

REVIEWS: AKAI 4-TRACK • ROLAND REVERB • DBX MIC PREAMP • STEWART AMP



THE PROJECT
RECORDING
& SOUND
MAGAZINE

DEC 1993



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YESTERDAY & TODAY

BY DANIEL LANOIS & FLOOD

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With over 20,000 ADATs already in use all over the world, Alesis has made more digital multitrack tape recorders

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The ADAT Group™

The ADAT Format – made for multitrack

ADAT records eight tracks of 16-bit linear, 48 kHz sample rate audio, with no data compression "tricks" or channel sharing. We chose Super VHS® (S-VHS®) tape as a foundation, then designed ADAT's data structure and heads specifically for the rough-and-tumble, back-and-forth, punch-in-and-out environment of multitrack recording. To make sure that recording one track wouldn't disturb any other track, we divided each helical scan into

eight separate data blocks. Some digital recorders combine data from two different channels into the same data block on tape, which means that each time you record a track, another track must be read into a buffer and actually re-recorded even though it is in "safe" mode.



Bigger is Safer

Microscopic contaminants in the studio aren't just probable, they're statistically inevitable. If the format can't overcome them, they'll cause mistracking, noise, distortion, even total muting of the audio. Formats smaller than S-VHS are more vulnerable to contaminants, dropout, and misalignment, especially when exchanging tapes between machines. One 8mm digital format attempts to squeeze the same amount of sound into one-tenth the tape area that ADAT does. ADAT's S-VHS tape offers more total surface area

to meet the demands of digital recording, and its wider 100 micron tracks are five times less vulnerable to being derailed by dust. Because even though technology makes it possible to make formats smaller and smaller, dust stays the same size.

Actual microscopic comparison of the ADAT tape format and the 8 track, 8mm helical scan format (enlarged approximately 100 times).



ADAT's wide 100-micron tracks offer an extra margin of safety for digital audio.



The 8mm's 20-micron tracks squeeze more data into the same area, with little room for error.



Comparison of tape areas for 1 second of audio:
ADAT (1,211 mm²)
and the 8 track, 8mm helical scan format (133 mm²).



than any other company. More than Sony. More than Mitsubishi. More than Yamaha, Akai, and Tascam combined.

More than just a tape recorder— The ADAT System

ADAT, when combined with the BRC™ Master Remote Control, is a complete digital recording and digital editing system with features that no other recorder, analog or digital, can match. The BRC is a full-function autolocator and MIDI/SMPTE time code chase-lock synchronizer. Plus, it controls digital copying between ADATs, like a disk-based recorder, but much simpler to use.

The ADAT MultiChannel Optical Digital Interface digitally transmits up to eight ADAT channels at once over a single fiber optic cable to any track on any ADAT in the system without repatching, all in the digital domain. Now you can "fly in" that perfect vocal part to multiple locations in seconds, with absolutely no generation loss. And our new QuadraSynth™ keyboard has an ADAT digital interface so you can record it without ever leaving the digital domain.

A fiber optic cable for digital connection is included with every ADAT.



The BRC Master Remote Control, shown with optional RMB™ Remote Meter Bridge, supercharges your ADAT System: by adding SMPTE and MIDI synchronization, storable autolocation points, copy and paste digital editing and more.

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L14 "CHORUS 1"
00:25:38:15

Unlike analog autolocators, the BRC can recall 460 points, storable on each ADAT tape for later recall, so you can keep your mind on the project instead of having to remember minutes, seconds and frames.

The ADAT Worldwide Network

Thousands of ADAT Worldwide Network™ multitrack recording group members are reaping the benefits of choosing The ADAT System. As WWN members, they are able to collaborate and exchange ADAT tapes with other talented musicians, producers, composers and engineers throughout the world. Alesis is proud that so many creative people worldwide are using this American-made product, making ADAT the most popular digital multitrack tape recorder in history. The recording professionals below don't endorse ADAT, they use it every day. Their credentials speak for themselves. Visit your Authorized ADAT dealer and see what the new standard in digital multitrack recording can do for you.



Dave Rouze
Technical engineer for Larry Carlton, currently using ADAT to record all Larry's live concerts. 2 ADATs and a BRC.



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Owen Bradley
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Francis Buckley
One of the top dance and pop engineers in Hollywood. 4 ADATs and a BRC.



Web Staunton
Grammy-nominated chief engineer and studio owner. 3 ADATs and a BRC.



Mick Guzauski
L.A.'s leading platinum-platinum mixdown engineer. 4 ADATs and a BRC.



Andy Hilton
Owner and Chairman of the largest pro-audio equipment-for-hire company in the U.K. and Europe. Plenty of ADATs.



Ray Benson
One of country music's hottest producers/arrangers/writers. 3 ADATs and a BRC.



Tom Sizemore
Has engineered and mixed a wide range of music from rock to legendary jazz. 3 ADATs and a BRC.



Russell Brower
Two Emmys (eight nominations). Sound designer and producer for film, television and major theme parks. 2 ADATs and a BRC.

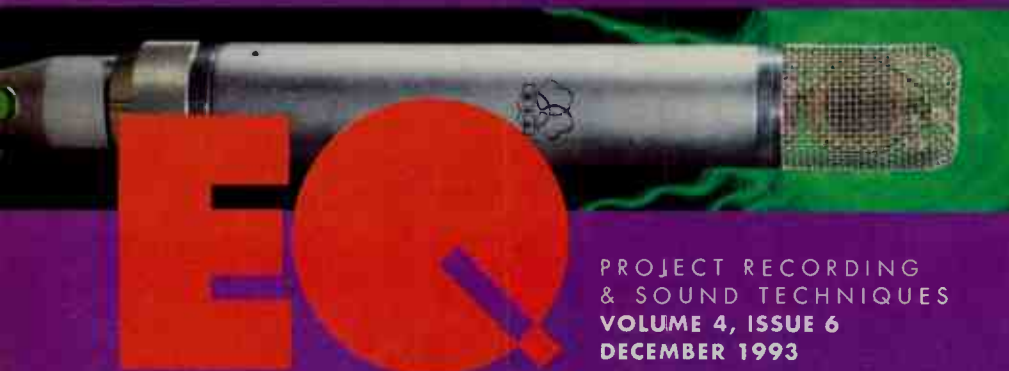


Tim Wilson
Consultant and system designer for leading recording artists and songwriters. Has installed more ADATs than he remembers.

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CIRCLE 03 ON FREE INFO CARD



PROJECT RECORDING
& SOUND TECHNIQUES
VOLUME 4, ISSUE 6
DECEMBER 1993



FEATURES

AT HOME WITH U2

Producers Daniel Lanois and Flood talk about getting two decidedly different types of U2 down on tape46

AES BUYER'S GUIDE

Whether you made it to Javits or not, *EQ* has your guide to all the hot products that are sure to improve project studio recording (Tie-In Plug: don't miss our Blue Ribbon picks for best in show on p. 18)54

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EQ (ISSN 1050-7868) is published bi-monthly by P.S.N. Publications, 2 Park Ave., Ste. 1820, New York, NY 10016. BPA Consumer Magazine Membership Applied For 11/92. Second class postage paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to EQ, P.O. Box GS32, Baldwin, NY 11510-0532. SUBSCRIPTIONS: U.S. 1 yr. \$19.97, 2 yrs. \$33.97, 3 yrs. \$49.97, CANADA add \$5.00 per year for surface; Other countries add \$10.00 per yr. for surface; All add \$20.00 per yr. for Airmail. Back-issues \$5. Printed in the U.S.A.

On the cover: U2 by Richard Pasley/LGI; John Tropea by Peter Monroe
World Radio History



It's nice to know an AKG studio standard isn't over anyone's head anymore.

Even among pros, there are times when your talent exceeds your budget. That's why we created the new AKG C3000. It has the warmth, clarity and character of the most popular AKG studio mic in the world — at about half the price. In fact, when you hear it you'll be amazed what a large, gold-coated diaphragm will do for your sound. The C3000 gives you all the quality of an AKG without having to pretend it's an AKG. It is.



Bean, from D'Cuckoo, whose new "Umoja" CD is on RGB Records.

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A PSN Publication
Vol. 4, No. 6
December 1993

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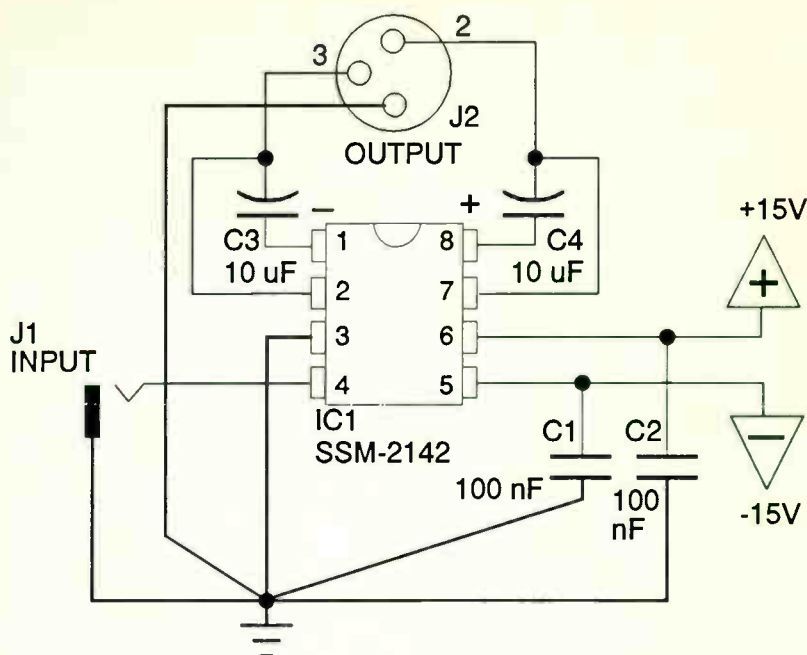
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EQ (ISSN 1050-7868) is published bi-monthly by P.S.N. Publications, 2 Park Avenue, Suite 1820, New York, NY 10016. BPA Consumer Magazine membership applied for 11/92. Second class postage paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to EQ, P.O. Box 0532, Baldwin, NY 11510-0532. SUBSCRIPTIONS: U.S. 1 yr. \$19.97, 2 yrs. \$33.97, 3 yrs. \$49.97; CANADA add \$5 per yr. for surface; Other countries add \$10 per yr. for surface; All add \$20 per yr. for Airmail. Back issues \$5. All product information is subject to change; publisher assumes no responsibility for such changes. All listed model numbers and product names are manufacturers' registered trademarks. Printed in the U.S.A.

LETTERS TO EQ



DO-IT-YOURSELF: Figure 1

DO-IT-YOURSELF

Thank you for the August 1993 issue of your magazine. I find it very informative and entertaining. I especially enjoy the "Do It Yourself" section. There is some additional information, however, that I would like to add to Jules Ryckebusch's design of the Balanced Line Driver circuit.

First of all, it is important to note that the SSM-2142 supplies a gain of 6 dB to the output. This decreases your system headroom and, in the case of a sound reinforcement system, the gain before feedback. There should not be anything to worry about here, but the user needs to be aware of it.

Also, in my experience with using the SSM-2142, the possibility of an output DC voltage offset exists. To eliminate the potential condition, I always include a coupling capacitor on each output, and each cross-coupling feedback loop is taken after this capacitor. This modified circuit is shown above (fig. 1).

I hope this adds valuable information to everyone who uses this excellent circuit.

Stephen J. Marks
Mark IV Audio, Inc.
Buchanan, MI

YOUR CHIP HAS COME IN

We have received inquiries regarding the Analog Devices AD1890 sample rate converter from those who

had seen the article in the October issue.

Here, in no particular order, is a list of companies presently using the AD1890 sample-rate converter: Z-Systems, Fostex, Gambit, Harmonia Mundi, Zaxcom, TOA, Corporate Computer Systems, AMS/Neve, nVision, Digital Domain, BEC Technologies, and RE Technologies. Sony also uses the AD1890 and demonstrated a recording console that uses it at AES. We are helping several other manufacturers design it in. We are also considering customized versions for some "big-name" consumer product manufacturers.

Peter Predella
Audio Marcom, Mgr.
Analog Devices
Norwood, MA

VENT OF A WOMAN

Re: The letter from Jennifer Monnar in the October EQ.

I've been a subscriber to your magazine for a little over a year, and unless I

WRITE TO US

EQ wants to dialogue with you. Write to Letters to the Editor, EQ, 939 Port Washington Blvd., Port Washington, NY 11050. Letters must be signed, and may be edited for clarity and space.

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CIRCLE 74 ON FREE INFO CARD

missed the issue where you bashed women, I feel that Ms. Monnar's comments about your magazine are a bit harsh and somewhat unwarranted.

I have worked in technical theater for over 25 years. Two years ago I crossed over into live sound. From my first days, I acknowledged that I was in a male-dominated field. Many times I was the only woman on the crew. In retrospect, I wouldn't have had it any other way. It was cruel and frustrating at times, but it taught me resolve, patience, and forced me to be my best. And when the occasional sexist comment was made, more often than not, my male co-workers took more offense and sprang more readily to my defense than I did. I learned to look beyond the words to the meaning. It is irritating to have a promoter say, "Gee, hon, you really work hard," but I can also hear in those words praise and affirmation. And when a musician tells me, "Sweetheart, my monitor mix was great!" I don't mind in the least that my name isn't "sweetheart."

I consider myself a feminist, but there are more men working in the field

than women, hence the majority of articles are going to be written by men or about men. I have never been offended by anything printed in *EQ*. The only thing that will anger me will be if you succumb to putting a female on your cover only because she is a female.

My only demand of any co-worker is that they share my commitment to give to the artist the very best sound reproduction possible. Anything less is not acceptable and everything else is not important.

Alicia Walters
Baltimore, MD

PEOPLE ARE PEOPLE

I can't believe Jennifer Monnar wants women recognized in *EQ* just for being a "woman in the music industry."

Sure, there are women out there making history, but why force a magazine to specifically print articles on women when it's not the sex of a person that justifies them being there.

We live in a society that demands recognition for each type of category we care to place ourselves in. Why

can't people be people?

The recording industry is made up of many types of people working together to make music, period. When you think about it, we are people first and type or interest group second.

I'm sure the women Jennifer mentioned are good at what they do, but I've never heard of them. Now Roger Nichols and Bob Clearmountain have been on the cutting edge of recording since the early '70s, and it'll be hard to bump them for not being a certain color or sex.

Being mostly Indian, I can say I enjoy people being people — not types or categories.

Daniel B. Plunkett

WE'RE SORRY

We incorrectly listed the choices of *EQ*'s resident tipster Dave Brody in our TEC Award picks section of the October issue. Dave's correct choices are as follows.

Acoustics/Facility Design Company

Harris, Grant Associates, Iver, UK

Audio Postproduction Facility

Howard Schwartz Recording, NY, NY

HEY! THIS EQ'S SMART.



I thought our eighteen hours of work had gone right down the drain. What sounded OK at 2AM just wasn't making it the next morning, and now my client was on a plane. To Japan. For three weeks.

So I hooked up my new Dolby Spectral Processor. It didn't take long to get the vocals popping back out of the mix, the horns punching, the bass cutting through. It even added the final sparkle to the master that made the recording.

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SONY



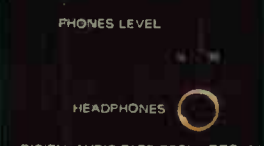
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Musical Instrument Technology

E-mu Systems Emulator II/XP

Signal Processing Technology

Avalon EQ

Recording Devices/Storage Technology

Digidesign Pro Tools Rev. 2.0

Recording Console Technology

SSL 8000 Series

EQ

OUR PRINTER'S SORRY

What, you've never had an off month? In the October issue, the figures that ran in the MicroTechnology Unlimited's MicroSound Digital Audio Workstation review were unreadable due to a printer's error. Here is how they were supposed to look (from top to bottom: figures one, two, and three):



CIRCLE 20 ON FREE INFO CARD

1 5 0 0
SERIES

WHATEVER YOU DO — DON'T BUY THE WRONG MIXER.

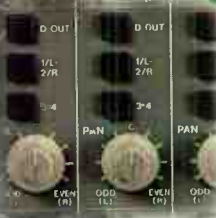
Especially if you're doing multitrack recording — whether digital or analog. Fact is, a mixer that's not specifically configured with the features essential for multitrack recording just isn't a recording mixer. Bottom line is, general purpose mixers make multitrack recording a nightmare.

IT'S NOT A RECORDING MIXER IF IT DOESN'T HAVE THESE FEATURES.



MULTITRACK DECK CONFIGURATION

If you don't have dedicated inputs and outputs for your 8-track deck, where do you plug it in? Without this basic recording configuration you'll be repatching day and night and you won't be able to record on 8 tracks at once. With these inputs, tape monitoring is as simple as pressing a switch. Also, because the TASCAM M1500 is a true 4-buss mixer, you can mix any combination of your input signals to any of the 4 output busses directly to tape.



DIRECT OUT AND GROUP OUT ASSIGNMENT SWITCHES

You gotta have these. Because without them you can't directly send a single input to tape, or record several inputs to one track. But with them, assign your inputs anywhere by pressing a few switches. Best part is, you'll never have to refer to any complex patch diagrams.



IN-LINE MONITORING

A sure sign of a recording mixer. This lets you monitor your tape tracks at any time without sacrificing an input channel. Just press a switch. With the M1500's dual section not only can you monitor tape tracks, it can be used for additional effects sends, or to double your inputs for virtual tracking at mixdown. And do any of this by flipping a switch.

You see, mixers that aren't designed and engineered for multitrack recording will torture you with the endless hassle of patching and repatching — every time you track, overdub or mixdown. It's frustrating, wastes valuable time and leaves you tangled in cable.

So before you choose a mixer for your studio — be sure it has the features of a dedicated recording mixer.



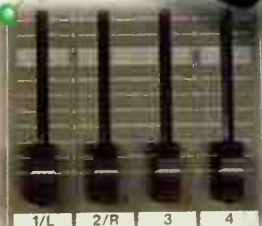
SWEEPABLE MIDRANGE EQ

Ask for it. Because when it comes time to tailor your sound, you need the flexibility where the action is — in the midrange. The M1500's sweepable midrange lets you isolate specific mid frequencies allowing you to make the subtle tonal corrections you want.



ELABORATE MONITORING

In a recording environment you need to hear what's going through your board at all times. With the M1500's comprehensive monitoring matrix you are able to hear any sound source at any time — inputs, tape, AUX sends, anything — it's your choice, just press a switch.



TRUE TRANSPARENCY AND LOW NOISE

In recording, your signal goes through the mixer several times. And each time it goes through, it is important not to lose or gain anything. Especially an identifiable "mixer sound." Test any mixer for its transparency. Take any signal and bounce it 3 or 4 times on your favorite digital recorder. With the truly transparent M1500, you'd be hard pressed to differentiate between the bounced tracks and the original signal.

At TASCAM, we've been making multitrack recording equipment for more than 20 years. We pack that experience into every mixer we make — and we make more recording mixers than any other company in the world.

For our M1500 Series of recording mixers, the result is an affordable mixing console configured for 8-track recording. A truly transparent mixer that makes tracking, overdubbing, and mixdowns easy. An extraordinarily flexible console loaded with the features and specs you'd expect on consoles costing thousands more.

But the M1500 Series of recording mixers are priced less

than many general purpose mixers on the market. They're available in a 16-channel/32-input tabletop version (M1516) and a compact rack mountable 8-channel/16-input version (M1508). So if you're involved in digital or analog 8-track recording, you've just found the best recording console value in the industry.

Get your hands on a true recording mixer today: the TASCAM M1500 Series. There's one waiting for you at your authorized TASCAM dealer. Go ahead — test it and play with it. It's your next recording mixer.

TASCAM
Take advantage of our experience

CIRCLE 86 ON FREE INFO CARD

World Radio History

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\$999
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EQ&A

EQUAL TIME

Q Since most stage setups require the main house PA amps to be set off to one side of the stage, is there a timing problem when using unequal length speaker cables; say 80 feet feeding the stage left speakers and 20 feet feeding stage right?

Chuck Cartley
Jackson, MS

A Your concern regarding arrival time differences due to the cable lengths in your sound system is, fortunately, unfounded. Audio in a wire is an electrical signal, which travels at slightly less than the speed of light. The difference in arrival time between the 20-foot cable run and the 80-foot run would be insignificant at audio frequencies. Audio signals, however, travel at a mere 1120 feet per second in air (at room temperature) and once the sound leaves the loudspeaker, a healthy concern over path length differences is warranted.

You should consider the impedance of the loudspeaker cables. This should always be less than five percent of the minimum impedance of

the loudspeaker, on even your longest run of cable. This prevents the cable from having a negative impact on the power available to the loudspeaker and the control the amplifier can exhibit over it.

Usually the greatest area of concern in multipair loudspeaker cables is the reliability of the connector and breakdown of the cable near the connector. This is the most common cause of open or short circuits on amplifier outputs and the loss of signal at the loudspeaker. After choosing the right connector and cable, regular inspection of these components can have the greatest impact on when (if ever) the signal reaches either of your loudspeaker stacks.

Wade McGregor
Contributing Editor
EQ

VIVE LA DIFFERENCE

Q I want to replace the TL072 dual op amps in my console with quieter, higher-performance parts. Do you have any suggestions?

Claude Roldu
Paris, France

A Here's a comparison of three dual op amps:

Type	Noise	Slew Rate	Current (no load)
TL072	18 nV/root Hz	13 V/ μ S	3 mA
NE5532	5 nV/root Hz	9 V/ μ S	8 mA
SSM2139	3.2 nV/root Hz	11 V/ μ S	4 mA

Although the SSM2139 is much quieter, the tradeoff is that external compensation is required for gains below 3. The NE5532's tradeoff is the relatively high current consumption, which can be as much as 16 mA (figures given for all parts are typical ratings). If you're replacing several op amps, this could put a major strain on the power supply. One option would be to replace only the mic preamps with improved performance chips, since this is where the difference would be most dramatic, and you could probably get away with the moderate increase in current consumption.

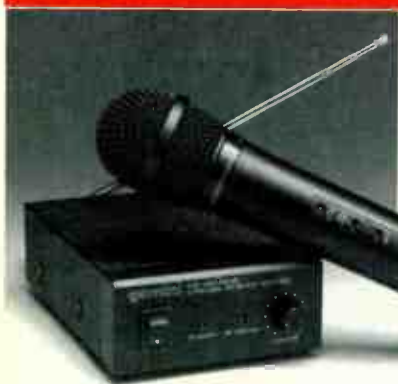
Be aware that any modifications may have unforeseen ramifications due to board layout, grounding, and so on. Change the chips in one channel and work with the mixer for a few days before committing to dealing with the rest of the mixer, and be extremely careful about exceeding the power supply specs.

Craig Anderton
West Coast Editor
EQ

DON'T FORGET THE TIP

Q In your June 1993 issue (page 43), engineer/producer Bruce Svedien mentioned that he used conical speaker stands called Tip Toes™ to mount nearfield monitors to his console's

The mike designed for those of us tired of going nowhere.



Introducing Gemini's VH-180 Wireless Microphone—designed to give you the freedom you need.

If you're ready to really cut loose on your next gig, start with our VH-180 wireless mike. It gives you up to 150 cable-free feet of wireless mobility, features our exclusive no-pop "silent" on/off switch and includes a vinyl carry-case and screw-on antenna. And thanks to our exclusive RF-signal enhancement system, your signal will kick through loud and clear in situations that would make other wireless mikes snap, crackle and pop. If you're ready to start going places, start with the Gemini VH-180.

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Introducing the new DUALFEX II from Behringer.

Have you noticed a difference between your recordings and the sound of CDs and tapes from your favorite artists? You can't fix it with EQ. And adding more parts to the mix just makes everything sound muddier.

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For more information about Behringer Signal Processing, please call 1-516-932-3810 or write to Samson Technologies Corp., P.O. Box 9068, Hicksville, NY 11802-9068.

Behringer is exclusively distributed in the U.S. by Samson Technologies Corp.

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CIRCLE 09 ON FREE INFO CARD

World Radio History

meter bridge. Where can these stands be purchased?

Chris Wood
Ashland, OR

A Tip Toes are one of the products of McCormack Audio Corporation, a manufacturer of high-end hi-fi pre-amps, amps, and several accessory-type products. Formerly known as "Mod Squad," McCormack is located at 542 North Highway 101, Leucadia, CA.

Tel: 619-436-7666. When you call them, mention EQ and they'll send you a complete product brochure and a list of local retailers who carry Tip Toes.

Hector G. La Torre
Executive Director
EQ

GETTING REALISTIC

Q I own two Realistic PZM mics (cat. no. 33-1090) that appear to be

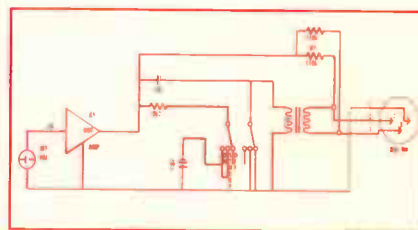
clones of the Crown version, but have minor drawbacks. For example: lower output than the Crown; battery powered by one 1.5V AA or two Eveready A544 (6V each), which must be removed when mics aren't in use; and 1/4-inch plug on end. I realize the 1/4-inch plug problem is easily solved with an adaptor, but can this mic be modified to accept 48V phantom power?

James A. Griffin
Jackson, MS

A Yes, and pretty easily. The problem of lower output could be due to a number of things, none of which are easily addressed via user modification. Four things must be done to power the mic with phantom power:

1. Optional output transformer must be used.
2. An XLR or other balanced capable connector must be used.
3. The high side of the transformer goes to the plus (pin 2); the low side goes to the minus (pin 3); and the shield must be carried through to either the sleeve, ground, or shield (pin 1).
4. Two 110 Kohm resistors must be tied from the plus and minus connections of the input side of the transformer to the junction of the 10µf Cap and the 2k2 resistor. (See diagram below.)

Greg Hanks
New York Technical Support, Ltd.
Chappaqua, New York



This is where your questions get answered. Send your query with your name and address to:
EQ Editorial Offices,
939 Port Washington Blvd.,
Port Washington, NY 11050
Fax: 516-767-1745
America Online: MPANDA

Power Mixer

Large mixing consoles can come in mighty handy when the situation calls for lots of microphones and several different mixes. But what about those applications when the needs are much more basic? Introducing the MM-6 PowerCard from ASHLY. Just plug this input option into any of ASHLY's new amplifiers and you've got all the power the job requires without the extra complication and cost of a separate mixer.

The MM-6 has separate controls for each line level channel, allowing for the connection of two stereo sources or four monaural ones. Phantom power is provided for condenser microphones, and there are even patch points on each channel for the connection of an equalizer or any other signal processing device. Combine all this flexibility with any of ASHLY's latest amplifier models, and you have a truly powerful powered mixer! Sometimes the best solutions come in small packages.



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Gain



MD 511/512



MD 515/516



MD 518



MD 527



MD 530



BF 1051



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CIRCLE 77 ON FREE INFO CARD
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MD 515

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Ten Reasons Why You Should Cho

1. TAPELESS EDITING The DR4d can simultaneously record 4 tracks directly to standard SCSI-compatible hard disks, not tape. Tape recorders which use a cassette format (VHS, 8mm, etc.) have a huge problem: without at least two machines, you can't edit. But even a single DR4d allows random access editing that tape recorders just can't offer. Move, Copy, Insert, Copy + Insert, Move + Insert, Erase, and Delete with ease. Edit with complete confidence, because if you try an edit but change your mind, the Undo function will instantly restore the previous arrangement. It's a breeze to copy any part of a track and paste it anywhere on any track, even with a specified number of repeats. Or perhaps use the Insert commands to instantly slide track data in time against other tracks. This editing power encourages experimentation, and thus, your creativity! Imagine it. Do it.

2. NO WAITING Another problem with tape is the time required to physically move from one point on the tape to another. Concentrating on your music is what's important, not waiting for tape to shuttle back and forth. Never again waste such precious time: the DR4d allows you to instantly move to 108 different locations. Set up repeat sections, jam along with your tracks, then drop into record to capture it all while it's still immediate, fresh.

3. JOG/SHUTTLE Another cool DR4d advantage is the ability to offer scrubbing of audio, like "reel-rocking" on analog decks - only with much better quality. Our Jog/Shuttle wheel lets you scrub through the audio at various speeds, forwards or backwards. So finding precise editing points is only as complicated as using your ears.

4. FAMILIAR OPERATION One concept we *did* want to carry over from tape recorders is the user interface. Friendly, tape machine-style controls make the DR4d by far the easiest hard disk recorder to use. With dedicated buttons for Play, Stop, Rewind, Fast Forward, and so on, what could be simpler? If you've used an analog deck, then you know how to use the DR4d. Punch-

ins/outs can be performed manually or automatically from the front panel, or via footswitch. Like you'd expect.



DL4d Remote

5. EXPANDABILITY Up to four DR4ds can be chained together to create a 16-track system, simply by plugging an optional cable between units! And the optional DL4d Remote makes it a snap to



Use the DR4d Hard Disk Recorder

control all of them. An optional, factory-installed 200 MB internal hard disk offers 32 track minutes of recording right out of the box. The DR4d can handle up to seven hard disks and supports seamless overflow recording across multiple disks. With enough disk storage space, you can actually record on all four tracks for an incredible 24 hours!

6. EXCELLENT CONNECTIONS The DR4d features a balanced TRS 1/4" Input and Output jacks easily switchable between -10 and +4 dBu levels, simplify interfacing with any type of console. The DR4d's pair of digital I/O ports allow communication with other digital devices in the form of both XLR and RCA connectors (AES/EBU or Type II selectable), as well as provide DAT backup. And then there's the supplied SCSI port for access to external hard disk drives. Just plug and play!

7. YOU'VE GOT OPTIONS And affordable ones, at that. For digital access to all four channels simultaneously, the IB110D provides the two additional AES/EBU ports. For SMPTE timecode applications (slave or master), the IB112T is installed in seconds. The IB113M interface gives you MIDI In, Out, and Thru, and the IB111S is a second SCSI port which will allow connection to computers for visual waveform editing and magneto optical drives for data backup.

8. DEDICATED DESIGN The DR4d is a dedicated digital audio product, rather than an add-in board for a computer. It's a tool designed for a single purpose: to record and edit audio precisely, effortlessly, and affordably. We think you'll agree that it succeeds on all counts beautifully.

9. SOUND QUALITY The DR4d contains Akai's own advanced digital technology, including super-clean 18-bit 64x oversampling A/Ds and advanced single-bit 8x oversampling D/A converters with 18-bit resolution. Industry standard sample rates include 48, 44.1, and 32kHz. In short, the quality is superb and with a full 96dB dynamic range, you can rest assured of always sounding your best.

10. \$1995.00 Simply put, the DR4d is the best value in digital recording today. For the first time, the nucleus of a professional quality 4-track hard disk recording system can be yours for only \$1995.00! Just add internal or external hard disks, and you're ready to use our latest masterpiece for creating your next masterpiece.

DR4d

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Specifications subject to change without notice
Consult your Akai dealer for information on compatible hard drives

World Radio History

The 3rd Annual **EQ BLUE RIBBON AWARDS**



The first AES held at New York City's Javits Center turned out to be the largest ever with 352 exhibitors showing their wares to more than 17,000 attendees. Our editors and contributors tirelessly walked the 185,000 square feet of show floor to bring you the best in show — our Third Annual EQ Blue Ribbon Awards.

THE BLAST FROM THE PAST AWARD **TO AKG VINTAGE TL MICROPHONE**

AKG has introduced the Vintage TL. This transformerless dual large diaphragm multipattern mic combines the sonic characteristics of the 1950s C12 capsule with advanced electronics from the C414 Series that exceed all digital recording requirements. So you now can have the best of both worlds — vintage warmth with digital sonics. For complete details, contact AKG, 1525 Alvarado St., San Leandro, CA 94577. Tel: 510-351-3500. Circle EQ free lit. #101.



THE MORE THAN JUST AUDIO AWARD **TO DIGIDESIGN'S POSTVIEW**

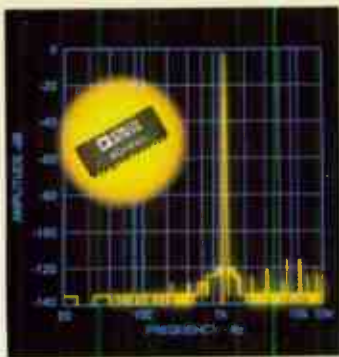
Digidesign's PostView brings digital video capabilities and VTR machine control to its popular Pro Tools audio editing system. PostView allows Pro Tools to import an accurate, instant, and random access digital "PostView Movie," and play it back from within the Pro Tools session. This allows for accurate laying of Foley, music, dialog, and special effects tracks, as well as accurate editing. The PostView movie is displayed either on the same monitor screen as the Pro Tools audio session or, with the appropriate hardware, on a separate monitor screen. The Movie is captured to a hard disk from a video source by an appropriate third-party video capture board and video capture software. By enhancing the QuickTime clock reference (which has less than frame-accurate resolution), PostView ensures frame-accurate synchronization between the audio and video once the Post-View Movie is imported into Pro Tools. For complete details, contact Digidesign, 1360 Willow Rd., Menlo Park, CA 94025. Tel: 415-688-0600. Circle EQ free lit. #102



THE SIZE DOES MATTER AWARD **TO AMEK'S BIG MIXING CONSOLE**

The Big by Langley console is manufactured by Amek and is available as either a 28- or 44-input chassis. Monitoring is in-line and there are eight stereo returns. All consoles are equipped with "Amek Supertrue" fader and switch automation. Also standard is a Recall system enabling all pot and switch positions from a mix to be stored in the computer for subsequent Recall and manual reset. For more information, contact Amek US Operations, 10815 Burbank Blvd., North Hollywood, CA, 91601. Tel: 818-508-9788. Circle EQ free lit. #103.

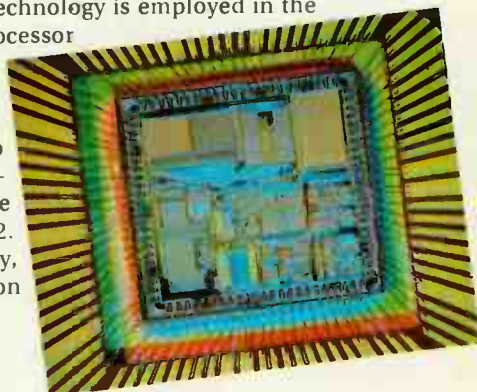




THE WHOLE IS JUST A SUM OF ITS PARTS AWARD TO ANALOG DEVICES' AD1890/1, DIGITECH'S S-DISC, AND MOTOROLA'S DSP56000 CHIPS

Analog Devices' AD1890 and 1891 SamplePort stereo asynchronous sample-rate converters (pictured at left) are the industry's first such ICs designed to solve sample rate and digital data interconnect problems in professional, computer communications, and consumer audio applications. The ICs are fixed-function, DSP-based chips that convert a digital input sample stream — at an arbitrarily clocked or dynamic changing sample rate — to a user-set output sample rate. Input and output clock frequency is automatically sensed with no user programming required. DigiTech's fourth generation S-DISC technology is employed in the company's TSR-24 digital reverb and multieffects processor

and allows you to program an unlimited number of effects algorithms by stacking effects modules in any chosen order, even using a module more than once if desired. Motorola's DSP56000 series of 24-bit digital signal processors (shown on the lower right) are designed to provide high-quality effects in various digital audio applications including multimedia computers, sound effects, electronic instruments, film production, and consumer and automotive audio products. For more information, contact Analog Devices, One Technology Way, Norwood, MA 02062. Tel: 617-329-4700. Circle EQ free lit. #104. DigiTech, 8760 So. Sandy Parkway, Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #105. Motorola, 6501 Wm. Cannon Drive W., OE314, Austin, TX 78735. Circle EQ free lit. #129.



THE TWO COOL AWARD

TO THE FOSTEX FOUNDATION 2000 AND RD-8 DIGITAL 8-TRACK ADAT-COMPATIBLE RECORDER

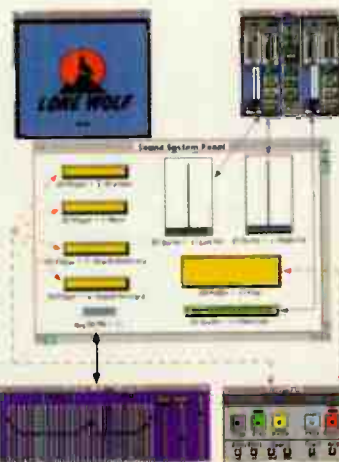
Fostex gets the nod for far-thinking technology and for taking its cues from American technology. The result is the Foundation 2000 (pictured), a six-rack-space enclosure for audio recording, mixing, and editing. Each Foundation 2000 has 16 channels summed to eight output tracks or dual-stereo mix outputs. One edit controller (a removable front panel) will support one to six systems, up to 96 channels. Data is stored on the Removable Project Environment (RPE), a standard Foundation 2000 feature. The RPE is a 3 1/2-inch

removable 540 MB SCSI hard drive that stores up to 90 minutes of mono audio. The removable feature eliminates upload and download time in the production process. As many as six external SCSI devices can be added for additional storage capacity. Foundation is based on a 16/24-bit scalable architecture. It comes with 18-bit data converter resolution and is open to future 20-bit digital performance. Fostex also deserves credit for furthering the affordable digital multitrack revolution. Its ADAT-licensed 8-track is used for multitrack recording, sound file library storage and retrieval, and for synchronized playback and production. It comes in a sturdy, rackmountable casing and it sports a familiar user interface; the same as that of an analog multitrack recorder, minimizing the user's learning curve. For further information, contact Fostex, 15431 Blackburn Ave., Norwalk, CA 90650. Tel: 310-921-1112. Circle EQ Free Lit. #107.

THE WE'RE ALL CONNECTED AWARD

TO THE AES SC-10 COMMITTEE AND MEDIALINK LICENSEES

We consider it the most significant development since MIDI. The AES SC-10 Committee made history by paving the way to a sound system computer control protocol. Don't be surprised if this move impacts the pro audio and consumer electronics industries for many years to come. Meanwhile, Lone Wolf's MediaLink received the nod of innumerable licensees. It is a format-independent network communications protocol that allows for the connection of electronic devices into a fault-tolerant network. MediaLink was designed specifically for real-time transmission of streaming multimedia data — such as audio and video, as well as control and monitoring signals. All data formats can be carried on a single cable through a single port. A high-speed channel for transferring control configuration and performance data between devices that are MediaLink-compatible is easily created. For more info, contact Lone Wolf, 1509 Aviation Blvd., Redondo Beach, CA 90278. Tel: 310-379-2036. Circle EQ free lit. #108





THE RACK IN THE BOX AWARD TO PEAVEY'S MEDIAMATION

Peavey's MediaMation is an entire sound system, except for power amps and transducers, on a PC platform. The MediaMation operating software provides a visual interface for the Peavey MediaMatrix digital signal processing card mounted within the PC. Each MediaMatrix DSP card utilizes five Motorola 56000 processors and the number of cards used is only limited by the number of available card slots in the user's PC. Individual signal processors can be called up from the Windows menu and placed on the user's screen as though the designer were drawing a block diagram of the audio system. Once the audio chain is determined, the user then "wires up" the devices using a mouse, thus enabling all interconnections to be accomplished with a simple "point and click." For further information, contact Peavey Electronics, 711 A Street, Meridian, MS 39302. Tel: 601-483-5365. Circle EQ free lit. #109.



THE ALL MY LIFE'S A CIRCLE AWARD TO RSP TECHNOLOGIES' CIRCLE SOUND SYSTEM

RSP Technologies' Circle Sound system is a cost-effective surround format that dramatically enhances music productions while adding more realism to video sound productions. The Circle Sound format is designed for recording in surround and also allows playback of any audio format, including any existing surround format. Circle Sound is an analog design intended to be used with at least four separate full-range speakers placed around the listener and driven from equal power sources. The complete system is comprised of three components: the Circle Sound Encoder, the Circle Sound Decoder, and the Circle Sound Controller that contains a four-joystick remote. The Circle Sound Decoder is the key element in the system. It detects ambient information present in the input signal to produce multidimensional effects. The advanced steering logic in these circuits use this detected information to place sounds at specific locations around the listener. For more information, contact RSP Technologies, 2870 Technology Drive, Rochester Hills, MI 48309. Tel: 313-853-3055. Circle EQ free lit. #110.

You've got a stereo signal. Why in the @#!? would you want to combine and process it in mono when you could process the whole thing in stereo with the exceptional effects processor you see right here.

The remarkable Yamaha SPX990. Which, unlike other processors in its price range, offers two discrete inputs from beginning to end.

Here's the other big reason why you're going to want this beauty.

It sounds a lot better.

Where other processors offer you standard 16-bit A/D and

D/A converters, the SPX990 boasts 20-bit A/D and D/A conversion. And internal 28-bit processing to deliver much greater dynamic range than most any effects processor you care to name.

And as you might expect from the company that brought you the legendary SPX90, the first affordable digital effect processor, everything about the new Yamaha SPX990 has been designed to silence other effect processors in its price range.

For starters, we've enhanced our algorithms to produce



So you'll have no trouble patching things up, the SPX990 takes either XLR or TRS phone jack connectors.

THERE'S NOTHING WRONG WITH YOUR LAST

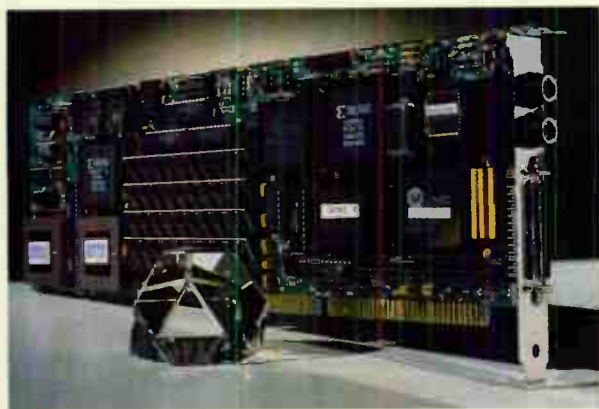


THE DID YOU CATCH THAT DEMO? AWARD TO THE TWO-VOICED GUY AT AT&T'S BOOTH

All right, we know that the man from Tuva is not a new product, but everybody at the show was talking about AT&T's demo, where this man and a young Tuvan boy each sang two notes at the same time. And while it looked a bit uncomfortable, no one could deny the uniqueness of the sounds being sung — a deep croaking sound combined with a high-pitched whistle. The live show going on at demo room 3D05 made more than a few attendees wonder, "How does he do that?" Others were thankful that Paul Simon never ventured in for a demo.



Photo by Bill Loewy/Friends of Tuva



THE WHOLE SPECTRUM AWARD TO THE SPECTRAL SYNTHESIS AUDIOPRISMA

Spectral Synthesis' new AudioPrisma is a digital audio workstation that features 96 tracks, 12-channel real-time mixing with dedicated multiband parametric EQ on each channel, 24-bit DSP, and MIDI, SMPTE, MTC, and SCSI support all on a single board for a suggested list price of \$3995. The Prisma operates within Windows to provide the sophisticated mixing, patching, editing, and signal processing functions required by professional environments. The Prisma will chase code, it supports CMX auto-conforming, and it permits recording on high-capacity removable media. For more information, contact Spectral Synthesis at 19501 144th Ave. NE, Ste. 1000A, Woodinville, WA 98702. Tel: 206-487-2931. Circle EQ free lit. #112.

far more natural sounding reverbs than you probably thought was possible.

But there's more to it than that.

The SPX990 features 30 different types of Reverbs. Delays. Echoes. Modulations. Pitch Changes and Sampling — plus variations on each — for a total of 80 all new effects. And if that's not enough, you can simultaneously add EQ and/or compression on top of any of these effects.

