

**THE PROJECT
RECORDING &
SOUND
MAGAZINE**

**NEW GUITAR GEAR IN REVIEW:
ART TUBE MIC PREAMP
KORG PANDORA PROCESSOR
HUGHES & KETTNER TUBEMAN
TECH 21 MIDI MOUSE**

1996 • ISSUE TWO

**THE STUDIO
SECRETS OF
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HALEN**

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EQ



PROJECT RECORDING
& SOUND TECHNIQUES
VOLUME 7, ISSUE 2
FEBRUARY 1996



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ON THE COVER:
Edward Van Halen at his 5150 Studio.
Photo by Karen Miller.

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LETTER FROM THE EDITOR

The Axe is Back!

Although guitars lost some of the spotlight when the MIDI revolution put synthesizers on the map, the axe is back — in a big way. Whether you're talking the angst of alternative or the taut rhythms of worldbeat, people are rediscovering the magic an accomplished player can coax from six pieces of metal stretched nearly to the breaking point over a plank of wood. From the sensuous timbres of nylon-string classical to the brain-bashing crunch of a heavy metal power chord, the guitar occupies a unique place in our hearts, as well as in our ears.

And it also occupies a unique place on stage or in the studio. The funky, noise-prone, unpredictable effects and amps of the past — while coveted for some applications — are giving way to multieffects, predictable tube emulation, superclean sounds, better tube design, and physical modeling. For capturing the music, hard disk recording gives guitarists the kind of editing options formerly reserved for the MIDI world, while digital tape preserves the guitar's sound quality better than analog tape ever did.

The issue of miking amps and guitars has been dissected time and time again, but comparatively little attention has been given to guitars in the project studio — where subjects such as direct injection, amp emulation, and level/impedance matching have become an important part of the mix. And there's more to come, since the guitar renaissance we've seen recently has not yet peaked. Soon we'll see more guitarists embrace hard disk recording, extensive MIDI control of multieffects, guitar "synthesizers," and much more.

This issue is the first salvo in *EQ's* coverage of the recording and sound problems, and opportunities, faced by today's guitarist. Future articles will examine how one guitarist made the transition from heavy metal idol to multimedia mogul, what hard disk recording means to guitarists, and how to get true analog tape compression effects with digital recording (tape or hard disk, and we're not kidding!). If you're a guitarist — or an engineer trying for the ultimate guitar sound — keep reading.

Craig Anderton
Technology Editor
(and Resident Target of Guitarist Jokes)

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A library of pre-programmed eq curves, dynamic settings and effect presets lets you work faster and more efficiently by drawing on the experience of mixing professionals.

Call the 800 number below for your free ProMix 01 Video and Application Guide.

Remember that great live gig last month? You know – the one where the mix was perfect. Every instrument eq'd just right. The punchy dynamics and tasteful effects.

ProMix 01 does.

Or how about that jingle you cut last year? What happens when the client calls and wants to change the voice-over. Can you precisely recall and reset the entire mix? Levels, eq, panning, compressors, effects and everything else?

ProMix 01 can.

Redefining the affordable mixer.

When it comes to mixing, the buzz is automation. It's designed to make your life easier and improve your mix. In the not-so-distant past, technology began allowing you to memorize and automate your mix. With only one catch: you needed access to a really sophisticated console costing a few hundred thousand dollars!

Or you had to be willing to link your mixer to a pricey outboard automation system that still left

many functions under manual control.

Limited options at best.

ProMix 01 changes all that with memory and real-time automation of all mix settings – at a price you can afford. Before we tell you about ProMix automation, let's define the terms "automation" and "memory." What they actually mean; what they do for you; and what you really need.

Memorable moments.

Total Recall – Talk about buzz. This gives you the ability to go back in time. Total Recall tells you where the knobs were set on your mixer

at a given moment in time. But you still have to manually reset most knobs and functions to a list of displayed values. Very time-consuming if you consider eq, pan pots and aux sends. And this still doesn't take into account your outboard processing like gates, compressors, effects and routing.

Total Reset – While Total Recall tells you where the controls were, Total Reset automatically returns the controls to the memorized positions for you. Very fast, very cool, and (until ProMix 01) very expensive.

New levels of automation.

Fader and Mute Automation

These are the standard automated functions. They allow hands-free real-time control over channel volume and/or channel on and off status. But remember – there's more to life than faders and mutes. What about eq, effects, dynamics and routing?

Onboard or External Automation

Where does the actual automation occur? Does the audio stay cleanly inside the console, or do you have to patch into an external automation box? And do those extra boxes and cables have an adverse effect on your sound?

Knowing these facts, suppose truly comprehensive memory and automation were available in a mixer you could actually afford. Would anything be left out? What would you get?

ProMix 01 – The new definition of mixing with memory.

Snapshot Memory – As defined above, ProMix features total recall and total reset of every mixing parameter. It's like taking a picture of every mixer setting – the complete capture of a moment in time. That's why it's called snapshot memory. And with ProMix's total reset, you

just press the Recall button and that moment comes back in an instant. In fact, ProMix 01 gives you the ability to save 50 of these snapshots, called *scenes*, right on board.

Library Memories – Not only does ProMix 01 save, recall and reset your settings, but it also comes with the built-in experience and memories of working professionals. These onboard libraries include pre-programmed eq curves, dynamic settings and effect presets that help you get working quickly and efficiently. And as you develop favorite settings of your own, ProMix 01 even has room to store these custom settings in memory as well.

Total Real-Time Automation – Add an outboard MIDI sequencer, and you'll have real-time control of every parameter inside ProMix 01. That means everything – not just faders and mutes! So imagine eq, panning, dynamics, effects and more, all changing in real time. And not only can you imagine it, now you can afford it too.

Complete Sonic Integrity – With its 20-bit A/D converters and its 24-bit internal digital processing, all of these features and functions happen inside ProMix 01 – without any compromise to your sound.

So after all this talk of automation and memory, what's the most important thing for you to remember? ProMix 01. And to jog your mind even further, call 1-800-937-7171, ext. 570 for your free copy of the ProMix 01 Application Guide and Video. Once you've read the book and seen the movie, you'll want to have your first lasting memory by visiting your nearest Yamaha dealer. Then get your hands on a ProMix 01. It might just remind you why you got into this business in the first place.

Store every setting in your mix as a single electronic snapshot, or "scene." Then push the Recall button, and you can instantly return to these settings – days, weeks or even months later

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ON THE RIGHT 4-TRACK?

With boards such as the Mackie 1202 and Spirit Folio at such affordable prices, I am amazed that TASCAM and Fostex have yet to offer 4-track cassette transports to complement these mixers. I have seen the budget 4-track devices, and it would seem that these are lacking in features or quality in the mixing section only. "No headroom" is the most common complaint I hear. The heads are fine, right TASCAM and Fostex?

It would be nearly revolutionary to develop a 4-track transport with balanced in/out jacks and the usual complement of controls. Take a cue from Mackie and make it tough, pro, and affordable. If you want to satisfy your corporate interests with big profits, add an option to make two or more of these operate in sync.

I have been considering this for years, and every musician and engineer to whom I have spoken says they would buy it, especially as a Mackie 1202 companion. With the option to upgrade by synching these units for more tracks, I believe this would be an incredible value.

Can anyone tell me why this has not been done? It seems almost a no-brainer. Is there a glaring technical problem I have failed to consider?

Kevin Paez
Freelance Mastering Engineer
Dallas, TX

MEEK YOUR MAKER

Re: Joe Meek December, '95

I read this article because I had no idea who Joe Meek was until I got to page 112 when you casually mentioned that he was a double murderer. How could anyone put this heinous man on a pedestal. Quote "...so wherever Joe Meek currently resides he must be having a bit of a laugh." I'm a sinner, not the Judge, but I know that where he resides presently, there is no laughter.

Charlie Solak
via America Online

[For those who called asking for more info on getting Meek's album, contact the record label, Razor & Tie, at P.O. Box 585, Cooper Station, NY 10276. Tel: 800-443-3555.]

WELL RED

As the designer of the MP16, I was

pleased to see Wade McGregor's review in the December 1995 issue of EQ. I would like to make a couple of things known to Wade and EQ readers so they might be able to put the technology in the MP16 to use.

The MP16 is built by BEC Technologies under a nonexclusive license agreement from me and my company, RED Designs. What does this mean to EQ readers? It means that other manufacturers who would like to use this remote control mic preamp architecture can certainly do so, by also licensing the design. RED Designs is also able to make custom remote control mic preamp solutions — so if Wade wants more splits, I can accommodate him. While RED Designs has been primarily a design consulting firm, we are looking to start manufacturing products targeted toward the project studio and modest touring applications.

Once again, thanks for the review, Wade. And if anyone would like to contact RED Designs to discuss manufacturing rights or custom mic preamp solutions they would like, they may contact us via e-mail: REDDESIGNS@aol.com.

Rick Downs
Dallas, TX

CREATIVE COMMENTS

I generally like the direction that your magazine is going. I would like to strongly urge, on the behalf of myself and several other people who feel the same way, that you offer more creative personalities, and be more in-depth with them. One of the most common criticisms that I hear from people who don't subscribe to your magazine is that there are not enough creative recording tips in your magazine.

Creative tips can include: mic placement, mixing, equipment use and abuse, great tips at getting more than the equipment was made for, how to get weird sounds, creative equipment set-up, differing philosophies of the whole recording process, and so on.

And getting back to the creative personalities: what about articles, in-depth articles in which the person discusses equipment, creative ideas, and philosophies at length? Interview people who are creative and interesting — Daniel Lanois, Brian Eno, Rick Rubin, Flood, Pierre Marchand, Michael

Brook, Peter Gabriel, Jimmy Page, Trevor Horn (slick, but damn good productions), Steve Albini, Butch Vig, and David M. Allen (The Cure). And what about all those artists who produce themselves that none of the recording publications seem to pay much attention to? Future Sound of London, The Orb, Portishead, Tricky, Us3, and one of the finest field recordings I've ever heard, *Sundanese Degung-Mojang Priangan* (Music of West Java) on Interra Records?

This is what we are interested in. The things you have in your magazine are interesting. New digital technology and sequencing and digital editing and outboard gear are all interesting. But how can we be even more creative with them? Details! We want details! Details and depth!

Ken Lee
Eleven Shadows
(Hyperium Recording Artist)
via America Online

MOIST AND DRY

In regards to "Baking Tips," (EQ&A in the December '95 issue):

I have an excellent method of removing moisture from most anything without the use of heat. I have not had the occasion to use this method on tape as was the need in this case (restoring moisture-damaged, reel-to-reel tape), however, I see no reason why my method would not work. And if it doesn't work, nothing lost — you can still bake the tape afterwards. And the equipment required has countless uses.

What you need is a dehumidifier. The most common use for dehumidifiers is to dry out damp basements. However, put a dehumidifier in any room and close the doors and windows, and it will dry out anything and everything in the room. For quickest results use in a small room — a closet is perfect. The dehumidifier has a small heater in it

WRITE TO US

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AMPEX

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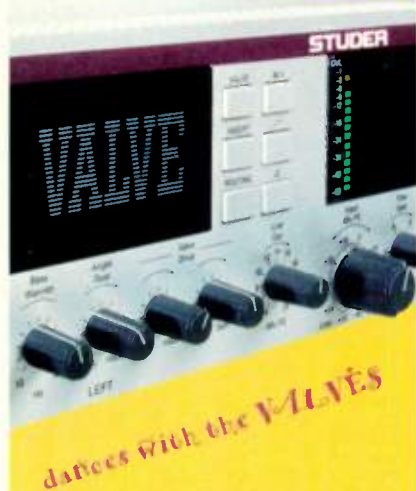
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LETTERS TO EQ

to heat the room air before it is blown across a refrigerated coil. The difference in temperature causes the moisture in the air to condense on the coil and drip into a bucket which must be emptied when it becomes full. The amount of heat added to the room is small.

Dehumidifiers have a control on them that turns the dehumidifier off when a set humidity level has been reached, and back on when the humidity level rises back up above this level, much like a thermostat. I'm not sure of its technical name, but I suppose "humidistat" will work! For quickest drying, this control can be set to "constant," which means it is always on.

Most dehumidifiers will accommodate a hose or plumbing on the drain so that you can remove the bucket and not have to worry about manually draining it. Plumbed thus, a dehumidifier can be made a permanent installation in, for example, your studio control room to keep harmful, corrosive humidity under control — especially if you live in a high humidity area like I do here in S.E. Kansas. Adjust the "humidistat" so that the dehumidifier only comes on when the humidity is high, or your electric bill will be quite high! (Dehumidifiers are available for \$200 from JC Penny, Sears, etc., last I checked — it's been a while!)

Tom Rhodes
Pittsburgh, KS

MR. IMPATIENT

I thought I'd drop you some mail and let you in on a few opinions I have about your magazine.

I have been a reader of *EQ* for the past year or so and have found only one major fault with it (and with many other mags too): I'm ready for the next issue three hours after purchasing the latest. The problem is I can't get the next issue for at least four or five more weeks.

I spend most of the time scanning the ads and reading reviews. I'm a budding musician and a confessed "bell and whistle" freak. I enjoy reading the Product Views and Room With A View sections.

I just read the December '95 "Across the Board" and have several questions for Roger Nichols:

1. How can any self-respecting musician be satisfied with just a one-hour shopping spree at Sweetwater Sound? It would take me at least three hours just to load the stuff, plus another

hour for the junk.

2. As long as we are being greedy, why not go for a pair of \$8K Genelec monitors?

3. How old must a piece of gear be before it is considered "vintage"?

4. How old must an engineer be before he or she is considered "vintage"?

Anyway, thanks for producing your periodical, even if I can't get the next issue in three hours.

David L. Agne Jr.
Silverdale, WA

FUN AND PROFFITT

I've read Paul Dean's letter in the December *EQ*, and I'm still trying to figure out whether some vital information was left out or if he simply doesn't understand Pro Tools. His idea that, since he has one internal hard drive and two external drives, he has to use up an authorization for each of them is clearly misguided. We have several drives, and we usually have at least ten projects in progress on the system. How many authorizations do we use? One, on the internal drive. If we want to take a project with us, we just grab the disk that contains the sessions and go. The problem resides on the internal drive, along with its authorization.

Now, assume I go work on someone else's system, and they are running a previous version. Then, I take my disks with me, install the program on the other, and *uninstall* it when I leave. I own the upgrade and the right to use it on a system. What I do not own is the license to take three authorizations and run the program simultaneously on various machines. That is, if I buy a used Pro Tools system, I also need to transfer the license, unless I'm going to be traveling with the second system. In that case, I still have three authorizations for one system at a time.

There's no doubt that Digidesign is a growing company and often suffers from the downtime due to training new tech support that growing companies endure. I've had to wait on the support lines like everybody else. However, I haven't yet had to cancel a session due to a lost authorization. I've been running the system for several years, and maybe I've just been lucky, but I've always been able to get a replacement disk if the unthinkable happened and I was running on my last authorization.

K.K. Proffitt
The Proffitt Center
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CIRCLE 75 ON FREE INFO CARD



DROP OUT

Q My ADAT will at different times drop out of record while synched to a SMPTE signal. I have checked my SMPTE signal to make sure it is not dropping out. Also, I have used a "SMPTE Jammer," which, when engaged, just keeps on generating SMPTE. Even so, my ADAT will still drop out of record in one or more places and usually in the same places. If I rewind back passed the dropout place, I can punch in and, in most cases, record past these dropout places. Only on occasion can I then not stay in record. Do you have any ideas that can help me?

Len Weisman
Audio Recording Studios
Los Angeles, Ca.

A Several things can cause an ADAT to pop out of record mode while being synchronized to external recorders using SMPTE timecode and an Alesis BRC, Alesis AI-2, or JLC Cooper Data Master (or when using the Fostex RD-8, which has a built-in SMPTE synchronizer). In all digital recording, time is of the essence. Bits have to wind up in exactly the right spot on the tape. When a digital recorder, like an ADAT, is recording while synchronizing to a nondigital source, its sampling rate must be derived from the incoming timecode. When things don't match up, the system is designed to drop out of record to avoid damaging data or recording nonsynchronously. The different SMPTE synchronizers for the ADAT system each have different features that may affect your problem. For the sake of this answer, I'll assume you're using a BRC (Alesis Big Remote Control).

1. Wow and Flutter in Timecode: Analog audio and video recorders are much less stable from a timing standpoint than digital recorders; they're plagued with small speed variations known as wow and flutter. Many VCRs are particularly bad in this regard; if SMPTE is recorded on a longitudinal audio track, the wow and flutter can

be considerable, even if there are no dropouts and the level is good. If the BRC's "Clock Source" menu is set to "SMPTE," it must continuously adjust the sampling rate of the ADAT to match the timecode. If the timecode has too much flutter, the ADATs will drop out of record and you'll momentarily see "Er 8" on the ADAT's display.

The cure for this is to run a stable video source (preferably from a black burst generator, but you can try using a composite video output of the VCR itself) to the Video Sync Input of the BRC, and set Clock Source to "Video." You might try recording future video tapes with VITC (timecode recorded in the vertical interval of the picture itself), which is more stable, but this requires a VITC reader to extract the timecode to send to the BRC.

If you're trying to synchronize to an analog multitrack, try to reduce its wow and flutter by cleaning its capstan, buying a new pinch roller, and having it checked out by an experienced technician. Ideally, you should buy a synchronizer for your analog recorder, and let it be the slave to the ADAT master, which has no appreciable wow and flutter.

2. Lock & Release Mode: If you are already using Video as your clock source, nongenlocked timecode could be the problem. Many people make the mistake of recording SMPTE onto a video tape "wild," that is, without simultaneously running a video signal to the timecode generator. As a result, the timecode and the video frames will slowly fall out of alignment and the BRC will pull the ADATs out of record. The same will be true if you set the BRC's clock source to "Internal" while the locate reference is set to SMPTE.

A software feature of the BRC is designed to make it less sensitive to this drift. In the External Sync menu, change Ext Sync Mode from "Frame Lock" to "Lock & Release." Frame Lock will stop recording if the clock source is more than one frame away from the SMPTE reference; Lock & Release allows the two references to drift up to five frames apart before it will stop recording.

3. Tape Damage or Dirty Heads: If you see the ADAT's Advanced Information Indicator (the period to the right of the seconds display in the ADAT, or the "sunburst" on the ADAT-

XT screen) flashing, the ADAT is having trouble reading its own tape. If the tape is at fault, simply making a digital backup to a new tape will cure the problem. If the ADAT's heads are dirty, have them cleaned. Often, the simple act of rewinding with the heads engaged will clean the heads enough to get through a session, which may account for why your ADAT didn't stop recording on the second try.

There are some other possibilities you might explore, such as crosstalk in your 9-pin sync cable (common when people use computer cables with ADAT instead of the supplied Alesis cable), unusually high or low SMPTE timecode levels (remember the BRC can supply either +4 or -10 outputs), or a balanced timecode source that has problems when connected to an unbalanced input like the BRC. In any case, these symptoms are easily cured with a little detective work.

Dan Tinen
Technical Communications Manager
Alesis

RIP-OFF OR NOT?

Q I need some quick advice on my TASCAM 38 (yeah! for analog). Channel 8 on record and playback disappears from time to time. I brought it into a local repair place and they said it was a problem with intermittent relay connections and would need some board connection work costing \$250-300. My questions are:

1) Does this sound right? Are board connections something that wear out? They said that other connections (the other 7 channels) will go out and should be fixed.

2) Does this price sound right?

Author Unknown

A The TASCAM 38 suffers from several intermittent problems and several service tech stumpers like, "How do I get to that !@#\$\$#@ thing?"

Yes, the problem can be relays; it can also be cold solder joints on the motherboard. I owned a 38 for years and serviced a few dozen machines over the course of seven years. Assuming the problem is not massive amounts of dirt on the heads and assuming your external wiring isn't suspect, the problem must be narrowed down to:

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a. The output reed relay (this looks like an IC) on the I/O card. I always replace these with a piece of wire because they only "mute" the turn on/off thumps.

b. The record/playback relay. TASCAM used nonsealed relays. I always replaced all of these with the sealed OMRON type.

c. The motherboard. This is a real mother to do because the only way to solve the problem is to remove the momma and redo every connection. Remember, if you have one problem, you will have others.

The best way to troubleshoot the problem is to:

1. Remove the bottom metal panel.
2. Remove the back plastic cover.
3. Using either "Y" cables or system wiring, route an oscillator to all eight tracks.

4. Gently turn the machine upside down on the bench so that you can easily access the I/O cards.

5. Record tone on all eight tracks for 15 minutes.

6. Confirm that all tracks actually recorded in both sync and repro modes.

7. Tap on the cards while monitoring both the meters and the outputs in both repro and sync modes.

8. Place the machine in input and again tap on the cards.

Important: Be sure to monitor each track while listening to each track. Do not swap cards because doing so will flex the momma board and temporarily "fix" the problem.

Sometimes the meters will cut out but not the audio. This is because the meter signal goes off the I/O board onto the motherboard and back. This is easily repaired by each card.

To extract the cards, it is first necessary to remove the support/guard rail that goes from front to back. Once removed, take the screw that held the rear of the rail and put it into the rail from the other side. This will allow single screw removal without taking off the back plastic panel. Well, almost. It is not possible to access the last two cards (7 & 8) because of the back cover. I used a small power jig saw to cut away the plastic.

Pulling out the cards requires a little bit of side-to-side wiggling. Sometimes a pair of long-nose pliers

helps, but be careful not to damage circuit traces near the edge. Replacing the cards requires that you use "the force;" that is, Don't use force! There are two dozen+ pins that must all line up. If they don't, you will bend or break the connector on the card. Use plenty of light and be very careful.

Yes, \$250 to \$300 bucks is fair — provided they do a thorough job.

Eddie Ciletti

Manhattan Sound Technicians
NYC, NY

ASK AKAI

Q I use my Akai GX-R60 cassette deck to record music for presentation videos. The unit stopped working and I'm having a hard time getting it repaired. Most repairmen won't look at it and others tell me they have no way of getting parts. Can you supply me with either Akai's address and phone number or a service center that could handle the job?

Lance F. Karp
via America Online

A Akai has a slew of repair centers in nearly all the States and beyond. However, you may be having trouble because you are trying to reach Akai directly. You need to contact their distributor to receive information on service centers in your region. International Music Corporation (IMC), located at 1316 East Lancaster, Fort Worth, TX., tel.: 817-336-5114, is the distributor of Akai gear. That address is also the site of the Akai National Service Center. Take note that some repair sites don't handle tape equipment, so specify your equipment model number and what you need when you call the main service center for information.

Hector G. La Torre
Executive Director
EQ Magazine

Send your queries to:

EQ Editorial Offices,
939 Port Washington Blvd.,
Port Washington, NY 11050

Fax: 516-767-1745

E-mail: EQMagazine@AOL.COM

INSIDE
THE
PL4.0

The Best Sounding Amp Is Now The Most Powerful

4.0

PowerLight

PowerWave™
Switching Technology
allows for the high-speed
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The new PowerLight 4.0 introduces massive power to a series of amplifiers that have already become a benchmark for excellent audio performance and reliability. **PowerWave™ Switching Technology** (patent pending), at the heart of the PowerLights, is **the power supply technology for the future**. The 4.0 clearly demonstrates why...

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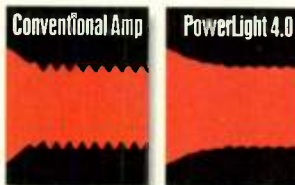
The 4.0 achieves remarkable audio quality because **voltage supply to the output section is powerful and stiff**. There are virtually no sags following transients or long peak power demands. You won't hear typical modulation from AC ripple or garbling during clipping. The bass is ultra-clean and fat. Highs are pure and unstressed.

MAXIMUM EFFICIENCY

A **PowerWave transformer "flies" at 115 kHz** (2000 times the frequency of a conventional transformer). Waste heat from resistance is almost nil. The supply is 90% efficient! And the 4.0 features **the latest three-step Class H linear output circuitry** for maximum audio quality and efficiency.

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QSC's renowned protection circuitry is enhanced by the PL 4.0's "smart" supply which matches power delivery to changing musical demand. The 4.0's thermal management keeps the amp cool under extreme conditions (even 2 ohm loads). And with the 4.0, **EMI and RFI are absent**, making the amp safe for wireless mics.



Less power sag, less clipping intermodulation, more bass impact, cleaner transients...PowerLight.

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You won't see or hear another amp with the power and performance of the PowerLight 4.0. **Call your QSC Dealer or QSC direct at 714-754-6175** for complete details.

The front panel of the PL 4.0 features comprehensive **LED status arrays**, detented gain controls with soft touch knobs and 2 dB steps for easy resetting.

Made in USA.

4 PowerLight Models

Output Power in Watts per Channel

Model	0.1 *	1 *	2 **
PowerLight 1.0	200 Watts	325 Watts	500 Watts
PowerLight 1.4	300 Watts	500 Watts	700 Watts
PowerLight 1.8	400 Watts	650 Watts	900 Watts
PowerLight 4.0	900 Watts	1400 Watts	2000 Watts

*20 Hz-20 kHz, 0.1% THD, **1 kHz, 1% THD

PowerLight 4.0 Key Features

- ▶ **PowerWave™ Switching Technology**
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For starters, virtually every production studio has at least one. If your business is post-production audio for dialog, sound effects and music — nothing is faster, nothing is more reliable and nothing sounds better than the TASCAM DA-88. Fact is, when deadlines are looming, the last thing you want is a machine that spends more

time in the shop than in the studio. Plus you need a machine that synchronizes and locks up fast — typically 2 seconds or less. What's more, only the DA-88 can record an entire feature on a single tape. That's why the TASCAM DA-88 is the choice of production professionals. And that's how it became the undisputed industry standard.

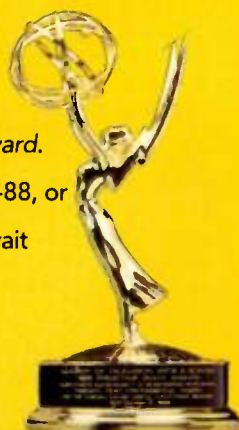




why you need to get a DA-88 in your production studio.

Because without one your studio could be wasting time and losing money. The DA-88 seamlessly integrates into any production studio to directly interface with SMPTE, MIDI and Sony 9-pin equipment — TASCAM's expert software makes it possible. Its blazingly fast transport means you spend less time waiting and more time producing. Plus, a truly modular design makes expanding and enhancing a DA-88 with third-party products quick and easy and makes it simple to service.

Fact — the DA-88 delivers what production professionals demand — economy, reliability, speed and synchronization that really works. That's why the DA-88 is the only modular digital multi-track to win the coveted *Emmy Award*. So, whether you already own a DA-88, or are waiting to buy your first, why wait another minute?



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EQ PRODUCT VIEWS

SET YOUR SIGHTS ON THIS

Technical Laser Company has created Speaker Sights to address speaker alignment problems. Speaker Sights has separate switching and LED indicators for both left and right lasers, and is powered by a battery pack no larger than the palm of your hand. An



optional A/C power adapter is also available. By positioning the Sight over the driver and activating the system, two bright red dots produced by the lasers can be shown on a flat surface placed at the mixing position. An optional sighting grid is available if needed. For more information, contact Technical Laser Company, 25242 G Steinbeck Ave., Stevenson Ranch, CA, 91381. Tel: 805-255-5500. Circle EQ free lit. #102.

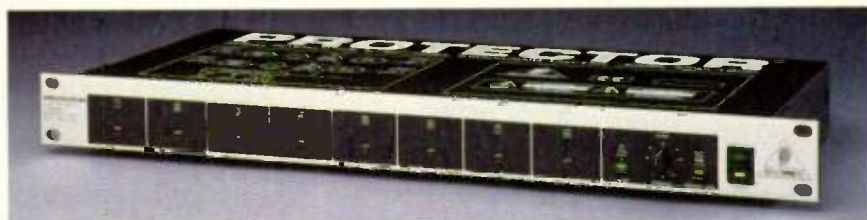
EASY AS ABD

Audio By Design (ABD) currently uses Focal, Audax, Morel, JBL, and Klipsch professional drivers. All speakers use conventional cone bass, mid-bass and midrange drivers, and silk dome tweeters to reduce sibilance, nasality and droning. All models use the exact same drivers to help maintain consistency in sound integrity regardless. For more details, contact ABD, 139 East 9th Street, Huntington Station, NY 11746-1846. Tel: 516-271-3348. Circle EQ free lit. #104.



YEAR OF THE AARDVARK

Aardvark has created the AardScape, a unit that utilizes new True Analog™ technology to endow digital recordings with the sound and feel of analog tape. The True Analog process simulates the warm sound of recording directly to analog tape without the tape hiss. The AardScape gives you control over saturation (soft, medium, or hard) and brilliance (full, clean, bright) and overall warmth. The unit supports +4 dBu I/O on balanced, XLR connectors and -10 dBu I/O on unbalanced, 1/4-inch connectors. For further details, contact Aardvark, 202 E. Washington, Ste. 306, Ann Arbor, MI 48104. Tel: 313-665-8899. Circle EQ free lit. #101.



DO YOU HAVE PROTECTION?

Behringer has introduced the Protector MDX 1800, designed to protect recordings from distortion, expand headroom and dynamic range, "energize" the sound of mixes, and optimize the resolution of digital equipment. The Protector is an 8-channel program/peak limiter that works with any analog or digital multitrack recorder, and protects digital inputs from overloading. The Protector features Behringer's dual-action IGC (Interactive Gain Control) circuitry, LED "limit" indicators on all channels, and operating level switchable from -10 dBu to +4 dBu. The Protector is also equipped with servo-balanced inputs. To find out more about the Protector, contact Samson Technologies Corp., P.O. Box 9031, Syosset, NY 11791-9031. Tel: 516-364-2244. Circle EQ free lit. #103.



YOU BETA YOU BETA YOU BET

With the introduction of two new models, the Shure line of Beta microphones has grown to a point where five distinct offerings can be used to fulfill the needs of an entire live performance. The Beta 52 is a dynamic mic designed to deliver the low-end punch required for kick drums and other bass instruments. The Beta 52 incorporates Shure's Dynamic Locking adjustment mounting assembly and a hardened grille. Shure's new Beta 56 utilizes a consistent supercardioid pattern to supply a high degree of gain-before-feedback and is centered around a frequency response suited for drums and instruments. Other members of Shure's Beta family include the Beta 57A, the redesigned Beta 58A which now offers a smoother response and extended high frequency performance, and the Beta 87. For more information on the entire Shure family of microphones, contact Shure Brothers Incorporated, 222 Hartrey Avenue, Evanston, IL 60202-3696. Tel: 800-25-SHURE. Circle EQ free lit. #105.



HAPPINESS IS A WARM TRACK

Drawmer has released the 1962 digital vacuum preamp that combines Drawmer's vacuum tube technology with two low-noise preamps and two 24-bit A/D converters. The 1962 incorporates matched pairs of preamps and D/A converters, while a switchable "zero overshoot" transparent limiter enables the full dynamic range to be utilized. The 1962 can be supplied as an analog-only device because its digital hardware is modular and can be upgraded at a later time. Other features include: variable high- and low-pass filters, fine tune equalization, dynamic enhancement, variable tube drive, selectable digital resolution (16, 18, 20, and 24 bits), provisions for mixing up to eight channels, and AES/EBU, S/PDIF, and TDIF outputs. For more details, contact QMI, 7 October Hill Road, Holliston, MA 01746. Tel: 508-429-6881. Circle EQ free lit. #106.

CUT THROUGH THE BS

BSS recently released the DPR-901 II Dynamic Equalizer. The unit offers a new "Split Band Switch" feature capability, which allows the DPR-901 to be used as a single 4-band device or as two separate 2-band devices, permitting one section to cover the low- and low-mid ranges, and the second to cover the high-mid and high ranges. Also new on the DPR-901 II is the "Side Chain Monitor" feature, which allows the engineer to tune in to the exact frequency area that he or she wants. For more info., contact Harman Pro North America, 8500 Balboa Boulevard, Northridge, CA 91329. Tel: 818-830-8278. Circle EQ free lit. #107.

TUBE TECH

DigiTech's new VTP-1 incorporates a vacuum tube mic pre-amp, tube line amp/DI, EQ section, and an 18-bit A/D converter in a 2U chassis. Also included is 12AX7 vacuum tube input circuitry to add warmth to digitally recorded vocal tracks. Each preamp control section offers front-panel switches for mic/line input select, phase invert, 20 dB pad and 48-volt phantom power. The VTP-1 also functions as a tube DI box, allowing synthesizers, guitars or bass to be run directly into a recording device. The unit's EQ section consists of four bands (two fixed and two sweepable) with each band offering up to 15 dB of boost/cut. The on-board 18-bit A/D converter allows program material to be output directly to digital in either AES/EBU or S/PDIF formats. The sampling rate is switch selectable between 44.1 or 48 kHz, while digital outputs may be used simultaneously if desired. For further information, contact DigiTech, 8760 South Sandy Parkway, Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #108.



EQ PRODUCT VIEWS

MIX WITH MACKIE

Mackie recently introduced the MSI402-VLZ compact mixer. The MSI402-VLZ features six low-noise/high-headroom mic pre-amps, six balanced/unbalanced line inputs, four stereo inputs, 3-band EQ (12 kHz, 2.5 kHz, 80 Hz), and PFL/AFL (Solo-In-Place) on every channel (globally switchable). The compact mixer also features Alt 3-4 for an extra stereo bus on each channel, a low-cut filter on channels 1-6, balanced XLR main outputs, 60 dB mic gain on channels 1-6, a very low impedance (VLZ) architecture, EFX to monitor switch, and a global Aux 1 pre/post switch. For more information, contact Mackie, 16220 Wood-Red Road, Woodinville, WA 98072. Tel: 800-898-3211. Circle EQ free lit. #109



ADD SOME VERB

Peavey Electronics recently introduced the Addverb™ III multi-effects processor, which can be used in band PA systems, fixed PA systems, home and professional studios, and in musical instrument effects racks. The Addverb III's user-friendly interface is designed to simplify the process of programming patches. Features include: true stereo inputs/outputs,



fully user-definable algorithms, two independent chorus effects, two independent pitch shifters, a total of 35 different effect types, 128 user-definable patches, 128 factory programs, and eight different special ultra-reverb effects. The Addverb III also boasts 24-bit stereo processing, a 12 Hz-20 kHz bandwidth, and dual data knob programming. Suggested retail price is \$349.99. For more details, contact Peavey Electronics Corporation, 711 A Street, Meridian, MS 39301. Tel: 601-483-5365. Circle EQ free lit. #110.

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SAFE POWER

Pulizzi Engineering, Inc. has introduced the Z-LINE® TPC 12/MTD power distribution system with up to 12 automatically sequenced time delays on power up. Systems can power up in a predetermined sequence to cut high in-rush current, and prevent momentary power sags from equipment, such as amplifiers, drives, and motors. Along with the patented Multiple Time Delay™ feature, the TPC 12/MTD also provides EMI/RFI high-frequency noise filtering, spike/surge suppression, and emergency power off. For power output, you have a choice of either twelve NEMA-style receptacles, or twelve three-pin AMP-style connectors for Form C switching. The TPC 12/MTD is available in 120 V or 240 V, and 15 amps, 20 amps, or 30 amps. For more details, contact Pulizzi Engineering Inc., 3260 S. Susan Street, Santa Ana, CA 92704-6865. Tel: 714-540-4229. Circle EQ free lit. #111.

LET'S ROK!

KRK has introduced the RoK•Bottom subwoofer that utilizes the same enclosure shape as the K•RoK. The 2.1 cubic foot enclosure features a 12-inch polyglass long-stroke woofer and is powered via a proprietary 250-watt K•Amp amplifier. The 8-ohm RoK•Bottom offers a maximum SPL of 110 dB and a sensitivity of 91 dB. For more information, contact KRK Systems, Inc., Group One Ltd., 80 Sea Lane, Farmingdale, NY 11735. Tel: 516-249-1399. Circle EQ free lit. #112.



- Stereo inputs and outputs
- Fully user-definable algorithms
- Automatic parallel and series effects linking
- Two independent chorus effects
- Two independent pitch shifters
- 35 different effect types
- Up to 8 simultaneous effects
- 128 user-definable patches, 128 factory programs
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**Incredible
Price
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EQ

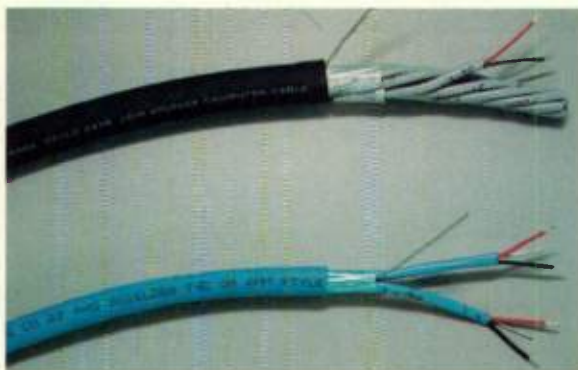
PRODUCT VIEWS

BOO!

Soundcraft's Ghost console offers a four-band EQ with two fully parametric mids, ten aux busses (two for stereo), a MIDI muting system, timecode synchronization, machine transport control, and four MIDI data faders. The Soundcraft Ghost console allows for control of digital multitrack tape recorders via MIDI machine control and video recorders via the Sony 9-pin professional standard. The Ghost also features a new low noise mic amp with phantom power and phase switch on every channel, four stereo returns, a MIDI-controlled snapshot-based mute recall system, timecode reader/generator, and LED meterbridge and 24-channel expander options. For more details, contact Harman Pro North America, 8500 Balboa Boulevard, Northridge, CA 91329. Tel: 818-830-8278. Circle EQ free lit. #113.

QUEST FOR TUBES

Whirlwind has introduced the PM line of Precision Manufactured power and preamp tubes for music applications. Whirlwind's PM series tubes are custom designed, manufactured, and matched specifically for music applications. PM preamp tubes are designed to minimize microphonics and noise over the life of the tube and are selected to provide classic European and American overdrive characteristics. The Whirlwind PM tube range includes both precision manufactured classic and proprietary advanced designs. For more information, contact Whirlwind, 99 Ling Road, Rochester, NY 14612. Tel: 716-663-8820. Circle EQ free lit. #114.



WIRE WRAP

Gepco International, Inc. has created GEP-FLEX, a new flexible outer jacket compound for the 618 (22 gauge) and 724 (24 gauge) series multi-pair audio cable. Designed for both indoor and remote use, GEP-FLEX has an increased temperature range with cold weather

properties to minus 60 degrees centigrade. With its aesthetic matte finish, GEP-FLEX provides customers with increased flexibility, while still retaining the UL listed-type CM rating required for permanent installation. GEPCO will stock GEP-FLEX multi-pair cable in bulk lengths and will cut to customer length specifications. GEPCO will also terminate GEP-FLEX cable to connectors, patchbays, etc., as requested. For more details, contact GEPCO International, Inc., 2225 W. Hubbard, Chicago, IL 60612-1613. Tel: 312-733-9555. Circle EQ free lit. #115.



