Mixdown Basics ▪ Reviews: Akai S01 and 5 More

Electronic Musician

July 1993

THE DIGITAL BEAT

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Scoring for Film

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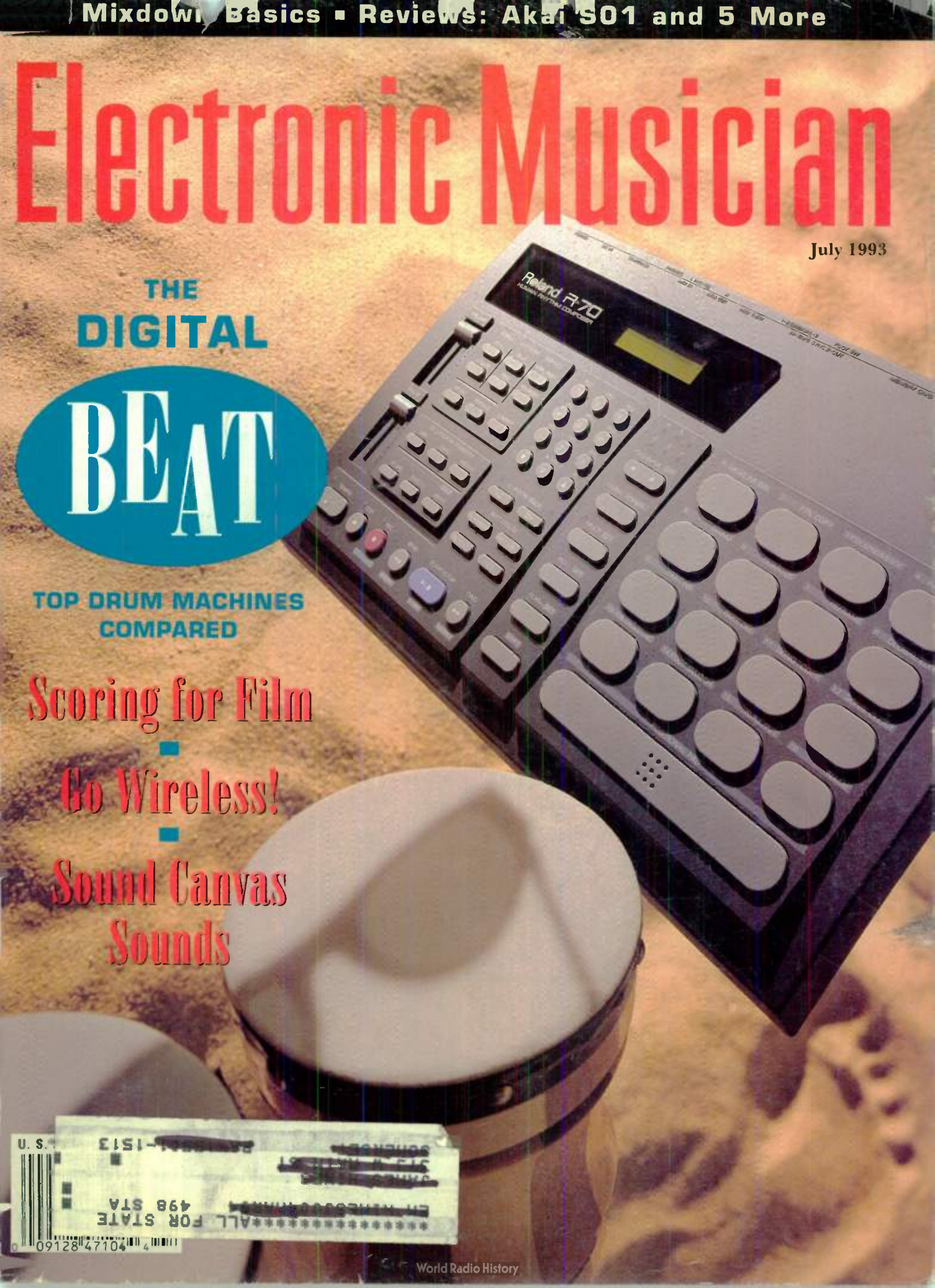
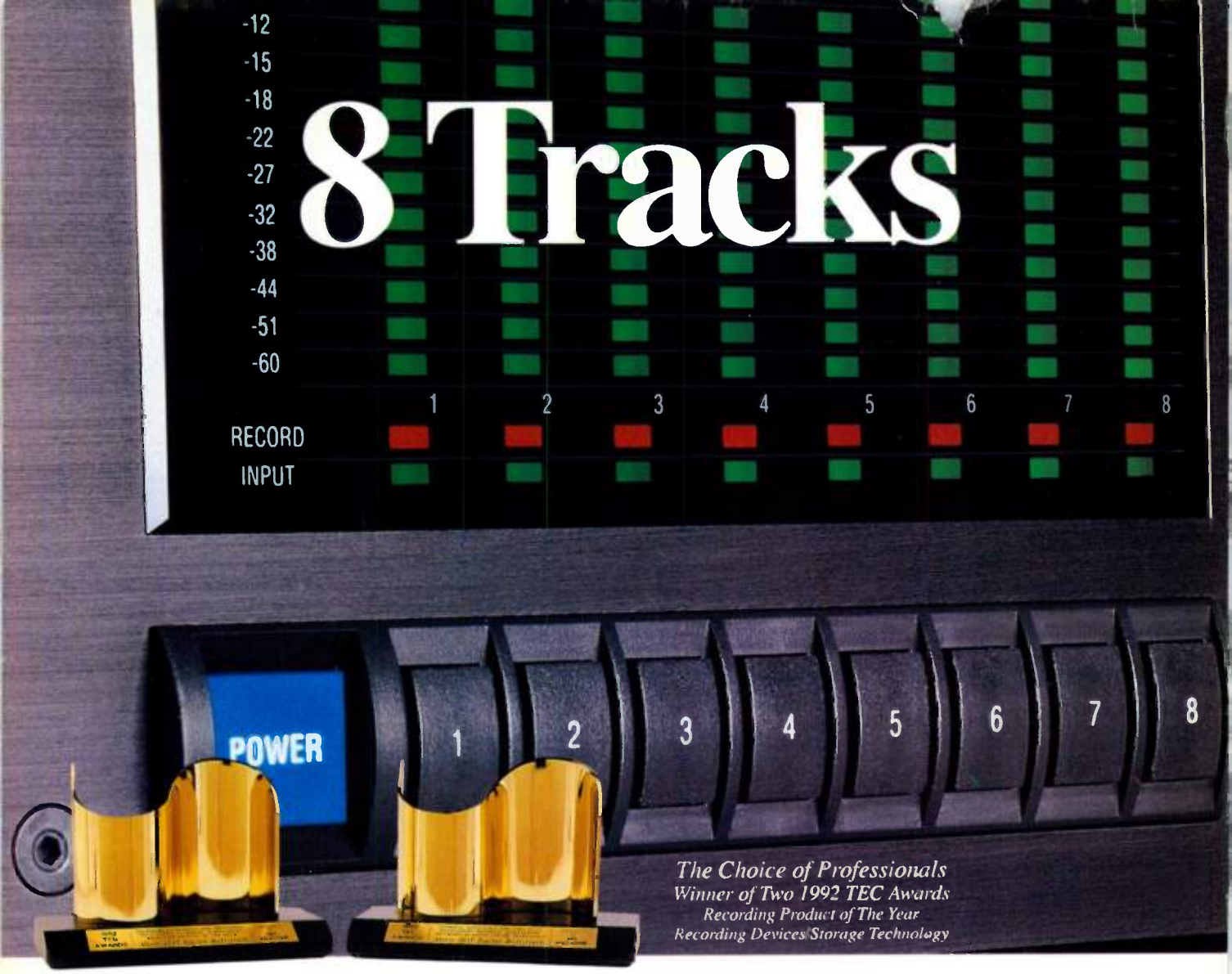
Sound Canvas Sounds





Demos to masters. Creativity to tape. Dreams to reality. Magic phrases for those who want to make music that sounds as good as it feels.

