 'n' easy edit UNDO. The only way that I could find to undo a mistake was to reconstruct it by backtracking my moves or by exiting the Project without saving the latest changes.

The system's owner's manual, which in this case is your lifeline, does a good job of explaining most of the basic operating concepts, but sometimes leaves out certain specifics. For example, finding the system command for recording from a digital source proved to be a real task.

In the final scheme of things, the Roland DM-800 would serve as a useful addition for those who are seeking a portable, "all-in-one" production package that can quickly and efficiently place and mix music, dialog, and effects cues within an automated, multichannel environment. —David Miles Huber

Additional reading on the DM-800 can be found in David Miles Huber's "First Look" in EQ's December '94 issue —H.G.L.



I was introduced to the SADiE system about two years ago when I was mastering a project at Masterfonics in Nashville. They were using the SADiE system for editing and sequencing albums for mastering. When I saw how fast it was to load songs into the computer and edit them, I was impressed. I brought in a project on DAT tape that Glenn Meadows was going to master for me. He put the tape in the DAT machine, placed the SADiE in record, pushed Play on the DAT, and walked away. At each new DAT start ID, SADiE marked a new Clip in the onscreen Edit Decision List (EDL). After the ten tunes were in the computer, it took less than 15 minutes to check the fades and tune spacings and start looking at EQ and levels of individual songs.

HARDWARE

The SADiE system is based around two cards that plug into an IBM PC-compatible computer. The X-S card provides the digital audio processing and communication with the SCSI hard disk for audio storage. The X-ACT card provides analog I/O and timecode facilities. Three cables run from the rear panel of the PC to a Breakout Box for connection of AES, analog I/O, SMPTE, MIDI, and Video In. The computer is used only for display and user input. The display software runs under Microsoft Windows (for Workgroups 3.11).

In addition to the hard disk drives for storing audio, optional devices that

are available (and on the unit I tested) include a Yamaha 4X CD recorder and an EXABYTE 8mm tape drive. The CD-R can be controlled from within the SADiE editor and can produce CD masters from SADiE's EDL. The EXABYTE drive can be used for backup or for production of a DDP (Disc Description Protocol) tape for the CD mastering plant.

BASIC SADiE

In SADiE, a Track is the audio data that is recorded on the hard disk. A Clip is the region of audio data that will be played back. The EDL is a list of all the edits and, therefore, what you will hear when you press Play. The Stream is the visual representation of the audio with edits and fade information. Channel refers to the four physical I/O ports for audio playback.

The SADiE display screen uses icons to depict the various tools available. Transport Controls and Level Controls are self explanatory. Playlist Window opens the graphical representation of the EDL. Edit Window pulls up the graphical edit window that allows you to create and edit Clips. The Trim Window lets you graphically edit two EDL entries for changing their timing relationship and fade information. The Clipstore allows you to arrange audio information and access audio clips for pasting into the EDL. Text EDL presents you with a text-based representation of your edits. If you have a specific start time for a Clip, just enter it here. Process is where you

SADiE FACTS

MANUFACTURER: SADiE (Studio Audio Digital Equipment, Inc.), 1808 West End Avenue, Suite 1119, Nashville, TN 37203. Tel: 615-327-1140.

APPLICATION: Digital audio editing stereo or four track; CD preparation.

SUMMARY: A great system for assembling and editing album material.

STRENGTHS: Graphically change fades and edits; nothing optional, does everything; fast, easy to use; four audio outputs.

WEAKNESSES: Limited to four tracks; no noise-reduction software available; only two digital inputs at a time.

PRICE: \$9995 (basic turnkey system, includes computer); CD-R, \$3695; EXABYTE drive, \$2495

EQ FREE LIT. #: 126

perform audio manipulation, including, EQ, compression, and time stretching. Alternate EDL allows you to switch between two active EDLs. You can have different versions of your edits and switch between them with one click of the mouse.

COOL SADiE

SADiE offers quite a few cool goodies that you can't easily get anywhere else.

- On-the-fly edit points. While recording or playing audio, edit points can be placed in real time with the click of a mouse button. If you are marking areas to be deleted, you need to place only one cut in the general area of the edit. You can come back later and clean it up. Check this out! SADiE will automatically place cuts when it detects DAT start IDs or CD track IDs.

- Overload Log. This text lists the time of all overloads that were created due to input level of fade curves or level changes in the EDL.

- Headroom Display. Shows remaining digital headroom to .01 dB resolution.

- Transmission Mode. Disables mouse and keyboard so that important playback operations cannot be stopped by accidental data entry.

- Fade Shapes. SADiE contains about a billion (actually 20) predefined fade types. Fade-ins and fade-outs can be of different lengths.

- Timed automatic saves to current EDL. So you can't forget to save your work as you go.

- Record only the number of bits you need. Other hard disk systems use 24 bits of space even when recording 18 bits of audio. SADiE only uses the space it needs for the resolution you select.

- Built-in DSP processes. SADiE incorporates the AT&T floating point DSP chip, which is faster and more powerful than the Motorola DSP used by most other vendors. DSP functions include 3-band parametric EQ, compression, expansion, gates, noise reduction (3-band, frequency-dependent expander), sample-rate conver-

sion, subsample micro timing, pitch shifting, timescrunch, and speech edit (like Strip Silence).

- Self-contained SMPTE reader/generator.

- Built-in PQ editor. Automatically generate PQ list from EDL. Cut CDs without additional software. Will input PQ bursts from existing digital audio masters. Graphical representation of track IDs on edit display window. Change track starts by dragging flag in edit window. Will work with SCSI or AES CD-Rs. Produce DDP (EXABYTE) masters without additional software. Only PQ editor that will place track IDs on audio-only CD-R units. Will also put start IDs on DAT tapes.

- Auto-Conform. SADiE will automatically conform edits to an imported EDL.

- Nine-pin machine control.

- Built-in backup. SADiE will back up to DAT tapes over the AES or S/PDIF connection or to an EXABYTE tape connected to the SADiE SCSI bus.

- Audio recording to MO drives.

- Hardware control. SADiE functions can be controlled from an external hardware control surface.

- Network transfers. Multiple SADiE machines can be connected together through a PC network.

ON YER MARKS...

That about covers it. An amazing amount of power in a single package. If you didn't already run out and buy a SADiE, there may not be any left.

—Roger Nichols

UPDATE

Akai DR4 and DR8

MANUFACTURER: Akai, 1316 E. Lancaster, Ft. Worth, TX 76102. Tel: 817-336-5114.

PRICE: DR4, \$1995; DR8, \$4995

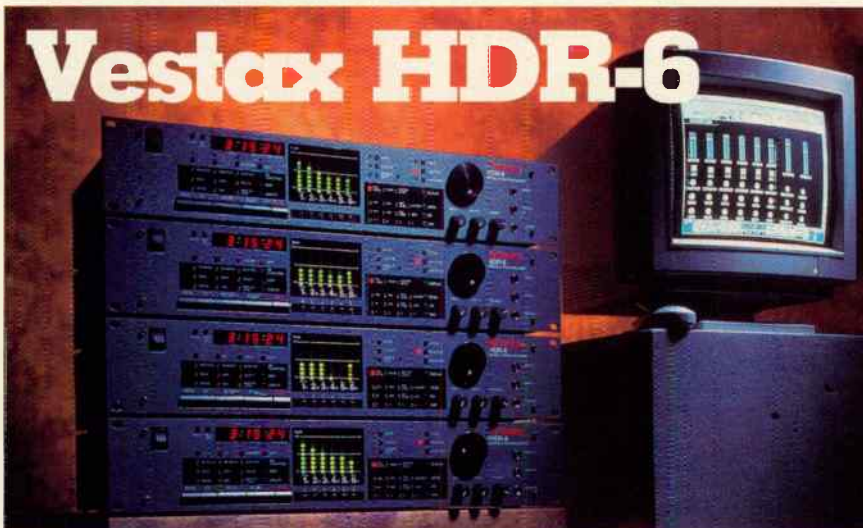
EQ FREE LIT. #: 127

In EQ's December '93 issue, I reviewed Akai's 4-track digital hard disk recorder/editor, the DR4d. Well, a lot has changed since then and Akai has not only released version 3 for the DR4, but it has also released an entirely new product: the DR8. First, though, let's look at what's new in the DR4.

The DR4 can now generate SMPTE and MTC (with the installation of the IB-112T or IB-113). The DR4 can also integrate with SMPTE, MTC, MIDI Clock, and MMC. An external SCSI mode has been added for use with a personal computer. This feature will allow graphic waveform editing when appropriate software is released. The DR4 remote is now supported and can be locked with three other DR4's for 16-channel operation. All hard disks connected can now be formatted or deleted in one operation. This is very useful, for example, during string sessions when you have multiple drives connected and need to format each of them (the wait is over). Other changes include the display setting (1.01.00 instead of 0), negative offsets, and level metering during back-up. Whew!

Akai is also now offering the DR8; list price: \$4995. The DR8 features 8 tracks of simultaneous record and playback, 1 GB internal HD, 18-bit A/D and 20-bit D/A, 16-channel mixer, Auto-punch, copy, move, insert, delete, erase, varispeed, UNDO, Word Clock/Video sync, Control of up to seven DR8's for 56 tracks total, eight balanced inputs and outputs (plus stereo), and many options. This is one serious machine. The modular hard disk recording world might never be the same. [Look for a detailed review of the Akai DR8 in an upcoming issue of EQ. —H.G.L.]

—David Frangioni



In the not-so-distant past, utilization of digital hard drive capabilities for recording audio had one small catch: You needed a computer attached to the hard drive! That was then, and this is now. Vestax has, with the release of its new HDR-6 digital hard disk multitrack recorder, introduced the audio world to the more affordable possibilities of modular hard drive recording.

Rear-panel connections are fairly straightforward. Two line-input jacks balanced at +4 dB, four auxiliary send jacks and master out, L and R, in normal mode become six direct outs in direct mode. Also included are MIDI In, Out, and Thru jacks, digital in and out (both coaxial and optical), two optional slots for additional drive space, and a punch-in footswitch jack. One more sign of a well thought-out design is the placement of the HDR-6's two analog inputs on the front panel.

Once connected, the HDR-6 comes

out of the gate with a demo song. This introduces the user to the mixer section of the unit, which houses track and master levels, EQ (low, mid, mid-freq. sweepable from 250 Hz to 4 kHz, and high), and pan controls. This song also provides the instant gratification that, yes, this unit really sounds great (musical preferences aside, please). Once this song has been completely obliterated from the device's memory (which happens after initialization is complete — a process that takes a good twenty to thirty minutes), the user is ready to dive in to the heart of the device: the recording capabilities.

Recording with the HDR-6 involves a series of methodical button presses that can grow tiresome (perhaps a remote editor, guys?). These procedures introduce the user to the front panel of the device, which includes transport controls, clock timer, absolute/relative time switch, A and B point location buttons, data entry and undo controls, bargraph

LED track display with accompanying track enable buttons, mute and direct out selectors, pitch and shuttle control with the jog dial, function selector, mixer section, two analog inputs with input level dials, and a headphone jack and volume wheel. Most of the functions of the HDR-6 are accessed through a series of "function" and "enter" combinations. Go slow at first, because the function list only goes in one direction, and frustration grows incrementally as you rush past the function you were searching for in a whirlwind of button presses.

The first step in recording with the HDR-6 is choosing a sample rate of either 32, 44.1, or 48 kHz. Next you would assign track/input allocation. Vestax has devised a strange system for organizing this process. The display reads from right to left and in that order assigns the corresponding inputs to the lowest activated track. An example input assignment display shows "InLr12." This display indicates that the left channel of the digital input is selected to record on the lowest enabled track number. If two tracks are enabled, the right channel of the digital input would be assigned to the higher numbered track. If three were enabled, then analog "in 1" would go to the next highest above that, and so on, in the order of the given display. Confused? This definitely could have been smoother. On the up side, you can auto-punch at any point in the song with a rehearse feature.

In order to actually input data into the HDR-6 hard drive, you must first make a home for this data to live in. This is done by using the "song create" function. The HDR-6 can store up to 30 "songs," or data areas. This feature is deceptive because no matter how many songs between one and 30 you plan on creating, the total amount of recording time, of course, remains unchanged, and shrinks after each new song. I was able to input a total of approximately seven minutes of audio among four separate songs. This is a very limited amount of available space for realistic recording environments. The addition of the optional second hard disk, and perhaps a supplemental external drive, becomes an inevitable additional expense to consider before purchase of the HDR-6.

Editing features on the HDR-6 include Move, Copy, Merge, and

HDR-6 FACTS

MANUFACTURER: Vestax Musical Electronics Corporation, 2870 Cordelia Road, Suite 100, Fairfield, CA 94585. Tel: 707-427-1920.

SUMMARY: The HDR-6 provides multitrack digital recording in a stand-alone box that is easily integrated in both the analog and MIDI environments.

APPLICATION: Six-track hard disk recorder with built-in mixer/EQ.

STRENGTHS: Ease of use; dynamic pitch control; MIDI-automated mixer settings; compact, good sound; two types of digital I/O on-board.

WEAKNESSES: Track assignment function could be better; limited inputs (only 2 analog and 2 mixing); limited to one digital I/O; manual poorly written and typeset.

PRICE: \$1995

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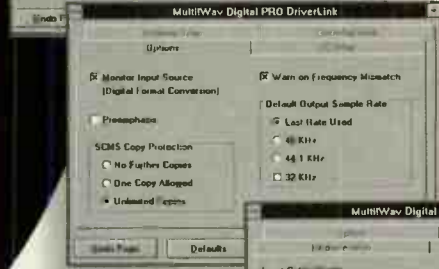
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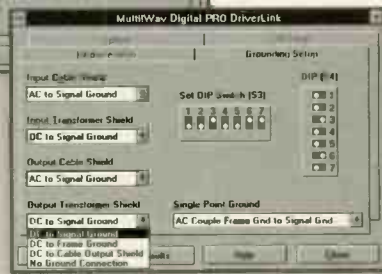
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(Left) Use the Options page to enable monitoring and other unique features.



(Below) Unique to Multi!Wav Digital PRO are the flexible ground strapping options.

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► Real-Time Digital Format Conversion	Convert Optical to Coaxial, S/PDIF to AES/EBU, or vice versa, in REAL-TIME!	YES	No
► Software Upgradable Hardware Design	Add NEW HARDWARE features from software updates, such as 24 bit audio & more!	YES	No
► 1/4" Phone Jacks for Coaxial S/PDIF	Multi!Wav uses pressure-contact 1/4" phone jacks. CardD uses single-ended RCA jacks.	PHONE	RCA
► Shielded Digital Audio Transformers	Reduce common-mode noise and clock phase jitter.	YES	No
► Flexible Ground Strapping for Pros & Audiophiles	Achieve optimal ground configuration. Reduce common-mode noise and clock phase jitter.	YES	No
► I/O Overload Protection to 50 VDC	Protect against accidental misconnection of inputs and outputs up to 50 Volts DC.	YES	No
► 256/512 Bit Upgradable RAM FIFO Buffer Option	Improve performance by reducing sensitivity to hardware underruns & overruns.	YES	No
► LC Filtered Analog Supply	Improve receiver PLL performance by reducing noise.	YES	No
► Multi-Layer PCB	Improve performance by reducing "digital" noise.	YES	No
► 24mA Bus Drivers	Meet all IBM PC Bus requirements.	YES	No
► 64 Selectable Addresses	Eliminate hardware installation conflicts.	64	Just 2
► Professional Sample Rates	48kHz, 44.1kHz, 32kHz (software selectable)	YES	Yes
► Life-Time Warranty	Protection against manufacturing defects.	LIFE-TIME	1 Year

* Comparison performed May 1995 using Multi!Wav Digital PRO (rev A) from Adb International and Digital Only CardD (1/n 00CD9159 rev B) from Digital Audio Labs. Multi!Wav Digital PRO requires one 16-bit ISA bus slot; a computer that meets the hardware requirements specified by your Windows WAV editing software; and digital I/O cables. Adb, Multi!Wav, and DriverLink are trademarks of Adb International. All other trademarks are the property of their respective owners. Made in USA.



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Delete. Editing is done within the selected song, and each song has two assignable A and B points along with eight locate points. The A and B points provide the start and end points for the audio section being cut, moved, swapped, inserted, deleted, etc. Assignment of the points is easy, and the material contained within them can be played out of the song once or in a loop for point verification and sampling. The shuttle function used to advance the individual frames, à la the jog dial, continues to repeat the individual frames while responding to the dial commands with little sensitivity, an ailment that proves hard on the ears after a few edits. The actual inserts of material can include one or all the tracks contained within the AB section. The other option for editing is the Playlist. In this mode, you can arrange chunks of data to play back in any order. Throw the razor out, as this type of editing is usually found on computer-based systems.

Thankfully, the HDR-6 is MIDI friendly, and can be quickly integrated into the modern MIDI environment with a variety of choices. It synchronizes with MIDI Timecode, MIDI Machine Control, or MIDI Clock. The HDR-6 can also automate its mixer settings and track assignments to MIDI Continuous Controllers.

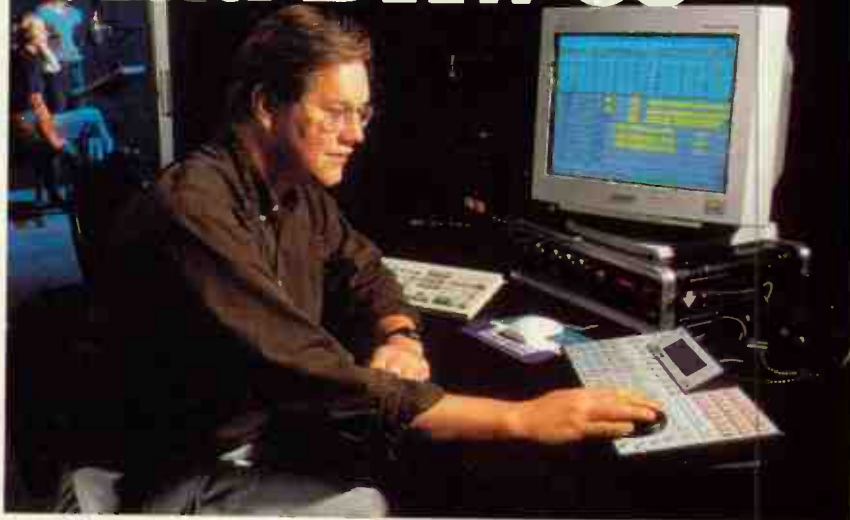
Ultimately, the Vestax HDR-6 proves to be slightly limited in storage capacity, making it necessary to purchase additional drives, which, of course, raises the initially low base price. The sound quality, though, is excellent, but the methods required between making the music and the playback of the finished product are slightly tedious (due to repetitive front-panel commands). Remember, I'm comparing these gripes to all other hard disk competitors on the market, which includes some very stiff competition at much higher price points.

The overall existence of this product and quality of sound produced are very exciting. The fact that this many features are available in a compact, portable unit is amazing. Remember, the HDR-6 does not require a computer of any kind in order to operate: this is a stand-alone unit. The Vestax HDR-6 might be just what the doctor ordered.

Special thanks to Brad Zeffren of DFE for his invaluable assistance.

—David Frangioni

TimeLine Vista DAW-80



This descendant of the legendary WaveFrame is optimized for postproduction work, but also does music. The system is built around a rugged, 4U-rackmount version of a standard PC, assembled by TimeLine specifically for the DAW-80. The base unit (\$17,500) offers 8 tracks and includes 8 MB of RAM, 1.44 MB floppy, custom keyboard/mouse (the custom keycaps make operation much faster than having only regular QWERTY keys), and software (DOS, Windows for Workgroups, and ATI Graphics Ultra+). A 4U-expansion box provides 8 channels of analog XLR I/O, AES/EBU-

S/PDIF digital I/O, MIDI (including MTC out), VITC and composite video inputs, timecode in, timecode out, and Word Clock I/O. You can expand tracks, inputs, and outputs until you have 24 of each (and a \$33,000 price tag).

Options include SVGA monitor (\$675 to \$2640, depending on size), serial interface card (\$300), assembler EDL input software (\$1000), machine control hardware/software (\$1000), and DSC-100 dedicated control surface (\$2750) with jog/shuttle wheel, dedicated edit keys, large LCD, etc. Storage options include 1.2 GB SCSI drive, 2.4 GB SCSI drive, 1.3 GB MO

DAW-80 FACTS

MANUFACTURER: TimeLine Inc., 2401 Dogwood Way, Vista, CA 92083. Tel: 619-727-3300

APPLICATIONS: Eight-channel (expandable to 24) DAW optimized for postproduction.

SUMMARY: The DAW's accent is on speed and reliability.

STRENGTHS: Rugged; PC-based operation allows for inexpensive expansion; great sound quality (no rough edges); Sound Selector makes it easy to find material; Media-Matrix option a major boon for mixing.

WEAKNESSES: Slow waveform redraws; requires outboard MIDI sequencer (and arguably a hardware fader unit) to take full advantage of stock mixer.

PRICE: Depends on configuration and options (review unit cost: approximately \$20,000)

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Otari RADAR

MANUFACTURER: Otari, 378 Vintage Park Dr., Foster City, CA 94404. Tel: 415-341-5900.

PRICE: 24-track system (includes 3 internal 1 GB hard disks), \$21,300; 24-track system with 3 internal 2 GB hard disks, \$23,900

EQ FREE LIT. #: 130

drive, and 8mm/2.5 GB tape drive for backup (\$825, \$1450, \$2800, and \$1800, respectively). The 486-based review unit had the tape drive and dual 1.2 GB drives; Pentium-based models are just going into production.