EIGHT GATE

PreSonus recently unleashed its third product onto the market, the ACP-8. The ACP-8 is an eight channel compressor/gate, housed in a steel, two-rack-space case that features eight separate compressor/gates. Each compressor features control of threshold, ratio (1:1-20:1), attack, release, and gain. Each gate features control of threshold, release, and variable attenuation range. The ACP-8 accepts balanced or unbalanced inputs and balanced or unbalanced outputs. Each channel features a sidechain jack for spectral processing and a separate jack for gate keying, as well as full gain reduction metering and compression and gate threshold indication. For more information, contact PreSonus Audio Electronics, P.O. Box 84008, Baton Rouge, LA, 70884. Tel: 504-344-7887. Circle EQ free lit. #116.

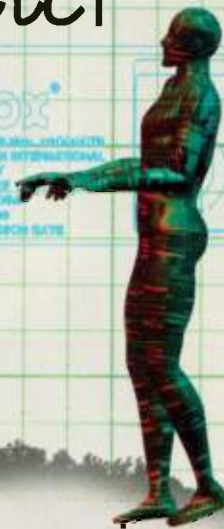


"WOW, THIS BOX DOES A LOT OF AMAZING @#\$\$%."



266 Compressor Limiter

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Whether in major touring systems, recording studios or the most serious guitar

and bass rigs around, dbx signal processors are the standard by which all others are judged. Now you can get dbx quality for a price you can afford.

For your guitar rig, vocals, bass rig, recording or live the 266 really does some amazing @#\$\$%. So head on down to your local dbx dealer and see and hear the 266 compressor/limiter today!

dbx
PROJECT 1

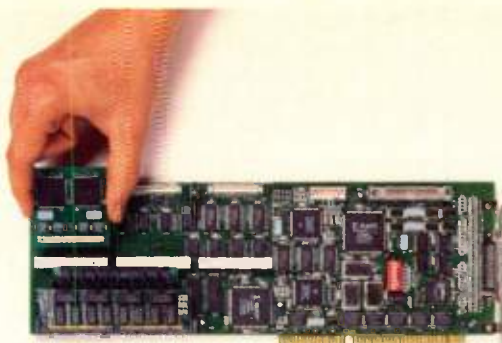


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World Radio History
CIRCLE 26 ON READER CARD

EQ STUDIO WARE



HAVE A V8

Digital Audio Labs announced the release of its V8 DAW system for the PC. This modular hardware platform features a main board with an upgradeable DSP architecture and a wide variety of input/output options, including interfaces for ADAT and DA-88 machines.

In its base configuration, the V8 is capable of recording and playing up to 16 discrete tracks. Application software for the V8 system will be available from third party audio, MIDI, and DSP plug-in developers. For more information, contact Digital Audio Labs, Inc., 13705 26th Avenue North, Suite 102, Plymouth, MN 55441. Tel: 612-559-9098. Circle EQ free lit. #117.

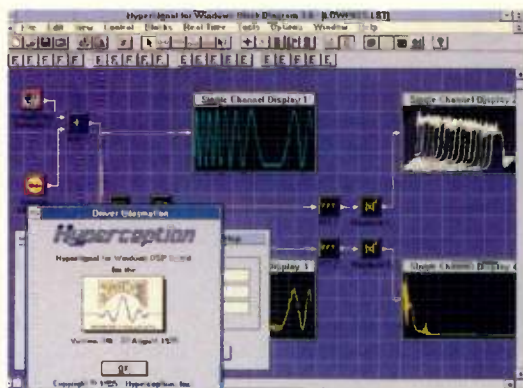


WHO'S THE (MIDI)MAN?

MIDIMAN's Macman PT is fully GEO port compatible and works with any older 8-pin serial port Mac. Macman PT is self powered and also has a built in power jack for use with an optional 9-volt wall wart — perfect if you have a PowerBook 500. When the Macman PT is not functioning as a Mac MIDI interface it acts as a 1 In/2 Out MIDI Thru box so you don't have to re-plug the system when the computer is off. Macman PT is guaranteed for life and retails for \$59.95. For further information, contact MIDIMAN, 236 West Mountain St., Suite 108, Pasadena, CA 91103. Tel: 818-449-8838. Circle EQ free lit. #119.

WINNING TEAM

Hyperception, Inc. has integrated the Bridge-north Signal Processing BN4000 DSP system board with Hypersignal for Windows Block Diagram 3.0. This combination of DSP hardware and visual programming software allows engineers to develop real-time signal processing functions on a floating point DSP processor using a graphical interface. Hardware features include dual access SRAM, hardware address generation, a bi-directional data FIFO, and bi-directional control registers. For more details, contact Hyperception, 9550 Skillman, LB 125, Dallas, TX 75243. Tel: 214-343-8525. Circle EQ free lit. #118.



EASY AS QSC

QSControl2 from QSC Audio Products is the control program for QSC's new Ethernet-based audio control network line. The control system provides the full programming capabilities for Microsoft Visual Basic. A complete control system is composed of a user interface system controller (a PC running QSControl2) for operation of the sound system, a network (Ethernet) for distribution of monitor and control data, and devices such as QSC's MultiSignal Processors that can be remotely controlled from the system controller. For more information, contact QSC Audio Products, Inc., 1675 MacArthur Blvd., Costa Mesa, CA 92626. Tel: 714-754-6175. Circle EQ free lit. #120.

SPECIAL FX

Power Technology combines proprietary DSP hardware and software in its DSP•FX. The technology is available either as a self-contained turnkey system called the DSP•FX PowerPack™, or as a cost-effective package of cards and software for any Windows-equipped PC, known simply as DSP•FX. Audio quality is maintained through Power Technology's 32-bit audio processing scheme, which utilizes floating point calculations. Visual Pro Audio's™ Display provides the on-screen centerpiece of each DSP•FX algorithm. Multicolored icons offer real-time indications of the degree, type and spatial location of processing effects. The control screen sports familiar console-like knobs and faders. Parameters can be controlled in real time by a mouse, by any MIDI fader system, or by the DSP•FX Controller. For further details, contact Power Technology, 100 Northhill Drive, Bldg. #24, Brisbane, CA 94005. Tel: 415-467-7886. Circle EQ free lit. #121.



meet your next rack. MR Rack.

64 Voices

12 Meg Wave ROM
Expandable to 84 Meg
(3 expansion card slots)

2nd-Generation Transwaves™
(with digital resynthesis)

44.1 kHz Output

Four Outputs
(four 18-bit DACs)



totally new totally awesome

The MR-rack cuts no corners to give you great sound – with 44.1 kHz playback through hardware that measures in at an awesome 102 dB signal-to-noise level. (Four 18-bit DACs sure help with that.)

Our all-new waveform ROM has 12 meg of the best sounds you've ever heard, including bigger and better piano, strings, brass, and voices. Plus the second generation of our unique Transwaves™, using digital resynthesis to give you sounds that move and transform under your control.

Great waves become great sounds thanks to MR-rack's all-new synth engine. Each sound is crafted with up to 16 sonic layers, creating the most realistic acoustic and the wildest synthetic sounds imaginable.

Our next-generation effects chip (ESP-2) provides 6 stereo busses for total mixing flexibility. Studio-quality reverb and chorus are always available, plus your choice from a broad selection of insert effects. And our thoughtful design lets you change the insert effect while the MR-rack is playing, without affecting the chorus and reverb.

Forget you ever heard the term "MIDI mode". Working with the MR-rack is easy, because it's always ready to receive on 16 MIDI channels. And it's just as easy to set up splits and layers on a single channel.

We've made selecting sounds a breeze with our proven SoundFinder™ interface – one knob selects

the sound type; the other knob picks the sound itself. And with hundreds of great sounds to pick from, you might never need to tweak one. But if you do, we made the most important sound parameters easily available for editing.

Want more? We thought so. The MR-rack has the best expansion options of any synth, with 3 card slots for up to 84 meg of wave data. And we give you tons of memory for your money. (Three times what anyone else offers!) Like our upcoming 8 meg Drums at only \$250, the 20 meg Dance/Hip-Hop card at \$425, and the 24 meg World and Piano cards at \$500 each.

Need another incentive? OK, buy an MR-rack and we'll give you a rebate coupon worth \$50 off your first expansion card. (This is a limited time offer good until we come to our senses!)

Whoops – ran out of room! So if you want to hear all the other totally cool things about the MR-rack (like the PCMCIA card slot, the 4 outputs, or the Unisyn MR editor we'll give you)

just call us, write us, or visit your ENSONIQ dealer and say

"I'd like to meet MR Rack!"

All-new ESP-2 Effects
(26 MIPS of 24-bit DSP power)

SoundFinder™

GM Compatible

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CREATING THE WILDEST SOUND IMAGINATIONS

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I want to meet
MR Rack!

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☐ KS-32 weighted action synth ☐ SQ Series synths
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P.O. Box 3035, Malvern, PA 19355-2735

CIRCLE 25 ON FREE INFO CARD

MS1402-VLZ

6 mono mic/line chs.

4 stereo line chs.

3-band equalization

Low Cut Filter (chs.1-6)

2 aux sends per ch.

Mute/Alt 3-4 Bus

PFL-in place/AFL Solo

60mm log-taper faders

Aux Send 1 master control

EFX Return to Aux Send

2 stereo aux returns

Control Room/Phones matrix

Control Room output

Tape inputs/outputs

Balanced XLR & 1/4" outputs

Built-in power supply.
No outlet-eating,
hum-inducing
wall warts!



Mondo protection from RFI interference.

Trim control (chs. 1-6).

Ultra-wide +10 to -40dB range handles everything from hot digital multi-track feeds to whispering lead singers and older, low-output keyboards.

Pan control with constant loudness and very high L/R attenuation so you can pan the channel hard left or hard right without bleed-through.



Studio grade mic preamps (chs. 1-6) with high headroom, low noise (-129.5dBm E.I.N.) and phantom power. These are the same discrete mic preamps used to track and mix several gold & platinum albums on our acclaimed B*Bus console series.

Balanced line inputs. Channels. 1-6 are mono; channels. 7-10 are stereo.

Low Cut Filter (chs. 1-6) cuts mic handling thumps, pops, room rumble and wind noise. Also lets you safely use Low Shelving EQ on vocals.

Two aux sends per channel with 15dB extra gain above Unity.

High shelf EQ. $\pm 15\text{dB}$ at 12kHz.

Peaking midrange with wide, musical bandwidth centered at 2.5kHz. $\pm 15\text{dB}$.

Low shelf EQ. $\pm 15\text{dB}$ at 80Hz.

Four buses on a 2-bus board! Mute switch routes channel output to extra ALT 3-4 stereo bus. Use it for feeding multitrack recorder channels, creating a subgroup via Control Room/Phones matrix (more info at right), monitoring a signal before bringing it into the main mix or creating a "mix minus."

Solo. AFL (for studio use) or PFL (for live sound mixing) via global switching. Individual channel metering via Solo makes level setting easy.

60mm logarithmic-taper fader.

More mixer in less space. The MS1402-VLZ takes up just 1.3 sq. ft. of work space.

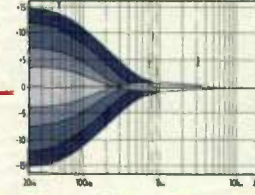
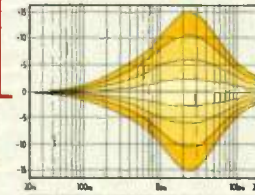
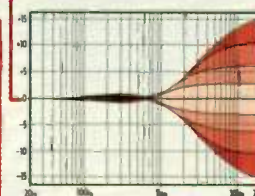


Balanced inputs & outputs (except RCA tape in/out & ch. inserts).

Beefy head-phone amp can drive any headphones to shock volumes.

12-LED meter display with Level Set Indicator.

Separate 60mm L/R Main Mix faders.



Control Room/Phones matrix adds incredible tape monitoring, mixdown and live sound versatility to the MS1402-VLZ. It lets you route any combination of Main Mix, Alt 3-4 bus and Tape Input signals to the Control Room/Phones fader, outputs & LED meters. Tape and Alt 3-4 can also be assigned to the main mix.

Solo Mode switch globally selects mono pre-fader (PFL) or stereo in-place (AFL).



Balanced XLR outputs with switchable mic/line output level.

Control Room & Alt 3-4 Bus outputs. Mackie's signature 3-way Channel Inserts (chs. 1-6).

60mm log-taper faders are accurate along their whole length of travel for smooth fades. They employ a new long-wearing contact material for longer fader life & super resistance to dust, smoke, etc.

NEW

THE NEW MICROSERIES 1402-VLZ. YOU CAN'T GET A BETTER COMPACT MIXER.



VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for our acclaimed

8•Bus console series, VLZ effectively reduces thermal noise & minimizes crosstalk by raising current & decreasing resistance.



Takes a stomping and keeps on mixing. Our unique

pressure-absorbing knob design, thick, horizontal fiberglass circuit boards and brass stand-offs resists downward impacts that would trash other mixer brands.

Solid steel chassis instead of aluminum or plastic.

RCA-type tape inputs & outputs.

Balanced 1/4" TRS main outputs.

Balanced stereo line inputs (chs. 7-14) are switchable from +4dBu pro level to -10dBV semi-pro levels. Can be used to boost any weak input signal.

Fast, accurate level setting via Channel Solo.

As the Rude Solo Light blazes forth, a soloed channel's level is displayed on the LED meters. Set the channel fader to Unity, adjust input level to the Level Set marker and you've optimized the MS1402-VLZ UnityPlus gain structure for maximum headroom & minimum noise.

Aux Send 1 Master

EFX to Monitor switch. lets you send aux return signals (delay or reverb) to the stage monitors through Aux Send 1.



Master Pre/Post switch. for Aux Send 1.

Two stereo aux returns with 20dB gain above Unity.

This one really drove our Engineering Department nuts.

NEW

Greg wanted to pack a gazillion studio and live sound features into an extremely compact mixer.

He wanted the same nice long 60mm faders we developed for the SR Series. He wanted balanced inputs and outputs. 3-band EQ, AFL/PFL and deluxe tape monitor/Control Room features. In short, he wanted it to be the best under-\$600 mixer value ever offered.

Many months and countless Diet Cokes later, it's here.

The MicroSeries 1402-VLZ.

We invite you to shop around and compare it to other mixers costing up to \$1000. When it comes to low noise, high headroom, impeccable mic preamps, sweet-sounding EQ and sheer density of Cool Stuff, we think that you'll agree... Greg and his fanatical Engineering Department have done it again.

CALL TOLL-FREE

FOR OUR NEW

40-PAGE

"IN YOUR FACE"

BROCHURE &

APPLICATIONS

GUIDE.



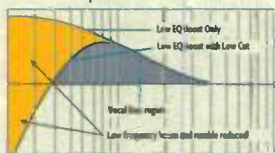
Why do we make such a big deal about our Low Cut Filter? First, it's a

real low cut filter with a sharp, 18dB per octave slope beginning at 75Hz (some so-called "low cut" filters' shallow 6 or 12dB/oct. slope lops off audible bass). Our filter cuts stage rumble, room noise, P-pops and microphone handling thumps — all of which muddy your

mix, robs amp power and can actually blow woofers. It has another equally valuable benefit: without the filter, if you try to add Low Shelving EQ to vocal channels, low-frequency

garbage gets boosted to potentially disastrous levels. Engage the Low Cut filter and you

can safely use Low EQ to enhance vocals.



* Suggested retail price. Higher in Canada.

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World Radio History

CIRCLE 50 ON FREE INFO CARD

MACKIE™

From Mangione To Mariah

STUDIO NAME: Barking Doctor

LOCATION: Mount Kisco, NY

KEY CREW: Mick Guzauski; Marnie Riley
PROJECTS RECORDED: Shawn Stockman of Boyz II Men, "Vision of the Sunset"; portions of Mariah Carey's televised Thanksgiving Special.

CONSOLE: Solid State Logic SL 4064 G Series with AT&T DISQ Digital Mixer Core.

MONITORS: Tannoy SRM-10B 10-inch dual concentric and SGM-10B 10-inch dual concentric reference studio monitor with Mastering Labs crossover network; Magneplanar MG-IIIC's with JBL subwoofers; DynAudio.

AMPS: Hafler H500's; Yamaha P2700's.

COMPUTERS & SOFTWARE: Macintosh Quadra 840 with Digidesign ProTools and Studio Vision.

RECORDERS: Sony PCM-3348 48-track digital, APR-24 24-track analog, and PCM-800's; Alesis ADAT.

DAT MACHINES: Sony 7030 timecode DAT and 2700A; Panasonic SV-3700.

OUTBOARD GEAR: Lexicon Model 300; Eventide DSP4000, H-3000SE Ultra Harmonizer, and SP2016; Sony DPS-V77 multieffects processor; Yamaha SPX-990; Ensoniq DP/4; GML 8200 dual-channel 5-band EQ and Series 3 limiter/compressor; Lang EQ; dbx 900 rack; UREI LA-22's; Calrec preamps; Neve preamps; API preamps.

MICS: Sony C800G; AKG C24; Neumann TLM170 condenser; Milab DC96; Shure SM57's and SM58's.

STUDIO NOTES: Guzauski says: The important thing to teach about recording — and I don't know if anyone does — is attitude. Not technology, not music, just attitude and how to deal with the people and the session. You really can't teach that. It's part of your personality and it's experience. I also think it's good to have a sense of humor about things and keep it light in the session.

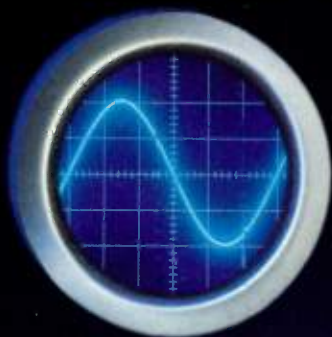
EQUIPMENT NOTES: Guzauski continues: I like the Sony 48-track. It's extremely convenient, sounds great, and its sampling memory allows you to move stuff around and quickly locate to any part of the song. Also, you don't have to wait for several machines to sync up. For acoustic music, I like to use two analog 24-tracks with Dolby SR because of the incredibly large dynamic range and detail at low level. —Andrea Rotondo



**ENGINEER MICK GUZAUSKI
 SETS OUT HIS SHINGLE AT
 HIS MT. KISCO HOMESTEAD**



Photo by Julian Jaime



AUDIO INTEGRITY

You are busy trying to create the perfect mix, so we'll get right to the point. The new Sony DPS-V77 is a single rack powerhouse –

a digital multi-effects

signal processor that

combines the best of

our DPS Series, for an impressive array of

effects including reverb, delay, modulation,

dynamic filtering and more. The V77 also offers

balanced and unbalanced analog and digital

I/Os, with high resolution 24-bit A to D, 20-bit

D to A converters and Sony's proprietary 32-bit

digital signal processing. Result: great sound in,

better sound out.

DUAL EFFECTS ARCHITECTURE

With 50 effects per block, the dual block architec-

ture of the DPS-V77 makes it extremely flexible,

since it allows for various serial and parallel configu-

rations. Each block is equipped with a switchable

IT'S A SIGNAL



IT'S A GARBA

pre or post effect EQ. You'll find 198 user presets in

addition to 198 factory presets. You'll also discover

several new, ear-opening effects, from intelligent

pitch shifting to irregular delays, to mono/stereo

conversion, and three-dimensional spatial place-

ment. The most important feature, however, may be

what this unit *doesn't* come with.

MORPHING

Nietzsche once said, 'get rid of the junk you don't need.' Or something like that. Anyway, sound philosophy for life is sound philosophy for signal processors. So, that annoying drop-out you get switching

USER FRIENDLY

Take a good look: nice, big LCD display and “jog/shuttle” knob. Numeric key pad, descriptive icons. Assignable direct access keys, located where they ought to be. Call up a preset and up to 6 of your most frequently used parameters are there instantly. All this, plus full MIDI

L PROCESSOR.



control. So work flows
quickly, smoothly, easily.

As easy as calling

GE DISPOSAL.

between effects? It's history. Eliminated. Toast.

Seamless transition – say, between the tail end of
a reverb into a chorus – is now reality. With this

'morphing' function of the DPS-V77, a new effect (like a chorus or flange) can begin while a current effect (like a reverb or delay) is decaying, giving you

from 0 to 10 seconds transition time.

1-800-635-SONY, ext. DPS, for more information.

Imagine. No more fumbling, grumbling, mumbling with
a whole rack of trouble. No more ex



SONY

Dar Williams "Mortal City"

Steven Miller explains
how he recorded
Williams's newest release

BY ROBERT GRANGER

What was the basic "studio" setup you used to record Dar's *Mortal City* disc? Basically, with the budget that was there, the only way to have it come out the way we wanted was to make the record at Dar's house. I had been trying to figure out what kind of portable system to get and I decided to go with the Roland DM-800. So I brought up the Roland unit, some mic pres (including a few APIs and a John Hardy), and a few mics. I did all the stuff on headphones, but I brought up a pair of Genelec speakers. In reality,

those weren't even really necessary because we ended up listening to most of the stuff on the headphones anyway.

What kind of mics did you end up using for her guitar and vocals?

I used two Schoeps with the switchable cardioid and omni capsule on the guitar. The other mics were pretty basic things, including a Neumann U87 and an AKG C414, which are not microphones that I particularly like, but they were stuff that I had lying around and we wanted to avoid big rental charges. We also used an Electro-Voice RE20.

How did you handle your tracks with the DM-800?

I wanted Dar to explore different ways of approaching the song, so I let her do a couple of takes, I'd compile them on the empty tracks, and we'd keep the one that we liked the best. I didn't do any "punching in"; in fact, I've rarely used that technique — even with my Windham Hill recordings. I like to let them sing takes

and then go through and grade them for pitch, delivery, and diction, then compile a master track from there.

How did you find the editing process using the DM-800?

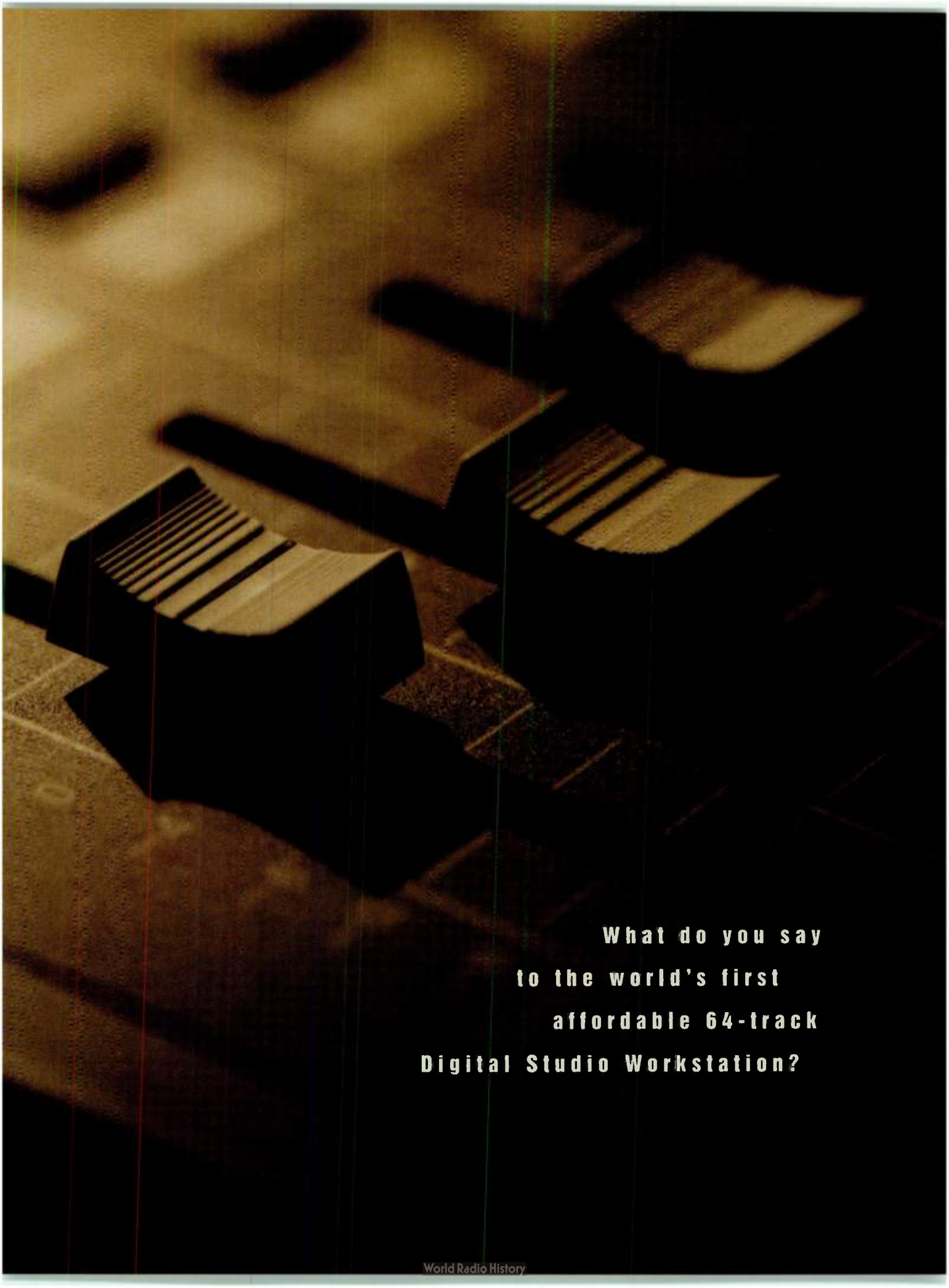
I really put this thing to the test. The tightest increment you can get on the DM-800 is milliseconds, which is good if you've got my mentality with the early days of tape editing. There are an incredible amount of edits.

How did you end up editing in a sports bar during the NBA playoffs?

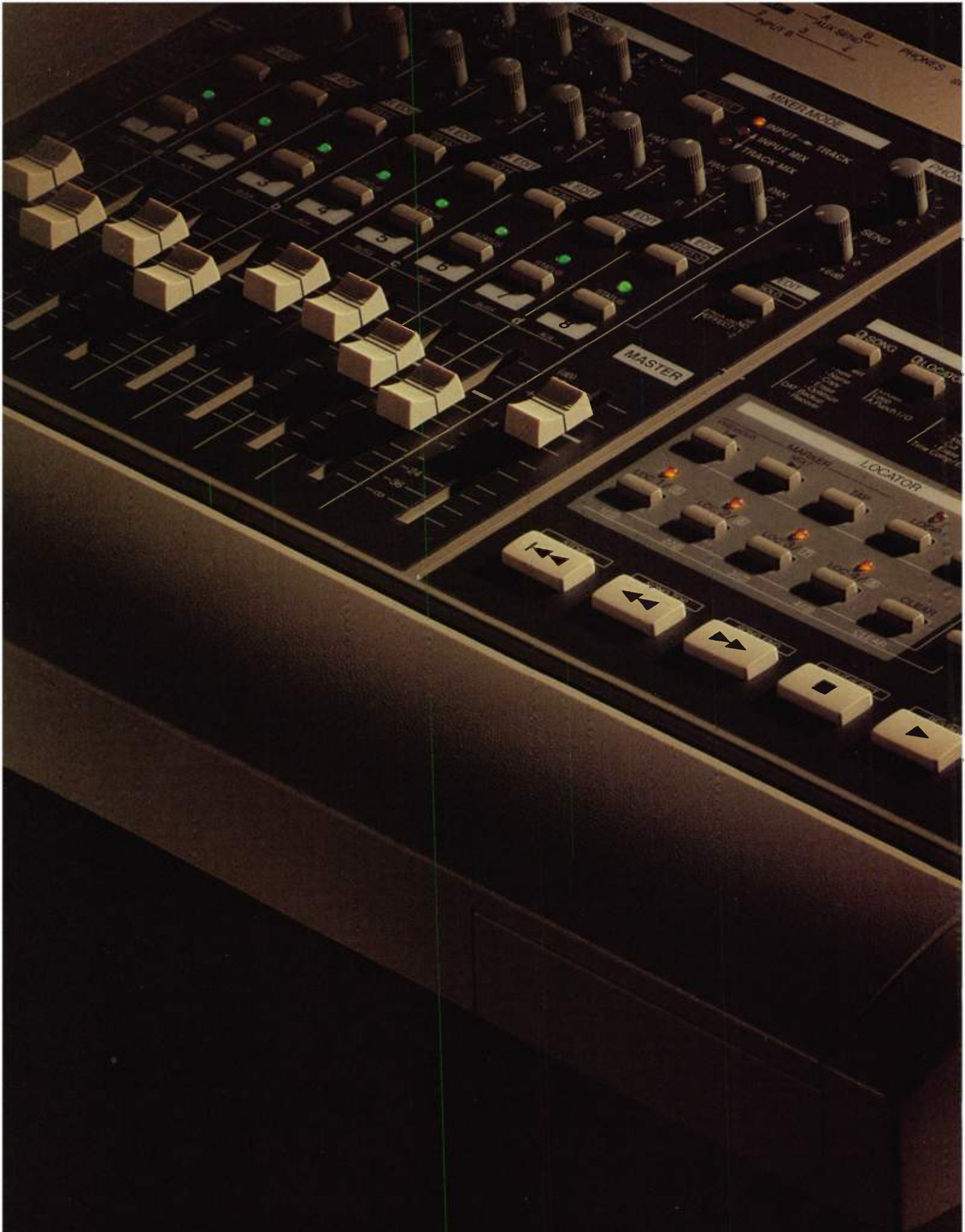
I'm an enormous basketball fan and I thought, "I take this thing everywhere else with me, why not take it to watch the Knicks game?" The Riviera Sports Bar is right up the street from me, so I got the DM-800, brought it to the bar, and just asked if I could plug it in. So it was me, the regular bartender, and four other guys and I was working and watching and drinking, and it worked out really well.

EQ





**What do you say
to the world's first
affordable 64-track
Digital Studio Workstation?**





Welcome home.

Say hello to the first fully integrated digital recording workstation practically anyone can afford. The VS-880 is for anyone who ever wanted more and more out of their home or studio recording environment.

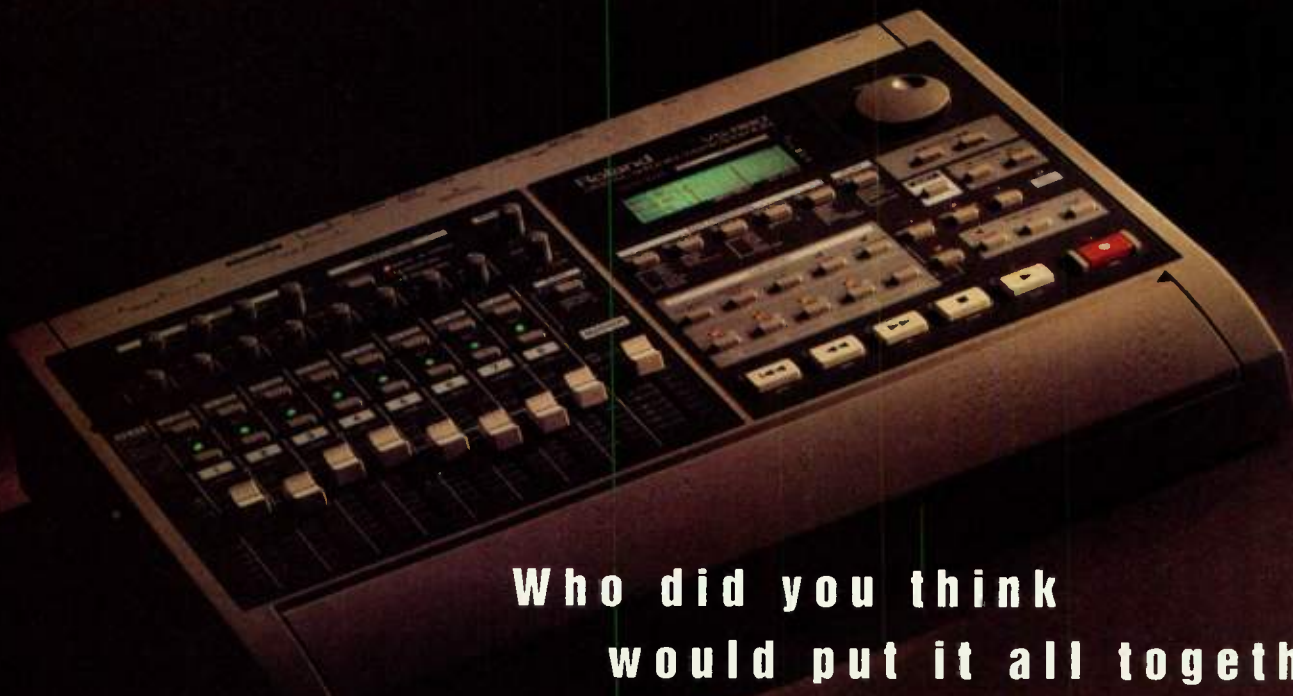
It's a 14-channel digital mixer. It's an 8x8/64 virtual track digital recorder. It's two completely independent stereo multi-effects processors*. And it's up to 500 minutes or more of random access recording time.

It's time to turn your home or workplace into the studio you've always wanted. Turn on to the VS-880 Digital Studio Workstation and discover just how easy recording, editing, mixing and mastering can be to help you create your best work.

 **Roland®**

VS
Studio
VS-880

*With optional VS8F-1 Effect Expansion Board.



Who did you think would put it all together?

Only Roland could combine all the key components of studio recording
in a fully digital environment.

The VS-880 is the first digital workstation of its kind.

A 14-Channel Digital Mixer

The VS-880 comes with a 14-channel digital mixer with digital EQ. Fader, pan and mixer parameters can be automated by MIDI control change messages. Internal snapshot automation is included.

An 8x8/64 Virtual Track Digital Recorder

Eight primary tracks with eight levels of virtual tracks give you the ultimate in recording flexibility. Record multiple takes, edit or undo edits and compile the best parts of various takes to create the perfect track without compromise. You can accumulate up to 64 instantly accessible tracks and choose eight for final mixdown.

Digital Editing

With the VS-880, you get fully non-destructive editing capabilities. You can copy, move, exchange, insert, cut and erase tracks. Because it functions like a word processor, you can select the perfect chorus of your song, copy it or move it somewhere else without re-recording it. Or cut out another section and have the remaining material slide over and fill the open space automatically. And if you're not satisfied with a particular edit, simply return to the previous performance. Instant locate points make editing on the VS-880 as user-friendly as it gets. For advanced applications, functions like Scrub Preview or Time Compression/Expansion are available.

Digital Mastering

The VS-880 is fully digital and has digital in and out. This makes it compatible with all your existing digital equipment, both linear tape-based and non-linear hard disk format.

Two Digital Effects Processors

A VS8F-1 Effect Expansion Board can be easily user-installed, giving you two totally independent multi-effects processors. Reverb, stereo delay, chorus, flanging, vocoder as well as distortion/overdrive and guitar amp simulation are a few of the effects that can be added during recording or during final mix in realtime. Three dimensional effects based on Roland's proprietary RSS[®] system are also included.

Digital Memory

You can choose the type of memory which best suits your needs. Select a 540 MB internal drive or an internal 1 Gigabyte removable Iomega[®] JAZ[®] drive capable of 500 minutes of recording time. A standard SCSI port allows for easy connection to external drives such as Iomega[®] ZIP[®], magnetic optical or other storage media.

Synchronization

The VS-880 is MIDI compatible for synchronization with MIDI Time Code (MTC) as both a master or slave. MIDI Machine Control (MMC) also allows automated transport control, putting playback, fast forward, rewind and more at your fingertips.

The VS-880 Digital Studio Workstation is ready and waiting for your valuable input at your nearest Roland dealer. Or call (213) 685-5141, ext. 798 to order a free demonstration video.

VSStudio
VS-880

Roland



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CIRCLE 67 ON FREE INFO CARD

TL Audio Indigo Series

A new line of processors
guaranteed not to make
you blue

BY STEVE LA CERRA

These days recording studios have more tubes than a tire shop. That trend has only been on the increase in the last year since manufacturers have started introducing tube-based processors that mere mortals can afford. TL Audio is a name familiar to engineers as the producer of high-quality, tube-based compressors, mic preamps, and equalizers. In an effort to bring its technology to a broader market, TL Audio has introduced the Indigo series, a new range of more affordable and easy-to-use units that are likely to make a project studio owner's eyes light up.

The Indigo line consists of five new product introductions, with additional processors scheduled for later in the year. Available now are a 4-channel mic preamp, a fully parametric stereo equalizer, a shelving/peaking characteristic stereo equalizer, a stereo compressor, and a stereo overdrive unit. All of the devices come in a compact one-rack space chassis. Four of the five units have line-level inputs and outputs on both 1/4-inch unbalanced and XLR balanced connectors. The exception, of course, is the microphone preamp, which has balanced mic-level XLR inputs and the same XLR balanced and 1/4-inch unbalanced outputs as the other units.

The IN-PA-2001 is the Indigo Series' 4-channel tube microphone preamp, and each of the four channels has identical front-panel controls. Two rotary pots (with knobs of different sizes) control input gain and output gain, allowing you to overdrive the input while still controlling the level to tape via output control. Push-button switches enable phantom power (thanks to TL Audio design engineers for putting them on the

front, *not* the rear) and a 90 Hz low-cut filter is available for keeping the rumble out of your tracks. A peak LED shows overload at the input stage of the preamp and a phase reverse switch lets you check relative phase of multiple microphones. As mentioned above, the rear-panel microphone inputs are on balanced XLR connectors. The IN-PA-2001 is expected to retail at \$1295.

TL Audio's IN-EQ-2011 is a peaking/shelving type of equalizer with a continuously variable input control, in case you might like to dial in some "crunch" to your EQ'd sound. There are four bands of EQ available for each of the stereo channels, two of which are shelving and two of which are peaking-type circuits. Each band has a

maximum boost and cut level of 12 dB. The low- and high-frequency shelving controls are switchable between two frequencies: 80 Hz and 120 Hz for the LF and 8 kHz and 12 kHz for the HF. The midrange controls are of the peaking type; the low-mid band is switchable between 250 Hz, 500 Hz, 1 kHz, and 2.2 kHz while the high-mid EQ band can center at 1.5 kHz, 2.2 kHz, 3.6 kHz, or 5 kHz, thus allowing a small area of overlap in the midrange. Signal status through the 2011 is monitored with two LEDs per channel: one showing peak signal level and the second indicating that the EQ circuitry is switched into the audio path (each channel may be individually bypassed). As an added bonus, TL Audio gives you front-panel auxiliary 1/4-



TRUE BLUE: TL Audio's Indigo line is priced more affordably than the company's other processors.

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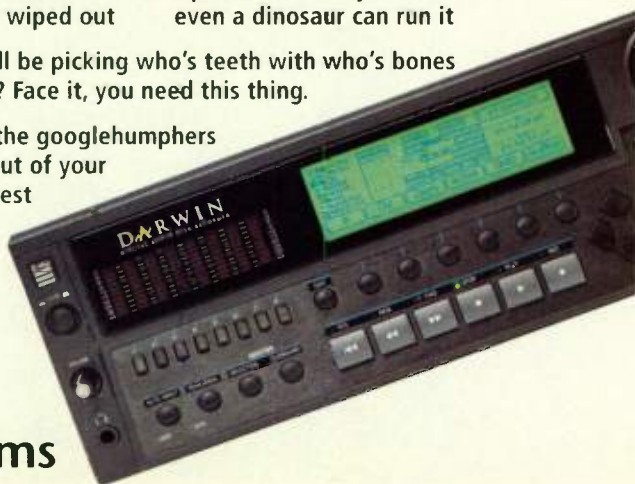


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FIRST LOOK

inch inputs for each channel, allowing the 2011 to be used "direct box-style" with equalization for keyboards and guitars. The 2011 has a suggested list price of \$1295.