The inspiration for these thoughts is the **Alesis ADAT Professional Digital Audio Recorder**, a technological revolution that tears down the walls to your creativity while delivering world class master recordings. Too good to be true?

Here's the concept. ADAT fuses a supersonic Alesis-designed very large scale integrated chip set with the proven reliability of an industrial grade S-VHS* tape transport and a logical, sensible user interface. The result is a digital tape recording system that exceeds the most demanding requirements of professional audio and that can be used by literally anybody. Hard to believe?

Here's some specs. Bandwidth 20Hz to 20kHz ±0.5dB. Total Harmonic Distortion plus Noise 0.009%. Wow and flutter unmeasurable. ADAT uses the professional standard 48kHz sample rate and delivers better than 92dB dynamic range.

Here's some features. ADAT uses the familiar tape recorder controls that you already know how to use so recording is fast, intuitive, effortless. Connections are provided for balanced +4dBu levels on a single 56 pin ELCO** connector and unbalanced -10dBV signals on 1/4" jacks. And ADAT uses S-VHS tape because it's a proven, robust recording medium with wide 1/2" tape to solidly support ADAT's 8 recording tracks while delivering 40 minutes of recording time.

The best part. ADAT's Proprietary Synchronization Interface (Patent Pending) locks multiple ADATs, independent of the audio tracks, to single sample accuracy ±5% of 1/48,000th of a second! In other sciences this is referred to as 'air tight'. So multiple ADATs function in perfect mechanical and electronic unison: up to 16 ADATs without an external controller. That's 128 tracks!

More best part. ADAT's Proprietary MultiChannel Optical Digital Interface (Patent Pending) simultaneously sends all 8 tracks of recorded information out the Digital I/O for perfect safety tapes and perfect track bounces.

Even more best part. The optional BRC Master Remote Control opens a whole other door to the ADAT miracle. With it you can control up to 16 ADATs (128 simultaneous tracks) with full transport functions, track offsets, machine offsets,

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To Megatracks

digital assembly editing via the Digital I/O, SMPTE and MIDI Time Code, Video Sync and more.

What does all this mean? Here's just a few benefits.

It's commonly known that many hours are wasted during expensive album projects while the artist, producer and engineer work in vain to reproduce the rhythmic feel and tonal nuance of demos. Demos that couldn't be used because they suffered from noise, limited bandwidth and overall sonic feebleness. Those days are over forever. ADAT's Sync and Digital I/O perpetually link your demos to your masters making them all part of the same creative process. Every track you record on ADAT is a master track that can be flown into any other ADAT recording, at any time. The best part is that ADAT can be there at any time to catch you at your best, flawlessly stored in the digital domain...forever.

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ADAT is not only a new recording medium, it is the new recording standard. Imagine a network of ADAT users from bands, composers and project studios to professional studios, video editing suites and broadcast production studios. All recording master quality tracks with full compatibility and no barriers between their creative disciplines. In fact, we're launching the ADAT Worldwide Network™ multitrack recording group to facilitate communication between ADAT studios.

In time we'll all start taking these little miracles for granted. Before that inevitable event, unpack your first ADAT and track a minute of single notes and chords on your favorite instrument. Play loud, play soft. Play it back and listen really close. It's always a good feeling to have your mind completely blown.

See your Alesis ADAT Dealer today and start Megatracking on ADAT.

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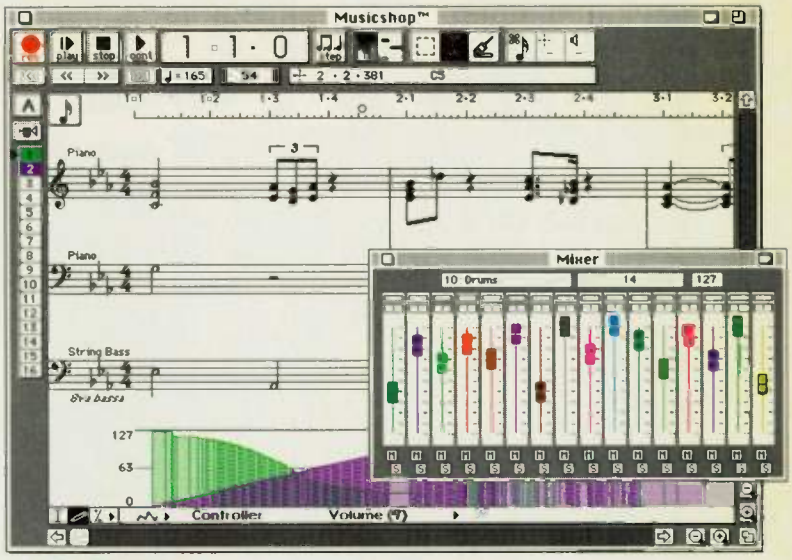
Instruments of Construction



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REVIEWS

DEPARTMENTS

Cover: Photo by Mark Johann.
Special thanks to Roland Corporation.

Musical Media

Standard MIDI Files may become copyrightable forms of musical expression.

ANNE HAMERSKY

Musicians have always used the latest technology to communicate their ideas. From the days of the oral tradition, through the development and codification of handwritten music notation, to the printed page and various forms of audio recording, musicians have embraced many different media to convey their messages.

The newest medium used by electronic musicians to share their compositions and arrangements is the Standard MIDI File (SMF). Developed by Opcode's Dave Oppenheim and introduced in 1985, SMFs are computer files in a standardized format that store MIDI sequence information. Thanks to their popular acceptance, SMFs can be read by most sequencing and music-notation programs on all platforms, several stand-alone hardware sequencers, and synthesizers with built-in sequencers.

The SMF format offers some compelling advantages over previous music media. Like audio recordings, SMFs communicate more than just notes on a page; they represent entire musical performances, complete with expressive nuances. Unlike audio recordings, however, SMFs are malleable. You can alter any music you receive in this format, including reorchestration, changing the tempo, or editing individual notes. In addition, SMFs store more information than audio recordings, including the specific parameters of a sound as represented by MIDI System Exclusive.