The DAW-80 does what you'd want a DAW to do — cut, paste, copy, sync to LTC or VITC, speak MIDI, etc. So, we'll concentrate on what makes this unit different from the norm.

For example, you can "save as" on a track-by-track basis, as well as save complete projects or the "reels" that make up the project. This lets you build up extensive libraries of sounds and effects. How do you find them? Use the Sound Selector, a very hip database that lets you find sounds as fast as you can type in key words.

This theme of customizing to your particular application runs through the DAW-80. Screens can scroll left or right or the cursor can move against a stationary screen. You can create custom tool bars and floating palettes if you're a mouser or use the keyboard macros if you're a typist.

The display works best when it shows discrete blocks of audio. You can view waveforms, but drawing and updating is real time (e.g., it takes 30 seconds to draw 30 seconds of audio). Don't use waveform display unless necessary.

What makes up for this is the excellent scrubbing. Locating specific points by ear couldn't be easier, and it seems faster than dealing with waveforms anyway — there's no need to "zoom," for example. You can also save multiple "views" consisting of zoom level and cursor location.

Audio can be overlapped on a single track (two segments can play simultaneously), which saves *mucho* track space when crossfading and keeps attacks from cutting off decays. Speaking of crossfades, the DAW-80 can overlay a multistage envelope on any audio snippet: initial attack, fade in time, maximum level, final fade time, final fade level, and overall fade. To crossfade, just drag region handles (although you can also specify start/end points for fades and have the DAW-80 fill in the slope). Editing is in real time and the unit rarely hiccups.

The fit time algorithm is very good, even with fairly extreme variations. Part of this comes from being able to optimize for different types of program

We covered Otari's RADAR 24-track hard-disk recorder in an exclusive review in the January '95 EQ, but a lot has happened since its release, so here's an update on the latest and greatest software, version 1.2 (provided free to all RADAR owners).

The biggest change is RADAR-VIEW, a graphic interface that provides on-screen metering, SMPTE timecode display, 24-track display with zoom in and out, digital audio routing status readout, and RADAR status indicators (sample rate, clock source, crossfade settings, etc.). Because RADAR-VIEW lets you see everything that's going on with RADAR, you can stash the recorders elsewhere to get hard-disk noise out of the control room. RADAR-VIEW requires four extra megs of RAM, an SVGA monitor, and a suitable video card (approximately \$125).

Other goodies include a choice of clock references (video sync, AES-EBU, or ADAT) with SMPTE as positional source, word clock in and out, timecode out, SMPTE freewheeling, static timecode out enable/disable, swap data between internal and external drives, partial backup/restore for individual projects, ADATLINK for 24-track digital transfers, support for two gigabyte drives, and reverse play. RADAR now includes remote modem diagnostics as well.

Although these additions were not unexpected — Otari has been pretty upfront about future plans — they are welcome and continue to enhance RADAR's already impressive and easy-to-use feature set. —Craig Anderton

MTU MicroSound DAW

MANUFACTURER: MicroTechnology Unlimited, 6900 Six Forks Road, P.O. Box 21061, Raleigh, NC 27619. Tel: 919-870-0344.

PRICE: \$6800–\$14,000. Systems can be customized.

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MicroSound is a Windows-based, PC-compatible system built around a plug-in DSP card that interfaces via umbilical to a 2-RU package. (An additional pair of cards provide MIDI and SMPTE I/O.) Users can purchase a turnkey system — including a computer in a rack-mount package — or go "à la carte." Built into MicroSound's software are "Autopilot Detectors" that insure that neither user nor system errors can corrupt soundfiles or crash Windows. One of the principle features of this system is its dependability due to emphasis on crash prevention. MTU boasts that no audio has been lost or damaged in nearly six years.

The MicroSound workstation was running software version 2.1 when first reviewed in EQ's October '93 issue. Version 2.4 (MicroEditor) was released in May '95 after eight months of rigorous testing. Of the 60 additions and upgrades, most notable are an assignable mouse-driven fader controller, non-linear fade ramps, solo view display, and 300-element peak meters. The software also features a multimedia driver that supports 15 sample rates plus AIFF (Mac) soundfiles. Its automatic waveform analysis creates "undetectable" edits without hassle, plus the system has the ability to manually enter record — during play — while synched to timecode.

New also in May '95 was the Micro-CD, a hardware/software add-on package that includes a 2X CD writer and the necessary tools to create Orange- or Red-book-compatible audio CDs. Micro-CD uses MicroSound's multifunction marker flags to create Star IDs. In addition, the ability to write files to CD at 2X speed offers a faster method of archiving soundfiles. —Eddie Ciletti

material. Of course, you can also undo; in fact, there are up to 256 levels of undo in the system. This means you can work fast and loose, knowing that you can return to the last good take if you press the wrong key at the wrong time.

ALL MIXED-UP

The mixer page (a separate program) looks incredibly impressive. You basically have up to a 10 X 4, MIDI-controlled mixer with input trim, phase invert, high- and low-shelf EQ with frequency and gain, midrange parametric, EQ bypass, two aux sends (pre or post), pan, solo, mute, and faders. The output section has two pairs of master faders and cute analog meters. You use the mouse to change parameters.

Great — except the only way to do automation is to run this with a sequencer, and the DAW-80 doesn't have one! Nor can it import MIDI files if you want MIDI instruments cooking along with your hard disk recorder. Granted, you can always run an external sequencer and sync it to the DAW-80, but given the price, you shouldn't need something else to make the mixer work.

You can also create custom mixers, for example, to control parameters in a signal processor (although the mixer controls cannot be programmed to send sys ex). This was a breakthrough when it appeared in the WaveFrame, but nowadays most sequencers include ways to create "virtual control panels."

Help, however, is on the way. Time-Line now offers a MediaMatrix option (\$4995) using Peavey's innovative Media-Matrix hardware and software. This lets you not only configure just about any type of mixer you want, but add in DSP such as compression, advanced EQ, and the like — all assembled on screen using "virtual patch cords."

Basically, the DAW-80 trades off editing precision for speed; don't expect cool DSP or sample tweaking, but do expect to get the job done. The "feel" is very tight and well-integrated, software reliability is excellent, and the Sound Selector alone will save you hours. If you just want to record music, then digital tape or an entry-level hard disk system is probably simpler and cheaper. But if you're doing audio-for-video and need to lay down audio and effects before the local Fed Ex office closes, this is a smooth and robust system. —Craig Anderton



Many hard-disk-based audio products are either add-on internal cards or external pieces of hardware designed for use with IBM-style PCs or the Apple Macintosh. The Fostex Foundation 2000RE is a dedicated, 16-channel, 8-track hard-disk recorder/editor designed and manufactured by New Hampshire-based Fostex Research and Development.

The Foundation 2000RE is a truly complete system enhanced by an ergonomically designed control surface, a built-in synchronizer, and

nearly every possible I/O port imaginable. Included as standard are an ADAT/RD-8-compatible digital audio interface (for 8-channel digital transfers), ADAT DB-9 SYNC, SCSI, SMPTE, Word Sync, Video, Toslink optical, standard AES, and 8-channel analog ports.

THE CONTROL SURFACE

Out of the box, the 2000RE behaves like a standard tape recorder. Its real control surface includes a touch-sensitive electro-luminescent (EL) screen and two rows of numeric LED displays.

FOUNDATION 2000RE FACTS

MANUFACTURER: Fostex, 2 Buck Road, Suite 2, Hanover, NH 03755. Tel: 800-7-FOSTEX.

APPLICATION: Sixteen-channel, 8-track hard-disk-based recorder/editor.

SUMMARY: A dedicated piece of hardware with all of the bells and whistles.

STRENGTHS: Easy to use, gradual learning curve facilitated by a great manual; good support of established RS-422 protocol; plenty of interface options make the package complete.

WEAKNESSES: Software needs to provide a more detailed inventory of potential and available disk space; sonic feedback should indicate when system messages occur.

PRICE: 2000RE package (includes main unit, edit controller, Release 4 software): \$9995 (\$11,813 w/1.2 GB RPE); 2000RE main unit: \$6915; Edit Controller: \$3080; 1.2 GB RPE: \$1818 (RPEs can be purchased directly from MountainGate and Rourke Data in sizes from 540 MB to 2 GB).

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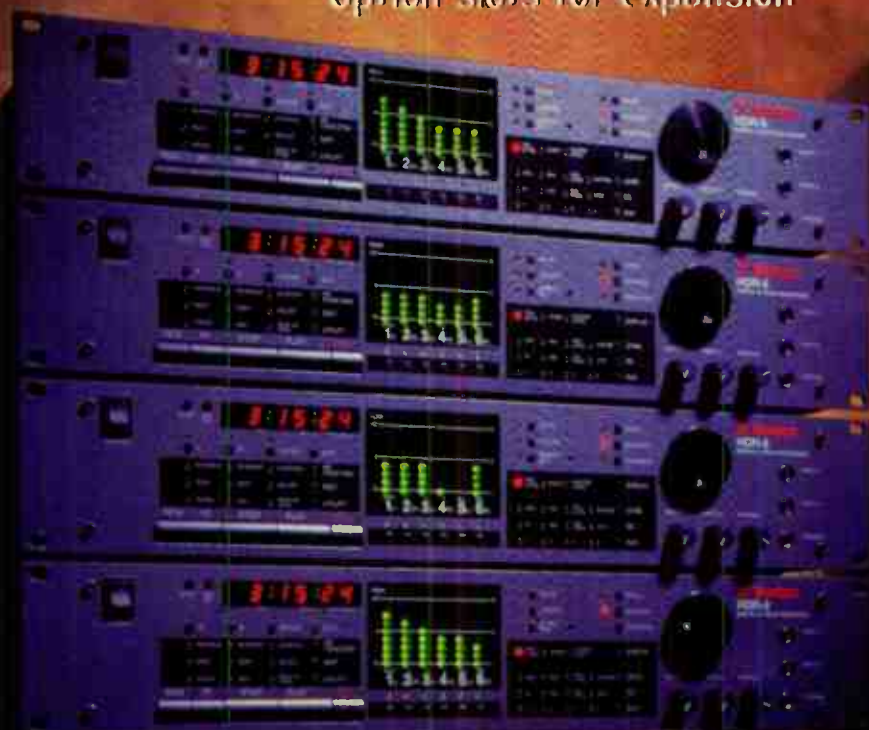


Vestax

HDR-6

D I G I T A L 6 T R A C K R E C O R D E R

Digital mixer with 3-band digital EQ
4 Aux Sends and Returns built in
Full editing functions—move, copy & delete
Synchronize any number of HDR-6 units
MIDI Sync, mixer control and Auto Mix
MIDI Machine Control
Auto Punch In/Out, with undo
Auto location for instant access
Real time pitch control
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18 bit A/D conversion
20 bit D/A conversion
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Soundscape SSHDR1

MANUFACTURER: Soundscape, 705A Lakefield Road, Westlake Village, CA 91361. Tel: 805-495-7375. E-mail: 74774,1337@CompuServe.com.

PRICE: SSHDR1, \$3250; SSHDR1R, new removable drive version, \$3710

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The Soundscape SSHDR1 is a dedicated piece of hardware with a PC front end. The unit was first tested with Version 1.14 and 1.15 software. I am currently testing an Alpha version of 1.17, which, among other things, now includes EDL (Edit Decision List), Grass Valley and CMX auto-conform, 29.97 and 29.97 df (Drop Frame), editing-on-the-fly, and JLCopper CS10 implementation. (See EQ, February '95 for the original review.)

In version 1.16, the deglitching has been improved. This was a low-level problem, which intermittently occurred on some edits. It now has a brain! Eight selectable fade curves have been added, as well as a marker directory that holds 999 locations. Of several new tools, one recalibrates the D/A and another defragments the hard drive. Plus, Solo and Group Scrub and a Take Directory have also been added.

While DSP has been limited to basic editing and EQ, a nondestructive noise gate has been added. Compression, reverb, time, and pitch change are in development, as well as several other toys and features — some from third-party developers.

Each 2 RU Soundscape package features 8 tracks with a built-in mixer and EQ. With a SMPTE-to-MIDI converter, this system will slave to any timecode-producing box. Inside the case is room for two 1.7 GB IDE drives (10 MB/stereo minute @ 44.1 kHz). Two power supplies isolate the digital from the analog circuitry. Soundscape is quite happy with a 386SX with 1 MB of RAM.

—Eddie Ciletti

Under jog-wheel control, the system behaves better than any tape machine. This, when coupled with the "zoom" feature on the EL screen, makes editing the most pleasant of tasks — especially with six levels of "Undo" for the bonehead in all of us. My one request is for aural feedback, perhaps in the form of a "beep," or even a "hey you," that is triggered whenever a user error or a system message occurs.

The buttons on the control surface are grouped into logical activity areas. To the right is a numeric keypad for saving, entering, and recalling timecode addresses. To the left are the standard transport controls (Play, FF, RW, etc.), plus Solo, Record Ready, and Input Enable buttons. In the middle are 20 buttons dedicated to such tasks as Cut, Paste, Ripple, Align, Trim, and Undo (my personal favorite). The controller also includes a video output so that the EL screen can be viewed on a standard NTSC TV monitor.

At the heart of the 2000RE is its mainframe, a 4U-high chassis with I/O ports on the rear and a slot for removable media on the front. The RPE (Removable Project Environment) is Fostex's way of making hard-disk recording manageable. The easily removable carrier allows any compatible hard-disk or magneto-optical drive to be hot swapped. A wide variety of SCSI hard drives are supported for the RPE. (Only the WangDAT has been tested and is currently supported for archiving.)

FOR THE VIDEO INCLINED

The Foundation 2000RE is the progeny of the Foundation 2000. The 2000 features a modular chassis and a digital mixer/control surface, while the 2000RE is "just" a dedicated digital recorder/editor. Both permit SMPTE timecode addresses to be sent over their RS-422 serial control ports (standard protocol in the video community). The 2000RE is compatible with nearly three dozen video products, including the industry standard Sony BVW-75, the JVC BR-S-522/622/822, the Panasonic AG-7650/7750, and the Pioneer VDV-1000 video laserdisc recorder.

TEST SIGHT

I tested the Foundation 2000RE at R/Greenberg Associates, NYC, one of

the premier computer graphics and video compositing facilities in the country. I interfaced the 2000RE with several Sony products, such as the PCM 7030 timecode DAT, a PVW-2800 BetaSP analog video recorder, and a DVR-2000 D-I digital video recorder. Also interfaced to the 2000RE was the Z-Systems 16 x 16 digital audio patchbay, which facilitated the process of routing the various AES signals. The 2000RE also features a built-in, virtual patchbay for selecting either the analog or the digital ports.

TALE OF TWO PROJECTS

The first editing project was the audio soundtrack for a video documentary. The video was recorded with consumer-grade Hi8 and VHS camcorders. From these sources, the best audio track was selected and loaded into the 2000RE via its analog ports. Each recording is called an "event." Using the "split" tool, the "main event" was broken up into smaller events that were then labeled and entered into the library as clips via the touch screen.

Editing Foundation-style is quite easy. The unwanted sections are defined by scrolling the cursor over the desired points and marking them with the In and Out buttons. In order to make cuts, tracks must first be armed by pressing their respective Record Ready buttons. Pressing Cut removes only the designated section, while the other events maintain their place on the timeline. Pressing Ripple before Cut also removes the marked section. If other events exist on that track, they shift forward by the amount removed.

The plan was to enhance the final audio once the video editing was completed. With this in mind, I chose the conservative approach by limiting myself to a stereo main track. (Later, sound from alternate camera angles would be placed on a separate pair of tracks for the Surround Mix. In addition, a pair of audience reaction tracks would also get their own space.)

In order to tighten up the space between speakers, some of my edits contained considerable overlap from applause directly into the following speech. The Foundation did not balk at doing lengthy crossfades on a single

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now you can have a DP, too

DP/2 Features

- 2 24-Bit ESP Chips
- 2 Inputs/2 Outputs
(balanced TRS)
- 65 Algorithms
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Talking 'Bout DAWs Charts & Things

Workstations basically come in two flavors: dedicated hardware (DH) and hardware that requires a host computer (HC). Dedicated systems are a completely self-contained caterpillar that typically include a control surface and a display. In the next phase of metamorphosis, the controller is replaced by a host Mac or a PC.

Shed the case and power supply, condense the digital signal processing (DSP) circuitry into a card that plugs directly into a computer, and, voila!, more confusion. Hardware that links the DSP directly to a dedicated hard drive means faster, more reliable communications and translates to more real-time tracks. Traffic slows down when the DSP must share a hard drive with the host computer.

Manufacturer	Model	Features	Price
Hardware Requiring a PC as Host Computer			
Digital Audio Labs	CardD Plus	4 RTT, DIY, DISK-V, TRIG, EQ, TC, AI (AN, AES/EBU, SPDIF), MIDI/MMC	\$795
	Fast Eddie	4 RTT, DIY, DISK-V, TRIG, EQ, TC, AI (AN, AES/EBU, SPDIF), MIDI/MMC	\$129
	EdDitor Plus	4 RTT, DIY, DISK-V, TRIG, EQ, TC, AI (AN, AES/EBU, SPDIF), MIDI/MMC	\$349
	Digital Only CardD	4 RTT, DIY, DISK-V, TRIG, EQ, TC, AI (AN, AES/EBU, SPDIF), MIDI/MMC	\$495
Innovative Quality Software	SAMM	SMPCONV, DSP/RT, EQ, DYN, SPACE, DISK-V, CS-0	\$499
	SAW Plus	—	\$999
	SAW/SAW Utilities	8 VT, DIY, software only, requires off-the-shelf PIC, I/O<, MTR, ED, MX, IMP/EXP	\$599
Micro Technology Unlimited	MicroSound	4 RTT, PIC+EX, MT, MX, I/O<, DISK-V, ED, BU (DAT), AI (AN, AES/EBU, SPDIF), TC, MIDI, CD, MicroEditor software v. 2.4, \$125 w/o contract (contract provides 3 upgrades)	\$6800-14,000
Sonic Foundry	Sound Forge	2 RTT, EQ, DYN, SPACE, PITCH, IMP/EXP, WAV/.SND/AIFF; Software only, requires off-the-shelf PIC, 16 bit	\$495
	Sound Forge	32-bit version	\$595
	Sound Forge	Software upgrade from 16 bit	\$99
Soundscape Digital Technology	SSHDR-1	8 RTT, VT, I/O<, MT, MX, ED, EX, AI (AN, SPDIF), BU (DAT), DSP/RT: MX and EQ, DSP/BKG: EQ and MX, 3P-F, DISK-D, TC-3P, MIDI	\$3250
	SSHDR1R	Same as above but with front-panel removable drives	\$3710
Spectral, Inc.	AudioPrisma, PrismaMusic, PrismaTica	8 RTT, TS, DIY, PIC+EX, VT, I/O<, MTR, MX, ED, AI, TC, WC, BU (DAT, EXABYTE), DSP/RT, EQ, DYN, TIME, PITCH, DISK/D	Price varies
Studio Audio Digital Equipment	SADiE	4 RTT, TS, DIY, PIC+EX, MTR, MX, ED, IMP/EXP, SMPCONV, TC, V, BU (DAT, EXABYTE), DSP/RT, EQ, DYN, TIME, PITCH, DISK-D, CD, DDP, AI (AN, AES/EBU, SPDIF), MIDI, NR, CS-3, NET (includes computer)	\$9995 (base system)
TimeLine/Vista	DAW 80	24 RTT, TS, VT, I/O=24, MTR, MX, ED, EXPAN (8-24), IMP/EXP, AI (AN, AES/EBU, SPDIF), TC, V, WC (BI), BU (EXABYTE), DSP/RT, EQ, DYN, TIME, PITCH, 3P-P (Peavey Mediamatrix), DISK-V, TRIG (manually), VDT, CS-0, DC	\$17,500 (base system)
Turtle Beach	Quad + Wave SE	(software only)	\$199
	Quad + Wave SE	4 RTT, PIC (Tahiti), AI (AN), I/O<, ED, EQ, SMPTE, MIDI, EXPAN, IMP/EXP WAV/AIFF/VOC/PCM/ADPCM, SMPCONV	\$499
Yamaha	CBX-D5	4 RTT, MT, DISK-D	Varies
Hardware Requiring a MAC as Host Computer			
Digidesign	ProTools III	16 RTT, I/O<, PIC+EX, EXPAN, MT, MX, ED, EQ, DYN, SPACE, AI (AN, AES/EBU, SPDIF), DSP 3-P, DISK-D, SMPTE, MIDI, MMC	\$6995 (core system)
Digital Expressions	SoftSplice	4 RTT, MT/ED, MX, I/O<, DISK-D, EQ, BU, AI	\$1985-4300
OSC	DECK II	16 RTT, DIY, software only, requires off-the-shelf PIC, VT, I/O<, MTR, MX, ED, IMP/EXP, AIFF (Quadra, PPC, Digi 442), DISK-V	\$399
Sonic Solutions	SonicStation	PIC+EX, DISK-D, DSP-RT, DSP-NRT, DSP-BKG, SMPCONV, SMPTE/EBU, AI (AN, AES/EBU, SPDIF), NET	Price varies
The Black Boxes (Dedicated Hardware Systems)			
Akai	DR4d	4 RTT, MT, ED, I/O=, AI (AN, AES/EBU, SPDIF), DISK-D, TC, EXPAN, PITCH, BU (DAT)	\$1995
	DR8d	8 RTT, MT, ED, I/O=, AI (AN, AES/EBU, SPDIF), DISK-D, TC, EXPAN, PITCH (DAT), V, WC	\$4995
Fostex	2000RE	16 RTT, I/O<, MT, ED, DISK-D BU (SCSIDAT), AI (AN, AES/EBU, SPDIF, ADAT), TC, V, WC (BI), CS-D	\$9995
	2000RE	Same as above but with 1.2 GB drive	\$11,813
Otari	RADAR	24 RTT, MT, DISK-D	\$21,300 (base)
Roland	DM-800	8 RTT, MT, MX, ED, EQ, DISK-D, CS-D, AI (AN, ADAT/DA-88), RS-422, MIDI	\$6295
	DM-800	w/2 (500-meg) drives	\$7495
Vestax Musical	HDR-6	6 RTT, MT, ED, MX, EQ, I/O<, DISK-D, AI (AN, AES/EBU, SPDIF), MIDI, MMC	\$1995

*Look for a review of this product in an upcoming issue of EQ.