The SPX990 also features 100 internal memory locations to store your own variations.



Store up to 100 of your favorite effects programs on one of these cards and you can take them with you to every session.

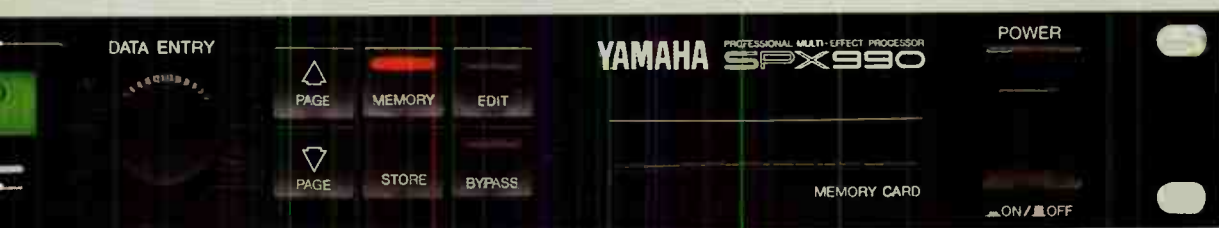
And you can say goodbye to all the button pushing. The data entry wheel on the SPX990 lets you enter your data on the fly. Looks like we're running out of room. So here's the big finish.

Every so often, something comes along that makes people in the recording industry sit up and take a good hard listen to the way they're doing things. This is one of those times.

Stop by your nearest Yamaha dealer and check out the SPX990 today. For more information, call 1-800-937-7171 Ext. 310.

Your next mix will thank you for it.

MIX THAT A LITTLE MORE INPUT COULDN'T HELP.





THE BUILT TO LAST AWARD

TO TANNOY'S MARK II PBM MONITORS

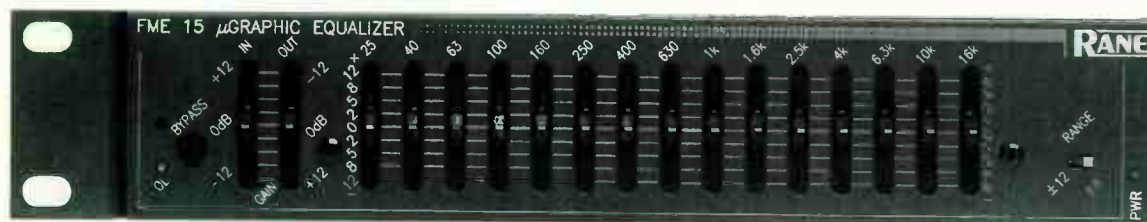
Tannoy has added the PBM Mark II Series to its award-winning line of nearfield monitors. Refinements in the PBM Mark II Series, which includes the PBM 8, PBM 6.5, and the PBM 5, include injection-molded cone materials, rather than the vacuum-molded technique that has been the past standard. These polyolefin low-frequency cones are also mica-impregnated for high resolution and enhanced endurance to avoid speaker fatigue. The Mark II Series also features high-grade minimalist crossover topology, and the speaker elements are suspended with a single roll of nitril rubber. These enhancements result in an additional half-octave low-frequency extension and smoother, more articulate midrange and high frequencies. There are three models in the line ranging from \$295 to \$695 per pair. For more info, contact TGI/Tannoy, 300 Gage Ave., Kitchener, Ontario, Canada N2M 2C8. Tel: 519-745-1158. Circle EQ free lit. #113.

THE NEW & IMPROVED AWARD TO THE ENSONIQ ASR-10 O.S. VERSION 2.0

Ensoniq's ASR-10 Advanced Sampling Recorder adds two tracks of digital audio recording to hard disk or RAM memory. You can add up to two tracks of live audio performance to MIDI sequenced tracks for full production in a single product. The new O.S. Version 2.0 features Digital Audio Tracks that can be recorded to either DiskTracks (SCSI hard drive) or to RAMTracks (internal memory). The floppy disk-based software will be available free to all ASR-10 owners and will be the standard operating system shipped with all ASR-10 samplers. Audio Tracks work like additional sequencer tracks, recording incoming audio instead of MIDI data. They can be recorded in conjunction with individual sequences or as part of a complete song consisting of multiple sequences linked together. The ASR-10's locate mechanism allows you to instantly move to any section of music and resume playback of both MIDI and audio data. Tracks can be recorded at 44.1 kHz or 29.76 kHz sampling rates in mono or stereo with punch in/out recording and auditioning of all recording and editing. For further information, contact Ensoniq, 155 Great Valley Parkway, P.O. Box 3035, Malvern, PA 19355-0735. Tel: 800-553-5151. Circle EQ free lit. #114.



EXPERIENCED EQ SEEKS WORK



High-performance $\frac{1}{3}$ -octave graphic equalizer available to start work immediately. Honorably discharged from highly-respected manufacturer. Works well with any other equipment. Recording/broadcast qualifications. Interpolates well. Proven track record. Small but very capable. Will work standing up or laying down. Call (206) 355-6000 for references. Ask for the FME 15 Constant-Q $\frac{1}{3}$ -Octave micro-Graphic Equalizer.

RANE CORPORATION 10802 - 47th Ave. W., Mukilteo, WA 98275. (206) 355-6000



BETA *Bio*



ROGER LINDSAY, SOUND ENGINEER

HOMETOWN:

Liverpool, England

CLIENTS:

Sade, Mark Cohn, Basia, B.B. King, David Gilmour, Frank Sinatra, Frank Zappa, Joe Jackson, et al.

ON GETTING STARTED:

"As a keen young roadie in Liverpool in 1967, my family thought I would do it until I was 21, then 'get a haircut and a proper job.' Thanks to my wife's patience, some talented artists and a little luck, the former is infrequent and the latter has evolved into a long and enjoyable career."

ON BETA MICROPHONES:

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THE ALTERED STATES AWARD

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E-mu's Morpheus Z-Plane synthesizer is a rack-mount synth that features 14-pole digital Z-plane filters capable of modeling virtually any resonant characteristic. The Morpheus Z-Plane features 32-voice polyphony, 16-channel multitimbral operation, and an 8 MB sound complement that is internally expandable to 16 MB. For more information, contact: E-mu, 1600 Green Hills Road, Scotts Valley, CA 95067. Tel: 408-438-1921. Circle EQ free lit. #116.

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THE WHAT A CONCEPT AWARD TO THE OTARI CONCEPT I

The new Otari Concept 1 features fully programmable master status switching, fader level and mute

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THE GIVE A LITTLE BIT AWARD TO THE APOGEE UV22 SUPER CD ENCODER

Apogee has finally placed the finishing touches on its UV22 super CD encoder. Apogee's UV22 does its job without sonic compromise and without adding a sound of its own. You can hear clean audio up to 30 dB down in the noise floor of the 16-bit CD. In addition, the UV22 process has 24-bit data handling capability and can encode information from beyond the 20-bit level into standard 16-bit formats. Other features include comprehensive input and output formats and a noise floor that is constant, irrespective of input signal. For more information, contact: Apogee Electronics, 3435 Ocean Park Blvd. #211, Santa Monica, CA 90405. Tel: 310-314-1700. Circle EQ free lit. #118.

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Tactile Technologies M4000 Console: The M4000 is a fully-automated, digitally-controlled analog mixing system that can be applied to studio applications, remote uses and stage mixing. Twenty-one functions are fully automated and it's (get this) project studio affordable. To find out more, contact: Tactile Technology at 310-802-1500. Circle EQ free lit. #130... **Soundcraft DC 2000 Console:** The DC 2000 is an in-line recording console that features fader automation, digital control, much more — for under \$25,000. Available in both 24- and 32-input versions, the DC 2000 includes 4 band EQ, stereo foldback returns, and digital overbridge. For more information, call: 818-893-8411. Circle EQ free lit. #131... **Lexicon NuVerb Digital Effects Processor:** The Lexicon NuVerb showcases a plug-in card for Apple's NuBus. In addition to offering 20-bit audio processing with AES/EBU digital input and output capacity, there are currently 11 development partners that are making NuVerb compatible with their products. For more information, contact Lexicon at 617-891-6790. Circle free lit. #132... **KRK Model 6000 Nearfield Monitors:** KRK's Model 6000 monitors are the most affordable models to date, offering a high-quality construction plus 75 watts of high-power handling and a portable configuration. They also feature low distortion and a sensitivity rating of 89 db. For more information, contact: KRK at 714 841-1600. Circle EQ free lit. #133... **Crown SmartAmp Amplifier:** Designed to ensure maximum protections against sound system disasters, SmartAmp informs you about vital amplifier functions. Other features include a smooth output limiter, power supply gate, and backwards compatibility, allowing any premium Crown amp to be upgraded to a SmartAmp. For more info, contact Crown at 219-234-7017. Circle EQ free lit. #134.

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Gingerly, they listen, to not much at all.

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Photo by Rick Diamond



GEORGIA ON HIS MIND: Chief engineer Mathew Still at Bobby Brown's Atlanta project studio.

LIFE'S A PEACH Atlanta

"Not to be pigeonholed into any one category, Atlanta has encouraged musicians of all types to come here to lay down tracks."

Nashville may have country and Seattle may have grunge, but Atlanta, GA is undoubtedly this season's project studio haven. Engineers, producers, and artists are migrating to Atlanta en masse, building their own places and producing the hippest and most profitable ideas in the music industry today. Just a sampling of some of the artists that have recorded there — Arrested Development, Black Crowes, Kris Kross — and one can see why Atlanta, in the words of its effusive Mayor, "is well on its way to becoming the third-largest entertainment center in the U.S."

Widely recognized as a weather-friendly, down-home attraction, Atlanta is loved for what it is as much as for what it is not — namely New York or Los Angeles. "It's not quite the rat race

down here yet," says Nate Smith, president of Bobby Brown's Triple B label. "The vibe is better, and it's more relaxed." John Rogers, manager of Dallas Austin's D.A.R.P. Studios agrees, stating the town's personality as the main attraction for a wide array of creative entrepreneurs. "People don't seem to be quite as greedy here," he observes, "but the competition's growing, mainly in rock and roll."

While rock and alternative music may indeed be penetrating Atlanta's entertainment base, there's no questioning the city's formidable roots in R&B and rap. Some of the stars and starmakers who have recently arrived to set up camp in Atlanta include Bobby Brown, Keith Sweat, Dallas Austin, and Jermaine DuPree, the producing mastermind behind Kris Kross. But, for all the influence these studio owners have had in recreating Atlanta in the image of Motown, the individuals most responsible for getting the Atlanta scene off the ground in the first place are, without a doubt, L.A. Reid and Babyface.

Since arriving here in 1989, the Reid/Babyface union has delivered a relentless barrage of smash hits by superstars such as Boys II Men, TLC, Toni Braxton, and Keith Sweat. By hinging their bets on an Atlanta-based

production company, comprised of their own Studio LaCoco and LaFace label, the pair effectively paved the way for future artists who needed financing for their own production companies built on Georgian turf. In that respect, credit is due to another legend in his own right, Clive Davis, founder and head of Arista Records, who gave L.A. Reid and Babyface his seal of approval early on. The duo has since split, leaving L.A. Reid at the helm in Atlanta.

Not content to be pigeonholed into any one category, Atlanta has encouraged musicians of all types to come here to lay down tracks. For example, one potential R & B bastion, Bobby Brown's Bosstown Studios, has expanded into an eclectic facility with a variety of clients. "From the beginning, it has been a priority of Bobby's that Bosstown be much more than a project studio," says studio manager Jon Marett. "The result has been a client base ranging from Arrested Development to Elton John to R.E.M."

While project studios have played a large role in shaping Atlanta's newest image as an entertainment powerhouse, the city does have its share of commercial activity as well. Facilities such as Audio Production Center, Southern Tracks, Crawford Post, and 2560 Studio, for instance, have also seen

their business grow as the excitement surrounding Atlanta builds. "One of the reasons this town is growing is because it's very cost-effective," enthuses Sal Nappo, owner of Audio Production Center, "and now that the Olympics are coming here in '96, everybody anticipates gangbusters business."

These days everyone's talking about the latest production hot shot to hit town — Brendan O'Brien, an A-list producer/engineer who made his name working for rafter-shakers like Pearl Jam, Red Hot Chili Peppers, and Stone Temple Pilots has hooked up with Atlanta's Southern Tracks operation. Many speculate that O'Brien's arrival in town will add another element to the ever-expanding Atlanta empire, one which speaks for the enormous rock/grunge constituency. "While Nashville's been getting a lot of session musicians, we've been seeing a lot of self-contained rock bands coming our way," says Mike Clark, owner of Southern Tracks.

Strong possibility. With hip-hop on one front and hard-rock on the other, Atlanta is now poised to become that which every rock and roll city craves to be — Hollywood (and dare we now add Nashville?) without the hype; New York without the noise. But underneath all the project studio heads' calls for "friendly competition" and "communal creativity" exists the inevitable specter of big business. And as the industry begins to tighten its focus on the town, a new question arises: How will Atlanta sing under the stress of being called the latest American jukebox hero? —Jonathan Varman

SMOOTH SAILING

Danny Kortchmar

"Basically I'm in favor of recording in other places, but the reality of that doesn't always come through."

The working title for Billy Joel's latest release, now called *River of Dreams*, was *The Shelter Island Sessions*. The name came from a project studio Joel had built at the Island Boatyard, located (as one might guess) at Shelter Island, New York.

The problem with naming it after his boatyard studio was that by the time all was said and done, only one of the songs from the studio made it onto the album ("The River of Dreams"). The rest of the songs were recorded at the Hit Factory in New York City.

Why the change of heart? The main reason was that this was Joel's first collaboration with producer Danny Kortchmar. "Billy had recorded six or seven tracks out on Shelter Island," explains Kortchmar, "and he gave me a tape of what he had done and I had a lot to say about it. I explained to him that these opinions were very subjective, but he wanted to try working with me, which means doing it my way."



DREAM TEAM: Danny Kortchmar (right) and Niko Bolas

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Kortchmar's way meant moving Joel from the project studio and bringing in engineer Niko Bolas and the musicians he wanted, as Joel was recording on the island with his touring band. "Basically I'm in favor of recording in other places," Kortchmar continues, "but the reality of that doesn't always come through. He was in a boatyard — communication was hard. The room was not that great of a room. I felt he needed to be in a recording studio."

Apparently Kortchmar's decision

was a good one — the album has been hovering around the top of *Billboard's* charts since its release. Of course, location alone does not make a hit record, and Kortchmar's got a few more tricks up his sleeve:

"Niko and I both believe in tubes and we like to work with older gear," he says. "We record from the mics in the studio right into Niko's mic pres and into one of my favorite pieces of digital gear — a Sony 48-track digital recorder.

"It's hard to say which is better — analog or digital," says Kortchmar. "It's the source that's got to sound great. It's got to be a great guitar into a great amp in a great room. By the time it gets to digital, it's already done.

"I prefer digital because of its speed. I like the sound of analog, but the recording process takes too damn long. In analog, if you want 48 tracks, you have to bounce and mix and most of the time you're listening to a lousy slave. You only hear the record once in the beginning and once in the end. I like hearing what I put on tape the way that it's going to be. Generally, we mix to 15 ips 1/4-inch and that brings back a lot of warmth."

Niko and Kortchmar use very few effects, notably an old EMT that Niko owns. Kortchmar adds, "Niko and I like the idea of a really good song played by a rocking band that means it. That's an effect in and of itself."

In addition to his producing duties, Kortchmar also played guitar on nearly every track on *River of Dreams*. He's currently finishing an album by Andrew Strong (of Commitments fame) and is currently producing Curtis Stigers' first album.

—Tony Savona

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SAVING A SYNCING SHIP

Mike Thorne

"The thing that drove all of us who were interested in reviving the company was so that we could continue to have the use of this technology."

Mike Thorne loves Synclaviers. So much so that he bought (saved?) the company. He is part of a group that is engaged in the revival of the Synclavier Company — something that is making a lot of Synclavier owners breathe a loud sigh of relief.

As Thorne explains, "The company [New England Digital] owed the bank a lot of money and they called in its loan and claimed the assets. Actually there were a number of people interested in buying the assets, all the spares and a number of systems.

"What happened was myself, Bruce Nazarian (a Synclavier owner

Studiomaster

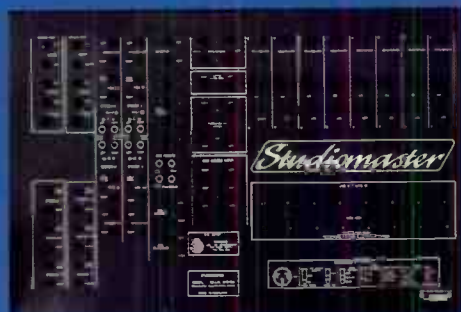
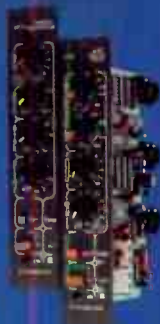
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Additional features and specifications include inserts, channel mutes, input swap switching, dual 2 track tape facility, overall bus mutes for tape and stereo line inputs, PFL/ solo in place, a loudness button for the head-phone bus and more . . . Dual half/rack ports add to the overall flexibility of the STAR SYSTEM allowing for the insertion of exclusive STAR SYSTEM audio processors including a stereo compressor, stereo gate, parametric EQ, digital reverb and digital delay.



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EQ PEOPLE

who works on postproduction in Los Angeles), and Griff McRee (a former employee of the company) marshalled the North American ownership and formed [an incorporated] company and raised funds to buy the assets. This all finally went through last April. Now it's up and running, orders are coming in, and things are doing quite nicely, thank you.

"The thing that drove all of us who were interested in reviving the company was so that we could continue to have the use of this technology which is still ahead of anything else." This is not just a spare parts operation, Thorne reminds us. Synclavier has an ongoing R&D program for both hardware and software support and development.

So who is this Synclavier Savior? Mike Thorne began his career in music recording as a tape operator on Deep Purple and Fleetwood Mac sessions in London in the early 70s. He came to the industry well-armed with a physics degree and, following his stint as a tape op, he studied composition at the prestigious Guildhall in London. This led to

continued on page 112



Photo by J.R. Rosti

SYNCING FEELING: Mike Thorne

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instrument sounds on earth, as well as the great classic analog and digital synth sounds that have made Peavey a world-class leader in keyboard products. In addition to the new instrument waveforms, the SI now includes all new drum and percussion samples like brush drums, rap drums, and ethnic percussion. And if that weren't enough, with the use of the optional GM program card, the SI is made General MIDI compatible. So if old-world technology has you grounded, see your Peavey dealer today for a test flight. The DPM SI takes you to a whole new world.



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The AKG C12

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presents one of his
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MICROPHONE NAME: AKG C12

TYPE OF MIC: Condenser

FROM THE COLLECTION OF: Allen Sides, Ocean Way Recording

SERIAL NUMBER: 1188

CURRENT VALUE: Around \$7000

POLAR PATTERN: Cardioid with remote-controlled directional characteristics during program pick-up

FREQUENCY RANGE: 20 – 15,000 c.p.s.

FREQUENCY RESPONSE: 50 – 10,000 c.p.s. ± 2.5 dB; 30 – 15,000 c.p.s. ± 3 dB

SENSITIVITY: 1 mV/microbar (for 250 ohms)

OUTPUT IMPEDANCES: 40, 250, and 500 ohms

HISTORICAL NOTES: This particular mic was used by Lionel Ritchie on three of his albums. Mr. Sides has personally used the mic on Frank Sinatra, Ray Charles, James Ingram, Denise Williams, and Johnny Mathis. It was also one of six or so of Ocean Way's C12's used on "We Are the World."

SONIC QUALITIES: Allen Sides states: The C12 is sort of the standard overhead drum mic of choice at Ocean Way, and it's fair to say that 80 percent of all recordings done at our studios use them. They are unparalleled for background vocals and make excellent lead vocal mics provided sibilance is not a problem, as they are very bright.

USER TIPS: Sides continues: Conventional measurement techniques do not always tell us the realities of one mic sounding better than another. A new mic that shows lower distortion, lower noise, and greater SPL capacity may still sound considerably less impressive than its tube counterpart. The things that we as engineers and musicians look for — size, richness, and what we might call a musical sound — are difficult to define in purely technical terms.

FUN FACT: At the AES Convention, AKG released the Vintage TL mic, which combines the sonic characteristics of C12 capsule with contemporary electronics. **EQ**

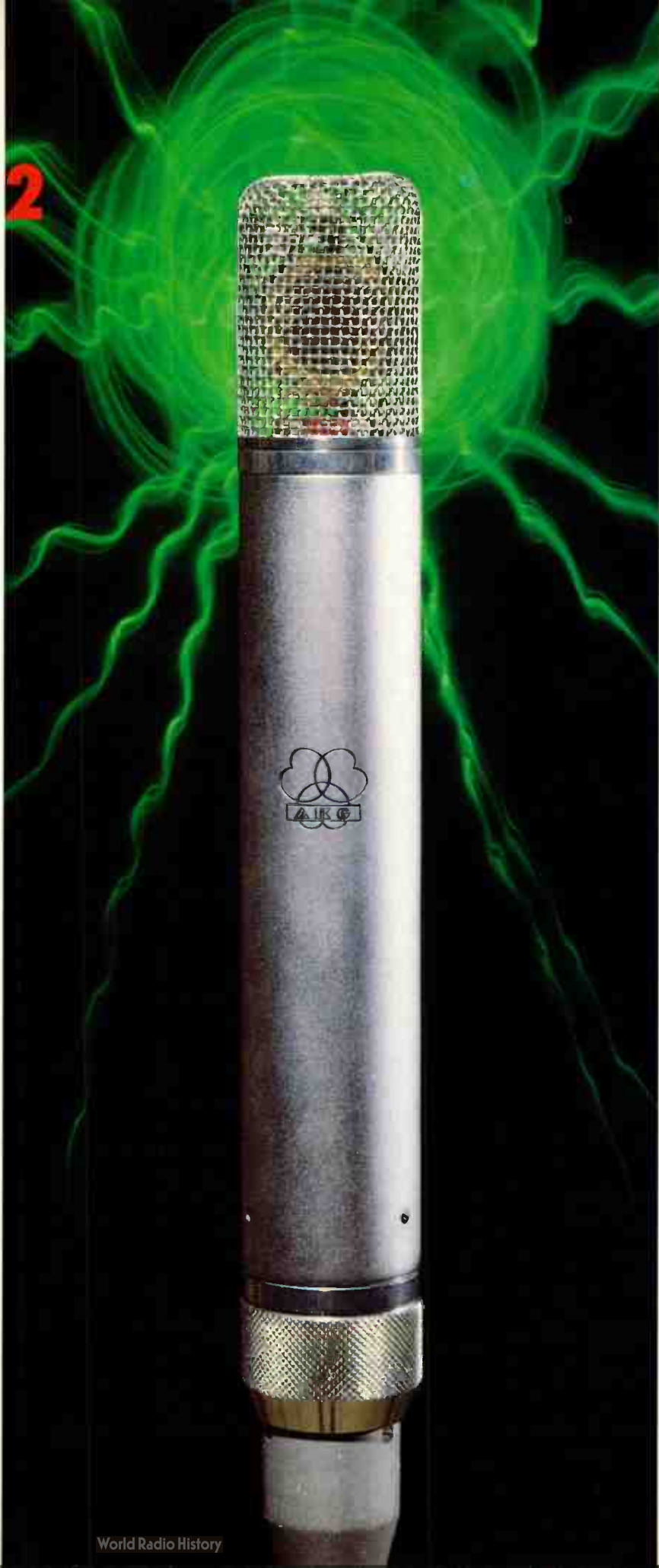
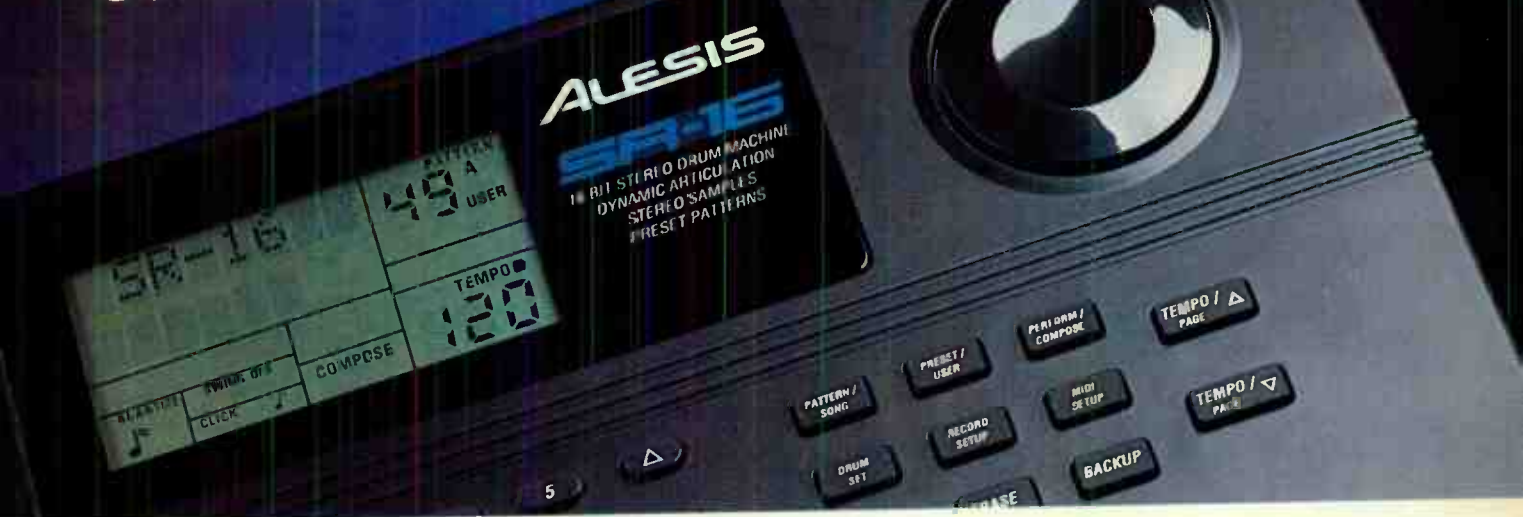


Photo by Ed Colver

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World Radio History



Man On The Flying Tropea

STUDIO NAME: San Tropea Productions

LOCATION: Cliffside Park, NJ

KEY PEOPLE: John Tropea, owner

PROJECTS RECORDED: Tropea has four albums: *Tropea*, *Short Trip To Space*, *To Touch You Again*, and *N.Y.C. Direct*. He is currently working with bassist Will Lee on an album entitled *Tropea Live At Mikell's*. He is also producing two albums, one for Charlie Brown and one for the New York blues group 9 Below Zero.

CREDITS: Tropea has played on Eric Clapton's *Journeyman*; Paul Simon's *Still Crazy* and *Best of Simon*; and many other projects including composing, arranging, and producing jingles for Sunday Productions.

CONSOLE: Amek Matchless 28x24

RECORDERS: MCI JH 24 24-track; 24 tracks of Tascam DA-88; Otari MX 5050 2-track and MX 5050 4-track; Sony DAT 55ES; Tascam cassette 122 MK 2; Fostex 2-track center channel

MICROPHONES: AKG C414 [2]; Audio-Technica 4051 [2]; Neumann 87 [2]

MONITORS: Yamaha NS10; B&W Studio Monitors; JBL 3340S; Visonik David's 6000 (powered by Dynaco amp/stereo 400)

SYNTHS & SEQUENCERS: Akai MPC sequencer and drum machine and S900; Korg M3R, M1, and 01W; Proteus 1 [2] and Proteus 2; Roland JV 880, D550, TX7, TX 817, and GR1 guitar synth

COMPUTERS & SOFTWARE: Apple Macintosh Classic; MOTU Performer

OUTBOARD GEAR: Yamaha REV 5, REV 7, and SPX 90; Roland SRV; Alesis MicroVerb; dbx 165A and 166; Korg A3; LXP 1; Zoom 9030

EQUIPMENT NOTES: Tropea states: I think my Amek is an outstanding board. Though it is an older board, it has a great warm sound and is easy to get around. I like the Tascam DA-88's because their format is simple and easy to use. As for my synths, I'd say my favorites are the JV 880, the Proteus 1 and 2, and the 01W. They're flexible and sound great together.

STUDIO NOTES: Tropea continues: My studio is flexible. I can take all types of preproduction on different formats, bump it up to 24-track, and transfer synth tracks with SMPTE timecode. From there it can stay or go anywhere else to be finished.

EQ

Photo by Peter Monroe

Guitarist/producer/
composer/recording artist
John Tropea gets on the right
track (24 of 'em) with
Tascam's DA-88



Surfing the Bleeding Edge



How to ride the ever-changing wave of new recording technology without wiping out

BY CRAIG ANDERTON

Information overload. Techno-babble. Companies and products that come and go like mushrooms in the spring (hope you didn't buy a PC jr. or Mac IIvx). Updates that make life more difficult, not simpler — and the list goes on.

No one ever said musical technology would be easy, but this is starting to get silly. If you just want to record and play music, how do you deal with staying on top of the "bleeding" edge? And perhaps more importantly, how crucial is it to stay on top of what's new? There are really three main issues:

- Assessing technological trends so you don't get stuck with outdated gear or "bet on the wrong horse."
- Staying informed about technological changes and products (after all, knowledge is power).

- Managing information so that it can be retrieved as needed.

As someone who has tried to keep up with synths, guitars, recording, signal processing, and computers — in the context of being both a user and a journalist reporting on same — much of my job has involved these three issues. Over the years, I've learned a few tips that may be helpful.

STAYING ON TOP OF TECHNO TRENDS

The most important directive is: Skip a technology wave from time to time. Technological progressions usually follow a series of crossfading waves; when the 486 microprocessor came out, people didn't stop buying 386 machines, but the 386 started fading out while the 486 faded in.

If you try to integrate every new wave of technology into your life,

you'll pay in both money and time. The solution is simple — stay with one wave a little longer than you might want to, miss a wave, then get in early on the next one.

For example, I bought a good analog 8-track many years ago, and stayed with it even after the wave of affordable 16- and 24-track machines hit. But I did catch the next wave (affordable digital multitrack) when the Alesis ADAT came on the scene. Similarly, I know people who are very happy with their analog 16-tracks, and are waiting until the next generation of budget multitrack recorders rather than going for an ADAT or Tascam DA-88.

Here's another example: Several years ago, on the advice of a friend who was pretty confident that Apple had positioned the IICI as the mainstay of the



Mac II line, I bought one. I've kept using it even as everyone else seemed to be upgrading to a IIx or Quadra. Now I'm waiting to see how the Power PC checks out, and once there's an answer, then I'll upgrade to the next wave.

The same principle applies to software revisions. Unless a rev contains an essential feature, consider sticking with the version you have and wait for a later rev. You'll save an upgrade fee and a learning curve. Another word of advice: don't be the first in line for a new software rev. There's no way a company can test their software under all possible conditions, and waiting even as little as 30 to 60 days after a rev is released might get you more stable software — thanks to the early users who found the bugs that would have had you tearing your hair out.

STAYING INFORMED

We're bombarded with information, so the task is how to filter information of value from the general data stream. Be clear about what you want from a magazine or other news source: education, entertainment, or both. For example, I would consider a NAMM show report to be more entertaining than educational, since so much of the information never comes true anyway (products disappear, prices change, companies get sold, and weird things happen). You can probably just skim these with no great loss.

Afraid you'll miss out on hearing about some really useful news? You won't. If a product becomes significant, you'll hear about it anyway — if you follow the next piece of advice, that is, which is to cultivate a circle of techno buddies.

I learned about this principle while covering the NAMM show for *Guitar Player* magazine. I'd look at the signal processors, someone else would look at the amps, another the guitars, and so on. Rather than visit every amp booth, I simply talked to the person who had. Once I knew where all the hot stuff was, I visited those booths.

You probably know some local infomaniacs who read all the press, talk to salespeople at companies and music stores, and spend time combing

BBSs — ask them what's hot. An hour spent on the phone calling the right people can give you a concise, executive-report-type summary of the state of the tech world.

And don't bother learning about things that aren't real yet. Is there any point in becoming a DCC or MD

expert at this point? For most people, the answer is no. A general overview will do just fine until you find out whether one system becomes dominant or not; then you can commit the time to learning what it's all about.

Finally, there are many tech-oriented expos open to the public such as *EQ's*

So Mike, I named it's new **4-Track** "Oma" because it's totally sweet. You know—auto punch, auto release, auto locate. **Dolby S** sounded good—but then—Dolby always sounds good. Actually, I thought about calling it "Hoover" first, because the 380's multitrack **Sweep EQ** is sweet for my guitar, "Diva". But "Hoover" is a vacuum, not a lesson. The difference. "Mike" **XLR Mic** would have been the absolute mono killer of all names. But "Mike" is the name of my foot pedal.

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MI INSIDER

Music and Sound Recording Expo, CyberArts, the AES Convention, Music West, and local shows and seminars sponsored by music stores, manufacturers, or colleges. General admission is usually quite inexpensive (although seminars can cost more), but what you get in return is the opportunity to pump hundreds, or even thousands, of potential techno buddies for information. Don't miss these events; in a few hours you can do a year's worth of information gathering.

MANAGING INFORMATION

Magazines are a useful source of information, but to find the proverbial needle in a haystack of back issues you need to clip your magazines regularly. I usually clip music and recording mags after two years and computer mags after one. Save only the articles that are relevant. Toss out the reviews — after two years, you should know whether something is worth buying or not; if not, just ask your techno-buddy network. I mean, what good is a Mackie CR-1604 mixer review at this point — just ask some of the zillions of people out there using the things what they think.

Next, you don't need to keep show reports. Or classifieds. Most interviews aren't really useful either, unless the subject is someone like Bruce Swedien, Roger Nichols, or the like. Get rid of applications articles for gear you don't have and theory articles about stuff that doesn't exist any more ("Inside the PCM-F1: Mastering Medium of the Future?"). Opinion pieces? Nuke them if they don't relate to what you're doing. Then, file the articles chronologically in a binder, filling cabinet, or large-sized envelope.

Clipping can shrink the average magazine to a svelte 10 or 20 pages. (Granted, this approach doesn't work too well with a magazine like EQ that's packed with interesting stuff.)

Now index the remaining articles in a database. What??? Isn't that a lot of work? Well...the equation goes something like this: every minute spent entering saves two minutes of trying to find something. And after your magazines have gone through the weight reduction program mentioned above, you won't have that much to enter anyway. Just make sure that along with the date, title, and author, you use lots of key words so that if you can remember that the article had "something to do with using Shure SM58's on kick

continued on page 112

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World Radio History

Developing Golden Ears

There's more to being
a good listener than just
opening your ears.

Here are some tips to
make your studio a
better place to listen

BY TY FORD

The truth; linearity, fidelity and accuracy. That's all we really want and expect from our studios. Without these virtues our work is only proper (hopefully) when heard in the studio in which it was created. If it doesn't sound acceptably similar wherever it was intended to be heard (on the radio, TV, car stereo, or museum PA system) what's the point?

Perhaps the biggest variable in all of this is you, the operator. Every single engineer or producer I know will freely admit that his or her ability to mentally process sound is cumulative and has improved over time. The more experience you have the better your mixes become. So if your monitoring system was config-

ured some time ago (using the knowledge you had accumulated at that time), it stands to reason that the knowledge you have accumulated since then can help you make better-informed decisions about what you're hearing now.

THE CONTROL ROOM

Your control room monitor system originally may have been set up to sound good, look good (as in many video suites), or it may have been set up based on what hardware you had on hand and what kind of sight lines you wanted. Most control rooms are constantly evolving. I was not totally surprised to find a noticeably different bass response in my monitors when I patched the outputs of my DAT machine directly into the monitor amp instead of feeding it through the console, but it was disconcerting. Over time, seemingly minor changes in equipment or routing can make major differences in what you hear. The repositioning of equipment, addition of new racks, and changing of consoles can alter a room's resonant and reflective characteristics. If it's been a while since you've done a close aural inspection of your control room, maybe it's time.

First, if you are currently using any sort of EQ to "correct" for problems in your monitors or room, you've either got the wrong monitors, the wrong power amp, the wrong impedance match between the sections of the monitor system, the wrong mounting of your monitors, the wrong room construction, or a combination of any or all of the

above. Equalizers, no matter how expensive they are, change the phase relationships of the audio that passes through them. Like the engineer who spends the extra time to find the right place for the microphone, you should spend the time to position the right monitors in the right place in your studio so that the sound can be properly reproduced.

ESTABLISHING THE SWEET SPOT

It's very important to have a stable and linear sweet spot (the main position at the console from which you make your mixing decisions). The bigger the sweet spot, the better. If your current monitor placement is a concern, sit in the sweet spot and run some typical stereo audio through your monitors. (Obviously, if you stand while mixing, do these procedures while standing.) Mono the output to the monitors and check to make sure that the sound appears to be coming from directly between the monitors from whatever position you want the center of the sweet spot to be.

If you can only move a few inches to the side before the centered mono sound moves with you, try changing the angle at which your monitors point to the sweet spot. Also check to be sure the distance between you and each monitor is slightly more than the distance between the monitors. The limits of your side-to-side dimension are also the result of the dispersion angle of your high-frequency speakers. The smaller the angle, the more narrow the beam of high frequencies and the smaller your sweet spot.

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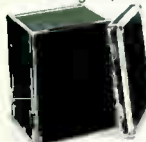
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a correct stereo balance. Concentrate on the placement of lead vocals, kick drum, and bass lines from several sources. Most of the time these elements are in the center of a mix. If they are consistently not in the center, correct any problems with outputs, pans, and/or balances, then move on.

Now move from side to side through the sweet spot. Try this in mono first to determine how large your mono sweet spot is. Listen again for any changes in phase and frequency response. Now switch back to stereo and make the same side-to-side check. Listen for differences in EQ, phase shift, and stereo image. You may find it helpful to make a few grease pencil marks on the console to indicate the the side boundaries of your sweet spot.

Finally, move your head from back to front, starting at a point about a foot behind to a foot past the spot where you normally sit while mixing. Again check for any changes in equalization, phase, or stereo image. EQ shifts, especially in the low frequencies, may be the result of angled ceilings, floor risers, or angled walls that change the cross-sectional area of the control room. Changes in phase or to the stereo image may be the result of reflections from nearby surfaces into the sweet spot. If you can't move the problem, try to treat it as best as you can.

It's also a good idea to check for any differences between the sound in the sweet spot and in the position you normally find yourself in when making EQ adjustments. If you're standing up, bent over the left end of the board working on kick and snare EQ, you could be making those adjustments without benefit of being in the sweet spot.

Checking for room resonance is more

While listening to a stereo mix that you are very familiar with, lower your head to just above the faders. Slowly raise your head until you are sitting erect. Hear any changes in phase, frequency response, or stereo image as you raise your head? Small amounts of change may be acceptable, but if you hear lots of changes you have got a problem. The shift could be caused by anomalies in the driver surfaces of your monitors, acoustical coupling between your monitors and whatever they are mounted on, or by the reflection of audio from nearby surfaces.

If the monitors are pointed down at the sweet spot, some of the sound is probably reflecting off of the console surface before it reaches your ears. That forest of knobs acts just like a giant unpredictable comb filter. There is no way to compensate for the sort of phase cancellation and addition caused by console reflectance. Your only hope is to mount your monitors so that they are aimed more directly at your ears, making sure that there are no other reflective surfaces, like walls or equipment racks, that will indirectly bounce sound into the sweet spot.

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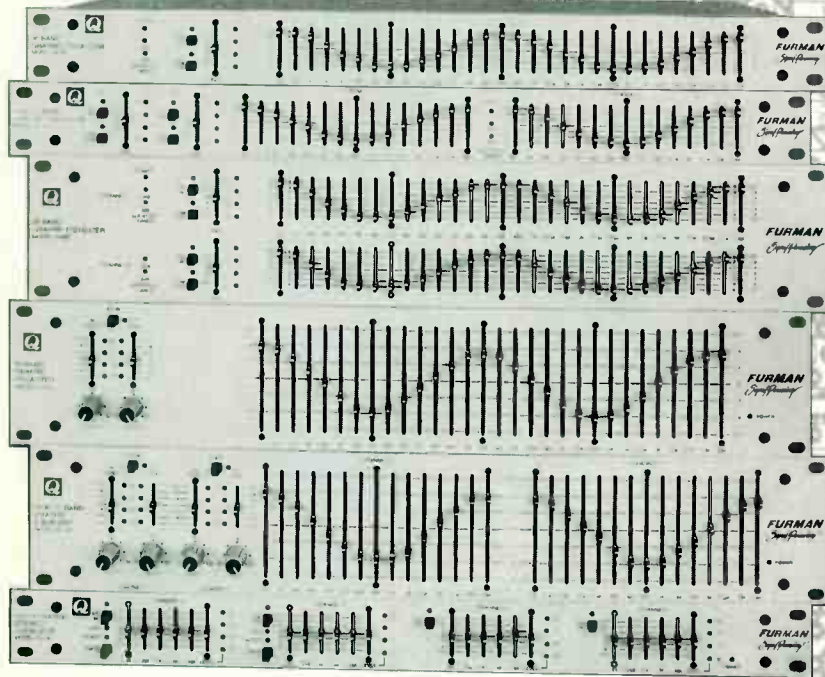
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TECHNIQUES LISTENING

difficult because there are more variables at play. Resonance is a complex function of frequency and level.

Let's say you suspect your control room is resonant at 500 Hz. In order to deal with the problem you really need to know how loud the monitors have to be before the room becomes resonant. There might not be enough energy at lower listening levels to excite the room to resonance. As you crank up the monitors you may reach a resonance peak that will remain constant, increase or peak, and then decrease. Listening to your mixes at low, average, and slightly higher levels on at least two sets of monitors will give you a more complete perspective. You also have to account for the nonlinearities of the human ear. As the volume of sound decreases, our sensitivity to frequencies above and below 3 kHz decreases. I also use the "walk-around-the-room" and the "step-out-in-the-hall-with-the-door-open" methods of monitoring to simulate less than optimum monitoring conditions.

IN THE END

The result of all of this fidgeting is that, by removing or reducing the number of variables in your monitoring environment, you have paved the way for more precise mixes. This means you spend less time mixing and agonizing over why something doesn't sound quite right. It's also an indication that, if you continue to get queasy feelings in your gut while mixing, you should change pizza delivery services.

EQ

*Ty Ford is a 20-year veteran of the radio and audio industries. He currently runs his own production company, is a regular contributor for several trade magazines, and gives seminars and guest lectures at conventions and universities. His studio also serves as a beta test site for audio equipment manufacturers and related research. His new book *Advanced Audio Production Techniques*, from Focal Press, is full of the kind of useful information found in this article. To get your copy, call 1-800 366-2665 and have your Visa or Mastercard handy.*

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the history of rock and roll



U2

DANIEL'S SONG

I've always been more of a musician than a technician, which makes it rather ironic that I



have become known for producing the likes of U2, Bob Dylan, and Peter Gabriel. I've always followed the musical route, it's just that I've gotten more fame as a studio guy over the years — although, with the release of my second album *For the Beauty of Wynona* and winning a Grammy for U2's *Achtung Baby*, both routes remain very important to me.

Getting the right sounds in all the wrong places. All the world's U2's project studio.
BY DANIEL LANOIS

Photo on previous page by Andre MacPherson. Daniel Lanois by Kate Gardener

I suppose I was always interested in the technical side — I built my first project studio with my brother Bob when I was 16 years old. It was in my mother's basement and it was made up of a homemade console and two Revox machines. We would record as much as we could in one pass on the first two tracks, and then run that back through the console. After that, we would overdub once and record it to the second Revox. Essentially, the second print would be the overdubs plus the mix. Surprisingly, the quality was excellent. There was not a lot of tape noise or hiss, considering the set-up.