As strong as the arguments for SMFs may be, however, they also have limitations. The primary one is that SMFs are useful only to musicians equipped with the appropriate MIDI gear. While that number is growing every day, it's still not close to a majority. Even musicians with the right gear sometimes find the music coming from their instruments to be significantly different from what the composer intended. The General MIDI (GM) patch-mapping scheme has reduced this problem, but not entirely solved it. In addition, many musicians are concerned that the limitations of GM—specifically, the sounds that are (or are not) available—place too many restrictions on their creativity.

Nevertheless, SMFs are becoming a viable way to represent, store, and exchange music. In fact, the U.S. Copyright Office is thinking about establishing a copyright procedure for Standard MIDI Files. This is particularly interesting for several reasons. For one thing, it adds even more legitimacy to SMFs as a long-term solution for representing music in electronic form.

It also raises some questions about SMFs of existing copyrighted material. Whenever a songwriter copyrights a song, they are entitled to receive a royalty payment for any public performance. In addition, music publishing companies also receive performance royalties and may elect to further exploit a work by allowing the publication of sheet music. SMFs are problematic because they offer some charactersitics of both performance and printed music. (In fact, if you import an SMF into a notation program and print out the result, you can get sheet music.)

In spite of these points, almost all electronic bulletin boards and electronic music user's groups maintain a large selection of popular-song files to download or trade, many of which may be violating copyright laws. (One notable exception is PAN, which forbids you to upload SMFs of copyrighted material.)

As with many technology-related legal questions, the issues brought up by the use of SMFs don't have any easy answers. If nothing else, they illustrate the impact of electronic music on the rest of the music industry.

Bob O'Donnell

Electronic Musician

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BPA INTERNATIONAL

EXPLOSIVE FEATURES!

The ENSONIQ ASR-10 brings the features you've always wanted to a sampling workstation.

Announcing the latest *ENSONIQ boom*–the new ASR-10 Advanced Sampling Recorder. With features like stereo sampling, dynamic effects processing, time compression/expansion, an integrated sequencer and 31-note polyphony, ENSONIQ brings innovation to the world of sampling– *again.*

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Together with a flexible, integrated 16-track sequencer, Poly-Key™ Pressure keyboard and Performance Presets that provide instant recall of sound combinations, you have one powerful workstation.

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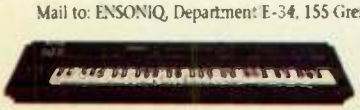

SQ-1 32 Voice Personal Music Studio

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Announcing a much

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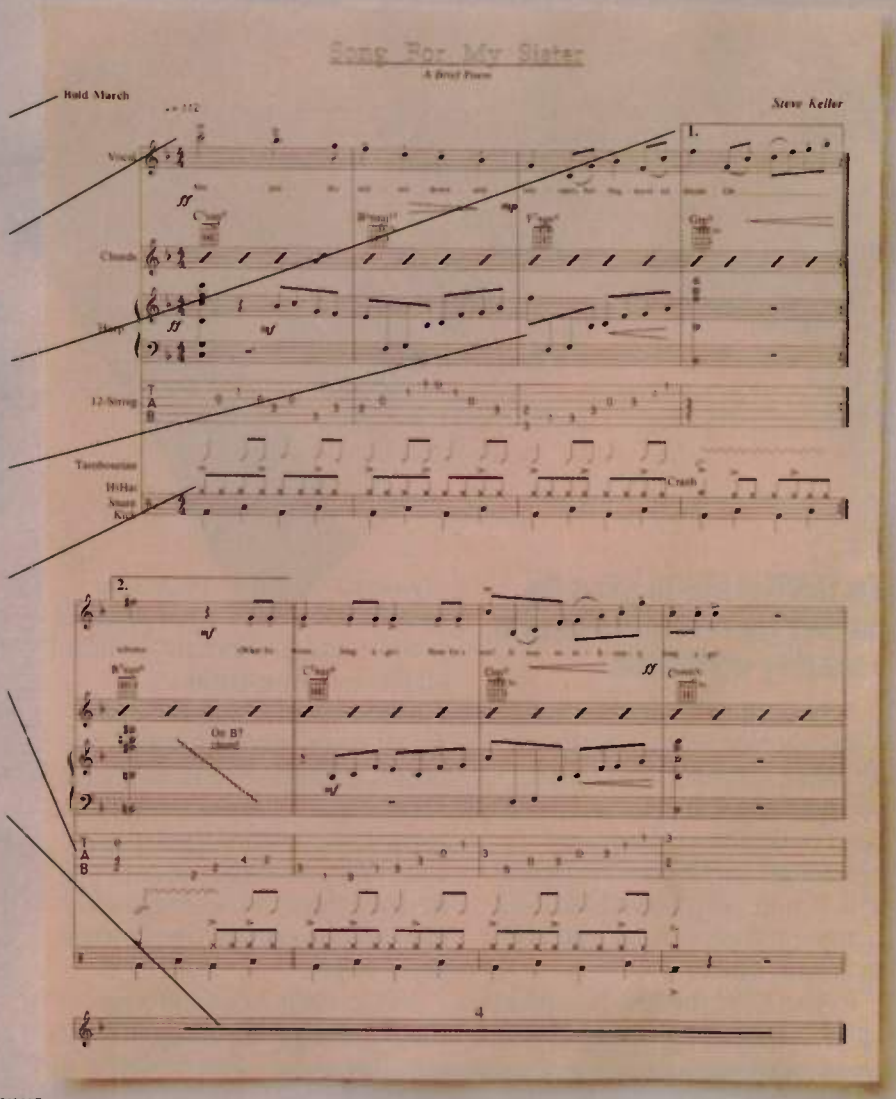
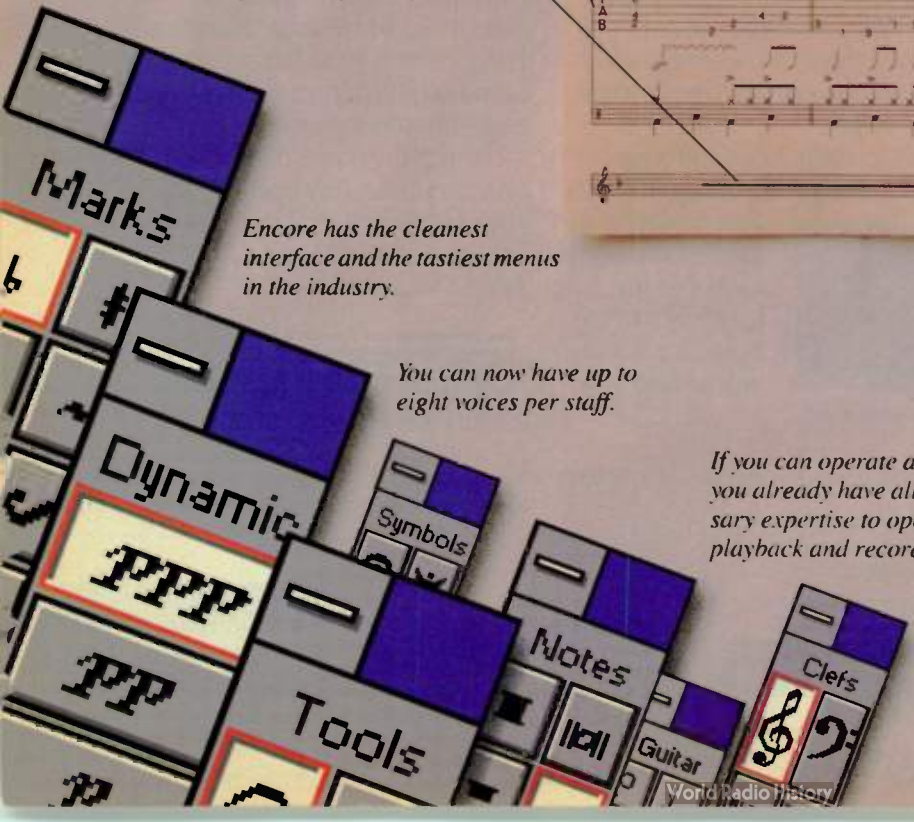
Finally there's a simple way to include compressed rests for groups playing from one piece of music.