Features/Options

TS: Turnkey System (computer included in the package)

DIY: Do It-Yourself/à la carte package

PIC + EX: Plug-In Card also requires External hardware and/or breakout box

RTT: There will be a maximum number of Real-Time Tracks

VT: Virtual Tracks. Most systems will have more tracks available than can be played in real time.

I/O=, I/O<: The number of Inputs and Output channels may be equal to or less than the number of real-time internal tracks

MTR, MX, ED: Systems may be Multitrack Recorders, Mixers, or Editors

EXPAN: Expansion (additional tracks) via more boxes and/or cards. There should be some method to view and control each group from a single window or controller.

IMP/EXP, NET: Soundfiles such as .WAV or AIFF can be imported or exported. Soundfiles may also be shared and passed over a network.

AI: Audio Interface (Analog, AES/EBU, SPDIF, ADAT, DA-88)

SMP CONV: Built-in Sample-Rate Converter via hardware or software (may not occur in real time)

TC, V, WC, MIDI, MMC (BI, PI, 3P): The ability to read and write several flavors of SMPTE/EBU TimeCode, resolve to Video, Word Clock and MIDI. This option can be Built-In to dedicated hardware, require additional Plug-In cards or require a 3rd-Party SMPTE-to-MIDI converter such as the JLCooper PPS-100. System supports MIDI Machine Control (MMC).

BU, DDP: BackUps possible to any standard digital tape machines, such as, DAT/4 mm, DA-88/8 mm, ADAT/SVHS) or restricted to SCSI devices such as DataDAT (4 mm) or Exabyte (8 mm). SCSI backup devices may not be included with system. Disc Description Protocol: The EXABYTE drive can be used to create a CD mastering production tape.

DSP/RT, DSP/NRT, DSP/BKG: DSP (Digital Signal Processing) may be performed in Real Time, NonReal Time or as a Background operation. May be used in conjunction with functions below.

EQ, DYN, SPACE, TIME, PITCH, NR: Software currently supports DSP for EQ, Dynamics, Space (Reverb/Delay), Time compression/expansion, Pitch Shifting, and Noise Reduction.

3P-P or 3P-F: Architecture supports Present or Future 3rd-Party DSP plug-ins.

DISK-D, DISK-V: DSP speaks to hard disk Directly or Via host computer's bus.

TRIG: Soundfiles can either be triggered manually or via MIDI like a sampler.

VDT, LCD, LED, EL: System and waveform display type (Video, Liquid Crystal, Light Emitting Diode, or Electroluminescent).

CS-D, CS-O or CS-3: Dedicated/Optional control surface, or provision for third-party hardware control surfaces, such as JLCooper, Penny & Giles, and Peavey.

CD, CD-ROM: Mastering feature includes various "rainbow book" standards for CD preparation, including, PQ codes, and software interface to control CD writers for both standard compact disc and CD-ROM.

DC: Manufacturers may do more than suggest which hard drives to use (Damage Control). —Eddie Ciletti

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CIRCLE 15 ON FREE INFO CARD

World Radio History



SPIRIT ROAD TEST
PAGE 102

THREE FOR THE ROAD



**BELA FLECK AND THE FLECKTONES TAKE THEIR
NONTRADITIONAL JAZZ ACT ON THE ROAD**

BY STEVE LA CERRA

Photo by Jim Herrington

LIVE IN THE FLECK LANE

WHEN MOST people think of the banjo, one of three things usually pops into mind: The Beverly Hillbillies, the theme from *Deliverance*, or a white-suited Steve Martin with a toy arrow through his head. But for jazz aficionados, the banjo brings to mind Bela Fleck. Fleck and his associates, The Flecktones, have taken the banjo into new territory, melding jazz, bluegrass, Dixieland, country, and fusion into a style that can only be referred to as Fleck music. Bela is not

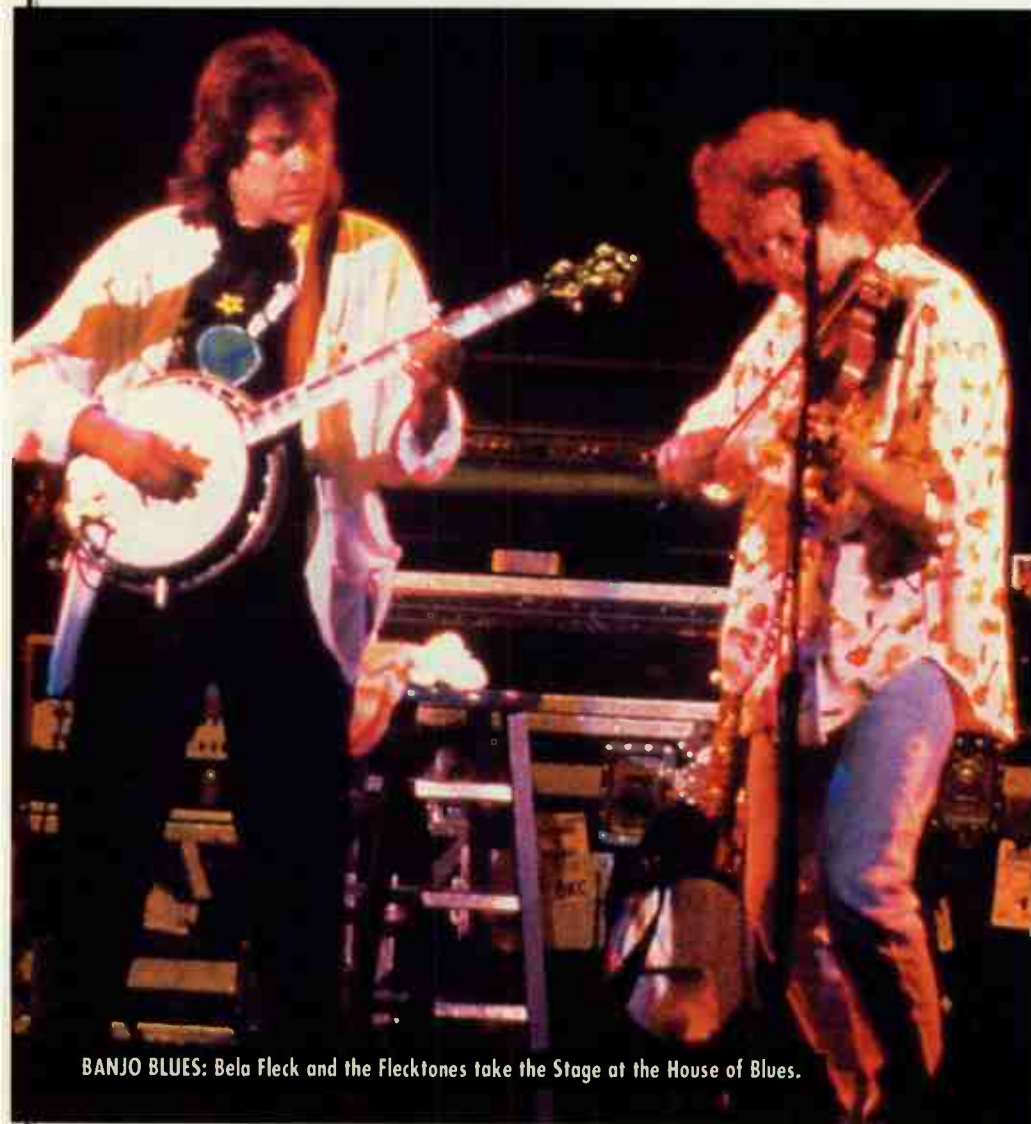
your average banjo player and the Flecktones is not your average band. After all, when was the last time you saw a band with a virtuoso bassist (Victor Wooten, voted Best Bassist in 1993 by *Bass Player* magazine) and a percussionist known as Future Man who plays a MIDI controller with no live drums on stage.

The Flecktones are currently out on tour in support of their latest CD, *Tales From the Acoustic Planet* (available from Warner Bros.). In addition to the

band, the CD features an assortment of guests that reads like a who's who in the jazz and acoustic-music worlds: Chick Corea, Branford Marsalis, Bruce Hornsby, Sam Bush, Tony Rice, Paul McCandless, and others. Many of these musicians are making live guest appearances with the band, which presents a special challenge to engineer Richard Battaglia. He has mixed the Flecktones for seven years and previously handled FOH for New Grass Revival (which began

his association with Bela Fleck).

The Flecktones perform in an extreme variety of venues, ranging from 200-seat clubs up to 15,000-seat festivals, although a large portion of the shows are in 400-1500-seat theaters. Due to the diverse nature of the rooms they are playing, Battaglia (who also acts as tour manager) and the band have decided not to travel with their own PA system. To help maintain a high level of consistency, Battaglia carries three racks of outboard gear that he can interface with any house PA. "I have a Barcus Berry BBE 862 Sonic Maximizer that I connect in-line with the board and 95 percent of the time it makes the room sound much better than before," he states. "I also carry two stereo digital EQs from Rane that I control with my Powerbook and the Lone Wolf Media Link system. I use one of the EQs for the house and the other for the drums. Generally the EQ and the BBE are both in-line, and that allows me to bypass the house EQ. If there's another act on the show, I can use my EQs, the other act can use the house EQ, and we can just bypass one or the other. I have the same EQ units every night and I know what they are supposed to sound like." For FOH effects, Richard carries dbx 160X compressors and 166X compressor/gates, and Lexicon's PCM-70, LXP-1, and LXP-5. "There are some nights when I'll hook up my EQs and the BBE and use everything else from the house. But there are situations when they don't have anything that I am really looking for so I use my own."



BANJO BLUES: Bela Fleck and the Flecktones take the Stage at the House of Blues.

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MIKING THE BANJO...

Fleck plays a variety of acoustic and electric banjos and has two separate onstage racks, one each for the acoustic and electric instruments. The output of the electric banjo is run to a Roland GP-16 guitar effects processor from which Battaglia takes two direct lines into the PA. Although Fleck hears this sound onstage through an amplifier, that amp is not miked. This instrument also has a MIDI pickup that Fleck uses for Hammond organ or pad sounds.

The acoustic banjo rack is a bit more complicated, containing a custom-built preamplifier designed by Battaglia. The preamp interfaces with a pickup inside and a condenser mic outside the instrument. Battaglia has mounted the

mic (a Shure SM98) on a custom-made gooseneck that connects with the banjo and the internal pickup, terminating at the end-pin jack. A stereo cable connects the instrument to the preamp, but the two signals can still be addressed separately at the house. The preamp provides phantom power to the SM98 and also has an effects loop and a mute switch for tuning purposes.

...AND THE REST OF THE BAND

There are some indoor shows where the Flecktones will do a small acoustic set where Bela plays solo and then the trio plays a song with Victor on cello and Future Man playing brushes on some old banjos. Battaglia was using Crown PZMs for the drums and cello, but he has

GUEST OF FLECK

Although the Flecktones are not currently touring with a piano player, they have been playing with guest pianists such as Chick Corea and Bruce Hornsby. Engineer Richard Battaglia shared some of his techniques for miking the piano with these well-known claviers.

"We usually use both a contact pickup and live mics. The C-Ducer is a contact pickup that attaches directly to the soundboard or the brace directly beneath the soundboard. We tried it in both places and it sounds better on the brace than directly on the soundboard. We use two of them — one for the low end and one for the high end. For mics I use AKG C414's. Every piano sounds a little different, but basically I put one over the low strings at the far end of the soundboard and one closer to the keyboard. With Howard Levy [who played on previous tours] we would use whatever piano was provided so we would have to find the sweet spots and it was different every night. With Chick Corea, we had the lid open on the short stick. Bruce Hornsby brought his own Helpenstill pickup, so we used that and the two live mics. During the last show with him the lid was open on the short stick but we did one show where Hornsby had the lid closed (he likes to have it closed during his show so he can climb up on top).

"I don't really like to pan the piano hard left and hard right. If the piano is the main instrument and you are trying to get across this huge sound, then it's OK. But if the piano is one of six instruments up there then I don't want it spread out. I want it more focused and tight so it has a specific spot in the mix."

—Steve La Cera

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changed his miking technique of late: "As we started adding more guests into the show we had to get a little more serious about miking. We use a Sennheiser 421 on the cello and we still use a PZM for the kick sound, but we add a pair of Shure SM57's for stereo overheads. For Bela's banjo we usually use a Milab mic."

When it comes to the band's electric set, Battaglia doesn't mic the drums because there are none! Future Man is playing an instrument referred to as the Drumitar. This strap-on MIDI percussion controller is a modified Synthe-Axe fitted with velocity-sensitive triggers. The instrument sends out velocity data to a rack-mount unit that con-

verts them to MIDI. Future Man has a rack of samplers that he premixes to stereo for the house console.

Battaglia generally doesn't use any compression on the drums because "that is not really what I'm looking for. I wouldn't want to have the kick affect the cymbals, so I normally don't use a compressor for drums. I do use the Rane

EQ, and that helps me mix the drums. If I need a little snare I can EQ it in or maybe fatten up the kick, depending upon the PA. Future Man mixes the sounds himself. He hears it in his ear monitors and knows what it should be — he is very sensitive to controlling the mix. The overall stage volume is a lot lower than with a set of acoustic drums and I can turn them down if they get too loud."

Bassist Wooten may have as many as four or five basses onstage with him that he runs through a mixer and then to an ADA bass preamp. Battaglia takes a direct out from the preamp to the house and runs compression on the signal since the bassist usually does not use a compressor onstage. This direct line is the only bass signal running to the PA; the amplifier is not miked.

Battaglia notes the importance of having good signals at the source: "These musicians are really sensitive to their sound and that makes my life easier. Their instruments have impeccable tone, so I have a jump on everything because they are interested in what they sound like. We spend a lot of time trying to make sure that what is coming off the stage sounds good. No matter how much consistency you strive for, there is always something new going on. Even in a normal situation, the guys are bringing in new instruments or trying new reverbs. As long as I know that certain things remain the same, then it's easier to handle the other little things. We do have fun out there and the guys love to play. I think of us as an urban guerrilla band — we go in do what we have to and get out alive."

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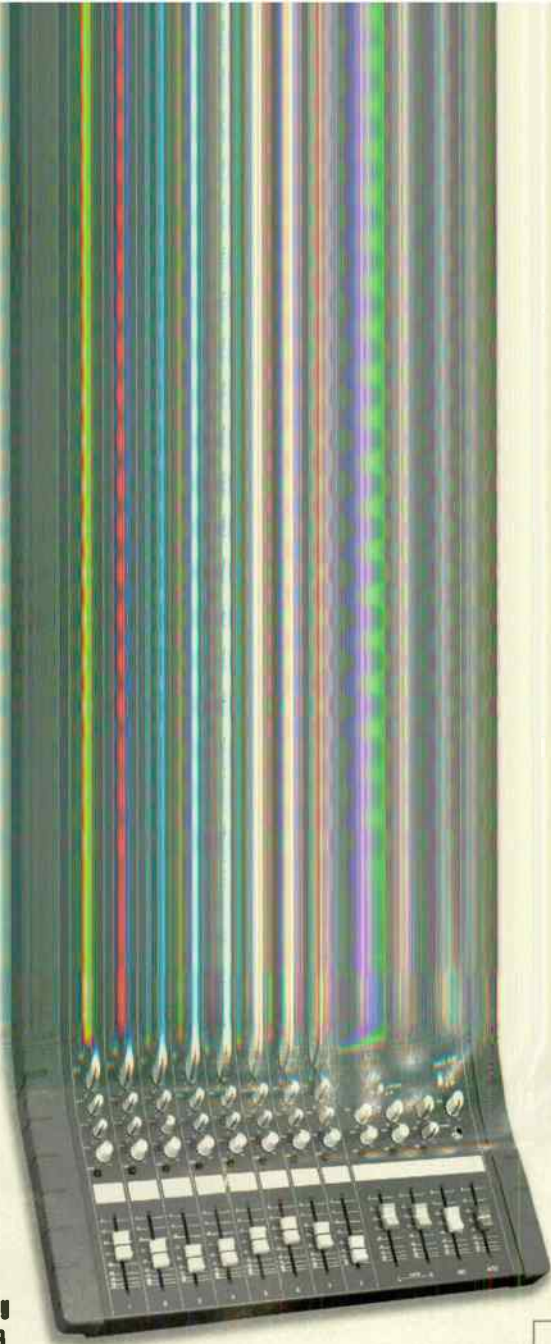
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The Future Sonics WAVE700™ system is a 700 MHz-range wireless AEM custom stage monitor system. The single-rack-space chassis features 32 selectable stereo UHF operating frequencies, internal cue-bus circuitry, and built-in limiting. The WAVE700 was designed specifically for use with Future Sonics' Ear Monitors™ custom headphones. Other features include an LCD display on both the transmitter and

receiver, system limiter, and the following controls: power on/off, stereo/mono, input level, group, channel, headphone level, EQ flat/boost, and cue bus. For details, contact Future Sonics, P.O. Box 187, Pineville, PA 18946-0187. Tel: 215-598-8828. Circle EQ free lit. #134.

PULLING INTO PORT

Fender Pro Audio has entered the world of networking. Fender's new SPA Series dual-channel power

amplifiers feature a D-sub accessory port option allowing computer monitoring of signals such as temperature, load status, operating mode, and amp clipping, as well as computer remote control and signal processing functions. Also included on the SPA Series are XLR, 1/4-inch and barrier strip inputs, Speakon, 1/4-inch, and binding posts outputs. There are four power amps making up the SPA Series: the SPA-3000, the SPA-7500, the SPA-13000, and the SPA-24000. At a 4-ohm rating, the amps feature 150, 375, 650, and 1200 watts RMS per channel, respectively. At 8 ohms bridged mono, the amps crank 300, 750, 1300, and 2400 watts. Other features include a ground-lift barrier strip, and a built-in power turn on sequencer in both of the larger models. For more details, contact Fender, 7975 North Hayden Rd., Suite C-100, Scottsdale, AZ 85258. Tel: 602-596-9690. Circle EQ free lit. #135.

upgraded console features a 10 x 2 A/B matrix output derived from the four subgroups, including mix, while there are full-featured mute groups. New to the board is its front end with the addition of a phase reverse switch on every mono input and Spirit's new "Ultramic Plus" pre-amp. The preamp offers 66 dB of gain range, which prompts a variety of inputs due to the abundance of headroom. For more information, contact Spirit Corporation, 8760 S. Sandy Pkwy., Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #136.

FEELING WIRED?

Electro-Voice showed that it can get wired, with the introduction of its R-Series wireless mic system. The R-Series has a wide selection of transmitters to choose from based on your individual needs — a handheld mic, a bodypack with a condenser lavalier mic, a headset, or an instrument cable. R-Series receivers are housed in solid metal cases designed to keep interference away from the internal circuitry. Both the R1 nondiversity and the R2 true-diversity receiver are available in ten

ON YOUR MARK...