The IN-EQ-2011's brother is the IN-EQ-2012 stereo parametric equalizer, which features one high- and one low-frequency band per channel: channel A has band 1, continuously variable from 30 Hz to 1.2 kHz and band 2, continuously variable from 1 kHz to 18 kHz. Channel B has band 3, continuously variable from 30 Hz to 1.2 kHz and band 4, which is continuously variable from 1 kHz to 18 kHz. Bands two and three each have an additional switch labeled "divide by ten" and "multiply by ten," respectively.

Although TL Audio is giving you only two bands per channel, don't be fooled into thinking that this EQ unit lacks flexibility. First of all, each channel can operate over a very wide range: 30 Hz to 18 kHz. And TL Audio has a little trick up its sleeve that tracking engineers will love. A front-panel switch labeled "mono mode" sends the output of channel A directly to the input of channel B. Engage this switch along with the "divide by ten" and "multiply by ten" functions and now you will have a single-channel, 4-band parametric unit with EQ available at the following frequencies: 30 Hz to 1.2 kHz (band 1), 100 to 1.8 kHz (band 2), 300 to 12 kHz (band 3), and 1 kHz to 18 kHz (band 4). Boost and cut range is 15 dB and the IN-EQ-2012 offers the same LED peak indicators, auxiliary inputs and bypass switches as its brother. Very versatile for a processor that lists at only \$1395.

The IN-C-2021 is the Indigo stereo compressor and features continuously variable controls for input gain, threshold, ratio, and gain make-up (you might note that while the photo shows a two-position switch for threshold adjustment, TL Audio has wisely changed the threshold control to a variable pot). The company simplifies the operation of this unit for less-experienced engineers by providing push-button switches labeled "fast" or "slow" for the attack and release times. A rear-panel sidechain insert allows you to connect an external EQ unit for "frequency-conscious" compression such as de-essing and a link switch straps the two channels

continued on page 130

Two Studio Veterans Team Up.

Ed Cherney and the AT4033

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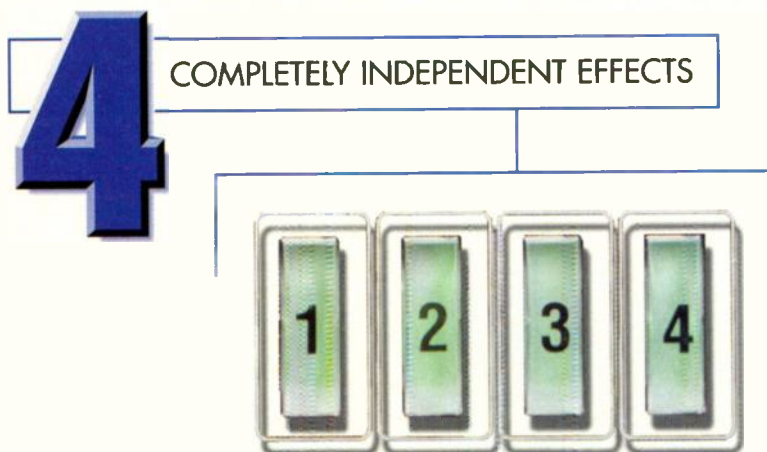
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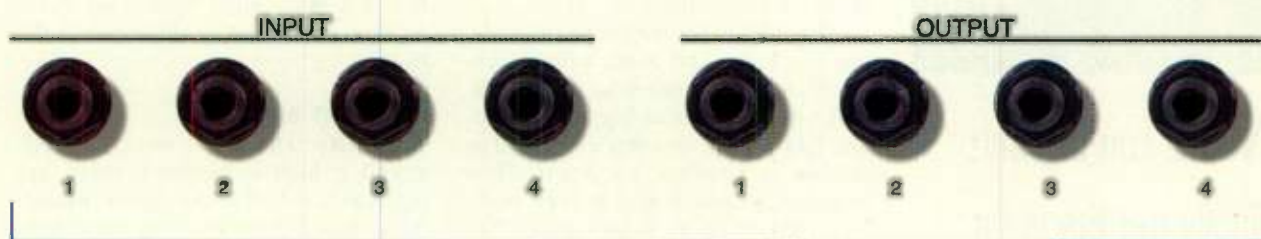
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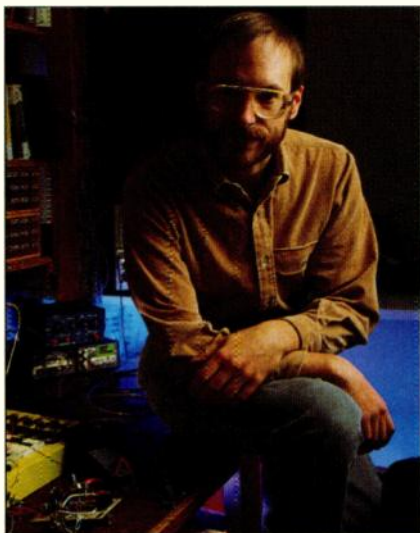
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The Ultimate Direct Guitar Sound



Now it can be told!
Finally get the guitar
sound you've been
looking for by going right
into the board

BY CRAIG ANDERTON

Are the neighbors complaining about your stack o' Marshalls going to 11 at 3 AM? Does your guitar lack clarity? Does the bass sound like someone shot holes in the frequency response at various random frequencies? Are you tired of getting a completely different sound live compared to the studio? Do you want something — anything — in your life that's actually predictable and repeatable? Then you're a candidate for recording your guitar or bass direct.

Going direct eliminates the hassles of miking an amp, leakage, and various other problems. But in return, you get an exciting new crop of hassles. This article will tell you how to

overcome them and get a great direct sound. But first, some theory.

THE IMPEDANCE IMP

Guitar pickups, unless they're active (i.e., have a built-in preamp), exhibit a high *output impedance* that increases at higher frequencies. Output impedance is like shoving a resistor in series with your guitar output. Meanwhile, whatever input the guitar feeds has an *input impedance*, which is the equivalent of placing a resistor from the amp (or mixer, or recorder) input to ground. Get the picture? We now have an involuntary, laws-of-physics-mandated volume control (fig. 1).

The higher the output impedance, and the lower the input impedance, the more signal loss your guitar will suffer — especially at higher frequencies. Conversely, to keep the sound as pristine as possible, you want a low output impedance and a very high-input impedance. Tubes and FETs have inherently high-input impedances, whereas transistors are (generally) of the low-input impedance persuasion — perhaps one explanation for why people like the sound of tube gear.

This is why plugging your guitar directly into a mixing console or recorder dulls the sound so much: the console will usually have a low-input impedance that sucks the life right out of your signal. A direct box converts the guitar's high-impedance output into a low-impedance out, thus providing a better match.

However, not any direct box will do. Older types often use transformers whose impedance may load down the guitar more than the

mixer input would. A direct box for guitar should have an input impedance greater than 250k (1 Meg is even better). You also probably want it to be able to generate balanced as well as unbalanced outputs. Any other features — tone controls, phase switches, etc. — can be helpful, but aren't essential. Many of today's mic preamps are also designed to work as a DI (direct injection) box for guitar; if you're handy with a soldering iron, check out the DIY DI (EQ, June 1991 issue), a full-function direct box optimized for guitar and bass. If you don't need something quite that elaborate but still need killer specs, the IGGY preamp elsewhere in this issue is the ticket.

DOWN AND DIRTY

Guitarists who have never experienced a high-impedance input are often astonished at the clarity, brightness, and definition they now hear from their guitar. However, while that's great for clean parts, what if you want a down and dirty amp sound? In fact, for some guitarists, an amp with a low-impedance input that robs high

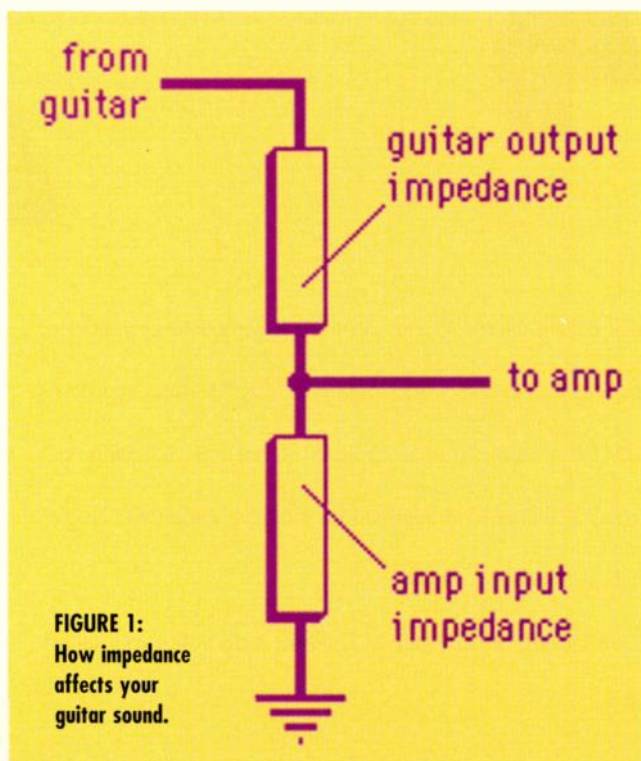


FIGURE 1:
How impedance
affects your
guitar sound.

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MI INSIDER

frequencies is part of their "sound" since taking off the high end, then adding distortion, gives a smooth, creamy sound. Fortunately, there's a way to simulate various amp qualities when going direct.

THE MULTIEFFECTS CONNECTION

An alternative to just patching in a direct box is to use a multieffects designed for guitar, or a series of "stomp boxes" patched together to shape the sound. These generally have the high-input impedance required to maintain your guitar's signal strength. Most of today's multieffects let you string a bunch of effects together in any order you want, edit the sound of each effect, and save the whole shebang in memory as a program. However, the programming choices you make can drastically influence the sound, particularly the order in which you place effects. Here's what works for me (see fig. 2).

COMPRESSOR

This goes first in the chain. If you're using a stomp box, it should have a high-input impedance to interface the guitar with the rest of the system. Adding some compression increases sustain, gives a smoother sound, and makes the best use of the limited dynamic range of many signal processors. Use a fast attack (10 ms or less) and medium decay (300–700 ms). Adjust the threshold and ratio according to whether you want a natural sound (e.g., 6 dB of gain reduction with a 2:1 ratio) or a squeezed, squashed sound (12 dB of gain reduction, 8:1 ratio).

PARAMETRIC EQ

Patching EQ before the distortion customizes the distortion sound. For example, if you boost the midrange at about 700 Hz with a one octave bandwidth,

single note leads higher up on the neck will be boosted more, thereby going into distortion earlier, and giving more sustain. Boosting the low end gives a chunky, meatier sound. Rolling off the extreme highs prevents that brittle, metallic kind of breakup that happens with some distortion boxes (and simulates the effect of loading down the guitar with a low-input impedance). Note that the pickup settings are important as well; the bass pickup gives a smooth sound (especially with the tone control rolled back), whereas the treble pickup gives more "bite."

DISTORTION

This is where the crunching occurs. Adjust to taste.

POSTDISTORTION EQ

Parametric or graphic EQ works well here to shape the sound's overall tonal quality. The predistortion EQ has less of an effect on the overall tonality because any subtle differences are wiped out by distortion-induced clipping. For example, even if the predistortion EQ rolls off the highs,

the distortion process itself will generate some additional highs. The postdistortion EQ can take care of this, as well as add some midrange peakiness so the signal cuts more, or roll off some of the bass to minimize interference with low-end instruments such as bass and low toms/kick.

One popular setting is to boost the midrange around 1 kHz to give more "honk" to the guitar for solos. For rhythm guitar, some engineers put a gentle midrange notch around 500–1000 Hz to create a sound that leaves some space for other midrange instruments, yet retains a bright top end and authoritative bottom.

Perhaps the best postdistortion EQ option is a speaker emulator. The

Guitarists who have never experienced a high-impedance input are often astonished at the clarity, brightness, and definition they now hear from their guitar.

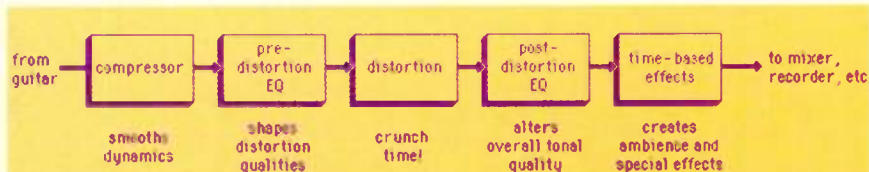


FIGURE 2: One possible order of effects.

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average amp cabinet has a frequency response that drops off like a cliff after approximately 5 kHz (12-inch and 10-inch speakers were never really designed to do a good job on highs). Some "speaker emulator" modules found in multieffects are simply graphic EQs or other simple tone controls that give you the option to roll off highs; others are digitally generated response curves of different types of amps that even let you specify whether you want the characteristics of four 10-inch speakers, two 12-inch speakers, open back, closed back, and so on. These can make a huge difference in terms of getting a "true-to-life" sound.

TIME-ALTERING EFFECTS

(As in chorus, delay, reverb, etc.). If you're using a multieffects, you might want to ignore the internal time-based effects and go through your studio's big-bucks, high-end reverb. In fact, any of the above stages might be served better with outboard gear — for example, use some nifty tube compressor instead of the one in a multieffects (however, make sure it has a high enough input impedance if it's the stage right after guitar).

One final caution involves stereo. Some stereo multieffects can cause problems when heard in mono because of phase cancellations. Always monitor a stereo guitar sound in mono before assuming it's okay.

After you've nailed your sound, there's a side benefit: because your sound is not dependent on an amp, your sound won't change as tubes age, and you'll have much more flexibility — if you want a brighter sound, a darker sound, or a crunchier sound, just tweak a few parameters. Furthermore, when playing live, you can just plug your output into the PA or other flat response system and it will sound the same as it did in the studio. Ain't (electronic) life grand?

EQ

*Craig Anderson is a card-carrying humanoid biped. He still thinks guitars are cool, and, in fact, is a consulting editor to *Guitar Player* magazine in addition to his technology editor duties at *EQ* magazine. Visit his "Sound, Studio, and Stage" area on America Online.*

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CIRCLE 30 ON FREE INFO CARD

Chas Chandler: Guiding Hendrix

The noted producer discusses the "Experience" of his lifetime

BY PATRICK STAPLEY

Bryan "Chas" Chandler began his musical career in the late '50s as bass guitarist with the Newcastle group The Contours. Keyboardist Alan Price, who along with Chandler and a fresh-faced Eric Burdon went on to form The Animals, was also a member. The band's distinctive R&B style quickly gained them a strong following in the North of England, and before long the group was brought down to London where they recorded their first single with then unknown producer, Mickie Most.

Chandler, however, was dissatisfied with Most's choice of song ("Let Me Take You Home"), and insisted that the next release should be "House Of The Rising Sun." It was an unpopular move that turned both the band's record company and management against them.

"They made life as difficult as possible for us," recalls Chandler. "They booked us into a London studio for eight o'clock in the morning after we'd been playing a gig in Liverpool (the night before). We got into the studio at 7:30 after driving all night, by 8:00 we were recording, and by twenty past we were packing up the gear for a gig in Bournemouth."

Despite all this, the record became a huge international hit and marked the start of an exhausting period of touring and recording that was to last for two years. Although the Animals were extremely successful, the band members saw little financial return, and by 1966 Chandler and Burdon were the only remaining founding members.

Feeling disenchanted, Chandler decided to do one final tour of America and call it a day — it was just before the start of this that he came across Jimi Hendrix.

"We'd organized the final tour to try and put some money in the bank, because we'd never seen a penny. I'd gone to New York a few days before the rest of the guys to see this young lady I was enamored with at the time, and she played me this track by Tim Rose called 'Hey Joe.' I thought, 'I know what I'm going to do when I get back to England, I'm going to find an artist to record this with.' I literally decided then and there that I was going to be a record producer.

"The next day I ran into Linda Keith, who was Keith Richards's girlfriend, and we got to talking about production. She said, 'If you're getting into production, you've got to come and see this guy I'm working with.' So we drove to Greenwich Village where I met this 24-year-old guy called Jimi James (Hendrix's stage name at the time). We got along very well, so I went down to The Cafe Wha? to see him play.

"The band was just a pick-up four piece — the other guitarist turned out to be a 14-year-old runaway named Randy California. The very first number they played was 'Hey Joe.' I just sat there and couldn't believe it, the whole thing was far too much of a coincidence.



Photo courtesy of the Michael Ochs Archives

PRE-JIMI: Chas Chandler in the studio with The Animals.

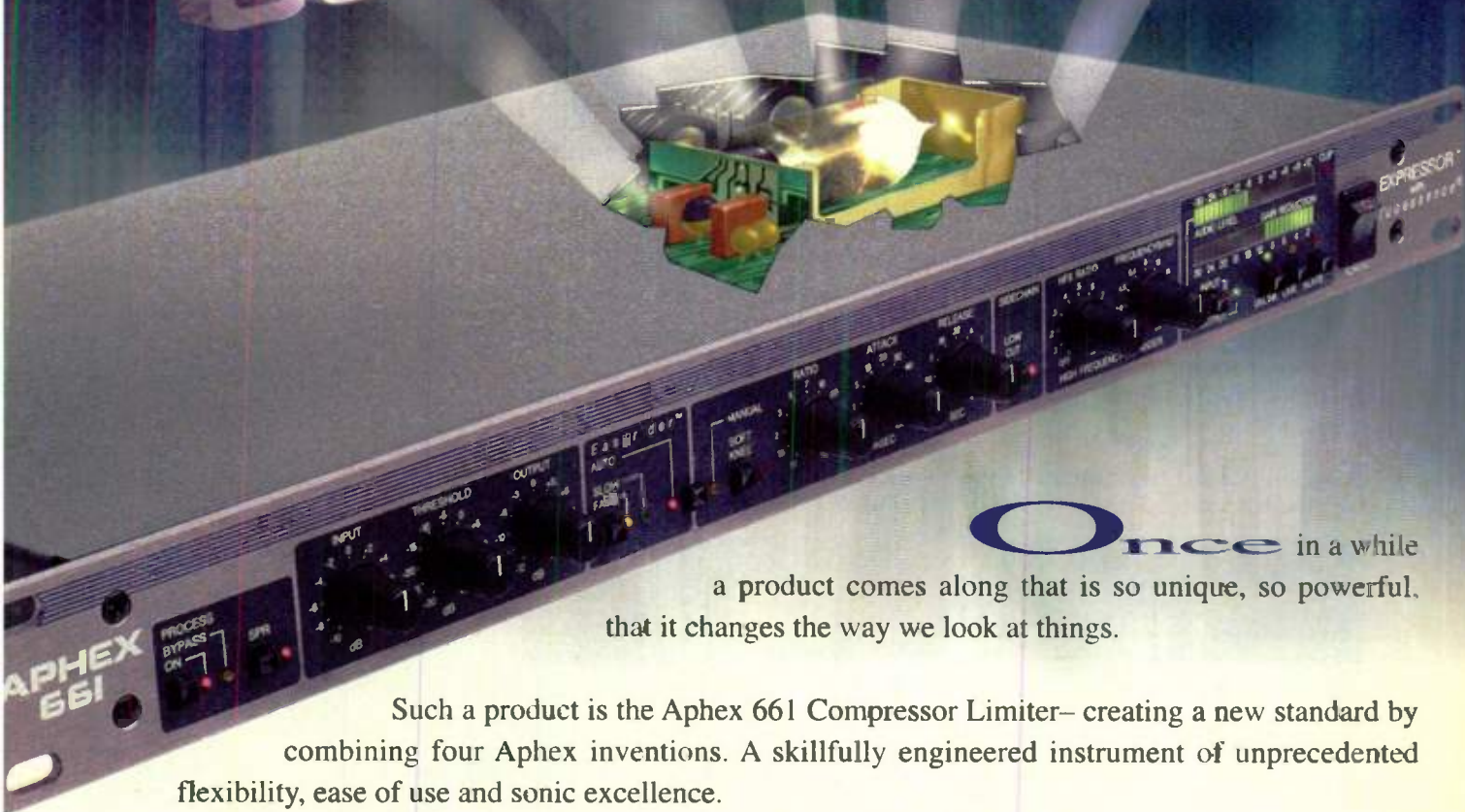
"Jimi was very impressive, and he really carried the band with his guitar and vocals. I offered to take him to England once the Animals tour had finished, and it was all agreed in 20 minutes — the only worry he had was what kind of amplifiers they had in England. I said, 'Believe it or not Jimi, you can buy American amplifiers over there if you want to,' and he was happy."

THE BIRTH OF THE EXPERIENCE

How did you go about finding a band for Hendrix?

I'd been helping Eric Burdon put his new band together, which had just left

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World Radio History

to do some recording in New York. I was in the office and this guy knocks on the door and asks if he could audition for the new Animals as a guitarist. He had his hair cut like Jimi's, it was Noel Redding, and I thought here's coincidence number two. So I asked him if he could play bass. He'd never played bass before, but I lent him mine and we went down to a club called Birdland in St. James where we were going to audition some drummers.

He began playing and Jimi just said, "If he's prepared to keep it simple like that, he'll be fine." So we settled on Noel but we just couldn't make up our minds about drummers; in the end, we had to toss a coin to choose between Aynsley Dunbar and Georgie Fame's drummer, Mitch Mitchell.

Mitch got the job. He was only 17, but he was an incredible drummer. He used to drive you mad though; he was the most consistently late person you've ever known. He'd always disappear minutes before the band was due on stage, and there would be this last minute panic to find him. I used to think, "Do I really need to put up with this sort of crap," and then as soon as he started hitting the drums I'd think, "Yes I do!"

How long before you got the band into the studio?

Oh, very quickly. We went to Kingsway where the Animals used to record, and put down the backing track to "Hey Joe" on four track with engineer Dave Siddle. There was then a gap when the band went to France to play a series of gigs with Johnny Halliday. When we got back we went into Pye to record backing vocals with The Breakaways, because Kingsway was booked-up. The B-side and mono mixes were then done at Kingsway.

Did you then record the rest of *Are You Experienced* at Kingsway?

About half the album was done there, and the rest, apart from "Third Stone From The Sun," was done at Olympic. "Third Stone" was actually recorded at CBS Studios, and the engineer there gave us some dead time without the studio knowing about it — we went in at about midnight to record. The reason we went to Olympic was because Kingsway was about to close, and also, we'd had problems because it was under a bank — Jimi played pretty loud, and they complained that the vibrations interfered with their computers. It was Mick Jagger that recommended Olympic, saying you can play as loud as you like there and nobody will complain.

At Olympic we met up with engineers Eddie Kramer and George Chkiantz who were both very impor-

tant to us. George was the tape-op, but he was much more than that, he was a bit of a boffin who talked electronics all the time, and he came up with a number of things for us, including phasing.

Along with chief engineer Keith Grant, he modified this old Revox — it was a bit hit-or-miss, but when it worked it sounded fantastic. The Small Faces were in the studio next door to us and they came in to have a listen and were so impressed that they rushed off and put it on *Itchycoo Park*, which came out before our album."

Was there much experimentation before that?

Yeah, it started with "Purple Haze" at Kingsway. Siddle was a more conventional engineer than Kramer, but we used to do some strange things like feed stuff back from tape to headphones and re-record it while moving them in and out over the microphone — it produced a kind of "phasey" sound. An awful lot of the effects were based around tape — echoes, delays, spin-ins, and so on. We did a lot of spinning-in of voices, silly noises, slowed up drums, and things.

We also used a lot of backwards effects, and Jimi was great at that — you'd put a tape on back to front and he'd just play along, he'd know exactly where he was and what to play to get



Photo courtesy of the Michael Ochs Archives

PLAYING THE CROWD: Hendrix listens in the studio amidst many onlookers. Chandler felt Jimi was playing for the crowd, not for the studio.

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the effect he was after. At Olympic there were a huge number of echo plates, Keith Grant was obsessed with them, and that was a massive advantage in those days. They also had this mock-up of a Leslie cabinet that we used, but it was amazing just how much tape we got through, and the Revox seemed to be the answer to just about every echo we wanted. Quite often Eddie and George would come up with an effect and we'd go home that night and Jimi would start writing something based around it.

Did Hendrix always use the same equipment to record with?

He always used a Strat, I only ever remember him trying a Gibson once and it was put aside very quickly. He'd mainly use a 4x12 Marshall set-up that was driven to its limit; there weren't many effects pedals to begin with — there was a thing called a Fuzz Face built by Rodger Mayer who was a friend of Noel Redding's. It was one of the first fuzz boxes, but in actual fact Jimi didn't use much of the fuzz on it, it was used more to produce extra sustain, he used to get

the fuzz automatically with his hands. Later on there was a wah-wah and an octave splitter called an Octavia also built by Mayer.

What was he like to work with in the studio?

Great, the only disagreement we had in two and a half years was a silly thing about an amplifier distorting — Jimi thought it sounded OK and I didn't. We couldn't agree, so Jimi said he might as well go back to America if he had to record like this. I'd just come back from the immigration department with his passport and return ticket, so I handed them to him and said, "OK, piss off then." He just looked at me and burst out laughing. We never fought after like that again — until the *Electric Ladyland* album.

Jimi was actually a very funny guy and a lot of fun to be with, he was also extremely intelligent. We shared various flats (apartments) together; the first Ringo lent us, but that caused all kinds of aggravation because the lease said no colored people. So rather than give Ringo any further grief we moved out and John Lennon moved in. He was only there two days before he got busted — the police had come to do Hendrix, but they got him instead. He was furious.

Did much material get composed in the studio?

Very little. It was all generally rehearsed before we went in. "The Wind Cries Mary" was an exception —



POST-JIMI: Chas Chandler today.

Mitch and Noel had never heard the song before, but it was completed along with three guitar overdubs in twenty minutes. The *Are You Experienced* album was done in six days and *Axis Bold As Love* in ten. We'd generally go into the studio at about eleven in the morning and finish up around ten at night.

We had to spend an extra day on *Axis Bold As Love* because Jimi

lost one side of the master. We'd brought the masters back to the flat and he'd taken them over to play for someone, but he left side one in a cab. The next night we had to go in and remix the whole first side again. The only problem we had was with "If 6 Was 9," we just couldn't get the same feel back into it, whatever we did it seemed totally dead. Noel said that he had a 7-1/2 ips copy of it at home and went off and got it. The tape he brought back was in a terrible state, we practically had to iron it to get it to play, but we ended up copying it and that's what we put on the record. It still amazes me how good it sounds.

Did the band get very involved with mixing?

Everyone helped out — Noel and

Photo by Patrick Stapley

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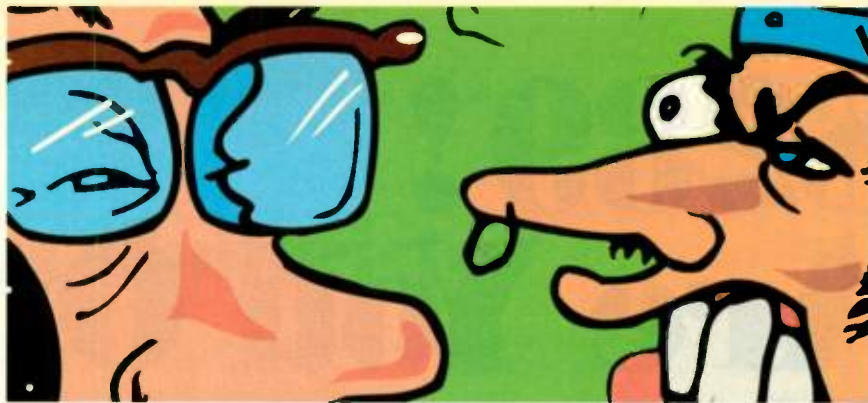
of experimentation to wreck a sound rather than just wrecking it right off the bat. Favorite quote: "Don't worry, we'll fix it in the shrink wrap."

Maestro: This engineer doesn't believe you might actually be able to create your own sound, so wants the band to sound like his/her production, instead of the production sounding like the band. Fave quote: "Whadayuh pluggin' in there?! We'll add that after."

Road Kill: This engineer has mixed live sound for the past 10 years, and can't hear anything over 8 kHz. Favorite quote: "What?"

Mr. Thin: This engineer refuses to believe that such a thing as phase cancellation exists with guitar cabinets. Can't understand why the guitar sound is so thin and lifeless. Fave quote: "Yeah, you're right, it does sound a little fatter at the amp."

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Telepathic Soul: Kind of short on social skills. Biggest danger is that this engineer invariably fails to communicate clear punch-in and punch-out points.

Mr./Ms. Think: Like our Clueless friend mentioned earlier, can't keep the tracks straight and "loses" your best take.

The Tunnel: Would never conceive of taking a suggestion or idea from a guitarist as to mic placement, use of outboard gear or anything that alters what's been done in the past. Favorite quote: "This is how I always mic an amp."

El Cool Dude: The big-buck engineer the band chipped in for is constantly on the phone lining up the next project.

Journey To Forever: You came in for overdubs and the engineer takes hours to get the mics and the cue mix together.

HEY, IT'S JUST A JOKE

Q: What do guitarists and recording engineers use for birth control?

A: Their personalities.



Bennet Spielvogel, AKA, The East Side Flash, owns Flashpoint Recording Studio in Austin, TX. He has been known to frequent both sides of the glass.

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Acoustic Guitar Miking Techniques

How to best capture the natural sounds of an unplugged six string

BY EDWARD GERHARD

The guitar that I played on *Luna* was built by Ervin Somogyi (Berkeley, CA), and it is a very unusual-sounding guitar. I think that's one of the things that contributes to the different sound of *Luna*. A lot of guitar records you hear are very crisp, crystalline, and bright. This guitar has some of those characteristics but it also is very round and thick-sounding, almost like a nylon-string guitar. And

that is the texture that I wanted to capture on these records.

I recorded the pieces for *Luna* in a couple of different rooms. One room was fairly large with a high ceiling. The other is a relatively small, rectangular shaped room — basically an extra bedroom in my apartment. Both rooms were rather dead acoustically and that, along with close-miking, helped to keep the guitar sound consistent.

Ninety-nine percent of the basic guitar tracks were recorded with a pair of Neumann KM 140 cardioid condenser microphones through a Mackie MS1202 mixer. This was before I got my Alesis ADAT, so I just used the Mackie mic pres and recorded the guitar in stereo straight to a Panasonic SV-3700 DAT machine. On a couple of songs those stereo guitar tracks were bounced over to an ADAT so that we could add overdubs. While a lot of songs on the CD were just solo guitar, there was some overdubbing. On a few tunes I played a second guitar and on other tunes there were trumpet, upright bass, or drum overdubs. For those purposes we transferred straight into an ADAT using the analog input and I didn't feel like there was any loss in the transfer. If I had heard any problems or differences in the audio I would have tried something different. I tried to be as meticulous as I possibly could where the audio was concerned — I listened very carefully to the transfers and they didn't pick up any noise and I didn't hear any generation loss.

MIC PLACEMENT

I used two Neumann KM 140's to mic the instrument and I placed the first mic on the neck at about the 18th fret. Sometimes it was pointing straight in at the neck and sometimes I would angle it a few degrees. If I was getting a lot of string noise I would face it slightly away from the neck and point it more towards the sound hole. Or if I could hear myself breathing, I would



Photo by Ralph Morang

Great recordings start at the source — any experienced engineer knows that. If you take a fine instrument and put it in the hands of a competent musician you are more than half way to a great sound. Just ask Edward Gerhard, whose acoustic guitar sound on his third CD *Luna* has gotten rave reviews. Acting as artist, producer and engineer while recording *Luna* (as well as his previous release *Christmas* and his soon-to-be-released *Counting The Ways*) Gerhard has honed in on a wonderful technique for recording his guitar.

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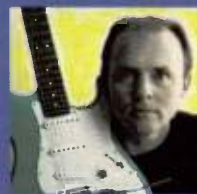
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angle the mic down a little bit towards the guitar. But it was pretty much on-axis and no more than six inches away from the neck. The second microphone was in a sweet spot just behind the bridge, pointing basically straight in at the soundboard, and, occasionally, I would move it slightly off-axis.

I wanted a really big guitar sound, but I have heard many guitar records that have an almost exaggerated degree of intimacy to them, which I didn't want. I wanted to go for the "cinemat-

ic" approach to the guitar sound where it would be filling the entire frame but it wouldn't be in your face. Each of these mics was recorded to a separate track (panned hard left and hard right) and they stayed panned in exactly the same position through the mixdown.

The microphone near the bridge area was also about six inches away, and I think it's important to keep the mics pretty close to the same distance away from the guitar. Otherwise, you will start having phase problems

because the amplitude in different areas of the guitar is going to be different. I listened really closely for phase cancellation and if there were any problems with phase, they were very minor. My way of thinking is that unless the sound is totally collapsing in mono — for an acoustic guitar record — you are generally pretty safe. Acoustic guitar records are not getting played on hit radio stations so you don't have to worry that much about what it will sound like on somebody's clock radio. I would sacrifice a little bit of phase coherence for a killer tone.

A HINT OF EFFECTS

The only time I processed the guitar was during mixdown where I would add a touch of reverb. I used a bit of Lexicon PCM 70 on most of the tunes — sometimes for a little ambience, sometimes for a wetter reverb. On pieces like "Luna" and "Howl," I knew I'd be using a bit more reverb than on the other songs, so I increased the distance between the mics and guitar when I recorded them. To me, a tightly miked acoustic guitar swimming in a big spacious reverb is an audio oxymoron. The presence is fighting with all the space you're trying to create with the reverb. Back off from the mics a little (even two inches can make a big difference) and the reverb sounds more real.

During the mastering stage we did not normalize or compress, although there were a couple of peaks I cut back so that the overall level of audio on the master tape could be raised. There was one brief bass note on "Red Mountain Serenade" that we trimmed with a little EQ. The guitar got a little bit thumpy during one particular passage so basically we punched the EQ button in, knocked the note back a couple of dBs, and then punched the EQ out for the rest of the song. Except for that one note there was absolutely no EQ and no compression. The sound of the Neumanns through the Mackie mic pres was exactly what I wanted.

NEW WAYS

My new CD will be called *Counting The Ways* (an album of all love songs) and I'm recording the guitar with a slightly different mic setup. I am using the KM 140's again, but I have added a Neumann TLM 193. One of the KM 140's is pointing straight towards the neck at around the 18th fret, but closer to the treble side of the fingerboard. The other KM 140 is raised up above the

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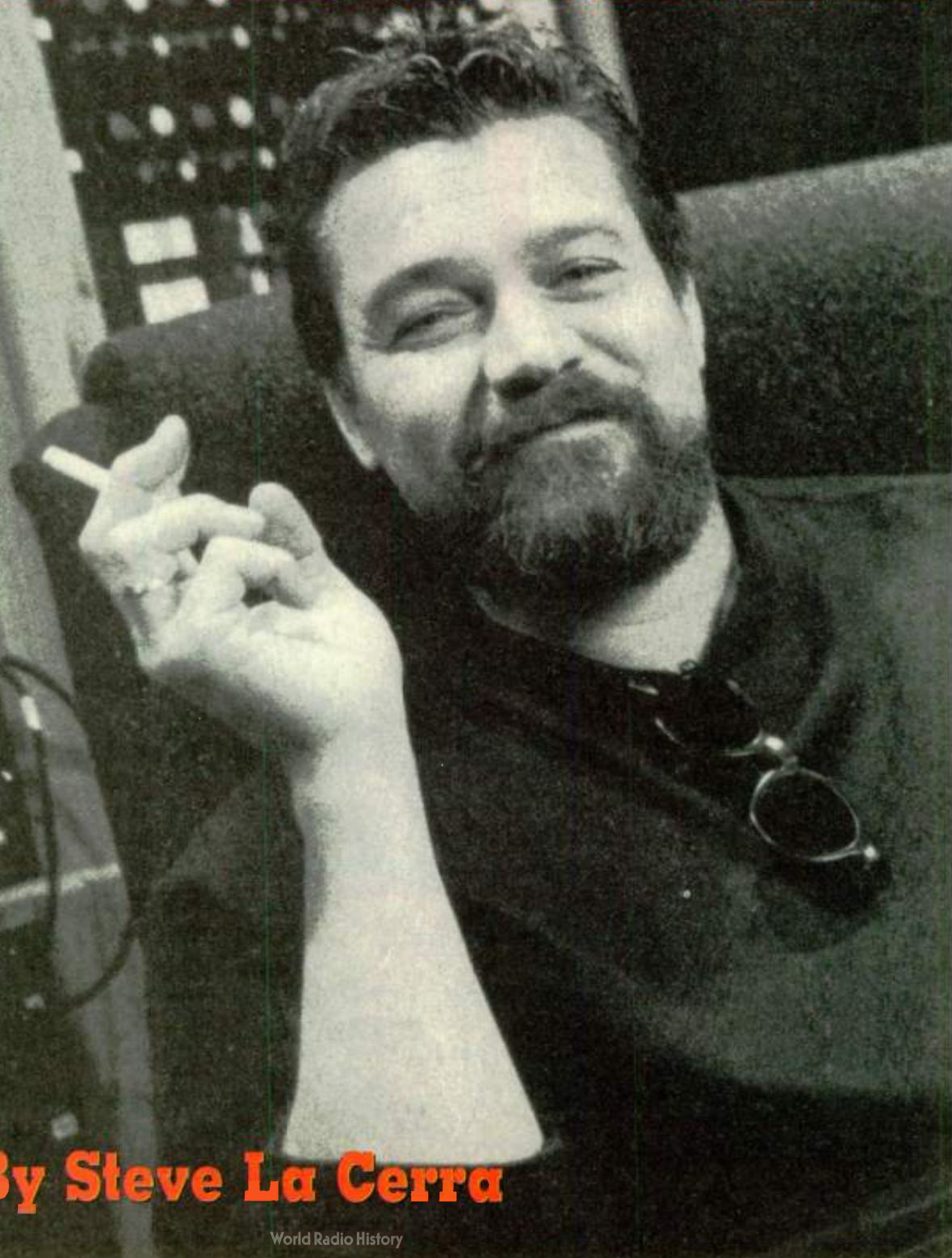
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A QUEST OF BALANCE

Edward Van Halen, the master of
of Van Halen's tenth album and the

OF BALANCE



By Steve La Cerra

fretboard magic, discusses the recording part his project studio played in it

NCE

Q: How did the songs for *Balance* come about? Did you write them while recording or during preproduction?

Edward Van Halen: I guess it really started when our manager passed away from cancer in October of 1993. My brother and I were so shocked that we gravitated to something we know, which is making music in the studio. And since I have my project studio, Alex and I just locked ourselves up and lost ourselves in making music. I let a cassette roll as I was writing. At the time we were also looking for a producer and we met with a few guys like Mike Klink, Bob Rock, and Andy Johns. Then we met with Bruce Fairbairn and he was a great guy. He walked in and said, "Play me some stuff." We had about 20 songs in rough form — some completed, some basic ideas on cassette, and some we just played live for him. Bruce asked when we wanted to start and we said, "Whenever you want to." So he went home to tie up some things — I think he was just finishing mixing a project. We started around June 1st. Out of the 20 songs, we cut about 16, 11 went on the record, and we have four or five left over. We always do that.