One of the reasons that I think I became pretty good technically was that I took a lot of chances with interfacing. I would always try to integrate unorthodox gear together. For example, I would use a guitar amplifier as a processing device by remiking and then setting up a chain of effects and processing gear. I would then use that as part of a feedback loop.

Most of the time in studios, a track will be sent to an effects box and



The project studio that U2 built for *Achtung Baby*.

a return will be brought back to that console and that will be the end of the chain. But I would always choose to send it to yet another processing device that would then go to another processing device and then to another — and then at that point the link in the chain would be regenerated back to the first link, creating a very musical regeneration and producing a very organic result. Much like the way a musical instrument amplifier has a personality because of the frequency response limitation. The limitations of this regeneration, or the emphasis of a certain frequency, would allow the sound to develop its own personality.

CASTLE ROCK

One of the most unusual places I have ever recorded in was Slane Castle, where U2's *Unforgettable Fire* was recorded. It was the band's idea to move out of the studio and to go out on location. Fortunately, this idea was not foreign to me — I had been doing this kind of recording in Canada where I experimented with different locations, including a big old library in town that had been closed for years. I feel that I can record anywhere as long as there is a good musical set up and, technically, there will be no complications. I'm less fussy than I used to be.



We set up three different rooms for U2 to work in at the castle: the ballroom, the library, and the workshop. The ballroom had a long reverberant decay time, therefore it could only be used for slower tempo songs. That's where the song "The Unforgettable Fire" was recorded. The library, on the other hand, had a very dense sound without much decay at all, making it easier to play in because the sound wasn't splashing all over the place. That was the room where the harder tracks were recorded; and, as such, it was the most active band room. The workshop was just another name for the control room.

Because much of the recording was done in the library, we set it up like we always do for U2 — stage set-up complete with floor wedges. U2 always records live with a PA. The drummer, Larry Mullen, always has a stack of PA equipment right behind his kit. It has become part of his drum sound — it gives a lot more bottom to his kick drum. We try and keep the band as close to Larry as we can, because when they are close like that they play more in sync.

Most of the unusual sounds were created in the workshop. That's where the harmonies were worked out and where the solos were done. It was an

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THE ZOOROPA STORY



very heavy outlook. This time around, U2 wanted to enjoy themselves and have a good laugh. If *Achtung Baby* was U2's *Sgt Pepper*, then *Zooropa* was their *Magical Mystery Tour*, an eclectic and experimental mix of sounds and ideas.

Recording U2 in the studio, at the Factory, and on the cutting edge

BY FLOOD

When it came time to record *Zooropa* with U2, there was no conscious decision made saying we were going to create a new sound. But there was a decision that we didn't necessarily want to make *Achtung Baby II*. That was a very furrowed brow type of record with a very intense,

We had to finish the songs in a very short time. Sometimes U2 would have to record early in the day, fly off to play their next date, and then come back at around two in the morning to listen to the mix. Plus, the vision of *Zooropa* was beginning to expand. One second we were recording an EP; the next, an album; the next, a B-side. There was some pressure involved because U2 is a high profile band, and it was more than just a challenge of finishing it in time. It had to be good as well.

Zooropa was recorded in Dublin at a studio called Windmill Lane. We also worked out of The Factory, a rehearsal complex that features a quasi-control room with a Soundcraft board and an Otari MTR-90 recording machine. When recording, we would use a Fostex synchro-DAT, so that rather than slaving, we could do ten

guitar takes or ten vocal takes onto the synchro-DAT and then compile them onto one track.

For actual sound, we would generally use 15 ips, because you don't use as much tape if you're doing hour-long improvisations. You can fit it all on one reel. Plus, the sound is much better at 15, not truer, just more musical. But, if you use 15 ips, you've got to be a lot more on the case with your drop-ins and edits.

TECHNO TALK

Recording the album was a mutual exploration in different areas. Having come from working with people like Depeche Mode and Nine Inch Nails, who are based more in a technological style of music, it was very challenging to have cross-fertilization with people like U2. It's stimulating because you can say: "Here is a drum loop, what do you want to do with it?" and U2 will probably respond in a way that's entirely different from what you would normally expect.

Initially, U2 was coming from the conventional band point of view, which says, "Here we are — drums, bass, guitar, and singer." This was different from a band like Depeche Mode. But both bands were similar in that they wanted to explore areas that the other had already explored. For instance, U2 wanted to push new venues and ask questions like, "Can we sequence that?" while Depeche Mode wanted to play with real guitars and drums on *Songs of Faith and Devotion*.



When working in the studio, one of my favorite pieces of gear is the Eventide H3000, because it's probably the most versatile effects unit there is. It's creative with delays, harmonizers, and weird distorted sounds, and anyone with any imagination can go completely mad with it. If you want straightforward delay or straightforward pitches, you got it. But if you want some sort of totally bizarre pitch-shifting reverse, then you could just as easily do it.

The hookline in the chorus of "Daddy's Gonna Pay For Your Crashed Car," for example, is half made-up of the H3000. When used in tandem with the Zoom 9010, a very effective guitar multieffects processor, you're allowed a great amount of flexibility. There are seven effects in a chain and you can have them in any order. You're not restricted by any predetermined order.

IN PIECES

The title track, "Zooropa," is actually in two halves. The first half was created from scratch in Dublin, but the second half was taken from a sound-check the band did in New Zealand or Australia about two years ago. The engineer and Edge sat down and took out the best elements of the jam using SoundTools to construct an arrangement. Both parts were then edited to get a stereo mix. To create a dovetail to the whole piece, Brian Eno laid down a track of a squishy, mad-synth sound that connected both halves of the song. Edge laid

down some guitars, and then he used an EMS Synthi A, which looks like something you'd see in a '50s sci-fi movie. I tend to collect and use those types of things — vintage pieces of equipment.

In addition to "Zooropa," some of my favorite songs on the album are "Crashed Car," "First Time," and "Numb." "Numb" was originally something leftover from the *Achtung Baby* sessions, so we were just trying out a few ideas on that to see if we could take it one step further. Edge started working out the basic rhythm for the vocals. He took it, worked the lyrical idea out, completed the song, and it came out sounding great. Edge comes from a sturdy musical background, but his knowledge of technical aspects is great as well.

LEMON HEADS

The song "Lemon" started off as a disco tune until Brian Eno got through with it, gating guitars and adding backing vocals, making it a very bizarre folk song. Bono sang in falsetto on "Lemon" using a Shure SM58. We spent one evening going through "Lemon" countless times, changing things here and there, but the first take we had was the best. Rerecording a song over and over doesn't always pay off.

Personally, I'm a firm believer in the first impression when it comes to recording artists. That's why I'll sometimes mix and record guitarists by going straight into the board. The

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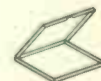
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DANIEL LANOIS

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interactive room and, anticipating that, I kept live mics, a guitar amp, and miked percussion at the ready.

Whenever I work with U2, whether in Slane Castle or the rented house just outside of Dublin where *Achtung Baby* was recorded, I try to become a temporary member of the band. I usually like to plug in a guitar or play a piece of percussion. It gets me involved in the arrangements and increases the adrenalin.

U2 is really about performance. We generally try to get something on tape as a foundation and then add a lot of detail to that. Many studio compositions come about from jam sessions based upon a riff that they had prepared. That tiny riff provides the inspiration to come up with other chords, in a different type of arrangement. What we wind up with is very different from what was originally planned.

MY WAY

The way I produce myself is not really all that different from how I would produce, say, Peter Gabriel or U2 — the tracks are recorded in much the same process. The part that gets difficult is recording the vocals and picking which tracks you put on the record.

Regardless of the artist, whether it be myself, Peter, or U2, I generally use the same miking techniques. For example, my favorite piano is a Steinway. When I mic a Steinway piano, I use a single microphone, usually an RCA 77 ribbon mic. I find that I get the most pure, clear sound with it. I like to place it center, slightly favoring the hammer hitting point. When you hear it back on radio, it sounds big and clear.

With guitars, the room has a whole lot to do with the sound. In my experience, the best sounding guitar rooms are rectangular-shaped with tall peaked ceilings and a solid wood floor. My favorite mic, usually placed favoring one speaker, is a dynamic mic, like a Shure SM58 or a Beyer 88. I also like to put up a room mic, which can be a nice tube mic like a Neumann U47.

I prefer to make the decision on the spot about blending. If there is too much competition in the room between instruments, I'll use the

close mic. The strangest thing about this is, even though you are tight miking, the room that the amp is in still has a huge effect on the tight mic sound. I believe that the amplifier responds to the room and the two become one.

These are the miking techniques that I used on all guitar sounds on my new record. For example, the solo in "Messenger" was recorded that way in a very pure sound — no processing. I used a '58 Fender Strat for that. An example of the room playing a big part of the sound would be Edge's sound. For *Achtung Baby*, we put him in this tall, rectangular room when he played his lead. Actually, in the house we recorded in, there was an isolation corridor between the drum room and the main studio. It was maybe 6 feet wide, 14 feet tall, and 14 feet deep. That's an extreme example of the tall rectangular room, but we found that we always got the best guitar sounds in that shaped room.

I also use a Korg SDE3000 as my preamplifier before I hit the box. It has a controllable output level that lets me hit the amplifier harder. I will always use that — even in bypass. With the Korg as a link in the chain, I find that it makes for a more musical result.

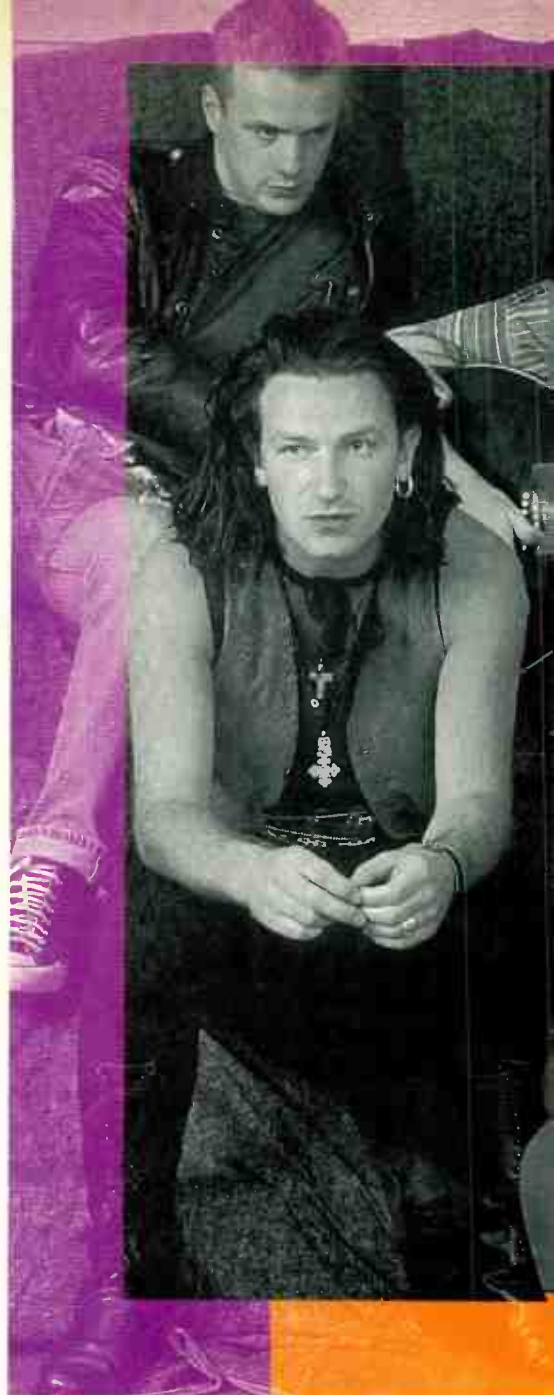
BRIAN'S SONG

Brian Eno, who shares the Producer Grammy with me for *Achtung Baby*, has been a very big musical influence on me. When I first started with Brian, I was engineering for him, but he quickly made use of my talent.

When working together, we have a simple agreement — I agree with everything he says and he agrees with everything I say. With the differences out of the way, you can concentrate on what is more important — getting the machine rolling — and once that's done, nature will decide the course. In my experience, where you are five hours after you started is not where you thought you'd be.

In closing, I would just like to add that I was very happy to get the Grammy. Not just because of the recognition from peers, although that's certainly appreciated, but also because I have been working with Brian for more than ten years, and it's a nice thing to share.

EQ



FLOOD

continued from page 51

guitar's always going to sound different if it's going into a board instead of an amplifier, and it's stimulating to the player to play in a way that breaks the song. It captures the element of spontaneity.

For example, let's say you have a great part, and you want it to be on your record. You can put it through an amp and go through all the business of doing so and find the sound you want, but by the time you do that you can have easily lost the spark of the moment. I tend to weigh things up like

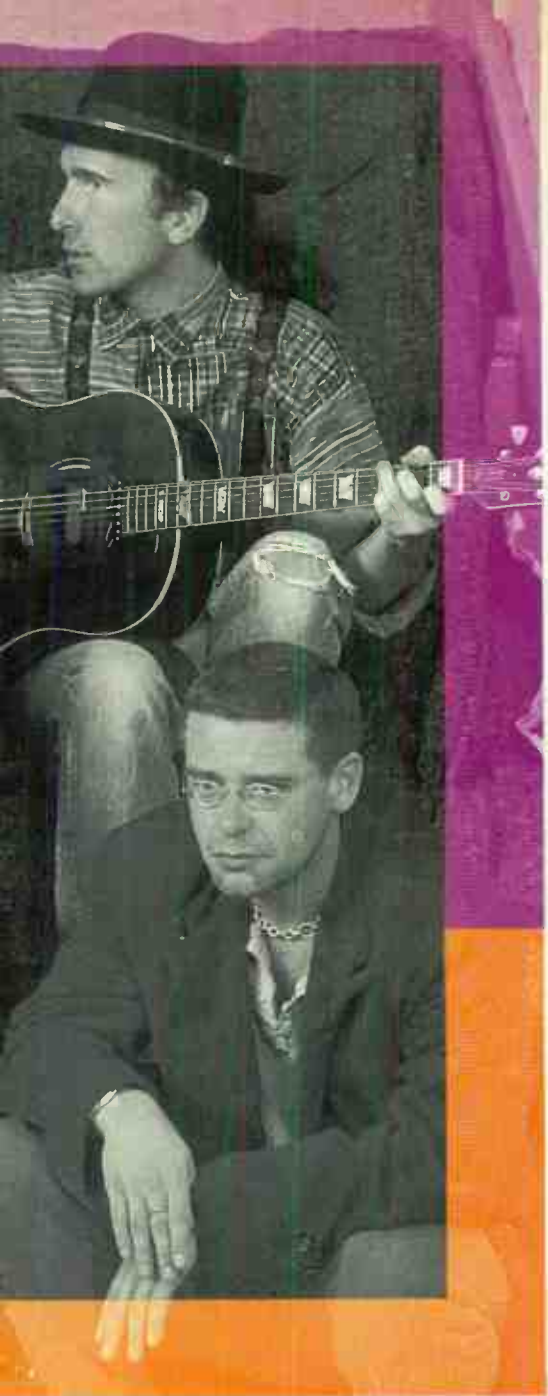


Photo by Richard Pasley/LGI

this when recording — what gains priority: sound tinkering, the original idea, or the song itself? First impressions mean a lot for any artist.

Essentially, I believe that modern technology is an instrument in the music. I am an advocate for technology as long as it's something that's used rather than something that somebody is used by. It's very easy to become a slave to technology and do something over and over again. Even though you have the ability to try a lot of options with a computer, that doesn't mean that it will be done any better or quicker. It is important that you make sure you use technology to your advantage and don't ever let yourself become used by it. **EQ**

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AES AT A GLANCE

The following chart is your easy-to-use shopping guide for new recording and sound gear that was introduced at the AES Convention in New York City. Scan the next few pages for gear you can use and fill out this issue's Free Literature Card to receive more information directly from the manufacturers.

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
ACE LABEL SYSTEMS	Various	Cassette, diskette, DAT labels	Various standard & parchment colors	Varies	800-369-1485	135
ACOUSTICAL SOLUTIONS	Alpha Pyramids	Noise reduction material	2' x 2' sheets available in 2-, 3-, & 4" thicknesses; NRC .50 to 1.00; uniform pattern	\$152/ \$6 sq.ft	800-782-5742	136
	Audio Seal	Isolation booth system	Custom sizes & configurations; STC 29; metal frame	NA		
ADAMSON	DX4000	Digital Signal Processor	Computer-optimized digital filtering, time alignment & EQ	NA	416-683-2230	137
	FM121	Compact 2-way floor monitor	80Hz-20kHz frequency response	NA		
	FM212	Compact 2-way floor monitor	Bi-amplified; two 16-ohm AW12 woofers & 50x40 degree coverage; 65Hz-20 kHz frequency response	NA		
	MH121	Compact 2-way loudspeaker	55 Hz-18 kHz frequency response; 43 degree trapezoid; passive or active models	NA		
	B118	Bass loudspeaker	18" woven kevlar diaphragm low frequency transducer	NA		
AGM DIGITAL	MRI-Mk1	Mic Recording System	Tetrahedral array; "Soundfield Type"; 20-bit digital signals on 16-bit media	NA	0353-665588 (UK)	138
AKAI	DP88	Digital signal patchbay	Patch any combination of 10 digital ins/outs & store in up to 128 memory locations	\$1095	817-336-5114	139
	DD1000s	Magneto Optical Editor	Serves as 'slave'; remote controlled; 16-bit linear quantization; 18-bit playback w/8X oversampling	\$12,995		
	CD3000	CD-ROM Sample Player	Access to over 2000 sounds on five CD-ROM discs	\$3995		
	DR4d	Hard disk recorder	4-in, 4-out recorder; 18-bit 64x oversampling A/D converters	\$1995		
	S3000HD	Stereo digital sampler	213 MB internal hard disk drive; 200 MB of sounds; 32-voice polyphony	\$5495		
AKG	S3200	MIDI stereo digital sampler	32-voice, 16-bit sampler; SMPTE reader/generator, SCSI interface	\$6395		
	C414B/TLII	Pressure gradient mic	20-20,000Hz frequency range; multi-pattern; sound of AKG C12	\$1499; \$3199 (stereo)	510-351-3500	140
	C3000	Condenser mic	Switchable polar patterns; windscreen; switchable -10 dB preattenuation	\$695		
ALESIS	ADAT Cables	Connecting cable	Designed for ADAT system	NA	1-800-5-ALESIS	141
	BNC cable	Connecting cable	For use between the BRC & the AI-1 AES/EBU, S/PDIF & sample rate converter interface	NA		
	X2	Recording console	24-ch., 24 in-line tape monitor, 8-group layout; parametric splitable EQ; stereo-in-place solo; 4-band EQ section	\$6495		
	Monitor One™	Studio reference monitors	6.5" low frequency driver; mineral-filled polypropylene cone; linear rubber surround; 1.5" voice coil	\$395		
	AI-2	Synchronizer	Developed w/TimeLine Vista; timecode synchronizer for the ADAT	\$995		
ALLEN & HEATH	Saber Plus	Recording console	16-track config. with 24/ 32/40 /48 inputs; mute automation; 4-band EQ; 2-band EQ for all multitrack monitor returns	\$15,599 & up	801-566-8800	142
	GS3V	Compact recording console	Up to 72 remix inputs; on-board VGA fader automation; add-on expander unit provides 8 extra ch.	\$6495-8495		
	GL2	Live mixing console	Rackmount; 4 subgroups; 14 ch.; XLR inputs; & outputs; 4 auxiliary returns; 4-band EQ with sweepable mids	\$1495		
AMPEX	499	Studio mastering tape	Incorporates a non-porous, high energy ferric oxide formulation; comes in 1/4", 1/2", 1", & 2" widths	NA	415-367-2457	143
	467	Digital audio mastering tape	Durable oxide & binder system; utilizes a conductive backcoating that minimizes tape edge damage	NA		
	406/407	Audio mastering tape	Bias compatible with Ampex Grand Master 456; unique oxide blending system eliminates batch-to-batch variation	NA		
ANALOG DEVICES	AD1890	Stereo sample-rate converter	Single IC replaces multi-DSP box-level solutions; fixed-function, DSP-based ICs convert digital input to a user-set output sample rate	\$34	617-461-3885	144
ANTEX ELECTRONICS	Series 2 SX-22	PC sound board	Dolby AC-2 comp; multiple sample rates; direct digital input/output; balanced analog & AES/EBU or S/PDIF digital input	\$2295	800-338-4231	145
ANTHONY DEMARIA LABS	ADL 1000	Tube compressor/limiter	All discrete design; punchy warm sound; "invisible" compression; handbuilt; Opto attenuator; 15 Hz - 30 kHz	\$1350	818-340-0228	146
APHEX SYSTEMS	Model 622	Expander gate	Logic assisted; ultra-pure audio path; 5 Hz - 100 kHz; VCA 1001 voltage controlled attenuator; 120 dB dynamic range	\$795	818-767-2929	147

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
APOGEE	Wyde Eye	Digital cable	Special golden shield foil; conductors are sheathed in a special low-capacitance, foamed insulation material	NA	310-314-1700	148
	UV 22	CD encoding system	Adds a high frequency bias signal to the digital bitstream	NA		
	UV 1000	CD mastering system	Combines UV 22 process with digital interfaces	NA		
APOGEE ELEC	AE-9	Concert loudspeaker	38 Hz-19 kHz; designed for diverse applications; 15" bass cone driver; 10" sealed midrange cone; 20-degree trapezoidal enclosure	NA	707-778-8887	149
ART	HD-15	High definition equalizer	Stereo 2/3-octave; long throw sliders; relay bypassing; .005% THD; maximum input level at +24 dBm	\$435 each	716-436-2720	150
AUDIO ACCESSORIES	632M/Type 1	Pre-wired patchbay	2 rows of 26 jacks mounted on a 3 1/2" high panel; EIA slots; 3-line single ch. metal designation strips	NA	603-446-3335	151
	610 Series	Audio patch cords	Woven DuPont nylon outer braid over a closely woven copper shield; reinforced 6" back from each plug	\$19-72		
AID	Spatializer	3-D option for Pro Tools	Permits spatial expansion, dynamic sound movement, & localization in 3-D space	\$8450	213-845-1155	152
AUDIO CONTROL INDUSTRIAL	PCA-200	Low frequency synthesizer	2-ch. subharmonic synthesizer; control over the creation & blending of the bass enhanced signal	NA	206-775-8461	153
	AC-10	A/C weighting filter	3/4" XLR tube that provides standardized A & C weighting curves	\$44		
	C-101 Series III	Octave equalizer	Real-time audio spectrum analyzer; contains test noise generator, calibrated measurement microphone, sound shaping equalizer	NA		
AUDIO KINETICS	ES.Lock 1.11	ESbus sync/gen/emulator	Fast lock-up; complete range of networking facilities; Time Line Bus; frame bus; timecode bus; Crash Record bus	NA	044-081-953-8118	154
AUDIO LOGIC	D20	Digital room delay	For acoustic alignment of under-balcony or multiple-speaker arrays; 18-bit A/D converter; EEPROM	\$1300	801-566-8800	155
AUDIO-TECHNICA	ATW-1235	VHF wireless system	Consists of ATW-12 receiver & ATW-T35 UniPak™ transmitter	\$690	216-686-2600	156
	ATW-1236	VHF wireless system	Consists of ATW-12 receiver & ATW-T36; features Hi-Energy™ dynamic element; operating range of up to 1500'	NA		
	AT4033	Studio condenser mic	Transformerless; low noise circuitry; cardioid pattern: 30-20,000 Hz freq. range	\$725		
	ATM35	Condenser mic	30-20,000Hz freq. range; pick-up for close-miking	\$340		
	SmartMixer	Mic mixer	Microprocessor-controlled; automatic switching; 4 ch.; female XLR balanced inputs; male XLR line level output	NA		
AUGAN	Optical Disk Dr.	Optical Disk Drive	For OMX optical multitrack recorder/editor; 1.3 GB disks; all edits, crossfades & level changes on 8 tracks are played out of individual outputs	NA	617-444-0191	157
AURASOUND	1800 Series	Loudspeakers	Low frequency transducers; capable of producing high-levels of low frequency; tear drop shape	\$1500	310-643-5300	158
AWARE	Speed-Of-Sound	CD-ROM MegaDisc™	For Macs & SG; interactive BrowsersFX™ librarian; digitally recorded 44.1 kHz stereo audio	NA	800-292-7346	159
BASF	DAT Master	Digital audio tape	Ultrafine metal particles; low error rate maintained after 500 passes; 15/30/60/90/120 minutes	NA	800-225-3326	160
BEC TECHNOLOGIES	MP16	Microphone preamp/splitter	16 ch. amp with 2-way splitter; >90 dB gain in two stages (fixed/variable)	\$5000	206-632-2431	161
	Audioplex AD16	Input converter/transmitter	16 balanced line level ins, converts to 16-bit digital, multiplexes signals into a single data stream	\$3000		
BEHRINGER	Autocom	Compressor/limiter	AUTO Processor sets attack and release times based on the dynamic of the program material; manually adjustable attack and release times	NA	516-932-3810	162
BEL	BDE-7000SDA	Digital delay sync	2 separate auto-tracking facilities; 0-660 mSecs (1-15 frames) of delay in stereo which is expandable to 1.32 secs	\$4975	313-524-2100	163
BEYERDYNAMIC	MV 100	Stereo preamp	Compact; lightweight; two XLR inputs; on/off switch with indicators; LEDs for overload & battery status	\$869	516-293-3200	164
	MC 834	Studio condenser mic	Cardioid polar pattern; 30-20,000 Hz freq. range; 70dB signal-to-noise ratio	\$1389		
BOSS	SE-70	Effects processor	35 high-definition effects; 45 preset algorithm & 100 user memories; 1/2-U; 48/32 kHz sampling	\$895	213-685-5141	165
BSS AUDIO	FDS-360	Freq. dividing/limiter system	Stereo 2-way or mono 3/4-way fixed frequency fourth order crossover; separate mid-filter frequency band limiting	\$1579	510-351-3500	166
	DPS-402	Compressor/peak limiter/de-esser	2-ch. compressor/limiter; high frequency de-esser & wide-band de-esser with peak limiting & adjustable speed	\$1499		
CAD	E-200	Condenser mic	10Hz-18kHz freq. range; multi-pattern side address; non-capacitive 20dB pad	\$699	216-593-1111	167
	ST 100	Surface-mounted boundary mic	20-20,000Hz freq. range on 4" square boundary; unidirectional half cardioid	\$199		
	CAD 92	Electret condenser mic	40Hz-20kHz freq. range; cardioid pattern; Flex-Form™ grille screen	\$199		
CARVER	CA-400	Stereo power amp	200W per ch. into 4 ohms; rear panel mounted controls & connectors include 11-detent input level potentiometers	\$698	206-775-1202	168
	PT-1800	Two-ch. touring amp	900W per ch. into 4 ohms; fully modular monaural design; positive locking detachable dual AC line cords	\$1850		
	PMX	Stereo crossover	Fourth-order, 24 dB/octave slope; Linkwitz-Riley alignment; plug-in modular construction; 2 ch. per unit	\$240		

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
CARVER	PST-24	Auto reverse dubbing deck	Dual auto-reverse mechanisms; high-speed dubbing; Dolby B/C NR; REC mute	\$560	206-775-1202	169
CELESTION	Studio 1	Compact monitor	8Ω; 1" titanium tweeter; felted fiber drivers; improved crossover; 50 watts	\$210	508-429-6706	170
	Studio 3 Series 2	Pro monitor	5" driver; 75 watts; 62Hz-20kHz frequency response; 1" titanium tweeter	\$300		
CREATION TECH.	RADAR	Tapeless multitrack	8 expandable tracks; 32-char LCD; 16-bit, 64x oversampling A/D conv.; MIDI	\$8500+	604-980-6850	171
CRESCENT	Mod Factory	Eventide H3000 upgrade	"Modular" digital effects processing for the H3000; includes adjustable delays, duckers, envelopes, pitch shifters	NA	201-746-9417	172
CREST AUDIO	9001	Power amplifier	3000W/ch. into 2 ohms; 20 Hz-20 kHz freq. response; takes up 3 rack spaces	\$4200	201-909-8700	173
	7301	Power amplifier	NexSys compatible; 940W low at 4 ohms, 240w high	\$2190		
	LM St. Monitor	Console	40 x 8, 32 x 8 & 24 x 4 versions; ideal for in-ear monitoring; 8 stereo mixes; 4 mono mixes	\$20,460 (32x8 stereo)		
	Gamble UltraMod	Retrofit for Gamble EX-56	Up to 68 inputs; up to 12 line input faders act as effect returns; each module accepts an unbalanced signal	\$500/ch.		
CROWN	MacroReference	Power amp	Performs within digital tolerances; 760W per ch. into 8 ohms; greater than 120 dB S/N ratio	\$3850	219-294-8000	174
	PB-1 & PB-2	Touring power amp	205W & 320W per ch. into 8 ohms, respectively; ODEP circuits; parallel mono & bridged mono operation	\$869, PB-1; \$1099, PB-2		
CSIRO AUSTRALIA	A4D2	Development system	Operates standard AT platform; A4 processor provides dual 2048 FIR filter & multipurpose time domain processor	\$995	612-372-4331	175
CUBICON	"D"	Enclosure material	Multi-ply mold of fiberboard made from recycled paper; 3/8"-1" thicknesses	NA	314-567-0667	176
CUTTING EDGE	Yellowtec Vip 1	Voice processor	Limiter, compressor, expander, de-esser; 3-band parametric EQ; jog wheel; LCD	\$1800	216-241-3343	177
DAN DUGAN	Model D	Auto mixing controller	8-ch. rackmount unit patches into console; balanced ins; reduces feedback; eliminates cueing errors; up to 96 mcs	\$5450	415-821-9776	178
D&R USA	Vision Series	Console	Extended bandwidth (10 Hz-100 kHz); user defined configurations; 4-band fully sweepable EQ and mic preamps; 12 to 100 in configurations	\$4000 and up	409-588-3411	179
DB TECHNOLOGIES	Model 3000	Sample-rate data converter	Format & sample rate conversion; acoustic bit correction; reference meter bridge; headphone monitoring	\$2995	206-842-8972	180
DBX	1024	Buffer amplifier	Matches XLR ins directly to the XLR outs, bypassing low level ins; extra set of -110 dBV buffered outs	\$239	510-351-3500	181
	760X	Microphone preamp	2 ch., transformerless design; 60 dB of sonic transparent audio; polarity reverse & phantom power switches; clip LED	\$349		
	274	Quad expander gate	4 ch. of user-selectable expansion or gating in any combination; patented VCA & RMS detection circuitry	\$449		
	296	Spectral enhancer	2 ch.; cleans up & details instruments, vocals & mixed program material; HF Detail circuitry; DynActive circuitry	\$349		
	266	Compressor/gate	AutoDynamic attack & release; new gate timing algorithms; separate precision LED displays; stereo or dual mono	\$299		
DDA	microFILE	VCA fader automation	8-ch. motherboards that link to under-console-mounted proprietary computer via ribbon cables	NA	616-695-4750	182
DELTRON DGS	700 Series	Multipole connectors	Chuck & screw-collar cable grips; squeeze-clip; plastic color coding	NA	800-292-2834	183
DEMETER	VTCL-2	Compressor/limiter	All-tube design; stereo; variable attack & decay; high quality VU meters; 40 dB of compression & limiting	\$1995	818-986-7103	184
DENON	DN-2700 F	Double CD player	16-bit stereo digital sampling nearly 6 seconds in length; seamless loop function; multi-range pitch control; jog wheel	\$2300	201-575-7810	185
	DN-770R	Bi-directional twin out deck	Play 2 cassettes at the same time; pitch cont. defeated during rec.; auto standby	\$650		
DIC DIGITAL	CD-R	Recordable CD	18-, 63-, & 74-min times; Orange Book standard in jewel box with 4pg insert	\$25-\$40	800-DAT-1-DIC	186
	AR-4000	DAT drive cleaner	Dry, non-abrasive tape in DAT-type enclosure	NA		
	HQ Series	High quality professional DAT	Microfinitly metal particle DAT tape; "jam free" shell design; "demo" length (10-min)	NA		
DIGIDESIGN	MasterList CD	CD mastering program	For Mac-based hard disk recording & editing systems; create masters on CD recorders, DAT recorders, or 8mm SCSI tape	\$995	415-688-0600	187
	Session 8	Mac version	8-ch. direct-to-disk digital recording; sequencer-style digital audio editing & computer controlled input patching	\$3995		
	Miles	Advanced pro control surface	Motorized faders; touchscreen; "soft" rotary knobs; transport control; autolocate controls; controls Pro Tools sessions	under \$7000		
	ADAT Interface	ADAT interface	Allows ADAT users to edit their multichannel tape-based sessions; offers Digidesign customers archiving option	\$995		
DIGITAL AUDIO	EdDitor Plus™	Sound Editor	Displays the soundfile being played while the new track is being recorded; displays both stereo tracks on the screen	\$349	612-473-7626	188
DIGITAL DESIGNS	DD181	Monitor	8" unit; shielded; bi-wired; tweeter/woofer controls; 38Hz-26kHz freq.	\$1099/1169	405-946-4500	189
	VSP	Control center	Utilizes a crystal oscillator device to reclock digital audio signals; reclocks any incoming frequency to 44.1 kHz	\$1495		

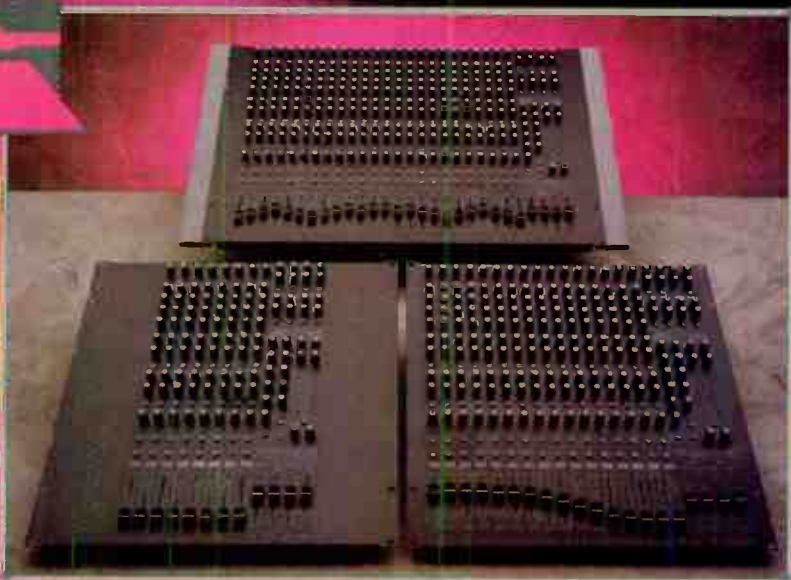
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BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
DIGITECH	GSP-2101	Studio preamplifier/processor	Combines DigiTech's S-DISC with a tube preamp in one unit; stereo reverb; digital effects; 12AX7-driven gain stage	\$999	801-566-8800	190
DIRECT RESEARCH	Direct 115	Multitrack recorder	Random access; 32 discrete tracks; 32 analog ins; 115 dB range; 20 bit resolution; 16 GB; track shifting; instant locating	NA	49-6151-711-624	191
DOD	231 Series II	Graphic equalizer	Dual ch.; 31 bands per ch.; 12 dB boost or cut; center detented pots in ISO standard centers; 20 Hz - 20 kHz	\$430	801-566-8800	192
DORROUGH	Model 280	Loudness meters	Specifically designed for measuring AES/EBU digital audio; horizontal mount; 40 dB range scale or expanded 60 dB scale	NA	818-998-2824	193
DRAWMER	MS00	Dynamics Processor	Combines 7 effects simul.; frequency selective noise gate; de-esser; compressor; expander; limiter; auto pan; auto fader	\$2300	508-435-3666	194
EAST-WEST	Dance/Industrial II	CD/CD-ROM Dance/Industrial	2-CD set; >1500 samples plus MIDI file for every loop; MAC, Atari & PC formats	NA	800-833-8339	195
	Zero-G	CD/Paul Hardcastle	Selection from the man who introduced the world to sampling with "19"	\$100		
	SoundArt	CD/Acoustic Drums	Suitable for jazz, dance or funk; dryer, unprocessed acoustic drums + cymbals	\$100		
EAW	SM 200iH	High definition stage monitor	1 x 12" two-way monitor; low-distortion titanium diaphragm compression driver; 90 degree conical coverage pattern	\$1645	508-234-6158	196
	SMS00V	High definition stage monitor	Low-distortion compression driver; loaded w/60-degree high frequency horn; 65Hz-18kHz frequency response	\$1825		
ELECTRO ACOUSTIQUE	PSP-2	Stereo preamp	Input & gain matching with the use of portable DATs in location recording	\$855	33-1-64-49-0542	197
	Micromix MKII	Location mixer	4 ins; 2 outs; pan pots; VU meters; peak level indicator; low cut filter; input faders; master fader; limiter	\$4080		
ELECTROVOICE	DLS223	Digital rotary speaker	"Rotating speaker" sound; provides quick access to the most used parameters; MIDI-learn; 24-bit digital proc.	\$1180	616-695-6831	198
EV/DYNACORD	DRP 10	Stereo reverb/room simulator	240 preset programs; 259 user memories; 24-bit digital processor	\$1250	616-695-6831	199
EMAGIC	Not.Logic Audio™	Mac sequencing program	Full score notation editor; 16-track digital audio recorder; fully integrated stereo source sample editor; supports DAE™	\$699	215-647-3930	200
ENSONIQ	ASR-10 2.0	Software upgrade for ASR-10	DiskTracks provides 2 tracks of hard disk recording; RAMTracks uses the ASR-10's internal memory	NA	215-647-3930	201
EVENTIDE	H3000SE	Studio Ultra-Harmonizer	Powerful pitch shifting; diatonic pitch shift algorithm; Vocoder algorithm; String Modeler	\$2995	201-641-1200	202
FOSTEX	D-10	DAT master recorder	Cue to modulation feature; on-board RAM; Instant Start; features eliminate pre-roll & loose cues; scrub control	\$2850	310-921-1112	203
	PD-2	DAT recorder	Internal generator writes & reads international standard formats (PAL/SECAM, NTSC); subcode address capability	\$11,495		
	Foundation 2000	Digital audio platform	6-piece rack enclosure; features proprietary software & hardware architecture for audio recording, mixing & editing	\$25,000		
	RD-8	Digital multitrack	Linear digital 8-track, ADAT-compatible recorder; sound file library storage & retrieval	\$4795		
FURMAN	Q-302	Graphic equalizer	Constant-Q response; "straight-wire" bypass; ±12 dB input & output controls; ±12 dB EQ at ISO 1/3 & 2/3 octave freq.	\$469	415-927-1225	204
GANE	G118	Fluid cooled subwoofer	600W; proprietary 18" cast basket; 35Hz-800Hz frequency response; 70 lbs.	\$700	416-690-3231	205
	SH15P	Fluid cooled loudspeaker	15"/HF 2-way proprietary 15" cast basket; dual PZT high freq. horn; 300W	\$500		
GEFEN SYSTEMS	M&E Organizer	Software System	Searches & locates sound effects libraries on Macintosh or PC computers; when interfaced with a CD changer also lets user audition effects	\$1995	818-884-6294	206
GENELEC	1035A	Active monitor	Two 19" rack mounted electronics systems; includes 6200 Watts of amplified power; 30Hz-22kHz frequency response	NA	508-435-3666	207
	1019A	Active monitor	Two-way compact near field monitor; 5" bass, 1" treble; crossover & amps inset on rear of enclosure	\$1249		
	1032A Producer	Near field monitor	Two-way console bridge; 10" bass, 1" treble; bi-amp system; crossover & amps inset on rear of enclosure	\$2249		
GENERALMUSIC	Sound Engineer	MIDI Controlled Audio Mixer	Programmable; Windows & Atari; mixing can be carried out with fixed scenes	\$5399-5999	708-766-8230	208
	LEM 2000	Live mixing console	24 or 32 ch.; 4 stereo input ch.; double stereo master controls; 4 groups; 8 aux sends; communications module	\$2799		
	LEM 4000	Live mixing console	40, 32 & 24 ch. versions; independent submix section; 4-band EQ; 10 aux sends for each ch.	\$5999 (24-ch)		
GML	8300	Mic preamp	Designed like the input module of the GML Master Recording Console; four ch. (2 or 4 in order); Discrete Bipolar Topology	NA	818-781-1022	209
	HRT System	Mixing system	Accommodates a maximum of 4 main & 4 aux busses; accepts XLR line level inputs from -20 dB to +4 dB	NA		
GEPCO	5524	Twisted pair cables	24 AWG conductor; 26 ohms/Mft nominal DCR; 1005 aluminum/polyester tape shielding; 26 AWG drain wire	NA	312-733-9555	210
GVP	H.E.A.R.	Lossless compression	Based on Entropy Coding; enables audio professionals to go beyond 16-bit sound & store longer audio tracks	NA	215-337-5809	211
HMB	Portadat PDR	Portable DAT recorders	4-head, 4-motor transport; analog & digital I/Os; monitor level control; SPDIF/AES/EBU digital I/Os; Time Control	\$4375-6995	207-773-2424	212

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
HMB	HMB DAT	Digital audio tape	Lower block error rates; improved archiving stability; reduced head wear; 15/30/48/62/92/122 minutes	NA	207-773-2424	213
ILLBRUCK	Sonex	Foam noise reduction	Anechoic wedge shape; NRC .70 to .95; positive & negative surface patterns	\$18/sheet	800-662-0032	214
JBL	MPA Series	Power amplifiers	Five models from 275W/ch. to 100W/ch. into 4Ω; Open Input Architecture	\$1419	818-893-8411	215
	SR6670A	Power amplifier	600 true watts long term current capability; XLR & 1/4" ins & Neutrik Speakon output connectors	NA		
	4400A Series	Studio monitor	Designed for recording/playback environments; 8" 4408A 2-way compact; 10" 4410A 3-way; 4412A 12" 3-way	\$325		
JLCOOPER	Autograph	Console automation	Supports several VCA & moving fader options including VCA Associates MTA-1537 & Penny & Giles moving faders	TBA	310-306-4131	216
	CuePoint	Autolocator/transport	MIDI Mach. Control; compatible with ADAT, DA-88 & hard disk recorders	\$800		
	dataMASTER	Synchronizer	For the ADAT; syncs to SMPTE or MIDI timecode without wasting a track	\$749		
JOHN HARDY CO.	M-1	Mic preamp	Dual range gain control & gain switch; polarity reverse switch; universal power supply	\$525 for mainframe	708-864-8060	217
JOSEPHSON	C700	Pressure & gradient mic	Allows pressure gradient components of the sound wave to be sampled independently; proximity effect	\$2400	408-238-6062	218
	KA11	Omni capsule mic	Natural resonances & rolloffs of geometry remain largely intact	\$340		
JVC	XD-P1 Pro	Portable DAT recorder	Designed specifically for field recording; very compact design; 10 Hz - 22 kHz; 90 dB S/N ratio; 90 dB dynamic range	\$1750	201-794-3900	219
KA0	CD-R	Recordable CD	Compatible with all existing system integrators & formats	NA	800-525-6575	220
KLIPSCH	KP-260	Compact loudspeaker	Flat frequency response; low distortion; trapezoidal cabinet; 12" die-cast aluminum frame woofer	\$850	615-689-2500	221
	KP-360	Compact loudspeaker	3-way full range; 15" die-cast aluminum frame woofer; midrange driver is mounted to a 60 x 40 degree Tractrix horn	\$1200		
KRK	Model 9000B	Monitor	2-way phase aligned; 9-inch woofer; 1 1/2-inch kevlar tweeter	NA	714-841-1600	222
KURZWEIL	K2000	V.A.S.T. synthesizer	ROM sample playback; digital sampling; sound design; comp.; line performance; sequencing; 60 DSP functions	\$2995	310-926-3200	223
LA AUDIO	4C	Comp/limiter/de-esser	4 ch.; full band limiting; single-ended compression; multi-band compression; +20 dB maximum output level	NA	44-0-71-9231-92	224