Here comes the second generation of Spirit's Live 4 mixing console — the Live 4 Mark II. It has been designed for FOH applications, and can be used in small project studios as well. The board comes in 12-, 16-, 24-, 32-, and 40-channel frame sizes. The



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VHF frequencies. Each receiver features front-mounted, collapsible antennas. The R2 offers two independent receivers for increased reception at longer distances. The R1 receiver produces reception at shorter distances. The handheld transmitter features a handle that is designed for durability and for a light weight. For low-noise operation, an adjustable level control allows mic sensitivity to be tailored for each user or audio source. Separate on/off and audio mute switches kill the popping noise sometimes heard with single switch transmitters. The bodypack transmitters are designed to fit all applications, and they each feature an oversized three-position on/off/mute switch. A two-color LED indicator shows on/off status and battery condition. The BL

lavalier system consists of a condenser mic, while the BF headset system has an adjustable mini gooseneck for placement of the unidirectional condenser mic. And for use with instruments, the BC instrument system features a stainless steel 1/4-inch connector. For more details, contact Electro-Voice, 600 Cecil Street, Buchanan, MI 49107. Tel: 800-234-6831. Circle EQ free lit. #137.

tape decks, consoles, equalizers, or mixers in recording and PA applications. XLR and 1/4-inch TRS phone connectors provide balanced +4 line level output, and unbalanced output is also available when a mono 1/4-inch phone plug is used. A variable gain control is provided on the jack panel to facilitate level-matching with other equipment. The DP1 is designed for connection to any existing GT tube

mic power supply via its DB9 type plugs. The DP1P incorporates its own self-contained power supply that will power any GT tube mic and also provides 48-volt phantom power for use with other condenser mics. Both units provide direct recordings at +4 levels. For more details, contact Groove Tubes, 12866 Foothill Blvd., Sylmar, CA 91342. Tel: 818-361-4500. Circle EQ free lit. #138. **EO**

IN A GROOVE

The Groove Tubes DP1 and DP1P are compact, stand-alone preamps for use with microphones as well as guitar, bass, and keyboard instruments. These units are specifically designed to amplify low-level signals to line level with virtually flat response for interface with



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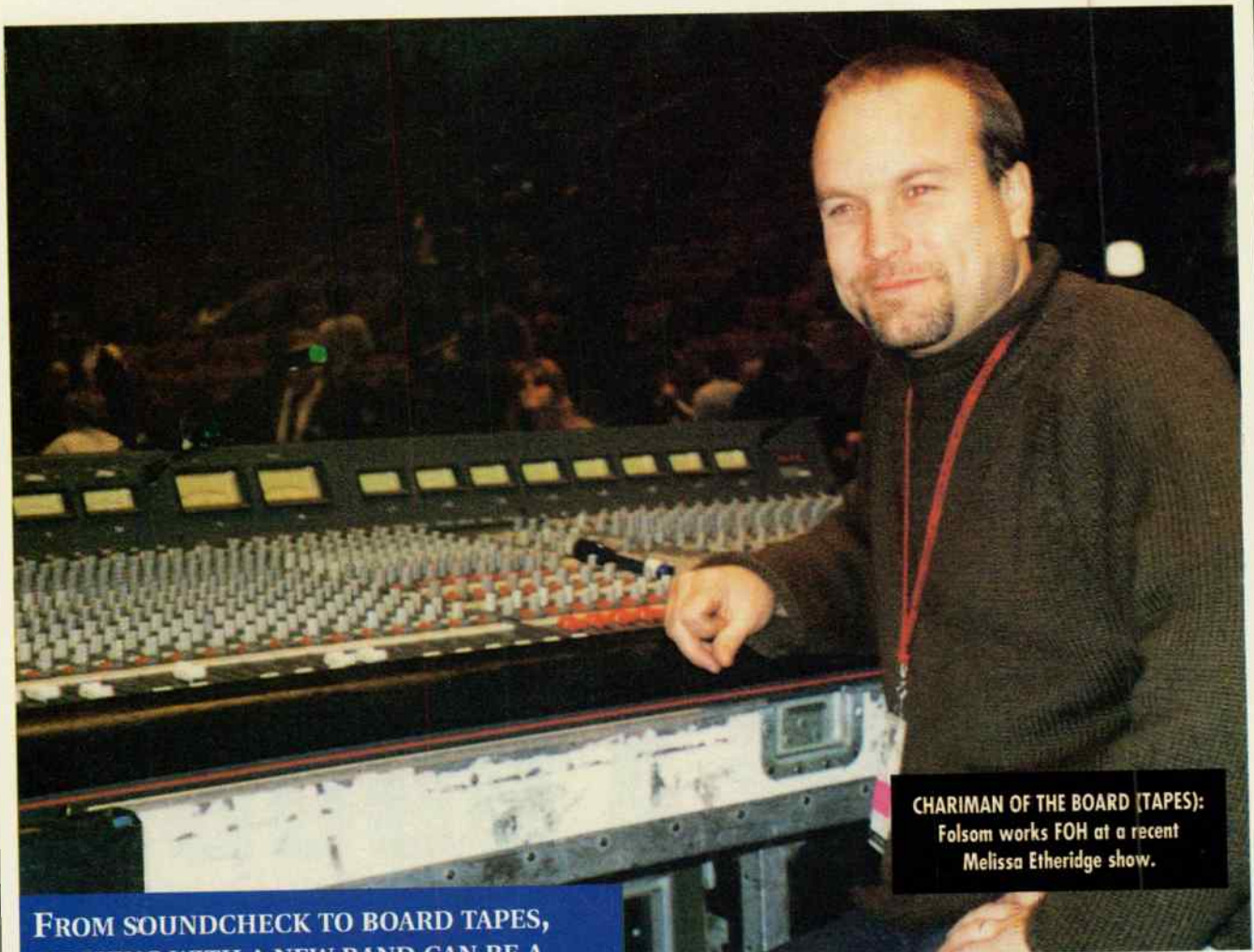


Photo by Beth Folsom

CHARIMAN OF THE BOARD (TAPES):
Folsom works FOH at a recent
Melissa Etheridge show.

**FROM SOUNDCHECK TO BOARD TAPES,
WORKING WITH A NEW BAND CAN BE A
ROUGH EXPERIENCE**
BY STEVE FOLSOM

THERE IS A certain feeling you get when hired as a live-sound engineer for a tour with an act you have never met before. Once you get over the initial things like per diems and single or double rooms and grab yourself a primo middle bunk on a new 45-foot Pre-vest, you can concentrate on the next phase — meeting the band. There is a kind of foreplay at the first meeting; sizing each other up and finding out who has been where and done what. A musical trivia jousting match follows to make sure

you have the proper influences and roots. Cool microphone talk and name dropping are sure to be included in this round. Congratulations, you have made it to first base.

On to second base: it's your turn to figure out how the band (especially the boss) perceives a soundcheck should be run. Some acts go in for the presoundcheck "jazz noodle" before the boss takes the stage, while others prefer the postsoundcheck Jeff Beck hour. If you are lucky, you will have a bulldog for a

stage manager. If not, it is up to you as an audio diplomat to ease the band off the stage so the opening act can at least have some time for a line check before the doors open.

Now you have rounded the horn, but guess what? At the first show during the first song, you look over your left shoulder and there are people sitting in seats you thought were production kills. A quick call to the stage reveals that these people are OK. Don't worry — it's only management, record company A&R, and, perhaps the toughest of the three, *band wives!* They are generally so tuned in to their honeys that they are

not really listening to the overall mix. But never underestimate their power. If you have a good show and everybody is smiling, pat yourself on the back.

With one good show under your belt, you might think you are home free. Think again: the hardest obstacle to pass on a nightly basis (whatever the band) is the dreaded "board tape." Historically, everyone knows that an analog cassette taken straight off the console sucks. DAT is better, but still has the inherent problems of the procedure: vocals are out of proportion, toms sound distorted, kick drums are all click, bass guitar is missing,



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and guitar solos and vocal effects seem to come from out of nowhere and then are gone. A board tape should be listened to as nothing more than a reference for arrangement purposes. The layering of the mix and tonal properties of individual instruments are not accurately reproduced in this format. Many a good live engineer has been crushed under the boot of the Teac 124. Others who choose to spend the majority of the show under their V-6 headphones and blow off the ticket-buying public get praise from the unsuspecting band and are offered great rewards such as live album credits.

The following is a list of the typical questions (and answers) regarding board tapes:

Q: Why can't I hear my guitar? **A:** Vocals are always louder on tape because they are acoustic and need more reinforcement than your 100-watt Marshalls.

Q: Why can't I hear my bass? **A:** It was boomy and I had to roll all the low end off your bass channel to make some notes audible out front.

Q: Why can't I hear my keyboards? **A:** I don't have enough channels to take all eight of your keyboard modules in stereo. I think we should try to balance out your patches.

Q: Why can't I hear my cymbals? **A:** The overhead mics really pick up too much from your monitors to bring your ride cymbal up on guitar solos. Let's try a couple of wedges instead of three TMS-4's.

Q: Wow — I can really hear my vocals. I like that! **A:** That's because the guitars are so loud and... Oh you like it! Cool! Well, you're the boss (whew).

Perhaps the best news I ever received on a first day

came from John Hiatt. When asked if he required a DAT and/or cassette every night, he replied in his inimitable Colonel Potter way, "Son, I'm not really in the habit of looking in the toilet after I've just..." Well I think you get the point. Bands have different reasons for not recording on a regular basis. When I tour with Melissa Etheridge, the decision *not* to record stems from the fact that Melissa has yet to record a live album. She is constantly trying out new material in the show that should not find its way onto the bootleg market before it's ever officially released. I carry a portable DAT for ideas that she might have (or radio station IDs, etc.), and in my rack is a double-record, auto-reverse cassette deck. It is set up to record out of matrix 7 and matrix 8 from my console. I send full left and right signal to the cassette deck and bleed in just the right amount of ambience from two live mics positioned at the front corners of the stage, in-line with the PA. The live mics go to tape via auxiliary mic inputs in the talkback module and are sent directly to matrix 7 and 8.

I find this to be much more accurate than trying to delay the tape to ambient mics set up at the mix position. Doing this as part of the daily routine tends to come in handy on those nights when you have last-minute local-TV or hearing-impaired feeds. If I am asked to record the show, I just throw in a 100 minute tape, forget it, and mix the show. I can keep a copy for myself and plan my defense for the next day.

Steve Folsom has been soundman for Melissa Etheridge for the last four years. He has also worked with John Hiatt, Aimee Mann, The Replacements, and Stanley Jordan.

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ELECTRO-VOICE P1250 POWER AMPLIFIER



SOME POWER amplifiers trace their heritage from the world of recording studios and broadcast facilities, while others jumped into the live-sound market feet first. Electro-Voice (E-V) can claim a very long history in live sound, and through its many sister companies in the Mark IV Audio Group, can call upon experience in every facet of the audio industry. Although the new Precision Series of amplifiers is very definitely built for the live-sound market, and specifically for touring-sound applications, it is also built to the standard of a fine studio monitor amplifier. The high quality of construction can be directly attributed to the German manufacturing of this series by Dynacord for E-V.

The P1250 is a powerful unit with the ability to produce a very clean 1000 watts into an 8-ohm load in bridged-mono mode (350 watts/ch @ 8 ohms and 500 watts/ch @ 4 ohms 20 Hz to 20 kHz). This amp not only produces this power cleanly, it also offers a proprietary Thermal Brain Circuit (to prevent hot heads from

blowing up the loudspeakers) that emulates the thermal behavior of a typical low-frequency driver. This allows the P1250 to produce an additional 40 percent above its rated power for short durations without fear of destroying the loudspeaker, thus keeping the long-term power from overheating the voice coil while still allowing transients to pass through without limiting. Of course, this is only a safety feature if your LF driver is capable of handling the rated power of the P1250. The Thermal Brain isn't smart enough to recognize that a \$40 Radio Shack 12-inch woofer is connected before melting its 50-watt voice coil, although it will protect the amplifier afterwards!

The P1250 has been carefully designed to incorporate features that make installation and operation into a live-sound system as painless and accurate as possible. For example, there are balanced XLRs for input to each channel (a transformer is optional) and Speakon connectors for output connection (two Speakon cable connectors

are also included). There are also XLR-M connectors for cascading the inputs to another amplifier, as well as recessed sliding switches for chassis ground lift; parallel-mono or dual-channel input mode; bridged or normal (two channel) output mode; and fast (high-frequency applications) or slow (bass and subbass applications) time-constants for the overload-protection limiter. The P1250 includes internal jumpers to select between the three most common

input sensitivities (26 dB of constant gain; full power at 0 dBu or +6 dBu input levels). The front panel has two input attenuators that include detents and extremely fine adjustment near the top (0, -0.1, -0.8, -1, -2.2, -3, -4, -5, -6, -8, -10, -12, -17, -26, -62 dB) that track very accurately in both channels. Unfortunately, the level control knobs have a position indicator that is very hard to see from a distance. There is also an LED indicator for

ROAD TEST

MANUFACTURER: Electro-Voice, 600 Cecil Street, Buchanan, MI 49107. Tel: 616-695-6831.

APPLICATIONS: A power amplifier specifically designed for touring and other portable uses.

SUMMARY: The P1250 includes all of the power and protection required for many live sound applications in just two rack spaces.

STRENGTHS: Comprehensive protection circuitry; excellent quality; easily adapted to most sound system gain structures and grounding schemes; selectable bass-boost specific to E-V loudspeakers and a generic setting for many compact loudspeakers.

WEAKNESSES: Requires a deep (18-inch) rack; difficult to see indicator on input attenuator knob.

PRICE: \$1900

EQ FREE LIT. #: 139

BY WADE MCGREGOR

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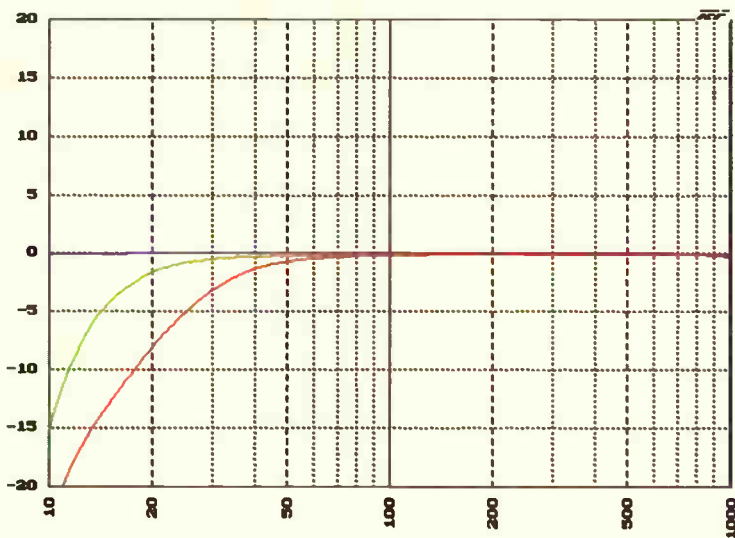


FIGURE 1: The P1250 includes very practical high-pass filtering switchable between Off (blue line), 15 Hz (green line), and 31 Hz (red line). Filtering is applied to both channels.

each channel's status of power on; input signal presence; output signal presence; limiting; protection mode (including muting during power up/down); and processor functions on.

The special filters selectable (for each channel) on the rear of the unit provide low-frequency boosts (see fig. 1) that conform to the response of specific loudspeaker tunings. A table is provided in the manual to assist users in matching their Theile-Small B_6 alignment (referred to as "step-down" tuning by E-V) TL-series loudspeakers. This extends the frequency response of these loudspeakers and implements excursion protection limiting in the amplifier to allow safe operation of these loudspeakers with the extended bass response. Other loudspeakers using the same basic loudspeaker design criteria can also make use of these filters. Contact your E-V dealer if you need specific information regarding the application of these filters with your loudspeakers. There is a 12-dB/octave high-pass filter to protect loudspeakers

not intended to produce subbass. The high-pass is switchable between 15 Hz, 31 Hz and Off (see fig. 2).

The LPN mode is intended to allow users of compact full-range loudspeakers to extend the low-frequency response in situations where they need the system to sound like it includes subwoofers. This cannot provide the output levels that large subwoofers can achieve at very low frequencies, but it will provide a very big sound from compact vented loudspeakers that can handle the power of the P1250. However, users should be aware that when small, less capable loudspeakers are used at high sound pressure levels, this much bass-boost may make them sound distressed and increase their harmonic distortion.

This amplifier is a fully professional unit that even includes com-

plete service instructions, bench-alignment procedures, and detailed schematic drawings; along with operating instructions in the concise owner's manual. Although there are settings on the rear of this amplifier that could easily destroy inappropriate loudspeakers, E-V gives the user credit that such settings will be applied only to loudspeakers that can handle them. This is especially true of the low-fre-

quency boost offered by the LPN mode. Although there is considerable protection circuitry to save a power-hungry compact SR loudspeaker, this setting could shred less robust units that cannot handle the P1250 output power capability. The very quiet variable-speed cooling fans use a well-managed thermal control system that keeps them from becoming the howling

monsters found in many amplifiers.

The P1250 amplifier is highly recommended for applications where its full output capability and processing can be used to advantage. The thoughtful application of filters matching common loudspeaker configurations will provide many users with a convenient alternative to a separate processor. This offers users all the bass enhancement of a processor tucked neatly inside of an excellent sound-reinforcement amplifier. Compact convenience for the road.

For those in need of a power amp without the additional processing, E-V has several other models that share the P1250's basic design and construction. The Precision Series includes: P1200, 370 watts/channel @ 8 ohms @ 1 kHz, list price \$1700; P1250, 370 watts/channel @ 8 ohms @ 1 kHz, list price \$1900; P2000, 560 watts/channel @ 8 ohms @ 1 kHz, list price \$2600; P3000, 850 watts/channel @ 8 ohms @ 1 kHz, list price \$3400.

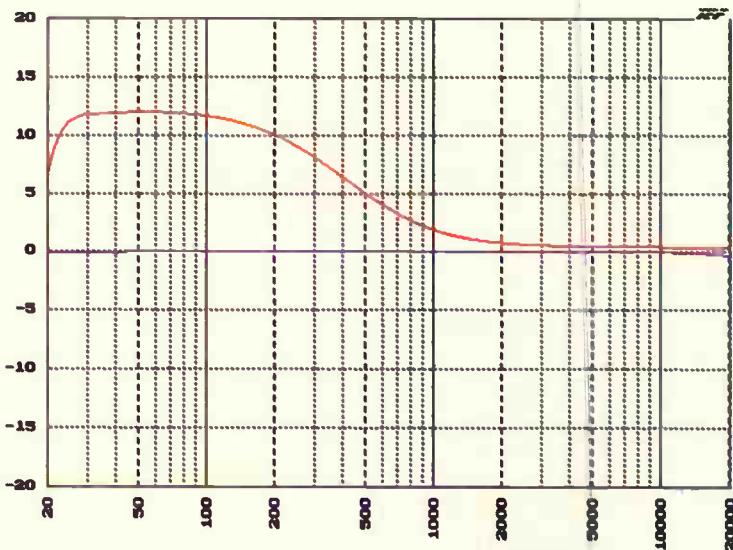


FIGURE 2: The P1250 processing features the LPN mode, which applies a second-order shelving filter at 50 Hz (red line) to increase the low-frequency output of smaller vented loudspeakers. The blue line shows amplifier response without processing on.

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SPIRIT ProTRACKER MIXER



ROAD TEST

MANUFACTURER: Spirit by Soundcraft; distributed in the U.S. by DOD, 8760 S. Sandy Parkway, Sandy, UT 84070. Tel: 801-566-9135.

APPLICATION: Live recording and project studios.

SUMMARY: Rack-mount 8-channel mixer with stereo effects return for live and location recording/mixing, including overdubbing and submixing.

STRENGTHS: Clean; compact; simple to use; pleasant and useful limiter; can be cascaded.

WEAKNESSES: Routing restricted and requires repatching; phantom power switches on back panel.

PRICE: \$999.95

EQ FREE LIT. #: 140

BY ZENON SCHOEPE

IT'S REASSURING to note that Spirit has now broken the cycle of ever-cheaper and smaller mixers with such things as speakers, radio mics, and products that apply its affordable technology to more special-

ized markets. The Spirit ProTracker rack-mount mixer — manufactured in England by Soundcraft — is an example of this, as it is optimized for the purpose of making high-quality, direct-out recordings in live

or location situations, but it can also be pressed into service in other areas.

Channel strips have balanced line/instrument inputs and balanced mic XLRs, each with individually switched phantom power on the back panel. The picture is completed by balanced tape sends and returns (switched for -10/+4 operation), unbalanced insert send and balanced return, balanced XLR 2-track output and return paralleled to RCA sockets, an unbalanced aux send, and balanced stereo effects return and monitor output.

Each of the eight channel blocks has a gain pot controlled by a mic/line selector followed by a 100 Hz, 12 dB/octave high-pass filter and a limiter, which is set globally on a switched 2-

dB-per-notch threshold pot from +12 dB to 24 dB, but can be switched in locally for each channel. The idea here is that the limiter serves as a protector against accidental peaks when sending out from the pre-amp circuit to digital multi-tracks. An insert can be switched into the monitor or channel paths and, similarly, the mixer's single aux, which is normally in the monitor path and can be switched globally to be pre or post status, can also be switched to be preface the channel signal. There's also a monitor pan, short fader, and PFL with master Solo active LED.

The "master" section has a stereo effects return fader routed to the main stereo with PFL and the two main mix output faders

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running to twin eight-segment bargraph meters. Monitor and phones outputs are controlled on the same pot, and the mixer can monitor the main mix, the 2-track return, the aux, and the tape return on inputs strips 7 and 8 on self-canceling buttons. The reason for the last of these is that the stereo mix output can be fed to channels 7 and 8, thus permitting a mix to be fed to tape from tape sends 7 and 8 while still recording direct from channels 1 to 6. Very useful. There's also a mode that switches the post high-pass filter channel signals to the faders and onto the stereo mix.

One of the handy things about ProTracker is that multiple units can be cascaded by locking 9-pin D-type connectors. This enables more than 8-track simultaneous recording and monitoring, and provides a sum of PFLs to the last unit in the daisy chain. This arrangement still enables submixes to be created and supplied locally along with local unit limiter threshold setting.

IMPRESSIONS

The whole purpose of ProTracker is to provide a compact and straight-wire approach to tracking, but with the additional facility for mixdown with the extra effects return to a stereo recorder. At its most rudimentary, it can be regarded as an 8-channel direct-out recording mixer. Signals on mic, line, or DI enter each strip and go straight to a connected multitrack after being monitored on the bargraph metering through PFL and can then be returned from tape and monitored in stereo on a fader and pan and consequently mixed to stereo with the aforementioned stereo effects return. Applying the features differently,

the mixer can be employed as a straightforward 8:2 mixer with one aux and a stereo effects return.

Between these two extremes, a number of twists allow added functionality to be realized.

Limitations are perhaps to be expected with this arrangement. For example, if you intend to lay tracks using multiple mixed channels, the lack of any real form of routable bussing means that replugging is necessary (although you can effectively track a mix to tape send 7 and B). As the arrangement is targeted at direct-to-tape recording, the lack of EQ is not a major hindrance, although perhaps another aux send would have helped matters. The limiter is easy to set and sounds good.