A QUESTION OF BALANCE

Were those extra songs actually finished?

Everything except for the lyrics. When I get on a roll or focus on writing I come up with a ton of music. I don't write the lyrics — Sammy [Hagar] writes the lyrics. He actually said, "Hey Ed — slow down. I can't keep up." So we have some completed tracks without vocals on them.

"Baluchitherium" was one of the ones that wasn't completely finished lyrically, and we decided to just leave it off.

That's how it ended up being an instrumental. It wasn't intentionally written as an instrumental. Bruce said, "Let's see how it sounds without anything." And we all thought it held up pretty well so we said, "What the f---?"

What about that drum machine in there?

That was actually a little ditty that I had written years ago, and it was a kind of cool way to end, so we just tagged it onto the end of "Baluchitherium." It was a really old Roland drum machine.

Do you find that you eventually go back to the music you have finished musically but not lyrically?

A lot of times we do, but generally we get more excited about the new stuff every time out. On every record there is something [older]. Like on the previous album, *For Unlawful Carnal Knowledge*, "Right Now" — I had written it years ago and no one really seemed to be too interested. There is a time and place for everything. Sometimes I'm into something that the other guys don't really care for at the time. I'll play it again for them a couple of years later and they'll go, "Wow, what's that?" And I'll say, "That's the same thing I played you five years ago," and now they'll think it's really cool. So sometimes we're not all in tune at the same time on the same type of music. But eventually everything surfaces. Every record we make is about 80 percent brand-spanking new material written for that record and sometimes we'll have something old laying around and we'll try it.

Do you record the rhythm tracks live?

Oh yeah; Mike, Alex, and I play everything live, and a lot of times, Sammy

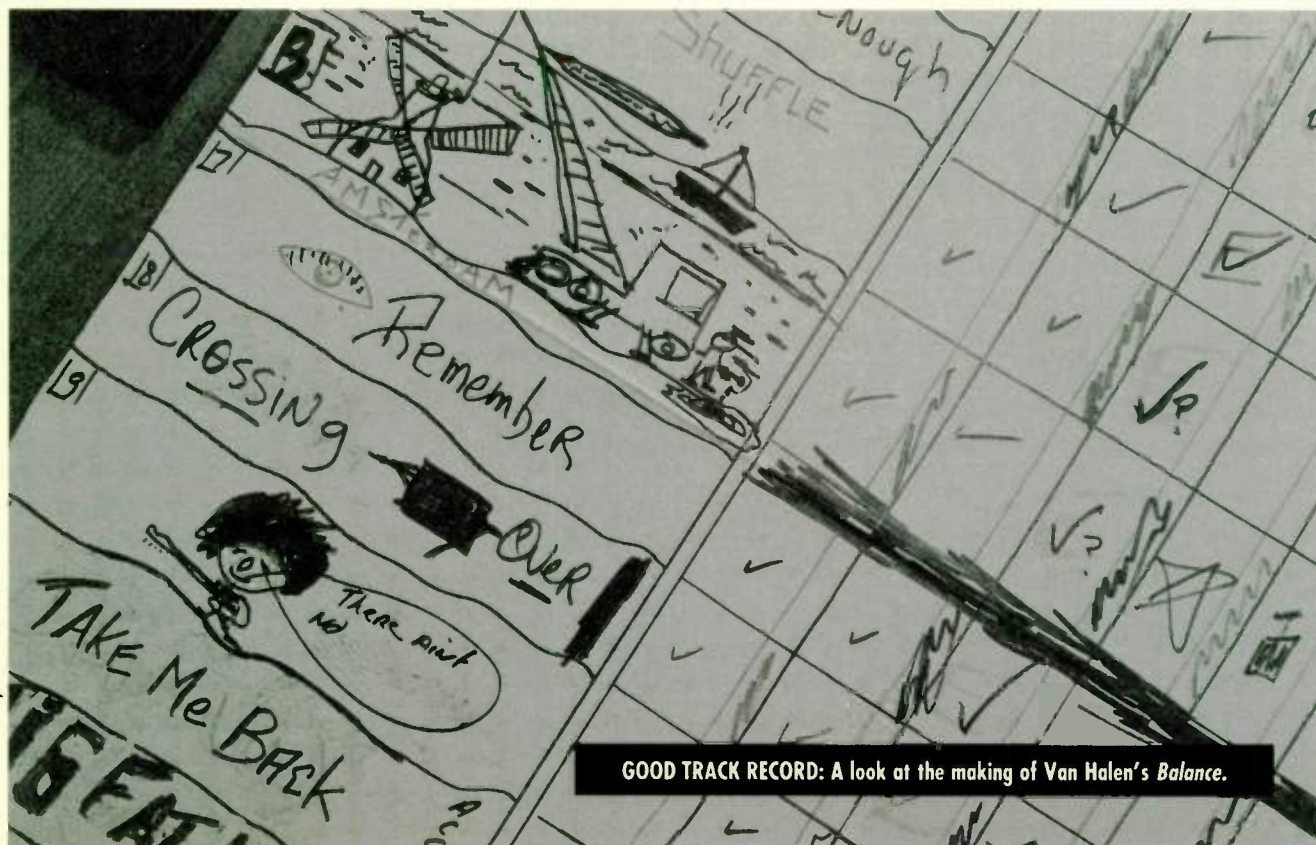
will scat along. Most of the time when we are tracking, Sammy is not done with the lyrics yet. But on songs like "Don't Tell Me" I'll play the solo on the rhythm track, and then if it needs any overdubs, I'll do a rhythm part underneath it later. That's the way we have always done it. I have walked in on some other band's sessions and they're overdubbing a kick drum or they start out with the drum track alone, then overdub guitar and then bass and I say, "Don't you guys ever play together?" And they say, "No — you guys do?" Well isn't that what a band is supposed to do? And that is why our music breathes.

And I'll assume that you don't have a click track going either.

No. It's really funny, because with "Big Fat Money" that was the running joke throughout the album. I guess a lot of bands that Bruce works with use a click, and so Bruce asked Al, "Do you want a click on this one?" Al said, "I don't need a stinking click!"

So the band is just going for it.

Well, yeah. Our stuff isn't perfect but that is how you lose the energy and the



GOOD TRACK RECORD: A look at the making of Van Halen's *Balance*.

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A QUESTION OF BALANCE

feel of it — by making it so sterile that it's perfect. I don't think that is what music is all about. What we try to do is to capture a moment and a magic. At the end of the day, if we feel like we have done that and there's a mistake in it or it speeds up or slows down a little, who cares as long as it moves you.

Since you do have 5150 [the name of Edward's project studio], if you are having a bad day on a particular song, do you come back to it the next day?

We never do more than two or three takes of a song. If we don't capture it, we move on to something else and then come back to try and nail that one the next day or whenever. A couple of times, I remember Alex and I saying, "We can do that one better," and Bruce would say, "Leave it — it's

fine." It is all about your emotions and what you are feeling at the time. If we went into the studio right this moment and re-recorded the album, every song would end up sounding different. That's the beauty of performing live. It's why playing songs off the first record on stage is exciting — because every time we play them they're a bit different. It's really not just all about the notes. It's about the feeling behind the notes and what's coming from the heart.

On "Can't Stop Loving You," what is happening with the guitar sound. It seems like there are a lot of layers.

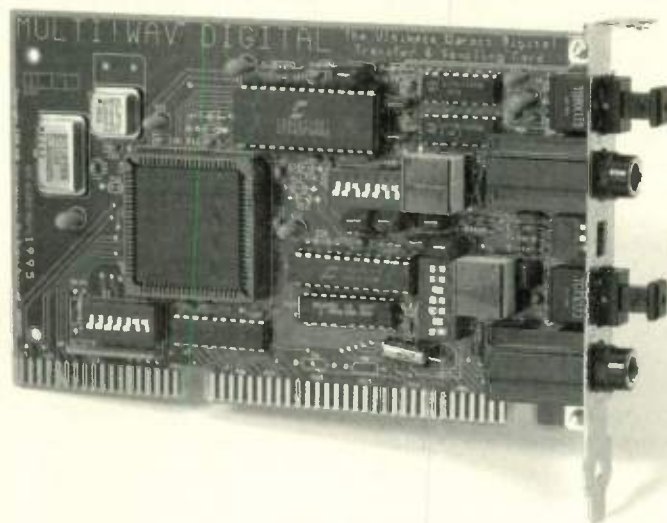
It's one guitar with two sounds. The guitar has a piezo pickup in the bridge and it also has the regular humbucking guitar pickup. So it's an acoustic pickup and an electric guitar sound coming from the same guitar.

What's the story with "Strung Out?"



SMOKIN' ZONE: Eddie sits in the control room of 5150.

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► LC Filtered Analog Supply	Improve receiver PLL performance by reducing noise.	YES	No
► Multi-Layer PCB	Improve performance by reducing "digital" noise.	YES	No
► 24mA Bus Drivers	Meet all IBM PC Bus requirements.	YES	No
► 64 Selectable Addresses	Eliminate hardware installation conflicts.	64	Just 2
► Professional Sample Rates	48kHz, 44.1kHz, 32kHz (software selectable)	YES	Yes
► Life-Time Warranty	Protection against manufacturing defects.	LIFE-TIME	1 Year

* Comparison performed May 1995 using Multi!Wav Digital PRO (rev A) from AdB International and Digital Only CardD (s/n 00009159 rev B) from Digital Audio Labs. Multi!Wav Digital PRO requires one 16-bit ISA bus slot; a computer that meets the hardware requirements specified by your Windows WAV editing software; and digital I/O cables. AdB and Multi!Wav are trademarks of AdB International. All other trademarks are the property of their respective owners. Made in USA.

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Back in 1983, Valerie and I had rented Marvin Hamlisch's beach house for the summer. We wanted to see if we might actually buy a place out in Malibu, so we thought we'd rent one to see if we even liked it out there. Marvin had this beautiful white Yamaha grand piano there. I used to drink a lot, and I got pretty wasted and started dismantling his piano with forks and knives and plucking on the strings. I bounced ping pong balls off the strings and used D-cell batteries to play slide and I recorded about six hours of cassettes. I put a bunch of cigarette burns in the piano. I basically had to restring and repaint the piano before we left. I don't think he ever knew that anything had happened because I pretty much put everything back together. But if he ever reads any of these interviews he'll know.

So that was recorded at his place. Yes. When I had written "Not Enough,"

Bruce asked me if I had any weird stuff that I could use for an intro. I asked him, "Well, how weird are you talking about?" And he said, "Well, I don't know, what have you got?" So I handed him six cassettes and he picked 60 seconds from one of the cassettes and that became the intro to "Not Enough."

Do you normally record the piano tracks at 5150?

I have two houses up here: one right

by the studio and our main house, which is away from the studio. When we built the house, I ran cables underground to the studio so I can record in any room of my main house. I was wearing headphones, playing piano in the living room of my main house while Al and Mike were up here in the studio. We played it live.

So you obviously had the foresight to have all the tie lines run.

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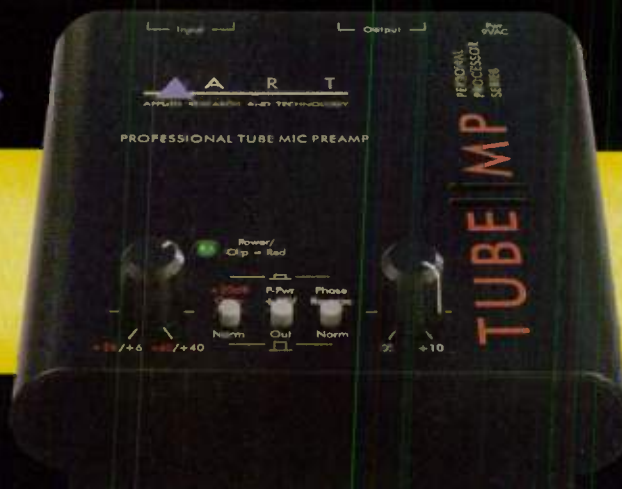
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A QUESTION OF BALANCE

Yes, and I have a racquetball court in my house that we use for echo.

And you had ties run to the racquetball court as well?

Yes. We use a combination of the real room and digital reverb depending on the music. We can't change the racquetball court — it is what it is. So if we want a shorter decay time, we use a digital unit. But we use the court for mixing and it's pretty cool. We have a couple of speakers and mics in there. Of course, it drove Valerie crazy cause we'd be working late at night and she'd be going, "Turn that crap down," and I'd say, "Honey we're almost done — only another week." "Another week?"

Do you have any preference for the mic you use on your cabinets?

I use Shure SM57's in the studio. Live I use the Groove Tubes MD-1 to get a slightly warmer tone, but live I use a different set up. In the studio I just use one cabinet and add the effects afterwards. I use two 57's, one directly off of center and the other angled in from the side. I pan those to the left. And to get the signal to the right side of the stereo spectrum I use a Harmonizer and then add a little delay to both sides. But it's just one signal coming from one speaker cabinet, whereas live I use a dry cabinet in the middle and two effect cabinets on the outside, to kind of duplicate the record.

Did you print the guitar tracks dry and then add the effects while mixing?

We always print the dry signal and the Harmonizer. The delay is added in the mix, but I do hear it in the studio off the monitor.

In "Baluchitherium" is there a synth doubling the bass part?

I overdubbed a Danelectro six-string bass, doubling Mike's bass and scrapping the strings like I do in the beginning of "Don't Tell Me."

We started talking about Bruce Fairbairn before. What did he add to the project?

I prefer to work with a producer because they tend to have you look at your own music from a different per-

spective. Bruce is a very musical guy, and for some songs he would just say, "Great," and for other songs he would have arrangement suggestions. We would try them, and if they worked better, we would go that way. If not, then we always had the way we originally started.

If you ask Bruce what he did, he'll say, "Well I watched Eddie plug in, I watched Al grab his sticks, and I had fun watching them play." But being a producer is everything from being a babysitter to being an amateur psychologist to you-name-it. I think a lot of times that if Sammy was going somewhere lyrically that the rest of us didn't like, we would go through Bruce to make suggestions to Sammy. A lot of times if I would say it to Sammy he'd say, "Hey I don't tell you what to play!" So Bruce was kind of a mediator.

I guess the main thing that he brought was organization, because if we were left on our own, I'd want to work on one thing on one particular day and Alex and Sammy will want to work something else. Bruce would say, "No, this is what we're doing today guys." He'd have it all mapped out and say we're doing these overdubs today and the backgrounds tomorrow. He wouldn't let us get away with, "I don't want to do this today." So it was one of the fastest recordings we have ever done — it took us four months for writing, recording, and mixing — and it's because Bruce is very organized.

I like someone who lets me express my own ideas and get everything out that I want to before they make changes or suggestions. Bruce is very good about that. There are some producers — I won't name any names — who want to feel like they have contributed somehow, and before I have said what I want to say with my music they are already tearing it apart and saying, "Why don't you do this or try that?" And I haven't finished my thought. I think the producer's job is to get the best out of the artist. To me, if the band doesn't have it together on their own yet, then what's the point?

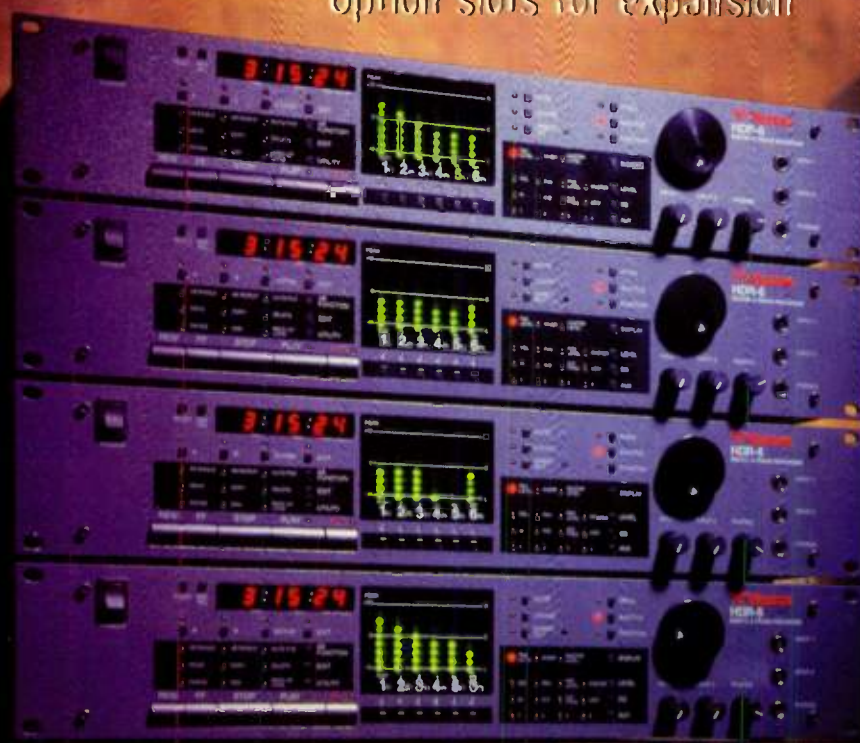
Bruce actually made me very nervous in the beginning. I was in the process of trying to stop drinking, and drinking has always been an easy way out for me. I got nervous a few times and he is such a great guy that he could tell and would just leave the room to let me be on my own. It was a great working relationship because he is very sen-



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sitive to the artist. If there were any guitar overdubs to be done, I did them on my own at night after everybody had left. All of the recording was done here except for a couple of the vocals which were done at Bryan Adams's house in Vancouver. Bruce lives up there and we told him we wouldn't mind going there so he could spend some time with his family instead of being down here every week. I think we did three lead vocals up there and the rest of the recording was done at 5150.

We mixed at Record Plant.

Why mix at the Record Plant?

That is where (remix engineer) Mike Fraser was comfortable. If Erwin [Muser, tracking engineer] would have mixed it, he probably would have done it here because he is familiar with my studio. Mike Fraser didn't do any of the recording, so he wasn't familiar at all with my studio. He said he would rather mix it where he was comfortable. The beauty of my studio is that basically everything you get out of here is true to what you are hearing, so you can take it anywhere and it sounds the same.

How involved were you in the mixing of *Balance*?

Mike Fraser and Bruce were mixing it down at Record Plant, and Al and I would go down and listen to what they were doing. On the very first day I think they had mixed "The Seventh Seal" and "Don't Tell Me," and it sounded completely different than it did up here. I said, "What the hell did you guys do?" They added a bunch of effects that just totally got away from the basic sound and I said, "Turn that — off." To me the more raw, the better. I always wondered why, if I take a rough mix it sounds great, but after it's mixed the punch and the power is gone. The more effects you add the more you cover things. So we took all the effects off the drums. There are no effects at all. That is the way Al's kit sounds in the room.

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machines. We ended up only using one because we recorded real basic for this album.

Have you used two machines on past projects?

We did on a couple of songs for the previous record and I think we went a little bit overboard. I hate locking up two machines and making slaves because there are always problems.

What was the deciding factor for you to get your own studio?

I don't want to get into negative stuff, but it stemmed from a lot of aggravation with Ted Templeman and Dave [Lee Roth] at the time. They were so into redoing old hits, and our album *Diver Down* was the last straw for me. It was half cover tunes and I was sick of that. I'd already written "Jump" at the time and these guys wanted nothing to do with it. So I thought, "F--- you. I'll build my own studio and the next record is going my way [laughs]." My own philosophy is that I'd rather bomb with my own music than make it with someone else's. Then all of a sudden "Jump" became a number one hit and the biggest record we've ever had. Then Roth quit because he didn't dig the fact that I was taking control, I guess. But that is why I built the studio—to do things my way.

How has it helped the band?

In every aspect. We have a place where everybody is comfortable. Even Bruce loves this place. He just got done producing Chicago and asked if he could use the studio for some of their overdubs. So I said, "Sure, knock yourself out." The place is open to my friends for free so go ahead and use it. I don't charge them any money because I'm not allowed to. They would close me down if I take the business away from anyone else.

For you what makes a great record?

Vibe. As long as it feels real and at the end of the day when we listen back it kicks our ass and we're excited about it. The most we can hope is that it moves somebody else and we really don't let anything out that doesn't move us. We stay true to ourselves and make music that we enjoy making. We've never followed any trends, and that's what I plan on doing until I don't feel like doing it anymore. And I don't see that coming in the near future.

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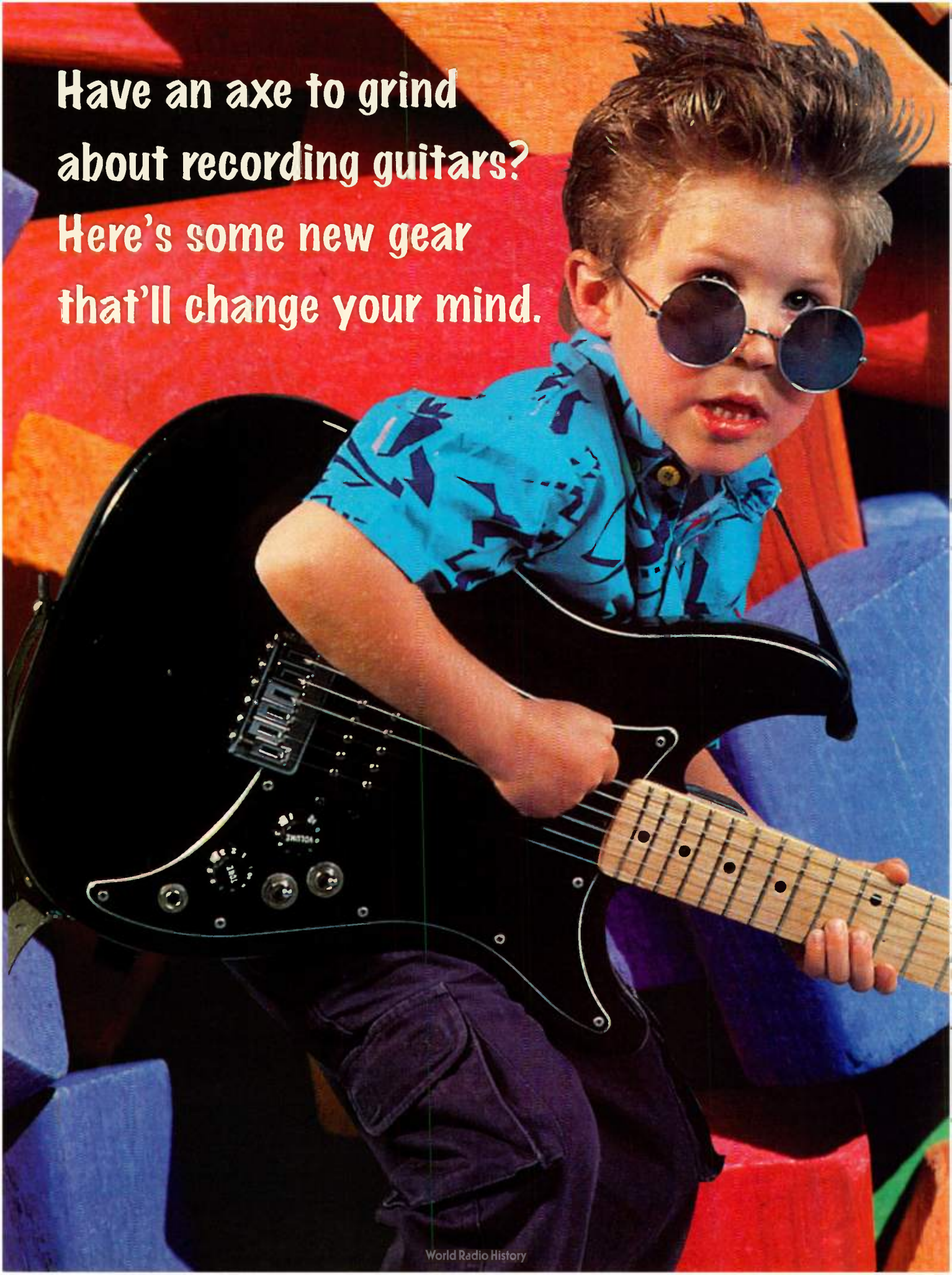


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But another unique feature in the M2000 is the *Dynamic Morphing™*. By applying this function, you will be able to apply, say, Chorus to a vocal at low volume levels, while the effect is being morphed into Flanging at high levels. Or any other combination of your liking. This will give the signal a totally new dynamic dimension.

The powerful true dual engine configuration means that you can run two full-blown effects simultaneously, i.e., on two individual effects sends. There is 250 factory presets, and another 250 of your own settings can be stored in the unit. You will find that creating new presets is a breeze.

The effects have been developed for optimal sonic quality, with no compromises made. This has only been possible because our engineers succeeded in combining the latest technology with TC's powerful DARC™ chip.

#1 IN DIGITAL

As the only signal processor in its category, the M2000 is fully prepared for the digital age. Not only does it have the digital I/O connectors S/PDIF and the professional format AES/EBU, it also has dithering. Dithering ensures that the dynamic range in your M2000 is kept when you digitally connect it to a device with a lower bit resolution, such as a 16 bit DAT. Proper dithering guarantees a clean, undistorted signal even at extremely low volume levels.



COMES WITH A FREE EXPERT

The M2000 comes with a free expert: You! Naturally, a manual is included with the unit; however, you will not be referring to it much.

Great care has been taken to create the ultimate user interface. With the Recall Wizard you can instantly find the preset that suits your need in

any situation. You simply enter your preferences, such as 'gentle reverb for vocal' or 'extra pitch for guitar', and the Wizard serves you a short list of presets ready to compare and use.

The single-layer interface ensures that all parameters are always only one menu-level away. No more paging through endless menu-levels. And much, much more...



THE SOUND, THE SOUND

As you can see from the back of this brochure, the M2000 has impressive technical specifications.

However, numbers don't tell the whole story. What really matters is how your final mix sounds. This is where TC's long experience in high-end studio signal processing (with industry standards like the TC2290 and the M5000) becomes important. Our feel and experience have been fully utilized to your benefit in the M2000.

You deserve the sensation of the M2000.

Call 1 800 798-4546 for information about your nearest Authorized TC Dealer.



TECHNICAL SPECIFICATIONS

Analog Input

Connectors: XLR balanced (pin 2 hot)
 Impedance: 15 KOhm
 Max. Input Level: +22 dBu
 Sensitivity: @ 12 dB headroom: -22dBu - 10 dBu
 A to D Conversion: 20 bit (4 bit, 64 times oversampling)
 Dynamic Range: >105 dB
 THD: 0.003% @ 1 KHz, +10dB
 Frequency Response: 10 Hz - 20 KHz: +0, - 0.2 dB
 Crosstalk: -60 dB max, 10 Hz - 20 KHz

Analog Output

Connectors: XLR balanced (pin 2 hot)
 Impedance: 100 Ohm (active transformer)
 Max Output Level: +22 dBu
 Output Gain Range: 0 to -32 dB
 D to A Conversion: 20 bit (4 bit 64 times oversampling)
 Dynamic Range: >96 dB
 THD: 0.003% @ 1 KHz, +10 dB
 Frequency Response: 10 Hz - 20 KHz: +0, - 0.2 dB
 Crosstalk: -60 dB max, 10 Hz - 20 KHz

Digital Inputs and Outputs

AES/EBU In/Out: XLR
 S/PDIF In/Out: Coaxial, RCA Type
 Formats: EIAJ CP-340, IEC 958, S/PDIF (20 bit)
 AES/EBU (24 bit)
 Sample Rates: 32 KHz, 44.1 KHz, 48 KHz

PCMCIA Interface

Connector: PCMCIA Type 1 cards
 Standards: PCMCIA 2.0, JEIDA 4.0
 Card Format: Supports up to 2 MB SRAM

Control Interface

MIDI: In/Out/Thru: 5 Pin DIN
 Pedal: 1/4 inch phone jack

General

Finish: Black anodized aluminum face plate
 Painted and plated steel chassis
 Dimensions: 19" x 1.75" x 8.2"
 Weight: 5.2 lbs (2.35 kgs)
 AC Power: 90 - 240 VAC without switch settings
 3 Pin IEC power connector

Radio Frequency Immunity/Interference

RFI/ESD: Conforms to FCC Class B,
 EN55022 Class B (CE), IEC 801-2, IEC 801-3

Environment

Operating Temperature: 32 °F to 122 °F (0 °C to 50 °C)
 Storage Temperature: -22 °F 167 °F (-30 °C to 70 °C)
 Humidity: Max. 95% non-condensing

Note: All specifications are subject to change without notice

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you and TC

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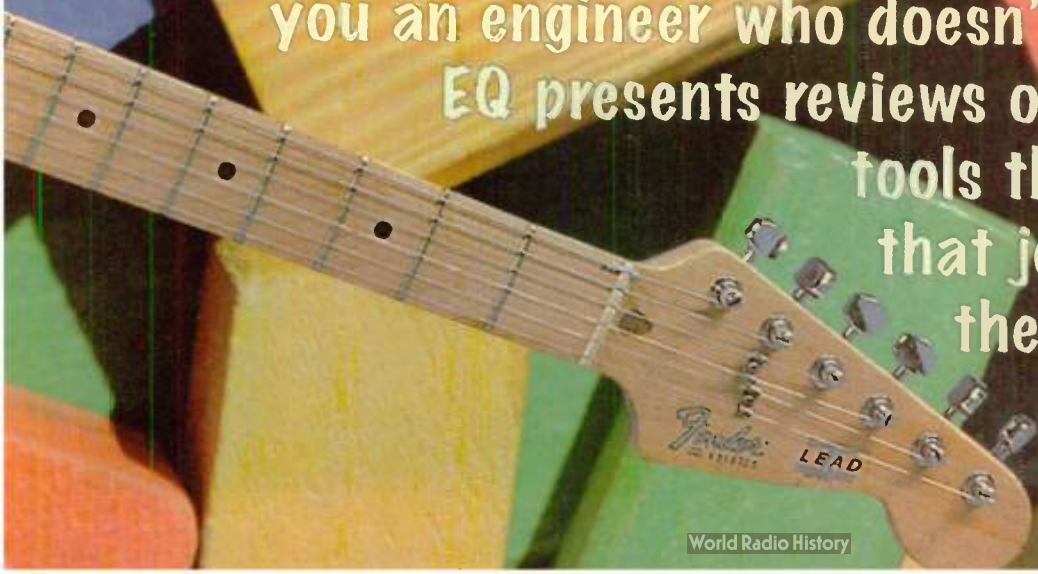


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GUITAR TOYS

Show us an engineer who doesn't have to worry about guitars and we'll show you an engineer who doesn't work much. EQ presents reviews of several new tools that will make that job easier and the guitar sound better.



Avalon U5 Direct Box



MANUFACTURER: Avalon Design, PO Box 5976, San Clemente, CA 92673. Tel: 714 492-2000.

APPLICATION: Interfaces low-level signals and amp outputs to consoles and recording devices.

SUMMARY: It's expensive, but it's really clean. The U5 is the top-of-the-line way to get a real-world analog signal into quality digital or analog recording systems.

STRENGTHS: Class A amplification; solidly built; "bonus" tone-shaping options; exemplary specs.

WEAKNESSES: Inflexible EQ; lacks dedicated 1/4-inch output on rear panel; no on-off switch.

PRICE: \$679

EQ FREE LIT. #: 122

A DIRECT BOX is, as they say, a good thing. It can match an instrument with a weak output, such as guitar or bass, directly to a console or mixer by providing proper level and impedance matching. But a direct box for \$679? I was pretty skeptical, and expected to see gold-plated knobs or something on its 2U, half-rack chassis.

After opening up the package, though, I must admit I was pretty impressed. This unit isn't for everyone, but it justifies its price tag in several different ways.

SPEC-O-RAMA

The first thing I look for is a high-impedance input (at least 1 Meg) for minimum loading of guitars with non-active pickups; the U5's input Z is 3 Megs. Next thing I look for is pin 2 hot on XLR connectors (the U5 has two XLR outs, one mic and one line). I figure if a company doesn't know there's a standard for XLR connectors, what else don't they know? Well, pin 2 is hot. There's also extended frequency response (5 Hz to 100 kHz, down 3 dB at 500 kHz), very good noise figures (quoted as -98 dBu line out, -104 dB mic out, unweighted), and +28 dBu of output juice.

Okay, so the specs are real good. But what justifies the extra bucks are the extras. Some of these are subtle, like in/out switches that glow orange when "in," DC-coupled outputs and discrete (not IC) Class A circuitry. (This is the most distortion-free amplifier class, although also the most current hungry—which is why it's used for preamp and small power

amps, but not large power amps. This also explains the massive transformer and ventilation slots in the box.) Some of the goodies are much more obvious, such as...

THE GOODIES

If you're trying to get a direct sound from an amp, a front-panel switch selects between the front-panel, instrument-level input jack and a rear-panel, 1/4-inch phone input that accepts speaker inputs up to 400 watts.

Gain is variable from +2 dB to +32 dB in 3 dB steps. The stepped feature is helpful for repeatability.

At first I was concerned that you can't interface the U5 with non-XLR devices, but a front-panel, 1/4-inch thru jack can switch between either paralleling the input jack, or providing an amplified and tone shaped output capable of feeding unbalanced, "project studio"-type devices.

Speaking of tone shaping, in addition to a high-cut "hiss killer" switch, there are six preset tone curves using passive circuitry (like the tone controls on classic guitar amps). Passive circuitry generally gives kinder, gentler curves than active filters since there's no gain available to sharpen up the response. This kind of filter technology has a reputation for musicality, whether you're talking Pultec or Fender Twin; if you like those kind of gentle EQ effects, you'll love having them built into a box. The tone circuitry can be switched out of circuit if desired.

The manual shows the six curves, as well as suggested instruments that work well with the included curves (e.g., curve 2, which has a fairly steep notch at 1 kHz, is recommended for bass). I agree with most of what they think is appropriate tone-shaping (I often roll off the low end of acoustic guitar, which is one of the available curves). I'm real picky about EQ, and the U5 has very natural-sounding, albeit not very versatile, EQ.

I'm surprised, however, that there's no typical guitar speaker cabinet curve. I think this would help guitarists feel more at home when going direct if they don't want a crystal-clear high end. Also, there is no ultra-sharp notch filter for 50/60 Hz hum, but that's to be expected given the passive circuitry. Overall, the tone shaping does not replace a dedicated equalizer, but it provides some solid, unobtrusive voicings that may obviate the

continued on page 130



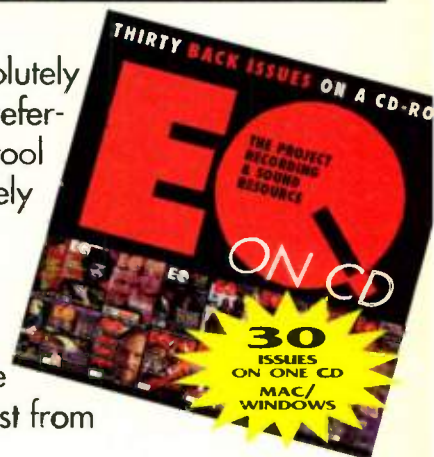
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ART MP1 Tube Mic Preamp



MANUFACTURER: Applied Research and Technology Inc., 215 Tremont Street, Rochester, NY 14608. Tel: 716-436-2720.

APPLICATION: Single-channel microphone and instrument preamplifier with tube-based circuitry.

SUMMARY: A tube microphone preamp and direct box affordable by even the most modest project studio.

STRENGTHS: Can be used to interface just about any audio signal to a tape machine; separate input gain control allows creative addition of distortion to audio signal; phase reverse switch.

WEAKNESSES: Wall-wart power supply; non-rack mount design adds to console clutter; no front-panel marking for 0 dB output level.

PRICE: \$149

EQ FREE LIT. #: 123

THE TUBE MP1 from Applied Research and Technology is a single-channel outboard microphone preamp in a compact chassis slightly bigger than a direct box. Similar in profile to ART's MR-1 reverb unit, the Tube MP is designed for table- or console-top operation. On the rear panel are jacks for a 9-volt AC "wall wart"

adapter and both 1/4-inch and XLR I/O connectors. While both outputs can be used simultaneously, ART does not recommend connecting more than one input at a time.

The front panel has rotary pot controls for input gain and output level and push-button switches for +20 dB input gain, phase reversal and

phantom power. There is no on/off switch, so the Tube MP remains powered as long as the AC adapter is connected. ART has provided a bicolor LED that indicates when power is on (green) and when the signal level at the output is 6 dB below clipping (red).

The input stage of the unit employs matched transistor pairs and a 12AX7 tube for amplification, and the gain of the Tube MP normally varies between +6 and +40 dB. When the input gain switch is depressed, that range is increased by 20 dB. At its maximum clockwise position, the output level control can provide an additional 10 dB of gain over that from the input stage, allowing for a maximum gain of 70 dB. I'd like to see a front-panel indication for 0 dB gain position of the output level control. This would make it easier to set the unit for minimum noise and maximum headroom.

Inside the Tube MP are three circuit boards arranged in a flattened U-shape. One of these holds all of the push-button controls, (sealed) pots, and a ceramic tube socket. This board is mounted perpendicular to the main circuit board and is secured to the front panel via nuts that thread onto the shafts of the pots. The main PC board (which holds almost all of the MP's circuitry) is neatly laid out and connects to the smaller boards via ribbon cables. Resistors are of the carbon-type and capacitors are electrolytics. The XLR and 1/4-inch input and output connectors are mounted onto the third board. I am generally not too crazy about PC-mounted connectors, but this circuit board is so small and lightweight that it is solidly held in place by the connectors. All semiconductors are clearly labeled including the TLO72 ICs for the output stage.

In the studio, the Tube MP made a great combination with a Neumann KM-84 condenser mic for recording acoustic guitar. The MP has a slight elevation in the lower midrange, which made the guitar sound really sweet without changing the character of the instrument. I have found that some consoles don't have enough gain



ART TUBE MP1 MIC PRE SPECS**Input connections:** XLR balanced, 1/4-inch TS unbalanced**Output connections:** XLR balanced, 1/4-inch TS unbalanced**Input impedance:** XLR: 2 k ohms; 1/4-inch: 840 kohms**Output impedance:** XLR: 600 ohms; 1/4-inch: 300 ohms**Max. input level:** XLR: +14 dBu; 1/4-inch: +22 dBu**Max. output level:** XLR: +28 dBu; 1/4-inch: +22 dBu**CMRR:** Greater than 75 dB typical**Frequency response:** 10 Hz–20 kHz (+0, -1 dB)**Dynamic range:** Greater than 100 dB (20 Hz–20 kHz)**Max. gain:** XLR to XLR, 70 dB**Equivalent input noise:** -129 dBu (A weighted), XLR in to XLR out; 105 dBu (A weighted), 1/4-inch to 1/4-inch**Power requirements:** 9 volts AC @ 700 mA**Dimensions (inches):** 5.0L x 5.5W x 2.0H**Weight:** 1.5 lbs

to get the 84's to line level without adding a lot of noise, but the MP could have given me another 10–15 dB of gain. When used with a Neumann U87 for vocals, the MP exhibited that same lower midrange characteristic, which helped fatten up a thin male vocal.

The MP's phase reverse switch is an important feature since many consoles in the project studio price range don't offer this feature, limiting the possibilities for multimiking of instruments. I noticed that the MP's phantom power ramps off very slowly, and it took about ten seconds for the U87 to actually shut down, so a bit of caution should be used when disconnecting phantom-powered microphones.