With EPS support, you can now place your compositions into other applications.



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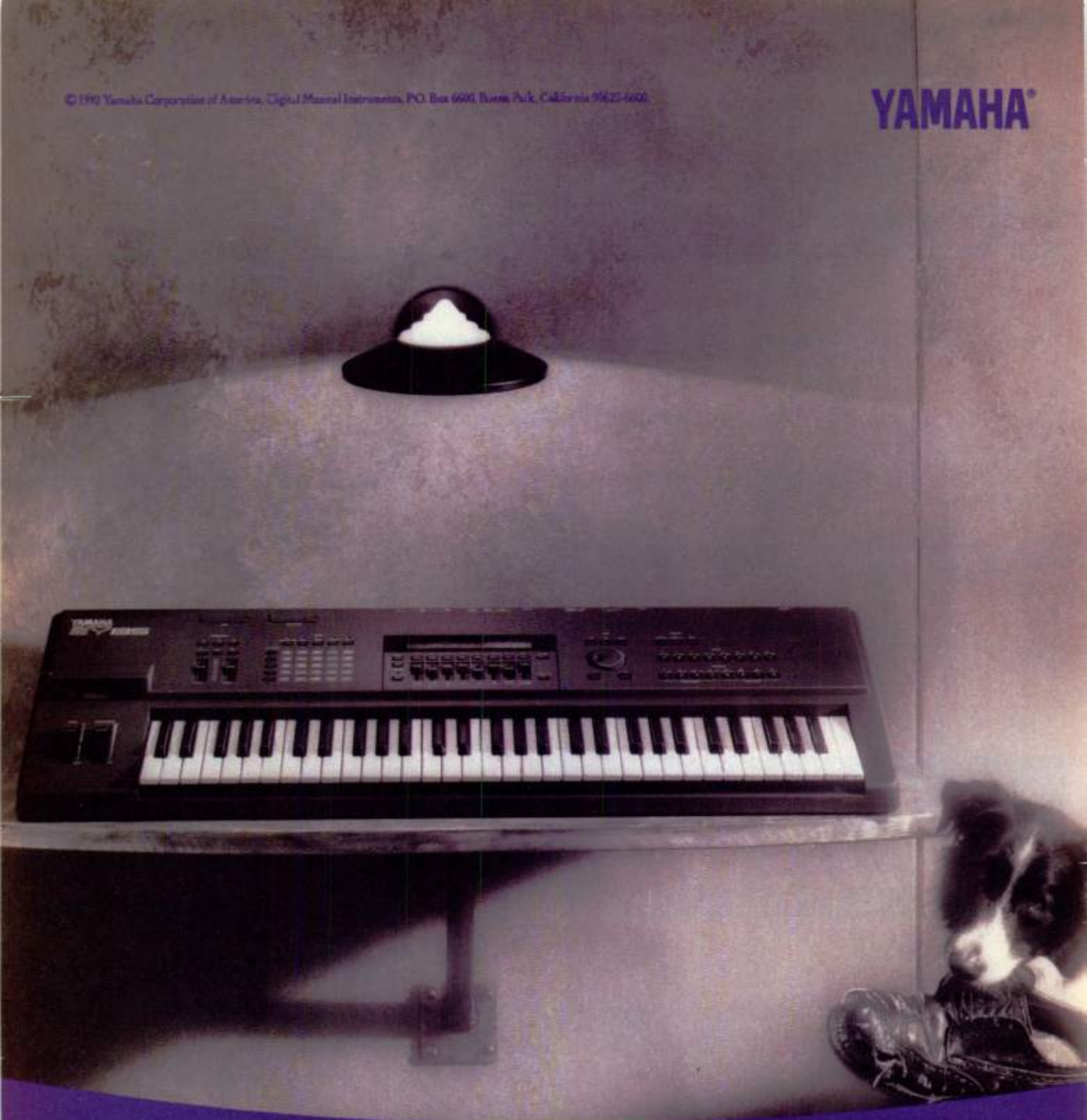

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MIXED FEELINGS

I understand the power of analogy. I also appreciate the human desire for politics. But equating mixing techniques with society's need for a fascistic fix of family values is going too far ("Recording Musician: Transparent Mixing Techniques," April 1993). It is hard enough to wade through Michael Molenda's materialism and condescension without the radical political overtones. Some elements work better buried in the mix.

Don Malone, Director
Electronic Music Studio
Roosevelt University
Chicago, IL

Regarding "Transparent Mixing Techniques": Who is this goof ball? Does Mr. Molenda really think the answer to mixing clarity is to compress and gate every single channel?

The first part of the article was on the right track: Listen to other people's winning mixes and analyze how they're different from yours. Deterioration arrived quickly, however. Any good engineer will tell you that compression and gating on all channels is not the key. I can summarize the process in a few sentences:

1. Choose the right microphone, through a day or so of experimentation on each instrument.

2. Spend another day or more positioning each microphone. This is by far the most critical factor in getting a good sound out of any instrument, and may eliminate the need for several gates.

3. Choose instrumentation and arrangements such that each instrument covers frequency ranges that are not in too much conflict with the vocal, or with each other.

4. Check for noise in every part of the signal chain, and gain stage every piece of gear for best S/N ratio.

5. *After* all the above steps are completed, use EQ (only if necessary) to provide each instrument its own place in the audio frequency spectrum.

Don't get me wrong; I'm as big a fan as anyone of compression and gating. But they're not the key to a clear, open mix. It may be true that many home-studio operators won't have access to killer microphones, but it's an even safer bet they won't have sixteen gates and compressors lying around. Besides, even the industry's finest still use workhorses like Shure's SM57s on more instruments than you'd think. It's not the equipment, it's the operator! You can put band-aids on all day long, but they're only covering up a lack of preparation before hand.

Craig Patterson,
President
PME
Denver, CO

Craig—First off, I should tell you that in the wacky world of record production, being called a "goof ball" is high praise. (Thank you so much for your support!) But all kidding aside, I completely agree with you that bad mixes often reflect poor pre-production. The article covered this very topic under "The Big Picture" subhead. ("Savvy producers conceptualize the final mix while the project is still being recorded.") I also concur that the operator, not the equipment, is the real key to a great recording. Having spent most of my career without access to the hip tools, my articles always stress innovation, inspiration, and craft.