Mic and line performance is fine (this is to be expected, given the short run of the signal path), and the overall sound of the box is excellent for the money. Since rack-mountable units can be cascaded, it means that fairly elaborate, but still clean, larger configurations can be easily created without compromising basic functionality and manageability.

Indeed, ProTracker answers a very real need for a high-quality, stripped-down means of capturing performances in an uncluttered way that can then be taken back to the studio for the tweaks and final mixing. It can also be employed in the studio as a high-quality submixer for keyboard or effects feeds, so it remains a useful box in any context.

For what is a very modest outlay, Spirit is offering a nicely targeted and genuinely versatile compact mixer that doesn't have many competitors. I would trust it on any live recording without a second thought. **EQ**



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ADAT in the Trenches

Some tips on how to
tune-up your ADAT

BY BENNET SPIELVOGEL

Toward the close of 1992, my studio, Flashpoint Recording in Austin, TX, like so many others, said good-bye to analog and gambled on a new digital tape format from Alesis called ADAT. I wasn't involved in the analog vs. digital war, I just wanted clean tracks.

However, changing from a multi-track analog format to the modular ADAT format required some unanticipated readjustments. Still, we worked through the learning curve and came out with some workable solutions. Perhaps by sharing the following tips I can help you get the most out of your ADAT and keep it running smoothly.

WARNING: *Some tips require technical skill; if you're intimidated by ripping into your ADATs, don't do it! You could damage the unit or yourself. Check your warranty first. Alesis has no obligation to fix what a customer destroys. That said, be careful, work in good light, and look closely at how parts fit together before you remove them.*



FIGURE 1: ADAT interior with pinch roller identified.

BURNING RUBBER

After a year of constant use, my three ADAT units seemed to take longer to lock up. I'd rewind to a locate point, the ADATs would approach it, and then click for five or more seconds as they tried to all line up. Sometimes "noFO" or "FULL" appeared on the display. I'd have to eject, reseal the tape, and, in the case of FULL, power down then power up.

Fortunately, the problem could simply be the idler tire and pinch roller,

which are fairly easy to change. (A worn idler or pinch roller can also lead to mechanically noisy and sluggish machines.) In addition to obtaining parts directly from Alesis (Tel: 310-558-4530), an alternate parts source is MCM Electronics Supply (Tel: 800-543-4330); the idler tire is part #32-750 (\$0.50 each, minimum order five), and the pinch roller is part #32-3520 (\$6.50 each). Here's the fix:

1. Disconnect the ADAT's power cord and remove the top cover. Note how one Phillips-head screw secures the pinch roller (fig. 1).

2. Remove the screw and lift the pinch roller out of the unit. If the pinch roller surface looks shiny, slick, pitted, cracked, or discolored, install a new roller.

3. Locate the idler wheel (fig. 2), which sits between the supply and take-up reels.

4. Getting the idler out requires dexterity. *Before you do anything else*, note how the idler attaches to the assembly. A small, metal, teardrop-shaped clip, hooked to a spring, holds the idler wheel on its axle. You can remove the clip and its attached spring as one piece.

5. Slide the teardrop-shaped clip back (opposite direction from the spring) and gently lift it and its attached spring out of the ADAT. Underneath the teardrop clip is a pres-

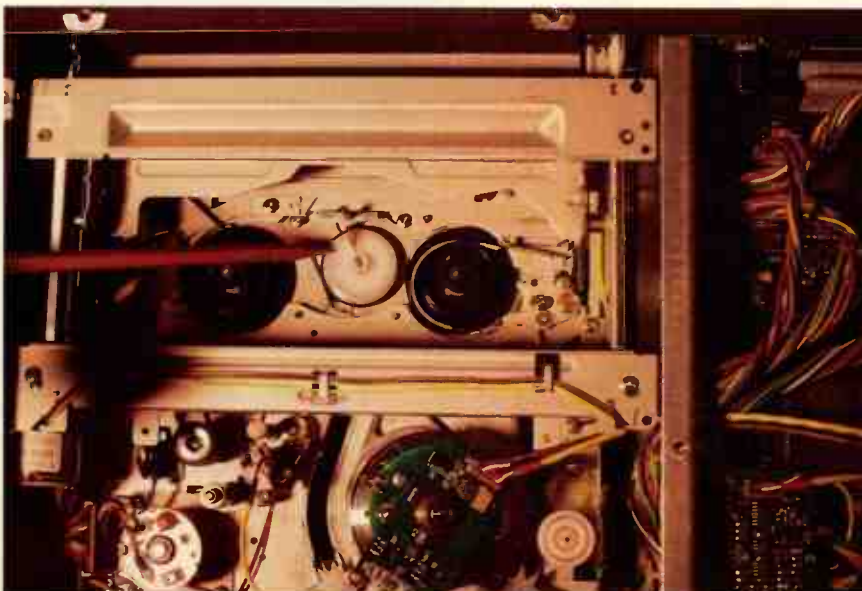


FIGURE 2: ADAT interior with idler, supply, and take-up reels identified.

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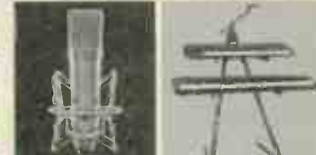
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sure spring that stands up as you lift off the clip (fig. 3).

6. Remove the pressure spring and lift the idler wheel out of the ADAT.

7. You can reuse the plastic idler wheel; just fit it with a new tire, which sits in a channel along the circumference of the idler wheel. Pull the old tire off (grab it with fingernails, hemostats, or small pliers and pull it out of the channel). Be careful and don't ding, scratch, or collapse the plastic idler wheel (grab the rubber, not the plastic).

8. Put on the new tire, reseal the wheel on its axle, put the pressure spring on top, and slip on the teardrop-shaped retaining clip and its spring. You're done!

JAMMIN' (NOT THE SONG)

If a tape jams, power down, hold the eject button, power up, and hope for the best. Major jams, where the tape is scrunched in the cassette shell, require a different approach. You can take the ADAT in to the local video store or remove the tape yourself (and maybe even salvage it long enough to make a backup).

In three years of constant use we've had only one jam. But if it happens, here's how to unstick the tape.

1. Power down and disconnect the ADAT. Remove the top cover.

2. Locate the blue ADAT logo on front of the unit. Behind that logo and slightly to the right is a small motor with a long, white, plastic extension attached to it (fig. 4).

3. Turn that extension counter-clockwise. The cassette will slowly back out of the machine. As you begin to remove the cartridge, hold its door open to avoid creasing the tape even more. That door is spring loaded and wants to shut. Tape the door open once you remove the cartridge..

4. Don't force anything; you may have to guide the cassette with your free hand as you turn the extension.

5. You now need to get the spilled tape back in the cartridge; wash your hands so you don't get any grease on the tape (white cloth photography gloves may help).

6. Mangled tape often looks worse than it is. Besides, ADAT has pretty heavy-duty error correction, so it's at least worth trying a salvage job. For best results, practice opening a non-ADAT tape cartridge before you dive into the mangled one. If needed,

unwrap the tape from any parts it's wound around. Try not to cut or break the tape; you may be able to salvage an intact tape.

7. Take out any twists and turns in the tape. It will be wrinkled and creased, but there's not much you can do about that. Open the tape cartridge, straighten out the tape, and rethread it. Keep everything neat and clean. By the way, do this surgery without a con-

trol room full of anxious band members looking on!

8. Once you get everything seated and the tape cartridge sealed, insert the tape in your ADAT, rewind it, and attempt to back up. Your chance of success is very high.

POWER-UP INITIALIZATION

Occasionally, the ADATs and BRC behave erratically. A solution that

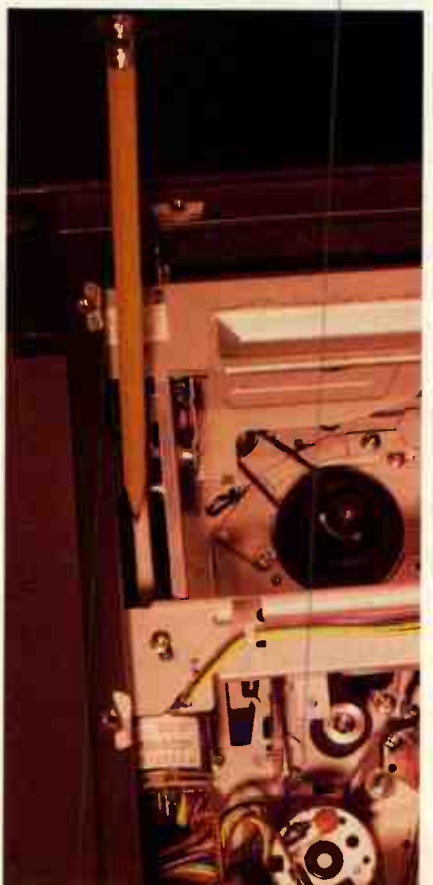
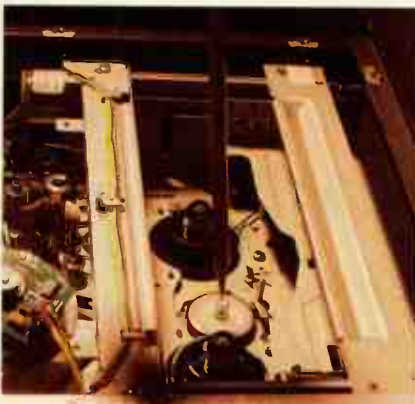
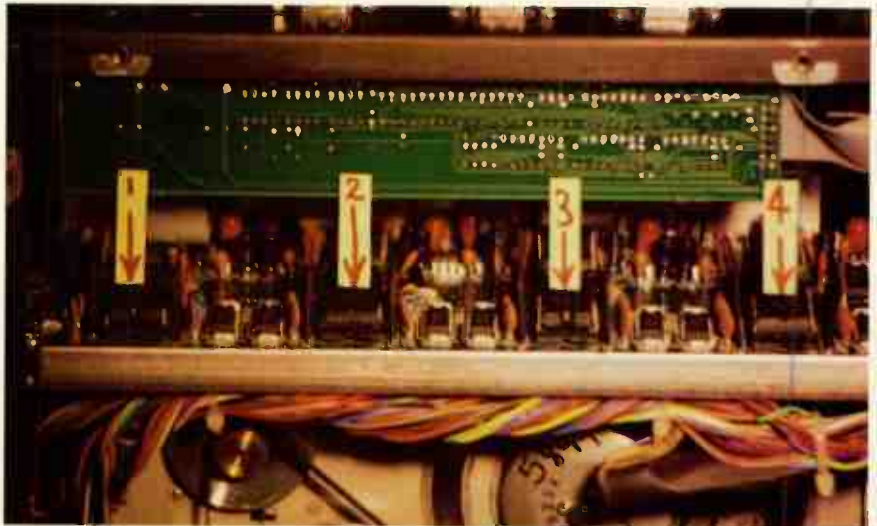


FIGURE 3 (Above): Idler wheel and pressure spring.
FIGURE 4 (Right): Tape cassette eject motor and extension.
FIGURE 5 (Top): The ADAT's four D-A chips.

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1. Reserve two ADAT tracks to mix onto (preferably on the same machine).
2. Route your mix to those tracks.
3. Patch the output of those two tracks into your console's 2-track return.
4. Mark any important fader moves (tape pencil, whatever) since you may need to recreate them later. It is especially important to mark your stereo bus level (the output to the two ADAT tracks).
5. Mix down and monitor the 2-track return.

Now comes the fun part.

Suppose you listen to the mix and decide the guitar solo is too loud. Instead of redoing the entire mix, you can simply punch in the mix of the guitar solo as follows:

- Push your stereo bus back up (if you faded it down).
- Roll up 30 or so seconds before the solo.
- Ensure that the console and effects settings are the same ones you previously used when mixing the solo.
- Put the two mix tracks on auto-input record ready.
- Monitor the 2-track return and punch in your mix.
- Make your moves and punch out after the solo.

This procedure works well if you need to piece a complicated mix together. It's a real time-saver and lets you get pretty creative.

Your mix is now on two ADAT tracks. Place a compressor (exciter, warmer-upper, or combinations) between those tracks and your 2-track machine (DAT, cassette, reel-to-reel) and try some different settings to see what works for you. If you don't need any changes, you can bounce to DAT digitally if you have an Alesis AI-1, but feeding the ADAT's analog outs to the DAT's analog ins sounds just as good for all practical purposes.

—Bennet Spielvogel

requires no technical skill involves reinitializing the firmware.

Eject any tape, power down the machine, hold play and record, then power up. The LCD says INIT. You can do this init procedure for the BRC by following the same sequence, except hold down play and record on the BRC then power up the BRC.

BRC SELF-TEST

Try the self-test to check for a BRC problem. Power down the BRC, hold Track Enable 1 and 8 buttons, power up, then release the buttons. The BRC enters an automatic self-test routine. The BRC's LCD identifies each test — ROM, RAM, LED (block), LED (cycle, which looks great in a dark room), and Switch. The Switch test is interactive. You can press any key on the BRC and the name of that key (i.e., cursor left, digital I/O, etc.) appears in the LCD. To exit that test and continue with more self-tests, press and hold the Pitch Down key, then press the Pitch Up key twice (while pressing the Pitch Down key).

The next test looks for the LRC. If it's not plugged in, the LCD says LRC unplugged. To exit that test press/hold

Pitch Down and then Pitch Up. The next test performs a loopback test on the MIDI port. To test the MIDI port, connect MIDI Out to MIDI In with a single cable before you begin the self-test routine.

NOISE: PLOYS & TOYS

ADATs have no tape hiss to hide behind. You will hear any noise recorded on tape, so shake down your control room.

Turn on your gear and get in mix mode, but don't run any tape yet. Push some faders up, plug some effects in, assign them and push them up, turn lights on and off, rotate dimmers, activate/deactivate thermostats, etc., and listen to what contributes noise.

If all is quiet, fine. If, however, you hear cracks, buzzes, pops, or hums, plan on breaking out the voltmeter, lighting a flashlight, and crawling on your hands and knees behind your rack as you systematically evaluate the grounding scheme and locate the likely suspects — quirky power, lack of common power, no single-point grounding, impedance mismatches, AC potential between rack effects and

continued on page 127

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The classic SM57 is the "workhorse" mic of stages and studios worldwide. Its carefully contoured frequency response means clean, well-defined instrumental reproduction and rich, warm vocal pick-up on lecterns or stages. The SM57 is the standard for drum, percussion and instrument amplifier miking.

- Unusually effective cardioid pick-up pattern minimizes effects of studio or location acoustics and background noise. Rear and side rejection uniform to very low frequencies and completely symmetrical about microphone axis.
- Bright, clean sound. Especially effective for announcing, narration and dialogue, vocal music, and rhythm packages
- Cartridge shock mounted for quiet operation
- Versatility - for use in the hand or on a stand - for use indoors or outdoors
- Microphone supplied with adjustable swivel adapter - permits tilting through 90° from vertical to horizontal.



SENNHEISER RF CONDENSER MICROPHONES

Unlike traditional condenser mics, the capacitive transducer in Sennheiser condenser mics is part of a tuned RF-discriminator circuit. Its output is a relatively low impedance audio signal which allows further processing by conventional bipolar low noise solid state circuits. They achieve a balanced floating output without the need for audio transformers, and ensure a fast, distortion-free response to audio transients over an extended frequency range.

MKH 20 P48U3 Omnidirectional

Low distortion push-pull element, transformerless RF condenser, flat frequency response, diffuse/near-field response switch (6 dB boost at 10 kHz), switchable 10 dB pad to prevent overmodulation. Handles 133 dB SPL. High output level. Ideal for concert, Mid-Side (M-S), acoustic strings, brass and wind instrument recording.

MKH 40 P48U3 Cardioid

Highly versatile, low distortion push-pull element, transformerless RF condenser, high output level, transparent response, switchable proximity equalization (-4 dB at 50 Hz) and pre-attenuation of 10 dB to prevent overmodulation. In vocal applications excellent results have been achieved with the use of a pop screen. Recommended for most situations, including digital recording, overdubbing vocals, percussive sound, acoustic guitars, piano, brass and string instruments, Mid-Side (M-S) stereo, and conventional X-Y stereo.

MKH 60 P48U3 Short Shotgun

Short interference tube RF condenser, lightweight metal alloy, transformerless, low noise, symmetrical capsule design, smooth off-axis frequency response, switchable low cut filter (-5 dB at 100 Hz), high frequency boost (+5 dB at 10 kHz) and 10 dB attenuation. Handles extremely high SPL (135 dB), ideal for broadcasting, film, video, sports recording, interviewing in crowded or noisy environments. Excellent for studio voiceovers.

MKH 70 P48U3 Shotgun

Extremely lightweight RF condenser, rugged, long shotgun, low distortion push-pull element, transformerless, low noise, switchable presence (+5 dB at 10 kHz), low cut filter (-5 dB at 50 Hz) and 10 dB pre-attenuation. Handles 133 dB SPL with excellent sensitivity and high output level. Ideal for video/film studios, theater, sporting events, and nature recordings.

TASCAM

DA-88 Digital Multi-Track Recorder

The first thing you notice about the eight channel DA 88 is the size of the cassette - it's a small Hi 8mm video cassette. You'll also notice the recording time - up to 120 minutes. These are just two of the advantages of the DA-88's innovative use of 8mm technology.

- The ATF system ensures that there will be no tracking errors or loss of synchronization. The DA 88 doesn't even have (or need) a tracking adjustment. All eight tracks of audio are perfectly synchronized. What's more, this system guarantees perfect tracking and synchronization between all audio tracks on all cascaded decks - whether you have one deck or sixteen (up to 128 tracks).
- Incoming audio is digitized by the on board 16-bit D/A at either 44.1 or 48kHz (user selectable). The frequency response is flat from 20Hz to 20kHz while the dynamic range exceeds 92dB. As you would expect from a CD quality recorder, the wow and flutter is unmeasurable.



One of the best features of the DA-88 is the ability to execute seamless Punch-ins and Punch-outs. This feature offers programmable digital crossfades, as well as the ability to insert new material accurately into tight spots. You can even delay individual tracks, whether you want to generate special effects or compensate for poor timing. All of this can be performed easily on a deck that is simple and intuitive to use.

Fostex RD-8 Multi-Track Recorder

Fostex has long been a leader in synchronization, and the RD-8 redefines that commitment. With its built-in SMPTE / EBU reader/generator, the RD-8 can stripe, read and jam sync time code - even convert to MIDI time code. In a sync environment the RD-8 can be either Master or Slave. In a MIDI environment it will integrate seamlessly into the most complex project studio, allowing you complete transport control from within your MMC (MIDI Machine Control) compatible sequencer.



- Full transport control is available via the unit's industry-standard RS-422 port, providing full control right from your video; but the RD-8 records at either 44.1 or 48kHz and will perform Pull-Up and Pull-Down functions for film/video transfers. The Track Slip feature helps maintain perfect sound-to-picture sync and the 8-Channel Optical Digital Interface keeps you in the digital domain.
- All of this contributes to the superb sound quality of the RD-8. The audio itself is processed by 16-bit digital-to-analog (D/A) converters at either 44.1 or 48kHz (user selectable) sampling rates, with 64x oversampling. Playback is accomplished with 18 bit analog-to-digital (A/D)'s and 64x oversampling, thus delivering CD-quality audio.
- The S-VHS transport in the RD-8 was selected because of its proven reliability, rugged construction and superb tape handling capabilities. Eight tracks on S-VHS tape allow much wider track widths than is possible on other digital tape recording formats.
- With its LCD and 10-digit display panel, the RD-8 is remarkably easy to control. You can readily access 100 locate points, and cross-fade time is fully controllable in machine to machine editing. Table of Contents data can be recorded on tape. When the next session begins, whether on your RD-8 or another, you just load the set up information from your tape and begin working. Since the RD-8 is fully ADAT compliant, your machine can play tapes made on other compatible machines, and can be controlled by other manufacturers ADAT controllers. Your tapes will also be playable on any other ADAT deck.

Roland DM-800

Digital Audio Workstation

The DM-800 is a compact, stand-alone multi-track disk recorder that provides an amazing array of features at an unbelievably low price. Whether for music production, post production or broadcast, the DM-800 will make your work simpler, faster, more productive and more profitable. A full function workstation, the DM-800 performs all digital mixing operations from audio recording, to editing, to track-bouncing, to final mixdown. It fully supports SMPTE and MIDI time codes and also features a built-in Sample Rate Resolver to synchronously lock to any time code.