I also used the Tube MP as a direct box/preamp for bass, guitar, and electronic keyboards. Compared to a Countryman Type 85 FET direct box, the Tube MP was just as quiet. On bass, the Type 85 had a more aggressive top end and reproduced more of the pick sound. The MP definitely gave the bass a more "retro" tone with no hint of harshness and a slight coloration in the lower midrange that would be great for R&B sessions. This coloration was also evident on guitar and gave me the idea of using the MP as a front end for recording synths and samplers.

As a keyboard interface, the Tube MP was great at reproducing transients from bell and marimba-type sounds. It sounded faster and seemed to capture the attack more accurately than the console preamp. The only time that the MP's self-noise became noticeable was when we were (intentionally) overdriving the input stage with an electric guitar. Used in this fashion, the MP actually did a credible job of simulating an overdriven guitar amplifier. It gave the guitar a growl that reminded me of Pete Townshend's guitar sound from *The Who's Who's Next*.

ART has created a cool little tube

preamp that can be used in quite a variety of recording situations. And at

a list price of \$149, the MP can fit into any studio's budget. —Steve La Cerra

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GUITAR TOYS

Korg Pandora

PANDORA PX1 is a new type of "personal" processor — it looks like a garage door remote with an LCD, and fits comfortably in a shirt pocket. Yet it's actually a reasonably full-featured signal processor, headphone amp, metronome, and tuner. Connections include a 1/4-inch input jack for guitar, stereo mini-jack for line-level instruments (e.g., stereo tape deck for practicing), on/bypass/mute button, and stereo 1/4-inch headphone jack that doubles as a stereo line out. There's an AC adapter jack, or you can power the unit from two AA batteries for about 8–9 hours.

The Pandora's front panel is simple: two sets of Up/Down and one set of Left/Right cursor buttons, Enter button, Metronome button, Write button, and a nonbacklit LCD (if you need to see it in the dark, expose it to really bright light for a bit and the background will glow for a while). There's also an Off/Edit/Play switch on the side — which I found a little too easy to turn on accidentally.

There are 20 editable programs, each with a master output level parameter (there is no input control). Within those programs, you have parameters for:

- Drive stage (12 distortion options or compression)
- Tone (individually adjustable bass and treble)
- Modulation [one of the following, each of which has four options: chorus, flanging, vibrato, phasing, autowah, tremolo, and random (the last is a truly wild, bubbly sound)]. You



can also choose triangle- or square wave-based panning, or a fixed wah sound.

- Ambience (six single delays, six stereo echoes, room, hall, and eight pitch-shift options; however, if you use room, hall, or pitch shift, you can't use modulation).

- Cabinet simulator (four options)
- Noise reduction

Each option (except cabinet simulator) has one adjustable parameter. For example, this parameter sets the drive input amount for the drive stage, the threshold for noise reduction, the processed/dry balance for delay or reverb, rate for modulation, pitch shift interval for pitch shift, and so on.

Although your programming options are limited — I kept wanting to turn down the wah resonance (designed to emulate the Vox Wah) or change the mix on the pitch shift, yet these parameters aren't available — it's surprising how much variety you can add with a little tweaking. There

continued on page 130



MANUFACTURER: Korg, 89 Frost St., Westbury, NY 11590. Tel: 516-333-9100.

APPLICATIONS: Recording direct in the studio with processing, as well as private practicing and guitar tuning.

SUMMARY: Does more than you'd expect, but be ready to program it yourself to get the most out of it.

STRENGTHS: Inexpensive; easy to learn; compact; looks cool; more options, sonic flexibility, and programmability than you'd expect at this price.

WEAKNESSES: Factory presets don't show off unit's versatility; wah resonance is fixed at a very high value; tendency towards hiss with gobs of distortion.

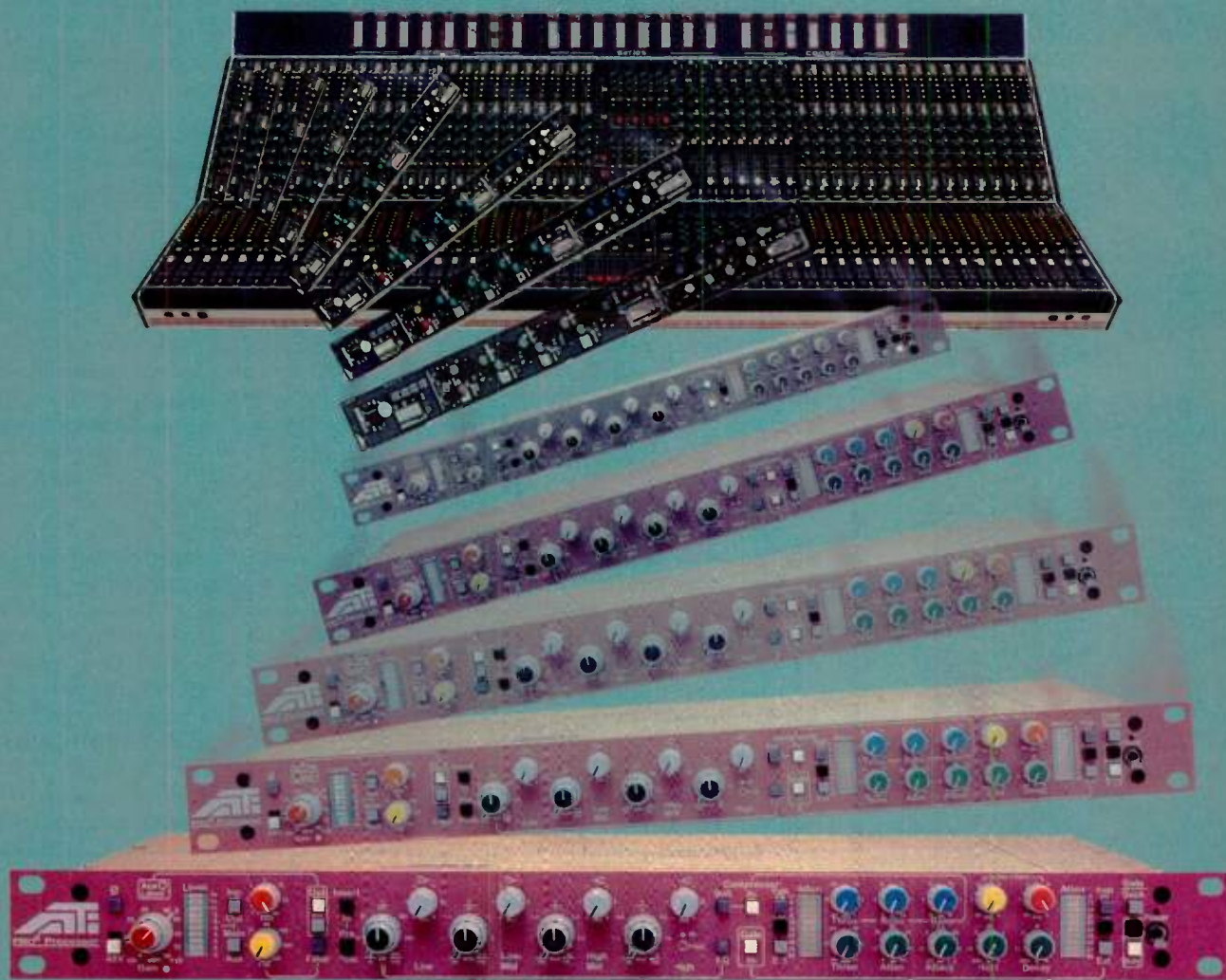
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H&K TubeMan



MANUFACTURER: Hughes & Kettner Inc., 1848 South Elmhurst Rd., Mt. Prospect, IL 60056. Tel: 800-452-6771.

APPLICATION: Guitar-specific direct box (unbalanced) and signal processor for the studio; signal processor/buffer for live use.

SUMMARY: Simple, uncomplicated, cost-effective way to get traditional tube sounds with minimal effort.

STRENGTHS: Smooth tonal quality; can obtain good "crunch" as well as full-blown distortion; funk, blues, and rock emulations very usable; gentle, but useable tone controls.

WEAKNESSES: No memory to store patches; difficult to replace tube; limited tonal variations.

PRICE: \$349

EQ FREE LIT. #: 125

THE H&K TubeMan is neither a bare-bones tube processor nor a do-all rack box, but falls somewhere in between the two. Designed as a floor box with accompanying wall-wart-type AC adapter, TubeMan has six knobs and two switches. A four-position rock/blues/funk/jazz knob provides general voicing; bass, mid, and treble controls provide postdistortion tone shaping, while a predistortion midrange boost switch alters the sound's "fatness."

There are two gain controls, one for preamp and one for master. The remaining switch is an active/bypass footswitch with status LED. The rear panel has an input jack and three output jacks (all 1/4-inch, unbalanced): to power amp, to guitar amp, and to mixer. You can use one or all, depending on your application. The power amp output is the brightest, while the guitar out has some high-frequency rolloff; the mixer connection incorporates Hughes & Kettner's Red Box cabinet simulator circuitry (which, essentially, rolls off some high frequencies and provides a mild midrange boost). Incidentally, tube purists will be happy to know that TubeMan puts a full 290 volts on the plate.

Speaking of sound, the Rock, Blues, and Funk voicings are excellent, although I found the Jazz setting to be somewhat bland. In addition to a creamy shred tone, the Rock setting can deliver gentle, smooth breakups if you

pull the gain back a little bit. This sound is important to me, and is often difficult for solid-state devices to emulate. Blues gives a strong, stinging tone — sort of '60s Buddy Guy-ish — and Funk sounds really great if you pull the gain back to avoid obvious distortion, and crank up the treble a bit. These are solid sounds — just a bit of aggression combined with the characteristic smoothness of tubes.

The low operating voltage means the tube should have a pretty long life, which is a good thing considering that replacing the tube is a fairly major hassle: you have to remove not only the casing, but the knobs, control washers, jack washers, and internal circuit board.

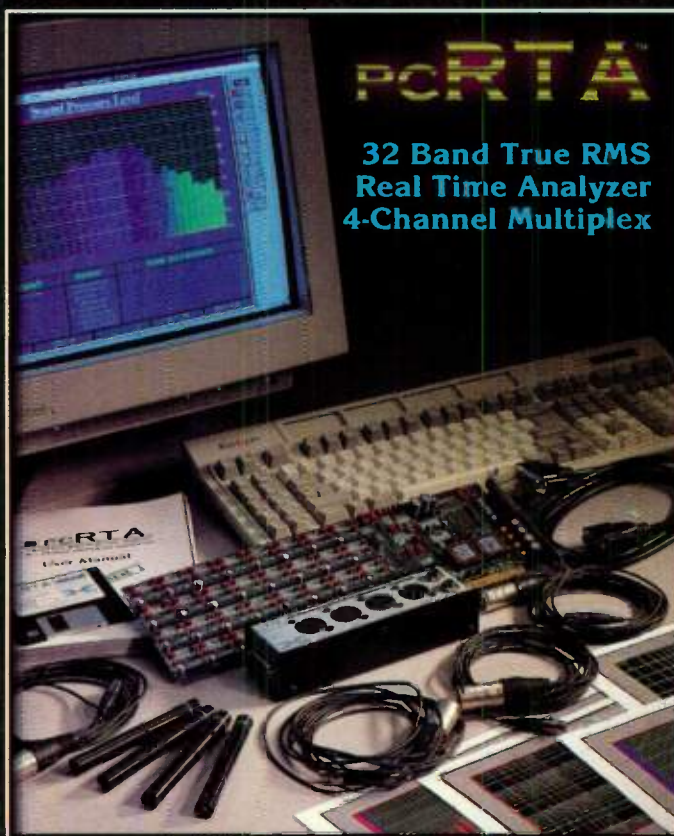
TubeMan is not programmable. It's not difficult to find good sounds, but the settings can be quite different. For live use, TubeMan probably works best as a set-and-forget device. Given the small number of controls, programmability in the studio isn't much of an issue — you can pretty much tweak up a sound in a minute or two. However, if you get a particularly groovacious sound, it's a good idea to write down the control settings so you can re-create them later.

Although TubeMan doesn't provide a lot of variations, overall it's a friendly, cost-effective, easy-to-use box that makes it easy to get quality guitar sounds with a minimum of hassle.

—Craig Anderton



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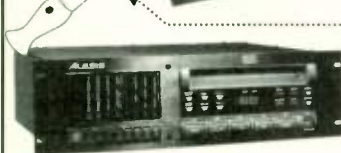


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GUITAR TOYS

Tech 21 MIDI Mouse



MANUFACTURER: Tech 21, 1600 Broadway, New York, NY 10019. Tel. 212-315-1116.

APPLICATION: Remote program switching of MIDI devices, live or in the studio.

SUMMARY: A simple, foolproof way to change programs.

STRENGTHS: Sturdy construction; very easy to figure out and use; multiple power options.

WEAKNESSES: No "trap door" for easy battery replacement; no provision for "bank" or 0-127 program readout, only 1-128; loses channel setting unless there's an internal battery.

PRICE: \$125

EQ FREE LIT. #: 126

IF YOU'D LIKE a remote control that can send MIDI program changes to a device like a signal processor or "snapshot" mixer, there's a bewildering array of choices — from computer programs to footswitches designed specifically for guitarists. Tech 21's MIDI Mouse is one of the simplest, and most foolproof, options. The black, 4.5" X 3.5" cast aluminum box features:

- A three-digit, seven-segment LED display that shows the MIDI program number (1-128).

- Three footswitches: Up, Down, and Active/Search. In Active mode, the display remains lit as you press Up to increment to the next higher-numbered program, or Down to decrement to the next lower-numbered program. In either case, the program change message is sent out instantly upon selection. In Search mode, the display blinks; you can select a program without sending a program change message until you press the Active/Search button again, which transmits the message via the MIDI Out jack. (Note that in Search mode, pressing and holding the Up or Down button scrolls through the programs.) Either mode can wrap around from program 128 to 1 or vice-versa.

- DC power jack that works with most 9 V adapters.

There are three power options: DC power jack; phantom powering through the MIDI cable using the two "outside" pins of the connector; or battery. The LED sucks beaucoup bat-

tery juice (about 15 mA average), but turns off after 10 seconds to save power. Tech 21 claims you can turn on the device and switch programs 2000 times from one battery. Environmentally speaking, an AC adapter is preferable, although using the battery does allow for an appealingly cable-free setup. You can set the MIDI Mouse to transmit on any of the 16 MIDI channels, but it will default to 1 when you remove power unless there's an internal battery.

The MIDI Mouse seems designed for live use, but it also makes a nifty little remote in the studio. The small footprint lets you place it on top of a keyboard or console (or wear it on a belt, for that matter) for quick program changes. A little Velcro on the back is a good addition in this context.

It ain't fancy, and bells & whistles are at a minimum, but you can run over this sucker with a car or drop it from your hotel room window and it will keep on working. If you want to change programs without having to become a rocket scientist, this is your box. —Craig Anderton



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Axon Guitar-to-MIDI Converter



MANUFACTURER: Blue Chip, distributed by Music Industries Corp., 99 Tulip Ave., Floral Park, NY 11001. Tel. 516-352-4110.

APPLICATION: Convert guitar playing into MIDI data capable of triggering MIDI instruments.

SUMMARY: It's not perfect, but it does bring a few new tweaks to the party and triggers faster than the average.

STRENGTHS: Fast response; clever split options; tracks well; flexible (almost to a fault).

WEAKNESSES: Still glitches if you're not careful; user-hostile interface; manual assumes much prior knowledge and is unclear in parts.

PRICE: \$1195

EQ FREE LIT. #: 127

MIDI GUITAR refuses to go away. Once touted as the next big thing, it has settled down into a comfortable niche existence, with Roland's GR-1 and GR-09 (reviewed in the December 1994 issue of *EQ*) as the undisputed leaders. Into this scenario steps the Axon NGC 66, which not only has to overcome Roland's reputation and clout, but the perception built over the years that MIDI guitar is pretty much for pro-peller heads with perfect technique.

First, though, the standard disclaimer: playing MIDI guitar has very little to do with playing guitar. You're playing synth, but with a more familiar interface. The type of synthesizer you play is important as well (personal favorites: Yamaha TX81Z and TX802, Ensoniq TS-10, Oberheim Xpander) since optimally, you should be able to play over multiple channels, and have each channel respond to only one note at a time (just like a real guitar). You also need to know about synth programming — many times tracking problems are caused by the synth programming, not the MIDI guitar.

However, the rewards of MIDI guitar can be considerable: a wide

palette of timbres, with a degree of expressiveness that is very difficult to achieve on a keyboard. Wind and string patches come alive, and human finger-based pitch bending beats an LFO any time. For those willing to slog through the MIDI guitar jungle, there is definitely the opportunity to find hidden treasure. What you need is a guitar-to-MIDI converter that's fast, accurate, and inexpensive. The perfect converter doesn't exist, but the Axon sure tries hard. Let's check it out.

The Axon NGC 66 is a half-rack unit designed to work with the Roland GK-2 guitar interface. The rear panel has MIDI in, out, and thru, bass/guitar switch (yes, it works with both), two jacks for footswitches (hold and patch advance), guitar audio out, and a jack for the GK-2 compatible multipin connector. The unit runs pretty hot, so make sure it gets a reasonable amount of ventilation.

The front panel has power on/off, four main buttons, six programming buttons, 32-character LCD, and a normal guitar audio level control. The Axon is a very deep and flexible unit; that's the good news. The bad news is

that trying to program something this deep through this limited a set of interface tools is a major pain — the amount of button presses required to do even the simplest tasks seems excessive. Although, in Axon's defense, this is designed to be a "set-and-forget" type of unit where you sort out all your assignments and patches beforehand, you might get frustrated enough to want to forget it before you finish setting it.

SPLITTING HAIRS (AND NOTES)

The Axon works well with General MIDI modules, and much of its flexibility comes from being able to set up different types of program/modulation splits. These can be set according to fret or string (e.g., notes played on or above a particular fret play a different sound from notes below the specified fret, or different strings can play different sounds).

More surprisingly, and most welcome, is the option to set a zone between the bridge and highest fret where picking sends out a controller such as modulation. For example, playing in the specified zone could add vibrato. What's best about this is that you can set the two points that specify the zone to different controller values. Suppose one point generates the maximum value controller, while the second point generates the minimum value. As you pick closer to the second point, the controller value that's sent decreases rather than just cuts off. Cool.

But wait — there's more. These options can be applied simultaneously, so that playing a note below a particular fret on a certain string, and picking in a particular part of the



CD-ROMS: PLAY BLUES GUITAR & JAZZ TUTOR

Pop quiz: you're an recording engineer and you're trying to communicate to the guitar player where you're going to punch in. Do you say: "Okay, we're going to punch in...":

- At this here part coming up next
- At SMPTE time 00:01:50:12
- When I make this gesture with my hand
- Just before the second measure of the turnaround

If you said a, b, or c, you might consider learning a bit about music theory. Although there's no CD-ROM entitled "music theory for recording engineers," there are some decent discs out there for musicians...like *Play Blues Guitar*, from Kudosoft. Keith Wyatt, the instructor, analyzes the structures of various songs as well as the playing techniques used in those songs, but of equal importance is the terms and techniques section. This provides background from the basic (how strings and fingers are numbered, guitar terms, etc.) to what makes up chords. This section is handy for when you're trying to decipher something you don't understand about a song, but it's also great for browsing and picking up some musical basics.

As one example of what happens when you find a topic that piques your interest, if you click on Rhythm Phrasing, you can then check out playing bass lines, blues turnarounds, strumming, combining chords, and using horn voicings. If you then click on blues turnarounds, you're presented with two video demos of standard and improvised riffs, and two MIDI playback videos that show fingerings and play notes. There's also a section on phrasing — bends, slides, slurs, vibrato, etc. All of these help make you more aware of the guitarist's vocabulary, and can come in really handy when trying to help break creative blocks ("Why not try using some horn voicings behind the vocals rather than strumming?").

From a musician's standpoint, *Play Blues Guitar* works because it's aesthetically very well done so you want to use it, navigation is simple, the instructor seems into it, and there's a lot of really solid information. This disc makes good use of the medium because it encourages you to float around to whatever interests you; there's no real road map through the CD, although the contents page provides a reasonable substitute. Then again, this isn't really a course in the traditional sense — indeed, this is one of the factors that makes it more suited to engineers — but more like a teacher who answers whatever question you have at any given moment.

However, *Play Blues Guitar* is blues only; if you already have one foot in the musical world, or are a musician seeking to really expand your theory chops, Masterclass Productions' *Jazz Tutor* is the most industrial-strength music theory CD-ROM I've seen. Musicians will appreciate the fact that it's a complete, paced course involving slide shows, charts, and MIDI examples based around five new songs by Phil Woods; those who are more interested in theory will be interested in the reference section (featuring a glossary of jazz terms and chord/scale glossary). If your brain starts to hurt after absorbing all that theory, you can chill out with a slide show with highlights of Phil Woods' career or listen to the five songs in all their audio CD glory.

While its complexity may not make *Jazz Tutor* as applicable to recording engineers who want to know a bit about music compared to the simpler (and more user-friendly) *Play Blues Guitar*, it's a real find for musicians who want the equivalent of a music school-level jazz theory course without having to leaving their PCs.

—Craig Anderton

Play Blues Guitar (\$59.95); Kudosoft, 11320 Chandler Blvd., Suite G, N. Hollywood, CA 91601. Tel: 800-887-7529 or 818-766-2958. System requirements: MPC-compatible 486 or greater, 256 colors, 150k/sec CD-ROM, 4 MB RAM, MPC sound card, mouse, Windows 3.1 or 95 and MS-DOS 5.0 or greater.

Jazz Tutor (\$99.95); Masterclass Productions, PO Box 304, Ridgewood, NJ 07451. Tel: 800-627-0833. System requirements: Same as above except 8 MB of RAM and 30 MB of hard disk space.

GET THE BLUES: A scene from *Play Blues Guitar*.

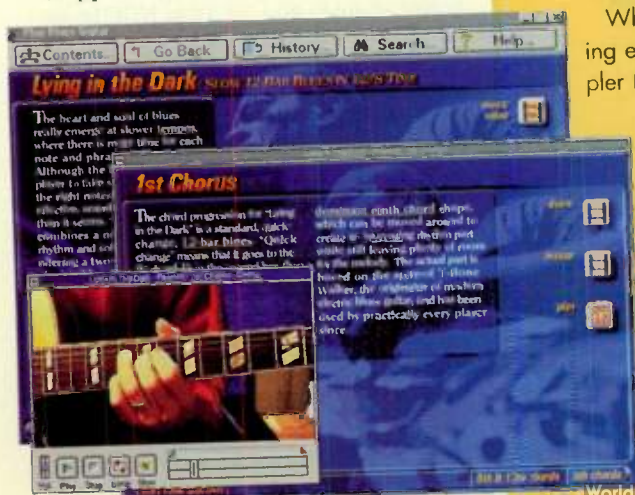
string, makes one sound; playing the same way but on a different string or note range could make an entirely different sound.

However, I must admit that due to Axon's awkward programming, I found it easier to use a MIDI guitar-friendly synth (Ensoniq TS-10) and leave the Axon set up to generate six channels of signal over six strings. Then I just set splits, different string sounds, and so on at the synth.

A little bit of time spent tweaking the TS-10 (e.g., glide mode set to mono, glide time to 0, system pitch bend to 12 semitones, MIDI mode set to Mono A) made it an ideal companion for the Axon. As I've said before, MIDI is like a combination lock, with the tumblers spread out over the guitar, MIDI interface, and synth. When everything is set correctly, great — otherwise you'll get glitching. Note that any problems are most obvious with very short, percussive patches such as kalimba. If they don't work, keep tweaking.

BUT WAIT, THERE'S STILL MORE...

The Axon has several other useful, if not exactly ground-breaking, features: note pitch quantization, minimal double-triggering, decay threshold (keeps notes from overstaying their welcome), velocity sensitivity and offset for setting various velocity curves, transposition, and the ability to program a variation sound that appears when you press on the hold footswitch (supplied with the unit).



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There are 64 "arrange" programs, which contain all available parameters. An additional 128 "scratch" programs lack the fancy split features mentioned above (although you can still send out a controller depending on pick position) and are a bit easier to set up. It is not possible to access them randomly; you have to scroll.

Finally, a chain mode lets you string up to 64 programs together through which you can cycle. This is intended mostly to simplify live performance, but of course, it has its uses in the studio as well.

So is the Axon the Holy Grail of pitch-to-MIDI? Once you get the synth and unit matched, the tracking is extremely good (and very fast; apparently the Axon need recognize only the initial picking transient in order to determine the note, and this really speeds things up). Compared to the Roland GR-09, it does seem peppier and tighter — but bear in mind it's an incremental improvement, not a mind-boggling quantum leap.

The Axon is also flexible, and the pick control feature is a real winner. If only there was a Galaxy or Unisyn editor/librarian, I'd be ecstatic. A unit this good shouldn't have to be saddled with such a frustrating interface.

Meanwhile, I'm glad that MIDI guitar continues to improve. The Axon is indeed a step forward, and deserves a close look from guitarists who have been waiting for the "next step" in MIDI guitar. If you want to join the wide world of high-tech guitar, you couldn't go wrong (although you might go broke!) with a Roland VG-8 for great guitar sounds, and an Axon NGC 66 to handle the MIDI end of things.

One caution: always try a guitar synth before you buy, with the sound generator you're going to use. My experience indicates it takes at least an hour or two, as well as a fair degree of MIDI literacy, to really figure out how to set up the guitar and synth properly. Some will try the Axon and decide it "doesn't work" because the other elements of the system are not set up correctly. But if you persevere, you can really get this box to sing. Blue Chip couldn't have picked a tougher product category with which to make their US debut, but it's a credible box with a lot to offer those who have both patience and savvy. —Craig Anderton

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VG-8 UPDATE

Regular readers of this magazine may recall my enthusiasm about Roland's VG-8, which to me was the product of 1995 for high-tech guitar players. Now Roland has introduced several new expansion options that take the VG-8 even further.

First is a major, user-installable software update that provides several new features:

- Four new instrument models: hollow body (electroacoustic) guitar; hollow body plus amp; dual amp with two signal chains; and "Vio" guitar, which adds comb filtering.
- Seven new pickup options: Tele; Les Paul with P-90; Les Paul with PAF; Danelectro "lipstick tube" pickup; Rickenbacker; Gretsch; and single-coil active pickup.
- Three new amps: Soldano; Marshall with master volume; and Vox/Matchless.
- Three new speaker cabinets: Fender Super Reverb; Celestion stack; and Vox 2 X 12.

There's also a wah function (pedal or automatic sweep), pedal control over pitch shift amount for any number of strings, "intelligent" polyphonic pitch shifting, ability to assign several HRM parameters to pedal control, and 64 new presets that take advantage of the above features.

In addition to the software update, there are two new ROM cards. The VG8D-1 "Traditional 1" contains 64 patches designed for country, folk, blues, jazz, and classic rock. The VG8D-2 "Modern 1" offers heavier patches intended for rock, metal, and fusion.

For more information, contact Roland at 7200 Dominion Circle, Los Angeles, CA 90040; 213/685-5141. —Craig Anderton

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Now with all that said, don't you think you owe it to yourself to check out the Klipsch KP-3002-C and hear what you've been missing? Check out your local Klipsch Professional dealer and experience the legendary Klipsch sound.

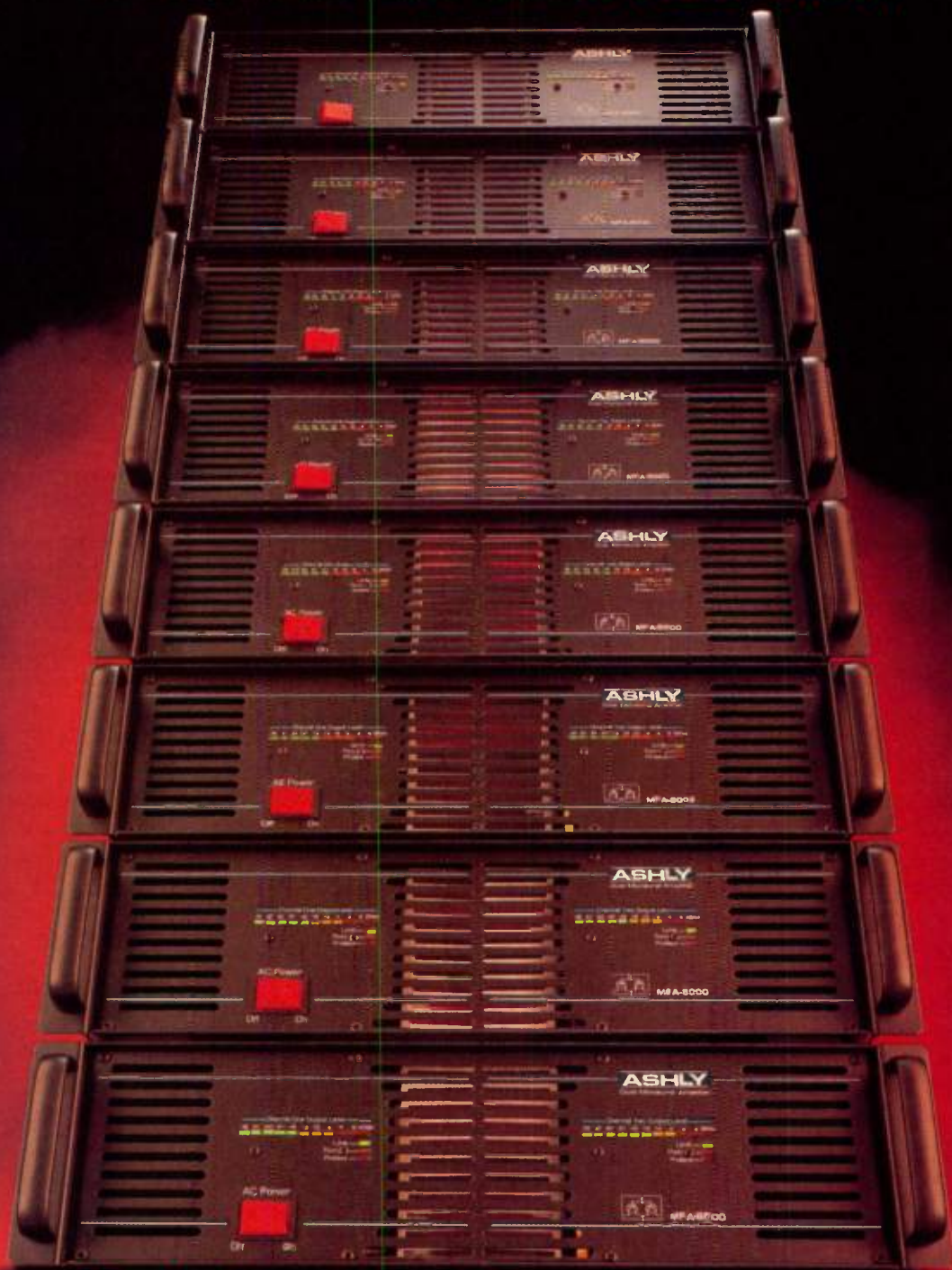
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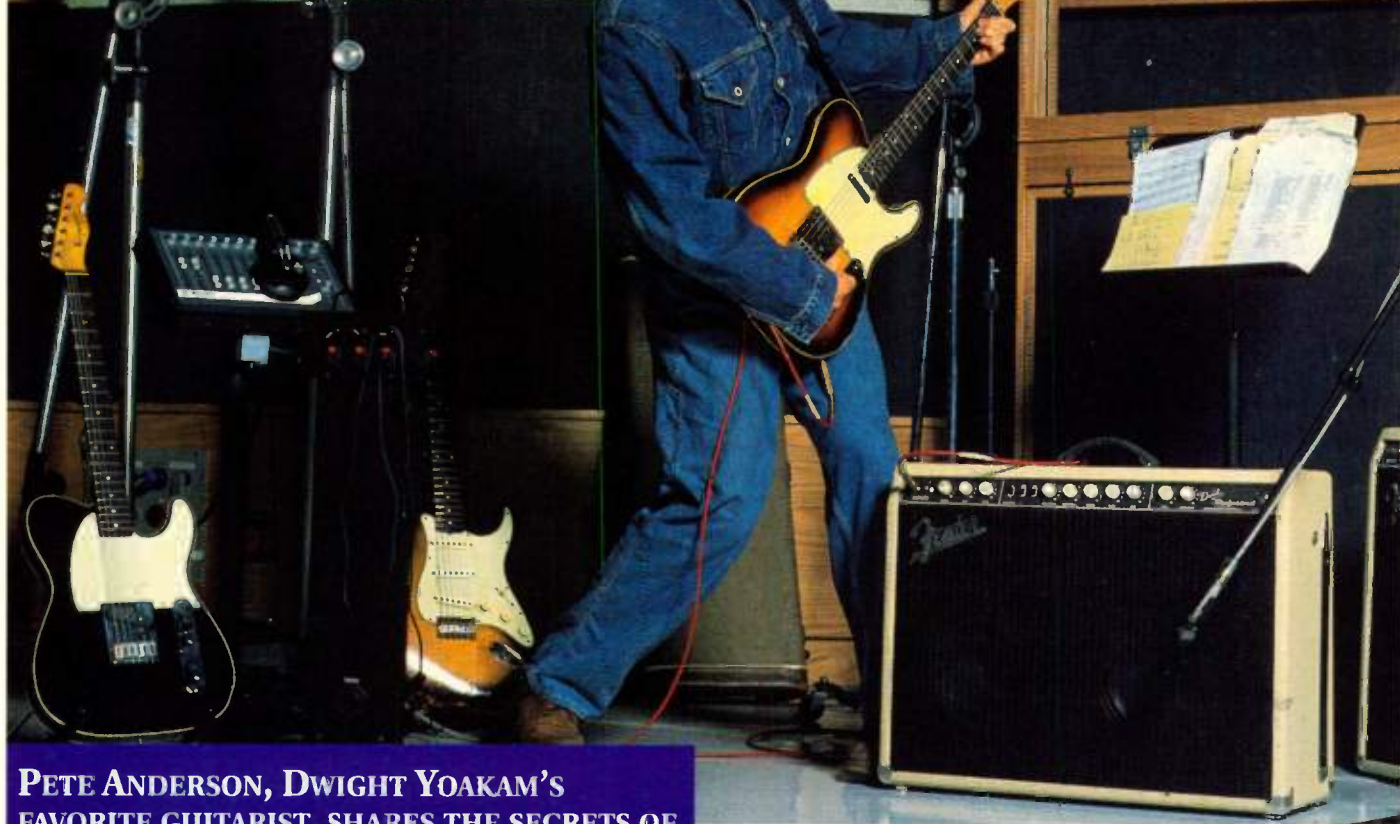
SIX STRINGS ON STAGE



BLUES TRAVELER
LIVE
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SIX-STRINGS ON STAGE



PETE ANDERSON, DWIGHT YOAKAM'S FAVORITE GUITARIST, SHARES THE SECRETS OF GETTING GOOD GUITAR SOUND LIVE

BY LIANA JONAS

PETE ANDERSON is more than a guitarist. He's got his own project studio, his own record label, Little Dog Records, an album called *Working Class*, and has been country superstar Dwight Yoakam's guitarist and right-hand man for over ten years now. He is a multiplatinum Grammy award-winning producer, and is presently up for Country Album of the Year/Producer for *Dwight Live* [Reprise]. Not bad for this one-time factory worker.

Ironically, despite Pete Anderson's fame as a country guitarist, his roots are deeply seeded in blues and rock music. Anderson didn't really play country guitar until he moved to Los Angeles in the early '70s. He found that he could play a wider variety of music in the local honky-tonks, and really learned his

instrument in that environment. This is where he and the then struggling Dwight Yoakam met in the early '80s.

Anderson maintains a basic rule of thumb in building a good guitar sound: "Use a great sounding amplifier and a great-sounding guitar. Once you've accomplished that, you have a strong foundation upon which to build a complete guitar rig." His personal brand of choice is Fender. "Ninety-nine percent of the time, I use a Fender guitar with a Fender amplifier," notes Anderson. "Once I've got that settled, I can choose my speakers. I like to use Electro-Voice speakers because I don't like distortion coming from anywhere but my amplifier. I find EV speakers to be very clean sounding. Some people may use softer types of speakers to get a distortion-like sound, but it's not

my preference. I like my distortion to come from the tubes and the preamp section of my amp."

As Anderson's gigging roster moved onward and upward, his stage rig has evolved in accordance to meet the growing needs. His first initial rig began with a Fender Blackface Deluxe with an EV speaker. The effects loop consisted of an old grey tube Echoplex delay box and a modified Boss Chorus. This was the rig Anderson used from clubs to the early Dwight gigs. Later on Anderson expanded his rig with two identical Deluxes and the addition of a Goodrich volume pedal. "The Goodrich had a battery unit, which created a low Z signal that went back into the amplifiers. Because it was a low Z signal, I didn't lose any high end or tone no matter how much cable I used. My guitar went directly into the Goodrich and then to one side of the

amplifiers, which was clean, and drove the other side that had the Echoplex and Boss Chorus. Both sides had on-board reverb. As the stages got bigger, I had to fill more space. I started jacking up the amps with power transformers and went as far as I could with a two-tube amplifier."

The next level in Anderson's evolution of stage rigs included a Fender Twin, "which is like two Fender Deluxes." But Anderson felt that the Twin was lacking something, and the bright switch did not yield the sound he was looking for. "No matter what I did, I couldn't get the brightness on the Twin the way I wanted to. So I ended up having the Twin modified where the down position held the same brightness value as a Fender Deluxe, and in the up position it had the same as a Fender Super Reverb. The changes were done, I tweaked the now-modified Twin to my

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ELECTRONICS

liking, plugged in and played, and it sounded like a big Deluxe. I was so happy."

At this point, Anderson had made the move to wireless guitar (Nady 701) and added on a Korg SDD2000 digital delay, which he had modified to sound like his retired Echoplex. "Everyone thought I was nuts wanting to modify the Korg delay. I actually requested that it be

degenerated from 16 kHz to 12 kHz just to get it to sound the same. It worked out well." MIDI control entered Anderson's rig by way of an ADA floor controller. Using the controller Anderson stored all of his effects settings.

The third and most current incarnation of Anderson's stage rig came in the form of a Fender Tonemaster and a Dual Professional, which are both

four-tube heads. Bob Bradshaw designed for Anderson the 4x (read: four by), a head-switching system that switches between up to four heads. The system has a feature that sends a "speaker dummy load" into the heads as speakers are switched in and out of usage. This is so the heads don't blow out from pumping power into nothing. Anderson notes, "On stage I have two cabinets that

look exactly like Fender Twins, except that they have no heads. They get the heads switched into them by my 4x. One cabinet is dedicated for clean signal and the other is for effects. My wireless guitar is switched between heads by way of a rack-mounted Patchmate MIDI control device. The 4x and the Patchmate are the two devices that make my rig work."

An entire show is programmed this way on a per song basis, and it is all operated by a guitar tech off stage. The only objects present on stage are Anderson, his guitar, the two cabinets, and a volume pedal. His effects rack, which is also off stage, is kept simple, consisting of a Peavey Valverb, a Roland SE-50, and a Korg SDD2000 digital delay. "I try to get my effects from on-board the amps as much as possible," Anderson comments.