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BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
LA AUDIO	4G	Noise gate	4 ch.; high & low filters on each ch.; Selective Noise Reduction	NA	44-0-71-9231892	225
LANGEVIN	EQP1-A	Equalizer	Pultec-type; all discrete Class A line amplifier circuit; Western Electric passive EQ previously licensed to Pultec	\$2150	909-627-4256	226
	Electro-Optical	Limiter	Miniaturized LED/LDR components; 2 ch.; 20 Hz - 60 kHz; 80 dB S/N ratio -2 dB to 12 dB adjustable gain	\$1775		
	CR-3A	Cardioid capacitor mic	48 volt "phantom" power; -10dB "pad" attenuation & bass roll-off (high-pass filter); rigid stand mount	\$800		
LEXICON	NuVerb	digital effects processor	Plug-in card for Mac; 20-bit audio processing with AES/EBU digital in/out	NA	617-736-0300	227
	Jamman	Digital delay/sampler	Echo, Sampling & Loop functions; rackmount; "Tap Tempo" sets up a tempo by tapping on a front panel button	\$459		
	Alex	Digital effects processor	16 presets; 3 variable parameters per effect; 16 registers for storing personalized sounds; remote capabilities	\$399		
	Version 4.0	ROM software Upgrade	Extensive 480L update; 100 new sounds; mastering presets featuring PONS™ Psychoacoustic Noise Shaping technology	\$699		
	Classic Cart	Plug-in RAM cartridge	Designed to work in conjunction with v4.0 upgrade software; includes sounds from Model 224 Digital Reverb	\$699		
LIGHTWAVE	Fibox	Digital optical trans	1 or 2 ch. versions; 20-bit A/D converter; accepts line or mic level signals gain continuously adjustable from 8 dB- 70 dB	NA	214-503-0958	228
LONE WOLF	MediaLink	Real-time media network	Precise real-time, fault-tolerant performance; format independent; common carrier for many standard formats	NA	310-379-2036	229
MACKIE	8 Bus	Console	16-, 24-, & 32-ch. versions; EQ; overload LED; -20 dB LED; LED meter bridge	NA	800-258-6883	230
MARANTZ	CDR610	CD recorder	Capable of recording orange & red book standard CDs; supports AES/EBU, IEC-958, & TOS link optical digital formats as well as balanced analog inputs	\$4000	708-820-4800	231
	PMD740	6-ch. multitrack	3-band parametric EQ section; Sync Tone Isolation Circuitry; XLR mic inputs; four insert points; effects bus for five effects	NA		
MARK OF THE UNICORN	MIDI Express	Multi-cable interface	Up to 96 MIDI ch.; connect drums, keys & synth modules w/a the need for an additional MIDI switcher; SMPTE sync	\$349	617-576-2760	232
	X-or Universal	Version 2 upgrade	For Atari; controls wide array of MIDI synths/devices; features Editing, Librarian & Database functions	\$195		
MEYER SOUND	MPS-355	Loudspeaker	Comprised of two 5" low frequency drivers & a single 2" by 5" piezoelectric horn	NA	510-486-1166	233
MICROTECH GEFELL	M 300	Condenser mic	Cardioid polar pattern; Ideal for project studios; 40-20kHz freq. range; XLR-3 male gold-plated contacts	\$495	212-765-3415	234
	UM 70 S	Condenser mic	Switchable polar patterns (omni, cardioid, fig-8); low-noise FET input stage; balanced output; 10 dB preattenuation	\$1395		
	UM 925	Tube-condenser mic	Features classic M7 capsule; 3-directional characteristics (omni, cardioid, figure-8); 40-18,000 Hz freq. range	\$2495		
MIDAS	XL348	Live mixing console	40-ch. mainframe; 32 mono & 8 stereo inputs; 100 Hz-10 kHz sine wave generator; pink noise generator; full-throw P & G faders	\$64,386	616-695-4750	235
MIDDLE ATLANTIC	RSH	Custom-fitted rack shelf	Rackmounts virtually any component without its own mounting ears; cut to desired size; adjustable rear brackets	Varies	201-839-1011	236
MILLENNIA MEDIA	HV-3	High-voltage mic preamp	Stereo; discrete-hybrid technology with no pads, filters inverters, transformers, internal connectors or sockets	NA	916-363-1096	237
MOTIONWORKS	Motionworker	Studio control system	Serial synchronizer; console remote operation; controls all audio, video & film machines	\$3500 & up	44-865-790577	238
NADY	650 VHF	True diversity wireless	Rack mount; IF filtering; allows up to ten 650 systems to operate simultaneously; patented companding noise reduction	\$525	510-652-2411	239
NEMESIS	FBS1000	Foldback system	8-ch. mono or stereo versions; each mixer station has a pan pot/balance control for each of the 8 ch.; 3- band EQ	\$1480/8-ch. master unit	44-81-460-7299	240
NIGHT TECHNOLOGIES	EQ3	Recording equalizer	5 Hz - 330 kHz; virtually no phase shift; high control over sibilance; .005% THD; 6 bands; +29 dB maximum output	\$4300 w/power	818-377-8356	241
NORTHSTAR	EFX1/EFX2	CD-ROMs	Two CD-ROMs for the Emulator III & EHX; over 2000 samples; features office, destruction, combat, etc.	\$695	503-760-7777	242
	The Wizard	CD-ROM	CD-ROM for the Emulator III & EHX; 46 samples & 1891 presets contained on 58 CD-ROM banks	\$695		
	"Sample It" Loops	CD-ROM	CD-ROM for the Emulator III & EHX; includes 80 loops & 28 bass patches	\$395		
	Phase 4	CD-ROM	CD-ROM for the Emulator III & EHX; 85 banks of digital instrumentation; focuses on ethnic & world instruments	\$695		
NVISION	NV4448	Digital sample rate converter	Accepts all digital audio sampling frequencies & protocols; 24-bit DSP; synchronous or asynchronous conversion	\$5950	916-265-1000	243
OAP AUDIO	T-102	Flyable trapezoid system	10" woofer; 1" throat titanium diaphragm compression driver coupled horn to a 90 degree x 40 degree constant dispersion	\$718	404-945-1033	244
	T-152	Flyable trapezoid system	15" woofer; 1" throat titanium diaphragm compression driver coupled horn to a 90 degree x 40 degree constant dispersion	\$898		

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
OMNIMUSIC	OMNI-FX	CD sound effects library	12 CDs features hundreds of all digital tracks edited to :29 & :59 second lengths for commercials or promos	\$695 (\$75/disc)	800-828-6664	245
OPCODE	Studio Vision	1.5 Upgrade	Mac sequencer; supports 4-ch. compatibility w/AudioMedia™ I & II	\$995	415-856-3333	246
OTARI	Concept I	Console	Programmable master status switching; fader level & mute automation on both signal paths	\$55,000	415-341-5900	247
PANASONIC/RAMSA	SV-3700	ProDAT deck	AES/EBU input/output; high-performance A-D one-bit converters; high-res. 4-DAC system; 4-digit error rate display	NA	201-348-7846	248
PEAVEY	Audio Link	Splitter system	12/4, 16/4, 24/6, 36/12+ versions; Neutrik G connectors; protective metal cover attaches to 12 & 18 gauge chassis	NA	601-483-5365	249
	Series 2482	Console	In-line recording desk; discrete transistor low noise preamp in each ch.; 48V phantom power pad	NA		
	2400	Production console	36 primary inputs; 4-band sweepable EQ; 48 modules with 2-band EQ; master section includes MIDI Command Center	NA		
	SDR 20/20	Digital multi-effects processor	Stereo; up to 8 simultaneous effects; 1-U size; LCD displays; 2 banks of 128 programs per bank	NA		
	Midibase	Voice Module	16-bit module; 300 int. sounds; 24-bit dual effects processor; reverb, chorus	\$800		
	RSM 2462	Live mixing console	24 ch.; 8 low-noise mic preamps on 8 mono ch.; 16 stereo line inputs on 8 stereo ch.; 48V phantom power	NA		
PENNY & GILES	MM16	MIDI management	Separate merge & control parts each with six-way output splitters; data values can be saved in up to 128 memories	NA	310-393-0014	250
PRO AUDIO SYS TECH	Neve 80 type	Equalizer	Designed with 60s & 70s technology; 1U size; greater than +26 dB headroom above nominal input level referred to 0 dB	NA	44-0-353-669903	251
RANE	Flex FSC 22	Stereo compressor	HR format housing; separate threshold & ratio controls for each ch.; switchable attack/release time	NA	206-355-6000	252
	Flex FVL 22	Remote/VCA limiter	2 ind-controlled VCAs; accepts ramp voltages from +5VDC (digital) to +24VDC (doorbell), external pots from 10k-100k	NA		
	GE 60	Stereo graphic equalizer	2 separate ch. of 30-band interloping constant-Q filter with 45mm slider controls; 3U size; sweepable high/low cut filters	\$849		
	AD22	Audio delay	Dolby Time Link data conversion sys.; 2 ch.; 2 sets balanced inputs/outputs w/independent sensitivity & fail-safe bypass	NA		
RE-AN	48-Way Modular	Patchbay	Noise-free patching; modular construction; easy customizing of normalled, half-normalled & de-normalled without soldering or cutting wires	\$129	201-808-0063	253

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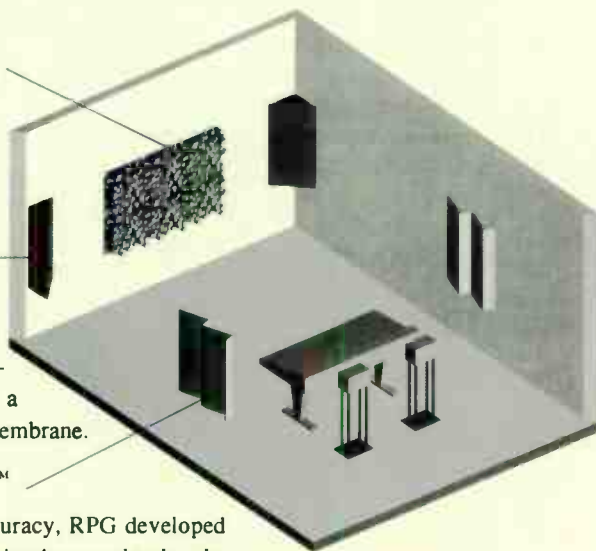
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Upper Marlboro, MD 20772
Phone 301-249-0044 • Fax 301-249-3912

CIRCLE 49 ON FREE INFO CARD

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
ROLAND	SDE-330	Dim. Space Delay	3-D sound localization technology; several conventional effects; up to 8-tap delays; 20 Hz-20 kHz; 44.1 kHz	\$1100	213-685-5141	254
	R-880	Digital reverb	Computer-based digital reverberation system that can be used to generate many space- & time-based effects	\$3995		
	L-CDP Series	CD-ROM sample library	L-CDP-01 features drums & cymbals; L-CDP-02 features guitar & bass; L-CDP-03 features orchestral percussion	\$175 each		
	Version 2.0	Firmware	Upgrades DM-80 DAW w/40 new features, such as audio profile display on the remote controller; Group Move	\$25		
SABINE	FBX-900	Feedback Exterminator	Digital signal processing; detects feedback, determines pitch & assigns 1 of 9 1/10-octave adaptive digital notch filters	NA	904-371-3829	255
	ADF-2400	Workstation	2 ch.; 12- or 24-band digital parametric filtering; digital shelving filters; delays; noise gate; multiple configurations	NA		
SAMPLEHEADS	Will Lee Library	Audio CD	Performances featuring Will Lee; 4-string, 5-string jazz basses; 12-string, 8-string, 5 & 4-string acoustic instruments	\$80	212-749-1613	256
SAMSON	S8	8-channel powered mixer.	300 watts @ 4 ohms; 10-band graphic EQ at main output; 4-band EQ per channel; phantom power; power meter	NA	516-932-3810	257
SCHOEPS	MSTC 64	ORTF stereo mic	2 MK 4 cardioid capsules spaced 17 cm apart & spread 110 degrees; the "T"-shaped dual amplifier is 12V-48V phantom-powered	\$2420	212-242-3737	258
	CMH 62	Pop vocal mic	Omnidirectional, 12V-48V "universal" phantom-powered; for close, hand-held use by stage-performers	\$1325		
SENNHEISER	MKH80	Condenser microphone	Transformerless design; highly immune to humidity; low inherent noise; symmetrical push-pull capsule design	NA	203-434-9190	259
SHAPE	Mark 10 SC Pro	Audio cassette	Patented Mark 10 independent bridge mechanism; high impact polystyrene offers superior scratch/shock resistance	NA	207-282-6155	260
SHEP ASSOCIATES	Classic	Class A output transformer	Designed by Rupert Neve to maintain the quality of classic Neve consoles	TBA	0763-261686	261
SHURE	FP22 Stereo+1	Portable headphone amp	2 1/4" or 3.5mm headphone feeds from any type of audio input; mix line or mic level mono signals (via XLR input)	\$375	708-866-2200	262
	Beta 87	Supercardioid condenser mic	Supercardioid; internal shock mounting; three-stage pop filter; also available in wireless version	\$420		
	FP32A	Portable stereo mixer	3 mic/line inputs; compatible with digital formats; 48V & 12V phantom & 12V T(A-B) power available	\$1795		
SONIC SCIENCE	Music Library	CD library	Features stock music created by North American composers	\$250	416-345-9211	263
SONY	PCM-9000	Optical master disc recorder	Two ch.; 16-, 20-, & 24-bit recording modes; uses Sony CLV magneto-optical disc; RS-422, SCSI, & DAQ-1000 interfaces	NA	201-358-4197	264
	PCM-E7700	Dual-Deck DAT Editor	Offers non-destructive editing w/o leaving digital domain; simple cueing; splice-style editing; analog/digital inputs	NA		
	MSD-1200	Magneto-optical media	Designed for PCM-9000 master disc recorder;	NA		
	MDU Series	Master digital 3/4" tape	VIVAX magnetic particles optimized for digital audio recording requirements	NA		
	Pro DAT Plus™	Digital audio tape	Optimizes studio recording & dubbing needs; designed for rigors of professional music, sound & dialog recording	NA		
SOUND IDEAS	Series 6000	Sound FX Library	Over 7500 sounds; contains new & expanded sound categories-animals, transportation, crowds	\$1495	416-886-5000	265
	Hanna-Barbera	Sound FX Library	2200 effects on 4 CDs featuring The Flintstones, Huckleberry Hound, Yogi Bear, etc.	\$495		
	Warner Bros.	Sound FX Library	5 CDs; 1500 sound effects that made Warner Bros. cartoons famous	\$495		
SOUNDCRAFT	DC 2000	Recording console	In-line w/moving fader automation & digital control; 24- & 32-input versions; 4-band EQ; touch-sensitive screen	\$25,000	818-893-4351	266
	SM 16	Stage monitor console	16 discrete mixes; dedicated stereo mixes; pre/post fader & on/off; 4-band sweep EQ; high pass filter; input metering	\$36,450 (32-in)		
SOUNDTECH	Panoramic	Compact mixer	Avionics grade, glass epoxy circuit boards; separate trim for mic, tape & line on each ch.; 3-band mid sweep EQ	NA	708-913-5511	267
SOUNDTRACS	Solitaire	Production console	24, 32 or 40 ch. configurations; ADP package provides gates, modulation & autopanning on each ch.	NA	516-932-3810	268
	Solo 8 Live	Live mixing console	Balanced mic inputs; 24-8-2 & 32-8-2 formats; group mutes; In Place Solo	NA		
STAGE ACCOMPANY	SA 1600	Power amplifier	550W/ch. into 2Ω; 10 Hz-20 kHz; Dynamic Damping protection circuitry; LEDs	\$2797	513-528-4035	269
	SA 2310	Graphic equalizer	Stereo; 31 filters; adjustable high pass filter; selectable range; LED bar; balanced ins & outs; no capacitors or ICs in signal path; 1 Hz - 100 kHz	\$2797		
	SA 20	Direct injection box	Solves interface problems between unbalanced sources & balanced inputs; phantom power supply	NA		
	C24	Subwoofer	Can be placed on four corners of dance floor; 80Hz-30kHz frequency response; 12" LF driver	\$2583		
STUDER	Dyaxis II	Assignable control surface	Moving faders; precision edit/scrub controls; track record controls; rotary knobs for EQ & pan	\$28,900 (8-ch)	415-326-7030	270
STUDIO TECHNOLOGIES	PreEminance	Mic preamp	12-68 dB gain range; 2 ch.; switchable phantom power; LED metering; balanced & unbalanced outputs	\$800	708-676-9177	271

EINSTEIN

to the RESCUE

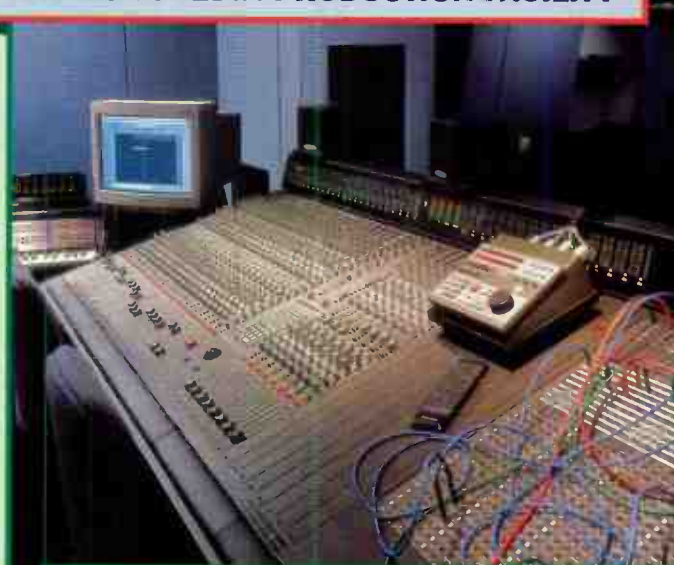
THE WRITER



'This is the perfect console for the writer/producer and you don't have to be ar. Einstein to use it!'

TERRY BRITTAN, winner of Best Writer and Best Producer GRAMMYS for Tina Turner's 'What's Love Got To Do With It?', London, UK

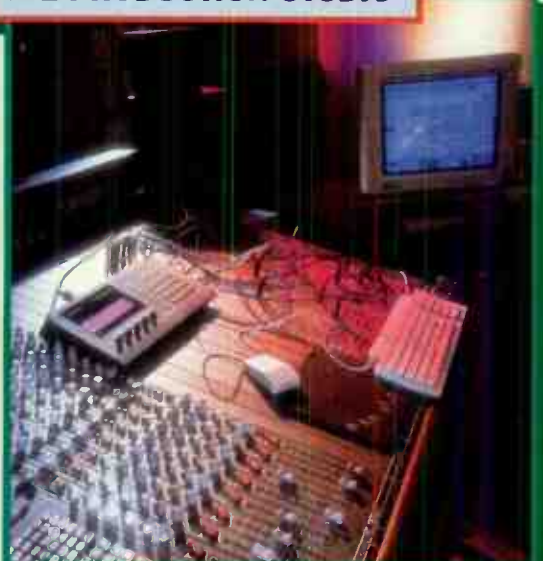
THE MULTIMEDIA PRODUCTION FACILITY



'Crawford's new Audio G room caters to our numerous advertising broadcast and corporate clients. This post-production suite centers around a 32 output PostPro SD and SONY 3324 Digital Multitrack. The EINSTEIN SUPER E console with SUPERTRUE automation gives us an incredibly compact and cost-effective way to bring all of these outputs into a quality signal path. We can mix all of the multitrack and PostPro SD channels and still have numerous automated effects returns with EQ.'

Steve Davis, Manager, CRAWFORD AUDIO SERVICES,
CRAWFORD COMMUNICATIONS Inc, Atlanta, Georgia

THE PRODUCTION STUDIO



'Apollo chose an integrated digital recording environment for music production. The heart of our system is a Mac Quadra 950 running CUBASE AUDIO linked to two Alesis ADATs and two AKAI S1100s. The virtual nature of the system means that we need plenty of ultra high quality audio inputs and high speed, accurate automation. When you weigh it up, what else is there but AMEK's EINSTEIN?'

Calum Maclean & Andy Haldane
APOLLO RECORDING, Glasgow, Scotland

THE AUDIO-FOR-VIDEO STUDIO



'Sophisticated audio for video production demands a console with lots of inputs, great flexibility and powerful automation. For my new studio I demanded all of this, plus a clean layout, compact size and a reasonable price. AMEK's EINSTEIN was the clear choice. It was the easiest equipment decision I had to make!'

James Klotz, Owner/Engineer, SYNCHRONIZED SOUND, Atlanta, Georgia



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CIRCLE 17 ON FREE INFO CARD

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
STUDIO TECHNOLOGIES	AN-2	Stereo simulator	Creates 2 incoherent signals from 1 source; simulates the sound of a spaced pair of mics w/o loss of mono compatibility	NA	708-676-9177	272
STUDIOMASTER	P7	Recording console	Expandable to 40 x 8 x 40 x 2; 88 equalized inputs; in-line design; 4-band EQ; 48V phantom power; 6 aux sends	\$4195-9070	714-524-2227	273
	Stagemaster	Live mixing console	4 configurations from 18 in/8 out to 40 x 8; compact design; 48V phantom power is available on all inputs	\$3750-7920		
SYMETRIX	601	Digital Voice Processor	High quality; parametric EQ; dynamics processing; delays; intuitive interface	\$1995	206-282-2555	274
SYTEK	A-SYS MPX-4D	Mic preamp	Digitally controlled; hybrid transformerless design; Class A Auto-Bias Bridge Configuration input stage amplifier	\$1200	312-588-4477	275
	A-SYS EQ4XM1	Parametric equalizer	Auto-stabilized true state variable filter Bessel Polynomial with no interaction between frequency & Q	\$1400		
TACTILE TECHNOLOGIES	M4000	Mixing system	Separate Digital Controller and Audio Processing Center (APC) allow for freedom in designing studio, touring or stage layouts; fully automated	NA	310-802-1500	276
T.C. ELECTRONIC	M5000	Digital signal mainframe	Modularized A/D, D/A & DSP sections; 2 ind. stereo proc. with analog/digital I/O; software-based effects/presets	NA	805-373-1828	277
TAD	TCM-1821	Two-way system	18" woofer; 22-20,000Hz; 4,000W maximum input power (music); 368 lbs.	NA	310-952-2415	278
TANNOY	PBM Mark II	Near field monitors	Features PBM 5,8 & 6.5; injection-molded cone; soft-dome HF element; rear-porting; gold-plated five-way binding post	\$295-575	519-745-1158	279
TASCAM	DA-60	Studio DAT recorder	4 heads; RAM buffer; Auto Punch In/Out; Rehearsal; gapless punching; pitch control; full SMPTE/EBU chase lock sync	\$6000	213-726-0303	280
	RA-4000	RAM recording/editing system	Dedicated buttons for all editing functions; large transport controls; 2 input ch.; 4 analog outputs; 200 MB drive	\$5499		
	DA-88	Digital 8-track recorder	Hi-8mm tape format; up to 16 units may be locked together; offers full SMPTE/EBU chase lock synchronization	\$4499;		
	SY-88	Sync card	For Tascam DA-88 8-track digital multitrack; full SMPTE/EBU chase lock synchronization; no loss of tracks	\$799		
TDK	SM Series	Demo length audio cassettes	Delivers high reproduction; Super Avilyn™ high-bias formulation; comes in 10, 20, 30 & 60 minute lengths	NA	800-TDK-TAPE	281
TECH 21	PSA-1 SansAmp	Tube amp emulator	Digitally programmable; 100% analog circuitry; 49 tube amp sound presets; 49 memory locations; 98 virtual tube amp	\$795	212-315-1116	282
	SansAmp DI	Direct box w/phantom power	Phantom & Ground Engaged: Phantom power through the XLR Out Disengaged: ground lifts, phantom power disconnects, and 9V battery activated	\$195		
TECHRON	AcoustaEQ	Equalization Software	Gathers & displays a sound system's equalized frequency response, unequalized freq. response, & the inverse	\$300	219-294-8300	283
TEKTRONIX	AM700	Measurement set	Portable, self-contained; analog & digital generators & acquisition units; internal CPU & DSP; requires no PC or monitor	TBA	503-627-2438	284
	Pathfinder AM70	Analyzer/generator	Identifies & solves digital format problems; troubleshoots analog or digital distribution systems	TBA		
3M	908	Audio mastering tape	Low print, low noise; for location & dialog recording with 3dB improvement in signal to print	NA	612-733-3477	285
	275LE	Digital mastering tape	Outstanding performance in high-density digital recording; lower drop-out rates; compatible in DASH, DMS & PD	NA		
TIMESTREAM	MC/48	Visual Conductor	Replaces click tracks & metronomes using light patterns that mimic the motion of a conductor's baton; preset patterns	\$249	212-724-1794	286
TOA	SR-F05	Two-way loudspeaker	Bass-reflex; features 10" transducer which provides low frequency response down to 60 Hz	NA	415-588-2538	287
TOROID	Toroidal	Power transformers	Generate very low magnetic strayfield emission; typically 85% less an E/I transformer; 50% less weight	Varies	410-860-0300	288
TUBE-TECH/ AUDIOTECHNIQUES	PA 6	Headphone amplifier	Designed for high-quality studio headphone monitoring; 5W output power; 5 Hz - 80 kHz	\$2137	45-31-71-00-21/ 212-586-5989	289
	LCA 2A	Compressor/limiter	5 Hz - 50 kHz; -85 dBm; variable ratio compression from 1.6:1 to 20:1; variable limiting threshold: off to 0 dBm	\$2993		
	PE 1C	Passive equalizer	Tube push-pull amplifier; 4 low frequency boost/attenuate; 10 high frequency boost with variable bandwidth	\$1715		
TURTLE BEACH	56K	Digital recording system	Operates on Intel-based platforms to create a stereo DAW	\$1295	717-767-0200	290
UREI	Platform	Signal processing	Flexible building block design; line includes a series of signal chain electronic cards; special bus	\$325-490	818-893-8411	291
USCO	DFW-3	Reference monitor	Three-way monitor; small front baffle size; 6.5" woofer	\$690	213-465-4370	292
	DB-2N1	Subwoofer System	Mono summing subwoofer; 10" polywoofer with foam surround; 1 20 Watts music; high-pass feed thru	\$345		
VEGA	662B	UHF wireless receiver	Local area network interface capability; extensive internal shield; guitar equalization circuitry	NA	800-877-1771	293
	AX-22 HE	Wireless mic system	Configured around the R-22 true dual-diversity receiver; includes T-28 transmitter; XLR mic-level audio output	\$1335		

BRAND	MODEL	TYPE	DESCRIPTION	PRICE	TEL	LIT #
VEGA	T-682H	UHF transmitter	Internal dipole antenna; with Shure SM85 electret condenser cardioid element; 140-150 mW output power	\$1620	800-877-1771	294
	T-688H	UHF transmitter	Same as T-682H, but with ElectroVoice N/D757B Series III dynamic supercardioid element	\$1524		
WHIRLWIND	Medusa	Multiwiring systems	WC3F female XLRs/WC3M male XLR / WCQF 1/4" returns wired to a fan-out w/ W13M male XLRs & W13F female XLRs	\$104-880	716-663-8820	295
WIREWOKS	Splitter Series	Microphone splitters	Transformer isolated; XLR-input multi-ch. splitters in both MultiBox & MultiRack configurations	\$266-457	908-686-7400	296
YAMAHA	M2000	Console	16, 24, 32 or 40 mono ch. ins; 128 scene memories; fail-safe preview button	NA	714-522-9011	297
	DMP9	Digital mixing processor	16-bit/18-bit D/A conversion; digital ins/outs allow for 20- / 24-bit interface; 2 multi-effects processors; reverbs; delays	NA		
	CBX-D5	Digital recording processor	4-track configuration; 16-bit reproduction system; internal CPU; 4x4 digital mixer; 82 preset effects	NA		
	WaveForce™	Live sound loudspeakers	Models include compact WF206; WF112 & WF115 full range systems; WF112M floor monitor; WF215SB subwoofer	NA		
	Project Manager	Software V 3.0	Control & edit parameters on the DMC1000 Digital Mixing Console from Mac	NA		
YORKVILLE	SY-35	Music synthesizer	2/4-element voices; 128 preset AWM waveforms; 256 preset FM waveforms; 64 preset voices; 64 user voice memory	\$899		
	Audiopro 3400	Power amplifier	1200W per ch. continuous into 4 ohms; 2 rack spaces; Energy management system; toroidal power supply	\$1679	716-297-2920	298
	YSM-3	Studio monitors	5.5" midrange driver; high-powered 12" low frequency driver; 1" hyperbolic dome tweeter; 35Hz-20kHz	\$998		
	Pulse PW	Powered subwoofer	Computer controlled; 600 Watt amplifier; dual 10" high BL magnet speakers; 3/4" poplar plywood construction; 40-100Hz frequency response	\$899		
Z-SYSTEMS	EX-350M	Stage monitor	350 Watt elite; 102 dB sensitivity from a 12" with horn enclosure	\$849		
	Z-1SRC	Sample rate converter	AD1890 chipset; external synchronization; AES/EBU, S/PDIF, coax, optical, XLR connectors	\$1800	904-371-0990	299
ZOOM	Player 2020	Guitar multi-effects console	Fully programmable; digital signal processing; pitch shift; phasing; flanging; tremolo; chorus; auto arpeggiator	\$370	516-932-3810	300

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BAND



NOT SO EASY RIDER
PAGE 72

LIVE SOUND FOR THE GIGGING MUSICIAN

**CHICK
COREA
GOES
MINIMAL
ON
TOUR**



INSIDE: ROAD TEST: STEWART
PA-1800 POWER AMPLIFIER

TRAVELING LIGHT

■IN CONTRAST TO past Elektric Band tours, the basis of Chick's current touring setup is simplicity, and a return to "the way things used to was." Before the tour, we (see "Cast of Characters") sat down with Chick and went through each song deciding which synths were absolutely need-

ed. We would even reprogram sounds from one synth module to another if it meant not having to take the original (synth). Please keep in mind that Chick's live setup interfaces seamlessly with his home studio (Studio 5's, ADAT, etc.), allowing for very little downtime between the two settings.

CHICK COREA IS WORKING WITH LESS THAN HIS TYPICAL RACK ON HIS PAINT THE WORLD TOUR, BUT STILL GETS ALL THE BENEFITS OF A BIG RIG

BY DAVID FRANGIONI AND BOB RICE

The touring system consists of a grand piano miked with two AKG 414's and a Barcus-Berry Planner Wave System. The piano has been modified by Brian Alexander of Key One to allow Chick to play while standing up. The piano is lifted onto large black pylons. A pedal lyre extension has been fitted to the piano and play.

Down stage of the piano, directly next to it, is a

modified Fender Rhodes piano with the Gilbransen Crystal MIDI System. The Rhodes audio is processed through a Tube Works Blue Tube instrument preamp. This allows Chick to recreate the crunchy overdriven sound he used to get from all those horrible rental Twin Reverbs he had to play during the '70s. On top of the Rhodes is a Yamaha SY99. Resting (not so) comfortably on top of the SY99 is the previously mentioned Blue Tube as well as the remote



DELAYS

ECHO

Alex

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SO LITTLE MONEY.

CHORUS

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Alex also features a footswitch input for stepping through the registers either sequentially or in your own customized "register chains" (to match a set list for example) - without needing MIDI to make it happen!

Alex is the latest in a range of classic digital effects processors that can be heard in all the right places - from the top players to the finest studios.

Check-out Alex today at the finest professional audio dealers.

Lexicon

HEARD IN ALL THE RIGHT PLACES

INVERSE

STRING
HALL

GUITAR
ROOM



controller for the Forte MIDI Mentor (MIDI patchbay/processor).

The Mentor is the brain of the system. It is used to route all input devices, preset all patch changes, preset MIDI volumes, preset reverb send levels (by assigning a continuous controller to the digital input attenuation parameter on the PCM70).

One neat thing we tried was to route the output of the

Yamaha TX802 through the Mini Moog external input. This effectively creates a fourth oscillator source to go through the Mini Moog filters. The MIDI is sent to both the Moog and the TX. The byproduct of this is that the Mini Moog becomes polyphonic! (Well, kinda.) The beautiful simplicity of it all is that this feature is the result of one 1-foot 1/4-inch to 1/4-inch cable. It also freed up

two additional channels on the mixing console.

We tried all kinds of wah-wahs, chorus pedals, and multieffects units to get more distortion effects for synths. The best-sounding stuff came out of the Blue Tube. The noise floor comes up, of course, and there's always potential for a 60 cycle hum, but that's just another way to get back that "warm analog sound." ☺



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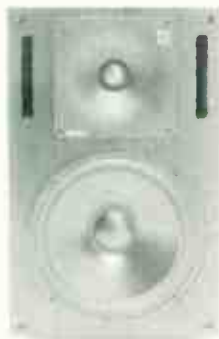
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— GEORGE MASSENBURG ON THE 1031A

THE GENELEC 1031A IS A TWO-WAY
ACTIVE MONITORING SYSTEM WHOSE
PROFILE IS ONLY SLIGHTLY LARGER . . .
THAN THIS PAGE.

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Max. peak SPL @ 1m from the engineer: >120dB
Drivers: 8" woofer / 1" metal dome tweeter
Bass amplifier power output: 120W
Treble amplifier power output: 120W
Weight: 26 lbs.

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EQUIPMENT LIST

Yamaha C7 grand piano on stilts
Fender Rhodes (modified w/Gilbransen MIDI System)
Yamaha SY99
Yamaha KX5 with Gambatte MIDI wireless system

RACK 1

Studiomaster 16x4x2 mixer (rack mounted)
Akai S1100 with 16 MB, IB104; PS Systems removable 44 MB SyQuest Lexicon PCM70

RACK 2

Tube Works Blue Tube (wired as effects send/return on mixer)
Mini Moog w/Studio Electronics MIDI modification (MIDI Moog)
Yamaha TX802
Roland D-550
Forte Mentor Patchbay/Processor
Walter Woods amplifier
Bag End TA-12 speakers on stands [2]

MISCELLANEOUS

Piano Wedge: Bag End TA-12
Down Stage wedge: Bag End TA-12
Volume pedal (for KX5 sounds): Blue Tube channel switcher pedal

NEAT STUFF

TX802 is routed through the Mini Moog ext. input to allow for filter control of FM synth and pseudo-polyphony of the Mini Moog.

CAST OF CHARACTERS

David Frangioni – system design/MIDI Consultant
Bob Rice – system design/MIDI Wrangler
Eric Seijo – Music Production Assistant
Larry Mah – system wiring/audio consultant
Darren Hynes – tour keyboard technician

Aphex Aural Exciter[®] Type C² with **BIG BOTTOM**™

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"Doesn't sound artificial." Nick Batzdorf, *Home & Studio Recording Magazine*

"Can make your rig sound bigger without bottoming out from too much EQ." Scott Malandrone, March 1993 *Bass Player Magazine*

It's a better Aural Exciter, too

"Silkier" Anderton, *EQ*

"Increased clarity, added brightness and better stereo definition." Paul White, *Recording Musician Magazine*

"I found it to be quieter and a real snap to use." Richard Chycki, *Canadian Musician Magazine*

Simple

"Everything works simply and easily." Michael Marans, February 1993 *Keyboard Magazine*

"Extremely easy to set up and use." Batzdorf, *H&SR*

Satisfied

"This box is a godsend. Kudos to Aphex. I was delighted." Anderton, *EQ*

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Malandrone, *Bass Player*



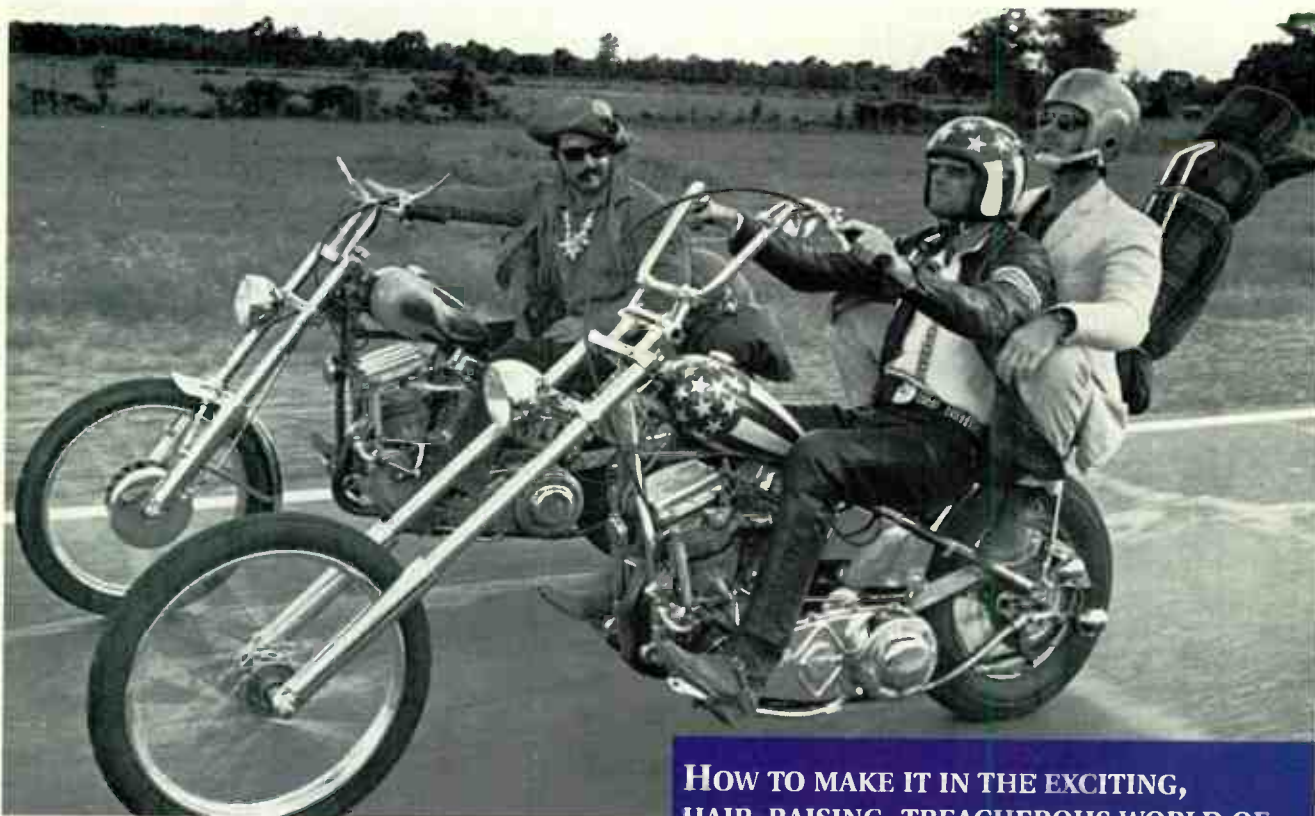
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Not So Easy Rider



**HOW TO MAKE IT IN THE EXCITING,
HAIR-RAISING, TREACHEROUS WORLD OF
PROMOTER PROVIDES**

BY SCOOTER SCOTT

■ **ALL THE PHONE** calls have paid off. (Yes!) You got the gig. You're going on tour to mix "the next big thing."

You're elated as you call your production manager (PM) to get your itinerary. Well, your PM not only spells out your itinerary, but he also gives you a list of every sound company in every town between New York and Los Angeles and then tells you to, "Call them up and get what you need. Bye."

Huh? No truck? No MSL IIs? No PM 4000? Prepare yourself for one of those painful "growth experiences." Welcome to the world of promoter-provides concert.

What is a promoter-provides (P-P) concert? Quite simply, the promoter provides all sound and lighting required by a rider for a concert. In some instances, a portion of the backline may accompany audio and

electric hardware. What this does is lower the purchase price to the promoter and the overhead to the band. By not paying for trucks, fuel, drivers, sonic and light gear, and attendant technicians, costs for the tour/concert are significantly reduced.

Performers also cut out a considerable chunk of weekly payroll, travel, and per-diem expenses. These savings can be used to help hire quality people (such as engineers like yourself) in key positions, and are passed on to the promoter in the form of a lower purchase price for the group. The promoter, in turn, can use leverage with his own audio and electronic resources to further improve his bottom line.

Sounds simple, but don't be fooled. You have entered a world where Murphy's Law is the order of the day. The only way you

can survive in it is to be informed and prepared. Calling all over the country from the list your PM gave you may be a pain, but it's part of your survival training.

The landscape you'll be covering has three basic features (i.e., types of shows):

1. A "one-off" (i.e., a single show or short series of concerts) is the most common type of P-P concert. If you get enough one-offs successfully behind you, you can manage just about any P-P situation, because one-offs address virtually all the P-P circumstances you might encounter. Often these shows are benefits (e.g., Live Aid). One-offs also include promotional tours and television appearances.

2. Low-budget tour packages are typically P-Ps.

Many times, foreign or lesser-known bands will assemble packages that fall within P-P parameters.

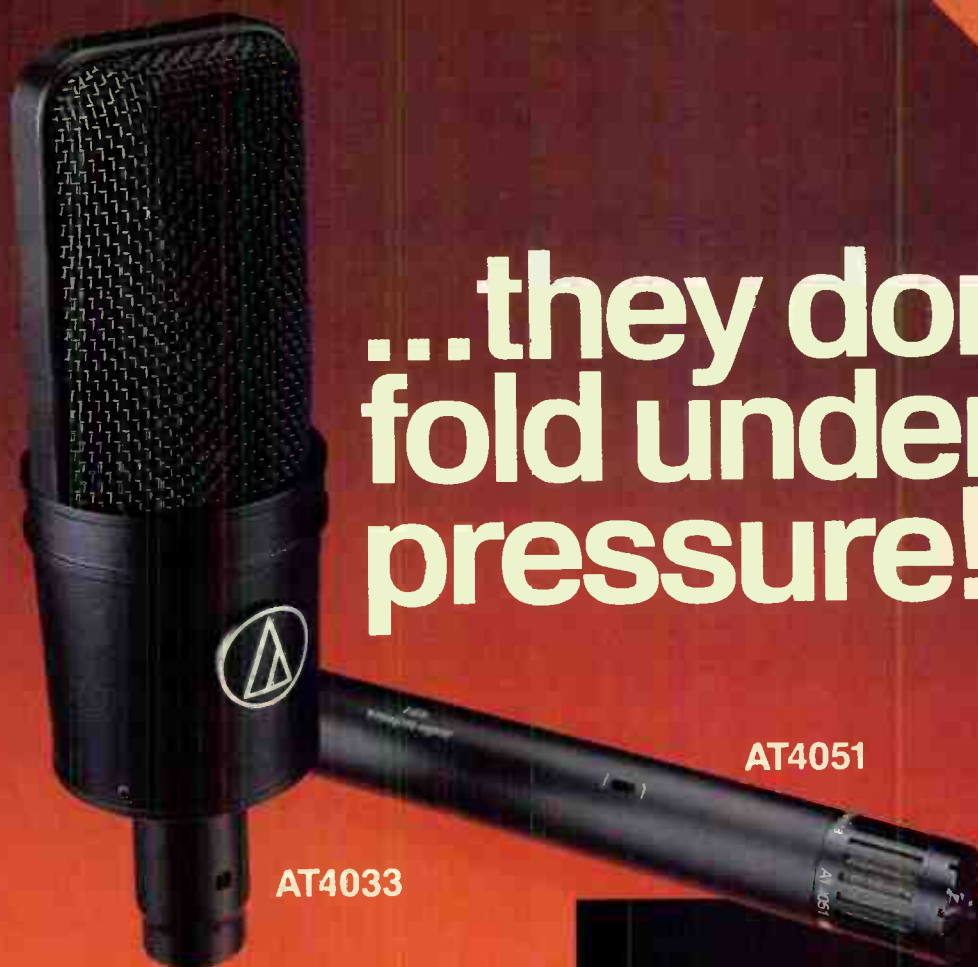
3. Lastly, cash-poor, up-and-coming bands often are baptized in P-P club tours.