POWERFUL EDITING

- Time Compression, Pitch Compression
- Completely Non-Destructive Cutting, Erasing, Copying
- Very Fast Looping for Music or Ambiance Editing
- Scrub Preview and Preview to, from and thru
- Six Levels of Wavelform Zoom for Fast Editing
- Optional RS-422 Interface (D10-800D) for 9-pin Control from Video Editor

FLEXIBLE I/O STRUCTURE

- Full Digital Patch Bay
 - Stereo Aux Send Bus
 - Direct Channel Outs
- Digital Stereo Input and Two Digital Stereo Outputs
- Four Balanced Analog Inputs with Gain Controls
- Four Balanced Analog Outputs with Option for 4 More

FULL AUTOMATION

- Dynamic and Snapshot Automation of Level, Pan 2-Band EQ, including Frequency Select, Boost and Cut
- Microscope Editing of Automation Data
- Phase Level Editing of Level, Crossfade and Fade In/Out

TRIGGER FEATURES:

- Trigger Mode to Play any Combination of 8 Tracks for Vocal Fly Ins or Sound Effects Placements
- Advanced Trigger Mode for Live Operation with Present or Dial up Cue of Phrases to be Played One after Another

MIDI FEATURES:

- MIDI Machine Control
 - Internal Tempo Maps
- Accurate Editing by Bars and Beats and Sub-Beats
- MIDI Clock and Song Position Pointer Output
- 8 MIDI Triggers for Instant Phrase Playback
- MIDI Trigger of Record and Punch In/Out
- Tempo Maps from External Sequences, MIDI or Tap Input

ACCURATE SYNCHRONIZATION

- Frame Accurate Sync to any Time Code
- Locks to MTC
- Generates and Reads all Types of SMPTE, including 24 25, 29.97 30 (Drop-on-drop) Frames per Second
- Incoming SMPTE Reshaped to Output Jack

RECORDING OPTIONS

- Records to Standard SDDS Drives
- Up to 24 Hours Recording Time Possible
- Uses Magneto Optical or Squester Drives for Fast Project Changeovers
- Optional Internal 2.5" Drives for Portable Operation

PROJECT CATALOGING

- Up to 150 Projects on Line at Once
- Easy Cataloging of Sound Effects and Projects
- Easy Transfer of Sounds from One Project to Another
- File Compatible with DM-80

HIGH QUALITY SOUND

- Sampling Rates of 48, 44.1, 32 kHz
- 18 Bit A/D and D/A with 128 and 8 Times Oversampling
- 24 Bit Internal Processing
- Superb Converters

VIDEO OUT

- Composite, S-video, Digital RGB Output
- All Track Overview with Infinite Level of Project Zoom
- Views of Phrase and Wavelform Editing
- Very Accurate Level Meters
- Track Status and Time Location

beyerdynamic

TG-X Dynamic Mic Series

The entire TG-X family of microphones is based on neodymium technology coupled with rugged construction and designed for optimum performance in a stage environment.

TG-X 5

- Clip-on gooseneck drum mic with high SPL capability
- Acoustically coupled to capture shell sound as well as skin sound
- Internally shock mounted for isolation from mechanical noise
- Rugged construction with convenient clothes peg mounting



TG-X 30/35

- Ultra-slim flexible gooseneck for easy positioning.
- Broadcast performance microphone with rugged construction.
- Lightweight, low profile adjustable neckband
- Applications: Hands free vocals (drums/keyboards) and aerobics.
 - TGX 30 15 Omni neckwork with pre-amplifier
 - TGX 30 16 Omni neckwork for wireless transmitter
 - TGX 35 15 Cardioid neckwork with pre-amplifier
 - TGX 30 16 Cardioid neckwork for wireless transmitter

TG-X 40

- Hypercardioid polar pattern with excellent isolation from unwanted sound
- Flat, wide range frequency response for uncolored sound reproduction
- Rugged construction
- Applications: Vocal piano, orchestral/recital recordings, strings and sampling



TG-X 50

- Hypercardioid kick-drum with high SPL capability
- Reduces shell ring in bass drum
- Exceptional gain-before-feedback
- Superb transient response and extended low frequency range
- Applications: Kick drum, floor toms, congas and timpani.



TG-X 80

- High quality hypercardioid vocal mic.
- Full range frequency response
- Studio quality accuracy
- Excellent off-axis isolation.
- Shock absorbing rubber ring
- Applications: Vocals, piano, strings, brass, percussion, woodwind, overheads sampling



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TASCAM

103 Mastering Cassette Deck

Cost effective three head stereo midrange cassette deck, appropriate for audio and video production facilities. With its three head design you can hear what is actually on the tape as it is recorded. Auto Monitor Function switches from playback to input automatically while in record/pause mode, allowing you to set record levels or match tape levels. Dolby HX PRO circuitry provides extended high frequency performance while keeping distortion and noise to a minimum. Tape type is automatically sensed and adjusted for by the Auto Tape Selection feature.

102 Cassette Deck

Designed primarily for midrange, the 102 provides solid performance and sound quality with durability and reliability. Although it is a two head unit, the 102 closely matches the performance and features of Tascam's 103 Mastering Deck.

202MKII

Dual record cassette deck offers dubbing and copying capabilities at a reasonable price. The deck is capable of simultaneously making two identical recordings from the same source, or making a single extended recording (first on one tape (both sides) then on the other (also both sides). Copying can be easily performed by using one side for playback and the other for record. Can also provide continuous background music, playing first both sides of one tape, then both of the other.

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SONY TCD-D10 PRO II Portable DAT Recorder

Packed with features and functions, the compact TCD-D10PROII is everything professionals need in a portable DAT recorder. Measuring only 10" x 2 1/2" x 7 1/4", it provides high performance, reliability and flexibility. Among its many features are high speed 100x search, LCD multi-function display, 4-motor Direct Drive transport mechanism and absolute time recording capability. With absolute time code, tapes recorded by the TCD-D10 PRO II can be used immediately as source material for the PCM-7000 series DAT editing system. Offering maximum performance and capabilities in a minimum package, the TCD D10 PRO II is the recorder of choice for any field application.



- Has balanced XLR input, switchable microphone (-60dB) or line (+4dB) inputs. A 12-pin digital connector provides interfacing with AES/EBU digital signals of 32.0, 44.1, or 48.0 kHz sampling rate. This means that compatibility with other digital systems is assured. It also provides the convenience of digital dubbing and editing without any degradation.
- Equipped with a comprehensive self-diagnostics function that constantly monitors the status of the head drum, capstan and reels. The tape transport mode and load/unload time are continuously checked as well. Upon detection of trouble, the tape is brought to a forced stop and unloaded automatically to protect the tape and the recorder.
- Up to 99 start IDs can be recorded in the subcode area. When the record button is pressed, the start ID is recorded automatically for 9 seconds. During recording, it can also be added manually to any position of the tape. Search for these start IDs is performed in two modes at 100 times normal speed.
- Offers a maximum spooling time of 140 x normal speed. A two hour tape can be rewound or fast forwarded in under a minute.
- 20-segment digital level meters include overload indicators. Closely tracks input signal for accurate level indications.
- During playback, the date and time of recording is displayed.
- Has a 5-segment battery indicator. The last segment blinks on and off, notifying you to change batteries.
- To eliminate distortion caused by unexpected peaks, the TCD-D10 PRO II incorporates a record-level limiter with a fast attack time of 300ms. The microphone attenuator prevents distortion by suppressing the signal level 20 dB.
- Immediate playback is possible through a built-in speaker.
- A wired remote controller is supplied to control the record, play, stop, and pause functions of the recorder. The top end of the controller is designed to accept a microphone holder. Two microphone stand screw chargers are also supplied.
- The supplied NP-22H rechargeable battery pack provides 1.5 hours of continuous operation. The optional NPA-D10 battery adapter enables 1 hour of continuous operation on AA-size batteries. With the use of the supplied AC-88 AC power adapter, it can also be operated on 100-240 VAC, 50-60 Hz.

SONY PCM-2300/PCM-2700A DAT Recorders

The superb audio quality of digital recording and the convenience of DAT cassettes is not restricted to broadcasting and post-production applications. In fact, it is just as relevant to business and educational applications. To meet the requirements of all these sectors Sony offers the PCM-2300 and PCM-2700A DAT recorders. While both are perfect for simple recording and playback at recording studios, the PCM-2700A is also well suited for simple program transmission at broadcasting stations. Both feature exceptional sound quality, three sampling frequencies, absolute time recording, long record/playback time, alternative subcode recording and digital fader.



THREE SAMPLING FREQUENCIES
At normal tape speeds, either a 44.1 kHz or 48.0 kHz sampling frequency can be selected. When set to long play (LP) mode, they provide 12-bit non linear digital recording at 32.0 kHz.

PROFESSIONAL PERFORMANCE
The servo system is completely controlled by carefully programmed software. This features sophisticated, smooth transport control, which optimizes tape handling and increases the search speed to approximately 150 times normal.

DIGITAL FADER
A 64-step digital fader is incorporated in both units. Both fade-in and fade-out functions are available on the digital and analog inputs/outputs. The fade duration can be set over from 0.2 - 15 seconds, and can be controlled either locally or by the remote.

PCM-2300 AND PCM-2700A
The PCM-2300 has unbalanced digital input/output, while the PCM-2700A has dual digital inputs/outputs (balanced and unbalanced), allowing most digital audio equipment to be directly connected. Both also have balanced analog line level inputs/outputs which can be adjusted over a range of -12 dBs to +8 dBs, for connection to many other types of audio equipment.

PCM-2300 ONLY FEATURES
The PCM-2300 has three servo-controlled motors, two direct-drive types for head drum and capstan, and a single DC motor for the reels.
The PCM-2700A employs a four motor direct-drive tape transport with head drum, capstan and reels, all individually driven by servo-controlled motors. The four motor direct-drive mechanism gives even more precise and stable transport.
PCM-2300 front panel display has a 20-segment peak level meter display with 0.5 dB step peak margin. The PCM-2700A has a 20-segment peak level meter with a 0.1dB step peak margin indication.

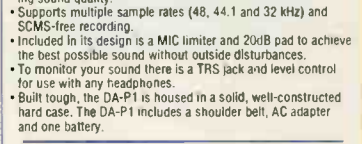
SUBCODES
They record various subcodes separately from the audio data to provide tape search functions. The subcodes include the Start ID, Skip ID, End ID, Program Numbers, Absolute Time, and Data Functions. Program numbers can be recorded sequentially as the Start IDs and are written (and can be renumbered) in the correct sequence whenever additional Start IDs are inserted.

OTHER FEATURES
• They operate in the Long Play (LP) mode, yielding twice the normal record/playback time. This also makes them compatible with the LP mode of consumer products. In LP mode, a maximum of four hours of recording and playback is possible.
• Built-in crystal clock generates a date function, which automatically indexes each recording with time and date info (minute/hour/day of the week/month/year). When tape is replayed it is easily checked for when the recording was made.
• Both units can be installed in a standard 19-inch rack.
• Both includes a wireless remote control for remote operation.

PCM-2700A ONLY FEATURES
• Read After Write function allows you to monitor the recorded signal immediately after it has been stored on the tape. This saves you valuable time, as recorded signal can be checked monitored in real time.
• High-speed location, in either direction, to points on the tape with a resolution of 1 second by entering the absolute time address via keys on the front panel.
• Convenient remote operation is performed by the optional RM-D7100 Remote Controller. Connected via the 37-pin parallel remote connector, it allows basic tape transport control.
• Has 8-pin remote interface to give a fader start function, which is particularly useful for On-Air applications.
• When manually wiring the Start, Skip, and End IDs, there is an enhanced rehearsal function which is available for accurate ID recording. While monitoring the ID recording, these can be rotated forwards or backwards in 0.3 second steps.

TASCAM DA-P1 Portable DAT Recorder

- With rotary two head design and two direct drive motors the DA-P1 offers one of the best transport in its class.
- XLR-balanced mic/line inputs (with phantom power) accept a broad range of signal levels from -60dB to +4dB.
- Analog line inputs and outputs (unbalanced) plus S/PDIF (RCA) digital inputs and outputs enables direct digital transfers of Super next generation A/D and D/A converters to deliver amazing sound quality.
- Supports multiple sample rates (48, 44.1 and 32 kHz) and SCMS-free recording.
- Included in its design is a MIC limiter and 20dB pad to achieve the best possible sound without outside disturbances.
- To monitor your sound there is a TRS jack and level control for use with any headphones.
- Built tough, the DA-P1 is housed in a solid, well-constructed hard case. The DA-P1 includes a shoulder belt, AC adapter and one battery.



SONY TCD-D7 DAT Walkman Player/Recorder

- High-quality Standard Play (SP) mode provides up to two hours recording of 16-bit digital audio on a DT-120 DAT cassette. The SP mode is ideal for recording live music.
- Long Play (LP) mode allows up to 4 hours of record/playback of 12-bit audio on a single DAT cassette. The LP mode is ideal for meetings, conferences or other voice recordings.
- Equipped with digital coaxial and optical input connector. Maintains highest signal purity for recording and playback of digital sources with all information retained in digital format.
- Also has analog Mic and Line inputs for recording from analog sources without external adapters.
- High-speed Automatic Music Sensor (AMS) search function finds and plays tracks, skips forward or back up to 99 tracks, all at 100x normal speed.
- Has a Digital Volume Limiter System (DVLS) that increases listening comfort and sound quality by automatically adjusting for sudden level changes of the recording. It also helps prevent sound leaks through headphones.
- Two-speed cue-review lets you hear sound while player is in fast-wind modes, up to 3x or 25x normal speed.
- Compact and portable, it has an anti-shock mechanism that permits accurate recording and playback even while in motion.
- LCD display with backlit windows clearly shows recording level, track number, operating status and 4-segment battery indicator, even in low ambient light conditions.
- Optional RM-D3K System Adapter Kit for complete digital interface. The kit is equipped with the input/output connectors for both the optical cable and the coaxial cable. Therefore you can use it as a relay between the TCD-D7 and other digital equipment. Also includes a wireless remote control.



AMPEX PROFESSIONAL AUDIO TAPE



467 DAT Tapes			
467-R015P	4.19	467-R030P	5.09
467-R046P	5.79	467-R060P	6.49
467-R090P	7.79	467-R120P	9.29

467 Digital Audio Mastering Tape			
467-1731J	1/2" x 60"	104" NAB Reel	64.49
467-272114	1/2" x 4620"	104" Heavy Duty Precision Reel	79.95
467-572811	1/2" x 4600"	104" Heavy Duty Precision Reel	149.95

489 5" Digital Mastering Tape Audio			
DM810AC	1/2" x 810"	Clear Library Box	8.99
DM810CC	1/2" x 810"	Gray Sleeve	8.99

456 Studio Mastering Tape			
456-151111	1/2" x 1200"	7" Plastic Reel	7.19
456-173111	1/2" x 2500"	104" NAB Reel	18.99
456-272111	1/2" x 2400"	Plastic Hub	26.99
456-273111	1/2" x 2400"	104" NAB Reel	33.99
456-572111	1/2" x 2500"	Plastic Hub	52.99
456-573111	1/2" x 2500"	104" NAB Reel	58.49
456-976111	2" x 2500"	104" PREC	125.99

499 Grand Master Gold Studio Mastering Tape			
499-174111	1/2" x 2500"	104" NAB Reel	20.49
499-274111	1/2" x 2500"	104" NAB Reel	37.49
499-97M111	2" x 2500"	104" PREC	134.99

Panasonic SV-3700/SV-4100 Professional DAT Player/Recorders

Panasonic's SV-3700 and SV-4100 are designed for professional applications. They have highly accurate and reliable transport systems with search speeds up to 400 times normal play speed. They also feature advanced, high-quality analog-to-digital (A-D) and digital-to-analog (D-A) converters and input/output circuitry designed to interface with the widest variety of devices.



- SV-3700 Features:**
- When recording via the analog inputs, a front panel switch permits selection of the sampling rate (44.1kHz or 48kHz). This avoids the need for a core version of the sampling frequency in 23 digital applications. When recording through the digital inputs, it automatically clocks to incoming frequencies of 32kHz, 44.1kHz or 48kHz.
 - Random record mute and ultimate with three seconds fade-in and five seconds fade-out provides automatic level changes at the start and end of a recording.
 - High speed transport enables searching up to 250x normal speed. High-speed search up to 400x normal speed is possible once the tape has been scanned in Play, Fast-Forward or Reverse mode. This ensures access to any point on a two-hour DAT in approximately 27 seconds.

SV-4100 Has All the Features of the SV-3700 Plus:

- Offers enhanced performance required for professional production, broadcast and live-sound systems. Features such as instant start, external sync capability, enhanced system diagnostics, additional digital interfaces and exceptional 20-bit audio make the SV-4100 the DAT quality standard.

- QUICK START WITH TRIM AND REHEARSAL**
- With 8MB of memory holding five seconds of audio data, the Quick Start function provides sound almost instantly after a play command is executed. Other DAT recorders lag about 7-second, making them unsuitable for professional applications.
 - Easy adjust the Quick Start position and specify it by A-Time, Start ID or PNO. Recording via Quick Start is also possible, allowing you to use the SV-4100 to be used for frame-accurate punch-out/punch-in and audible editing.
 - You can adjust the Quick Start position with 1-frame resolution over a range of ±50 frames. Using the shuttle dial and Skip key for adjustments. Frame number is preceded by a - or - sign. A-Time, subcodes and peak level are displayed, to provide a general guide to positioning.
 - Without playing the tape, you can monitor the level of stored data to check your Quick Start position. This preview capability is handy before actual editing or on-air play. Repeated play is also possible, using about 1.5 seconds of the data to create a kind of sampler effect.
- FRAME ACCURATE INDEXING AND EDITING**
- Using the trim and rehearsal functions, you can accurately determine points to write, start and skip IDs. These IDs can be written, rewritten or erased at any point in the recording and automatically renumbered.
 - With two SV-4100s connected via the 8-pin parallel remote terminal, synchronized frame-accurate editing can be performed. Continuity of edit points can be checked by rehearsal playback. By entering and editing end position in one of the Locate buttons, you can determine a punch-out point as well.
- FLEXIBLE SEARCH**
- Easily and accurately access your A-Time. You can specify hour, minute, second and frame.
 - In most modes, the currently displayed A-Time can be assigned to one of the Locate buttons. Then from Stop, Pause or Play you can rapidly cue to any of these four addresses by pressing its Locate key. In addition, Locate Last takes you to the most recent Quick Start A-Time position.
 - Search is also possible by Start ID or program number.
- 5 MODE EXTERNAL SYNC**
- Has 5 external sync modes. External sync is essential for applications such as video postproduction and stereo mixing recording. It assures uniformity of timing between different equipment to the audio data, consistently matches up with the target media.
 - Select from 3 video external sync modes (25, 29.97 and 30 frame per second) or use the word sync or Digital Data modes (which lock to the input sampling frequency).
- ENHANCED SOUND**
- The SV 4100 satisfies the highest professional expectations both in terms of sound and functionality. It features new 20-bit (equivalent resolution) digital-to-analog converters.
 - Has XLR-balanced digital input and output plus unbalanced digital coaxial and optical inputs and outputs. Analog inputs/outputs are XLR-balanced and output level is switchable between +4dB and -19dB, providing compatibility with other equipment.
- MULTIPLE DIGITAL INTERFACES**
- Has XLR-balanced digital input and output plus unbalanced digital coaxial and optical inputs and outputs. Analog inputs/outputs are XLR-balanced and output level is switchable between +4dB and -19dB, providing compatibility with other equipment.
- 8-WAY REMOTE CONTROL**
- 8-pin parallel remote terminal connects to another DAT deck, computer or win-d remote. Includes wireless remote control.

JVC XD-P1 Pro Portable DAT Recorder

- An integrated package, the XD-P1 Pro combines a DAT recorder and a microphone with digital output in an unbelievably light package.
- Records and plays at all three standard sampling frequencies. Choose from 32kHz for long recording sessions, 44.1 kHz for mastering if CD production or 48kHz for highest fidelity.
 - Operates without the restrictions of SCMS (Serial Copy Management System), permitting one generation of digital to digital copy, using 44.1 kHz sampling frequency. You can digitally dub or copy a recording mode on the XD-P1 Pro as many times as necessary.
 - The supplied detachable digital output microphone provides two pick-up patterns: "Telescopic" and "Stereo". A collapsible microphone stand is also supplied, allowing you to set the mic on a desktop for the interviews or conferences.
 - Extensive use of aluminum and ultra-thin molding techniques make the XD-P1 Pro compact, lightweight and durable. The main module weighs under a pound (12.5 oz). With microphone and battery it weighs only 2.2 lb.
 - All basic controls are on one side of the unit and readily accessible. You can operate the recorder using one hand.
 - Advanced power-saving design and low power-consumption circuits give the XD-P1 Pro long recording capability - on a single battery charge. Optional rechargeable batteries further extend recording time.
 - Supplied AC adapter/charger works anywhere in the world regardless of voltage or frequency.



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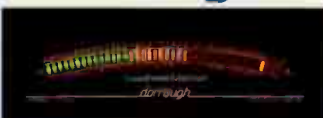
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dorrough



With today's audio systems stretching the limits of program dynamics it's become critical for engineers to obtain maximum loudness with the minimum of distortion components. To fully utilize the dynamic range available, it is of equal importance that they have a method of monitoring and establishing the maximum safe level at which a system can operate.

That's why every Dorrough Audio Level Meter simultaneously shows 3 dimensions of program material content: Peak, Average Power and Compression are displayed on a color-coded 40-segment LED scale. Meters are easily viewed while providing precise indications of program event content.

Loudness Meter Model 40-A

The model 40-A has a scale allowing 14dB of headroom in 1dB steps. A stand-alone unit, it measures 8" x 2 1/2" x 6 1/2" and has an internal power supply. Model 40-AP has a peak-hold option as well.

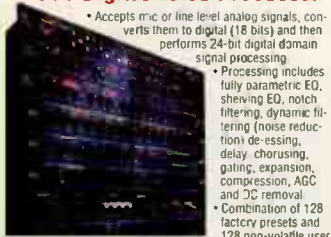
Loudness Meter Model 40-B

The Model 40-B provides metering of relative loudness to peak modulation. The 40-B is a scale differentiation of the 40-A and is calibrated in percent (%) modulation, with the lower scale in dB from +3 dB to -3 dB. The 40-BP also has a peak-hold option.

Symetrix

Signal Processing Products

601 Digital Voice Processor



- Accepts mic or line level analog signals, converts them to digital (16 bits) and then performs 24-bit digital domain signal processing.