Now for recording *good sounds, the process you summarize is excellent. (Although few recordists have the luxury of time or patience to spend entire days experimenting with mic positions.) However, I must remind you that my article was about transparent* mixing *techniques. Because the final mixdown (obviously) occurs after everything is recorded, the mixing tips dealt with getting the most from what you already have on tape. If you're not blessed with pristine tracks, I still maintain that noise gates and compressors can help you produce a clean and professional mix. And by the way, you shouldn't need sixteen of these units "lying around" to help improve mix quality. A typical 8- or 16-track home studio can get by with one inexpensive, quad noise gate and a single, low-cost stereo compressor.—Michael M.*

REQUEST LINE

Maybe I've missed something over the years I've subscribed to your excellent publication, but I would very much appreciate a dedicated, in-depth article on the secrets of mixer and/or FX equalization, something like the fabulous "Riding the Bus" article (March 1991) some years ago. I'd like charts on Hz-kHz/octaves/instrument ranges, tips on using real-time MIDI control of FX units' EQ sections, and so on. If there was such an article, please tell me when.

Jan Winter
Uppsala, Sweden

Jan—I don't remember an article specifically on equalizing effects; it's an interesting idea, and we'll consider it. We've discussed mixer EQ sections in several articles over the years. You should check out "Basic Studio Series, Part 4: Mixers" in the February 1990 EM*; "From the Top: Mixers and Mixing," in the May 1992 issue; and "Recording Musician: Maximizing Your Mixer," in the April 1992 issue. Although it is not really about mixer EQ, you might also enjoy "Signal Processing Today, Part 4: Fun With Filters," in the October 1990 issue. —Steve O.*

UNIVERSAL OMISSION

Thank you for your recent "Computer Musician: Universal Editor/Librarians" (April 1993), as it presents a good overview of the concepts and features involved in this type of software. Unfortunately, your "quick rundown on the major players in the marketplace" presented some misleading

GORDON STUDER

The Seriou

The TASCAM DA-88 The Digital Multitrack Deck For Serious Production

It's true. The first machine designed specifically for low cost digital multitrack production is now available. And it comes to you from the world multitrack leader, TASCAM. It's simply the most advanced, well thought out and heavy duty digital 8-track deck you can buy. The best part is, it's incredibly affordable.

The DA-88 is built for production. The integrity of TASCAM's design is evident in every facet of the deck. From its look and feel — to its exceptional sound, unsurpassed features and expansion capability.

Goes Faster, Lasts Longer And Takes A Beating

While we admit that it's an elegant looking machine, it's tough to see its finest asset. The tape transport. Designed and manufactured by TASCAM specifically for the DA-88, it's fast, accurate and solid. And that's what counts in production — in personal studios, project studios or in those demanding high-end facilities.

You'll notice it uses superior Hi 8mm tape, giving you a full 108 minutes of record time. What's more, the transport is lightning fast and yet so quiet you'll barely hear it blaze through a tape.

We didn't stop there. Because production environments are notorious for constant, if not abusive, shuttling, punching, 24-hour operation — you get the idea — the transport was designed and built to take a beating.

Even more impressive is the transport's responsiveness. Take a look at the front panel. Notice the shuttle wheel? Turn it just a bit and the tape moves at one fourth the normal play speed. Turn it all the way and it flies at 8 times faster. Do it all night if you want. It's quick, smooth and it's precise. Need to get to a location quickly? Accurately? Shuttle a bit and you're there. The location is easily viewed on the DA-88's 8-digit absolute time display — in hours, minutes, seconds and frames. With the optional SY-88 sync card it displays timecode and offset, too.

Adding the optional SY-88 synchronizer card is as easy as changing a Nintendo® cartridge. With it you're SMPTE and MIDI compatible. And no matter how many DA-88s you have locked up, you need only one sync card. Other optional accessories include AES/EBU and SDIF2 digital interfaces allowing the digital audio signal to be converted for direct-digital interfacing with digital consoles, signal processors and recording equipment.

You Already Know How To Operate It

Unlike other digital multitrack decks, the DA-88 works logically and is simple to operate. Like your analog deck. All functions are familiar and easily operated from the front of the deck.

s Machine

Take punching-in and out, for example. You have three easy ways to do it. You can punch-in and out of single tracks on the fly. Just hit the track button at the punch-in point. Hit it again to punch-out. You can use the optional foot switch, if you like.

Or, for multiple tracks, simply select the track numbers you want to punch, push play, and when you're ready, hit record to punch-in, play to punch-out.

Finally, for those frame accurate punch-ins, you've got auto punch-in and out. In this mode you can rehearse your part prior to committing it to tape.

No matter which way you choose, your punch-in and out is seamless and glitch free due to TASCAM's sophisticated variable digital crossfade technology.

That's not all, you also can set your pitch (± 6%), sample rates (44.1 or 48K), as well as crossfade and track delay times. All from the front of the DA-88.

Complete Synchronicity

There's more. Add the optional SY-88 synchronizer card to just one of your DA-88s and you've got full SMPTE/EBU chase synchronization. The best part is, you can record time-code without sacrificing one of your audio tracks. You also get video sync input, an RS-422 port to allow control of the DA-88 from a video editor, and MIDI ports for MIDI machine control.

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So get to your authorized TASCAM dealer now. Check it out. Touch it. And listen to it. Once you do you'll know why the TASCAM DA-88 is the serious machine for digital production. The TASCAM DA-88 s the choice of studios worldwide. And at only $4,499, it should be your choice.

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Dean Jen
Sakura, Japan

Dean—I'm sorry you feel the reviews are not sufficiently informative. This is the first time anyone has suggested we discuss things such as key pivot radius, travel distance, etc., in a MIDI master keyboard review. I question the practical value of such information. The subjective feel of the action is far more important, and we give a brief subjective evaluation of every keyboard controller action. Unfortunately, it is, as you say, a matter of taste. We try to concentrate on evaluating the features, overall quality, user interface, and value because, when trying a keyboard in a store, these things are not as obvious as the feel of the action. Cutaway photos of the keyboards might look cool, and I am certainly not opposed to the idea. However, if you want to ascertain the real (not the apparent), practical power of the device, you'll learn a lot more by reading the review than by looking at the ICs.—Steve O.

ERROR LOG

May 1992, "From the Top: Spectral Enhancers": We accidentally overlooked the Audio Logic PA88B ($320). This dual-channel, psychoacoustic processor uses 180-degree phase cancellation, narrow-band delays, and indirect frequency preemphasis to create a side-chain interference signal. When the side-chain signal is mixed with the original signal, it cancels only the desired frequencies. Tight time delays, critically spaced in octaves, are used to fill the holes left by this notching. This is said to increase the apparent high-frequency response, restore the natural presence of the original signal, and provide a 5 to 9 dB apparent increase in signal level. Audio Logic; tel. (801) 566-8800; fax (801) 566-7005.