Keeping the objectives and roles of the tour's featured players straight is key to successfully avoiding the perils inherent in P-P gigs. And we're not talking about the performers either.

MEET THE GANG

The first featured player is the promoter. Always remember that the promoter buys bands' services so that he or she can charge admission for folks to see them. On truck tours, where the production companies or artists handle the technical and other supports, all

...they don't fold under pressure!



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Josh Leo *Producer*

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I've got to stress the flexibility of the 4051. It's so clear and present on the acoustic guitar and piano, yet it gave us the grit and honest sound we wanted from the Marshall. We must have tried a million microphones, but on both power chords and leads the 4051 held up better than any other.

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Jeff Giedt (standing), Josh Leo (center, seated), Steve Marcantonio (standing), Larry Lee (seated, far right)

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Some recent Josh Leo/Larry Lee/ Steve Marcantonio/Jeff Giedt projects:

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the promoter basically has to provide is a safe stage, electricity, stagehands, and catering. In assuming responsibility for the hardware (and paying for it), he reduces his costs, but he also shoulders more of the weight for managing the show's variables. But keep in mind that he's not there to solve your problems. Your best friend, the next featured player and head hon-

cho on the tour, the production manager, is.

The PM generally oversees all aspects of the production, down to such details as transport times for sound, light, set, and crew. His objectives are to get the show on the road, get his people the resources they need, and to make things happen on time. If the PM does quality advance work (especially if he makes all

those equipment calls mentioned earlier) he's really a friend.

And then there's you, the engineer. You're on the tour to present the artist's sound and "feel" (i.e., acoustic personality), as consistently as possible. Doing this can be a snap — if you're lucky enough to have the same set of transducers, mixers, and processors each night.

But this is not your lucky day. You've got a P-P gig, so you'll have to accomplish your objective the hard way.

SURVIVAL OF THE FITTEST

The foundation of your survival is the thoroughness and quality of the advance. Assess all your sonic needs. Sit down with your PM and explain your decisions and priorities. Be meticulous. You need your PM's authority and backing to establish the rules for your endless hardware exchanges (and to keep folks from messing with you). No matter how thorough and clear you've been, always expect snafus and be prepared to unsnarl them.

Remember that, like luck, you have to create your own opportunities in this business. For example, as the production manager and sound engineer for Majek Fashek, I was responsible for the group's appearance on *Late Night* contracts — so I should have kicked back and rested easy, right? Wrong again. Promoter-provides paranoia had me at the studio hours early, and what did I find? It was what I didn't find that was the problem. Rental gear I had clearly, specifically, and consistently requested was missing. When it comes to fixing screw-ups, time is the engineers' most precious resource. Since I had created "extra" time, calls were made; gear was delivered; and it turned out to be a perfect show. The other rule here is that it is especially important to be paranoid about a one-off, for it's the least-forgiving of shows: There is no performance tomorrow to erase tonight's disasters.

Tour packages are more accommodating of screw-ups or failings. In packages, the first week generally is allotted to acclimation. If the tour-production manager does a competent job of pulling the pieces of the tour

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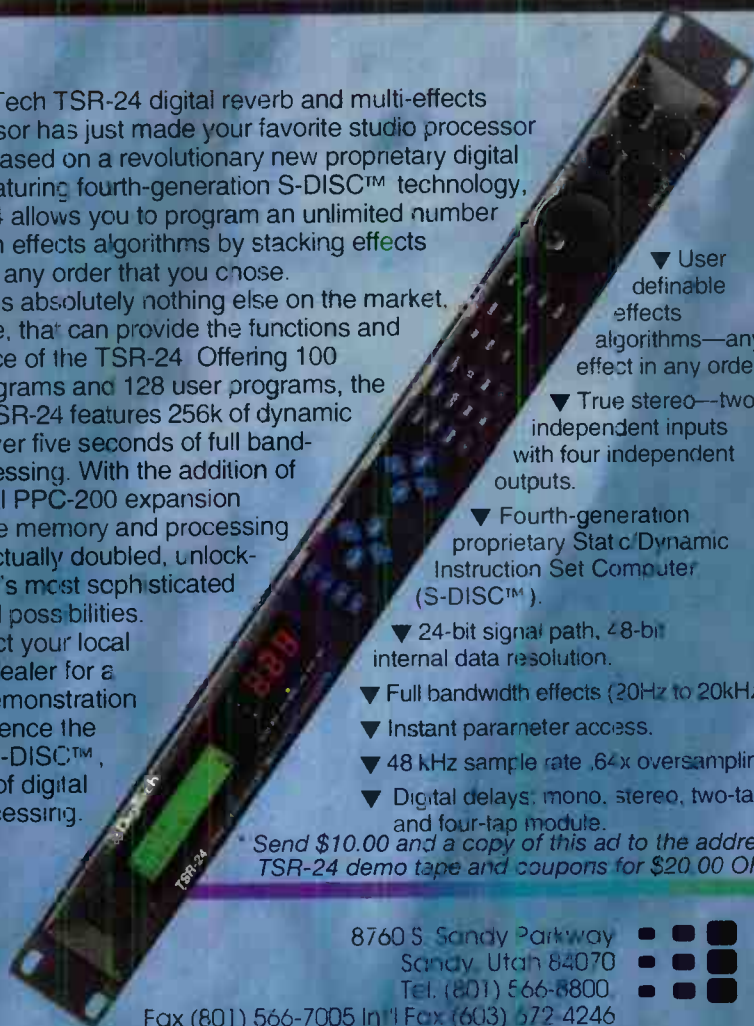
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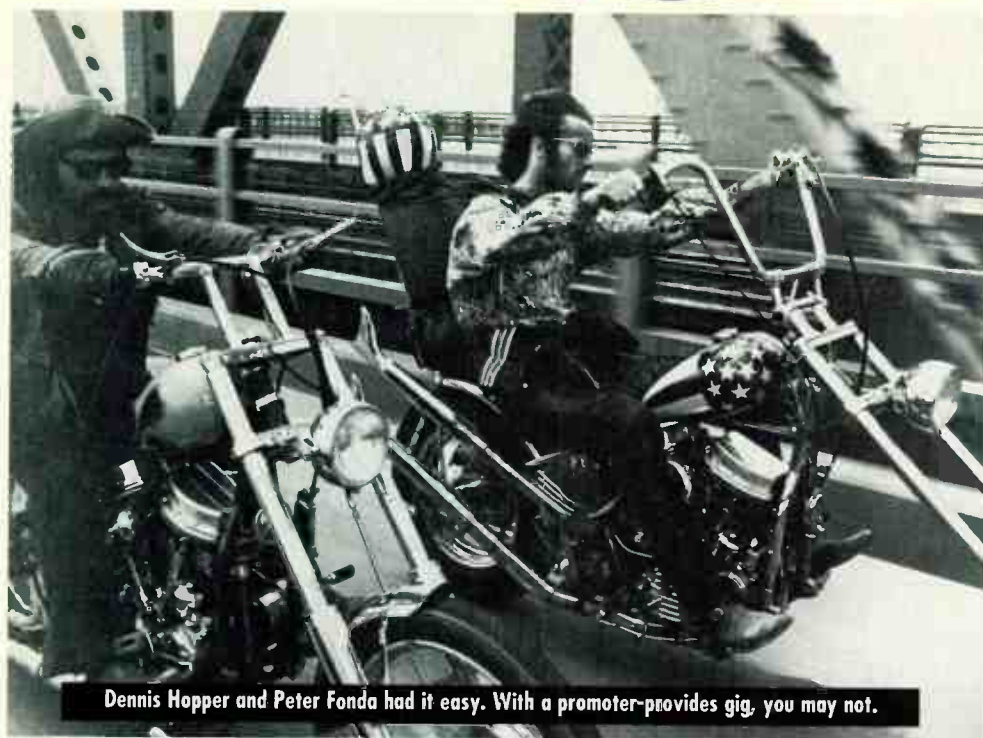
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CIRCLE 31 ON FREE INFO CARD



Dennis Hopper and Peter Fonda had it easy. With a promoter-provides gig, you may not.

operation together, your job comes as close to "a walk in the park" as promoter-provides get. If you do your part and establish your priorities with him or her, early on and as best you can, you should be set.

Club tours are completely different animals. Your group's PM is doing the advance, which puts you right next to him in the crosshairs when Murphy decides to bag one. Since clubs traditionally own or rent PAs from the Stone Age, the tour will fly or flop depending upon how creative you are about doing a little magic, which usually involves some borrowing, coaxing, conniving, bribing, and threatening to get what you need to kick some decent response out of those relics.

Another tool is the ability to learn from the past. In my young and tender (read: stupid) days, when I was advancing a show for Lisa Lisa and Cult Jam, I inquired about power. The dudes assured me that all was "More than adequate." Right. The minute I started

to move some air with the subwoofers, Poof! The circuit breakers blew on the front-of-house amplifiers. The monitors allowed the band to finish the song while I redistributed the AC load, but you-know-who was not pleased or really impressed with my save. The lesson I learned and pass on is to never trust what you haven't seen, inspected, and tested.

BRAND NEW BAG

My favorite survival tool by far is my "bag of tricks." And, just like Felix the Cat, I open mine in times of trouble. My bag starts in my mind with a do-more-with-less attitude. Just knowing how to troubleshoot a system and effect simple solutions or repairs is a handy trick. Using that little basis in Detroit, I "saved the life" of a misconnected dbx 900 that was full of vital processing. Other basics are connectors and adaptors — the nuts and bolts of audio assembly. *Carry them.* No mic connector is safe from me because I always have a Leatherman and a Porta-

Sol. Never underestimate the power of microphones. They are the only part of the transducer chain that you can easily take with you.

From the basics, a natural progression is to go to controllers and effects. Lord among these is the MRC or Fast-Faders type. Real-time manipulation of parameters and the ability to carry programs with you give you back some of the control and consistency that promoter-provides gigs take away from you. No money to buy them? Don't sweat it; you'd be surprised how often they show up. Knowing how they work and some practice on the units can almost be like having your own. Write down the settings you like. I've seen some engineers travel with their own rack. All hardware exchanges are combatted by ease of access to various performance sounds night after night. This won't help you on TV, but television studios rarely lack processing.

You can start a bag of tricks just by knowing how to

make pitch change "C" on an SPX 90 chorus. From there, let your own taste be your guide. A slick trick is to have the "Playmate" footswitch for the Roland SDE (1000, 2000, or 3000 series). These units are everywhere. I also carry a Micro Verb or SE-50 just in case. Compressors and gates also find their way into my bag because you never know.

After my basic tool kit, a fundamental knowledge of effects programming, and my SE-50, I'm looking for more gain and noise control. This is the age of ultra-clean and controlled sound reinforcement. In keeping with portability and the more-with-less approach, I lust for a CAD polyframe and a DP4, not to mention a CR1202. (Is anyone reading this?)

Even lacking these tricks for my bag, I can't complain. Those I do have allow me to pull a big sound. They also allow me to make sure all my fundamentals (like channel inputs) are working. I can enhance what's on my table in simple but effective ways. Having lost a lot of blood (and spilled some) while growing up and growing professionally in the promoter-provides jungle, I'm also prepared to apply myself and my hardware to monster messes that require tricks that are not quite so simple. And when it works, it's *great*.

There you have it — a long look inside my bag of tricks. So if a promoter-provides gig comes your way, go for it. Don't despair: there really are cities in between all those villages with thatched huts; viewing the country by bus is great fun; truck stop food has gotten better for the most part (except in the Midwest); and you can learn a helluva lot in one P-P tour that might take you years otherwise.

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PA work, DJ'ing, and, of course, parties. PAPA, in my opinion, outperforms setups costing much more and the size-vs.-performance ratio is unbeatable.

Most sound-reinforcement bass bins use ported

reflex enclosures, which are 3-6 dB more efficient than PAPA's acoustic suspension enclosure. Efficiency was important back when power amps were expensive, but the tradeoffs are uneven low-end frequency response and a drastic drop in acoustic output for frequencies below the port's cutoff frequency.

Mids and highs are generally produced by a small compression driver coupled to some type of horn. The benefits are a reduced number of drivers and a controlled dispersion pattern, but it's difficult (and expensive) to have one small driver convert lots of electrical power into sound. Instead, PAPA uses an array of small drivers to reproduce the mids and highs (hence the term "Phased Array").

A SOUND DESIGN FOR SOUND

Since bass frequencies require more power to reproduce and distortion is most noticeable at high frequencies, PAPA is a biamped system (e.g., it consists of two speaker/amp combinations, one for low frequencies and one for highs; double this for stereo). Biamping lets you drive the bass amplifier almost into clipping while running the highs from a smaller amp well below clipping. I used a pair of Carvin stereo amplifiers (500 watts/channel for the bass bins and 225 watts/channel for the mids and highs), but other amplifiers with similar power ratings will work fine. Biamping also requires a crossover network; see the sidebar.

Each bass bin (which also makes a great subwoofer for existing systems) uses a Carvin 400 watt, 15-inch professional sound-reinforce-

ment woofer. A second enclosure with eight 4 1/2-inch full range drivers and two 1-inch soft dome tweeters handles the mids and highs; this mounts on the end of a 2-foot pipe attached to the bass bin, which elevates the mids and highs about 7 feet off the floor (fig. 1).

THE BASIS OF BASS

There's a formula to figure out the optimum volume for an acoustic suspension enclosure. Using the Thiele/Small parameters for the woofer and selecting a Qbox of 0.7 (for the flattest frequency response and least "boominess") yields an optimum volume of 5.5 cubic feet. Use the "golden rule" for acoustic suspension enclosures to calculate the box dimensions, namely that the width x height x depth ratio be 1 x 1.6 x 0.6.

Multiplying the dimensions together gives $V_{box} = 0.96 \times Z^3$. Solving for Z gives 1.79 feet (21.5 inches). Our full dimensions are therefore 21.5 inches, 12.9 inches, and 34.35 inches. The actual dimensions are pretty close to theoretical, as shown in fig. 1. An internal brace from front to back reduces box vibration, and lining the box with dampening material (fiberglass insulation) minimizes internal standing waves.

MIDS AND HIGHS

Distributing power over multiple drivers makes each one work less hard (for a cleaner sound) and there's no horn to add coloration. The tradeoff is phase interaction between drivers, which creates comb filtering effects and "sweet spots," meaning that the sound can shift with the listener's position. However, I feel the sound quality of multiple

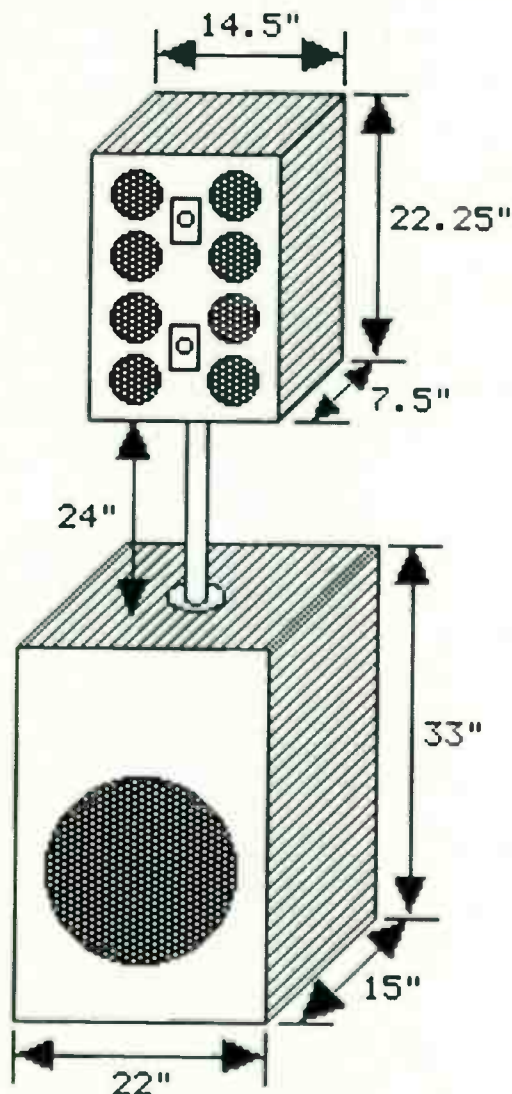


Fig. 1: Overview of the speaker system for one channel. The bass bin is on the bottom; a 24-inch pipe screws into it. The box with the drivers and tweeters sits on top of the pipe

HOW TO BUILD A DO-IT-YOURSELF PHASED ARRAY PA

By JULES RYCKEBUSCH

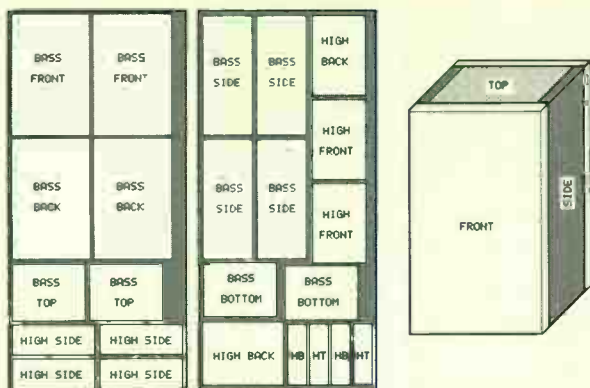


Fig. 2: How all the pieces fit on two sheets of plywood. The diagram on the right shows how the top, side, and front overlap for both the bass and mid/high boxes.

drivers outweighs this disadvantage.

The mids/highs enclosure volume is not critical since bass response is not an issue. I arranged the small drivers in two rows of 4 1/2-inch drivers separated by the two 1-inch tweeters, which looked good and made use of the leftover wood from the bass bins.

CONSTRUCTION ZONE

Two sheets of 3/4-inch hard-wood plywood can provide all the necessary pieces (fig.

2). Birch is strong, finishes nicely, and isn't too expensive; if you're going to paint the speakers or cover them in cloth, particle board works well. All the joints are simple, yet strong, butt joints.

Mark the pieces on the plywood and cut them with a table saw. If you have never used a table saw before, get experienced assistance — be careful around equipment designed to cut things in half! Do all the cuts of one size at the same time to create identical-sized pieces. A portable

PARTS LIST

2 Sheets 3/4-inch birch plywood
Bass bin: 4 front/back (22" x 33"), 4 sides (13.5" x 33"), 4 tops/bottoms (13.5" x 20.5")
Mids/highs enclosure: 4 front/back (22.25" x 14.5"), 4 sides (22.25" x 6"), 4 tops/bottoms (13" x 6")
2 20-1/2" 2 x 2 wood braces
2 15" Carvin woofers (#PS15C)
16 4-1/2" Pioneer full range speakers
4 1" Pyle soft dome tweeters
4 2.2 µF non-polarized capacitors
2 24" lengths of 1" steel pipe
4 1" pipe flanges
80 1/2" #6 Phillips head screws
8 1-1/2" #10 bolts and nuts
2 Power amps (e.g., Carvin FET450 and FET1000)
1 Active crossover (see text)
Misc: Wood glue, wire, stain, varnish, 2" nails, 1-1/2" screws, etc.

SUPPLIERS

Paia Electronics (3200 Teakwood Lane, Edmond, Oklahoma 73013; tel: 405-340-6300; fax: 405-340-6378) offers the Active Crossover Kit (part no. 9216K) with all parts and circuit board for \$22.75 (+\$3 S/H). A suitable power supply (part no. BPS-15) is available for \$29.95 (+\$4 S/H).
The PS15C 15-inch woofer, FET1000 amp, and FET450 amp are available from Carvin, 1155 Industrial Avenue, Escondido, California 92029.
The following parts are available from MCM Electronics, 650 Congress Park Drive, Centerville, Ohio 45459-4072: 1-inch tweeter (#53-205), 4 1/2-inch full range driver (#51-075), and 15-inch speaker grille (#50-540).



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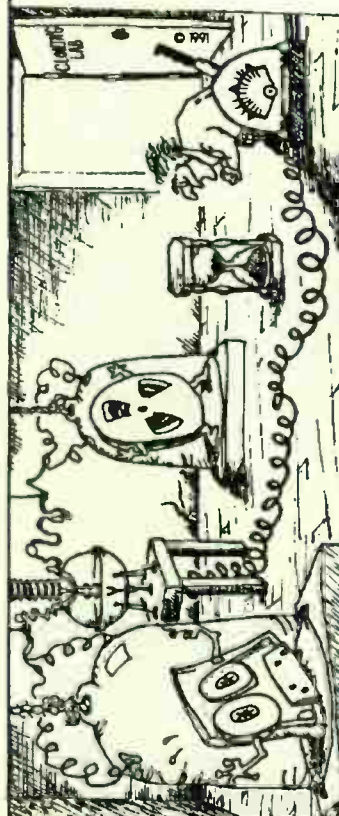
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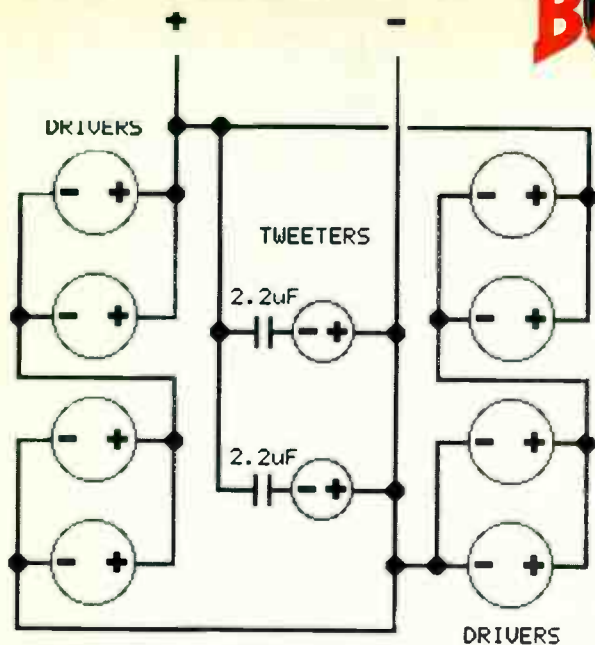


Fig. 3: The eight 4 1/2-inch drivers are wired in series/parallel for a total 4 ohm impedance. The two tweeters are wired in parallel through non-polarized coupling capacitors.

belt sander can help even out small size differences, but be careful — it can remove a lot of material very fast. Practice on scrap wood first.

To cut the driver holes, drill a 1/2-inch pilot hole then use a jigsaw to cut out the main hole. Trace the hole using the speakers for a

guide, then draw a smaller hole freehand. Don't forget the cutouts for the handles on the side pieces and the speaker terminal boards, or the holes to mount the pipe flanges. Do all woodworking and cutting prior to building the boxes so that if you make a mistake you ruin only a

piece of wood and not the entire speaker.

Assemble the boxes using lots of glue (wipe off any excess outside the joints, particularly if you plan to stain the wood) and 2-inch finishing nails. Mount the front of the mid and high box with screws (no glue) for easy driver replacement.

The bass bin brace mounts in the middle of the enclosure, about 6 inches above the woofer. Attach the brace to the back and then mount the front piece. Caulk all the bass bin's internal seams (this is easily done through the woofer mounting hole). It's crucial that no holes or cracks exist; air will "whistle" through them and prevent the box from "acoustically suspending" the driver. If you used particle board, paint the entire enclosure (inside and out) with enamel to seal the material and help prevent moisture damage that can occur from humidity.

Finish the cabinets

before mounting the drivers. For maximum beer resistance, I stained mine and gave them five coats of polyurethane, sanding between coats. The pipe and the flanges were painted flat black. Finally, attach PA cabinet handles to the bass bins.

COME TOGETHER

Wire all the speakers to their terminals prior to lining the boxes with acoustic insulation. Neutrik connectors are recommended, but you can get by with running 1/4-inch connectors from the bass bins to the mid/high enclosures. Solder enough wire (12 gauge or better) to each terminal to allow for easy speaker removal.

Mount all the small drivers on their front panel prior to wiring. Wire the eight 4 1/2-inch drivers for a total impedance of 4 ohms (fig. 3). The two tweeters go in parallel with the 4 1/2-inch drivers using 2.2 μ F, non-polarized coupling capacitors. (This is

continued on page 113

CROSSING OVER

Passive crossover networks are difficult to design, require nonstandard component values, and waste amplifier power. Active crossovers provide better spectral balancing and power handling. Walter G. Jung's book *Audio IC Op-Amp Applications* includes a suitable design (see diagram) tailored to a 500 Hz cutoff frequency. The 3rd order Butterworth response yields an 18 dB/octave rolloff and smooth passband phase response. Each channel requires three single op amps, so using three dual op amps provides enough op amps for both channels.

The circuit assumes the input and outputs see capacitively-coupled stages. If there is a DC offset at the input, be sure to add a 0.22 μ F (220nF) coupling capacitor between J1 and R6.

Use an NE5532 or equivalent dual op amp (a 741 clone doesn't cut it), 1 percent resistors, and quality capacitors. The crossover requires a bipolar ± 15 V supply.

CROSSOVER PARTS LIST

Capacitors *mylar or polystyrene preferred*

C1	3300 pF (3n3 in metric notation)
C2-C4	0.01 μ F (10nF)
C5	0.022 μ F (22nF)
C6	0.056 μ F (56nF)

Resistors *1% metal-film preferred*

R1	8.98k (8k98 metric)
R2-R4	20k
R5	22.9k (22k9)
R6	100k
R7	158k

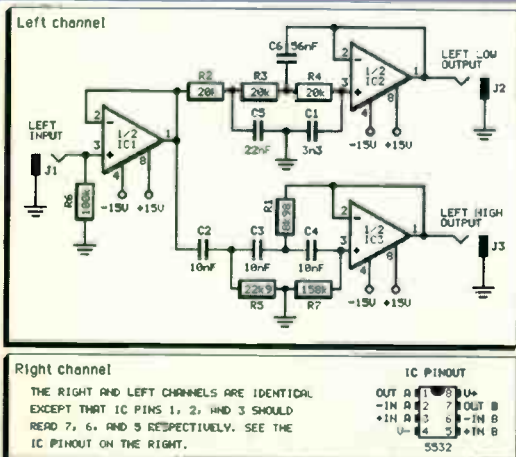
Jacks

J1	1/4" phone jack
J2, J3	Neutrik connectors (see text)

Note: The above components are for one channel. Duplicate all components for a second channel.

Semiconductors

IC1-IC3	NE5532 or equivalent dual op amp
Misc.	Wire, solder, chassis, panel, etc.



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Let's talk about the criteria that make up a good amplifier. Frequency Response: The Servo's wide, flat response from 20 to 50 kHz easily covers the entire frequency spectrum. All lows, highs and mids come out at the same time, in the proper relationship to one another.

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a damping factor exceeding 100 and crosstalk greater than 83 dB. Impressive, but they don't begin to tell you how good these amps *sound*.

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DURABILITY

The 240 and 150 are also fitted with an all-steel chassis and a lightweight anodized aluminum heat sink to ensure the ultimate in road-worthiness and long life. Plus helpful features like 1/4" and push spring output connectors.

The Servo Amps from Samson Audio. Now you can get all the performance, protection and practical features you want – at the price you *need*.



Servo 150



Servo 240

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For more information about the new Servo 240 and 150 Power Amplifiers or other Samson Audio products, please contact Samson Audio, a division of Samson Technologies Corp., P.O. Box 9068, Hicksville, NY 11802-9068 (516) 932-3810 FAX (516) 932-3815

NEW GEAR FOR YOUR NEXT GIG

POWER UP

Yorkville Sound has debuted their new Audiopro 1220, a 1220-watt, stereo 20-channel version of their popular 12- and 16-channel powered mixers. Audiopro 1220/ 1216/1212 are powered by the same high-efficiency design used in Yorkville's Audiopro 1200 power amplifier and will operate with loads down to 2 ohms. These compact mixers are packed with features including: 600 watts x 2 continuous average power; Alesis digital signal processing with 16 preset effects; phantom power; two monitor sends; two effects sends; channel inserts (fully buffered); 3-band channel EQ; dual 9-band graphic EQ for mains and monitors; speaker processor with switchable EQ curves; stereo Aux inputs; selectable headphone monitoring; patching capabilities; and Yorkville's Self Correcting Hum Reduction, which is incorporated into sub, main, and monitor outputs for both balanced and unbalanced line capability. As with all Yorkville products, Audiopro mixers come with a two-year unlimited (even if you break it) transferrable warranty. Suggested retail is \$2449, 2699, and 2899, for the 12-, 16- and 20-channel mixers, respectively. For more information, contact Yorkville Sound Inc., 4600



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MADE MARION

Marion Systems' new MST-2 Modular Synthesizer System, the latest instrument from American synthesizer pioneer Tom Oberheim, is designed to provide you with an instrument that combines ease-of-use, modularity, and freedom from obsolescence. The heart of the MSR-2 is the "Mainframe," a single-rack-space device capable of holding two MSR sound



Marion Systems MSR-2

modules. Each module is a complete synthesizer that slides into the Mainframe. MSR modules can be based on any sound technology. The initial module is an

Mainframe provides a programmable 6-channel stereo mixer for module outputs and a pair of external inputs, a programmable stereo graphic equalizer, and two complete MIDI ports with extensive MIDI processing. Retail price is \$1495. For further information, contact Marion Systems, 335 Willow Heights, Aptos, CA 95003. Tel: 408-688-8593. Circle EQ free lit. #120.

CATCH A WAVE

New from Yamaha is the SY35 synthesizer that features Advanced Wave Memory (AWM), which is a sophisticated sampling technology that allows high-fidelity reproduction of digitally-sampled "live" sound. The SY35AWM system also has an extended waveform ROM that allows longer samples. SY35 voices can be derived



Yamaha SY35

advanced 8-voice analog synthesizer featuring proprietary High Resolution Oscillators which combine classic analog sound with digital stability. The module also contains warm 2- and 4-pole voltage-controlled filters, external audio inputs into each filter for the processing of external sounds, and an extensive modulation matrix for real-time expressive control. The

from two elements (one AWM, the other frequency modulation (FM)), or four (two elements of each). There are 128 preset AWM waveforms and 256 FM waveforms that can be assigned to the appropriate elements in a voice to be blended and tuned in a variety of ways — manually or automatically. There is also a Vector control for 2-axis control of element level and detuning. There are



64 preset voices and 64 user voice memories. External memory cards provide limitless back-up and storage capability. For the vast array of further information on the SY35, contact Yamaha, 6600 Orangethorpe Avenue, Buena Park, CA 90620 714-522-9011. Circle EQ free lit. #121.

BF, Not BS

Sennheiser has introduced the BF1051 to the ProForce line of microphones. This handheld wireless system can operate on two switchable frequencies. It features a true-diversity receiver that employs a logic switch that continually monitors the field strength captured by the two independent receiving sections, choosing the one with the strongest signal. The receiver includes the two antennae, channel



selector, squelch control, and LED level and status indicators. The transmitter is ergonomically formed for ideal placement of the antenna and the microphone in front of the vocalist's mouth. It has an internal antenna and recessed switches for on/off, microphone sensitivity and channel selection. A voltage stabilizer ensures that perfor-

mance remains constant throughout the life of the battery. A nearly frequency-independent supercardioid polar pattern ensures optimum feedback rejection. The entire system can be stored in the supplied case. For more information, contact Sennheiser, 6 Vista Dr., P.O. Box 987, Old Lyme, CT 06371. Tel: 203-434-9190. Circle EQ free lit. #122.

MEGA MONITORS

JBL has just introduced the SR Series II line of loudspeakers. Consisting of 13 models, SR Series II covers a wide variety of concert and stage-speaker types, including seven two-way and three-way full-range stage speakers. In three-way systems, models are available using large-format compression drivers as well as with cone midranges. Two floor monitors offer a variety of operational angles, choice of coverage patterns, and a selection of high-frequency driver formats. Three subwoofers round out the line. For complete details, contact JBL, 8500 Balboa Blvd., Northridge, CA 91329. Tel: 818-893-8411. Circle EQ free lit. #123.

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STEWART PA-1800 POWER AMPLIFIER



■ STEWART ELECTRONICS has been building small, lightweight amplifiers for a number of years, both under their own name and as an OEM supplier to other companies. Their approach to power amplifiers has departed from other designs to include power reserves stored in large (for switching power-supply amps) capacitors.

The PA-1800 is the largest of Stewart Elec-

tronics' new line of power amplifiers for sound reinforcement applications. Rated at 1800 watts into a 4-ohm load in bridged-mono mode, the PA-1800 will drive loads down to 2 ohms (in stereo mode) and will provide up to 400 watts RMS into an 8-ohm load (both channels). Frequency response is extremely flat throughout the audio band and the damping factor is rated to be greater than 500, providing excellent

control over a loudspeaker's behavior.

The PA-1800 has completely separate electronics for each of the channels, each side sharing only the line cord. This reduces the interaction of even the protection circuitry between the two channels. Each channel even has its own power switch, allowing trouble-shooting or last minute changes to be made with one channel turned off while the other channel remains on. In addition to the power switches, the front panel also includes four small LED indicators for each channel to display power on, clipping, and output levels of -20 dB and -3 dB below full power.

The rear panel contains all the controls that are typically adjusted during the installation and setup of the sound system, such as input attenuation and mode (stereo and bridged mono) selection. The input connections cover the range of possibilities common to sound reinforcement, i.e., 1/4-inch phone jacks, barrier strip terminals, and an XLR-type

connector. This not only allows for the preferences of most users, but also for applications where a single signal is fed in parallel to both channels, just by jumping one of the unused input connectors to the other channel. In an emergency, the barrier strip also allows a connection to be made to any cable with bare wires — very handy when the connector breaks during a show.

I prefer the ability to switch the input signal ground connection between floating and connection to the chassis and there are still occasions where it would be handy to switch the polarity of this connection, as well. All of these variations are possible by using the barrier strip connector instead of the XLR or phone jack.

Output connection is made with 5-way binding posts. The holes in these binding posts are extremely large, accommodating up to #6 gauge wire. Stewart plans to build its own binding posts that will use the conventional 1/2-inch nut-driver for locking down the terminal. The unit I

ROAD TEST

MANUFACTURER: Stewart Electronics, 11460 Sunrise Gold Circle, Rancho Cordova, CA 95742. Tel: 916-635-3011.

APPLICATIONS: High-power amplifier for installations and touring sound reinforcement.

SUMMARY: Good sound quality and practical design combine to create an amp that is equally suited to driving full-range stage monitors or sub-bass loudspeakers.

STRENGTHS: Compact size (weighing a mere 17 lbs), yet capable of driving loads down to 2 ohms without compromise; five-year no-fault warranty.

WEAKNESSES: Loud cooling fans and it's awkward to accurately reset the input attenuation.

PRICE: \$1699

EQ FREE LIT. #: 124

BY WADE MCGREGOR

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THE STEWART PA-1800 HAS A CLEAN AND SIMPLE APPEARANCE AND, SIMILARLY, THE AUDIO QUALITY IS CLEAN AND UNAFFECTED BY THE HIGH-TECH INTERNAL POWER SUPPLY.

had used a slotted type, which is what current runs of the amp are using. The terminals are spaced to allow dual-banana connectors in either stereo or bridged-mono modes. There are also circuit breakers for each channel that replace the fuses typical of many other amps.

The rear panel also includes one of the two cooling fans (the other one is just inside the case). These fans produce a significant amount of noise (53 dBA SPL @ 1 meter). This is a pity because the noise these fans create may limit the applica-

tion of this amp. Cooling fans, however, are a fact of life for compact amplifiers, simply because such amps lack the surface area to dissipate the heat through convection that is inevitably produced by (even very efficient) high power amps.

All the connectors and switches are clearly marked, with the polarities of the phone jacks and XLR connectors also shown. Missing is the legend for output connection in bridged-mono mode, although this is conventional using the two hot (+) terminals — the left channel

becomes the positive and the right channel becomes the negative polarity. The input level adjustment is made by adjusting the two detented controls on the rear panel. These are labeled "level," but do not have a scale marking and are difficult to reset unless you want to count through the 20 detents.

Full power is available from a source as low as 0.775 volts (0 dBv) with attenuation of the inputs to accommodate higher input signal levels. The input attenuation is not precisely stepped, but does provide repeatable settings, once the appropriate gain structure is found. The two channels did not track evenly on the review unit, thus hampering accurate channel balancing beyond the first 8 dB of attenuation. However, I like the way the PA-1800 mounts the input attenuators — on

the rear of the amplifier and recessed. As with any amplifier, gain structure and balance between loudspeaker drivers must be carefully set; accidental or unauthorized adjustment of the input attenuation may require a time consuming recalibration of the system.

The separate power switches on the front panel act as individual channel mute switches. This is all that is really required in the routine operation of most power amps. The muting of power up transients, both those of the amp itself and of other equipment ahead of it in the signal chain, is very important in sound-reinforcement applications. Unexpected power losses can be problem enough without it also causing the loss of loudspeaker components when power suddenly returns. The PA-1800 fades the audio in after muting occurs to pre-

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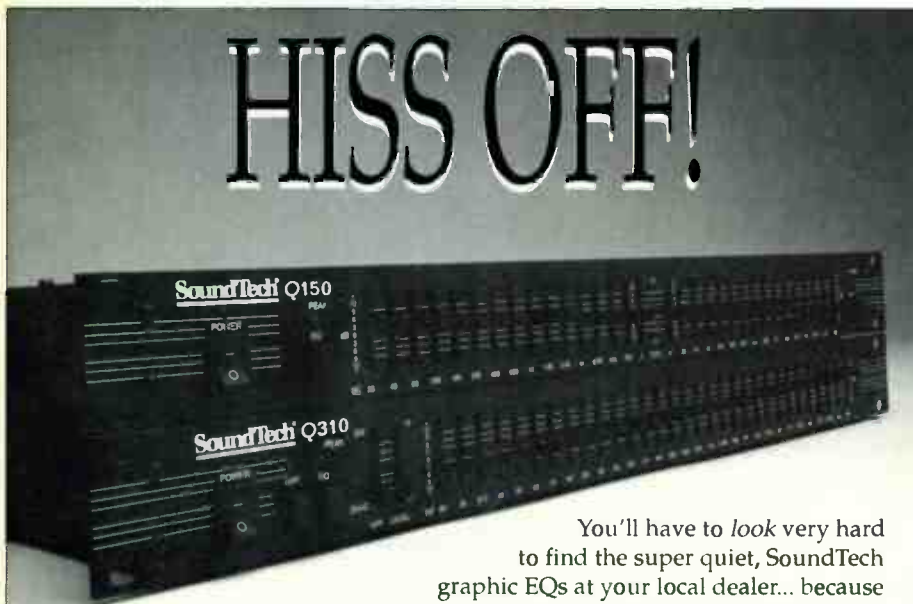
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vent the abrupt shock of regaining power with the mixing board sending its maximum output level.

The Stewart PA-1800 has a clean and simple appearance and, similarly, the audio quality is clean and unaffected by the high-tech internal power supply. Minus the fan noise this amp could also find application where ambient noise is a consideration. The size of the PA-1800 is notable not only for its low mass (17 lbs), but also for its very shallow rack depth (15 inches).

The power supply design of the PA-1800 is unusual in many respects compared to other power amplifiers. The storage capacitors are charged when the amplifier is plugged into the AC line, regardless of the position of the power switches on the front panel. This means that switching them on from the front panel won't cause clicks, trip breakers, or dim the lights in the room. The cunning use of capacitors to provide power reserve and the Class H design of the amplifier (dual power supply rails of 40 and 100 volts DC) give this efficient amplifier a clean sound at low levels, and yet it can maintain high power into a low-impedance load for extended periods without going into protection mode. The protection circuitry is able to cope with short-circuited outputs without stress and does not significantly affect the output signal when operating within the amplifier's specified limits.

As an aid in reducing the size of the amplifier, many components are mounted vertically. This may not prove to be a problem, but I associate a perpendicular 5-watt ceramic resistor with broken leads or fatigued solder connections. Stewart has used silicon to fix these com-

continued on page 113



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IN REVIEW

Akai DR4d Digital Audio Recorder



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

APPLICATION: Random access digital multitrack recording and editing.

SUMMARY: Standalone, 4-track, hard-disk digital recorder with some editing features such as copy, paste, erase, and move. Four units may be daisy chained to make a 16-track integrated recorder. Two-channel (expandable to four) digital I/O is included.

STRENGTHS: Great sound, low cost, expandable as your needs grow, easy to use, portable, no computer required.

WEAKNESSES: Editing is limited, no extensive DSP, no graphic waveform editing.

PRICES: \$1995

EQ FREE LIT. #: 125

record, rewind, fast forward, locate to zero, play to out, and stop. It also has 108 locate points available at the touch of a button. Remember that because this is a hard disk, access to any point in the song is instantaneous. Locate points can be entered manually or on the fly.

The rear panel has four 1/4-inch inputs and outputs, all of which can be set to +4 balanced or -10 unbalanced. This switch is active for two channels at a time (i.e., four switches). In addition, AES/EBU and SP/DIF digital I/O are standard. The optional IB110D adds another set of digital ins and outs, allowing the recording and output of all four tracks digitally at the same time.

One useful feature regarding the digital I/O is that the DR4d can be set to emphasis on/off for the output of either set of digital outs. Therefore, if your material was recorded digitally with emphasis, you can play it back with the emphasis on. Very cool. You cannot, however, record digitally on two tracks and analog on the other two tracks simultaneously. (I don't know of many or any devices that can do that, but I just thought I'd mention it.)

A SCSI-A connector is fitted, allowing the chaining of up to six additional drives for recording. An

AS MANY OF you are aware, we've come a long way the past few years in digital recording and editing. Sound Tools from Digidesign helped revolutionize affordable digital hard disk recording and Alesis' ADAT did the same for digital-tape-based recording. It was inevitable that a company would introduce a system that fell somewhere between these two devices.

Akai has been a leader in the field of digital audio since the introduction of their S Series samplers, the DD1000, and the ADAM 12-track. Akai now has introduced the DR4d, a 4-track, hard disk-based digital audio recorder. It is

priced at just under \$2000 without a hard disk, and offers several attractive options for expansion (more on that later). The DR4d is a 3-space, rack-mountable unit that sits about 16 inches deep and requires no external computer to operate. The fact that this unit is standalone makes it very attractive to the traveling musician.

The Time and BBC (Bar, Beat, Clock) display on the front panel is a simple LED style that displays only 8 characters at a time. It would have been nice to see a little more information available in the same amount of space. The front panel also includes all of the standard controls such as play,





optional SCSI-B connector (the IB11-IS) is available and will add optical drive back up as well as a Macintosh computer front end. This will surely increase the DR4d's ease of use in a Macintosh-based environment due to the fact that it communicates through SCSI. To make things easier, Akai can supply users with a list of compatible SCSI hard drives that can be successfully used. In addition, Akai also offers an optional remote control called the DI4d.