HIGH FIVE

According to Anderson, the following top-five ingredients will yield a good live guitar sound:

1. Knowledge of the room type: "You want to adjust your delay and reverb according to the room. Is it a dead room, is it really live sounding? Adjust accordingly. Also, you want to be heard. The best way for a guitarist to be heard is to play mono and dry. I know that might not be very fun, but it will give you impact you're looking for."

2. No compressors: "I never use compressors on stage because it takes away the high end and impact of your sound. If your rig is dialed right, you'll get natural compression."

3. Build your bass: "Dial in the bass according to the room. It's easy to create a bass trap in clubs/bars because you are often positioned in a corner. Build your bass from the lowest level up."

4. Simplicity: "Try to keep your signal chain as simple as possible in order to get the

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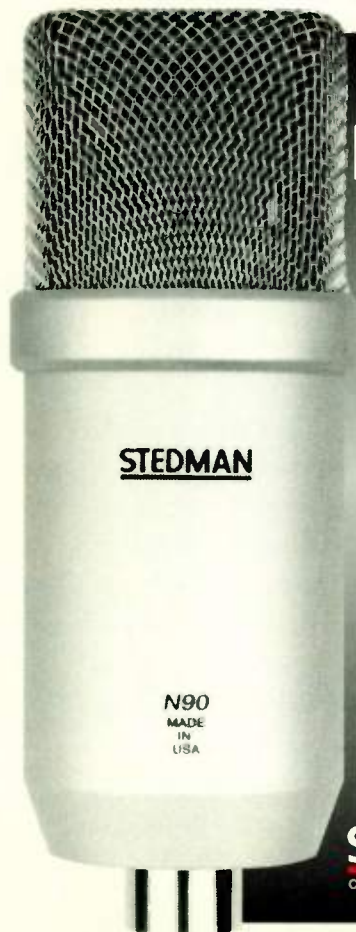
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EQ
LIVE

cleanest signal to your amp's front end. Turn the effects on, but keep your mix knob turned all the way down, and bring it up only as necessary. You want unity gain in your loop."

5. Active Volume Pedals: "If you use a volume pedal, I recommend low-Z, battery-operated ones that go in between the guitar and amplifier. I find that most nonactive volume pedals dull your tone out."

OTHER TIPS

Anderson cites single-coil pickups as one of the main causes of a noisy guitar rig. "Single coil pickups pick up (no pun intended) the hum often generated from light dimmers. I recommend having copper shielding installed in the cavity of your guitar and make sure that it is grounded really well. Another way to avoid noise is to put your delay at the end of the chain because, for example, you don't want a delay signal hitting the chorus signal."

When using a wireless system, Anderson recommends walking the stage during soundcheck. This is the way guitarists can identify drop-out spots, and mark the spot(s) on stage where not to step. When gigging, bring your own bag of gear and don't rely so much on rental systems. "Often times these rentals are very beat up and break down. You don't want to be caught in a bind. Also learn how to operate a Fender Twin Reverb because they are the standard in most rental situations."

The final tip Anderson offers is to get off monitors. "There are plenty of monitors on stage, particularly around the singer, and you can listen to those. Learn to hear what you need to hear, learn to hear yourself. I don't want to hear the rest of the band except for the snare drum and the hi-hat. Guitar players should be concerned with these two instruments because they provide the pattern that guitarists play to." **EQ**

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CIRCLE 72 ON FREE INFO CARD

THE EVENING BLUES



Photos by Julian Jaime

I HAVE BEEN working with Blues Traveler in preproduction and live mixing for eight years now, and have watched the band grow both musically and dynamically. Other artists that I have worked with include Soul Hat, Chris Whitley, Colonel Bruce Hampton and the Aquarium Rescue Unit, and the Screaming Headless Torsos.

Blues Traveler has become more fluid and relaxed on stage over the years. There was a time when they were a bit trapped in "over-professionalism," and almost came across as rigid in their performance. But now that the band has achieved a level of technical proficiency, they are more relaxed on stage. As a result, we're doing a lot of live recording for a live album due out in May; as a matter of fact, we've begun the mixing process.

For recording, my partner Dave Swanson is using a Mackie 32•8 with four TASCAM DA-88's, splitting off of the monitor or FOH console, depending on which is more discrete. We're using

four channels of Drawmer 1960's for some tube mic pre warmth and smooth limiting, four channels of Dirk Schubert (more on these awesome units later on) parametric EQs, and three sets of ambience mics. Two pairs of the ambience mics are placed facing the audience (one from up in the truss and a broad stereo stage L/R from the side); for these we're using your basic condensers, AKG 460's and Audio Technica 4051's. The third pair is a set of AKG 414's with one set to cardioid and the other set in a figure eight pattern, which is run out of phase in mix-

down. The 414 pair gives an out-of-phase, super-wide stereo image from the figure eight, and then we dial the cardioid up the middle for a three-way room perspective.

ROAD ARSENAL

In my FOH racks, I have BSS graphic EQs; Drawmer and Aphex gates (which are in the racks for the opening act); a t.c. electronics M5000 mainframe (which I love); Yamaha REV5, SPX900, and an SPX90II for an old pitch change program I use on Popper's vocal; some older dbx 165's with discrete circuitry; and Dirk Schubert, very highly-

secret, 6-band parametric EQs. You just try and find one of these things! These EQs have been compared to Massenburg's; they've got a super-tight bandwidth. I keep them around for inserts or for the downfills that I use across the front of the stage. The Schubert EQs are my secret weapons, as are the older dbx 165's, and I bring them to all the Blues Traveler's shows.

Speaking of secret weapons, there is one other that I bring along with me — the dbx 120XP. [The unit is designed to produce an additional octave of bass. — Ed.] I can't say enough about the dbx 120XP Subharmonic Synthesizer, which is made, believe it or not, for discos and DJs. It costs around \$150, but it gives you 50 Hz from here to kingdom come! On the hollow stages, I use less actual acoustical rumble in my kick drum and put the 120XP to use. This is another one of my toys that I load into my rack for the shows.



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BY RICHARD VINK

IN THE VINK: Engineer and author Richard Vink.

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CIRCLE 48 ON FREE INFO CARD

PICK A SPOT, ANY SPOT

I like to mix from as close to a crowd perspective as possible. And I don't mind mixing from the worst-sounding spot in the room because you just get used to that in theaters. (I'm talking about under the balcony!) The only place that I really avoid mixing from is all the way off to one side of the room. The reason why I don't mind being in a tough spot is because if I can make the mix sound good from there, it's an achievement. If I'm in a sweet spot, like on a riser in the middle of the floor, the sound is unrealistic. I try to never be on a riser because by the time you get all of your gear out in front of you, you've created a little bit of a bass trap. Being positioned up in the horns, higher than the rest of the crowd, and blocking the sight lines is not for me.

My ideal mix position is slightly off-center and in the crowd at their level. This will give me a nice, realistic blend of two perspectives: the crowd's and the room's.

POPPING SENSATION

Having a lead singer who

also plays harmonica also offers some challenges. For John Popper's vocals we're using an Audix OM5. We chose this mic because John is a big guy and sings very loud. The Audix handles his high SPL superbly and has such strong presence. This has worked out very well for us in the live recordings. Additionally, John's vocal has a lot of top end, so using the board EQ I'll create a dip at around 3k for a presence curve. I use the dbx 165 compressor set for hard limiting in a protective manner. After that I use a limiter soft-knee with a slowed down attack. This helps gather him up from 500 Hz and down.

For the harmonica, a Hohner Special 20, we're using a Shure SM58. So John has the Shure in one breath and the Audix in the other. The SM58 has two toggle switches about half way down the mic's shaft, and it's duct taped from here to next month. The right side toggle switch is an amp channel (lead and overdrive) changer switch for his Soldano 100 watt guitar head, and the left side is a speed switch for

his Leslie cabinet. Just on top of the two switches is a volume pot that controls how much of his harmonica is going to the Leslie. (The pot controls the slave out on his Soldano, allowing John to turn on his Leslie cabinet as he wishes.) He will use his two thumbs to control the toggle switches, and his index fingers to maneuver the volume pot. It's quite a talent he's got there. Popper's SM58 was cus-

tomized by the techs at Eastern Stage Productions.

John cups the mic a lot and uses that to get a very thick low-end feel, and we usually set up his gain structure on stage to work off of that. Popper has got his lead channel turned up very loud and rides the distortion. He uses both channels on the Soldano and switches back and forth between overdrive and a clean sound. We carry a DI for the harmonica for extreme emergencies. Popper runs an Eventide H3000 and a DigiTech multieffects unit on a coffee table full of tricks that are controlled by a MIDI foot controller — he'll use some pan delays and harmonization. It's funny, a lot of people think that I'm doing all of this kooky stuff on the harmonica when it's all Popper. I simply bring up the amount of effects that he's playing and blend it with the house mix.

My harmonica FOH channels are two Shure SM57's, a clean DI, two effects channels, and two Leslie channels that are panned wide and in stereo. We only mic the top horn part of the Leslie and spread it very wide in stereo to create more tremolo, using two AKG 460's. For the Soldano, we use two SM57's. One is perpendicular to the cabinet on a 90-degree angle, and the other is next to it and out of phase by 45 degrees. This allows me to leave the EQs on the inputs flat in almost all scenarios, and just use the 57's in a presence-oriented manner. It gives me more edge, and I just balance between the two



PLAYING BLUES: Guitarist
Chan Kinchla

faders, and in a way, it kind of turns into a 2-band EQ on the faders. We do this on both Popper's harmonica and the guitar rigs. It works really well with 12-inch speakers.

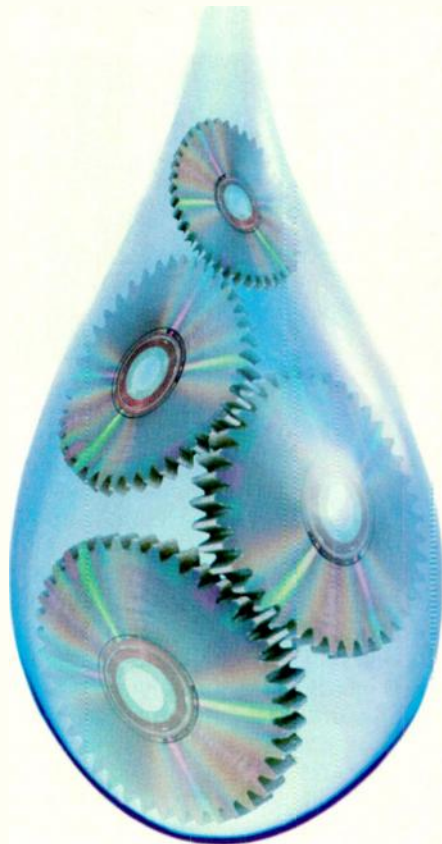
HOLLOW STAGES

I've found that the Crown 5000's [amps] we're using on the EAWs give a lot of punch to my low end, but as the crowd fills in, the low end starts nondirectionally rolling backwards under the stage. This kind of tickles the band on stage and bounces them around like chess players. When this happens, it is not good because they start misperceiving the feel of their music.

If the situation permits, I like to build a solid barricade going around the back of the speakers to prevent the bass from rolling back underneath the hollow stage. Unfortunately, Blues Traveler plays on six-foot high hollow stages quite often, and this is the absolute worst possible scenario! You've got to battle 60 Hz just going berserk on stage, but not in FOH. This situation gives me an unre-

continued on page 130

HARPMAN: John Popper



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NEW GEAR FOR YOUR NEXT GIG

FEELING SXY

Samson has introduced the SX6 Mixer Amplifier. The SX6's integrated mixer design combines XLR/line

inputs with a power amp that delivers 150 watts into 4 ohms. It comes with a three-spring reverb, independent two-band EQ for each channel, and a five-band graphic EQ on the main output.

Other features include an aux/reverb send on each channel, separate reverb and aux/effects returns on each channel, 48 V phantom power, protection relay circuitry with front-panel LED, front-panel peak overload LED, and a rear-panel amplifier input and preamplifier output. The SX6 is housed in an all-steel chassis and features an anodized aluminum heat sink. For further information, contact Samson Technologies Corp., P.O. Box 9031, Syosset, NY 11791-9031. Tel: 516-364-2244. Circle EQ free lit. #128.

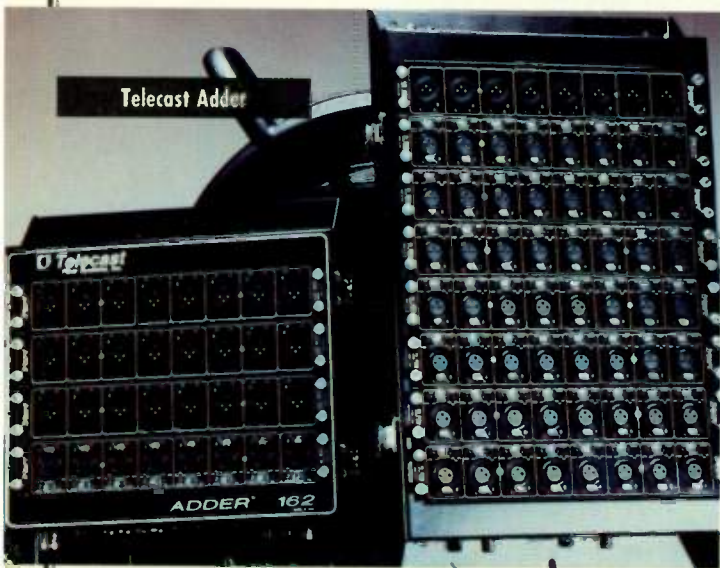


Samson SX6

ADD IT UP

Telecast Fiber Systems announces the Adder, a family of bi-directional snake systems. Adder snakes simultaneously transmit and optically split up to 64 audio channels plus intercoms and data/control channels both ways over a single optical fiber. Telecast's new Adder family consists of the Adder 162 and Adder 322, capable of carrying 32 and 64 channels, respectively, over a optical fiber cable. The Adder is available as portable "shells" or 19-inch rack enclosures. Digital modulation and multiplexing combine all signals onto a single optical fiber for two-way

transmission via standard ST optical connectors. Variable gain preamps accept microphone or line inputs. Each input also provides switchable phantom power. A unique feature splits stage inputs into multiple optical outputs to different locations. For further information, contact Telecast Fiber Systems, Inc., 102 Grove Street, Worcester, MA 01605. Tel: 508-754-4858. Circle EQ free lit. #129.



Telecast Adder

ADDER 162

jack on the rear, or with any 13 VAC RMS/12-14VDC source. The true receivers feature 0 to 180 degree lights to show diversity operation. The

unit's high performance RF front end includes a high Q input coupled with a GaAs-Fet amplifier. For more information, contact Telex,



Telex FMR-450G

9600 Aldrich Avenue South, Minneapolis, MN 55420. Tel: 612-884-4051. Circle EQ free lit. #130.

TELEX-CELLENT

Telex Communications, Inc. recently introduced its professional UHF wireless guitar FMR-450G and bass guitar FMR-450B systems. The systems include the wireless WT-450G transmitter for guitars and the WT-450B transmitter for bass guitars. The 450 system is compact, lightweight and self-contained. The transmitter is about the size of a pager and clips onto your belt or guitar/bass strap. The guitar cord jack for the WT-450G/B is designed to accommodate guitar pickups with impedances up to 50K ohms. A toggle switch is provided to allow the user to mute the guitar if desired. The FMR-450G/B receivers are powered by an external AC supply via the power

COOL COMBO

HI-MU recently expanded its amplifier line with the inclusion of the Model PPEL84 18 combo. The PPEL84 incorporates dual EL84's in a push-pull configuration yielding a power output of 18 watts. HI-MU's version of the EL84 is a recreation of the classic, late 50's Mullard circuit, modified to eliminate the negative feedback used in the original. The PPEL84 runs in Class A operation, which is standard fare on all HI-MU models. For more details, contact HI-MU, 52 Wheeler Avenue, Cranston, RI 02905. Tel: 401-781-7314. Circle EQ free lit. #131.

PLAY WITH ZOOM

Zoom raises the ante in guitar effects with the introduction of the new Player 3030 multieffects system. The Player 3030 features 32 of Zoom's newest analog distortions and digital modulation effects, with up to seven that can be used simultaneously. Also included is an assignable expression/volume pedal. Specific volume and effect parameters on this pedal can be changed in real time and when used with the optional FP01 foot pedal, volume and expression can be manipulated simultaneously. Equipped with 28 user and 28 Zoom presets, the 3030 features three types of amp simulation that can be used in tandem with eight different analog distortions for a total of 24 sounds from crunch to ultra-high gain. The 3030 also boasts Zoom Noise Reduction (ZNR), and an "intelligent" harmonized pitch shifter (HPS). Additionally, the 3030 has an auto-chromatic guitar tuner for tuning on stage. For more information, contact Samson Technologies Corp., P.O. Box 9031, Syosset, NY 11791-9031. Tel: 516-364-2244. Circle EQ free lit. #132.

SCRATCH THAT

Denon recently introduced the the SMX-2000, the world's first Digi-Scratch DJ Mixer. The SMX-2000 Digi-Scratch function emulates the sound of scratching on vinyl records. The effect may be actuated by turning the Digi-Scratch turntable and is available in three different playback modes: forward, backward, and both. The unit also features a sampler which has a maxi-



Zoom's Player 3030 multieffects system

mum record time of 16 seconds and a frequency response of 20 Hz to 20 kHz

@ ±50% pitch. The mixer section features three channels with six inputs, stereo

outputs and a sub out. Channels one and two can each be switched between line/phono and line input, while channel three switches between mic and line input. For more information, contact Denon Electronics, 222 New Road, Parsippany, NJ 07054. Tel: 201-575-7810. Circle EQ free lit. #133.

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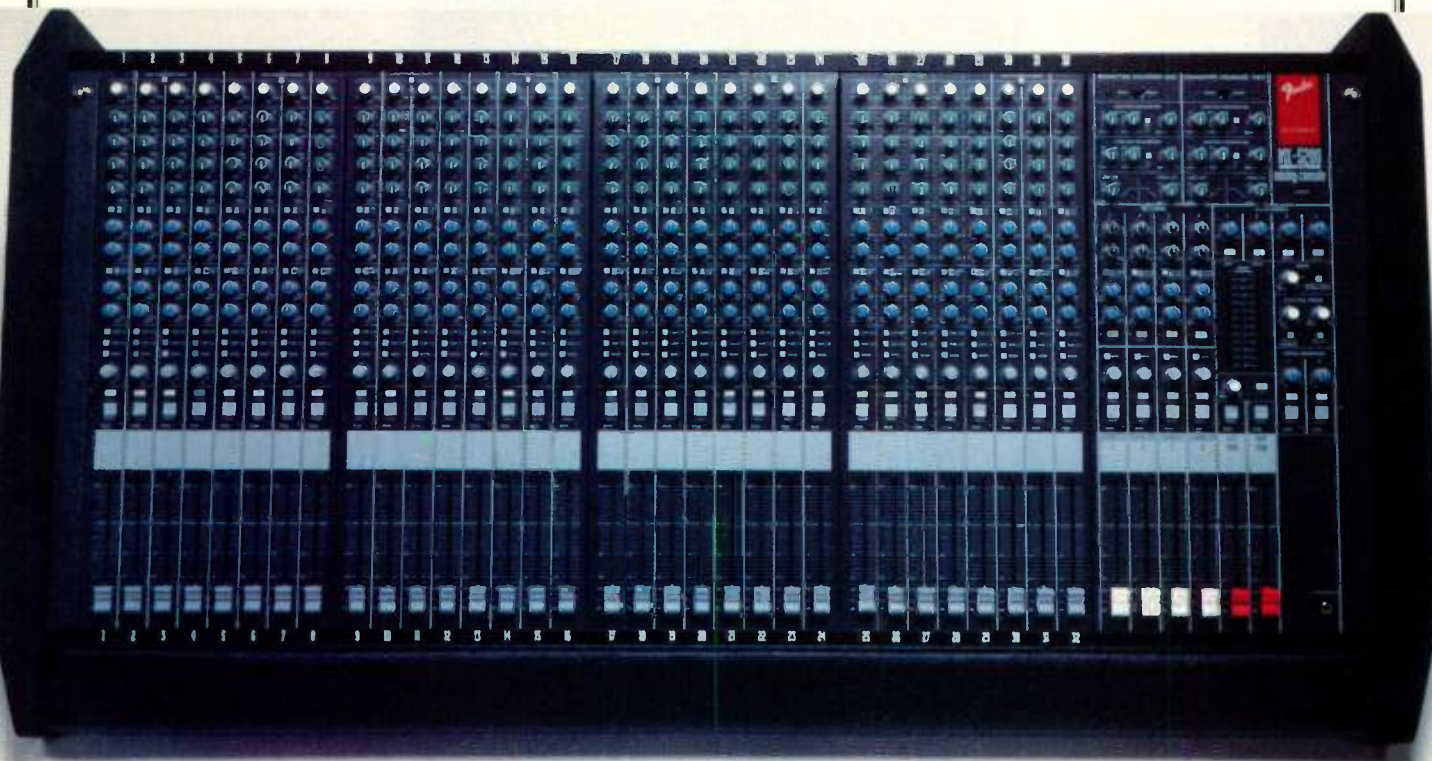
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CALL TO GET ON OUR HIEROGLYPHS MAILING LIST

FENDER MX-5232 MIXING CONSOLE



WHAT'S IN A NAME? Well, quite a lot really, because some names are more evocative than others. Take Fender — you immediately think of contoured bodies, machineheads all on one side, and single-coil pickups that made rock 'n' roll. Fender may be guitars and screaming backline to most people, but it now also makes a rather good range of sound reinforcement products, including speakers, power amps, and SR mixers. The Fender MX-5200 range of consoles are the sort of no-nonsense, down-to-earth desks there really ought to be more of. This is good gear.

Available in 16-, 24-, or 32-channel versions with separate power supplies, the 5200 series is extremely well built. It provides four groups with 3-band EQ, four auxes, and two monitor sends on the channels, four stereo effects returns, and (unusu-

al) two 2-band parametric EQs with high- and low-pass filters that can be assigned to the two monitor sends or can be patched physically into any insert on the desk. [A spare power supply and rack-mount adapter for mounting up to two power supplies in a 3-space rack are available as accessories. The 5200's power supply includes a built-in automatic changeover and protection provision for redundant operation, meaning that if the supplies are hooked up together and one should fail, the remaining supply will automatically switch over and operate the console. Spare supplies retail for \$399.99; rack carrier tray to hold two supplies: \$74.99.]

Each channel has balanced inputs plus a TRS jack insert and a mic input with switchable phantom power in four channel blocks. Channels have a gain pot with 48 dB of boost, access

to the four aux sends from two pots (1 and 3 are post, 2 and 4 are pre, but may be jumper modified) and two monitor send pots switchable pre/post. EQ offers ± 15 dB on fixed shelves at 12 kHz and 80 Hz and a sweep-

able mid peak covering 100 Hz to 7 kHz. There's routing to the main mix; four subs via a pan pot; a solo (switchable globally for Stereo-in-Place); a nice big Mute switch; and a smooth long-throw fader with associated

ROAD TEST

MANUFACTURER: Fender Musical Instruments Corporation, 7975 North Hayden Road, Scottsdale, AZ 85258. Tel: 602-596-9690.

APPLICATION: Live sound.

SUMMARY: Four-bus console with 3-band EQ, four auxes, two monitor sends, and four stereo returns, plus two "assignable" parametric EQs.

STRENGTHS: Dead easy to use; well built and laid out; excellent sonic performance.

WEAKNESSES: Lack of metering; no EQ bypass; aux access somewhat restricted; no master Solo indicator.

PRICE: \$3259.99 (32-channel as reviewed). **EQ FREE LIT. #:** 134

BY ZENON SCHOEPE

The background of the advertisement is a collage of various Focusrite Red Range audio equipment. At the top, there's a section of a Focusrite EQ (RED 6 or RED 7) showing multiple frequency sliders and a VU meter. Below that, on the left, is a Focusrite Mic-pre & Dynamics (RED 7) with its characteristic '7' logo and various input and processing controls. To the right of the Mic-pre is another section of a Focusrite EQ. At the bottom, there's a Focusrite Stereo Mic-pre (RED 8) with two channels of input and processing. The equipment is shown in a close-up, detailed manner, highlighting the iconic red faceplate and silver controls.

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Focusrite
Stereo Mic-pre

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Each of the Reds featured here include the premier outboard microphone preamplifier, the classic Rupert Neve - designed Focusrite Mic-Pre. Transformer coupled for optimum impedance matching, this classic delivers all the performance of your chosen microphone direct to the recorder (RED 8) or via a subsequent processing stage.

Recording direct, with optimised signal level, is clearly superior to tracking through a mixer, the performance of which is compromised by the design budget.

Each of these Reds enables you to match the level to the recorder, getting the best performance from the A-D converter, without compromise.

RED 6 combines the classic mic-pre with the equally classic Focusrite EQ: High and low pass filters, high and low frequency shelving controls and two parametric mid bands. Also featured are balanced line input, VU metering and output fader. **\$2,495***

RED 7 is similar, but features dynamic control instead of EQ. The mic-pre is followed by a compressor, (identical to the TEC Award winning RED 3) and a de-esser /exciter stage. This is the best vocal front end in the business (in our humble opinion!). **\$2,495***

RED 8 simply provides two channels of the Focusrite mic-pre. If you've never had the chance to use one, you'll be amazed when you do! Your microphone will reveal hidden tonal & dynamic qualities whether it's a condenser, ribbon or dynamic. **\$2,295***

*Suggested retail price.

The Red Range - World Class.

Focusrite

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peak LED. Mutes are also available with peak indication on the four subs and the two main output faders.

Only two meters — which follow the main stereo mix — are provided, but they also register Solo levels. The lack of more extensive metering is to an extent overcome by the presence of peak LEDs, which make setting up optimum gain structures through the desk very easy and inspire confidence. Fender offers an optional, analog VU meter bridge for \$599.99. The bridge has eight illuminated VU meters — one for each submaster, the stereo master, the mono sum out, and the PFL/AFL solo.

The four stereo effects returns can be routed to the main mix or to a sub in mono and can also be fed to the two monitor busses. Subs can be switched individually to the main mix via a pan. The four aux masters have Solos and the two monitor masters additionally have mutes and peak LEDs. A summed stereo mono output is also supported on its own level pot for feeding center clusters.

The inclusion of two "floating" 2-band parametric EQ sections is a peculiar, but extremely useful, addition. A three-position switch bypasses these sections individually or hard wires them to the two monitor busses for EQing stage monitors. The third position routes the EQ into whatever insert you have physically patched them into. As the main output, the four subs, and each channel all have TRS inserts, it means you can patch an EQ section anywhere you like on the desk as well as using it on external sources.

The two parametric EQs have high- and low-pass 12-dB/octave filters sweeping 10–300 Hz and 3.3–50 kHz, while the two fully parametric bands offer

±15 dB and cover total ranges via a x10 multiplier switch of 80 Hz to 22 kHz and 8 Hz to 2.2 kHz with fully variable bandwidth from 0.4 to 2 octaves.

IMPRESSIONS

The above-described EQ really is wonderful, and while it would be nice to have this level of control on each channel, the basic channel EQ is not bad. The HF and LF are superbly responsive and the mid-range is broad enough to be useful but not so broad as to be unmanageable. Patch a parametric into a channel when processing a really critical source and you'll have no need for outboard equalizers (more frequently, it could be used to eliminate feedback in the on-stage monitoring feeds). The filters are a real luxury and the mid bands are sweet as a nut on their broadest bandwidth. This is quality stuff.

Indeed, the whole desk is quality — it feels rugged and dependable. The sound quality is really quite exceptional and it's clean through the board with predictable overload characteristics on the inputs, good crosstalk, and excellent mute isolation. Even the headphone amp is hi-fi, with stacks of level on tap — something you can't say about all desks.

On the downside, there is no master Solo indicator LED; the auxes are a bit fixed unless you choose to jumper them to suit yourself; and there is no EQ bypass. There are, however, LED indicators beside each input and output Solo switch, plus LED indicators on each mute switch.

Still, I'm very impressed. This live desk is fast and easy to use, which is what you want from a live desk.

Fender guitars? Mixers as well now. Good gear. **EQ**

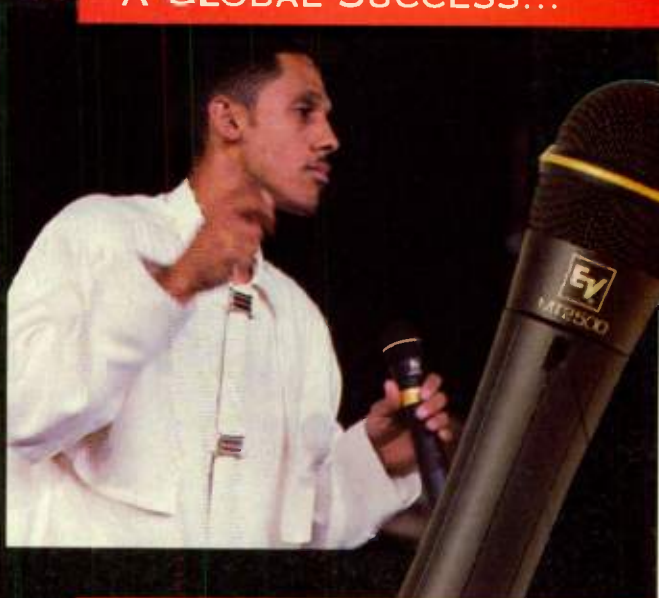
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AUDIO TOYS PRO⁶ AUDIO PROCESSOR

WHEN ATI introduced the Paragon console, it included every feature anyone had ever thought to be useful on a live mixing console. There was no need for a rack of dynamic processors and all those patch cables because every input channel included a complete compressor and noise gate. The Paragon console defined the high-end features for live-sound mixing, but it was financially out of reach for most touring companies and venues. For many users this level of processing on every microphone input may be unnecessary, so ATI (now known as Audio Toys, Inc.) presently offers the complete input section of the Paragon console in a single-rack-space processing unit, the PRO⁶. [Dimensions: 1U, 1 $\frac{1}{8}$ " H x 19" W x 11" D; weight: 7 pounds.] You can now have a Paragon mixer's input for the voices and instruments that most need it.

As a stand-alone processor, the PRO⁶ remains a high-end processor with all the power you would expect from an individual mic preamp, parametric equalizer, compressor, or ducker/noise gate. The single-channel PRO⁶ can not only produce the great sound of a high-quality

processor, it can also produce the kind of special effects that only professional-strength processing is capable of achieving. This is not a device with a control range that remains within the limits of what will always sound good — dramatic effects or drastic repairs are also possible. After all, this is the input section from what was designed as the ultimate live mixing console, and in live sound there is no Take 2, so last minute drastic action is not unknown in processing signals.

The PRO⁶ can accept mic or line-level inputs and, via a detented control, apply as much as 65 dB of gain. The input polarity can be reversed and 48 V phantom power can be switched from the front panel. Mounted concentrically with the input gain is an auxiliary output level control. This auxiliary output can be fed from the signal immediately after the mic preamp section, following the EQ section or following the dynamics sections. With the very flexible signal routing within the PRO⁶, this offers users an output for recording or as a monitor send that can share or ignore

ROAD TEST

MANUFACTURER: Audio Toys, Inc. (ATI), 9017-C Mendenhall Court, Columbia, MD 21045. Tel: 410-381-7879.

APPLICATIONS: No compromise analog signal processing for live sound or recording.

SUMMARY: From the microphone preamp to the main output, the PRO⁶ offers complete control over the signal and all the flexibility of discrete processors.

STRENGTHS: Powerful fully-parametric 4-band EQ; access to the sidechains of both the compressor and ducker/noise gate; major amounts of headroom.

WEAKNESSES: Powerful processing can be badly misadjusted by the uninitiated; cooling fan may be audible in some situations.

PRICE: \$2295

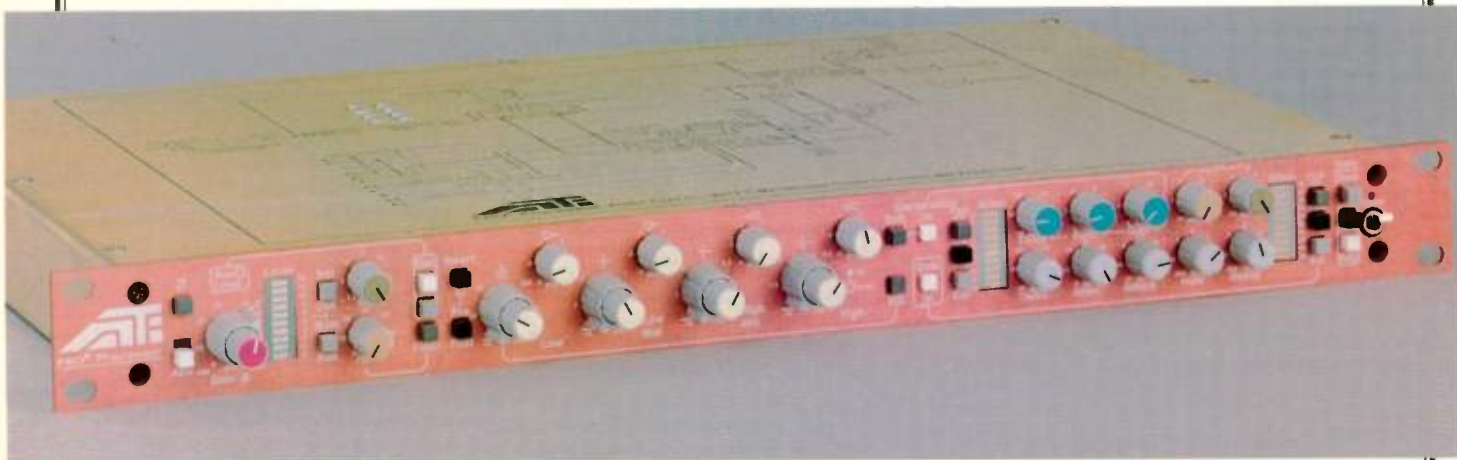
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BY WADE MCGREGOR

any or all of the primary processing required for the main signal. A total of 80 dB of gain is available to the auxiliary output signal, an additional 15 dB more than the main output.

The equalization of the PRO⁶ is more flexible than many stand-alone parametric EQs. First, there are continuously variable high-pass (10 Hz to 320 Hz) and low-pass (1.2 kHz to 40 kHz) filters with a bypass switch. Then there are four bands of parametric EQ, which offer generous overlap and can be switched to peak or shelf filter types. Add to this

a variable Q of between 0.3 and 3 octaves [see fig. 1], and you should be able to find a filter shape that suits any signal you will encounter. All the EQ controls serve double functions: concentric controls for EQ amount (dB) and frequency center, while the continuous control for Q is also a push-switch to alternate between shelf and peak. I found that some of these switches would occasionally need to be over-pressed to activate, because the control's shaft was binding slightly on the front panel.





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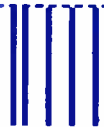


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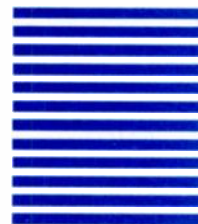
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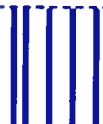


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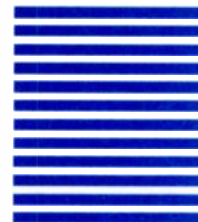
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The compressor and noise gate are completely independent processors. The compressor includes controls for threshold, ratio, and make-up gain, plus switchable soft-knee mode and high-frequency enhancement. The combination of soft-knee compression with ratios up to 10:1 and the high-frequency enhancement offer remarkable degrees of compression without the usual loss of definition. [Manufacturer's Note: The PRO® compressor circuitry is a patent of ATI. The high-frequency enhancement is always present in the compressor circuitry, but acting on the sidechain of the VCA to reduce the amount of high-frequency content that

ing where you want some instant help in overlaying two sounds.

The combination of mic preamp and compressor is especially useful in live sound applications to reduce the large dynamic range of some performers and to help when ringing out feedback from the monitor or FOH system during setup. Set a relatively low threshold on the compressor, and then as you bring up the microphone gain to the level of feedback (with an active sound source at the mic), the howl is held at a level that prevents damage to ears or loudspeakers. As you notch out each feedback ring, the compressor will bring up the gain to the next feedback

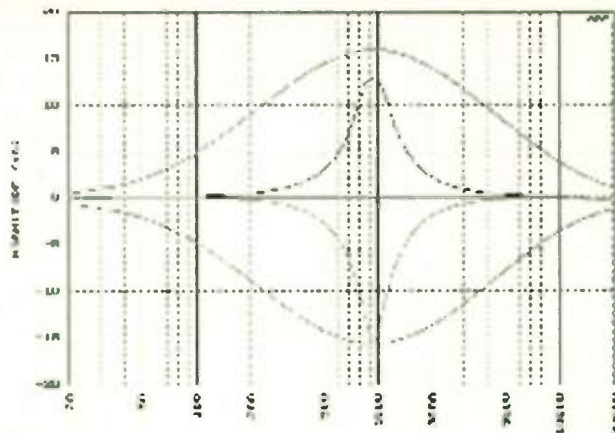
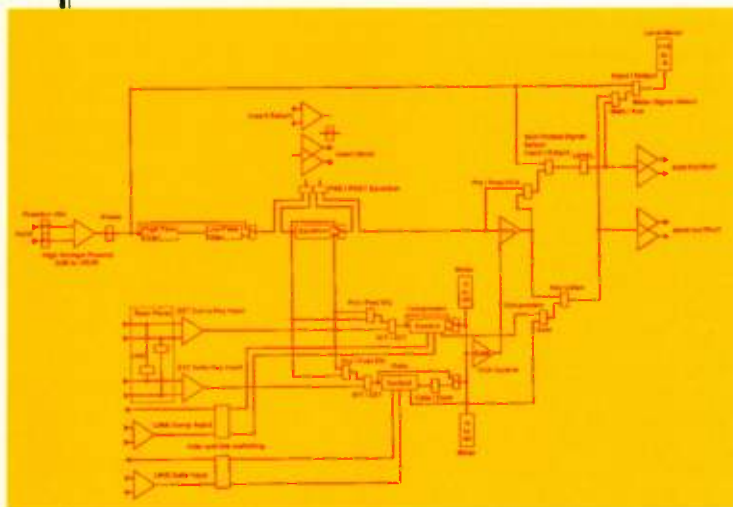


FIGURE 1: The PRO® offers a wide range of bandwidths for each of the four EQ bands. Shown above is EQ band two set to 950 Hz with full boost and cut (± 15 dB) and Q settings of 0.3 and 3 octaves. Each band can also be switched between peaking (shown above) and shelving (not shown) filter types.



GET IN THE FLOW: A signal flow diagram for using the ATI PRO®.

would be attenuated under high compression ratios.) The noise gate is complete with on-board key filters to add frequency as well as level discrimination to the key source. Attenuation can be adjusted from unity up to -60 dB; Attack from 10 ms to 100 ms; and Hold and Release adjustable between 4 ms and 4 seconds. This is enough range to transparently remove leakage from a vocalist's mic or deliberately add transients to a dull sounding kick drum. The gate can also be switched to perform duck-

ring. Quick and painless feedback equalization.

Metering is complete and concisely grouped on three very bright 10-segment LED ladders. Input and Output, both main and auxiliary, can be selected with pushbuttons on a meter adjacent to the Input/Aux level controls. Compression gain reduction is displayed beside the compression-mode switches, and gate attenuation is displayed beside the gate switches. It would be my preference to have these

meters active even in bypass so that I am aware of the level of gating or compression I can anticipate when engaging this processing.