We welcome your feedback. *Address correspondence to "Letters," Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608. Published letters may be edited for space and clarity.*

WHAT'S NEW

▲ THIRD COAST LABS TOOLBOX DI

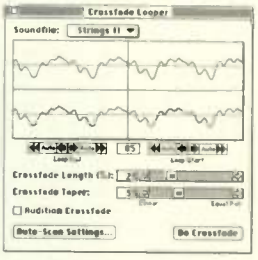
Third Coast Labs announced Toolbox DI ($579), a 1U rack-mount power supply with voltmeter, front and rear rack lights, a chromatic tuner, a metronome, and two active direct-injection (DI) inputs. The power supply serves seven surge- and spike-protected, 115 VAC outlets with EMI and RFI filtering and a 10-amp circuit breaker. All seven outlets rotate up to 90 degrees to accommodate "wall-wart" voltage converters. Two outlets feature a 2-second delay so the amplifiers can be powered up after other devices.

Two pull-out tubes house dimmable front lights, which use easy-to-change miniature bayonet bulbs or halogen bulbs. The rear panel contains a female BNC connector for a gooseneck lamp (e.g., Littlite). The tuner handles frequencies from 27.5 Hz to 3.951 kHz and can be calibrated to produce a tone at A=431 to 446. The metronome is adjustable from 35 to 250 bpm and has a visual indicator and a mutable audio click. Third Coast Labs; tel. and fax (615) 228-3765.

Circle #401 on Reader Service Card

▶ JUPITER SYSTEMS INFINITY

Jupiter Systems is shipping *Infinity* ($495), a unique sample-looping and editing application for the Macintosh. The program's Crossfade Looper with Smart Auto-Scan automatically finds loop points and creates a crossfade loop. You can fine tune by moving the loop points during playback. You can also adjust the shape and length of the blend crossfades. *Infinity* offers a specialized SPR Looper DSP tool that randomizes the spectral components of the sound inside the loop points for looping irregular waveforms such as orchestral strings and analog synth-type waveforms. Stereo samples' ambience and dimensionality is retained. The Freeze Looper tool automatically loops sonically pure waveforms, such as winds, brass, and bells and is useful for "freezing" the timbre of decaying strings (e.g., piano or guitar).



Sample-editing functions include Mix, Invert, Reverse, Clear, Silence, and many more. *Infinity* runs on, but does not require, all Digidesign sound cards and uses Apple Events to communicate with Digidesign's *SampleCell Editor* (version 2.0 or later). It reads and writes all *Sound Designer* and AIFF file formats. The program requires System 7.0 or later, 4 MB of RAM (8 MB recommended), a math coprocessor, and 32-bit addressing. A Digidesign DSP card is strongly recommended. Jupiter Systems; (800) 446-2356 or (916) 878-2770; fax (916) 878-8577.

Circle #402 on Reader Service Card

▼ ENSONIQ TS-10

Ensoniq is shipping the 32-voice polyphonic TS-10 Performance/Composition synthesizer ($2,595). The company's new flagship synth "workstation" offers four polyphonic audio outputs, 6 MB of 16-bit waveforms (254 waveforms), 300 Sound Programs, and 300 Performance Presets (combinations of up to three sounds with a custom effect). The 61-key keyboard features Poly-Key polyphonic aftertouch and Ensoniq's unique Patch Select buttons, which access four preprogrammed sound variations. The TS-10's high-density floppy-disk drive can store sound, sequence, and SysEx data.

Editing functions for Performance Presets include mix, pan, attack/release time, brightness, key zone, velocity range, transpose, detune, and controller enables. Sounds can be combined by double-clicking a selection.

The new instrument has two new items of particular interest. First, it can load and edit samples from Ensoniq's ASR/EPS samplers and includes 2 MB of sample RAM, expandable to 8 MB with standard SIMMs. With 2 MB of RAM, the unit holds up to ten sounds; with 8 MB, it holds twenty sounds. In addition, the TS-10 has a Hyper-Wave mode that enables the user to select a list of up to sixteen waveforms and crossfade between them with a variety of controls.

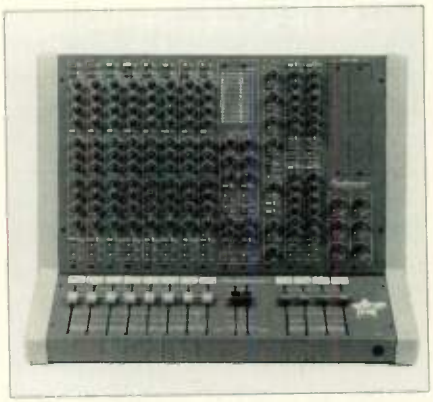
The effects processor offers 73 effects algorithms, many of which provide multiple effects, and allows real-time modulation of any effects parameter. The 24-track, 96 ppqn-resolution sequencer holds 30,000 notes, expandable to 97,000 notes. You can audition all edits before saving them. The sequencer allows real-time or step-time recording, including multitrack recording from an external MIDI source. Functions include overdub, punch in/out, and looping. Up to 60 Sequences/Songs can be held in memory. Ensoniq Corp.; tel. (800) 553-5151 or (215) 647-3930; fax (215) 647-8908.

▶ STUDIOMASTER STAR SYSTEM

Studiomaster introduced the Star System mixer ($1,595), which offers eight full-featured channels and ten stereo line-input channels. The full-featured channels have XLR mic and ¼-inch, balanced line inputs with input-swapping switch; 100 mm faders; pan; defeatable, 3-band, fixed EQ; four aux buses with stereo returns; and tape in and out with in-line monitoring and pan. The eight mic/line channels can be routed to either of two fully parametric equalizers, which also feed the L/R outputs.

Four of the ten line-input channels have switchable RCA phono inputs and ¼-inch line inputs, 2-band fixed EQ, selectable access to any aux bus, pan, and rotary level pots. The other six line-input channels just have level pots. All channels have PFL monitoring and in-place solo.

In addition, the mixer has insert points for the L/R bus and aux buses; two mute buses for the stereo line and tape-monitor inputs; D-connectors and cable adapters for +4 dBm, balanced operation; and two effects ports that accommodate Star plug-in effects modules, including a stereo compressor, stereo gate, and parametric EQ. S/N ratio is rated at 92 dB, dynamic range at 108 dB, frequency response at 20 Hz to 20 kHz (+0/-0.5 dB), and THD at 0.0025%. Studiomaster; tel. (714) 524-2227; fax (714) 524-5096.



Circle #404 on Reader Service Card

▼ PEAVEY DPM-4

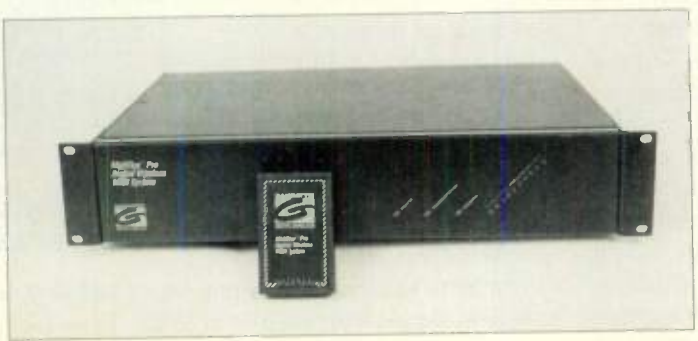
Peavey is shipping its latest keyboard-synth "workstation," the DPM-4 ($2,399). The basic voice architecture is the same as in the company's DPM-3, but polyphony has been expanded to 32 voices. The instrument features 10 MB of ROM-based samples selected from the Prosonus, McGill, and Northstar sample libraries. New waveforms include an improved acoustic piano, steel and nylon-string guitars, orchestral sections and solo instruments, orchestral percussion, brushed percussion, house drums, and sound effects. The 512 KB of sample RAM is expandable to 1 MB, and samples can be loaded from floppy disk or via MIDI Sample Dump Standard.