On the subject of options, the DR4d offers several important ones. The IB112T SMPTE Reader adds SMPTE read/write with adjustable offset time. This option is an absolute must for any serious recordist. Without it, you cannot lock the DR4d to timecode of any sort! With it you'll be able to stripe code and lock up to four DR4d's to any of the standard SMPTE frame rates. The IB113M MIDI interface allows the DR4d to generate MIDI Beat Clock, acting as the master in a MIDI system. It actually works well, sending the desired tempo that you input. It can generate a user-definable MIDI Beat and Tempo Map. You simply go into the Tempo page and enter the tempo for each measure as well as the time signature for that bar. It's a great feature for those of you who use MIDI sequencers and don't need to lock up any other devices. The DR4d cannot lock to MIDI, it only acts as the master in a MIDI setup.

The concept behind this unit is that of a 4-track digital tapeless recorder with some editing features. Up to four DR4d's can be daisy chained together (via a proprietary sync cable) to make an integrated 16-track system. The unit functions in many ways like any standard tape recorder. In fact, you will be recording tracks within minutes of taking it out of the box. First off, you'll want to select a sampling rate before recording — 48k, 44.1k, and 32k are offered with varispeed pitch shifting. You should know that the unit is based around 44.1k, meaning that at 48k you can only pitch shift down (-64 to 0), and at 32k you can only pitch shift up (0 to +64).

To record a track, simply plug a line level source into the back (you'll need some kind of outboard preamp or a mixing console for gain purposes), arm the desired track, press the Record key, and hit Play. Your track is now in record and you're jammin'. Punching can be done manually by a footswitch or automatically with the Auto Punch feature. As with all of the DR4d's functions, these options are laid out on the front panel in a very clear, concise and straightforward manner. No menus within menus within menus here. Just fast, ergonomic functions.

When using the Auto Punch, you can rehearse the in and out points before committing to them. Should you decide to try to punch without rehearsing, don't worry. The DR4d has the life-saving UNDO feature for every edit or take that you perform. In fact, for recording, the UNDO feature is active during playback, allowing you to hear the difference between two takes in real time. This is a real time saver (no pun intended) and very useful when comparing takes.

The DR4d does not offer advanced editing such as play list style arrangement, EQ, time stretch, and so on. It does have Copy, Copy and Insert, Move, Move and Insert, Erase, Delete, and Insert. These features are all very easy to use. For each task, you specify the in point and out point to edit and then the in point for its destination.

For example, let's say that you wanted to copy a section from the chorus and place it in another part of the song, having it repeat four times. No problem at all. Choose the part to copy (in and out points), the number of times you'd like it to repeat, and the destination in point. Of course, you can do this track by track or all four tracks at a time. Any combination of the four tracks can be simultaneously edited.

Just for the record, the Copy and Insert function allows you to copy sections without going over existing material. It moves the material back without deleting it. Moving tracks can be done in much the same way as

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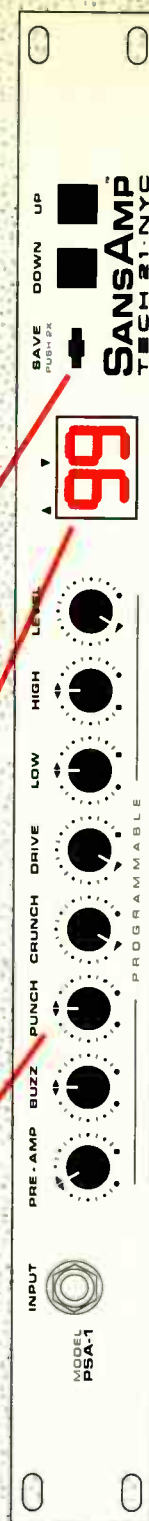
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copying tracks, with Move and Move and Insert. The difference between Erase and Delete is that Erase leaves the space that was edited (much like an analog tape recorder would when erasing part of a track) and Delete butt splices the edited sections together.

So now that we know how it works, but how does it sound? Well, it sounds great. As is typical of most high end 16-bit digital recorders, the DR4d holds its own. In direct comparison with digitally transferred tracks among Pro Tools, the ADAT, and the DR4d, there was no apparent sonic difference. This is even more significant given the fact the DR4d is at least half the price of either of these units. I recorded many sessions on this unit over the course of a month and found it to be very fast and very good sounding. Several of my most picky clients raved about the DR4d's speed of operation and transparent sound.

Backing up the tracks is accomplished via DAT (using the Digital I/O). This is a little slow since it is done in real time, but you don't have to backup the entire disk. You can backup only certain sections, again by specifying in and out points. When the SCSI B option is available, you'll be able to backup to magneto-optical disk.

The DR4d is a real winner for anyone seriously considering a digital recorder. When you combine great sound, useful features, and friendly operation, you've got a piece of technology that is sure to set a new standard in affordable recording. The DR4d could become the heart of a recording system for several types of project recordists: if you need an additional four tracks in your current recording setup (demos, live recording, etc.); if you're looking for digital audio tracks to add to your MIDI setup (this would be great for those of you still using analog tape or no tape at all); or as an addition to a digital multitrack (ADAT and DA-88 users, listen up). Do yourself a favor and check out the DR4d.

—David J. Frangioni



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World Radio History

IN REVIEW

Roland SRV-330 Space Reverb



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

APPLICATION: Mid-priced reverberator for project studios, commercial studios, and live performance.

SUMMARY: Roland has applied expertise gained with the R-880 and RSS 3D sound system to design a pro-sounding reverb at a reasonable price.

STRENGTHS: Well-defined, precise sound quality; easy programming; flexible MIDI control; unusual processing (e.g., amplitude envelopes and phasing) available for special effects.

WEAKNESSES: Unbalanced audio inputs and outputs only (no XLRs); can't edit algorithms; sluggish response when changing programs; 3D effect is subtle at best.

PRICE: \$1195

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A LOT OF PEOPLE liked the Roland R-880 reverb, but found it too expensive for the average project studio. Ditto the Roland RSS, a 3D sound processing system for two-channel systems that could surround you with sound for the price of a small house. But high-priced R&D trickles down over time into less expensive products, and Roland's SRV-330 Space Reverb packs some of the R-880 and RSS into a single-rack-space processor retailing for \$1195. Although the SRV-330 isn't a multieffects device, the possible variations on the basic reverb make the SRV-

330 much more flexible than you might initially expect.

FACTS AND SPECS

The SRV-330 offers 22 different reverb algorithms. Seven include user-editable 3D processing and six offer true stereo in/out operation (as opposed to summing the inputs, then synthesizing a stereo field). Algorithms are various combinations of reverb/plate/chorus/phaser/delay/early reflection processing, and there are four nonlinear algorithms. These aren't your typical "backwards reverb," however, as two four-stage

envelopes can shape the reverb amplitude into more complex curves than a simple fade or gated cutoff (this is a great idea, and it really works).

Audio inputs and outputs are 1/4-inch, unbalanced phone jacks (no XLRs or balanced lines) with switchable input and output levels (-20 and +4, but no -10). Other 1/4-inch jacks are for a bypass footswitch, control footswitch, and control pedal.

Up to five SRV-330 algorithm parameters (per program) can be controlled in real time by the control pedal or MIDI input, which recognizes pitch bend, aftertouch, note number, velocity, and controllers 0-31 and 64-95. (Thanks, Roland, for realizing that we do want to control signal processors with MIDI signals other than continuous controllers and program changes!) The control footswitch can be assigned to a parameter and selected between minimum and maximum values.

The front panel sports a dual-ganged control for left and right input levels, dry/effect balance control, 12 buttons for editing, an alpha dial, stereo 7-stage meters, backlit LCD, and on-off switch. The AC line cord is two-conductor only and permanently attached.

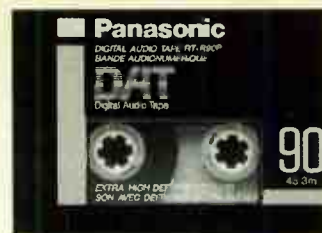




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There are plenty of editable parameters; most of these are fairly standard, such as low/mid/high parametric EQ, early reflection level/time/ diffusion, various reverb parameters, chorus rate/depth/phase/predelay, and so on. What's not standard are the "elevation" and "azimuth" parameters found in the 3D processing options. Suffice it to say that although the 300 (!) factory ROM presets are all most people would need, you can still have lots of fun filling up the 100 user-editable RAM programs. (Although the SRV-330 doesn't implement MIDI Bank Select, there's a MIDI mapping option to access any 128 programs from the 400 that are available.)

COOL STUFF

The SRV-330 is loaded with goodies that make life easier. For example, you can alter the order of parameters in

the edit mode so that the parameters you edit most often are the easiest to access. Another favorite: When you switch to a program that utilizes MIDI controllers, it assumes the programmed value. You have to actually change the controller value before the parameter locks on and becomes subject to MIDI control.

Controller range assignment is simple. Specify a parameter's minimum and maximum value and the pedal or controller automatically covers this range. For negative scaling, just set the maximum below the minimum.

Although "straightforward operating system" and "readable manual" are usually not the first things that spring to mind when you think of Roland, to their credit Roland has taken these criticisms to heart. Unless you have a mental block against

KIDS, DO TRY THIS AT HOME!

Sound is very subjective, and if this review piques your interest you'll probably want to check out the SRV-330 in person. Here are some tips on getting to know it.

- On power-up, you can select different programs with the alpha dial (or inc/dec buttons). The factory programs accurately represent what the unit can do, but you owe it to yourself to go through all the sounds — there are some real gems up in the 200s and 300s.
- A consistent audio source makes it easier to audition so many programs. Create a 2-bar drum machine pattern with a clave starting one measure and a high-acoustic tom sound (both dry, of course) starting the next. These kinds of sounds basically trigger the reverb tail then get out of the way, so you can appreciate the nuances in the reverb decay. Try vocals after you've gotten to know what the unit can do.
- When in program select mode, press the Program button a couple of times until the LCD shows a number in the bottom line, lower left. This is the algorithm number, followed by the name. Look for algorithms with 3D in the name to check out the RSS-derived effects. Also, Algorithms 12 and 13 give some really cool chorusing/flanging reverbs, and Algorithm 22, although not including 3D, can nonetheless give exceptionally animated effects.
- If the reverb sounds too grainy, increase the reverb density and/or first reflections density. (You can generally increase the reverb density by hitting Edit, Func 3, then turning up the alpha dial. When you're done listening, press Exit twice to return to program selection mode.) The grainier reverbs seem to work well on pads and ensembles. As always, let your ears be the judge.

Finally, a demo CD with 79 examples of the SRV-330 reverb and companion SDE-330 delay is available for \$5 from Roland; this is as simple a way as any to hear what these effects sound like in your own studio.



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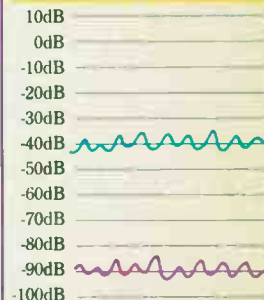
(U.S.A. HUSH News) – HUSH Systems latest entry in the noise reduction field, the new HUSH Elite, is a professional stereo single-ended noise reduction system that combines the most effective real time HUSH Systems technology with the ease of an "Auto" mode providing hands-free operation. Selection of the "Auto" mode will select the optimum filter and expander thresholds, filter cut-off points and release times, all of which will automatically change based on the audio source. Of course, as with other HUSH System's designs, the dynamic filtering is coupled with an expander circuit. The HUSH Elite's broad band expander also incorporates HUSH System's incredible VIR™ (variable integration release) circuit which tracks the envelope of the audio so as to provide the release time required based on the audio. No other noise reduction unit on the market can match the performance of the Elite with an 18dB per octave low pass dynamic sliding filter, and a sliding high pass filter. LED metering includes bandwidth for high/low band filters and gain reduction indicating the amount of expansion.

Please see COVER STORY inside page 4

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microprocessor-controlled devices, once you figure out the unit you probably won't have to look at the manual again.

The only problem I experienced was a lockup; after switching to a program, the switches and controls froze. Powering off and on again didn't help to solve the problem, but reinitializing returned everything to normal.

OPINIONS

The SRV-330 sounds great. There's a lively, silky quality that's subjectively a little less "conservative" than the Lexicon units I've played with. And unlike budget reverbs, there's a great deal more definition in the sound. There's virtually no periodic "fluttering" (except of course with low density values), the tail fades out gracefully instead of sputters, and the reverb is airy enough so that it doesn't compete with the primary sounds but unobtrusively fills in the cracks and spaces. I also appreciate the easy editing — lots of the fun with digital reverb is creating rooms that don't exist in nature.

Strangely, though, very little of all this cool stuff has anything to do with the 3D algorithms. Most of the time I wouldn't have known a 3D effect was being used if I hadn't seen it in the algorithm name. I tried shifting my position and that of the speakers to find a "sweet spot," but to no avail. If the SRV-330 sounded so-so and I was counting on the 3D effects to make it palatable, there would be a

problem. Fortunately, the SRV-330's basic algorithms sound wonderful anyway, so one has the luxury of regarding 3D as a bonus, not the unit's *raison d'être*.

To my ears, the difference between 3D and non-3D algorithms seemed comparable to the difference between, say, 14-bit and 16-bit digital audio, not color and b&w TV. Part of this is because the 3D effects are exploited to some degree in all the algorithms, so the biggest differences are due to any changes you make in the editable parameters. I suppose the 3D angle is a good marketing hook that helps differentiate the SRV-330 from competing devices; just don't expect any revelations. (Note that you don't have to worry about mono compatibility with the 3D algorithms. Independent stereo processing means that the left and right channels contain mostly different information that can collapse into mono with very few "holes.")

Granted there are a lot of good reverbs these days, and the standards keep getting higher. But one thing's for sure: If you can afford it, the SRV-330 gives you a clean sonic signature, is easy to program, includes the breadth to offer some truly whacked-out sounds for the adventurous, and wraps a cozy and airy ambient blanket around whatever you feed into it. If that isn't what a good reverb is all about, I don't know what is.

—Craig Anderton

Although the SRV-330 isn't a multieffects device, the possible variations on the basic reverb make the SRV-330 much more flexible than you might initially expect.



Deus ex Macintosh? Part 2

Alchemy has vanished. Has the Mac fallen from its pedestal in the digital audio pantheon?

By Tim Tully

LAST ISSUE we began an overview of the Macintosh software that's available for recording, playing and editing sampled sound. We started by covering the programs that are optimized as audio recorders—digital versions of tape decks. Part 2 of this series will cover the rest of that field, then look at some hybrid programs and finally go to the traditional sample editor—all geared to answer the question: when it comes to digital audio, does the Mac still make it?

TimeBandit

Steinberg-Jones's *TimeBandit* (\$499) is a relatively new program and one of the most focused applications in any venue. TimeBandit

is designed to do just two things to a digital audio file: it can make a sound up to 25% longer or shorter without changing its pitch; and conversely it can change a sound's pitch by as much as sixteen semitones up or down without altering its duration.

These functions can be invaluable in a production environment where a singer or musician is out of tune on a short passage, or in post production, where a scene needs a cue to be just a little longer or shorter than was planned. The application can be a boon to people designing sounds for sample-playing MIDI instruments as well. For situations where you might *want* the distortion that results from excessive time- or pitch-shifting, TimeBandit has an Effects mode that allows you to exceed its normal limits. In these cases, the algorithms that the program uses to maintain a sound's "natural" qualities are disabled, allowing you to actually get the boominess or munchkinization effects of shifting a pitch down or up.

TimeBandit makes no bones about its single-mindedness; it will not show you a waveform (since you can't edit it anyway), but only a session window containing small icons representing various sound files. (Figure 1) You can import or create any number of files in a session window, play them and of course process them to create a new stretched or shifted file.

In line with its straightforward functions, TimeBandit is easy to use. The session window has but four controls: buttons that load a file, play the sound and activate the time stretch and pitch shift dialog boxes.

The Time Stretch dialog (Figure 2) displays the original file's length and number of samples. A vertical slider lets you set the factor by which you want to stretch or shrink the sound, and a pair of boxes tell you what the

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Editorial



By **Tim Tully**

The deadline, as is its wont, was roaring down on me like a fast freight coming down the back of the continental divide. It was big. It was fast. And nothing on earth could stop it.

Like Dudley Dooright's Nell, lashed cruelly to the track by Snidely Whiplash, I had only one option. Keep a calm and exquisite control over mind and emotions. And keep. The panic. Down. (Never gone. Just controlled. Like a cheap effects box held barely in check by a brick wall noise gate: always bubbling, rumbling at the fringes of awareness.)

Untie one knot at a time—not too fast, and not too slow—making sure every motion loosens another hitch, and not a second is wasted thinking (chug-a, chug-a, chug-a) about the consequences of not getting it all done in time (chug-a, chug-a), about the sheer impossibility of slipping so many knots in so short a span.

It was a constant and continual act of the will: work as fast as hell, but maintain the calm center. All those rigorous years of training in a Zen monastery were paying off (actually, just reading *Siddhartha* once in college. But, hey.) Keep a cool, rational detachment, and just think clearly about the next keystroke, the next sentence, the next idea. Order my thoughts and not even the fact that having six different articles open in the word processor, TimeBandit

running in the background along with the graphics program to edit screen shots and now asking the phone dialer program to call Peavey has made the computer freeze up colder than I'm gonna be if I haven't saved everything and real recently, too FROZEN??? NO YOU CAN'T LOCK UP ON ME NO DON'T DO THAT NO NO NO-O-O (chug-a, chug-a chug-a)

It did. I hadn't.

All those days and years doing this; all the times I've preached to myself and anyone else who's asked: "Save whenever you've done more work than you want to do over again," and I'd spent the whole afternoon keeping so many balls in the air that the one marked "Save" disappeared like a stolen voice on a cheap synth.

The point, if any, is that our industry, and the rest of the world, is going software. (surprise.) One company spokesman at the AES convention told us we were about to see a computer-based system that would make "all that hardware out there obsolete." Fifteen minutes later, the grizzled New York studio veterans and wisecracking trade journalists in the room were passing around grudging compliments.

The models on which we base our work are still being changed profoundly by the personal computer. Those of us who neglect (or forget) to get in line with the new, computer-based models...chug-a, chug-a, chug-a, chug.

EQ ■ December 1993

STUDIO SOFTWARE REPORT

AN EDITORIAL SUPPLEMENT TO EQ, PUBLISHED BY PSN PUBLICATIONS
2 PARK AVENUE, NEW YORK, NY 10016

PUBLISHER
Paul G. Gallo

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SSR Editorial: 5914 Fremont Street, Oakland, CA 94608 ■ TEL: 510.654.7169 ■ FAX: 510.450.0301

DIGITAL AUDIO

continued from page 98-1

resultant file's specs will be: number of samples, tempo, and length, in seconds and SMPTE Time Code. You can also type numbers directly into the destination boxes to specify the results you want. For tempo-oriented changes, you can either type in a tempo or, if you don't know the tempo, type in both the file's length in bars and its time signature. This allows the program to calculate the tempo of the original, and

provides you with a figure you can use as a basis for determining any tempo change you may want to make.

The final control here is a slider that lets you set a mix of "sound accuracy" and "rhythm accuracy." The exact nature of this slider's effect is not too clear in the documenta-

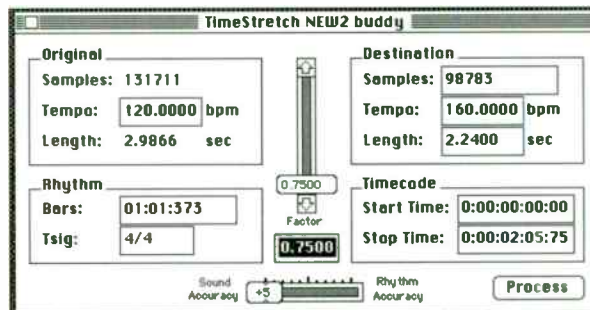


Fig. 2: The Time Stretch dialog box gives you a lot of information about a sound file and the results of stretching it.

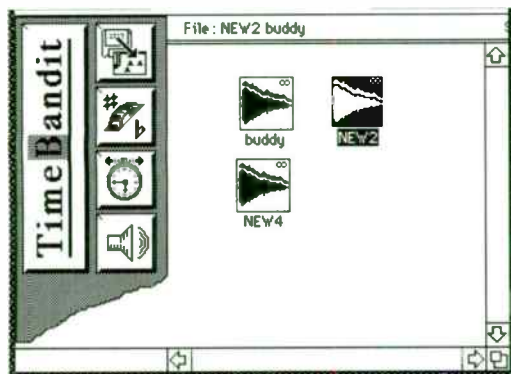


Fig. 1: A TimeBandit Session window can hold almost any number of sound files.

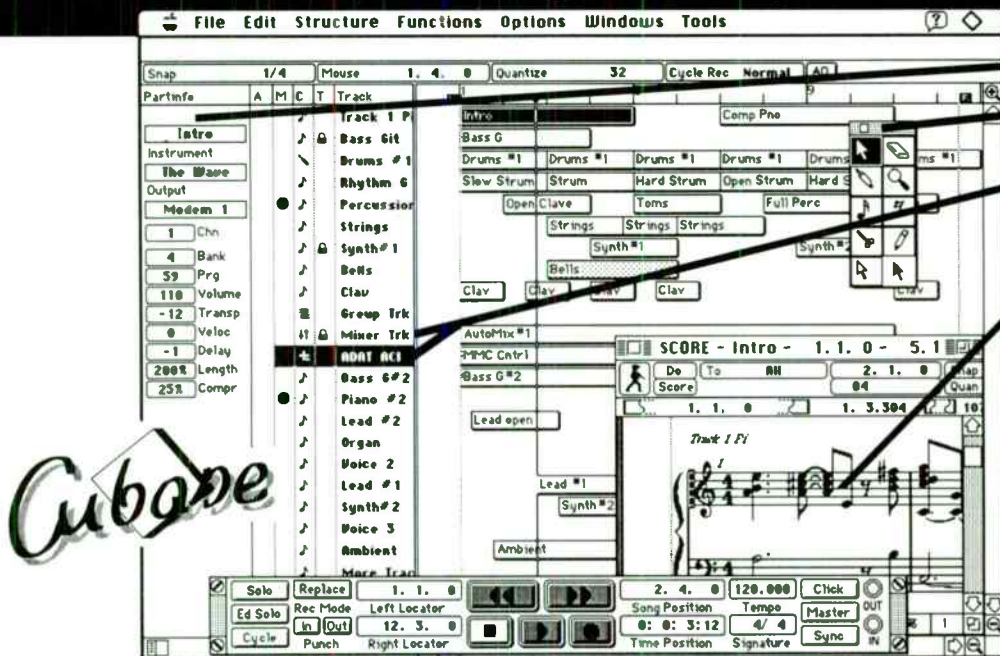
tion, but apparently, selecting more "rhythm accuracy" will make the program look for spikes—i.e., drum hits—and keep them equidistant. Moving the slider closer to "sound accuracy" causes the program to spend more of its brainpower preserving the tonal qualities of the sound.

To change a sound's pitch, TimeBandit presents you with another dialog box in which you click on the keys of a piano keyboard graphic or type in a

number of semitones and cents. (Figure 3) If a sample has a basic pitch—i.e., if it's a sample of a single note—you can have the application deduce that pitch to help orient your subsequent processing. You can also make multiple pitch shifts at once and mix their results with the volume slider to create chords from a single tone. Pitch Shift has a rhythm accuracy/sound accuracy slider and an effects mode that work in much the same way as their analogs in the Time Stretch function.

TimeBandit uses the same method of copy protection as does Steinberg's

"Cubase is just so damn fast, it has become real difficult to work with any other sequencer..." CRAIG ANDERTON



The Track Inspector - Immediate access to the most frequently used parameters. Direct Access.

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Cubase: you must connect a small plastic box—a “dongle”—to the Mac’s ADB (keyboard) bus, or the application will not run. Some people find the dongle a great inconvenience, but this method does let you move the application around

that of Pro Tools in its intuitive graphical nature, and is not far behind in features either. You can drag across a section of audio to select it, cut, copy and paste it, or drag it to a new location that you can line up by eye or by precise numerical readouts.

While Studio Vision was the first, others have come along since, and as it happened with sequencers, these applications too have melded a good deal of their predecessor’s audio features and functions with their own sequencers.

In addition to the Digidesign hardware, Digital Performer, from Mark of the Unicorn, works with MOTU’s own Digital Waveboard and the Yamaha CBX-D5 external audio unit. Digital Performer can play back four and record an unlimited number of audio tracks, offers a audio event list editor and all the MIDI power of its popular sequencer, Performer.

Similarly, Steinberg-Jones’ entry, Cubase Audio for the Mac offers a parallel set of features framed by the idiosyncratic model of its sequencer, Cubase.

Cubase Audio uses iconic tools to cut, paste and otherwise manipulate audio as well as MIDI events, subdivides tracks into parts for an extra layer of control over editing, and supports all the Digidesign hardware.

The differentiations among these three sophisticated programs are subtle yet important. In the end, a good deal of the differences come down to one’s personal taste for one particular set of operations and interface metaphors over another. The audio features of all three are powerful, sophisticated and about equal.

Sample Editors

The final group of Mac audio applications are specifically designed for the creation and modification of sound samples intended to be used by a MIDI sampler. They work with sounds loaded into the Mac’s RAM, rather than with files on hard disk. As such, they are faster, but are limited as to the size of the files they can load. This is the ground that had been covered so well by Alchemy. Let’s see what’s there now.

Infinity

Jupiter Systems’ new *Infinity* is every bit as focused as *TimeBandit*, but with a different target. Infinity is designed exclu-

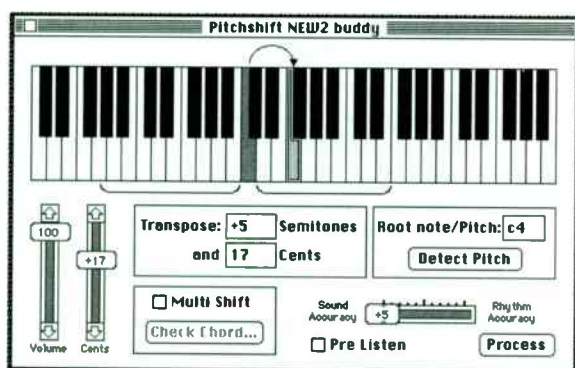


Fig. 3: The Pitch Change dialog lets you designate changes in semitones and cents.

freely on your disk or even run disk optimization programs without tedious de-and re-installing. Both the TimeBandit and Cubase keys have been installed on my Mac for a while and I don’t even notice they’re there.

While TimeBandit is something of a one-trick pony, it is very easy to use overall, and yields predictable and respectable results.

Hybrids

A second group of applications adds another dimension to the world of Mac digital audio. This genre combines the audio functions with those of the MIDI sequencer.

The first successful MIDI/digital audio amalgam was Opcode Systems’ Studio Vision. Now in version 1.5, Studio Vision combines all the features of Opcode’s flagship professional sequencer, Vision, with the capability of playing back four discrete synchronized channels of audio on nearly all the Digidesign DSP cards and can contain many more “virtual” tracks. (Figure 4)

In addition to combining MIDI and audio recording in one application, Studio Vision offers extensive non-destructive editing of the audio that lets you play any segment of an audio track in any order, control its dynamics, panning and volume and edit it in any number of ways, all without altering the actual sound file.

Studio Vision’s audio editing rivals

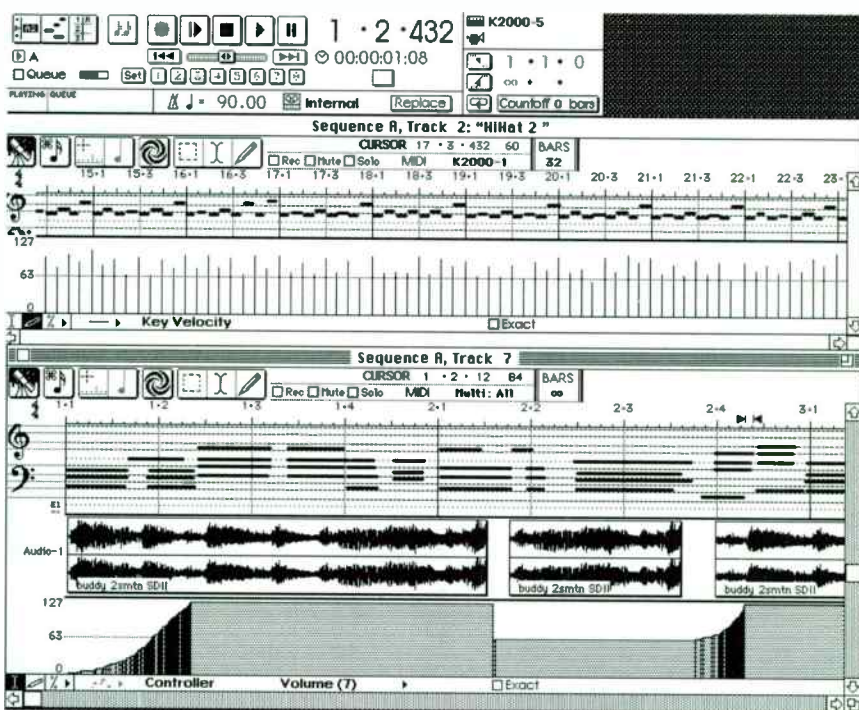


Fig. 4: Opcode’s StudioVision combines MIDI sequencing with digital audio recording, editing and playback.

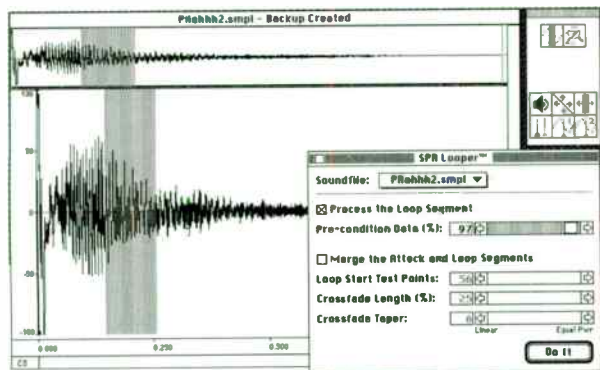


Fig. 5: Infinity's sophisticated looping algorithms give you a lot of control options.

sively to create seamless, bumpless loops in sounds intended for samplers and sample-playback synths.

Infinity was designed by people who had previously developed software for geophysical research. They've managed to translate their skills well, and Infinity brings a new set of tools to the sampler user. Infinity applies digital signal processing technologies to the looping process that serve to automate it, reduce the enormous trial and error traditionally associated with it, and significantly improve the quality of the resultant loops.

Of these technologies, Infinity's smart auto-scan is the only familiar one of its four looping methods—and the only one easily explainable. The feature improves tremendously upon the traditional auto-scan functions. In addition to simply finding zero crossings, Infinity's auto-scan also compares the amplitude and phase of the major harmonics at potential loop points to create a loop that is much less noticeable.

The first of Infinity's more novel loop tools is the freeze looper. It works exceptionally well on decaying timbres like guitars or pianos by analyzing and then perfectly "freezing" the timbre of a sound over a number of cycles, creating an absolutely seamless loop that sounds just the way you always thought your loops should, but only rarely did. Two other looping algorithms—the Rotated Sums Looper and the Spectral Phase Randomization Looper (I'm not making this up) work wonders with non-periodic waveforms like chorus and orchestra, and complex sounds, like those of string sections choirs and others, whose tone color must be preserved exactly. (Figure 5).

Despite the tendency of Infinity's terminology towards Amos 'n' Andy scam-speak, the software most undoubtedly works. It creates loops like nobody's business, and its designers had the sense to emulate some of the best elements of Infinity's spiritual forefather, Alchemy. Infinity

doesn't have Alchemy's range of features and functions, but it's not entirely limited either. The edit menu (Figure 6) offers a good handful of edit commands, including such basics as cut, copy, paste and mix, as well as others that normalize a sample, accurately change gain and let you control loop points. Moreover, the application is terrifically navigable—its interface nearly always lets you do just what you want with a notable absence of search and struggle.

Naturally, Infinity uses the Digidesign DSP cards for playback, but

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it also has a special relationship with SampleCell via the Mac System's Apple Events. Choosing SampleCell as a playback device in Infinity will automatically launch the SampleCell editor, and not only let you use a SampleCell card for playback, but automatically update the card with any changes you make in Infinity.

Infinity is a unique and powerful tool that has redefined what sample loops are all about. As such, it's a must for serious sound designers.

Turbosynth SC

Turbosynth SC for the Macintosh (\$349) is a new version of the sample-editing/sound design program from Digidesign. While the original Turbosynth was able to load samples from, and save them to many different brands and models of sampler, the SC version works only with Digidesign's sampler-on-a-NuBus-card, SampleCell. That is, it will load and save sounds in the same Sound Designer II or AIFF formats that SampleCell uses.

Digidesign has effected this redirection as part of its overall plan to design a recording studio that will fit entirely into a single Macintosh. This desktop studio will be built using the company's random access digitizers, signal processors and TDM signal routers, and SampleCell will be the sampler in that studio. What Turbosynth brings to the party is a front end for SampleCell that (together with any of the Digidesign DSP cards) turns the sample-playback card into a full-featured sampler with many, many ways to modify, sculpt and creatively warp the samples it plays.

Turbosynth and SampleCell are intimately entwined via Apple Events—the Macintosh System 7 feature that allows various programs to communicate. So if you run Turbosynth and the SampleCell Editor at the same time, saving a Turbosynth patch will automatically load it into SampleCell as a new instrument, which you can play from your MIDI keyboard, just as you would with any other sampler.

Turbosynth will then update the sound in SampleCell any time you change it and save it. This may sound like a Rube Goldberg way to do things, but in fact it works quite smoothly and reliably, and offers a hell of a lot of power.

So just what does Turbosynth do?

The application is modeled along the lines of early synthesizers on which you built up a sound by connecting various electronic modules with patch cords. Turbosynth does the same thing, but entirely with software. You patch together samples and/or digitally-generated oscillator waveforms and route them through software algorithms and DSP chips to create filters, envelope generators, LFOs and the like that eventually generate a sample you can play with SampleCell.

Turbosynth gives you a main window into which you bring all the elements of a patch, and where you can open various sub-windows that show you details of individual processes (Figure 7). There's a 21-icon palette containing tools with which you add sound source modules to a patch, insert controller modules such as LFOs, envelope generators for amplitude and filtering, resonance generators, time stretchers and compressors, pitch shifters, delays and more, then route everything through a mixer with a patch cord tool. All this is accomplished with standard mouse moves, and is pretty intuitive, especially considering the depth of processing you can achieve.

In addition to the kinds of controllers familiar to synthesists, Turbosynth serves up some weird stuff. This includes the Waveshaper, which alters a sound using a transfer function to change the instantaneous level of a sample following a

wave you select; the Spectral Inverter which radically alters the partials of a sample to produce very strange effects; and the Diffuser, which provides the basis for creating your own reverbs.

Turbosynth can let you make subtle modifications to a sample or convolute it monstrously. It is an excellent front end for SampleCell and makes programming the Digidesign sampler more effective and in some ways easier than ever before.

Finale

People who create music, design sound and produce audio on a Macintosh are ill served by the disappearance of Alchemy. While older versions are still around and functioning, it's only a matter of time until some part of a new system or hardware design is incompatible with existing versions. Alchemy was an exceptional application that gave people unprecedented power over sampled sound, and was as responsible as any single device for the development of the sound design industry.

The future is not entirely bleak however. Programs like Infinity and Turbosynth do things Alchemy never could, and many gaps are being filled by other applications, new and old. In the meantime, things change. Audio editors for Windows will not remain under-implemented toys forever, and indeed, Apple's



Fig. 6: Editing functions available in Infinity's Edit menu.

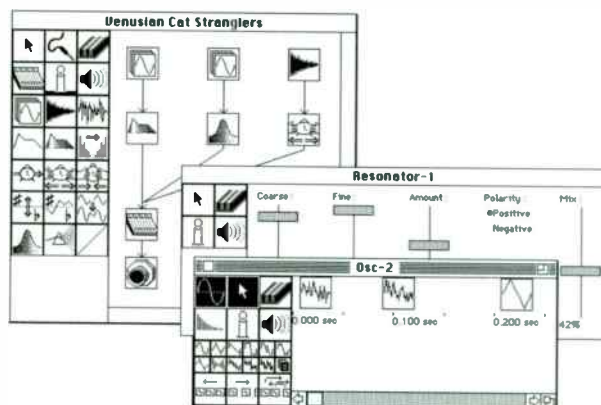


Fig. 7: Turbosynth's main window contains sound sources and their controllers, each of which with its own sub-window.

Power PC—expected to arrive in March of next year—is in many ways the harbinger of the demise of the Mac itself.

But for the present, whether it's sample editing, hard disk recording or specialized sound design, the Macintosh still takes the prize for elegance and power in digital audio. ■

The Next Generation

LATEST PRODUCTS



ILLUSTRATIONS BY LINDA BLECK

Signal processors and MIDI instruments upgrade their operating systems with ROM.

ADAT Computer Interface (\$399)

The ADAT Computer Interface (ACI) is a MIDI Machine Control device that enables a user of any of Steinberg's Cubase MIDI sequencers to control the Alesis ADAT eight-track digital tape recorder from within Cubase. The available functions include stop, play, fast forward, rewind, record, arming a track, punching in and out and others. The interface will effectively add eight tracks of synchronized digital audio tape to any Cubase system. Steinberg-Jones has announced a shipping date of July, 1993.

Steinberg-Jones
818.993.4091

ROM upgrades for ART gear (n/a)

Applied Research and Technology (ART) is offering upgrades for its entire family of signal processors. The new EPROM chips will upgrade an SGX 2000 to an SGX 2000 Express; an SGX T2 to an SGX Nitro; and the Nightbass, DRX 2100 and Alpha 2.0 to the new Studio Editions of those units. The upgrades will add many new features including greater memory, over 400 new factory presets, enhanced reverb algorithms, regenerated delay time increase, and expanded tuner algorithms.

ART
716.436.2720

K2000 Orchestral Sample ROMs (\$395; daughter board \$125)

Young-Chang/Kurzweil has announced new ROM chips for the entire K2000 series of instruments. The new chips provide users eight additional

megabytes of samples recorded, looped and processed to the exacting quality standards for which Kurzweil is famous. The Orchestral ROMs include 100 new programs and 50 new setups, and come with two floppy disks that hold 300 additional programs that use the new samples, as well as several new sequences and a General MIDI disk designed for use with the Orchestral ROM.

Young Chang-Kurzweil
617.890.2929

Multi Media Pro Database (\$89.95)

The Multi Media Pro Database for the IBM PC (DOS) is an easy-to-use, low-cost filing solution specifically designed for videos, books and audio. Pull-down menus and an extensible help system, as well as simple commands, let you add, edit, delete, recall, search, order and query records. Originally written for use at a TV station, the database is particularly designed to organize movies, tapes and other media-type elements.

Supersoft Development Co.
800.334.3925

Cubase Audio for the Falcon030 (\$999)

Steinberg-Jones is shipping their MIDI sequencer/hard disk recording software for Atari's new Falcon030 computer. Cubase Audio offers professional MIDI sequencing, eight tracks of hard disk recording, Time Stretch and other digital effects, and standard notation printing. The program employs the same interface as Cubase for the Mac, PC and Atari ST, and gives the user standard Cubase tools, such as the scissors and glue used to cut, copy and paste

audio or MIDI data. The eight audio channels can be assigned to play back audio from disk, to act as a drum sample player and to do RAM-based playback. Integrated DSP lets the user create such digital effects as reverb, delay and equalization, and Falcon Audio incorporates all the features of Cubase Score, including mix automation, score layout and printing and more.

Steinberg-Jones
818.993.4091

SP-Remote (\$149)

SP-remote for the Macintosh is a software front end for the Peavey SP that lets the user edit the processing parameters of the instrument (though not the waveforms themselves). It puts graphic control over all the instruments parameters on the Mac screen and adds some global editing features not found in the SP itself. An auto-make feature automatically creates new presets from pitched or non-pitched sounds and determines the multisample split points to ease programming. SP-Remote will also convert Akai S1000 and S1100 programs to SP preset data. It requires a Mac Plus, system 6.05 or higher and a MIDI interface.

Distributed by Peavey
601.484.4287

ADAT Interface (price n/a)

Digidesign announced an interface device that will integrate either of its digital audio workstations—Pro Tools for the Mac or Session 8 for the PC—with the ADAT, the eight-track digital audio tape deck from Alesis. Using the ADAT's on-board optical interface, the rack-mount device will be able

to transfer eight channels of digital audio simultaneously from a Digidesign system to the ADAT and back. It can link the two systems to give the user up to sixteen tracks of synchronized digital audio, or it can be used to enormously enhance the editability of material recorded on the ADAT. Any section of any ADAT track can be transferred to the Pro Tools or Session 8, edited there with the speed, accuracy and convenience of visual editing on a random access system, then laid back to the ADAT with down-to-the-sample accuracy. The interface will also allow the Digidesign user to archive material to ADAT tape, providing a copy that can be played on any of the large installed base of ADAT machines.

Digidesign
415.688.0600

Musicshop added to Opcode's Music Bundle (\$299.95)

Opcode has replaced the Book of MIDI HyperCard stack with Musicshop in its music bundle, the Easy Music Starter Kit. Musicshop is a software notation program that can record up to sixteen tracks of MIDI information and allow the user to edit it as standard notation or in a piano roll-type graphic. Musicshop lets the user edit individual notes and MIDI controllers and provides an arrangement window for assembling a large piece of music out of many smaller segments. In addition to Musicshop, the bundle includes PG music's Band-in-a-box, the MIDI accompaniment software, and a MIDI Translator II Macintosh MIDI interface.

Opcode Systems
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Manufacturers can have their products listed in the Version

Update List by sending information to: Studio Software Report, PO Box 8607, Emeryville, CA 94662-8607. Preferred media (in descending order) for submissions to the list are: 1. Text files on Macintosh or PC 3.5" floppies, 2. Fax (510.450.0301), 3. Print on paper. You can also send E-mail on PAN to SSR. Include the name of the product, whether the software is a computer application or internal to a piece of hardware, the latest version, release date of that version, cost to owners of the previous version, system requirements, the new version's important fixes and features and the name and issue of any recent magazine reviews you want people to read.

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BALLADE (MAC) Dynaware	1.1	8/93	n/c	Mac Classic <	16-Trck Seq'r, Print Score, GS/GM spprt	EM 3/92
BEYOND 2.0 Dr. T's Music Software 617.455.1454	2.1			Mac II		KYBD 1/92
CADENZA FOR WINDOWS Big Noise Software 904.730.0754	2.04	5/93	\$10 or n/c <60 days from purchase		Staff edit & print, bank select, swing quant, multitrack record	EM 6/92; HSR 8/92
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CUBASE LITE MAC CUBASE 2.5 MAC CUBASE SCORE MAC CUBASE AUDIO MAC	1.0 2.5 1.0 1.2	9/93 9/93 9/93 9/93		Mac Plus< Mac Plus/Classic; 2MB RAM;sys 6.07 Mac Classic; 2MB RAM;sys 6.07 Mac IIci ; 5MB RAM;sys 6.07;audio card		

V. = Version #. A version number preceded by a "<" indicates the cost to owners of that version or earlier; version numbers preceded by a ">" indicates the cost to owners of that version or later. >prev means "from the previous version." Upgrades from earlier versions may cost more. **R.D.** = Release date. **\$** = Cost of update to registered owners. **REQ.** = Min. hardware and software required. **FIXES/FEATURES** = What's cool about this version. **REVIEWS** = Recent magazine reviews. Abbreviations: n/c= no charge; Kybd= Keyboard; EM= Electronic Musician; CMJ= Computer Music Journal; HSR=Home & Studio Recording.