Front-panel labeling is dense, and some labels for pushbuttons do not clearly indicate which mode is active when the button is depressed. Fortunately, the labeling is consistent, and with use this confusion should be short-lived. However, it is not immediately apparent from the front panel that the Q controls for the parametric are also the shelf/peak switch. Any confusion can be quickly dispelled by the user's manual, where concise descriptions of each function and clear drawings of the related controls or connections appear.

In keeping with the high-end heritage of the PRO®, all audio connections are fully balanced. In fact, the rear panel is covered in them. Nonetheless, there is still room for ground-lift switches (input, outputs and inserts) and clear labeling. The input connection and main and auxiliary output connectors are XLR-type. All the other audio and DC control connections are 1/4-inch phone jacks. Both the compressor and

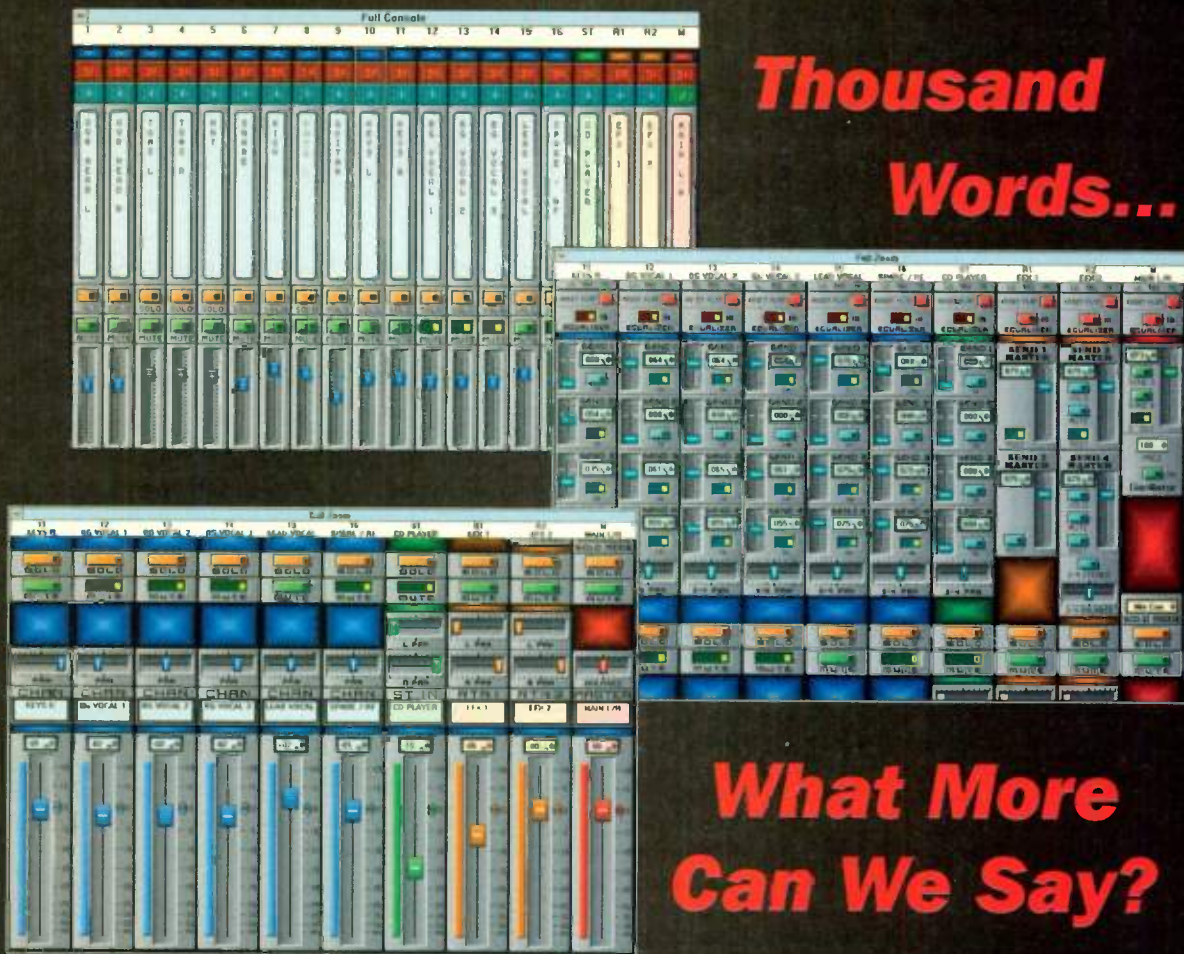
gate include separate link connections for In and Out (DC control of the VCA for stereo operation) in addition to external audio inputs for triggering the thresholds. All four of these connections can be selected individually from the front panel, thus making permanent connections to a patchbay very practical. There are also insert send and return connections that can be switched in/out of the signal path and routed pre/post EQ. These are more connections than many dedicated dynamic processors provide.

The ATI PRO® takes high-end mixing console technology and places it within reach of the project studio, regional/local SR company, and club performer. This is a great combination of an excellent pre-amp and processing that will allow them to make adjustments that can range from the tiniest tweak to a sledgehammer blow. The PRO® qualifies as both an esoteric mic preamplifier and as an excellent signal processor, and is worth the investment even if you are only after one of its many capabilities. After all, there are bypass buttons on every section.

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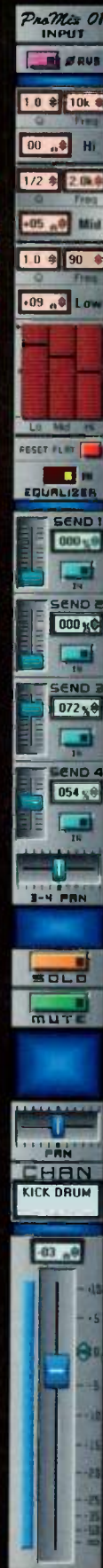
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Steroids for Electric Guitar

How to build your own IGGY and get better sound from guitars

BY CRAIG ANDERTON

One of the surest ways to kill a guitar's tone is to load it down with a low-impedance input (like most mixing consoles and pro-quality effects have). As mentioned in this month's *MI Insider*, an impedance mismatch can result in a dull, lower-level sound — definitely not the way to have your axe cut through the average wall of noise.

Throw in the nasty effects of cable capacitance, hum pickup, and other

gremlins, and it's amazing guitars sound as good as they do. One solution to all these problems is to immediately follow the guitar output with a preamp that presents the guitar with a very high-input impedance, and transforms the signal to one with a very low impedance. Not only does this preserve the level, it also counteracts a cord's cable capacitance with long cable runs.

Although there are lots of preamps in the world, IGGY (Interface Gizmo for Guitarists) is designed specifically to make guitars and basses sound better in the studio. For a little work and about \$30 in parts, this box will let you patch a guitar directly to a mixing console, drive effects with XLR balanced inputs, and allow for extremely long cable runs without sound degradation. And if you're a real purist, you can also record right into the balanced inputs of tape or hard-disk recorders and DATs, thus bypass-

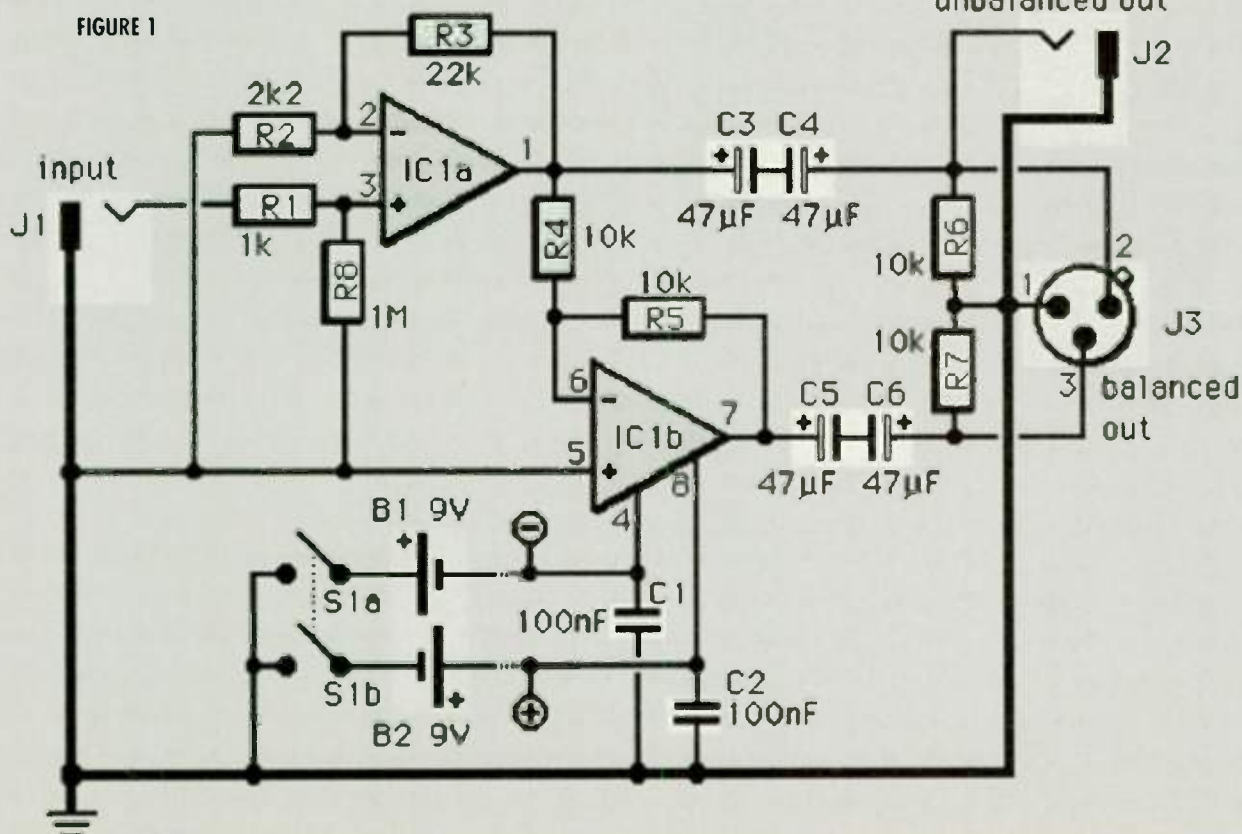
ing all the mixer electronics (IGGY's signal-to-noise ratio is better than 90 dB, and the frequency response extends past 100 kHz). The improvement in sound quality can be significant.

WIRE FOR HIRE

Fig. 1 shows the schematic; the main ground lines are drawn a little thicker. IC1 is an NE5532 dual low-noise op amp (this chip is used a lot in pro gear because of its excellent specs), however, you can substitute a TL082 or TL072 (slightly lower noise than the 082) if the NE5532 is hard to find. To find good parts sources, go to your newsstand and buy a copy of *Electronics Now* or *Popular Electronics*. A variety of parts houses advertise in these magazines (and you'll get much better prices than Radio Shack).

IC1a converts the guitar's output from high-impedance to low-impedance, while adding approximately 20

FIGURE 1



PEAVEY AND EDWARD VAN HALEN ANNOUNCE THE WOLFGANG GUITAR!

PEAVEY ^{EVH} wolfgang

Todd Cowden

ANAHEIM, CA — At the 1996 NAMM show, Peavey Electronics and Edward Van Halen announced the release of the Wolfgang guitar.

the design of the guitar was a joint effort by Harley Peavey and Edward Van Halen



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PARTS LIST

Resistors (5% tolerance, metal film preferred for fixed resistors)

R1	1k
R2	2.2k (2k2)
R3	22k
R4-R7	10k
R8	1M

Capacitors (35 or more working volts, mylar or polystyrene preferred except as noted)

C1, C2	0.1 μ F (100n)
C3-C6	47 μ F*

*tantalum or electrolytic

Other Parts

IC1-IC3	NE5532 or TL082 dual op amp
---------	--------------------------------

J1, J2	Mono, open circuit, 1/4" phone jack
J3	XLR plug or chassis-mounting male XLR jack (see text)
S1a+b	DPST or DPDT switch
B1, B2	9-Volt battery (see text)
Misc.	IC socket, perf board, case, wire, power supply, etc.

Specs

Freq Response: ± 0.1 dB, 10 Hz–100 kHz

S/N Ratio: Greater than 90 dB

Input Impedance: Greater than 500 kohms

Output Impedance: < 600 ohms

Headroom (+15 V supply):

Greater than 26 V peak to peak

Gain: 20 dB

dB of gain. IC1b provides the additional output needed for balanced line operation. J2 sends the signal to unbalanced inputs, and J3 patches to balanced inputs. Since you can use both outputs simultaneously, IGGY is also an active splitter.

BUILDING IT

The simplest approach is to mount the parts on a perf board or printed-circuit board, which then mounts inside a metal case with a cable trailing out to an XLR plug. Install the 1/4-inch jacks in the box itself. Use metal-film resistors for lowest noise, and a socket for IC1 to prevent heat damage while soldering.

Power IGGY with two 9 V batteries as shown, or any bipolar power supply between +5 and +15 V. If you're not going to use batteries, remove them and S1 (which turns the battery power on and off); feed in the external supply at the points marked (+) and (–) on the schematic.

To use IGGY, plug your guitar into J1 using as short a cable as possible, and patch J2/J3 into the console input, processor input, or long cable run. Play away — you might be surprised at just how clean and crisp a guitar can sound when it's not being loaded down.

MOD SQUAD

You can alter IGGY's gain by changing R3's value. The amount of gain equals $(R3 + 2.2) / 2.2$, with R3 in kohms. For example, R3 = 22k gives a gain of 11; 100k gives a gain of approximately 45.

J3 is wired with pin 2 "hot," in accordance with the IEC standard for XLR connectors. However, some maverick gear uses pin 3 as "hot." You can accommodate this gear by reversing the wires going to J3 pins 2 and 3, but this isn't really necessary unless you're using IGGY as a splitter.

And that's all there is to it. Aren't you glad you know how to solder?

(Note: this article is adapted from the book "Do-It-Yourself Projects for Guitarists," published by Miller-Free-man books.)

EQ

Craig Anderton is technology editor to EQ magazine and a consulting editor to Guitar Player magazine. Visit his "Sound, Studio, and Stage" area on America Online.

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IN REVIEW

Valley Audio 730 Dynamap



MANUFACTURER: Valley Audio, a division of Galaxy Audio, Inc., 601 E. Pawnee Avenue, Wichita, KS 67211. Tel: 316-265-9500.

APPLICATIONS: Audio processor for the recording studio.

SUMMARY: Lots of versatile features makes this unit stand out among its contemporaries.

STRENGTHS: Very versatile; plenty of features; good A/D-D/A converters.

WEAKNESSES: Won't get my morning paper; interface takes some getting used to.

PRICE: 730DD (digital), \$2798; 730ADD (w/analog), \$3548

EQ FREE LIT. #: 136

IF YOU remember the Kepex, the Gain Brain, the Headroom Horseman, and the Dynamite, then you have been around audio for a while and are familiar with Valley Audio. Valley Audio has been around for 25 years producing solutions for audio dynamic control. Not a company to rest on its laurels, I offer a hardy (I couldn't resist) congratulations on their entry into digital dynamic control.

The Valley Audio 730 Dynamap provides an entirely fresh approach to dynamic control. Besides doing an exemplary job at the normal dynamic parameters, the 730 has added features that are virtually impossible with analog dynamic processors. The expected parameters, such as Attack, Release, Threshold, Gain and Ratio, have been joined by Range, Shape, Mix and Stereo Width. The only thing I haven't been able to make the 730 Dynamap do is get my morning paper.

The 730 Dynamap is available in two versions: 1) The 730DD (not to be confused with any measurements on the 50-foot woman) is fully digital in and out; 2) The 730ADD has all of the

digital capabilities plus stereo 18-bit delta sigma A/D and D/A converters. The analog inputs can be balanced, unbalanced, pin 2 or pin 3 hot, and ground lifted. The digital inputs available are AES, S/PDIF, and optical. Any two of the three inputs can be operational at the same time. The second input can be routed to the Key/Mix input. If Mix is selected from the Key/Mix menu, then both inputs can be mixed together digitally.

FEATURES

Peak Limiter: Because the 730 is a digital device, it can look ahead to see what is going to happen before you actually hear it. LSB truncation in conjunction with the look ahead feature provides distortion-free peak limiting with the elimination of pesky "overs."

High-Frequency Compressor (De-esser): Digital domain de-essing is one of the best applications of the technology. High Q filters with phase correction allows processing sibilance without turning "S"s into "F"s. With the resurgence of analog mastering, sibilance processing has become more

important than it was for CD-only mastering.

Stereo Dimension Enhancement: You can reduce the stereo separation all the way down to mono, or you can enhance the stereo separation by up to 6 dB. I tried it on some old 2-track tapes with excellent results.

Digital Level Control: You can raise or lower the level digitally to get the most use out of those 16 bits.

Mix: This feature lets you do some amazing things with the compressor. You basically have two threshold levels. As the level exceeds the first threshold, compression starts compressing at the set ratio. As the level gets higher, some of the source audio mixes in and starts canceling the compression. Loud peaks get through uncompressed-compressed, while the meat of the audio can be made to sound loud without pumping. [The Mix parameter is available when using the Standard, Enhanced or Map compressors simultaneously with the Expander. When the Mix value is set to 99 percent or less, some unprocessed signal will be present regardless of whether the threshold has been reached. As the amount of unprocessed signal increases, the knee softens, that is, the effective ratio changes. The amount of effective make-up gain decreases at the same time.]

Memory: There are 495 user-programmable storage registers for settings and parameters.

OPERATION AND SOUND QUALITY

The 730 Dynamap has more parameters to set than you can shake a stick at. It takes a while to get used to surfing around the menu tree, but once you get the hang of it you get from



anywhere to anywhere else with just a few keystrokes.

I spent about a month cruising the compressor and de-esser. With the extra parameters added to the compression settings, the combinations are almost endless. For me, this is a good thing. There have been many times when I have inserted a compressor on an entire mix to see if I could get the mix to sound a little louder. It would sound fine for a while, and then when the drum fill came, *SUCK, SUCK, duhSUCK*. With the 730 controls, you can set up the compressor so that things like drum fills are let through the compressor, instead of driving down the level of the rest of the track.

This brings us to the namesake processing option of the 730, the Dynamap. The characteristics of most compressors can be defined using only a single ratio, threshold, and gain setting. With the 730 Dynamap, you can construct a dynamic map made up of eight segments. The segment slopes and locations are defined by selecting Threshold/Gain endpoints. After you select the Threshold and Gain of each endpoint, the 730 calculates the ratio for each segment to connect the endpoints. The ratio in each segment may be greater than 1:1 (compression) or less than 1:1 (expansion) depending on the endpoints you select.

The High-Frequency Compressor is used mostly for de-essing. There are three listening modes to help you set up the de-esser for optimum operation: Normal mode allows you to listen to the broad band product with de-essing active; Tune mode allows you to listen only to the compressed high-frequency band to help you optimize your settings; and Invert mode suppresses the broadband signal 24 dB and the compressors operation is inverted. This causes the level of the effected band to increase as it crosses

the threshold, making the problem area jump out so you can further fine tune the parameters.

The 730 Dynamap also has a mode called Static. No, it doesn't add clicks and pops to your audio. In this mode there is no dynamic processing. This is the mode that allows you to adjust the stereo field width, input and output levels. The Key/Mix input is also adjustable in this mode, allowing you to mix in another digital signal if needed. The Main In, Key/Mix In, and Output levels can be changed in 0.5 dB steps from 0 dB to mute. The Stereo Width can be changed from +6 dB to -71.5 dB to Mono in 0.5 dB steps. I haven't figured out exactly how they do it yet, but the +6 dB position actually does widen the stereo image. On the oscilloscope it does not look like the phase relationship is getting out of hand, so I would not be against trying this on some old mixes I want to spiff up.

SUMMATION

The 730 Dynamap is a great sounding piece of equipment. The converters sound good enough to use as your main A/D-D/A for critical listening. Nice and smooth. If you have any doubts about using a digital compressor on analog material because of the extra conversions, forget about it. These conversions won't get in your way. Don't forget that you can use an analog source to key the dynamics on a digital signal, or vice-versa.

If you have ever sat in front of a compressor saying to yourself, "I wish this thing would..." well, this is just the puppy that can.

If you don't have room in your rack for the 730, don't worry. With the polished stainless-steel chassis, you will want to put it out on top of your rack where everyone can see it. Good work, Valley Audio. I can't wait to see what's next.

—Roger Nichols



World Radio History



**COMING UP IN
MARCH 1996**

CONSOLE ANNUAL. Once a year our editors get their hands on the coolest consoles around, putting the latest desk configurations to the test. Here's what's new from the major purveyors of console technology.

EQ LIVE. Steve La Cerra takes the Lexicon PCM 90 out on the road. And the first in a series of new club reports takes us up I-95 to Toad's Place in New Haven, CT, to find out what the house system has to offer the band-in-a-van.

GREAT GEAR. This month's product section is devoted to the mega-intros at NAMM. We're also the first to review the new Iomega Jaz drive, and take the very first look at the Roland VS-880. And software heads get a taste of four new noise reduction programs for Windows.

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Tube Amplifier Tips

Don't assume the worst
(i.e., most expensive)
thing when your tube gear
breaks down

BY EDDIE CILETTI



Vacuum tube (VT) guitar amp designs are anything but conservative. Simple, perhaps, but not conservative. In fact, so much performance is squeezed out of each tube that the end result can be mostly inconsistent — and, occasionally, magical. This explains why enthusiasts are particularly obsessed about subtleties like make, model, and vintage of both the gear and its component parts. Purists will insist only on original replacement parts and zealously argue against replacing a VT rectifier with a solid-state (SS) device.

In contrast, some hi-fi gear and most pro equipment is of such conservative design that even marginal tubes will allow them to meet spec. For this — and many other artistically related reasons — experience has taught me to treat guitar amps differently from hi-fi/pro gear. For example, distortion in excess of 1 percent is plainly visible on a 'scope. Guitar amps, however, have typical distortion figures of 10 percent — *before* going into overdrive. They never look great on a 'scope, and present a temptation to "tweakheads" like me who must resist the urge to "improve via modification."

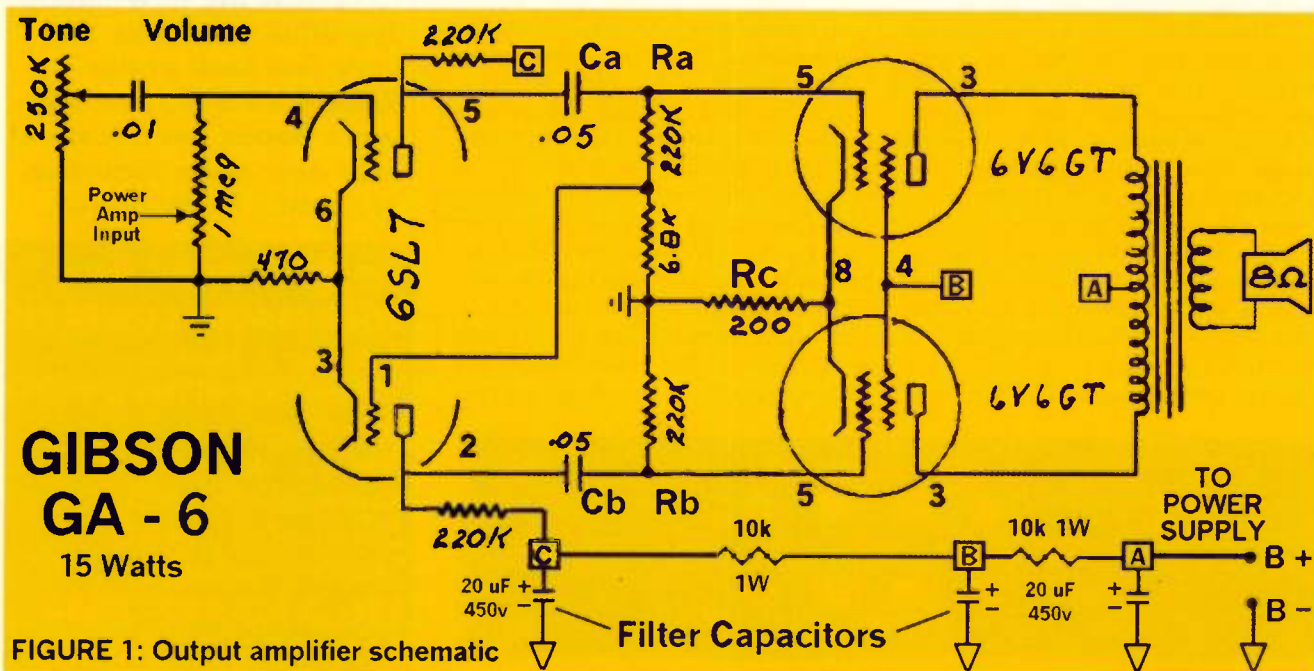
In all cases, failure-prone parts should be replaced even when they *appear* to be good. This approach will save considerable time. Don't, however,

assume that the cause of an intermittent problem is the most expensive, hard-to-find part, such as an output transformer. Look instead for the simple, affordable solution: components such as high value resistors (100 kohm and up) and inter-stage capacitors, both of which often become unstable when they're critically needed.

Here are five, common, easy-to-solve, tube-amplifier maladies:

Hum: Power supply filter or smoothing capacitors lose their ability to hold a charge, resulting in a saw-toothed hum that will vary in frequency depending on the type of rectification. The conversion from AC to DC will yield either a 60 Hz, "half wave" hum when a single diode (VT or SS) is used or a 120 Hz "full wave" hum when two or four diodes are used. The solution is to change the capacitors, which have capacitance specified in micro-Farads (abbreviated as "µF" or "mF") and operating voltage specified in either "volts" or "working volts" (V or WV). Typical values are 20 µF @ 525 WV. Replace solid-state, plug-in rectifiers either with a new model or a vacuum tube. The older type are failure prone and can short-circuit a power transformer designed for VT rectification; a sad and most unhappy smell.

Noticeable Loss of Output Power or



Fender TWIN REVERB SCHEMATIC AB763

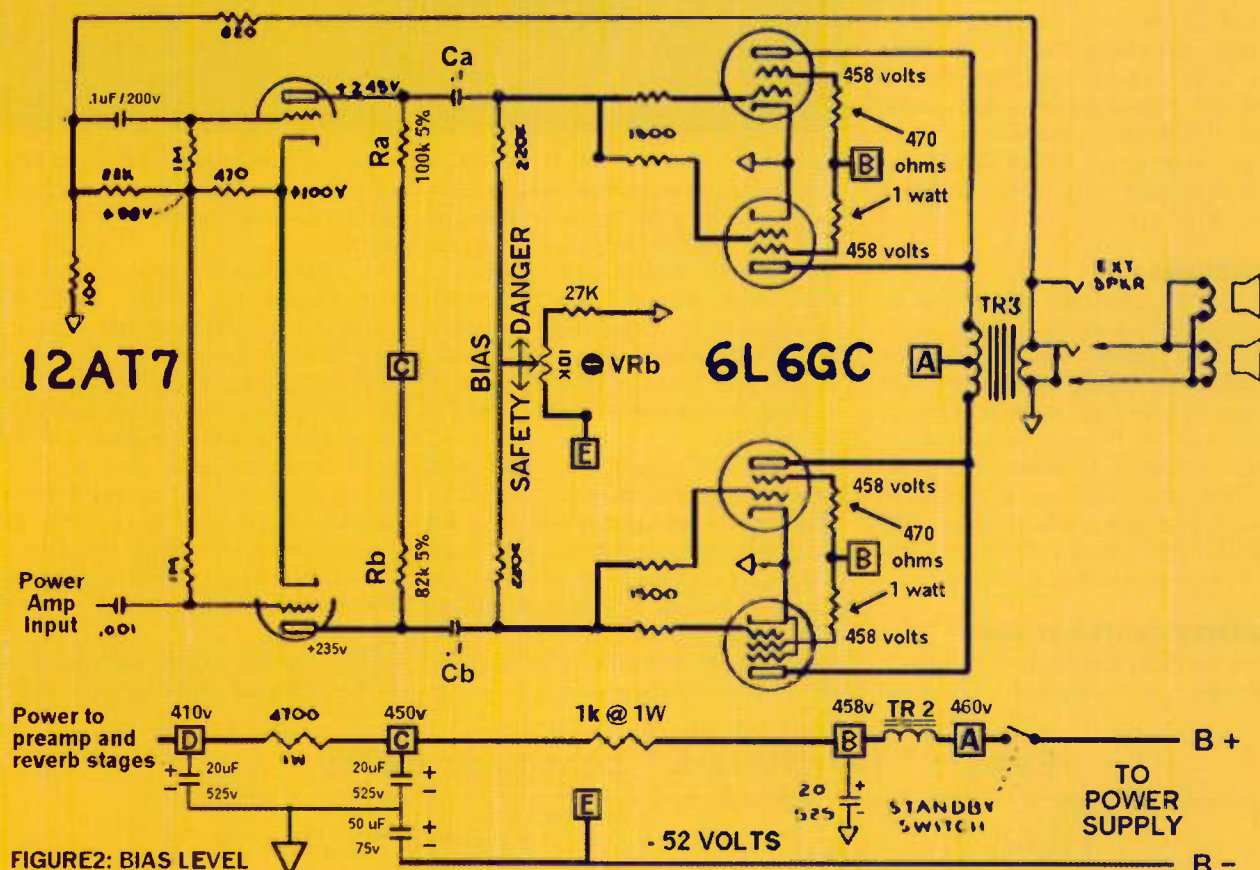


FIGURE 2: BIAS LEVEL

Preamp Gain: After years of burning the midnight oil, the cathode's electron emission will be reduced. This can be verified with a tube tester. The mystery ailment, however, is "gas," and a tube suffering from this disease will be particularly nonlinear — a.k.a. distorted — even when not overdriven.

Noise: While tubes can be a source of microphonics and noise, recurrent problems point to carbon resistors. A significant improvement can be made by replacing them with the metal film variety.

Intermittent Problems: Since guitar amps are subject to road abuse, look for loose components or tube sockets that have lost their grip. Suspect a socket that produces a crunchy noise when the tube is wiggled. Loose sockets will not only cause bias-related, output tube problems such as the dreaded "cherry-red plate" syndrome, but also interrupt the filament power. (I solved one mystery simply by close, visual inspection of the miniature, dual-triode (12AT7) preamp/driver tubes.) Confirm that the filaments in both halves are lit.

Tube Matching & Bias: For any amplifier using two or more power output tubes, each tube should be by the same manufacturer and each pair (or quartet, if applicable) should be matched. If one tube fails or is damaged, always replace both! Mismatched tubes will make proper adjustment impossible. Not only do guitar amps subject tubes to great amounts of stress (especially if you are keen on distortion), but the relative amount of bias will affect sound and performance.

BIAS: GOOD FOR YOUR TUBES

Bias optimizes the degree to which both tubes and tape are "turned-on." (No bias = the tube will overheat; too much bias = the tube will barely let a signal through.) The primary difference is that biasing tape requires a high frequency (AC) while biasing vacuum tubes requires no frequency (DC). (Transistor amps have bias adjustments too.) Insufficient or disappearing bias, either through poor adjustment or component failure, will shorten tube life, possibly damage related circuitry, and trash the output trans-

former (the most expensive component).

VISUAL INSPECTION

Not all amplifiers provide or require a bias adjustment. If you suspect a problem, one quick and simple user test requires only a close look. Power output tubes have filaments that are supposed to glow red, but they also have plates that should not glow at all.

If you have changed the output tubes with no improvement, then it's a good idea to change the grid resistors (Ra and Rb) on each tube. This resistor is connected to pin 5 of a 6L6, 6V6, 6CA7/EL34, 5881, 6550, and/or pin 6 of a 7027 and pin 2 of a 6BQ5/EL84. The DC blocking capacitors Ca and Cb — between the driver and the output stages — should also be replaced. This sort of information can be found in...

THE TREASURE MAP

Three bias circuitry variations are depicted in figs. 1, 2, and 3. These can also be found on America Online in Craig Anderton's SSS under "EQ On-line." Just look for the button with my name! Fig. 1

WORKSHOP

is a schematic of my most prized possession, a Gibson GA-6. I was lucky enough to find the Master Service Book for this no-frills, tweed-era 15-watt amplifier. Figs. 2 and 3 have been simplified to show two Fender power output variations. (Incidentally, enthusiasts could not go wrong acquiring any of R. Aspen Pittman's tube amp books (Groove Tubes, 818-361-4500).)

CATHODE BIAS

Fig. 1 shows how bias voltage can be developed across a cathode resistor, R_c . If the tubes attempt to draw excessive current, more voltage will appear across R_c (typical values are between 12 and 20 volts), raising it even higher above ground potential. To look at it another way, the grid (which is referenced to ground and essentially at "0" volts potential) will appear to be more negative with respect to the cathode.

SEPARATE NEGATIVE BIAS SUPPLY

When an independent bias voltage is desirable, it is developed by a "tap" on

BEAM A LITTLE BEAM

For a detailed look at a beam power tube, check out the June '95 issue of *EQ*. On page 84, the illustration to the left shows each component clearly labeled. (The sidebar above it also lists sources for parts.) The outermost metal housing is called the Plate, which is made positively attractive to electrons (which are negatively charged), by applying hundreds of volts. Too little bias will accelerate the electrons to ecstasy, bombarding the plate at such force as to cause it to glow red. Eliminate all other sources of illumination to make sure that each plate is not even faintly glowing.

—EC

the power transformer to which a reverse-biased semiconductor diode is connected in a half-wave configuration. The voltage ranges between -60 and -35 volts (with respect to ground) when measured before the bias resistors, R_a and R_b . If the juice is missing or not within spec, check the diode, replace the capacitor, then spray and exercise the pot (replacing the latter, if necessary).

The Bias adjustment, VRb, will either vary the amount of voltage to both tubes (fig. 2) or change the balance of the voltages between the tubes (fig. 3). In all cases, if either of the plates in the output stage is glowing, try another set of matched tubes. If the problem persists or is intermittent, replace the bias resistors, the coupling capacitors, and, if loose, the

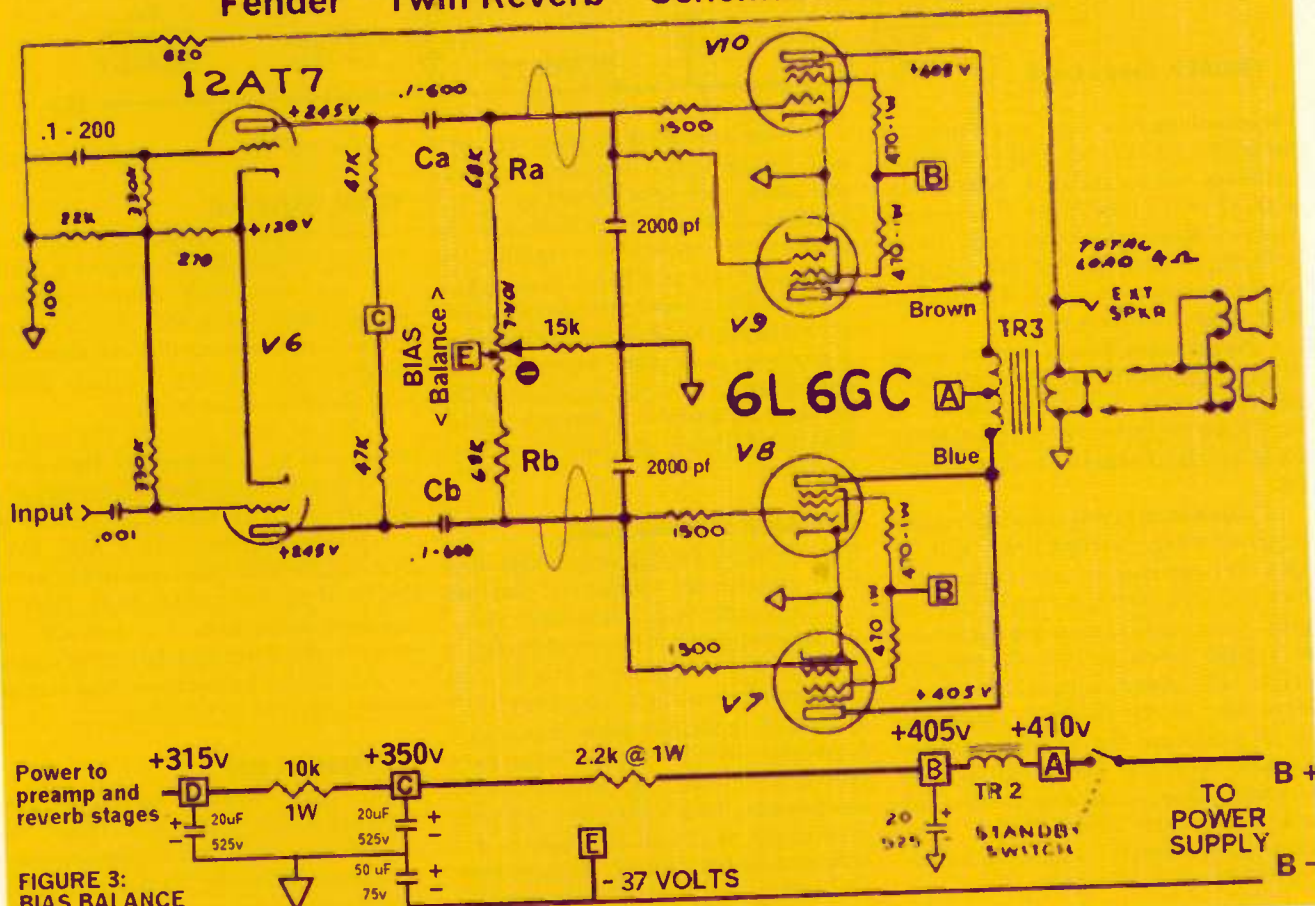
socket(s). While the output transformer may be suspect, all of the other solutions are far more affordable steps worth trying first.

Note: Measuring the juice in a high-impedance circuit requires a voltmeter capable of 20,000 ohms-per-volt (less is not better). Unless an oscilloscope or a really high-impedance DC voltmeter is used, attempting to measure the grid voltage will yield little information of value. In fact, it could momentarily "fix" the problem. In addition, be especially careful when working on high-voltage circuitry. Do not attempt to steady yourself by placing one hand on the chassis.

EO

Contact Mr. Ciletti at: eddieau-dio@aol.com.

Fender "Twin Reverb" Schematic AA769



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FIRST LOOK

continued from page 38

together for stereo operation. The IN-C-2021 has two eight-segment LED meters that can either show output level or gain reduction — very handy for monitoring the status of your signal. And like the two EQ units, the compressor has auxiliary instrument-level inputs for taking keyboards or guitars direct to tape. The IN-C-2021 lists at \$1395.

The last member of the Indigo series is the IN-O-2031, a descendant-on-steroids of TL Audio's VI-1 vacuum tube line interface. But this unit lets you manipulate the signal with considerably more facility than the typical tube-based line driver. Each channel has continuously variable input and output controls with a boost control (defeatable) providing extra gain at the input to overdrive the tubes. A jack on the rear panel accepts a footswitch for turning the boost function on or off.