The DPM-4 provides remote control of Peavey's DPM SX Sampling Expander, with sample capture, looping, and trimming. It has dual effects processors; a 3.5-inch, PC-compatible floppy-disk drive; a 61-key, Velocity and Channel Aftertouch-sensitive keyboard; and a 9-track, 40,000-note sequencer. In addition to the usual mod and pitch wheels, it has a programmable slider, a data wheel, three assignable footswitch inputs, and a CV-pedal input. A DPM-3 can be upgraded to a DPM-4 with a simple conversion kit. Peavey Electronics; tel. (601) 483-5365; fax (601) 484-4278.

Circle #405 on Reader Service Card

▶ GAMBATTE! MIDISTAR PRO

Gambatte! has resumed manufacturing and sales of the MidiStar Pro wireless MIDI system ($2,995). MidiStar is completely digital and uses spread-spectrum frequency diversity to transmit identical data over a wide range of radio frequencies. This averts RF dropout, regardless of transmitter movement, providing reliable communication. The system operates in the upper UHF band (902 to 928 MHz) and, according to the manufacturer, will not cause interference with other wireless systems. Several factory-set frequencies allow multiple systems to operate simultaneously. The system has a range of over 400 feet and transmits any type of MIDI data on all MIDI channels. The transmitter operates for six hours on one 9V alkaline battery and features a built-in antenna and low-battery indicator. All cables, mounting hardware, and battery are included. Gambatte!, Inc.; tel. (404) 325-4843; fax (404) 315-6809.

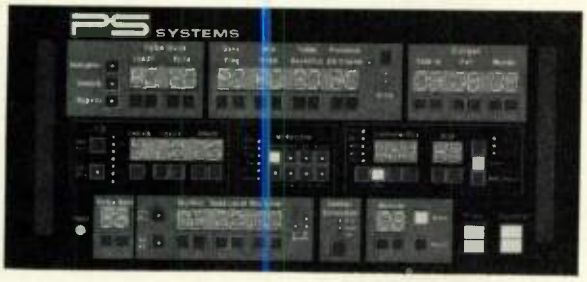


Circle #406 on Reader Service Card

▼ PS SYSTEMS EB100S

PS Systems is shipping the EB100S programmable guitar-amplification system ($1,495). The device lets you configure your signal path through two 12AX7-based preamp stages, the second with a distortion circuit, then through EL34 output tubes. The 4-band EQ (±18 dB) is located after the output tubes, as is a fully parametric EQ. A noise gate also is included.

The two stereo effects loops can be configured in series or parallel, with programmable send and receive levels and wet/dry mix, and you can crossfade between effects loops. The unit includes a stereo, 100W/side MOSFET power amp. In addition, balanced and unbalanced line-level outputs are provided, with open-back and 4 x 12 speaker-cabinet emulation.



The EB100S has two programmable LFOs that can modulate any parameter of the unit. It lets you use two footpedals, the LFOs, MIDI note numbers, and Velocity messages to control almost any combination of tubes, EQ settings, pan, volume, effects loops, and LFO settings. The pedals can even be configured to sweep multiple parameters at once. The completed patches are stored in the unit's 100 user preset locations. PS Systems; tel. (800) 446-8404 or (619) 578-1118; fax (619) 578-8851.

Circle #407 on Reader Service Card

▼ DRAWMER DL441

Drawmer introduced the DL441 Quad Auto Compressor/ Limiter ($1,149). The 1U rack-mount device includes four channels of the company's DL241 Auto Compressor and variable peak-level section. Features include switchable hard/soft knee compression with ratio control in both modes; auto attack and release to constantly follow the dynamics of the signal and preserve transients without allowing excessive peaks; peak-level control, adjustable between 0 dB and +16 dB; switchable +4 dBu or -10 dBu operation; and balanced XLR inputs and outputs. QMI/Drawmer; tel. (508) 435-3666; fax (508) 435-4243.

Circle #408 on Reader Service Card

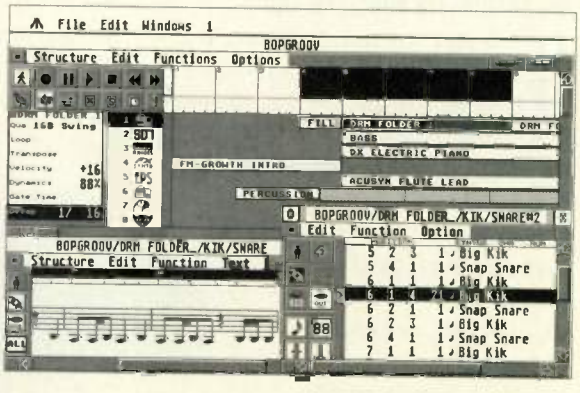
▼ SUNRIZE SMPTE OUTPUT

SunRize Industries released *SMPTE Output* ($249), a stand-alone application for the Commodore Amiga that stripes LTC time code onto audio and video tape. The program generates 24, 25, 29.97, and 30 fps non-drop and drop-frame time code and sends it out the computer's audio jack, allowing the Amiga to be the master clock. It offers multiple reset points and fast-forward, rewind, play, and pause controls. *SMPTE Output* locks to the video sync pulse of each video frame when used with a genlock or NewTek Video Toaster, providing highly accurate time-code generation. The program is NTSC- and PAL-compatible and works with any Amiga with 1 MB of RAM. It runs alone, or as an expansion module for the company's *Studio 16* audio-editing system. SunRize Industries; tel. (408) 374-4962; fax (408) 374-4963.

Circle #410 on Reader Service Card

▶ EMAGIC NOTATOR LOGIC

Emagic (distributed in the U.S. by Ensoniq) has announced the availability of *Notator Logic* ($699), a combination sequencing/notation program for the Atari ST, STe, TT, and Falcon030. The object-oriented sequencing environment of *Logic 1.5* for the Atari offers similar features to the Macintosh version, including 960 ppqn resolution, real-time editing, and sophisticated score-editing features. Emagic is also offering existing users of *Notator*, *Creator*, and *Notator Alpha* an upgrade to *Logic* for $299, $450, and $479, respectively. The upgrade price also includes *SoundSurfer*, a new universal librarian. In related news, Emagic announced version 1.6 of *Notator Logic* for the Macintosh. The new version (a free upgrade) adds step-time recording, new editing options, and enhancements to the score-editing features. Ensoniq; tel. (800) 553-5151 or (215) 647-3930; fax (215) 647-8908.