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CUBASE WINDOWS GS	1.2			386 < Wim 3.1		
CUBASE WINDOWS 2.5	1.0			386 < Wim 3.1		
CUBASE SCORE WINDOWS Steinberg-Jones 818.993.4091	1.0			386 SX/25MHz<; 4MB RAM;Wim 3.1		
CUE Opcode Systems	3.01	12/90	>3.0 n/c, <3.0 \$50	Mac Plus		
DECK 2.0 OSC 415.252.0460	2.0	7/93	n/c	Mac II, Quadra	16-bit, 4-track hard disk recording, non-destructive editing, unlimited virtual tracks, waveform editing	
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EDIT ONE Opcode Systems 415.369.8131	1.0	9/93		Mac Plus <	Editor/Librarian for single instruments	
ENCORE MAC/WINDOWS Passport Designs 415.726.0280	3.0	8/93	\$99 >prev	Mac Plus/PC Windows 3.1	New tools & palettes; EPS files; editing features	KYBD 6/90
EPS 16+ (ROM) Ensoniq 215.647.3930	1.3	7/92		EPS 16+	Intelligent backup & restore, SCSI improvements	KYBD 2/91
GALAXY Opcode Systems 415.369.8131	1.2.2	1/93	\$15 or n/c	Mac Plus; OMS		
GALAXY PLUS EDITORS Opcode Systems	1.2.2	1/93	\$99	Mac Plus; OMS	Set#2 Editors: K2000, E-mu ProCussion, Alesis D4, Roland U-220	KYBD 4/92
INFINITY Jupiter Systems 800.446.2356	1.0.6	5/93	\$495 list	Mac. System 7, 4MB RAM	Sample-looping program. Proprietary looping algorithms loop any sound	EQ 8/93
JAZZ IMPROVISATION SOFTWARE MIBAC Music Software 507.645.5851	1.5.8	5/92		Mac, multitimbral MIDI Synth	Improved transmit routines, drum note sustain, improved printing, 12 styles, tempo and countoff control, humanize rhythm	MacWorld 11/90, EM 9/90, KYBD 10/90, Downbeat 10/90
KCS Dr. T's Music Software 617.455.1454	3.5	10/91		Amiga		KYBD 10/86, 2/87
KCS LEVEL II Dr. T's Music Software		3/89		Mac		
KCS OMEGA Dr. T's Music Software	4.0			Atari		
MACPROTEUS FRONT PANEL Digidesign	1.02	12/92		Mac II, Iix, Ilcx, IIsi, Ilci or Ilfx		
MASTER TRACKS PRO 5 Passport Designs 415.726.0280	5.2	5/93	>prev: \$99	Mac Plus	Auto mixer, SMPTE insert, enhanced Step Editor, transpose map, velocity editor	
MASTER TRACKS PRO FOR WINDOWS Passport Designs	4.6	1/92	>prev: \$99	IBM AT, PS2/clone, MPC, Windows 3.0, DOS 3.1Microsoft	Issues commands to Start, Stop MCIplayer to play WAV. Audio in Windows	
MASTERLIST Digidesign	2.3	12/92				
MASTERSCORE II Steinberg-Jones 818.993.4091	2.0	1/93	\$89	Atari ST/Mega	Score Printing, bugs	

VERSIONS continued on page 98-10

PRODUCT	V.	R.D.	\$	REQ.	FIXES/FEATURES	REVIEWS
MAX Opcode Systems 415.369.8131	2.5	7/93		Mac II	Flexible MIDI Programming	KYBD 4/91
MIDISCOPE Kurzweil Music Systems 213.926.3200	1.5		n/c	Mac	MIDI data analysis	
MIDIMIXR 7s CNSLE MAC/PC Mark of the Unicorn 617.576.2760	1.1.1/1.02	1/93 1/93	n/c n/c	Mac PC/clone	Control MIDI Mixer 7s ditto	
MIDI TIME PIECE II CNSLE Mark of the Unicorn 617.576.2760	1.03	6/93	n/c	Mac	PowerBook Compatible	KYBD 8/90
MIDI TIME PIECE II ROM Mark of the Unicorn 617.576.2760	1.0g	9/93	n/c	Mac/PC		
MIMIX Steinberg-Jones	1.06	4/92	\$5,995 new	Atari ST/Mega	Mixing automation	
MOD FACTORY Creacent Engineering 201.746.9417	1.0	3/92	\$250 new	Eventide H3000 Ultra-harmonizer	New H3000 functions: gain-ducked delay and reverb, envelope-controlled filter, audio-rate LFOs	
MOSAIC Mark of the Unicorn 617.576.2760 Fax: 617.576.3609	1.3	7/93	\$195 for Composer owners	Mac II 2.5M RAM (Sys 6) or 3M RAM (Sys 7) hard drive, ATM	Many new features, QuickDraw printers	KYBD 2/93
MUSIC TIME MAC/PC Passport Designs 415.726.0280	1.2	5/93		IBM AT, PS2/clone, MPC, Windows 3.0, DOS 3.1 Msrst mouse	Auto mixer, SMPTE insert, enhanced Step Editor, transpose map, velocity editor	
MUSICATOR GS/ WINDOWS THINKWARE 415.255.2091	1.0	12/92	n/c	Mac II	Various feature enhancements	
NOTATOR LOGIC (MAC/ATARI) Emagic 800.553.5151	19	9/93	n/c	Mac II < / Atari ST <	Many sophisticated sequencing features	
OFFICE MANAGER White Crow Inc. 800.424.0310	2.5	12/92	n/c	Mac II	Various feature enhancements	
OBJECT MOVER Kurzweil Music Systems 213.926.3200	2.0			Mac	K1000/1200 series librarian	
OMS Opcode Systems	1.2.1	9/93	n/c	Mac IIs, Quadras	Fixes problems with Powerbook modem port	EM 3/92
PERFORMER Mark of the Unicorn 617.576.2760	4.2	7/93	n/c	Mac Plus 4M RAM hard drive	Partial solo; solo button in all edit wdws; popup menus for track switching	KYBD 8/90
POWER CORDS/PRO Howling Dog Systems 613.599.7927	1.1/2.0	5/93 9/93	\$15, free if after 4/15/93 /\$200 new	PC/clone, Windows 3.1, mouse, snd card or MIDI interface	Copy/move/delete groups of bars, smart MIDI thru, key transpose./16 melodies per bar; drag&drop edits, quant'n; import MIDI&PwrChrds parts;efx.	EM 1/93; SOS 9/93
PRO TOOLS Digidesign 415.688.0600	2.2	7/93		Mac IIs, Quadra	Built-in timecode calculator; set selection by SMPTE; SMPTE in Transport window	
PRODUCER/PRO Passport	1.1/1.0	5/93 8/93		Mac IIs, Quadra	Pro Video support, hardware control etc.	
Q-SHEET A/V Digidesign	2.01			Mac Plus, SE1, SE/30, IIs		
QUICKSCORE DELUXE Dr. T's Music Software 617.455.1454	1.0	7/93	\$149.95 new	Windows 3.1 386 PC 2MB RAM	Windows MIDI Scoring Program; 16 staves; Suprts Windows Printers & True Type; input from MIDI Kybd.	

V. = Version #. A version number preceded by a "<" indicates the cost to owners of that version or earlier; version numbers preceded by a ">" indicates the cost to owners of that version or later. >prev means "from the previous version." Upgrades from earlier versions may cost more. R.D. = Release date. \$ = Cost of update to registered owners. REQ. = Min. hardware and software required. FIXES/FEATURES = What's cool about this version. REVIEWS = Recent magazine reviews. Abbreviations: n/c= no charge; Kybd= Keyboard; EM= Electronic Musician; CMJ= Computer Music Journal; HSR=Home & Studio Recording.

PRODUCT	V.	R.D.	\$	REQ.	FIXES/FEATURES	REVIEWS
SAMPLECELL EDITOR Digidesign 415.688.0600	2.0	7/93	\$50	Mac IIs, Quadra, SampleCell Nubus Card	New Interface Sys & savvy, Apple Events.	
SESSION 8 Digidesign	1.15	7/93	n/c	386 PC/Clone	Supports DATa for the PC	
SOUND ACCESS Digidesign	1.10		n/c			
SOUND DESIGNER III Digidesign	2.5	12/92	>2.xx: n/c <1.xx: \$195	Mac IIs, Quadra	New time compression/expansion, pitch shifting	
SOUND DESIGNER IIPT Digidesign	2.5	12/92	\$995 for Pro Tools	Mac IIs; Quadra	New time compression/expansion, pitch shifting	
SOUND EDIT PRO MacroMedia 415.442.0200	1.0	1/92	\$349 new	Mac Plus, Sys. 6.0.7	Edit 16-bit audio, non-destructive editing, DSP effects	
SOUND STAGE (56K SYS) Turtle Beach Systems 717.843.6916	2.0	1/93	n/c	PC w/ Windows 3.1	Feature fixes, larger buffers	KYBD 5/91
STUDIO 3 DA Opcode Systems 415.369.8131	1.01	9/89	n/c	Studio 3 Interface		
STUDIO 5/OMS SETUP Opcode Systems	1.1.3	1/92	n/c	Studio 5 Interface	More OMS device names	
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TIGER CUB Dr. T's Music Software 617.455.1454	1.1	10/91		Amiga		
TIGER Dr. T's Music Software	1.21	2/91		Atari		KYBD 2/90
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TIMECODE READER (ROM) EnterTec Inc. 804.353.7133	1.1		\$179	PC/Clone DOS, Windows 3.x	Captures SMPTE to Clipboard	
TRACKCHART Opcode Systems	1.03	4/92	n/c	Mac Plus	Sys 7 compat., 32 bit clean	
TURBOSYNTH SC Digidesign 415.688.0600	1.00	7/93	\$29 dmstc \$49 int'l	Mac Plus or better	Sound creation and editing system for samplers; Suprts Stereo; SmpleCel Editor via Apple Evnts; AIFF; SD II; new ManI; no samplers but SmpleCell	KYBD 10/88
UNISYN Mark of the Unicorn 617.576.2760	1.00	7/93		Mac Plus or better	Universal Editor Librarian	
VISION Opcode Systems 415.369.8131	1.44	5/93	>1.3 n/c; <1.3 \$29	Mac Plus		KYBD 7/89
WAVE FOR WINDOWS Turtle Beach Systems	1/93	2.0	\$39	PC/clone Windows 3.1	DSP reverb, delay, pitch shift	

Techniques for the Digital Studio, Part 1

By Craig Anderton



Mention hard disk recording, and most people think of audio storage and editing. That's one application, but a hard disk recording system can also serve as a piece of audio test gear roughly comparable to a high-resolution, two-channel storage oscilloscope.

With a hard disk recording system you can find a synthesizer's delay in responding to MIDI messages; test equalizer frequency response; learn the

sure noise gate response time, frequency response, gain, and sequencer jitter.

Beating the Numbers Game

Let's remove the shroud of mystery around synthesizers that say an attack time is "03" or an LFO speed is "22." What does that mean in milliseconds? Not only can hard disk systems provide the answers, they can also give some insights into the "vintage synth" sound.

Figure 1, a screen dump from Sound Tools, shows a note played through a Peavey DPM 3 amplitude envelope set for an attack time of "20."

Highlighting the attack region gives an elapsed time readout in the box to the right of the scrub icon—in this case, about 225 ms. (With Sound Tools, the cursor must remain at the end of the region; if you move it, the elapsed time reading will follow its position.) Take several readings for different generator values, plot a graph, and you need never guess about envelope times again.

It's also instructive to look at an envelope's overall shape. "Vintage" synthesizers like the Minimoog usually have envelopes that decay exponentially after a short peak hold time (Figure 2), which gives a natural sound.

Modern digital synths tend to have linear decays. Note how a DPM 3's

decay envelope drops off linearly after a 30-ms hold (Figure 3). But you can program linear rate/level envelope generators to simulate an exponential decay by setting each sub-

sequent level at half of the previous value, and doubling the times between levels. Figure 4 shows a DPM 3 amplitude envelope set for levels 99-50-25-00 with times of 4-8-16 between these levels.

Interestingly, the DPM 3 and Minimoog, both of which are considered "punchy," exhibit a very short maxi-

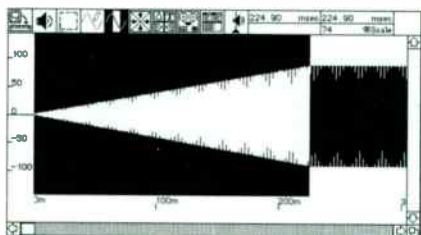


Fig. 1: DPM envelope attack time of 20.

real times—in milliseconds—of synthesizer envelope segments that range from "00-99;" check sequencer timing jitter and more. The measurements aren't real time, but you can record a series of measurements and analyze them at your leisure (as well as store them as computer files), which in some cases is better.

You'll usually need to measure only a few seconds or minutes of audio to get the data, so a giant hard drive isn't as crucial as it ordinarily is. But good audio cards make for the most accurate reading.

In this installment we'll calibrate your synthesizers, samplers, and other sound generators. In part 2, we'll mea-

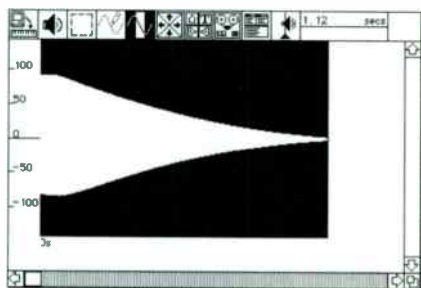


Fig. 2: Minimoog envelope decay.

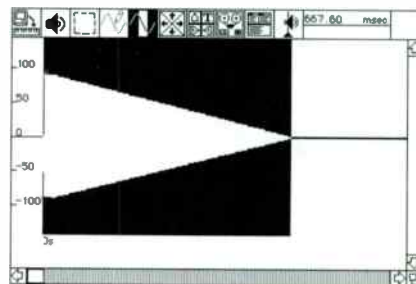


Fig. 3: Linear envelope decay.

mum-level sustain time (30 and 40 ms respectively) before the decay kicks in. The short "full on" time may give the subjective effect of punch. (If you see "punch" buttons on synths that add this hold time, you saw it here first!)

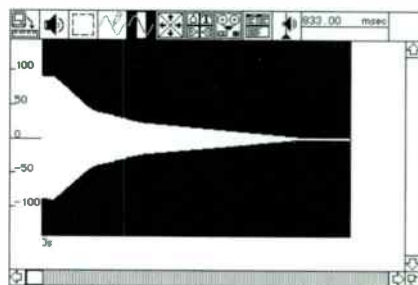


Fig. 4: Setting a rate/level envelope for exponential decay.

Punchiness involves other factors. When subjected to the scrutiny of hard disk editing, it's clear that some synthesizers don't have an instantaneous attack time, even with the attack parameter set to 0. It's easy to test a synth for this by setting the synth's attack to 0, recording

a note into your hard disk system, then checking if there is a time difference between the onset of the note and when it reaches its maximum level. Fig. 5 shows an OB-8 synthesizer's attack time (this is a fairly old and slow synthesizer); highlighting the time difference shows the delay in milliseconds (in this case, 2.00 ms).

When testing attack times with a sampler, truncate the beginning of the sample somewhat to insure that the attack characteristic of the sample itself

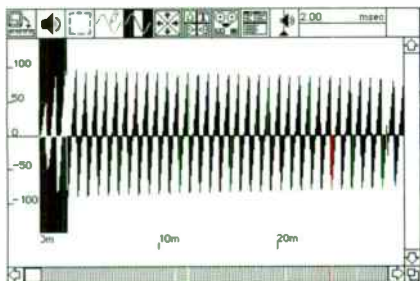


Fig. 5: OB-8 fixed attack time revealed.

doesn't influence the attack. Musically, this implies that instruments with non-zero attack times are best for strings and pads rather than percussive sounds. (Maybe this is one reason why the OB-8 was famed for its string and horn pads, two sounds that aren't dependent on quick attacks.)

"This is MIDI Central, Please Hold..."

Even the best synths don't respond instantaneously to incoming MIDI data. Some take less than a few milliseconds and exhibit a constant delay; others have significant, and sometimes varying, delays. Timing delays that vary randomly are the worst, because the variability makes it difficult to compensate for the delay by shifting sequencer tracks a few clocks. Fortunately, a hard disk recording system can help quantify these delays.

Figure 6 shows the test setup, which requires a stable source of timing pulses and MIDI events. The Alesis MMT-8 has exceptionally stable timing (I recorded the click into the hard disk system and measured the elapsed time between clicks, as well as the elapsed time between the generation of MIDI events; both were virtually constant). By feeding the MMT-8 metronome click into one

TECHNIQUES continued on page 98-15

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Software Directions

STUDIO SOFTWARE NEWS AND UPDATES

The studio shrinks to the size of a desktop, and maybe there's a future in modular synths.

In 1969, **Tom Oberheim** founded Oberheim Electronics, where he developed some of the most used, loved and respected instruments in the history of electronic music. He founded **Marion Systems** in 1987 to further the state of electronic music, and the company recently made an intriguing announcement.

The **MSR-2 Modular Synthesizer System** (\$1495 per module) is scheduled for release to Marion Systems dealers in November. The unit is designed to meet the musician's need for an electronic instrument that combines top-quality sound, ease of use, modularity and freedom from obsolescence. The instrument will let users incorporate many different technologies into a single system with a single user interface. It's based on a 1U rack unit ("The Mainframe") that can hold two plug-in sound modules, each of which is a complete synthesizer that slides easily into and out of the rack. The first modules to be developed will be configured as eight-voice analog synthesizers featuring proprietary High Resolution Oscillators that will combine the classic analog sound with the stability of digital technology. The modules will offer warm, 2- and 4-pole filters, external audio inputs into each filter, and an extensive modulation matrix that will provide expressive, real time control. Future modules will feature wavetable synthesis, sample recording and playback, reverb and other new technologies. The user will be able to swap different modules in and out of the Mainframe to create individualized, custom sounds, and to access its 6-channel mixer, external inputs, programmable graphic EQ, two MIDI ports including MIDI processing, and easy-to-use, menu-driven



interface. Experienced synth-oids will keep a eye out for this new development. **Marion Systems:** 408.688.8593.

Digidesign continues to pump up its Macintosh-based **TDM Bus** system which will serve as the foundation for a complete, all-digital studio in a box. The TDM system will give users of **Pro Tools** access to all the functions normally associated with the recording studio, but all in the digital domain, and generated by hardware and software installed in the Macintosh. Software "plug-ins" will perform such operations as EQ or noise reduction and Mac NuBus cards (such as the **Lexicon NuVerb** or Digidesign's **SampleCell**) will offer signal processing, sample playback, mixing and other functions. The system also allows the ability to route signals to and from outboard analog or digital gear already in a studio, and to control send and return levels automatically.

New TDM-compatible products include **PostView**, an integrated digital video and VTR control software for Pro Tools; **MasterList CD**, a CD mastering system for ProTools, ProMaster 20, Sound Tools II and Audiomedia II systems; and the **File Browsing Utility**, an audio file management system that provides cataloging, searching, auditioning and allowing the user to insert a file into current applications. **Digidesign:** 415.688.0600.

Mark of the Unicorn is also boarding the Digidesign TDM bus. The venerable sequencer and MIDI interface manufacturer announced that their **Digital Performer**, too, will support the **Digidesign Audio Engine**. The DAE is the system-level software that integrates and operates the TDM system. MOTU's

collaboration means that their software will be able to take advantage of future enhancements to TDM. **Mark of the Unicorn:** 617.576.2760.

Peavey, not content to let Digidesign have all the fun putting the recording studio in a Mac, has announced **MediaMation**, the technology that puts a sound reinforcement system in a PC. The system is based on Peavey's **MediaMatrix** expansion card, designed around four **Motorola 56002 DSP** chips, and the MediaMation software. Since the functions of the DSP cards are configurable in software, they can function as EQs, signal processors, mixers, and "anything between the mics and the power amps," as one Peavey representative put it. The user can install as many MediaMation cards as the PC has slots, to give the system an extraordinary expandability.

The software provides a graphical user interface that lets the user click and drag icons representing the elements of a system. The screen can show an overview including unit names and signal routings and zoom in to display the controls of any of the individual units. The software can also display (and save) scanned photos or architectural-style diagrams of any venue, onto which the user can impose elements of the sound system, including speakers, mixers and other gear. These images can be saved and recalled along with the settings required at the given venue to make setup faster and surer.

The system connects to the outside world via small A-to-D/D-to-A breakout boxes that can integrate outboard analog gear into a setup.

While the system is optimized for sound reinforcement, its internal processing is done in a 24-bits format, so it could be refitted for studio use by a relatively simple redesign of its breakout boxes to also reflect 24-bit quality. **Peavey:** 601.486.1287. ■

TECHNIQUES

continued from page 98-13

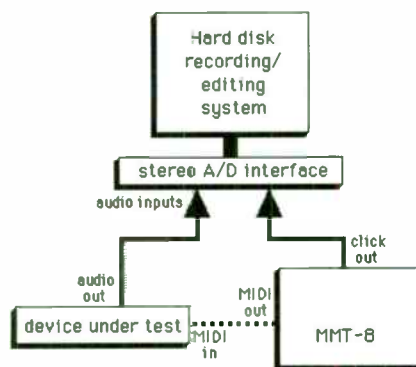


Fig. 6: Test setup for measuring synth MIDI delays.

hard disk recording channel, driving the instrument under test from the MMT-8's MIDI out, and recording a percussive sound from the instrument being tested into the other channel, compare the offset between the click and note onset to get the delay times of different synths.

Figure 7 shows the delay for an Alesis SR-16 drum machine. The highlighted area defines the region between where the click starts and where the audio starts, which is around 1.9 ms—very

fast, considering that a MIDI note-on message itself takes about 1 ms.

Fig. 8 shows the delay for an OB-8. The highlighted region is about 7.50 ms, but this can vary a little for individual notes. (For what it's worth, a good synth or sampler will measure around 3-4 ms of delay, an average device around 4-6 ms, and below average, 6 ms or more.)

Once you know the delay times of your synthesizers, you can "slip" sequencer tracks to tune out variations.

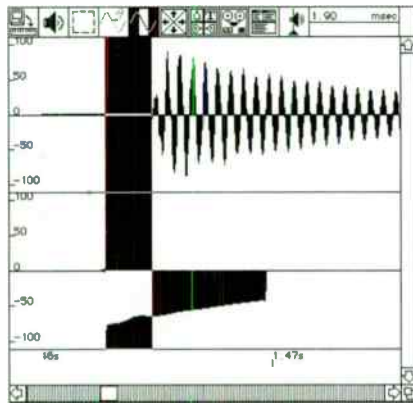


Fig. 7: SR-16 MIDI response time.

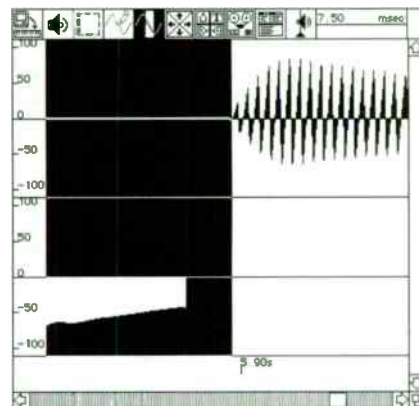


Fig. 8: OB-8 MIDI response time.

(Even if you do track-shifting to create a particular "feel," it helps to have a consistent point of departure when you start.)

Now that we have the synths figured out, it's time to find out more about the rest of your studio. See you next issue.

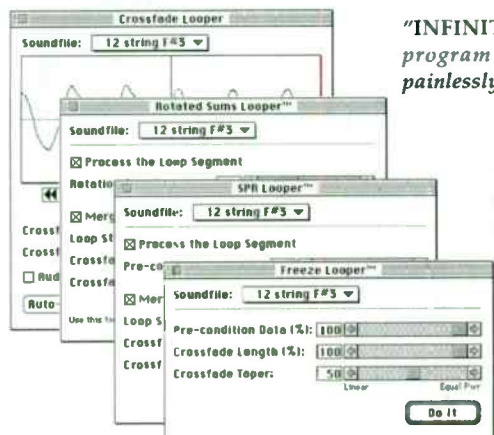
Craig Anderton spends most of his time traveling around the world and giving lectures on subjects related to musical electronics. He knows where the video arcades are in all major airports.

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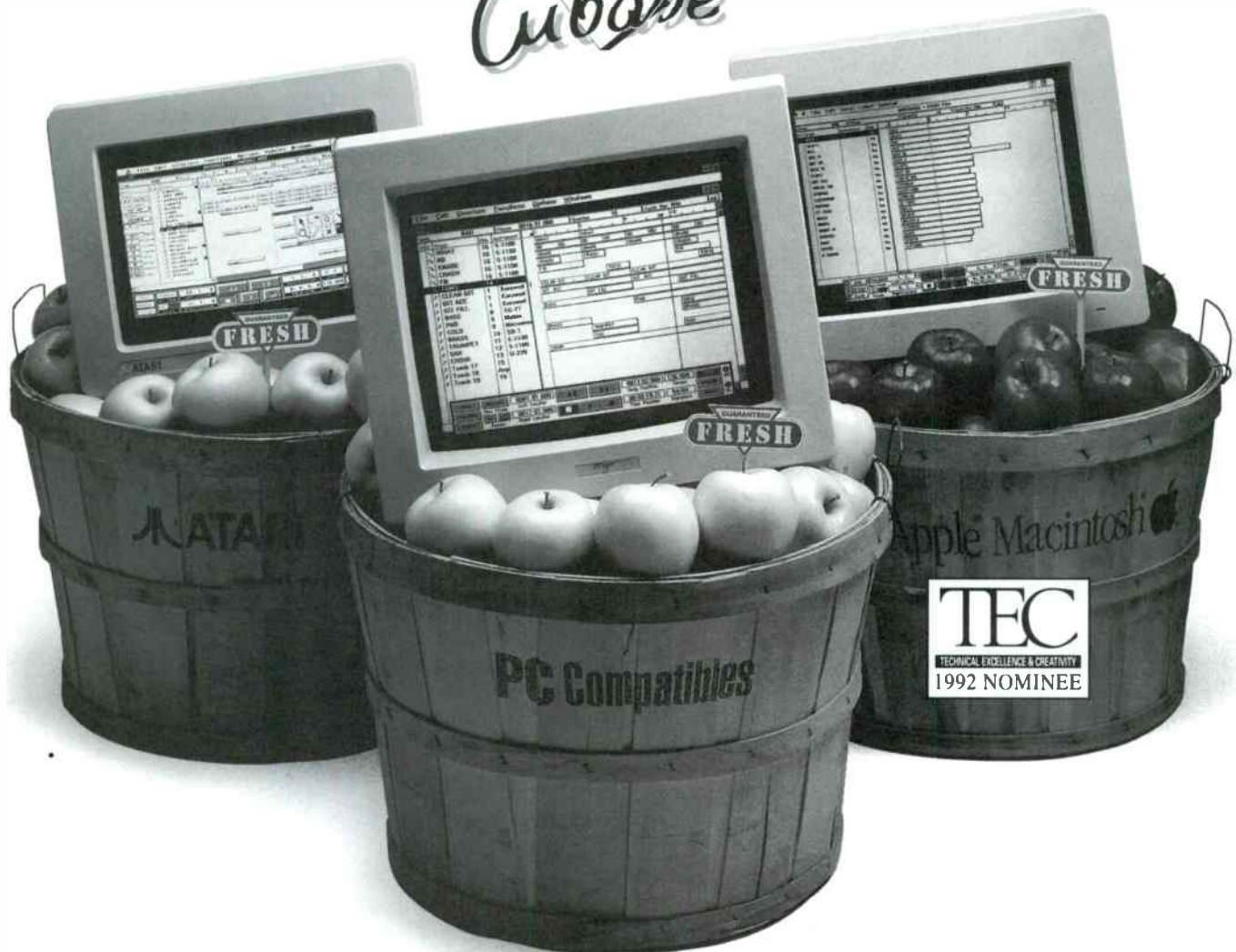
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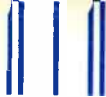
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IN REVIEW

dbx 760X Microphone Preamp



MANUFACTURER: dbx Professional Products (a division of AKG Acoustics, Inc.), 1525 Alvarado Street, San Leandro, CA 94577. Tel: 510-351-3500.

APPLICATION: Standalone microphone preamplifier.

SUMMARY: Compact, transformerless design is equivalent to, or exceeds, the design and quality of those found in mixers ranging from \$20,000 to \$30,000.

STRENGTHS: Clean, quiet, affordable transparency in a solid package.

WEAKNESSES: Insufficient metering; no battery operation; no headphone jack.

PRICE: \$349 including rack hardware

EQ FREE LIT. #: 127

HELLO AUDIO HOUNDS! If you are looking for a bargain, get yer sensitive little noses closer to the fine print...

WHAT ALL THE FUSS IS ABOUT

The demand for mic preamps has risen dramatically with the proliferation of affordable digital formats. There are a number of reasons for this; the lower noise floor of digital being the most obvious. In addition, the digital medium has placed greater demands on the preamplification process. Because of its improved transient response over analog tape, a digital recording may reveal other limitations of the sound source, most notably, transient anomalies such as distortion and slow response time. These nonlinear elements degrade that elusive quality of transparency.

(On the other hand, analog may be the chosen medium because of its tendency to saturate.)

The mic preamps found in many mixers, like their equalizers, are built so that the price of the whole mixer can be competitive with other brands. It is here that compromise begins to undermine the quality of sound design. Try this one on for size: Take the list price of this dbx stereo preamp and multiply it by half the number of mixer channels you need. If the number calculated is greater than the list price of your mixer, then you have good reason to check out the 760X. (Don't forget that the cost of good EQ, per channel, starts at what the 760X lists for.)

The 760X is a dual-microphone preamplifier in a half-width, single-rack-space package. It is powered via a

20-volt AC wall-wart. On the front panel, from left to right, are LEDs to indicate audio power, clipping, phase reversal, and 48-volt phantom power. There is a level control, plus polarity and phantom power switches for each channel. XLR inputs and outputs are provided on the rear panel, as are 1/4-inch tip-sleeve jacks for unbalanced output operation. Nominal output level is 0 dBu. The 760X's balanced output is capable of delivering +23.5 dBm into a 600 ohm load.

The 760X features a transformerless design in and out. Properly carried through, this type of preamp should offer greater bandwidth and transient response than transformer designs. For better or worse, transformers can color the sound. From a manufacturer's point-of-view they also add considerably to the cost and the weight. Transformers do provide about 15 dB of "free" gain, though. This requires less gain/work from the active electronics and results in less noise. dbx got around this by using the SSM 2017 audio preamplifier IC by Analog Devices (see the technical sidebar). It's the same chip that's used in the Big console by Langley and the Orion mixer by D&R.

GETTING THE MOST

What dbx has done to make the 760X the best it can be is to use low noise, 1



percent, metal film resistors throughout. The circuit board is strong fiberglass-epoxy. In addition, electrolytic signal capacitors are paralleled with high-quality mylar capacitors to improve transient response. This also serves to extend high-frequency response and guarantee long-term stability and channel balance.

Three areas that are very important to good transformerless design are: RF immunity; proper shielding; and a robust ground plane. Those are the three areas in which the dbx 760X greatly impressed me (see the "Torture Test"). The 760X PC board is mounted to a metal base of 1/16-inch steel with a cover of extruded aluminum. All of the input/output jacks are grounded to the case and include RF/TVI LC (Radio Frequency/Television Interference inductive-capacitive) filters. (This is rare in most mid-line mixers.)

HOW TO USE IT

In order to get the most from any microphone preamplifier, it is best to connect it directly to a recording device whether it be analog or digital. Of course, you may want to use signal processing, but if you do choose to go straight to tape from the 760X's unbalanced output, for example, there are only two IC op amps (operational amplifiers) in the path plus the SSM 2017. Exiting from the balanced output are two more op amps, one for XLR pin 2 and the other for XLR pin 3. (A fifth op amp monitors the output in case it becomes unbalanced.)

TORTURE TEST

AKG, the parent company of dbx, supplied a pair of condenser microphones from their Blue Line Series: the SE300B preamp with CK91 cardioid capsule. The preamp body features a switch that selects three modes: flat, low filter, or pad.

The "torture" involved running a cable from my shop to a nearby cafe; a distance of about 125 feet. The cable, Canare "star quad," has four conductors plus shield and is wired with five-pin XLR's at each end. Each pair of conductors is dedicated to a channel, left and right. Break-out boxes con-

verted the five-pin format to two male or female XLRs as needed. The 760X accepted this without a hint of RF/TVI. This is amazing, especially on New York's Lower East Side where the World Trade Center radiates at least five, full-power, VHF TV stations. Many a client has asked me to get such interference out of their studio systems.

I fed the unbalanced output to a DAT deck and the balanced output to a Hi-Fi preamp so that I could monitor the 760X without going through the analog-to-digital conversion process. The jazz ensemble playing at the First Street Cafe consisted of sax, piano, acoustic bass (augmented by a small G-K amp), and drums. I set the mics flat, no pad, no roll-off, and mounted them on a "T" bar with goose neck to obtain an X/Y configuration. The microphones were placed by the piano and bass in order to balance them with the sax and drums, which were much louder.

The 760X was set to minimum gain using the DAT to set record level. I have to say I was both surprised and very happy with the sound, as was the band! I captured useful low end, natural-sounding ambience, and clean, clear drums. The sax was smooth and unabrasive.

As an additional sonic experiment, I loaned the microphone preamp combination to Paul Special, of Special Audio Services in NY, who used them to record two music cues for an upcoming Touchstone Pictures (Disney) film. The composer is Kurt Hoffman, formerly of the Ordinaires. The string section consisted of two violins, viola, cello, and bass.

Paul found that the AKG CK91/SE300B (also known as the C391B) combined with the 760X produced less noise than using AKG 451's along with the preamps in the console (a Soundcraft 1600). He also felt that this new combination produced a beefier, smoother sound than his normal in-house choice.

Other gear on this session included a Neumann TLM-170 on bass, an AKG-414 on cello (these were fed to a Gaines MP-2 pre-amp), and an AKG

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TECH STUFF

About the SSM 2017 and the guts of 760X...

The SSM 2017 is an IC amplifier whose job it is to amplify very small (microphone level) signals with as little noise and as much transient response as possible. In a microphone preamplifier application, it is the first stage of amplification, the front end, followed by a standard TL072 op amp. (An op amp itself cannot provide stable high gain and low noise.)

Many mixers, including the Soundcraft Spirit, for example, use a pair of discrete transistors followed by an IC op amp. The transistors can be matched and selected for low noise. The SSM 2017 basically replaces this transistor pair. All of the devices on the SSM 2017 are matched since they are grown on the same silicon crystal.

You may recall the TAC Scorpion. It used the SSM 2015. The SSM 2017 has almost half the noise of the SSM2015, plus the slew rate (transient response speed) has been improved from 8 volts/microsecond to 10 volts/microsecond.

451 on viola. The distance from instrument to mic was between two and three feet measured from the F hole. Two AKG 451's and a pair of Realistic PZMs were used as room mics. Paul wished that the 760X had at least one LED to indicate the presence of signal, say at minus ten.

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THE MANUAL AND THE TECH TESTS

The manual, written in real English, is both thorough and informative. I consulted it primarily to check the specs. The only vague specification is Equivalent Input Noise, which, at -129.5 dBu, is the theoretical maximum under lab conditions. In the real world, you might squeeze 100 dB signal to noise with the gain set to minimum, as I did for the cafe recording, using the unbalanced output. (The balanced output does have a bit more noise.)

The gain is adjustable from a minimum of 20 dB to a maximum of 60 dB. The increase in noise is only about 12 dB over this range and the increase occurs mainly between the 4 o'clock and 5 o'clock positions. The gain control is subdivided in linear increments with gain settings of 30, 40, and 50 dB occurring at the 10, 2, and 4 o'clock positions, respectively. The weak link of this preamp is its carbon-type gain pot, which is potentially scratchy (especially between 50 and 60 dB). I would instead recommend a conductive plastic pot because of its lower noise and longer life span.

SUMMARY

I feel confident that the 760X will meet or exceed the quality of mic preamps found in mixers costing upwards of \$30,000. dbx took this basic design all the way through the production stage without compromise. Its compact size and sturdy design are certainly more roadworthy than you'd expect for a product in this price category. If interference is your nemesis and voiceovers your livelihood, the 760X could help you make an affordable step up. (Or give your personal multitrack the kick in the butt it needs!)

—Eddie Ciletti

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REVIEW SHORT



Jeanius Electronics Russian Dragon

"Often the best ideas are the simplest ones, and the concept behind the Russian Dragon is fiendishly clever."

IN MUSIC, AS in most aspects of life, timing is everything. Nowhere is this more critical than when creating recorded music. For years, musicians have relied upon an indefinable something called "feel" to know when a rhythm track is in the pocket. But the computer age is upon us, and the proliferation of sequencers, click tracks, and drum triggers has redefined the way we create and produce music.

Enter Jeanius Electronics' Russian Dragon (\$499) — an ingenious (dare we say?) device that provides instant visual feedback to let you know, within a tenth of a thousandth of a second, just how in the pocket a track actually is.

Often the best ideas are the simplest ones, and the concept behind the Russian Dragon is fiendishly clever. The single-rack-space unit provides two audio inputs (these accept either balanced or unbalanced signals) and a large front panel 25-LED display shows you whether the two incoming audio signal peaks occur at the same time, or whether one is early (rushin') or late (draggin') relative to the other. An "ms per LED" control allows you to determine the range of the LED display. For exam-

ple, at a setting of "4 ms per LED," if the 9th LED on the rushin' side of center is lit, the Russian Dragon is indicating that the signal plugged in to the second audio input is 36 ms early. When both LEDs on each side of center are lit, the signals are perfectly synchronized. This display reading is called "Snake Eyes."

Other front panel features include: input level meters (these allow you to set optimum input levels); masking controls (these allow you to remove extraneous incoming sounds so that double-triggering can be avoided); and polarity check buttons (which enable you to determine the phase of the incoming signal transient).

In its most typical usage, you would feed a click track into the reference input and bass drum and/or snare drum hits into the test input. But there are many other uses for the Russian Dragon. For example, you can use it to accurately line up samples being triggered from live or tape sources, or you can use it to set correct speaker delay times in large PA installations.

The Russian Dragon also has its place in equipment testing. For example, I used it extensively to measure the audio/MIDI synchronization stability of various hard-drive recording systems, and the results were impressively consistent even when the same complex tests were conducted repeatedly. Perhaps the most fascinating usage is to test MIDI sequencer tempo stability — that "steady" 120 bpm you think your sequencer is outputting may not be all that steady after all!

Originally released in 1987, the Russian Dragon has already become the "secret weapon" of many commer-

cial and project studios. As a result, the device has undergone a number of hardware and software incarnations. Their most recent model (reviewed here) is the rackmount RD-R, and I really only have one minor complaint about the unit: While the concept of using 25 large LED squares to show the amount of timing deviation is a good one (you can see them clearly even from across a control room, and they are colored differently to indicate different amounts of deviation), I would love to see an additional front-panel display that shows deviation times in actual numbers of ms. Of course, to make that really useful, you'd want to also have some kind of computer interface so that a continuous record could be viewed onscreen or printed out.

Did you ever buy a piece of equipment and then wonder how you ever did without it before? After months of intensive usage, that's how I feel about the Russian Dragon RD-R. If you do any amount of serious recording work that involves MIDI sequencing and/or sample triggering, you should seriously consider rushin' down to your local music store to check one of these guys out—and stop draggin' your feet!

—Howard Massey

Contact Jeanius Electronics at 2815 Swandale Drive, San Antonio, TX 78230. Tel: 800-880-8776. Circle EQ Free Lit. #128.

Howard Massey heads up On The Right Wavelength, a MIDI consulting company. His latest book is The Complete Sound Blaster.

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Digital-Savvy Consoles

It takes a special console to make sure your digital multitrack recorder is operating to the max

BY J.D. SHARP

Now that the Alesis ADAT and the Tascam DA-88 have become a part of everyday studio life, and with the recent release of the Fostex RD-8, a new focus has been brought to bear on mixing boards. Specifically the question of signal-to-noise has taken on new importance, since all digital machines are capable of producing tapes with S/N ratios in the low 90s. The same is true of multi-output hard-disk recording systems. So a console that seemed perfectly adequate just a year or two ago could suddenly be seen as obsolete.

That's the bad news. The good news is that console manufacturers have raced to the rescue with

improved designs in every price range. So no matter what your budget might be there's a solution to your mixer woes.

There aren't a whole bunch of choices below \$1000. You can cludge together a system using a 2-bus sound-reinforcement mixer, but some necessary facilities are sadly lacking, like a stereo monitor bus, proper headphone/cue feeds, and monitor speaker controls. Tascam's M1508 and M1516 are about the least expensive, true recording mixers around, and do offer all the aforementioned goodies along with dual inputs for your virtual MIDI tracks come mixdown time. They do fall a bit short on the signal-to-noise side, but with careful management of gain levels your results will be quite acceptable.

BIG MACKIE

A popular alternative in this price category is to take a Mackie CR1604 (\$1095) or one of the many mixers that have been derived from this design (Samson 2242, DOD 1604RM, ART Phantom 3208, Peavey Versamix, and others) and use it for recording. The Mackie offers outstanding performance and has gained an enviable reputation for the quality of its microphone preamps. The board is quiet, has lots of headroom and sounds

great. It would be the ideal low-cost solution except that there are many features missing that make it fairly inconvenient, if still quite useable, in a studio context.

Because there are no separate tape inputs, you tie up half your inputs using them as tape returns. You do have 16 to start with (22 on the Samson), however, so perhaps this is not such a big issue if you only use a few sources at a time while tracking. Of more concern is the lack of a true studio monitor bus. The Mackie offers two ways around this; first, you can use the L-R bus as your monitor/mix bus and use the "alternate" outputs as your stereo output pair. Fair enough, but this renders the Mute feature inoperative since the Mute switch is how you select the alternate bus. Or you can use one of the cue sends as a mono control room and/or headphone feed — but now you're listening in mono, which can make it tough.

Despite these drawbacks, the 1604 and several of its competitors do get the job done with commendable specifications, and if you're trying to limit your spending to the one grand range, there really is no fantastic alternative; you have to choose between the complete feature set of the Tascams versus the higher performance but substantially greater inconvenience of the Mackie CR1604 and its clones.

STAR CONSOLE

So what's the least you can spend for a "full-featured" console? As of this writing the honors belong to none other than Studiomaster. They've brought out the Star mixer (\$1895), most notable for its unusual stand-up design that looks ridiculous at first glance but makes more and more sense as time goes along. For one thing, it takes up way less desktop space than any competitor, yet offers more inputs. All connections are easily reached, yet they're out of your way while working with the board. And all knobs and switches are completely visible and easy to get to.

The Star is basically a stereo mixer with a twist. Each of its eight main inputs can be sent "direct" to the asso-



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WORKSHOP SYSTEMS

ciated tape track (input one to tape in one, and so on). Any tracks that aren't selected for direct send end up in the L-R bus. This in turn feeds the eight "to tape" outputs, with Left going to odd channels and Right to even. Since all the digital tape machines automatically switch between source and tape when recording, you simply select which pair of tracks you want to record on at the tape machine and put them into record. If you need to record more tracks at once, the Direct function has you covered.