In addition to the expected I/O controls, there are some unexpected EQ functions in this unit. There are three rotary pots for fixed-frequency low, mid and high band EQ. While this single set of controls does affect both channels, there are independent EQ bypass switches per channel as well as a continuously variable low-pass filter (also with bypass). These extra features make the 2031 attractive to owners of digital multitracks who are looking to reduce the coldness of their tape machines and experiment in attaining new sounds.

But the really cool thing about the 2031 is that the instrument-level input, signal boost control with foot switching capability and EQ enable the unit to function as a high-quality guitar or bass preamplifier. So studio owners get a high-quality guitar pre as a bonus when adding this unit into their rack. Signals passing through the unit are monitored by three-stage LED meters (one per channel) that indicate signal present, peak and clip levels (note that in the photo, the clip LED is labeled "boost" but production units will be labeled "clip"). The IN-O-2031 lists at \$1295. 

For more information, contact the Sascom Marketing Group, 34 Nelson St., Oakville, ONT., Canada, L6L 3H6. Tel: 905-469-8080. Circle EQ free lit. #137.

AVALON U5 REVIEW

continued from page 82

need for EQ further down the line.

The remaining features include a "signal present" LED, ground-lift switch, headphone jack (and wow, does it ever sound good when you listen to your guitar through this!), and 115/240 V operation. One feature that doesn't show up on a spec sheet is the design, which can best be described as the krells meet Hallicrafters (inside joke for those familiar with both the movie *Forbidden Planet* and communications transceivers). It's built like a tank. I didn't venture dropping it from my roof, but I bet it would survive if I did.

There is one caution: the input ground is isolated from chassis ground, which is good design practice. However, if you're listening through headphones and don't have the XLRs feeding something, there's no return path to ground from the input jack ground, which leads to beaucoup hums and buzzes. If you find yourself in this situation, clip the input cord ground to anywhere metal on the chassis.

DO BIG BUX BRING DELUXE?

Yes, but think carefully about your studio before you get too excited. This box is overkill for many applications, because unless the rest of your equipment is on a par with the U5, you're paying for performance you can't really hear. But with ultraquiet digital recording gear, the U5 provides a top-of-the-line link between the analog world and all those digital audio A/D converters that can't handle low-level signals. The sound quality is beyond clean, and the construction is solid. This is a direct box that comes very, very close to the ideal of a straight wire with gain. For many people, that will be worth the price tag. —Craig Anderton

KORG REVIEW

continued from page 86

are a huge number of sounds lurking in here, because there are so many possible combinations of parameters.

So what's there not to like? Well, the factory presets favor aggressive alternative rock and thrash styles, and feature highly distorted effects. Some players will like the presets as is, but others working in different music

styles may find these presets unsatisfying. That would be too bad because the factory patches do not show how versatile Pandora is.


Because I prefer smoother, more vintage sounds, I was ready to write off Pandora until I became intimate with the Editing mode. Playing with the parameters yielded smooth leads, some great rockabilly country sounds — even decent compression once I pulled back on the drive control. If you plug in and don't like what you hear, just remember that there's much more to Pandora than meets the ear initially.

Overall, Pandora gives you major bang for the buck, and the effects are surprisingly good once you figure out how to tweak them. Pandora is not going to blow away a digital multieffects costing twice as much, but the gap between the two is narrower than you might expect. The tuner function is also helpful. Plan to program Pandora if you buy it, because editing will get you beyond the presets and open up lots of more versatile, cool sounds that definitely belie the small size and low cost. —Craig Anderton

BLUES TRAVELER

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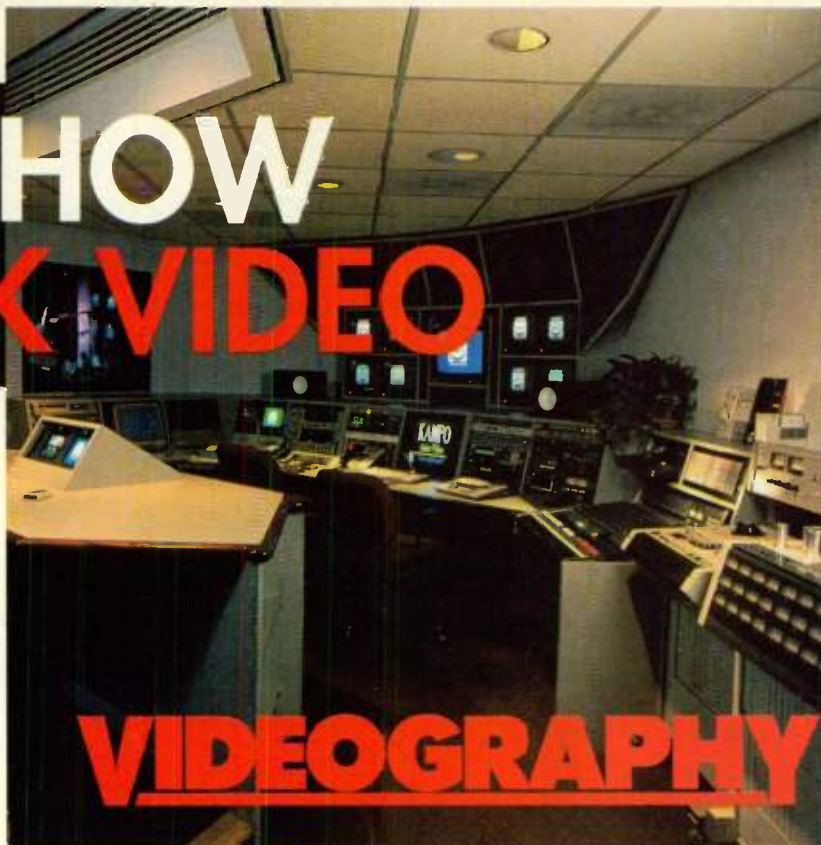
alistic impression of what's going on up there. To combat this, I try to get the subs uncoupled with the floor as much as possible and position them out to the sides. Or I'll form some creative speaker columns. I just try to find different ways for the bass to couple with the area of the room it's working in. When I go way out to the sides with the subs, I get the natural low end tendencies of the room. Then the cabinets are responding more to what's sensitive to me and not what's sensitive on stage. When the sensitivity point spills in towards the stage, it's really difficult to deal with. I'd rather have the sound a little more thick and low-end oriented in the FOH before it gets to the stage. The resonant coupling is twice as bad for the band as it is for the audience. Bass is nondirectional and I think techs sometimes overestimate the time-alignment aspects of it.

Blues Traveler is trying to communicate to the audience, and this makes my job more enjoyable. The most intense part of their show is that it's like a canon — they come on strong and finish strong. Those first 12 bars are a real adrenaline boost for me! 

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SM58 Unidirectional Dynamic Microphone

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- Self-contained spherical filter to control explosive breath sounds ("pop") and wind noise in outdoor locations.
- Unusually effective cardioid pickup pattern to minimize background noise and undesirable effects of studio and location acoustics. Rear and side rejection uniform to very low frequencies and completely symmetrical about microphone axis.
- Bright, clean sound. Especially good for vocal music, announcing, narration and dialogue.
- Cartridge shock-mounted for protection and quiet operation.
- Wind and "pop" filter removable for cleaning or replacement.
- Versatility - designed for both field and studio use - hand-held or on a stand (slip-in swivel adapter included).



SM57 Unidirectional Dynamic Microphone

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

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



SENNHEISER

RF CONDENSER MICROPHONES

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



MKH 20 P48U3 Omnidirectional

Low distortion push-pull element, transformerless RF condenser. Flat frequency response, diffuse/near-field response switch (6 dB boost at 10 kHz), switchable 10 dB pad to prevent overmodulation. Handles 142 dB SPL. High output level. Ideal for concert, Mid-Side (M-S), acoustic strings, brass and wind instrument recording.

MKH 40 P48U3 Cardioid

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

MKH 60 P48U3 Short Shotgun

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

MKH 70 P48U3 Shotgun

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

TASCAM

DA-88 Digital Multi-Track Recorder

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

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



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

Fostex

RD-8 Multi-Track Recorder

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



- Full transport control is available via the unit's industry-standard RS-422 port, providing full control right from your video tape. The RD-8 records at either 44.1 or 48KHz and will perform Pull-Up and Pull-Down functions for film/video transfers. The Track Slip feature helps maintain perfect sound-to-picture sync and the 8-Channel Optical Digital Interface keeps you in the digital domain.
- All of this contributes to the superb sound quality of the RD-8. The audio itself is processed by 16-bit digital-to-analog (D/A) converters at either 44.1 or 48KHz (user selectable) sampling rates, with 64X oversampling. Playback is accomplished with 18 bit analog-to-digital (A/D) and 64X oversampling, thus delivering CD-quality audio.
- The S-VHS transport in the RD-8 was selected because of its proven reliability, rugged construction and superb tape handling capabilities. Eight tracks on S-VHS tape allow much wider track widths than is possible on other digital tape recording formats.
- With its LCD and 10-dot display panel, the RD-8 is remarkably easy to control. You can readily access 130 locate points, and cross-fade time is fully controllable in machine to machine editing. Table of Contents data can be recorded on tape. When the next session begins, whether on your RD-8 or another, you just load the set up information from your tape and begin working. Since the RD-8 is fully ADAT compliant, your machine can play tapes made on other compatible machines, and can be controlled by other manufacturers ADAT controllers. Your tapes will also be playable on any other ADAT deck.

Roland DM-800

Digital Audio Workstation

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



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- Internally shock mounted for isolation from mechanical noise.
- Rugged construction with convenient clothes peg mounting.



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- TGX 35 15 Cardioid neckwork with pre-amplifier
- TGX 30 16 Cardioid neckwork for wireless transmitter

TG-X 40

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



TG-X 50

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- Reduces shell ring in bass drum
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- Applications: Kick drum, floor toms, congas and timpani



TG-X 80

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102 Cassette Deck

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

202MKII

Dual Recording Cassette Deck

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



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SONY

TCD-D10 PRO II Portable DAT Recorder

Packed with features and functions, the compact TCD-D10PRO II is everything professionals need in a portable DAT recorder. Measuring only 10" x 2 1/4" x 7 1/8", it provides high performance, reliability and flexibility. Among its many features are high speed 100x search, LCD multi-function display, 4-motor Direct Drive transport mechanism and absolute time recording capability. With absolute time code, tapes recorded by the TCD-D10 PRO II can be used immediately as source material for the PCM-7000 Series DAT editing system. Offering maximum performance and capacities in a minimum package, the TCD-D10 PRO II is the recorder of choice for any field application.



- Has balanced XLR input, switchable microphone (-60dB) or line (+4dB) input. A 12-pin digital connector provides interfacing with AES/EBU digital signals of 32.0, 44.1, or 48.0 KHz sampling rate. This means that compatibility with other digital systems is assured. It also provides the convenience of digital dubbing and editing without any degradation.
- Equipped with a comprehensive self-diagnostics function that constantly monitors the rotation of the head drum, capstan and reels. The tape transport mode and bad/unload time are continuously checked as well. Upon detection of trouble, the tape is brought to a forced stop and unloaded automatically to protect the tape and the recorder.
- Up to 99 start IDs can be recorded in the subcode area. When the record button is pressed, the start ID is recorded automatically for 8 seconds. During recording, it can also be added manually to any position of the tape. Search for these start IDs is performed in two modes at 100 times normal speed.
- Offers a maximum spooling time of 144x normal speed. A two hour tape can be rewound or fast forwarded in under a minute.
- 20-segment digital peak level meters include overload indicators. Clearly tracks input signal for accurate level indications.
- During playback, the date and time of recording is displayed.
- Has a 5-segment battery indicator. The last segment blinks on and off, notifying you to change batteries.
- To eliminate distortion caused by unexpected peaks, the TCD-D10 PRO II incorporates a record-level limiter with a fast attack time of 300ms. The microphone attenuator prevents distortion by suppressing the signal level 20 dB.
- Immediate playback is possible through a built-in speaker.
- A wired remote controller is supplied to control the record, play, stop, and pause functions of the recorder. The top end of the controller is designed to accept a microphone holder. Two microphone stand screw adapters are also supplied.
- The supplied NP-22H rechargeable battery pack provides 1.5 hours of continuous operation. The optional NPA-D10 battery adapter enables 1 hour of continuous operation on AA-size batteries. With the use of the supplied ACP-88 AC power adapter, it can also be operated on 100-240 VAC, 50-60 Hz.

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467-R099P	7.79	467-R120P	9.29

467 Digital Audio Mastering Tape

467-173J11	1" x 4600	15K	NAB Reel	64.49
467-276J11	1" x 4600	10K	Heavy Duty Precision Reel	79.95
467-576J11	1" x 4600	12K	Heavy Duty Precision Reel	149.95

489 Digital Mastering Tape Audio

DM810A0	1" x 810	Gray Library Box	8.99
DM810C0	1" x 810	Clear Sleeve	8.99

455 Studio Mastering Tape

455-151111	1" x 1200	15K	Plastic Reel	7.19
455-173111	1" x 2500	10K	NAB Reel	18.99
455-272111	1" x 2500	10K	Plastic Hub	26.99
455-273111	1" x 2500	10K	NAB Reel	33.99
455-572111	1" x 2500	10K	Plastic Hub	52.99
455-573111	1" x 2500	10K	NAB Reel	58.49
455-976111	2" x 2500	10K	PREC	125.99

499 Grand Master Gold Studio Mastering Tape

499-174111	1" x 2500	10K	NAB Reel	20.49
499-274111	1" x 2500	10K	NAB Reel	37.49
499-977111	2" x 2500	10K	PREC	134.99

SONY

PCM-2300/PCM-2700A DAT Recorders

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



THREE SAMPLING FREQUENCIES

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

PROFESSIONAL PERFORMANCE

- The servo system is completely controlled by carefully programmed software. This features sophisticated, smooth transport control, which optimizes tape handling and increases the search speed to approximately 150 times normal.
- Absolute time can be recorded in the subcode area of the DAT tape. DAT tape with absolute time is ideal for editing with the Sony PCM-7000 Series Editing System, as it translates A-time into SMPTE time code.

DIGITAL FADER

A 64-step digital fader is incorporated in both units. Both fade-in and fade-out functions are available on the digital and analog inputs/outputs. The fade duration can be set over from 0.2 to 1.5 seconds, and can be controlled either locally or by the remote.

PCM-2300 AND PCM-2700A

- The PCM-2300 has unbalanced digital inputs/outputs (balanced and unbalanced), allowing most digital audio equipment to be directly connected. Both also have balanced analog line level inputs/outputs which can be adjusted over a range of -12 dBs to +8 dBs, for connection to many other types of audio equipment.
- The PCM-2300 has a reliable tape transport system driven by three servo-controlled motors, direct drive for the reels, direct drive for the capstan, and a direct DC motor for the reels.
- The PCM-2700A employs a four motor direct-drive tape transport with head drum, capstan and reels, all individually driven by servo-controlled motors. The four motor direct-drive mechanism gives even more precise and stable transport.
- PCM-2300 front panel display has a 20-segment peak level meter display with 0.5 dB step peak margin. The PCM-2700A has a 20-segment peak level meter with a 0.1 dB step peak margin indication.

SUBCODES

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

OTHER FEATURES

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

PCM-2700A ONLY FEATURES

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

Panasonic

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



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

SV-3700 Features:

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

- Built-in shuttle wheel has two variable speed ranges: 3 to 15x normal speed in Play mode and 1/2 to 3x normal speed in Pause mode - an ideal way to find tape locations.
- Comprehensive display includes program numbers, absolute time, program time, remaining time and Table of Contents which displays total recorded time and total PNO count for commercial prerecorded DAT tapes.
- Has XLR-balanced and unbalanced (phono) digital inputs and outputs. They provide direct interfacing with compact disc player, digital audio workstations and other components in a recording studio or production facility. Also has XLR-balanced analog stereo inputs and outputs. Output level is selectable between -40dB and -10dB. The input level is -40dB.

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

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

QUICK START WITH TRIM AND REHEARSAL

- With 8MB of memory holding five seconds of audio data, the Quick Start function provides sound almost instantly after a play command is executed. Other DAT recorders lag about 7 seconds, making them unsuitable for professional applications.
- Easily adjust the Quick Start position and specify it by A-Time, Start ID or PNO. Recording via Quick Start is also possible, allowing two SV-4100s to be used for frame-accurate punch-in/punch-out and assemble editing.
- You can adjust the Quick Start position with I-Frame resolution over a range of 450 frames. Using the shuttle dial and Skip key for adjustment. Frame number is preceded by a - sign. A-Time, subcodes and peak level are displayed to provide a general guide to positioning.
- Without playing the tape, you can monitor the level of stored data to check your Quick Start position. This preview capability is handy before actual editing or on-air play. Repeated play is also possible, using about 1.5 seconds of the data to create a kind of sampler effect.

FRAME ACCURATE INDEXING AND EDITING

- Using the trim and rehearsal functions, you can accurately determine points to write, start and skip IDs. These IDs can be written, rewritten or erased at any point in the recording and automatically renumbered.
- With two SV-4100s connected via the 8-pin parallel remote terminal, synchronized frame-accurate editing can be performed. Continuity of edit points can be checked by rehearsal playback. By entering and editing end position in one of the Locate buttons, you can determine a punch-out point as well.

FLEXIBLE SEARCH

- Easily and accurately access your A-Time. You can specify hour, minute, second and frame.
- In most modes, the currently displayed A-Time can be assigned to one of the Locate buttons. Then from Stop, Pause or Play you can rapidly cue to any of these four addresses by pressing its Locate key. In addition, Locate Last takes you to the most recent Quick Start A-Time position.
- Search is also possible by Start ID or program number.

5-MODE EXTERNAL SYNC

- Has 5 external sync modes. External sync is essential for applications such as video postproduction and stereo submix recording. It assures uniformity of timing between different equipment so the audio data consistently matches up with the target media.
- Select from 3 video external sync modes: (RS, 29.97 and 30 frames per second) or use word sync or Digital Data modes (which lock to the input sampling frequency).

ENHANCED SOUND

The SV-4100 satisfies the highest professional expectations both in terms of sound and functionality. It features new 20-bit (equivalent resolution) digital-to-analog converters.

MULTIPLE DIGITAL INTERFACES

- Has XLR-balanced digital input and output, plus unbalanced digital coaxial and optical inputs and outputs. Analog inputs/outputs are XLR-balanced and output level is switchable between -40dB and -10dB, providing compatibility with other equipment.

3-WAY REMOTE CONTROL

- GPI input allows simple triggering of Quick-Start Play, 8-pin parallel remote control connects to another DAT deck, computer or wired remote. Includes wireless remote control.

TASCAM

DA-P1 Portable DAT Recorder

- With rotary two head design and two direct drive motors the DA-P1 offers one of the best transport in its class.
- XLR-balanced mic/line inputs (with phantom power) accept a broad range of signal levels from -50dB to +18dB.
- Analog line inputs and outputs (unbalanced) plus S/PDIF (RCA) digital inputs and outputs enables direct digital transfers.
- Uses next generation A/D and D/A converters to deliver amazing sound quality.
- Supports multiple sample rates (48, 44.1 and 32 kHz) and SCMS-free recording.
- Included in its design is a MIC limiter and 20dB pad to achieve the best possible sound without outside disturbances.
- To monitor your sound there is a TRS jack and level control for use with any headphones.
- Built tough, the DA-P1 is housed in a solid, well-constructed hard case. The DA-P1 includes a shoulder belt, AC adapter and one battery.



SONY

TCD-D7 DAT Walkman Player/Recorder

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



JVC

XD-P1 Pro Portable DAT Recorder

- An integrated package, the XD-P1 Pro combines a DAT recorder and a microphone with digital output in an unbelievable light package.
- Records and plays at all three standard sampling frequencies. Choose from 32kHz for long recording sessions, 44.1 kHz for mastering if CD production or 48kHz for highest fidelity.
- Operates without the restrictions of SCMS (Serial Copy Management System), permitting one generation of digital to digital copy, using 44.1 kHz sampling frequency. You can digitally dub or copy recording mode on the XD-P1 Pro as many times as necessary.
- The supplied detachable digital output microphone provides two pick-up patterns: "Telephonic" and "Stereo". A collapsible microphone stand is also supplied, allowing you to set the mic on a desktop for the interviews or conferences.
- Extensive use of aluminum and ultra-thin molding techniques make the XD-P1 Pro compact, lightweight and durable. The main module weighs under 3.5 pounds (1.5 kg). With microphone and battery it weighs only 22 oz.
- All basic controls are on one side of the unit and readily accessible. You can operate the recorder using one hand.
- Advanced power-saving design and low power-consumption circuits give the XD-P1 Pro long recording capability - on a single battery charge. Optional rechargeable batteries further extend recording time.
- Supplied AC adapter/recharger works anywhere in the world regardless of voltage or frequency.





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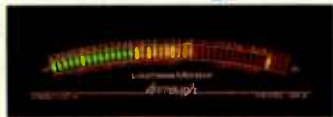
samick

MM Series MM842/1242/1642/2242 8/12/16/24 Channel Modular Mixers



- Electronically balanced XLR inputs
- Channel gain trim LED headroom indicator
- 3-band active EQ, sweep mid-band
- Individual channel inserts for patching
- Direct outputs on each channel
- Assignable bar graph level indicator for left and right or group outputs
- XLR and 1/4" balanced outputs
- +48v phantom power

dorrough



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

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

Loudness Meter Model 40-A

The model 40-A has a scale allowing 140dB of headroom in 1dB steps. A stand-alone unit, it measures 8" x 2 1/2" x 6 1/2" and has an internal power supply. Model 40-AP has a peak-hold option as well.

Loudness Meter Model 40-B

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

Symetrix

Signal Processing Products 601 Digital Voice Processor

- Accepts mic or line level analog signals, converts them to digital (18 bit), and then performs 24-bit digital domain signal processing.



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

488 Dyna-Squeeze

8-Channel Compressor/Intarface

- Can easily increase average recording levels in your digital or analog tape recorder by 10dB with no side effects.
- Tracks programing in Dyna-Squeeze have precise and increased articulation. Subtle sounds become more up front.
- Many professional mixing consoles have output levels that are much hotter than digital recorder inputs. The 488 matches any console to most any digital recorder.

We are the full stocking dealer for the entire Symetrix line

TASCAM

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

LOW NOISE CIRCUITRY

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

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

PREMIUM QUALITY MIC PRE-AMPS

- The M-2600's mic pre-amp yield an extremely low noise floor, enormous headroom and an extremely flat frequency response. This lowers distortion and widens dynamic range. It also increases gain control to an amazing 51dB. Plus, you get phantom power on each channel.
- The M-2600 accepts balanced or unbalanced 1/4" inputs, and low-impedance XLR jacks. Better still, the TRIM controls operate over a 51dB input range. For the hottest incoming signals, all it takes is a press of the -20 dB PAD button and each channel strip to bring any signal down to manageable levels. Plug anything into it - keyboards, guitars, basses, active or passive microphones, samplers and more. No matter what you put into it, you can be confident that signal can be placed at optimum levels without a lot of fuss.

THE BEST AUX SECTION IN THE BUSINESS

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



FLEXIBLE EQ SECTION

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

ADVANCED SIGNAL ROUTING OPTIONS

Direct channel input switching. Assign to one of eight busses, or direct to tape or disk, or to the master stereo bus. Because the group and direct-out jacks are one and the same, you can set or flexibility in a "one-size-fits-all" board.

ERGONOMIC DESIGN

The M-2600 has a big studio feel. All buttons are tightly spring loaded, lock into place with confidence and are large enough to accommodate even the biggest fingers. The faders and knobs have a tight, smooth "expensive" feel and are easy to see, easy to reach and a pleasure to manipulate. Center detents assure zero positions for EQ and PAN knobs. Smooth long throw 100mm faders glide nicely yet still confidently allow you to position them securely without fear of accidentally slipping to another position.

MACKIE

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

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

BIG CONSOLE FEATURES

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



- Master section includes two stereo aux returns, a separate headphone level control, metering and two stereo aux returns.
- Line inputs and outputs are designed to work with any line level, from instrument level, to semi-pro -10dB, to professional +4dB.

HEAVY DUTY CONSTRUCTION

- Designed for non-stop, 24-hour-a-day professional duty in permanent PA applications, TV and radio station, etc.
- Sealed rotary controls instead of open frame phenolic potentiometers that suffer from dust and contamination.
- Has steel chassis, rugged fiberglass circuit boards and a built-in power supply. Also has exceptional RF protection.
- Ideal "entry level" mixer for those just starting a MIDI suite.
- Ideal as headphone or cue mixer, level matching pre audio "tool kit", drum or effects sends submixer. 8-track monitor mixer.

CR-1604 16-Channel Mic-Line Mixer

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

LOWEST NOISE, HIGHEST HEADROOM

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

CONSTANT POWER PAN POTS

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

IN-PLACE STEREO SOLO

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

UNITYPLUS GAIN STRUCTURE

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

EFFECTS SEND WITH GAIN

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

INTELLIGENT EQ POINTS

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

REAL MIC PREAMPS

- The CR-1604 has genuine studio-grade phantom powered, balanced mic preamps on channels 1 through 8. All CR-1604 (and XLR10) discrete input mic preamp stages incorporate four conjugate-pair, large-emitter geometry transistors just like the big mixers use. So, when recording natural sound effects to heavy metal or mixing flutes or kick drums, you get the quietest, cleanest results possible.

BUILT TO LAST

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

Optional Accessories

OTTO-1604

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

XLR10

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

SENNHEISER

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

HD414 Classic

A re-issue of the world's first open-Aire dynamic headphone, the HD414 Classic offers maximum transparency, fidelity and comfort. A limited edition model, the HD414 Classic also features Professor Sennheiser's signature on the headband.

- Radial based diaphragms for more accurate reproduction
- Field replaceable parts for long-term enjoyment
- Neodymium-ferrous magnets for broad frequency response (18-21,000Hz)
- 10ft. Kevlar-reinforced oxygen-free copper signal cable with 1/8"-1/4" stereo phone plug.



\$5995

HD25 SP Studio Monitor Headphone

Offering dramatic isolation from external sounds, the HD25SP is designed for professionals who rely on studio monitor headphones for work and pleasure.

- High-efficiency drivers for portable and field use.
- Modular parts for long term value and durability.
- Neodymium-ferrous magnets for broad frequency response.
- Frequency Response: 16-22,000Hz
- Sensitivity: 105dB
- Impedance: 70Ω



\$11995

HD265 Studio Monitor Sealed Headphone

Designed to meet the stringent demands of studio professional and audiophile alike, the HD265 breaks new ground in the sealed-chamber headphone format.

- Sealed-chamber headphone format
- Triple-wound aluminum voice coils for quick transients.
- Polycarbonate dome-damping minimizes distortion.
- Oxygen-free copper signal cable with 1/8" to 1/4" stereo phone plug.
- Frequency Response: 10-25,000Hz

\$19995

HD535 Dynamic Hi-Fi Stereo Headphone

The HD535's earcups surround your ears rather than resting on them, for a more natural listening experience.

- Open-back construction and classic design.
- Light aluminum coils in the transducer systems offers excellent transient and dynamic response.
- Supported by the open structure, tonal quality develops high dimensional sound qualities.
- Circumaural, oval earpads for good wearing comfort.
- Can be connected to all digital and analogue Hi-Fi components



\$13995

HD545 Digitally Compatible Circumaural Headphone

The HD545 is the headphone to which all in its price category must be compared.

- Polycarbonate dome-damping materials for clearer highs.
- Triple-wound aluminum voice coils mean powerful bass, high output and greater durability.
- Velvety soft, circumaural earpads and adjustable, padded headband for extended comfort and perfect fit.
- Oxygen-free copper signal cable assures optimal signal transfer.
- Includes 1/8" to 1/4" stereo phone plug.

\$16995

HD565 Digitally Compatible Circumaural Headphone

Offering natural sound reproduction without tonal distortion - the choice for use with the most sophisticated equipment.

- Silk dome-damping for brilliant highs and ultra-smooth midrange reproduction.
- Copper-coated aluminum voice coils for high linearity.
- Bass-tune tuning for extended, powerful low frequencies.
- Velvet ear cushions provide lavish comfort.
- Oxygen free copper signal cable with 1/8" to 1/4" stereo phone plug.

\$23995

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Stewart PA1000/1400/1800 Power Amplifiers



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

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



Performance Series Amplifiers



Performance Series 1 300 Watt Power Amplifier

- Measuring only 3.5 inches high and weighing 24 pounds, the Series 1 delivers more than 150 watts per channel.
- Its welded steel chassis is unbelievably strong unlike a custom heat sink extension provides exceptional thermal capacity.
- An internal fan provides quiet background noise levels for critical monitoring applications and when pushed hard the cooling system insures continuous cool operation even in the most demanding situations.
- Active balanced inputs with both XLR and 1/4" phone jacks.
- Supplied with quality 5-way binding posts for highly reliable speaker connection.
- Front panel handles are reversible for either rack mount installation or easy handling.
- LEDs are provided for signal presence and clip indication; the detented gain controls have large knobs for easy front panel adjustments.

Performance Series 2 600-Watt Power Amplifier

- Same as above except the Series 2 weighs 33 pounds and delivers more than 300 watts per channel.

Performance Series 4 1200-Watt Power Amplifier

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

TANNOY

System 6 NFM II

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



PBM Series II Reference Monitors

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

PBM 5 II

- Custom 5" injection-molded bass driver with a nitrile rubber surround for extended linearity and accurate low frequency reproduction. They are better damped for reduced distortion and exhibit more naturally open and detailed midrange.
- Woofer blends seamlessly with the 1/4" polyimide soft dome ferro-fluid cooled tweeter providing extended bandwidth for extremely precise sonically-balanced monitoring.
- Designed for nearfield use, the PBM 5 II cabinets are produced from high density media for minimal resonance and features an anti-diffraction radiused front baffle design.

PBM 6.5 II

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



PBM II

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



TURTLE BEACH SYSTEMS

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

MULTISOUND MONTEREY Multimedia Sound Card

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

- The Motorola DSP-56001 Digital Signal Processor operates at 20MHz and performs all digitization functions with very low system overhead.
- High S/N (-89dB, A weighted), low distortion (<0.01% THD, <0.01% IM - both A weighted), flat frequency response (DC-19KHz, 5dB).
- On-board real-time effects processor for a variety of effects, including reverb and echo.

- Professional quality MIDI synthesizer with wavetable playback (4MB of real instruments audio). Up to 4MB of standard SIMM-type memory can be added for sampling of new sounds.
- True 16-bit recording, using 64x oversampling and sigma-delta conversion technology.
- True 16-bit playback, with 64x oversampling and sigma-delta conversion utilizing 18 bit DACs and an 8x interpolating filter.

WAVE 2.0

Professional Sound Editing for Windows 3.1 Compatible Sound Card

Wave is simply the best audio recording/editing/effects program available under Windows 3.1. With its logical layout, plethora of functions and wealth of effects, Wave will become an indispensable tool in your studio. Wave has the features (and interface) of a tape recorder. It supports stereo or mono recording/playback at 11,025, 22,05 or 44.1KHz sampling rates. Wave will work with any Windows 3.1 compatible audio board.

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

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

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QUAD STUDIO Professional 4-Track Recording System

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

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

\$399⁰⁰



BEHRINGER

MDX 1000 Autocom Automatic Compressor/Limiter



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

MDX2000 Composer Interactive Dynamics Processor



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

PEQ305 Studio Parametric The Musical Equalizer

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

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

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

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

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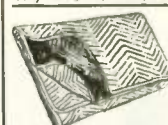
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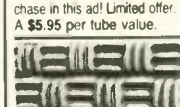
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ACROSS THE BOARD

continued from page 146

issues a serial number to any new form and keeps track of who is using it and what information was entered into it. This is the perfect setup for a studio with more than one room. Work orders can be checked out by the engineer who is working on the project and later by the accountant for entry into the billing system. I would rate this one four stars.

DIGITAL SOFTWARE

There are a couple of software packages that I have been playing with that you should know about. The first one is AD-1 Pro Audio Analyzer by Intelligent Devices. It is basically a digital meter/spectrum analyzer/phase scope/waveform monitor for the Mac. It comes in two versions, one that runs under Digidesign's TDM bus, and another that is stand-alone. The stand-alone version requires either a Power PC Mac or a Digidesign DSP board.

The Supermeter section of the display shows digital audio levels on a 242-segment meter with a resolution of a tenth of a dB. There are actually five

meter bars so that you can see stereo peak, average, and phase information all at the same time. The Spectrum Display is a 1024-point FFT display with 0.1 dB resolution and floating peak display for long-term spectral information viewing. The Phase Scope works like an old analog phase scope to display the phase relationship between the left and right channels. The Waveform Monitor displays a running history of the digital audio passing through the system. You have your choice of stereo, summed mono, or L/R difference. You can see past clipping events and evaluate compression and fade shapes with this display. The prices are \$349 for the stand-alone version and \$449 for the TDM version. I like it.

Apogee Electronics has been shipping Master Tools with UV22 for about a year now. Master Tools provides a unique metering environment for your digital audio as well as a way to preserve the high-resolution audio that is available on the Digidesign TDM bus. The metering front end of Master Tools shows a three-dimensional history of the audio levels and phase relationship as they go by. In addition to levels, Master Tools displays DC offset and allows you to perform DSP processing on the digital audio. You can remove

DC; swap the left and right channels; reverse the phase of left, right, or both channels; mute any channel; and add UV22 processing to your digital audio before it comes out of Digidesign at 16 bits. If you care anything about the quality of your audio, you will get Master Tools. It is \$795 and you can check it out on Apogee's Web Site at <http://www.apogeedigital.com>.

These software packages are cheap when you compare them with the hardware to do the same thing. The hardware to swap channels, flip phase, mute tracks, and remove DC will cost much more than \$2500. So just think about how much money you will be saving by buying both of these packages.

Well I have successfully met another deadline (almost...only one day late) and am on my way to the NAMM show in Anaheim, CA. I have a few empty spaces in my new rack that need to be filled up. Don't tell my wife I was there buying equipment — she thinks I am just off somewhere having an affair.

EQ

Check out Roger's new web page at <http://www.digital-atomics.com>. It links to the Steely Dan Home Page and much more.

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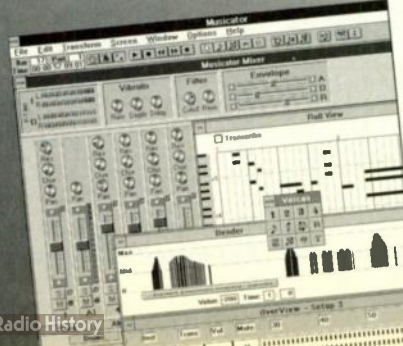
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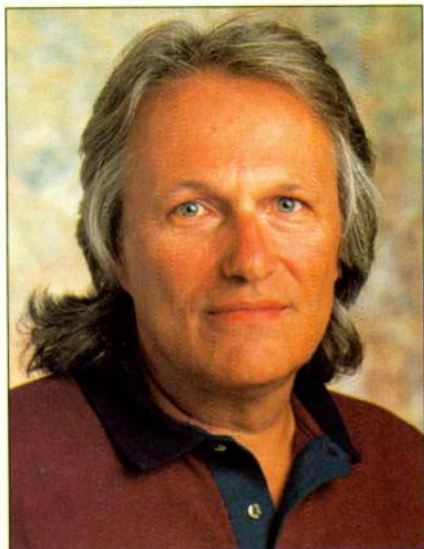
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EQ & Pro Sound News

Tales of a Blithering MIDlot



The ramblings of a technology junkie

BY ROGER NICHOLS

I have mentioned before that technology takes advantage of its users. When there were only five or six television channels, there was nothing worth watching. When cable TV arrived on the scene there were 40 channels of nothing to watch. Now there are satellite dishes with hundreds of channels. There is still nothing worth watching; it just takes longer each day to surf through the choices to convince yourself that there is nothing to watch.

I have noticed the same thing with online services. They are now all offering connection to the Internet. They have lowered their prices to make you think that you are getting a great deal, but as more and more people connect,

the response time gets worse and it takes you longer to do whatever it was you were doing than it did before when you were paying a higher rate; so it ends up costing you more in the long run.

Synthesizers now come with billions of presets so that you won't have to spend a lot of time programming in the sound that you want. Great, but it takes you longer to search through the presets than it would have taken to program your sound from scratch.

JBL & STUFF

As I write this column, I am sitting by the pool at the Ritz-Carlton Hotel in Palm Springs, CA. It is JBL's 50th anniversary. They are having a big bash for all of their international distributors and a few press people. I snuck in.

The theme for the meetings was "teamwork," pulling together to get the job done. There was a guest speaker who knows all about working together as a team, Jim Lovell, commander of Apollo XIII. Talk about teamwork! He told the whole story, and it was much worse than it seemed in the movie version. This guy was 200,000 miles away trying to change the course of his space craft so that he could get back to earth. I no longer have any reason to get mad when installing Digidesign software and it eats my hard disk. It is no big thing if my cat pulls the tape out of my ADAT. Lovell was in deep space doo-doo and pulled it off. I am impressed.

Speaking of Digidesign, I did get a copy of Session to try out. It uses the same copy protection scheme as Pro Tools 3.1. It does not like the Mac Ilci with the Daystar 601 card. I tried installing the new software and it ate all of the installs currently on my hard disk for Pro Tools 3.0, Sound Designer 2.8, Masterlist CD 1.0, my TDM install, and probably a few other things that I haven't found yet.

I mentioned the problem with PT 3.1 last summer, but nothing got resolved. It is now January and it has not sent any fixes. I will try once more to try to talk Digidesign into changing its protection scheme to the dreaded *dongle*. My E-Magic sequencer uses the dongle method, and after a dozen hard disk crashes I can still use E-

Magic without any problems. I can even have the software installed on multiple hard disks without worrying about losing an install. Just plug in the dongle and you are in business.

INTERNET COMMENTS

I noticed on the Internet that some people are interested in computer-based track sheets. I have been using Fastforms by Power-Up Software. This is a pretty simple program for form generation and printing on the Mac. You basically draw the form on your computer screen and name each field where data will be entered. The data entered into each form is stored in a database. You can print a form with the data in the blanks, or you can print out blank forms for hand entering the data. I use Fastforms for DAT J-cards, CD labels, track sheets, cassette J-cards, and tape box labels.

Opcodes used to make a Mac-based program called Track Chart, but I am not sure if it is still available or still supported. Track Chart lets you group tracks together in stereo pairs and enter icons denoting live tracks, drum tracks, or sequencer tracks. Track Charts lets you display your track information as a track sheet (with any number of tracks you choose) or as a timeline. If you have a Studio 3 MIDI interface, you can feed the audio from any track into the audio input of the Studio 3, and, along with timecode or MTC, Track Chart will detect where there is audio information and where there is blank tape. This information is displayed in the timeline so that you can see where you have spaces in your recording. It works great for those times when you need to find a few empty bars to stick in some percussion or guitar lick.

Last, but not least, InFORMed by Shana Corp. is the top end in form generation and distribution. A suite of programs called InFORMed Designer, InFORMed Manager, InFORMed Number Server, and InFORMed Revision Distributor provide all the functions you will ever need to maintain form-based information in your studio. InFORMed is designed to work on a Mac network. After the forms are laid out, any user on the network can "check out" a form from the form library where he can fill it out locally. InFORMed

continued on page 144

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