- Processing includes fully parametric EQ, shelving EQ, notch filtering, dynamic filtering (noise reduction), de-essing, delay, chorusing, gating, expansion, compression, AGC and TC removal.
- Combination of 128 factory presets and 128 non-volatile user programs guarantee predictable and repeatable effects from session to session, performance to performance.
- Has XLR-balanced (analog) monoaural mic and line inputs and XLR-balanced stereo output. XLR-balanced and S/PDIF (RCA) inputs and outputs. MIDI input/output supports connection to virtually any type of MIDI control device for programming or controlling the 601 in real time.
- Ideal for a variety of recording, broadcast, live sound, and post production applications.

488 Dyna-Squeeze

8-Channel Compressor/Anteface

- Can easily increase average recording levels on your digital or analog tape recorder by 11dB with no side effects.
- Tracks processed by Dyna-Squeeze have presence and increased articulation. Subtle sounds become more up front.
- Many professional mixing consoles have output levels that are much hotter than digital recorder inputs. The 488 matches any console to most any digital recorder.

We are a full stocking dealer for the entire Symetrix line

TASCAM

M-2600 Series 16/24/32 Channel Eight Channel Mixers

LOW NOISE CIRCUITRY

- Combining completely redesigned, low noise circuitry with Absolute Sound Transparency™, the M-2600 delivers high-quality extremely clean sound. No matter how many times your signal goes through the M-2600, it won't be colored or altered. The signal remains as close to the original as possible. The only coloring you hear is what you add with creative EQ and your outboard signal processing gear.

- Double reinforced grounding system eliminates any hum. World-class power supply provides higher voltage output for better headroom and higher S/N ratio.

PREMIUM QUALITY MIC PRE-AMPS

- The M-2600's mic pre-amps yield an extremely low noise floor, enormous headroom and an extremely flat frequency response. This lowers distortion and widens dynamic range. It also increases gain control to an amazing 51dB. Plus, you get phantom power on each channel.

- The M-2600 accepts balanced or unbalanced 1/4" inputs, and low-impedance XLR jacks. Better still, the TRIM controls operate over a 51dB input range. For the hottest incoming signals, all it takes is a press of the -20 dB PAD button atop each channel strip to bring any signal down to manageable levels. Plug anything into it - keyboards, guitars, basses, active or passive microphones, samplers and more. No matter what you put into it, you can be confident that signal can be placed at optimum levels without a lot of fuss.

THE BEST AUX SECTION IN THE BUSINESS

The most versatile AUX section in its class, rivaling expensive high-end consoles. 8 sends total, 2 in stereo. Send signal in stereo or mono, pre- or post-fader. Available all at once. Return signal through any of 6 stereo paths.



FLEXIBLE EQ SECTION

You'll find both shelving and split-EQ sections on some mid-level consoles. But that's where the similarities with the M-2600 end. The M-2600's bi-directional split EQ means you can use either or both EQ sections in the Monitor or Channel path... or defeat the effect altogether with one bypass button. Most other comparable pre-mixers will lock the shelving mix into the Monitor path only, limiting your EQ application.

ADVANCED SIGNAL ROUTING OPTIONS

Direct channel input switching. Assign to one of eight busses, or direct to tape or disk, or to the master stereo bus. Because the group and direct-out jacks are one and the same, you can select either without patching. You won't find this kind of speed or flexibility in a "one-size-fits-all" board.

ERGONOMIC DESIGN

The M-2600 has a big studio feel. All buttons are tightly sprung loaded, lock into place with confidence and are large enough to accommodate even the biggest fingers. The faders and knobs have a tight, smooth "expensive" feel and are easy to see, easy to reach and a pleasure to manipulate. Center detents assure zero positions for EQ and PAN knobs. Smooth long throw 190mm faders glide nicely yet still confidently allow you to position them securely without fear of accidentally slipping to another position.

MICRO SERIES 1202 12-Channel Ultra-Compact Mic-Line Mixer

Usually the performance and durability of smaller mixers drops in direct proportion to their price. Fortunately, Mackie's fanatical approach to pro sound engineering has resulted in the Micro Series 1202, an affordable small mixer with studio specifications and rugged construction. The 1202 is a no-compromise, professional quality ultra-compact mixer designed for professional utility in broadcast studios, permanent PA applications and editing studios where nothing must ever go wrong.

BIG CONSOLE FEATURES

- Working S/N ratio of 90dB, distortion below 0.025% across the entire audio spectrum, switchable +48 volt phantom power and +28 dBu balanced line drivers.
- Real switchable phantom-powered mic inputs with discrete, balanced mic preamps as good as those found in big consoles.
- Has 4 mono channels, each with discrete front end mic pre-amp/line input and four stereo channels, each with separate left and right line inputs.
- Every input channel has a gain control with unity at the center detent for easy setup. Also a pan pot, low frequency EQ at 80Hz, high frequency EQ at 12.5 KHz, and two aux sends with up to 20dB available gain.
- Main outputs operate either balanced/unbalanced, as required.
- Switchable three-way 12-LED peak meter displays.



- Master section includes two stereo aux returns, a separate headphone level control, metering and two stereo aux returns.
- Line inputs and outputs are designed to work with any line level, from instrument level, to semi-pro -10dB, to professional +4dB.
- Designed for non-stop, 24-hour-a-day professional duty in permanent PA applications, TV and radio station, etc.
- Sealed rotary controls instead of open frame phenolic potentiometers that suffer from dust and contamination.
- Has steel chassis, rugged fiberglass circuit boards and a built-in power supply. Also has exceptional RF protection.

HEAVY DUTY CONSTRUCTION

- Ideal "entry level" mixer for those just starting a MIDI suite.
- Ideal as headphone or cue mixer, level matching pro audio "tool kit", drum or effects sends submixer, 8-track monitor mixer.

CR-1604 16-Channel Mic-Line Mixer

The hands-down choice for major touring groups and studio session players, as well as for broadcast, sound contracting and recording studio users, the Mackie CR-1604 is the industry standard for compact 16-channel mixers. The CR-1604 offers features, specs, and day-in-day-out reliability that rival far larger boards. It features 24 usable line inputs with special headroom ultra-low noise Unihybrid circuitry, seven AUX sends, 3-band equalization, constant power pan controls, 10-segment LED output metering, discrete front end phantom-powered mic inputs and much more.

LOWEST NOISE, HIGHEST HEADROOM

- With the CR-1604, having the lowest noise and highest headroom (90 dB working S/N and 108 dB dynamic range) at the same time are not mutually exclusive. It is free of commonly encountered headroom restrictions, and is able to handle the occasional pegged input with ease. In fact, many drummers consider it the only mixer capable of handling the attack and transients of acoustic and electronic drums.

CONSTANT POWER PAN POTS

- Only with constant power pan pots will a source panned hard left or hard right have the same loudness as when it is sitting dead center. While most small mixers pass simple balance controls for pan pots, the CR-1604's carefully optimized constant power pan circuitry make it a professional tool with the kind of performance necessary for CD mastering, video posting and other critical audio production.

IN-PLACE STEREO SOLO

- Stereo "in place" solo allows not only the monitoring of level and EQ, but also stereo perspective. Usually found in very expensive mixers, stereo solo allows you to critically scrutinize and carefully build a mix using all the channels with their respective sends and AUX returns.

UNITY PLUS GAIN STRUCTURE

- Proper gain settings are facilitated by proper gain labeling, along with center-click detents on the faders, clearly understandable input trim controls and output meters that read channel levels in solo mode. With properly set levels you achieve very high headroom and low noise at the same time.

EFFECTS SEND WITH GAIN

- Unusual circuit design that provides two different "zones" that reflect real world use: send from each channel can vary in level from off to unity gain, which is the normal range of effects sends in other mixers. Since you also get another whole zone from the center detent to +15 dB gain, the channel fader can be pulled down and the effects send can be boosted above unity when more effect is needed.

INTELLIGENT EQ POINTS

- Low frequency EQ is at 80 Hz where it has more depth and less hollow midbass "bark". Midrange is centered at 2.5 KHz, providing for more control of vocal and instrumental harmonics. A specially-shaped HF curve that shelves at 12 KHz creates more sizzle and less aural fatigue.

REAL MIC PREAMPS

- The CR-1604 has genuine studio-grade phantom powered, balanced input mic preamps on channels 1 through 6. All CR-1604 (and XLR10) discrete input mic preamp stages incorporate four conjugate-pair, large-emitter geometry transistors just like the big gear. So, when recording natural sound effects to heavy metal or mixing flutes or kick drums, you get the quietest, cleanest results possible.

BUILT TO LAST

- The CR-1604 is designed for non-stop, 24-hours-a-day professional duty - even for tours that log 100,000 miles in three months. It has sealed rotary potentiometers that are resistant to airborne contamination like dust, smoke, liquids, and even the oxidizing effects of air itself.

Optional Accessories OTTO-1604

Add sophisticated computer controlled automation to your CR-1604. When connected to the MIDI port of your computer (PC, Mac, Amiga or Atari), each one of the 16 input channels can be programmed to change gain or to mute, just as you would program a sequencer. Master levels can be programmed as well, along with all buss channels.

XLR10

While the standard CR-1604 comes with 6 high performance mic inputs, there are times when you need more. Enter the XLR10. This simple-to-install accessory adds 10 more (for a total of 16) mic inputs, with the same quality, performance and features as those in the CR-1604.

SENNHEISER

Incorporating state-of-the-art technology and decades of experience, Sennheiser headphones offer outstanding design, superb audio quality and luxurious comfort. From the ear padding to the O.F.C. (Oxygen Free Copper) cable, all materials are carefully selected and precision engineered to ensure incomparable quality.

HD414 Classic

- A re-issue of the world's first open-Aire dynamic headphone, the HD414 Classic offers maximum transparency, fidelity and comfort. A limited edition model, the HD414 Classic also features Professor Sennheiser's signature on the headband.
- Radial based diaphragms for more accurate reproduction.
- Field replaceable parts for long-term enjoyment.
- Neodymium-ferrous magnets for broad frequency response (18-21,000Hz).
- 10ft, Kevlar-reinforced oxygen-free copper signal cable with 1/8" - 1/4" stereo phone plug.



\$599.5

HD25 SP Studio Monitor Headphone

- Offering dramatic isolation from external sounds, the HD25SP is designed for professionals who rely on studio monitor headphones for work and pleasure.
- High-efficiency drivers for portable and field use.
- Modular parts for long term value and durability.
- Neodymium-ferrous magnets for broad frequency response.
- Frequency Response: 16-22,000Hz.
- Sensitivity: 105dB.
- Impedance: 70Ω.



\$1199.5

HD265 Studio Monitor Sealed Headphone

- Designed to meet the stringent demands of studio professional and audiophile alike, the HD265 breaks new ground in the sealed-chamber headphone format.
- Sealed-chamber headphone format.
- Triple-wound aluminum voice coils for quick transients.
- Polycarbonate dome-damping minimizes distortion.
- Oxygen-free copper signal cable with 1/8" to 1/4" stereo phone plug.
- Frequency Response: 10-25,000Hz.

\$1999.5

HD535 Dynamic Hi-Fi Stereo Headphone

- The HD535's earcups surround your ears rather than resting on them, for a more natural listening experience.
- Open-back construction and classic design.
- Light aluminum coils in the transducer systems offers excellent transient and dynamic response.
- Supported by the open structure, tonal quality develops high dimensional sound qualities.
- Circumaural, oval earpads for good wearing comfort.
- Can be connected to all digital and analogue Hi-Fi components



\$1399.5

HD545 Digitally Compatible Circumaural Headphone

- The HD545 is the headphone to which all in its price category must be compared.
- Polycarbonate dome-damping materials for clearer highs.
- Triple-wound aluminum voice coils mean powerful bass, high output and greater durability.
- Velvety soft, circumaural earpads and adjustable, padded headband for extended comfort and perfect fit.
- Oxygen-free copper signal cable assures optimal signal transfer.
- Includes 1/8" to 1/4" stereo phone plug.

\$1699.5

HD565 Digitally Compatible Circumaural Headphone

- Offering natural sound reproduction without tonal distortion - the choice for use with the most sophisticated equipment.
- Silk dome-damping for brilliant highs and ultra-smooth midrange reproduction.
- Copper-coated aluminum voice coils for high linearity.
- Bass-tube tuning for extended, powerful low frequencies.
- Velvety ear cushions provide lavish comfort.
- Oxygen free copper signal cable with 1/8" to 1/4" stereo phone plug.

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Stewart

PA1000/1400/1800 Power Amplifiers



- High frequency switch mode power supply fully charges 120,000 times per second (1000 times faster than conventional power supplies) requiring far less capacitance for filtering and storage.
- High speed recharging also reduces power supply "sagging" that affects other designs.
- Incredibly efficient. 5 PA-1000 or PA-1400's (4 PA-1800's) can be run on one standard 20 amp circuit. There is no need for staggered turn-on configurations or other preventive measures when using multiple amp set-ups, as current draw during turn-on is only 6 amps per unit.
- They produce smooth and uncolored sound, while offering very full detailed low end response and tons of horsepower.
- They each carry a 5 year warranty on parts and labor.

PA-1000 weighs 9 lbs, is 15" deep and occupies one standard rack space. Delivers 1000 watts into 4Ω when bridged to mono. PA-1400 weighs 16 lbs, is 15" deep and takes 2 standard rack spaces. Delivers 1400 watts into 4Ω when bridged to mono. PA-1800 weighs 17 lbs, is 17" deep and takes two rack spaces. Delivers 1800 watts into 4Ω when bridged to mono.

BSW

Performance Series Amplifiers



Performance Series 1 300 Watt Power Amplifier

- Measuring only 3.5 inches high and weighing 26 pounds, the Series 1 delivers more than 150 watts per channel.
- Its welded steel chassis is undefeatably strong while a custom heat sink extends on provides exceptional thermal capacity.
- An internal fan provides quiet background noise levels for critical monitoring applications and when pushed hard the cooling system insures continuous cool operation even in the most demanding situations.
- Active balanced inputs with both XLR and 1/4" phone jacks.
- Supplied with quality 5-way binding posts for highly reliable speaker connection.
- Front panel handles are reversible for either rack mount installation or easy handling.
- LEDs are provided for signal presence and clip indication; the deflected gain controls have large knobs for easy front panel adjustments.

Performance Series 2 600-Watt Power Amplifier

- Same as above except the Series 2 weighs 32 pounds and delivers more than 300 watts per channel.

Performance Series 4 1200-Watt Power Amplifier

- Same as above except the Series 4 weighs 53 pounds and delivers more than 600 watts per channel.
- Has a switch selectable clipping eliminator that prevents damage to the speakers.

TANNOY

System 6 NFM II

A 6.5 inch Dual Concentric with Tullip HF wave guide forms the heart of the System 6 NFM II providing a reference single point source monitor in a more compact enclosure than ever before. Every aspect of design fully complements the drive unit's capability. The rigid cabinet with carefully contoured baffle and trim minimizes diffraction and the high quality minimalist DMT crossover and gold-plated Bi-Wire terminal panel optimize the signal path. Pin-point stereo accuracy with wide frequency response, good power handling and sensitivity make this an ideal nearfield monitor.



PBM Series II Reference Monitors

The PBM II Series is the industry standard for reference monitors. They feature advanced technologies such as variable thickness, injection molded cones with nitrile rubber surrounds, and the highest quality components including polypropylene capacitors and carefully selected inductors. With a Tannoy monitor system you are assured of absolute fidelity to the source, true dynamic capability and most important, real world accuracy.

PBM 5 II

- Custom 5" injection-molded bass driver with a nitrile rubber surround for extended linearity and accurate low frequency reproduction. They are better damped for reduced distortion and exhibit more naturally open and detailed midrange.
- Woofer blends seamlessly with the K" polyimide soft dome ferro-fluid cooled tweeter providing extended bandwidth for extremely precise sonically-balanced monitoring.
- Designed for nearfield use, the PBM 5 II cabinets are produced from high density media for minimal resonance and features an anti-diffraction radiused front baffle design.

PBM 6.5 II

- Transportable and extremely powerful, the PBM 6.5 II is the ideal monitor for almost any project production environment.
- 6.5" low frequency driver and 3/4" tweeter are fed by a completely redesigned hardwired hand selected crossover providing uncompromised detail, precise spectral resolution and flat response.
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.



PBM 8 II

- High tech 1" soft dome tweeter with unmatched pattern control and enormous dynamic capability. 8" driver is capable of powerful bass extension under extreme SPL demands.
- Hand-wired crossover features true bi-wire capability and utilizes the finest high power polypropylene capacitors and components available.
- Full cross-braced matrix mediate structure virtually eliminates cabinet resonance as a factor.
- Ensures precise low frequency tuning by incorporating a large diameter port featuring laminar air flow at higher port velocities.

TURTLE BEACH SYSTEMS



Turtle Beach audio cards bring true studio performance to the PC platform. Based on the technology used in their professional products, the performance of both their hardware and software has garnered accolades from users and press alike. Unlike other PC-based audio cards, Turtle Beach products are not designed for sound card game compatibility. Instead, the design philosophy is to give the best possible performance and quality, in the Windows operating environment, while bypassing traditional PC limitations.

MULTISOUND MONTEREY Multimedia Sound Card

The next generation of Turtle Beach's award winning Multisound brand, Monterey offers high quality performance and features at a very reasonable price. Multisound's Hurricane technology provides very high speed audio data transfer between the card and the hard drive. This approach allows for data throughput up to eight times faster than the more common DMA designs, while putting minimum burden on the CPU (critical if you're recording audio and video simultaneously).

- The Motorola DSP-56001 Digital Signal Processor operates at 20MHz and performs all digitization functions with very low system overhead.
- High S/N (-89dB, A weighted), low distortion (<0.01% THD, <0.01% IM - both A weighted), flat frequency response (DC-19kHz±0.5dB)
- On-board real-time effects processor for a variety of effects, including reverb and echo.
- Professional quality MIDI synthesizer with wavetable playback (4MB of real instruments audio). Up to 4MB of standard SIMM-type memory can be added for sampling of new sounds.
- True 16-bit recording, using 64x oversampling and sigma-delta conversion technology.
- True 16-bit playback, with 64x oversampling and sigma-delta conversion utilizing 18-bit DACs, and an 8x interpolating filter.

WAVE 2.0

Professional Sound Editing for Windows 3.1 Compatible Sound Card

\$349⁰⁰

Wave is simply the best audio recording/editing/effects program available under Windows 3.1. With its logical layout, plethora of functions and wealth of effects, Wave will become an indispensable tool in your studio. Wave has the features (and interface) of a tape recorder. It supports stereo or mono recording/playback at 11,325, 22,05 or 44.1kHz sampling rates. Wave will work with any Windows 3.1 compatible audio board.

- Supports cut & paste editing (just like editing in a word processor) and has a full Undo function to eliminate fatal mistakes.
- Gain adjustment can be made to a whole file, or just the section you highlight.
- Wave can import and export a large variety of file formats, including .SMP, .SFI, .WAV, 16, 8 and VOC. In addition, you can change the sample rate of previously stored files.
- FX Clips function provides real professional effects like distortion, flange, digital delay, reverb, auto-stutter and others.

- A four band parametric equalizer function (WaveEQ) gives you the ability to touch up sections of your audio as well as the whole file. You can easily correct flaws in the sound or go for the special effects.
- Speed control lets you adjust the playback rate of your recorded audio (up to 200% faster or 50% slower).
- You can mix up to three sound files into a new fourth one, with control of volume and starting time of each file.
- Glitches in the recorded sound can be repaired by simply drawing the correction on the waveform with your mouse.

\$99⁰⁰

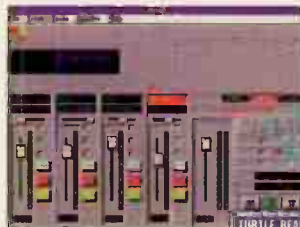
QUAD STUDIO

Professional 4-Track Recording System

Quad Studio is the first real-time four track recorder for the PC. Now you can record two tracks directly to your hard drive (16ms or faster), then record two more tracks while playing back the first two. With its high performance and ease of use, Quad Studio is the perfect replacement for 4 channel mixer/cassette decks.

- Graphics interface emulates all common mixer/tape deck controls.
- Record, overdub, mix and bounce tracks in real time with no loss of quality.
- Previously recorded audio can be effects processed (using the optional Wave program) and then mixed, in real time, with new audio.
- Includes Turtle Beach's high-performance Tahiti board.
- Software is also separately available for Monterey cards.

\$399⁰⁰



BEHRINGER

MDX 1000 Autocom Automatic Compressor/Limiter



- Incorporates an interactive auto processor for intelligent program detection. With the auto processor, the attack and release times are derived automatically from the respective program material - preventing control on adjustment errors.
- The auto processor also allows you to compress the signal heavily and "musically" in dynamic range without any audible "pumping" or "breathing" of other side effects.
- Provides both Attack and Release controls allowing for deliberate and variable sound processing.
- Switchable soft knee/hard knee characteristics. Soft knee is the basis of the "inaudible" and "musical" compression of the material. Hard knee is a prerequisite for creative and effective dynamics processing and for limiting signal peaks reliably and precisely.