The Star has many other goodies that make life convenient. Tape outs and ins are individually switchable between -10 dBv and +4 dBv levels. A provision is made for two stereo recorders (i.e., a DAT and a cassette), and you can dub between them with a simple push of a switch. Eight stereo inputs are provided; you can use them as effect returns or as additional line ins. Each input is dual, with a rotary gain knob for the second input and a Flip switch that trades the mic/line and tape inputs, so you can put the one you want on the long-throw channel fader. Another provision is made for both control room and studio outputs, and headphone monitoring is quite flexible. A couple of extras not found on other consoles: there are two individual single-band parametric EQs that can be patched to any insert point (the board is loaded with them), and there are two miniprocessor bays that accept processors from Studiomaster's Star system, including compressors, gates, limiters, and the like. With a total of 36 line inputs available for mixdown and an overall S/N figure of 92 dB the Star wins the under-\$2000 category hands down. About the only thing missing is multiple output busses, and there are no mute or solo functions for the dual input, but for a personal recording mixer or for working with a couple of other people, there's nothing like it in the price range.

MACKIE II: THE SEQUEL

As we move up the pricing ladder the consoles start to take on a more professional cast, with more features the order of the day. One console that has made a huge splash is the Mackie 24•8. It provides eight output subgroups plus 24 dual inputs and is perfectly capable of handling up to three 8-track recorders without breaking a sweat.

Its most notable feature is its 4-

band EQ with both a full parametric and a sweepable midband per input along with a high-pass filter. The EQ may be split between the main and dual input, effectively providing 48 equalized ins. The 24•8 is one of few consoles to offer a full meter bridge as an option, which is great for working with multiple machines. This console is especially complete when it comes to monitoring options with its two separate headphone outs fed by selectable sources and separate level controls for Studio and Control Room feeds. Six effect returns can operate in either mono or stereo.

Mackie has paid uncommon attention to details like fader construction and microphone preamps in the quest for quality at a moderate price. A 32-input version should be on the market by the time you read this. Both consoles are prewired for an add-in automation system (more on this later). About the only things missing are solo and mute for the dual input and direct input to recorder routing without using patch cords.

THAT'S THE SPIRIT

The console that most of the industry has been chasing for the last year and a half is the Soundcraft Spirit Studio. This board single-handedly revolutionized console design and has held up remarkably well as competitors have taken pot shots at it. Each input can be fed directly to the associated tape output by pressing a Direct button, or is routed to the eight subgroups with even-odd panning. If you're not using a direct, the subgroups in turn feed the to-tape outputs, with group one feeding outputs one, nine, seventeen, and so on down the line. Thus it's possible to assign to every tape input for three machines (four machines on 32-input versions) without ever throwing a patch cord. Equally nice is the fader reverse (flip) function, so full advantage can be taken of the dual-input construction.

The Spirit Studio also pioneered split EQ, allowing the two mid-sweep bands to be used separately from the shelving high and low. These consoles have definite blood lines; there's no question that Soundcraft's extensive experience in designing big-time consoles has rubbed off in the sound of the mic preamps and equalizers. Sixteen-, 24- and 32-input versions are

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offered. The biggest complaint here is the lack of EQ bypass.

THE MORE THE MERRIER

There are a host of consoles that resemble the Spirit Studio and add or rearrange features. Allen and Heath's GS3 provides 2-band EQ for the dual input and 3-band, swept-mid EQ for the main in, so all inputs are equalized, all the time. MIDI muting is built in, and requires no external computer. A MIDI command center memorizes and regurgitates MIDI commands; this comes in mighty handy for MIDI Machine Control applications like driving your ADAT without leaving the console!

EQ bypass is provided for the main input and solo can be found all around. Patch-free dubbing facilities for two stereo decks are also incorporated. This console is expandable in increments of 8 ins from 16 up to 32 ins, so this can help out the budget by allowing you to grow into your console.

Soundtracs offers the Solo, which also includes MIDI muting, EQ bypass, split EQ, direct recording, and more. Like the Mackie, optional meter bridges are available. A more stripped-down and cost-effective Soundtracs is in the works, designed to give the Mackie 24•8 a run for the money. Stay tuned!

Studiomaster's P7 console expands up to 40 dual inputs, giving it the most clout in the class, and it covers all the goodies, including MIDI muting and stereo solo in place, with superb quality.

Finally, Alesis has the 24-input, 8 out X2 scheduled for introduction right around the beginning of 1994. Although there's nothing particularly revolutionary about the console, by the time you finish adding up everything they've built in, you'd have to be brain dead to not be impressed. The splittable EQ section provides two fully parametric mid bands plus shelving highs and lows and a high-pass filter. The monitor fader is a 40mm. linear affair instead of a rotary knob, and, naturally, you can flip the main and monitor channels. Stereo solo in place is built in. You'll find one stereo and six mono sends and no less than eight stereo aux returns, each with 2-band EQ and muting. Speaking of

mutes, a 10,000-event mute controller is built in and can be synchronized directly to the ADAT, manipulated externally via MIDI, or controlled in real time by 100 sets of four mute groups.

Construction is fully modular and a complete meter bridge is standard, not optional. Three ELCO connectors are mounted on the back panel for balanced +4 connections to three ADATs using multicore snakes rather than a host of individual wires. About the only thing missing is...nothing?

It may seem strange to you that more time isn't spent covering each of these consoles, but to tell the truth they are roughly comparable to each other in basic features, signal routing, and quality. Each has its particular virtues, appearance and tactile feel, so it's up to you to absorb as much infor-



The Mackie CR1604 can hold its own in a digital studio.

mation as you can and then search these consoles out. All are capable of producing world-class results.

GETTING AUTOMATED

A final area of interest is automation. As the cost of this option falls, popularity is on the increase, which is not surprising when you consider how difficult it is to handle as many as 86 inputs during a mix! The low-cost leader in the automation battle is Mackie's CR1604, to which you add their \$795 OTTO system. This comes with nifty software for the Mac and provides mute and fader automation as well as sophisticated features like off-line mix merging and editing. All fader movements must be done on the computer screen or via a MIDI fader device like a J.Cooper Fadermaster or similar piece of gear (you leave your regular channel faders in the nominal "unity gain" position). Resolution is 7-bit (128 levels). The software handles up to

three OTTO units, and you can combine three 1604's with Mackie's Mixer Mixer, so affordable 48-input automation is available now. An expanded version of this system will become available during 1994 for the 24•8 and 32•8 consoles.

Automated consoles are also offered by Soundcraft, Allen and Heath, Soundtracs, and Tascam. The Spirit Auto uses either a Mac or Atari computer to control its faders with 8-bit, 256-level resolution. Fader movements are faithfully recorded right from the console, with null lights to get you back to the current level before you punch in. Both Allen and Heath (GS3V) and Soundtracs (Solo Logic) offer automation with more resolution; their 12-bit systems provide 4096 levels, making them virtually seamless in operation. These systems record their moves to onboard storage and don't require a computer.

Tascam's M3700 provides onboard storage plus a floppy disk for saving and reloading mixes (you need to use MIDI sys-ex with the A&H and Soundtracs). The Tascam system can become a complete off-line editing system with the addition of optional J.Cooper Pro3700 software and hardware. And speaking of Mr. Cooper, any console can be automated with his selection of add-on automation systems, ranging from the 8-in MixMaster MIDI-controlled

VCA package through the proven MAGI system to the new Autograph™, which even interfaces to moving fader systems. Other add-on 8-input packages are available from CM Labs (they did the work on OTTO) and Niche (they use resistor arrays rather than VCAs for extremely low distortion and noise.)

If nothing else, by now the fact that there is a tremendous array of consoles available for interface with the new-generation digital recorders should be well documented. For the audio consumer, you couldn't ask for a better situation; the products already represent a quantum leap forward from consoles just a few years old, and both the quality and functionality will continue to evolve, delivering more bang for the buck than ever. **EQ**

J.D. Sharp is owner of Bananas At Large, San Rafael, CA-based music dealership.

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MIKE THORNE

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his successful career as a world-class producer beginning with sessions that included *Tainted Love* (Soft Cell), *Voices Carry* (Til Tuesday), *Nunsexmonkrock* (Nina Hagen), *Parting Should Be Painless* (Roger Daltry), and *Smalltown Boy* (Bronski Beat).

Earlier production efforts include the classic punk *Live at the Roxy* and the first three Wire albums, the second of which led to his first synthesizer — a fateful meeting in that Thorne today

maintains several synths and a giant Synclavier at his studio, The Stereo Society in New York's West Village, where he spends much of his work time when not working out of studios in London, such as Lansdown, a current favorite haunt.

Although he owns The Stereo Society, Thorne doesn't devote his energies in the daily management as such. "I don't deal with it on a day-to-day basis; my primary function is to produce records as I see it, although it really is a very high-tech place. It has 16-tracks direct-to-disk featuring 16 Synclavier outputs with 30 MB of RAM. It's basically a large Synclavier

and direct-to-disk system on top of a conventional heavily loaded 24-track studio."

Thorne's love affair with the Synclavier actually began well-over a decade ago. "I started off in the late '70s," he states, "where, with all that sonic excitement of the New Wave, people were looking for new and odd sounds. What I gradually came to do was to build up a collection of instruments and effects units. It was always good to have this fire power in the studio. That gradually built to my first Synclavier which I bought in 1979; I think it was number 6. And I kept pace with them right up through the direct-to-disk stuff and the large thing that it is now. The principle is that I should always have instruments on tap as well as these strange-sound-producing machines so that I can reach for anything and have it available. I turned around a lot of what I earned and put it straight into further useful gear."

Thorne says that this is what eventually grew into The Stereo Society. "I hadn't intended to be a studio owner; so many people go down that path. In fact, I swore blind I'd never do it. But it just gave me a facility that I couldn't get anywhere else."

—David Jacobs

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MI INSIDER

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drums," you can type "Shure," "SM58," "mic," or "kick" and be able to narrow your search down to a few articles.

While you're at it, remember that manuals are part of the information barage that needs to be organized. Take all your manuals, three-hole punch them, and stick them in three-ring binders (for small manuals, you can buy three-ring compatible "pouches"). It will be time well spent. (Make the manual your central repository of information on the gear: serial number, repair record, the name of the customer support tech who saved your butt last time the thing locked up, and so on.)

I hope these ideas are useful. Good luck — and if you have any additional tips, tell us about them. We need all the help we can get to avoid wiping out when we surf the bleeding edge! **EQ**

Musician/author/lecturer Craig Anderton, EQ's west coast editor, lives his life surrounded by 3.5-inch diskettes. He's very glad they are not carnivorous and don't need to be housebroken.

COME TO PAPA

continued from page 80

actually a hybrid biamped system with the tweeters crossing over around 9 kHz.) Double check the driver polarities; a single out-of-phase driver will mess up your highs.

Now take a break and recheck your wiring. If all looks well, assemble the speakers.

Get out some gloves and a long-sleeve shirt — it's fiberglass time. Line each bass bin with two packages of Radio Shack or equivalent acoustic insulation. House insulation without paper backing will also work. Split another package between the two mid and high enclosures. Stuff the insulation in evenly and attach it with a staple gun. After the insulation is secured, install the 15-inch drivers and mount the mids/highs front panel. Install the grills on the bass drivers and you're almost finished.

THE SMOKE TEST

Screw the pipe into the bass bin then screw on each mid/high enclosure. For each channel, hook the audio source to

the active crossover, then feed the crossover outputs to the amplifiers. Don't cross the right and left channels! Now connect the amplifiers to their respective speaker systems (I use four-conductor 14-gauge wire to allow for one cable per speaker).

Before firing up the system, turn down the amplifier level controls and apply power to everything. No smoke anywhere? Good! With power applied and no audio applied to the crossover, slowly turn up the amplifiers. You should hear no noise or hum; if so, check the crossover wiring and your connections.

Set the amplifier gain to half volume and feed it some audio — it should sound crystal clear. Pan hard right then hard left to identify any problems in your wiring to and from the amps. If everything sounds good, crank up the volume — then enjoy the clean, spacious sound these speakers deliver, even at high volume levels. If everything is working fine the police should be on their way. They showed up at my house! Must have been the Motown... **EQ**

Jules Ryckebusch glows in the dark, perhaps due to all the time he has spent in the company of nuclear submarines as part of the US Navy. The rest of the time, he writes do-it-yourself articles and DJs.

STEWART PA-1800

continued from page 88

ponents in place, but they are bound to move in transit and bear a second look after the unit's been on the road. Internal components are not marked on the PC boards, but all wiring and connectors are well fitted and neatly finished.

The Stewart PA-1800 sounded present and sharp in my listening tests. I did note a very slight increase in the sense of transients and high frequencies present compared to my reference amplifier. I could not measure any difference, however. This amp was also able to effortlessly drive a subwoofer at full power, continuously, for extended periods of time without showing any stress or change in the audio quality.

Stewart has shown that they can build a compact, high-quality amp that can be used in many different sound-reinforcement applications. If they could add quiet, variable-speed fans to the cooling system, the amp could find even wider application. Anyone interested in powerful, clean sound quality and reducing the weight of their drive racks should consider the Stewart PA-1800. **EQ**

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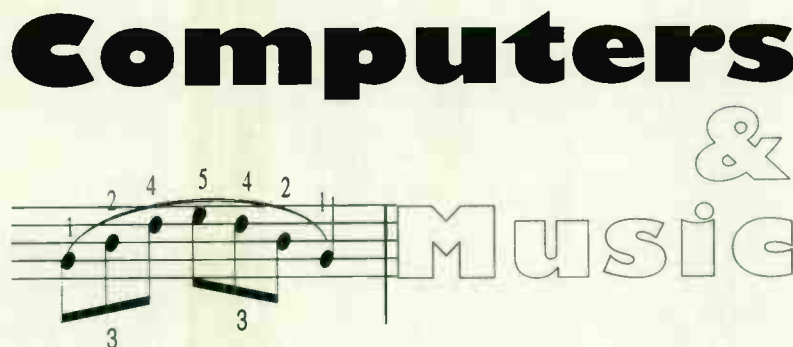
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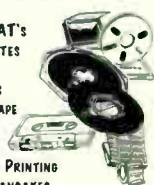
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Manic Compression

Putting the squeeze on your sounds so they can be used in the computer age of music

BY MARTIN POLON



Well here we are — at it again at the *EQ* classroom for recording in the future! Not to mention the after school seminar for the future playback of the sound you have recorded. Today's lesson focuses on audio data compression techniques to store and reproduce digitally recorded audio signals on various space-limited mediums and via various transmission schemes.

Mention digital compression around audio practitioners and you can obtain a diverse set of opinions ranging from outright approval to absolute disgust. The bottom line on compression is that it must exist if we are to record, playback, or transmit audio in the digital domain and fit it into storage formats or into transmission "pipelines" that are size limited.

Let's face the facts. Digital audio is an extraordinarily needy format to be stored or sent as computer bits and bytes. It takes about 10 MB of storage space per minute to record 2-track digital audio information, assuming a 16-bit sampling rate and uncompressed information. To provide some measure of what megabyte capacity is all about con-

sider this: The average personal computer performs all of its tasks and stores all of the data pertinent to its use and all of the hundreds of files created by its user on an 80 MB hard disk. Some users do not fill an 80 MB hard disk in two years of business usage. Yet a hard disk of that capacity would only store eight minutes of recorded, uncompressed two-channel digital audio. That means any storage format with less than the roughly 660 MB capacity of the compact disc cannot store one hour of playback of two-channel digital audio. Et voila — enter compression to extend the capacity of the consumer audio DCC and the MD to the needed hour time limit.

The need for compression, however, has entered the lexicon of the personal, project, and mainstream studio as well. Compression systems are being used for hard-disk storage, digital-audio editing, original recording, and broadcast cart playback, as well as transmission between radio studios and transmitters, between recording studios for postproduction, and for remote-studio artist insertion on album projects.

Not all compression is the same. When a computer uses compression software to double hard disk capacity to record, it squeezes the redundant information present in data storage formats. On retrieval and playback, the data is restored. Unless there is a system crash with associated difficulty in restoring file integrity, the audio information will be more or less intact.

With most of the audio recording formats now being proposed for studio and broadcast use, psychoacoustic coding is used to remove those portions of the audio spectrum that are theoretically inaudible to the listener at low levels of the human hearing curve. In recent tests, where a number of listening panels and professional users have found many of the coding schemes used alone to be "acceptable" to "very good," the use of several coding systems in a cascade (as might happen in broadcast chains or studio projects) has caused a great deal of alarm amongst audio professionals.

Among the complaints noticed in testing recorded audio processed with several compression systems have been the following:

1. Fragile, almost brittle transient distortion and spreading of high-frequency information.

2. Loss of integrity of the stereo image, including "swishing" left to right.

3. Intermodulation distortion on certain material and low-frequency flutter on sustained passages.

4. Increased perceived distortion at low playback levels or through small speakers.

5. Presence of "beats" and "chirps" in the recorded program material.

6. The insertion of an "invisible curtain" between the listener and the music, reducing the perceived program dynamics.

These problems require that we consider the use of compression/coding technology with care. It is also clear that we are only exploring the potential for coding and compression technologies with early generation implementations. These technologies will only get better, easier to use, and much less likely to cause interactions.

In the future — and that future may be a lot sooner than later — the availability of larger format recording and playback storage mediums will obviate the necessity for some kinds of compression based on media space shortfalls. With 1 GB (1000 MB) SCSI (small computer systems interface) hard drives currently priced around \$1000 and up as of 1993, the progress in storage capacity and the "knee of the curve" pricing dynamic in electronic data storage promises to rapidly place even larger, uncompressed recording power in the hands of most users who want it.

It is helpful to remember, however, that a 48-track digital audio tape recorder lays down the hard disk equivalent of no less than 48 times 300 MB of audio information or about 15,000 MB of stored characters on a one-hour tape. So with additional operational data, we will need affordable 30 to 50 GB digital storage capacity to match the comparable tape formats without compression.

We will continue this examination of digital compression/coding issues in the next issue of this magazine! **EQ**

For A Few Bits More



How to make 16-bit CDs sound like 20-bit CDs

BY LEN FELDMAN

As I mentioned in my last column, when the CD first burst upon the scene there were many who maintained that a 16-bit digital system was "not good enough." Many felt that 18-bit samples would have been a better choice, while some even felt that, technology permitting, a 20-bit standard should have been selected.

While the 44.1 kHz sampling rate used for CDs guarantees reproduction of the full range of audio frequencies (if you agree that audio need not extend beyond 20 kHz), the 16-bit CD format permits only 65,536 possible amplitude values. Any difference between the actual value of an input signal and the closest 16-bit value assigned to the sample represents quantization error. This error is a form of distortion and is called quantization noise. Under normal conditions it shows up as "white noise," characterized by equal amplitude at all frequencies. While it is fairly low in amplitude,

it represents one of the major imperfections in digital audio. While much has been done to minimize quantization noise, the noise can only be eliminated completely by the use of infinite precision in the sampling process, a condition that is only theoretically possible.

Much better sonic reproduction can be achieved by using 20-bit samples during the recording process and, indeed, this type of 20-bit recording has been used by Sony since April 1989. However, while the use of 20-bit recording has improved the overall low-level resolution of the studio master tape, the problem arises again when converting from the 20-bit to the 16-bit format required for CDs. During this process the four least significant bits (LSBs) are generally truncated or "rounded off," or, in some cases, redithered. (In a future column, we'll talk about dithering. For the moment, suffice it to say that dithering, or the addition of ultra low-level random noise to a digital audio signal actually increases the dynamic range of the resulting signal beyond what would be the theoretical limits of around 96 dB for a 16-bit system.) Redithering impairs overall signal-to-noise ratio, while truncation once again increases harmonic distortion.

NOISE SHAPING AND SUPER BIT MAPPING

Noise shaping has been used in the past to counter the effects of quantization error. The Super Bit Mapping system introduced by Sony also employs noise shaping, but because the objective is different — achieving 20-bit sonic performance within a 16-bit CD system — the approach is also different. Unlike other noise shaping approaches, which attempt to redistribute noise outside the audible spectrum, Super Bit Mapping uses noise shaping to redistribute noise energy within the audio spectrum. The white noise, which represents the difference in quantization error between 20-bit and 16-bit encoding, is reshaped to minimize audibility.

At low levels, the human ear is most sensitive to sound between 3 kHz and 5 kHz, but noise in this region is

only audible if its amplitude is greater than the Fletcher-Munson curve denoting the threshold of human hearing at those frequencies. If the noise can be redistributed so that the noise energy at these most sensitive frequencies falls below the threshold of human hearing, the noise will become inaudible even though the total noise power has not decreased. The beauty of this approach lies in the fact that compact discs produced with the Super Bit Mapping System require no special decoder for playback. Anyone with a high-performance CD player can now experience music reproduction of 20-bit quality.

LISTENING TESTS

During a visit to Sony's headquarters in Tokyo last year, listening tests were conducted to compare 20-bit master tapes with two types of 16-bit transfer techniques: truncation and the Super Bit Mapping system. In every instance, the Super Bit Mapping system yielded sonic quality that was much closer to the 20-bit master. Those of us who heard the difference described the sound as being richer than with truncated 16-bit transfer. Imaging of vocalists and solo instruments was more accurate. String instruments were mellower, while a concert grand piano was reproduced with the resonance of its sounding board more clearly audible. It is significant to note that, until now, improvements in CD reproduction have largely been confined to improvements in the CD players themselves. Super Bit Mapping represents a major improvement in the way CDs are produced, and therefore represents a sonic improvement that can be enjoyed by anyone owning a high-quality CD player. Many in attendance at the listening tests suggested that CDs manufactured using the Super Bit Mapping system ought to have some special identifying mark, much like the three letter coding system now used to denote the degree of digitization of current CDs.

Sony is not the only company that is trying to overcome the limitations of 16-bit digital audio recording and playback. Another pioneer in the

world of digital audio is the Denon Company, whose Japanese parent is Nippon Columbia. That company claims to have been the very first to record audio digitally way back in the early 1970s, and as far as I have been able to tell, that claim is valid.

DENON'S ALPHA D/A CONVERTER

Denon's approach to improved CD sound attacks the problem at the playback end of the system. In order to reproduce a truly smooth waveform, Denon uses a processor to interpret and produce low-level signals below the Least Significant Bit (LSB) that was expressed in the conventional 16-bit waveform. By a series of steps, this processor detects when a signal is at its lowest available level (around -90 dB — the limit in a 16-bit system) and uses its lower-order bit data generator to produce data for the four lowest-order bits,

17 to 20, that should normally exist below the 16 bits. The result is a waveform that more nearly duplicates the original analog low-level waveform that was previously truncated or limited by conventional 16-bit D/A conversion. Denon, in the bulletin describing its Alpha Processor, maintains that the superior response characteristics of this novel D/A conversion system also permits the proper reproduction of such unusual signals as impulse waveforms with virtual perfection, and without the usual "ringing" effect commonly encountered when such waveforms are reproduced using conventional 16-bit D/A conversion systems. In listening tests conducted by Denon, the difference between conventional D/A conversion and that provided by its Alpha Processor was quite audible. Digital audio's characteristic noise distortion was significantly reduced and

music sounded more natural, according to Denon.

Even though the digital audio world is now confronted with all sorts of new formats utilizing data compression (such as MiniDiscs and Digital Compact Cassettes), it's important to remember that none of these formats is intended to replace the CD. The compact disc remains the "purest" digital recording and playback medium available to consumers and will probably remain the format of choice for most music enthusiasts for decades to come.

With billions of CDs out there and many millions of CD players in consumers' hands, it's obviously too late to change to a 20-bit system. It's heartening, therefore, to find companies such as Sony and Denon willing to explore methods of approximating 20-bit performance within the limitations of the standard CD format. **EQ**

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Project Studio Fabrication



How to dress your recording studio in just the right (acoustical) fabrics.

BY JOHN STORYK & BETH WALTERS

For the past twenty years, if one were to nominate a surface that is almost always seen as a studio "finish" material, fabric would certainly be a candidate.

1. Fabric coverings are extremely versatile and are able to be formed in virtually any shape you can imagine.

2. Fabric coverings come in an almost infinite variety of colors, shades, textures, and patterns.

3. More importantly, if properly specified, they are acoustically transparent, thus enabling a large variety of visually uninteresting treatments and construction techniques to be "hidden."

4. Finally, many fabric covering installations are extremely economical compared with other finished surfaces.

The usefulness of fabric in the studio environment is not a new idea. Using fabric correctly, efficiently, legally, and practically involves experience and numerous "tricks of the trade." We'll explore some do's and don'ts.

FABRIC TRANSMISSIVITY

The most important criteria for fabric selection in a studio is an acoustical property referred to as transmissivity — the ability of sound to pass through the fabric membrane as a function of frequency. In the studio environment, there are three types of surfaces (or combinations of them) that are most commonly constructed: absorption, reflection, and diffusion (see fig. 1).

All three of these treatments often create aesthetic features that are undesirable for final finishes — especially mid/high-frequency absorption, typically unfaced 4-6# insulation. Fabric surfaces hide this as well as other architectural items in the studio such as ducts, conduits, electrical work, and so on.

Transmissivity information is typically given in dB of loss per frequency band — the best results being no loss at all as well as a comparison of each loss/frequency band relative to each other. Such a test result is presented in a later figure.

USES IN THE STUDIO

Speaker Covers — This involves fabric with the most critical acoustical transmissivity specifications. Amazingly enough, I was surprised to see certain major speaker "grill-cloth" manufacturers who will not provide you with these specifications. The large majority of fabric used in the studio environment, although reasonably high in uniform transmissivity, would not be satisfactory as "world-class" speaker cover fabric. The test results that we have seen show less than .5 dB per 1/3 octave band throughout the full audible frequency bandwidth. Most speaker fabric comes in very few colors, although one company, Trend Textiles (Schiller Park, IL), does offer a rather nice selection of excellent speaker cover fabrics.

Panel Fabric — This term refers to fabric types and weave commonly used as either coverings for prefabricated acoustical panels and/or stretched fabric over built-in architectural/acoustical treatments. Most fabrics meet Flammability Class 1 or Class A ratings for ASTM E-84 — the most common building code requirement. It is important to check this before finalizing a decision on which fabric to use. Perfect transmissivity is not a requirement for the typical panel fabric.

The most common fabric used, and one which comes in many colors and patterns, is Guilford 701, manufactured by Guilford of Maine, Grand Rapids, MI. At the request of our office, transmissivity tests were run on a typical 701 fabric sample. These results are shown in fig. 2. Note that they are quite reasonable throughout the entire frequency range, but not quite good enough for speaker covers. Most panel fabrics are covering insulation substrates that are absorbing at mid and high frequencies, and so attention to transmissivity is important. A fabric with any type of dense backing would not be advisable.

Stretched Fabric Installations — Stretched fabric in studios is simply any fixed installation of fabric over some sort of framing and attachment system. Common examples are:

FREQ Band (hz)	TL (dB)	FREQ Band (hz)	TL (dB)	FREQ Band (hz)	TL (dB)
50	0.5	400	0.5	3150	1.0
63	1.0	500	0.5	4000	1.0
80	0.0	630	0.5	5000	1.0
100	0.0	800	0.5	6300	1.0
125	0.0	1000	0.5	8000	1.0
160	0.5	1250	0.5	10000	1.5
200	0.0	1600	0.5	12000	1.5
250	0.0	2000	0.5	16000	2.0
315	0.5	2500	1.0	20000	2.0

Figure 2. Transmission Loss Data - Guilford - FR 701 Panel Fabric

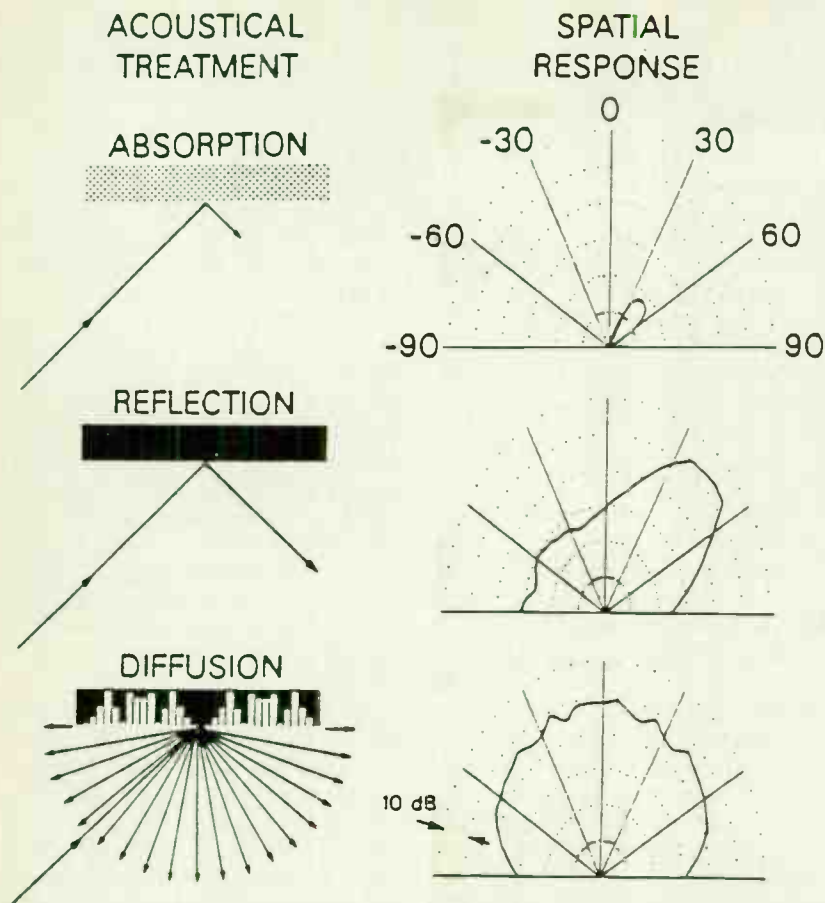


Figure 1. Typical types of acoustic treatments as seen in Recording Studios

- Facia/soffit shapes around perimeters of rooms (see examples later in article).

- Instrument and/or acoustic "traps" — These are cavities of excessive absorption and/or diffusion that are covered with fabric. These typically do not need speaker-quality transmissivity values.

Because of the almost limitless variety of fabrics to choose from, many will have no transmissivity specifications. For general purposes — i.e., all general purpose panel usage and stretched fabric installations — holding a fabric sample up to a bright light source and observing light through the weave will usually work as a quick test. This is not a good test, however, for speaker covers.

INSTALLATION

Acoustic Panels: Prefabricated acoustic panels are made by numerous companies and for the most part offer good mid/high-frequency absorption at reasonable cost. Generally the panels are self-edging, which is accomplished off site by hardening the edges in a urethane-

based material. Most reputable manufacturers offer products that meet ASTM E-84 requirements for flammability. Edges can come in a number of shapes; square, beveled, rounded, etc.

Mounting is usually accomplished in one of several ways. The decision is based on size, ease, reuseability, and so on.

- a. Direct glue — simplest if the panels are backed correctly

- b. Blind nailing — also relatively simple

- c. "Velcro" or similar product — good if the panels are small

- d. Z-clip fastening system — usually the best, but requires that a counter-clip be inserted in the panel prior to installation (usually by the manufacturer). See fig. 3.

Stretched Fabric: Direct Attachment to Framing — Tunable absorbing cavities (called bass traps, absorbing alcoves, facia/soffit traps, etc.) are quite often covered with stretched fabric that is attached directly to the framing, which often holds up little more than the fabric. Thus framing spacing need only relate

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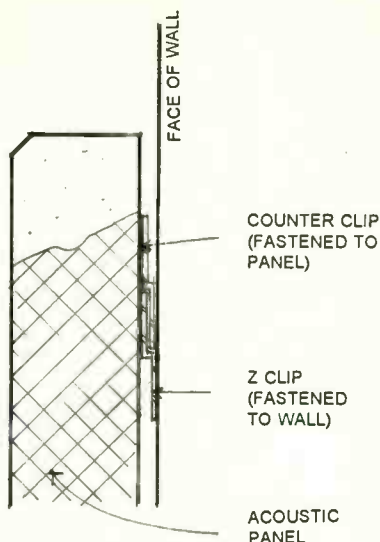


Figure 3. Typical Prefabricated Acoustic Panel - showing Z-clip mounting

to the width of fabric. Note: fabrics do not all come in the same widths. They typically vary from 48 to 66 inches. There is no one standard for this, although all fabrics are sold by the running yard!

Direct attachment has the fabric stapled every 1 to 2 inches, using an electric staple gun. The trick is to stretch the fabric evenly with each staple and to not pull unevenly on the fabric at any one fastening point. Staples can be covered with batten strips of finished or fabric wrapped wood or other suitable materials. This is an economic method of attachment, involving no exotic materials. Its nonremovability is a disadvantage for cleaning and repair. The batten strips are often viewed as an aesthetic liability. They have virtually no acoustical implication. Some tips:

1. When stretching fabric, beveling the frame slightly towards the inward direction of the stretched area will assure a clean, crisp edge.
2. It is almost impossible to predict whether the framing or substrate behind the fabric will be seen when the stretched fabric installation is complete. Test a piece of the fabric behind the framing in the actual light that will be used (including inserted high hat lighting). Only then will you know if you have to prepaint the framing or (as in some instances) double the fabric.

Mechanically Attached with

Strip Fastening System (SFS) — In the past several years, several strip fastening systems have been introduced that allow direct attachment to framing or suitable structure, yet also allow for a "seamless" visual appearance. They all involve the preattachment of a small profiled continuous fabric "grabber" or mounting track. Once attached, fabric is squeezed into the grabber with a special tool and/or beading system. Exact techniques vary from manufacturer to manufacturer, some needing an over-bead and some needing special tools. When completed they appear seamless. These systems are very flexible and can adapt to virtually any shape.

Although not truly removable, fabric can be removed from the grabbing track and easily replaced with new fabric if damaged.

Removable Frames — This is probably the most expensive method of stretched fabric installation, but gives the most flexibility re: removal, cleaning, and replacement. The frames are attached either with velcro or with mechanical fasteners as part of the installation. Again, note the beveled edge at the point of fabric attachment providing an exact fabric line on the stretcher as well as clearance from the stretcher itself.

Statement of Ownership

Statement of Ownership, Management and Circulation
(Required by 39 U.S.C. 3685)

1. Publication Title: **World Radio History**

2. Issue Date: **12/1986**

3. Issue Frequency: **Quarterly**

4. Issue Number: **4**

5. Annual Subscription Price: **\$12.00**

6. Number of Copies of This Issue Published: **10,000**

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World Radio History



ACROSS THE BOARD

continued from page 130

If I had a choice between two similar pieces of software (or hardware driven by software), I would buy the one from the company that was more up front about potential bugs.

I like to tell the story about the guy who told his doctor that he had a pain when he held his left arm over his head. He asked the doctor what he should do about it and the doctor said, "Don't do that."

At the end of every *Studio Software Report* I would like to see a bug report. Each piece of equipment would have two sub sections. One for bugs reported by the company, and the second for bugs reported by users. Each bug report would include a "work around" so that the same problem could be avoided by others until a new software release eliminates it. If the report becomes too big for *EQ*, then I will personally sysop a Bug Report computer bulletin board.

BBS OR NOT?

At an *EQ* staff meeting I brought up the

idea of an *EQ*-sponsored forum on Compuserve. The forum would provide feedback to *EQ* on the magazine's performance, and also provide someplace else for pro audio guys and gals to hang out besides the MIDI forum. This could be the perfect spot for the bug reports. If you think it would be a good idea, drop me a line at the following mailboxes:

Compuserve: 70641,1142 (where I have been hiding since 1978)

Internet: rsn@world.std.com (so secret I don't even know my own password)

ANR HEADSETS

I have been getting a lot of calls about the Bose ANR headsets that I talked about last month. The Bose headsets are not sold through dealers, only direct from Bose. The headsets cost \$995 a pair. You can get them for \$29 per month. To get more information call Bose directly at 1-800-242-9008. The Bose fax number is 1-508-872-8928. Ask for: Chris Miller.

SAMPLE CDS

Sampling other peoples' material has been a problem ever since there have been samplers. Forward looking

companies like East-West/Sound-Warehouse have jumped in with sample CDs and CD ROMs for just about every application you could imagine. They have sample libraries from engineers like *EQ* contributing editor David Frangioni and Bob Clearmountain, from drum specialists like Ross Garfield (The Drum Doctor), and from sound effects libraries like The Hollywood Edge.

Musicians have been jumping on the bandwagon as well. There was a booth at the show manned by none other than Will Lee, bass player extraordinaire from the Paul Schaffer band (who also played on some Steely Dan cuts). As long as you are looking for bass samples, they might as well be Will Lee's. The compact disc includes assorted bass grooves at different tempos and keys, as well as single note samples from a zillion different basses. The CD is out now, the CD-ROM will be out after the first of the year.

Well all you need for the perfect project studio is a dry basement, a telephone to call in equipment orders, and a credit card with lots of room for toys. Oh, yes, and don't forget your Gear Sluts membership card. **EQ**

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World Radio History

Software Explosions and More



A look at things that bug me and other computer confessions

BY ROGER NICHOLS

I think that it's time to talk about software again. Phil Burnet from River Sound just called me about the Flying Faders they have installed on their Neve console. Apparently the computer crashed just as they were getting ready to print the mix to 2-track. The computer locked up. The screen started doing funny things, the keyboard would no longer work, and the faders wouldn't move. Nice.

The Flying Fader system software is stored on the hard disk of a Hewlett-Packard "IBM PC" clone. Inside the HP box is a card that contains a stand-alone computer with its own memory, CPU, and I/O that actually does all of

the automation. The "automation" board is connected to the scanning computer located under the console by a fiber-optic link. The CPU in the HP box is just there for the screen display and the hard-disk storage. When you move a fader, the scanning computer sends the movement information to the "automation" board. If you save a mix to disk, the HP asks the "automation" CPU to send over the data for the mix that you want to save. The HP's CPU then stores that data in a format that you can get to with any DOS-based computer.

The data in the memory of the "automation" board is completely isolated from the HP's memory space. If the memory and CPU crash in the HP, there is no reason to expect the data in the "automation" board's memory to be corrupt. Got it?

If the HP crashes, there is no way to reset the computer without turning it off. If you turn off the computer, you will surely lose all data in the "automation" board. I asked Neve four years ago why there wasn't a hardware reset on the HP box. They said that someone might accidentally press it and ruin a mix. It also prevents someone from pressing it on purpose to save a mix.

I picked Neve in this case because that happened to be the most recent phone call I received before sitting down to finish this column. It could just as easily have been any number of other manufacturers who rely on computer software to make their products work. That covers just about all of them.

My gripe here is that these crashes are usually caused by bugs in the software. Some combination of circumstances causes the computer to go off into never-never land. Most of the time the software vendor knew about the problem, but release schedules wouldn't allow any more time to be spent debugging. The next release of the software would be better. The product is shipped to the customers and if the customers' system crashes, the vendor acts as though he is the first person to encounter the problem.

Even big companies like Microsoft do it. DOS 6.0 will eat everything on

your hard disk under certain circumstances. When IBM's version of DOS 6.0 is released, all of the known bugs will be fixed, but Microsoft didn't want to wait.

I have nothing against introducing new software that is not quite ready to go. I love to test new versions of software with new bells and whistles. I would, however, like to know what the problems are that I am likely to get myself into. I think that there should be someplace you could go to find out about potential software problems.

There are two major plusses involved in disclosing known bugs. The first is the knowledge that the end user can dive into the buggy water if he wants to, but he can stay away from problem areas if he needs to have a reliable product in order to finish a paying job. The second plus is that if the software user is aware of the bug, he could document the course of action taken before the crash, thus providing the vendor with some data that might help solve the problem.

I had a program once that would crash if you tried to save a sample that was an exact multiple of 512 samples. If you sampled a drum that lasted about five seconds and the last sample was 524,288, saving would mean crashing. After the company told me about the problem it was easy to cut the drum off one sample sooner or one sample later. It made no difference to the sound of the drum, but it sure made a big difference in my sanity at four in the morning.

There are digital EQs that roll off the bottom end even when they are bypassed. It is a software problem. There are digital EQs that mute the digital output data stream when you recall a new EQ setting from memory. Software problem. There are digital audio workstations that always pass the digital audio through the DSP and change it slightly even when you think that the DSP is bypassed. Software problem. There are digital multitrack machines that stay in record after you press stop in certain circumstances. Software problem.

continued on page 128

DIGITAL EVOLUTION

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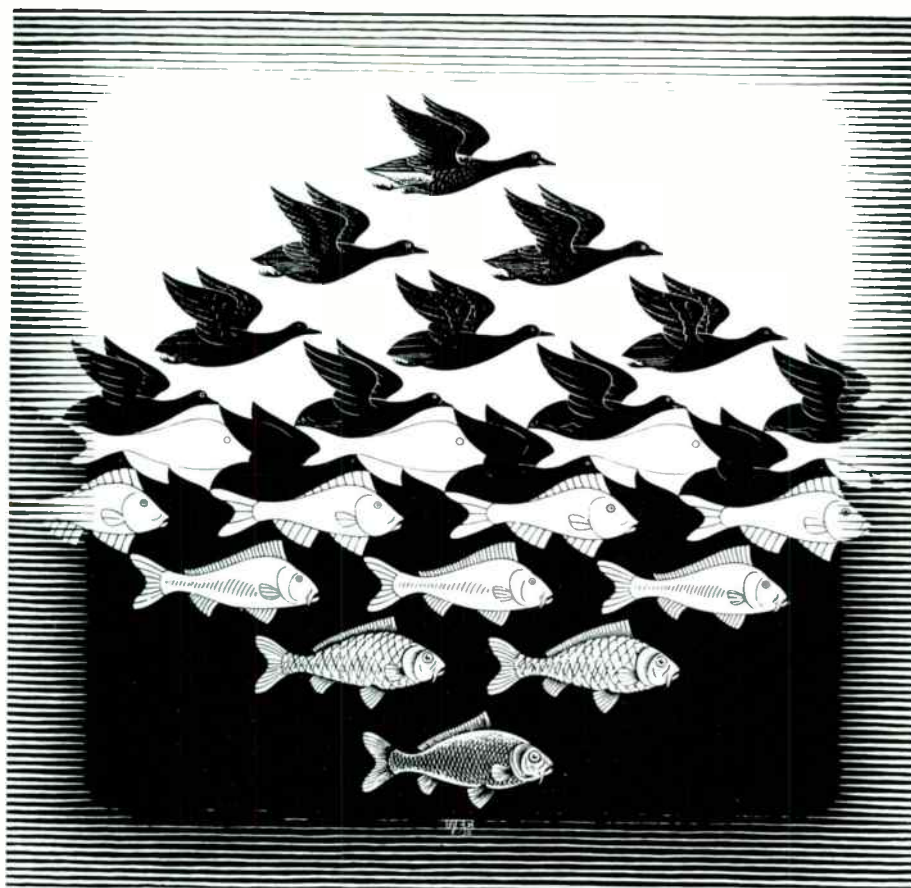
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If you think only your eyes can play tricks on you...



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Study the illustration. Are the geese becoming fish, the fish becoming geese, or perhaps both? Seasoned recording engineers will agree that your eyes *and* your ears can play tricks on you. In the studio, sometimes what you think you hear isn't there. Other times, things you don't hear at all end up on tape. And the longer you spend listening, the more likely these aural illusions will occur.

The most critical listening devices in your studio are your own ears. They evaluate the sounds that are the basis of your work, your art. If your ears are deceived, your work may fall short of its full potential. You must hear everything, and often must listen for hours on end. If your studio monitors alter sound, even slightly, you won't get an accurate representation of your work and the potential for listener fatigue is greatly increased.

This is exactly why our engineers strive to produce studio monitors that deliver sound with unfailing accuracy. And, why they create components designed to work in perfect harmony

with each other. In the laboratory, they work with quantifiable parameters that do have a definite impact on what you may or may not hear.

Distortion, which effects clarity, articulation, imaging and, most importantly, listener fatigue.

Frequency Response, which measures a loudspeaker's ability to uniformly reproduce sound. *Power Handling*, the ability of a

loudspeaker system to handle the wide dynamic range typical of the digital domain. And, finally, *Dispersion*, which determines how the system's energy balance changes as your listening position moves off axis.

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