MDX2000 Composer Interactive Dynamics Processor



- Powerful and versatile signal processing tool provides 4 most commonly dynamic control sections: fully automatic compressor, manually controlled compressor, expander and peak limiter.
- Innovative IKA (Interactive Knee Adaptation) circuit combines the "musicality" of the "soft knee" function with the precision of the "hard knee" characteristics. Provides subtle and "inaudible" compression of the sound allows creative dynamics processing.
- Auto processor provides fully automatic control of attack and release times. There is also manual control.
- Interactive Ratio Control (IRC) expander eliminates "chatter" on or around the threshold point.
- Interactive Gain Control (IGC) Peak Limiter combines a clipper and program limiter. This allows for "zero" attack, distortion-free limitation of signal peaks.
- IGC is invaluable in live applications. Servobalanced inputs and outputs. Operating level switchable from -10dB to +4dB.

PEQ305

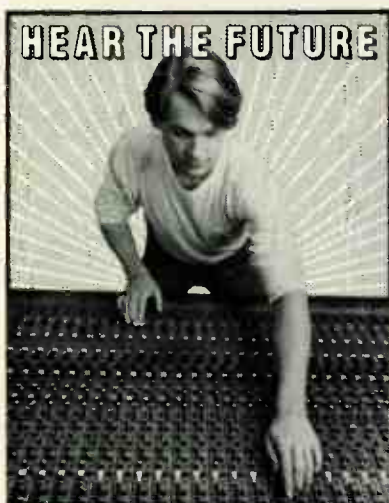
Studio Parametric The Musical Equalizer

- Five independent, switchable bands. The quality of each of the five frequency bands can be modified gradually from notch to broad-band characteristics. This offers more flexibility than any graphic equalizer can provide.
- Bands 1 and 5 are switchable between shelf and peak. This is extremely useful, since acoustic problems usually occur in the upper and lower frequencies.
- Utilizes the "Consistent Q" principle to eliminate interaction of the parametrics frequency, bandwidth and amplitude. The same applies to interaction between the individual frequency bands.
- Parallel arrangement of the individual filters reduces phase shifting and associated delays to a minimum.
- Potentiometer response follows human hearing characteristics.
- Relay-controlled hard bypass with auto-bypass function during power failure.

DEQ8000 Ultra-Curve 31-Band Digital Graphics Equalizer/Analyzer

The DEQ8000 is an innovative programmable graphic equalizer/spectrum analyzer built with digital technology. A two-channel unit, it features Burr-Brown 20-bit A/D and D/A converters for input and output. It achieves the dynamics and audio quality of analog equipment while avoiding the drawbacks of analog filters such as tolerances in components.

- Programmable two-channel equalizer with 31 graphic bands on digital basis.
- Filter settings are displayed either in the form of display slide controls or as a filter curve representing the actual frequency response and taking the influence of several adjacent filters into consideration.
- Shelving function makes the moving of groups of faders possible.
- Up to 3 additional notch filters can be used whose frequency and bandwidth is freely selectable.
- Search and Destroy function automatically detects resonant frequencies, thus acting as an automatic feedback suppressor.
- The integrated Real Time Analyzer features both peak and RMS weighting, a noise generator with a separate output and a broad section of auxiliary functions such as variable integration time, peak hold, etc.
- In Analyzer mode, a cursor is used to poll the amplitude of the single bands with an accuracy of 25dB.
- The signal source (measuring microphone or equalizer input) fed into the analyzer input is freely selectable.
- Various analyzer measurements can be saved and recalled for reference purposes.
- Auto EQ mode combines the analyzer with the equalizer section and thus allows for the automatic equalization of acoustic environments. Within 0.5 seconds, the Ultra-Curve provides a linear frequency response based on the actual room acoustics.
- MIDI interface allows for selecting memory locations from an external MIDI controller. Remote control of all Ultra-Curve parameters can be realized via system exclusive information. Also, several units can be linked together via MIDI.



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New compact disc manufacturing plant in Hoboken, New Jersey needs a chief engineer to manage this facility. Must have a minimum of 2-3 years experience.
Call Manny Sethi 212-921-4588 Fax 212-575-1109

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New compact disc manufacturing plant in Hoboken, New Jersey needs a sales executive with contacts with recording industry and computer industry.
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FOSTEX DAW

continued from page 80

stereo pair because of its 16-track capability. This also allowed me to make a digital transfer directly to D-1 on its first pair of tracks. The second pair of tracks would be used for the surround effects.

Editing video to the audio was not too difficult, but it would have been even easier if the Foundation had the ability to create an Edit Decision List (EDL). (Video editing systems typically generate an EDL to floppy disk. No floppy drives are available for the 2000RE at this time.)

The second project involved a last-minute combining of a voice-over with a music bed for a Colgate Toothbrush spot. The voice-over came from a BetaSP tape and the audio source was a DAT recorded at 44.1 kHz. This was for a work-in-progress, so I didn't make a fuss about the sources, but anyone doing audio for video should know that the 48 kHz sample rate is what D-1 wants to see. Otherwise transfers are made in the analog domain.

Lining up two audio tracks on the Fostex is easy. The track(s) to be moved are highlighted by pressing the touch-sensitive screen. Once a start point is selected, press Align, then Start, and the job is done. An external mixer, which combined the two stereo tracks, then fed a timecode DAT.

A NICK IN TIME

A timeline at the top of the EL screen indicates the percentage of used-versus-unused space. This is augmented by a numeric readout at the top right corner of the screen that indicates remaining time. The library, if you so choose, keeps track of all the clips, their names, and lengths.

By importing the entire audio track from the video — rather than just the desired audio clips — the 2000RE presented me with but one obstacle, that of reclaiming disk space from discarded audio tracks. This is possible to a limited extent and with minimal feedback under the System menu. It would be helpful, though, if the system interrogated the drive(s) and displayed its size. In addition, a breakdown of the space used by the on-screen tracks, the clips held in the library, and that which has been cut (on the clipboard) would also have been useful. I am told this will be resolved in a future software revision.

THE GOOD BOOK

The owner's manual is well written, especially considering that any software-based product is subject to numerous changes. The documentation included a separate Appendix detailing audio and digital I/O pin-outs, as well as info on time compression, event grouping, synchronization, and machine control. Especially appreciated were the Release Notes for the 4.01 Beta version tested for this review. Fostex is kind enough to inform users not only of what's new, but also of known bugs and "work arounds." It was here that I also found two lists that detailed compatible hard drives and video decks.

SUMMARY

The Foundation 2000RE is a wonderfully reliable, stand-alone product that is transparent — especially when compared to the idiosyncrasies of a tape transport. The 2000RE survived continuous power for 30 days without any crashes. This included unplugging both the hard drive and the edit controller without powering down the system.

Users who are uncomfortable with the thought of recording rhythm tracks directly to other hard disk systems might consider the Foundation 2000RE, at the very least, for overdubs and editing. Though loading and unloading audio from tape to a hard disk recorder might seem an obstacle, it is most certainly a considerable improvement compared to the time it takes to locate and synchronize multiple linear machines over the course of a session. The Fostex Foundation 2000RE is loaded with plenty of useful features without hidden costs.

—Eddie Ciletti

ADAT IN TRENCHES

continued from page 110

the console, dodgy audio/power connections, physical location of audio cables and power cords, grounds lifted/not lifted, lighting, and so on.

If all else fails, a Behringer 202 denoiser placed on the console's main stereo inserts can be a cost-effective short-term solution. (Of course, the best noise reduction is recording quiet tracks in the first place.)

UPGRADING THE A/D-D/A CONVERTERS

You can replace the A/D-D/A converters with upgraded versions. The differ-

ence is subtle, but definitely audible; vocals and drums in particular seem to sound a lot better. If you record in the yellow a lot and like to bang all the bits, the sound with the upgraded chips seems less strident, as well as a bit "fatter." I don't know if the chips are actually more forgiving if you go into the red, but they seem to be. WARNING: This is for advanced wire jockeys only. You could really mess up if you're not careful. If you've never handled static-sensitive devices or replaced socketed 28-pin ICs, don't even think about doing this!

The A/D-D/A circuit board is located on the bottom of the ADAT (fig. 5); the converters themselves sit in the four sockets shown below. Remove the bottom cover to access this board.

Alsis uses D-A chips manufactured by Burr-Brown (Tel: 602-746-1111) and designated as PCM-1700P; an upgraded version, the PCM-1700P-K, is also available. Each ADAT contains four chips, and some may already be the K versions, so read the numbers on the top of the chips before you do any replacing. You do not have to remove the chips from the machine to identify them.

You can buy Burr-Brown PCM-1700P-K chips from Insight Electronics (Tel: 800-677-7716; \$25.10 per chip). Several third-party companies also provide ADAT upgrades and mods.

I've changed the chips without removing the board, but it's a tight squeeze. If you do change the chips yourself, remember: (1) Take precautions. These are static-sensitive devices; (2) Note the chip's orientation; (3) Line up all the pins in the socket before seating the chip (it helps to bend the pins in slightly on a flat surface before inserting); (4) Save your old chips.

That's all for now. I hope this information proves useful. Going ADAT turned out to be a smart move for us. Business has increased tremendously since just about everybody seems to have an ADAT.

One of the main reasons that made two-inch a success was *compatibility*. This holds true for ADAT. Now, if the next-generation Panasonic industrial ADATs have four motors and a basic maintenance manual that breaks out part numbers, I'll really be ecstatic.

Bennet Spielvogel (aka The East Side Flash) owns and operates Flashpoint Recording Studio in Austin, TX. He can be contacted at esideflash@aol.com.

ACROSS THE BOARD

continued from page 130

that I have forgotten to mention. (I am sure I will get letters reminding me about that and my English.)

I don't do much audio post work, except for some multimedia things that I am playing around with, so my basic use of DAWs falls into a few narrow areas.

First: I use a DAW to edit samples for drum loops that are played back by triggering from sequencers or audio triggers. The samples are initially

recorded on DAT or the Sony 48-track digital and then transferred to the computer for editing. Most of the samples are in stereo and recorded at 48 kHz. Some of them were recorded on the 3M 32-track and have a sample rate of 50 kHz. After the samples are edited, they are stored away for future use. Some of them end up in the new Akai MPC-3000 drum machine slash MIDI sequencer; others are played back from Digidesign SampleCell; some are triggered directly out of Studio Vision from Opcode; and some end up in Wendeljr cartridges. The editing program of choice has been Sound Designer II from Digidesign, although

on occasion I have used Alchemy for editing.

Second: I quite often have to "fly" parts from one part of a tune to another part of the same tune. I use Pro Tools, Sound Designer, and Deck II for these tasks with no problems.

Third: I use a DAW for cleaning up tracks that I have recorded on the Sony 48-track. I transfer the entire track to the computer, straighten out timing mistakes, remove clicks, remove hiss and hum, and then put the track back on the 48-track — all without leaving the digital domain. For noise cleanup I use Sound Designer II with the DINR noise-reduction plug-in, and the Q-10 equalizer plug-in. For timing correction I use Deck II and Pro Tools.

Fourth: I use DAWs to compile tunes to make CDs. Sometimes they are premasters for CD production, and sometimes they are just for my car. SADIe and Sonic Solutions allow you to cut CDs without leaving the editor. Sound Designer and Pro Tools users must load another program called CD MasterList to cut the CD. Deck II files must be written to CD using third-party CD-R software. SADIe was by far the fastest way to get from finished mixes to CD. Assembly and editing that took 20 minutes in SADIe required hours or couldn't even be done with other systems.

Fifth: I use DAWs for mixing to 20-bit converters. There are not very many places to store 20-bit mixes. I record them to hard disk and then back them up to EXABYTE or removable SyQuest cartridges. Sound Designer II software will allow 20-bit recording using Pro Tools 442 NuBus card only from the Pro Master 20 interface. The files recorded on disk are 24-bit files. Pro Tools III hardware will not support more than 16-bit audio. Pro Tools software will not support more than 16-bit. Deck II is limited to 16-bit.

OUTTA HERE

Well, there you have it. I hope you are as frustrated about DAWs as I am. Maybe by this time next year there will be one system that will let you do whatever you want to do at a reasonable price. High-density, high-speed optical discs that will let you record eight tracks at a time should be here by the 1996 AES show. When that happens you will be able to have the modular recording of an ADAT or DA-88 with the reliability of optical media and the random access editing of a DAW. And, of course, everything you own now will be obsolete...again. **EQ**

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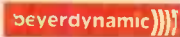
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BY ROGER NICHOLS

Here we are at the soon-to-be famous DAW issue of *EQ*. I hope you can figure out the right system to buy. If you do, please let me know. There is so much to choose from, and every system performs the same basic tasks in a different way. Also, each camp has its, "I'd rather push a Chevy then drive a Ford"-sales staff ready to pounce on any unsuspecting potential purchaser. Just like buying your first car, you will probably know which system to buy when looking for your third system. Kick the tires hard and watch to see if the doors fall off.

Digital Audio Workstations have been around for five to eight years,

depending on who you ask. If you ask me, I had a system in 1981. It was based on a Compupro S-100 8 MHz, 80286-powered computer with a 32 MB, eight-inch Micropolis hard disk with a digital I/O that plugged right in to the 3M 32-track digital machine. It used a DEC Vt-100 terminal with Retro-Graphics for waveform editing. (There will be a quiz.) I used it to fly guitars, pianos, vocals, bass parts, drum licks, and whatever else you could imagine from place to place on Donald Fagen's *Night Fly* album.

In 1985, when Compaq introduced the 386-based IBM PC compatible, I ported the program over to that platform. It had mouse-controlled scrubbing of audio for finding edit points and would perform nondestructive edits and fades. Included here is a screen capture of hard disk recording and editing circa 1985. I showed it to Sony and Mitsubishi at that time, but they both said that no one would be interested because of the lack of storage time (80 MB hard disks were about the biggest available) and the time it would take to back-up the audio. (Sony F-1, Mitsubishi X-80, 3M 4-track, and Sony 1610 were the only choices.)

The big guys like Lucas had the SoundDroid, which not only edited audio to picture, but also performed noise reduction for noisy film soundtracks. I approached Andy Morer about licensing the noise-reduction software

to clean up old masters for record companies. CDs were still new, and the record companies did not yet realize the value of their old catalogs (and I am finding out that they still don't). Andy Morer and Bob Doris went on to form Sonic Solutions and offer No-Noise software that runs on a Mac-based DSP card. The rest is history.

Today's DAWs include a plethora of systems based on stand-alone Mac and PC platforms. The least expensive systems use the computer for all of the processing and require a minimum or no additional hardware to operate. The most expensive systems have cards containing DSPs, SCSI hard disk interfaces, MIDI and SMPTE I/O, and only need the computer for the display and user interface. An advantage to stand-alone systems is that you can use your computer for other applications while performing digital audio tasks. The Akai DD-1000 records two tracks at a time and plays back four at a time from optical disc. The Akai DR4 and DR8 record and edit four and eight tracks, respectively, on internal hard disks. Otari's RADAR is a 24-track system that operates a lot like a linear tape machine, but just press a couple of buttons and random access editing is at your fingertips. Roland, E-mu, Fostex, Fairlight, Dyaxis, Neve, and SSL have multitrack hard disk systems as well — not to mention probably a dozen others

continued on page 128

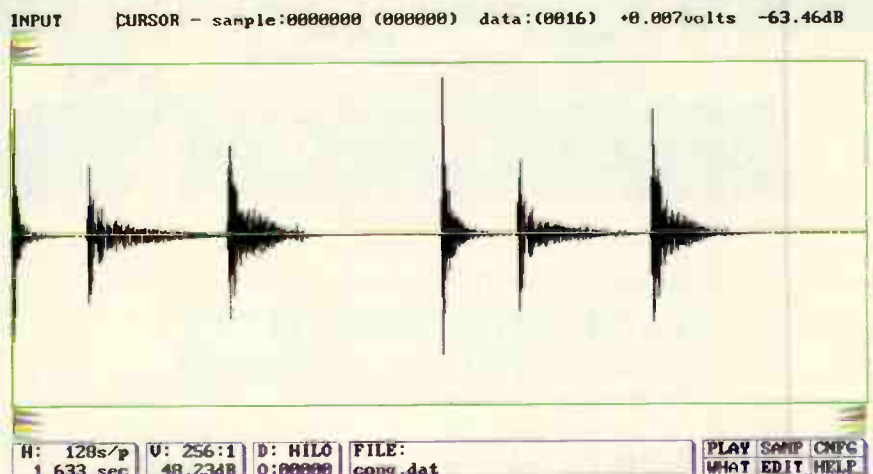


FIGURE 1

40-INPUT PROBLEM SOLVER.

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Of course, when you consider everything that we packed into the LM-3204, it's a great mixer to start out with, too. You get two studio-quality mic preamplifiers, virtually every feature of our famous CR-1604 (and then some), plus twice the number of line inputs. All for under \$1000 suggested retail*.

Same low noise/high headroom gain structure as the CR-1604. Same bottleneck-free mix amp architecture. Same musical-sounding 3-band EQ. And the built-like-a-tank construction quality that's made our mixers legendary on world tours and in 24-hour-a-day production facilities.

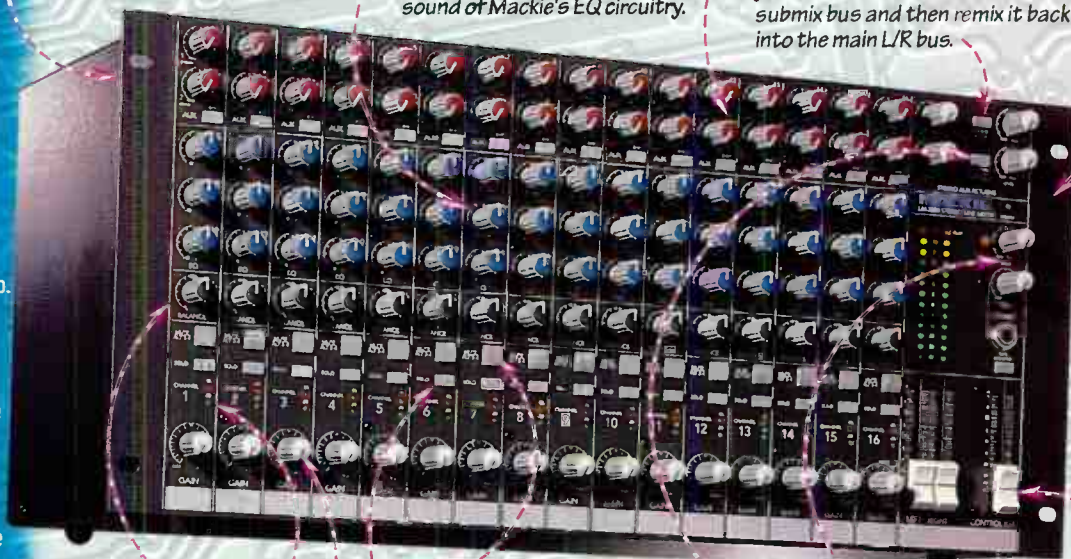
Then we added a Control Room output with its own 45mm fader. Tape Monitor section with both RCA and 1/4" inputs and outputs and even -20dB signal present LEDs on every channel. Then we made the LM-3204 expandable — you can plug in one or more LM-3204Es for 32 or even 48 inputs.

Whether you're looking for a pro-grade instrument or effects submixer, an economical main mixer for a MIDI project studio, or the perfect solution for solo or duo club acts, you've gotta check out the LM-3204. It can make a big impact on your creativity without making a big crater in your equipment budget. Call toll-free today for a free 30-page full line brochure & applications guide.

Sixteen **STEREO CHANNELS** in five rack spaces. Special mix amp architecture prevents overload from multiple hot inputs.

3-BAND EQUALIZATION at 12kHz, 2.5kHz and 80Hz. Others have copied our frequency points, but none have achieved the musical sound of Mackie's EQ circuitry.

4 **AUX SENDS** per channel (2 accessible at any one time). **ALT 3-4 TO AUX RETURN 3** switch lets you use Alt 3-4 as a stereo submix bus and then remix it back into the main L/R bus.



Stereo **BALANCE** control. Ultra-sensitive **-20dB SIGNAL PRESENT** LEDs give you a constant visual indication of what's on every ch. Overload LEDs, too.

CHANNEL GAIN CONTROL with an extra 15dB of gain PAST Unity Gain.

INSIDE: All those goodies that set Mackie apart from the clones... double-sided thru-hole-plated fiberglass main circuit board, gold-plated internal interconnects, exceptionally high RFI rejection input design and much more.

Four **AUX SENDS** (2 stereo & 2 mono) with ultra-high gain. If you're not using effects, the 4 stereo **AUX RETURNS** can also be used as extra stereo inputs.

FINEPRINT: ¹ Suggested retail. Higher in Canada. ² Denotes usage or ownership only, as reported to Mackie Designs, and is in no way intended to represent official endorsement by the individuals or groups mentioned in this ad. ³ When eaten as part of a balanced breakfast.

MUTE routes the signal to the **ALT 3-4** stereo bus. Stereo **IN-PLACE SOLO** maintains stereo perspective including effects; also meters individual channel level on 13-LED ladder.

SOLO & HEADPHONE level controls. **AUX RETURN TO CONTROL ROOM** button sends Aux 4 to headphone & monitor buses so you can "wet monitor" or play along with a cue or click feed.

45mm **MASTER L/R & CONTROL ROOM** faders.

Built-in **POWER SUPPLY**. No wall wart! **CONTROL ROOM** outputs to power amp (frees up your headphone output).

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Stereo **INSENTS** on Chs. 1-4.

Two of Mackie's renowned **MIC PREAMPS** with phantom power and trim controls are patchable to any input channel. Great for live sampling, acoustic or vocal tracking, small single or duo lounge acts or post-industrial speed thrash karaoke.



INPUT for LM-3204E EXPANDER. Basically an LM-3204 without a master section, the LM-3204E adds sixteen stereo channels and four Aux Returns in five rack spaces for \$899¹.

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