Circle #409 on Reader Service Card

Music Suite A, Soundelux Florida

SOUNDELUX is a diversified audio production company, located in Orlando and Hollywood, dedicated to superior and innovative sound design and music for the motion picture, television, and theme park industries.

oundelux depends on Peavey Audio Media Research equipment...from recording consoles and reference monitors to multi-effects processors and stereo studio amps. Quality and innovation: Soundelux and Peavey!

PEAVEY

Peavey Audio Media Research 711 A Street, Meridian, MS 39302-2898 Telephone: 601-483-5365 *Made in the USA* ©1993

FACE IT. YOU NEED

It's enough to drive you crazy.

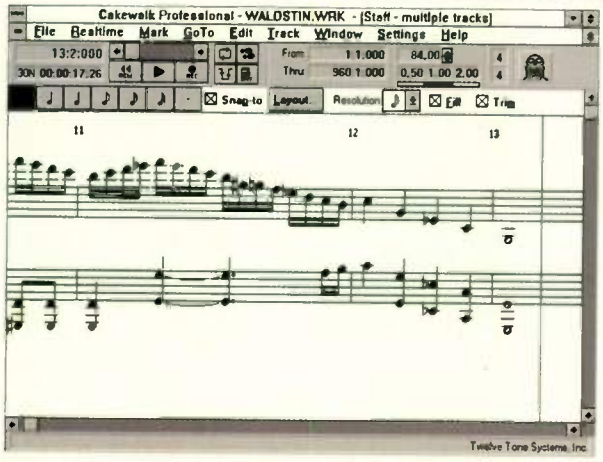
You've been searching for software that will help you turn your musical ideas into polished performances. But the first program you tried wasn't powerful enough. And the other was so complex, you didn't know where to start.

Maybe it's time to see a Professional.

Cakewalk Professional for Windows™ is the 256-track MIDI sequencer that's powerful *and* easy to use.

Express Yourself

The detailed **Event-list view** lets you view and edit all MIDI events on multiple tracks at once. You can even insert non-MIDI "special" events like digital audio waves (voice, special effects) that play back on .WAV-compatible sound cards.



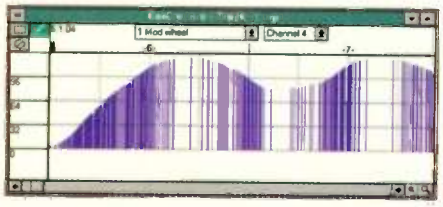
Staff view

Tempo

Take Control

Cakewalk Professional also has a graphic tempo map and **Controllers view** for drawing tempo and Controller changes with your mouse.

Use up to 16 assignable faders to send out MIDI Controller events while recording or during playback. Fader positions update in the **Faders view** during playback to show Controller values.



Controller view

Professional Staff

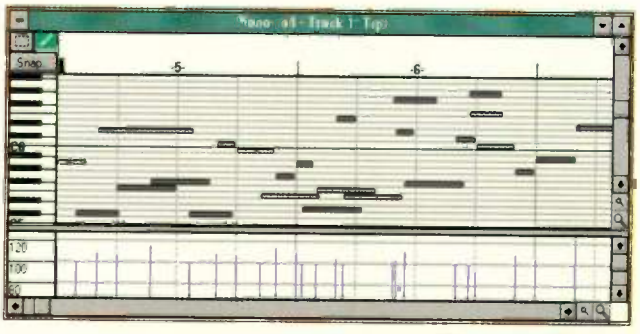
A multi-track **Staff view** lets you edit up to 10 staves of standard notation. You can insert, delete, and move notes with your mouse. Like all views, the Staff window scrolls during playback.

Use the **Piano-roll view** for inserting, resizing, and moving notes in a piano-roll grid. You hear the notes change pitch as you move them. And you can redraw note velocity levels as well.

Markers

Get On Track

Use the **Track/Measure view** for assigning track parameters like MIDI channels and patches. And you can adjust parameters in real time, like volume, pan, key offsets, and velocity levels. All Track parameter columns can be moved and sized. Use the Measure pane for fast "drag-and-drop" editing of selected measures.



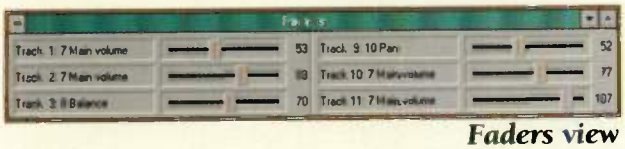
Piano-roll view

Professional Experience

Cakewalk Professional works hard to earn its "professional" status: a variable timebase of up to 480 pulses per quarter note; support for all SMPTE/MTC formats; a Meter/Key map; a **Markers view** for creating a text list of "hit points"; and a powerful

PROFESSIONAL HELP.

Event Filter for selective edits, like splitting out drum notes onto separate tracks.



Faders view

CAL-
SWING 16.CAL

Cakewalk Professional has a 256-bank System Exclusive generic librarian, for storing and sending your instrument sound banks and presets.

Event-list view

Sysx

Meter/Key

And the built-in Cakewalk Application Language (CAL) even lets you create your own editing commands, like chord generators, drum maps, and "swing quantize" routines. (A free library of CAL routines is available to all registered users.)

Get Help Fast

Unlike some sequencers, Cakewalk Professional has context-sensitive, on-line help available at any time. Just press the F1 key to get help with what you're working on. Examples, definitions, and even a list of answers to common questions are a mouse-click away, supplementing the comprehensive *User's Guide*.

Comments

See A Professional Today

Cakewalk Professional for Windows ($349) is sold at finer music and computer stores worldwide. For more information, or for the name of a dealer near you, call

800-234-1171 or
617-926-2480.

A demo disk is available for $10.

System Requirements: IBM PC with 10 MHz 80286 or higher, 2 MB of RAM, hard drive, mouse; Microsoft Windows 3.1. Supports any combination of up to 16 MIDI ports on devices with Multimedia Extensions drivers (including Roland MPU-401 compatibles and Music Quest MQX interfaces).

Twelve Tone Systems, Inc.
P.O. Box 760 Watertown, MA 02272
Fax: 617-924-6657

Own Another Sequencer?

CALL ABOUT OUR TRADE-IN OFFER!

Cakewalk
PROFESSIONAL
for Windows

Twelve Tone
SYSTEMS

PRESSURE SENSITIVITY:
LIKE ON THE $2,050.00 ROLAND JV-80.

+

32 VOICE POLYPHONY:
LIKE ON THE $1,495.00 E-MU PROTEUS MPS.

+

55 TEMPERAMENT VARIATIONS:
LIKE NOBODY ELSE. ROLAND'S $2,295.00 JW-50 HAS ONLY 16 TEMPERAMENTS AVAILABLE.

+

32 MULTITIMBRAL PARTS:
LIKE NOBODY ELSE. YAMAHA'S $2,195.00 SY-77 HAS ONLY 16 PARTS.

+

FULL EDITING AND STORAGE:
LIKE ON THE $2,399.00 KORG O1W.

+

MAC™ INTERFACE:
LIKE YOU'D PAY AN EXTRA $99.95 FOR THE MACMAN.

+

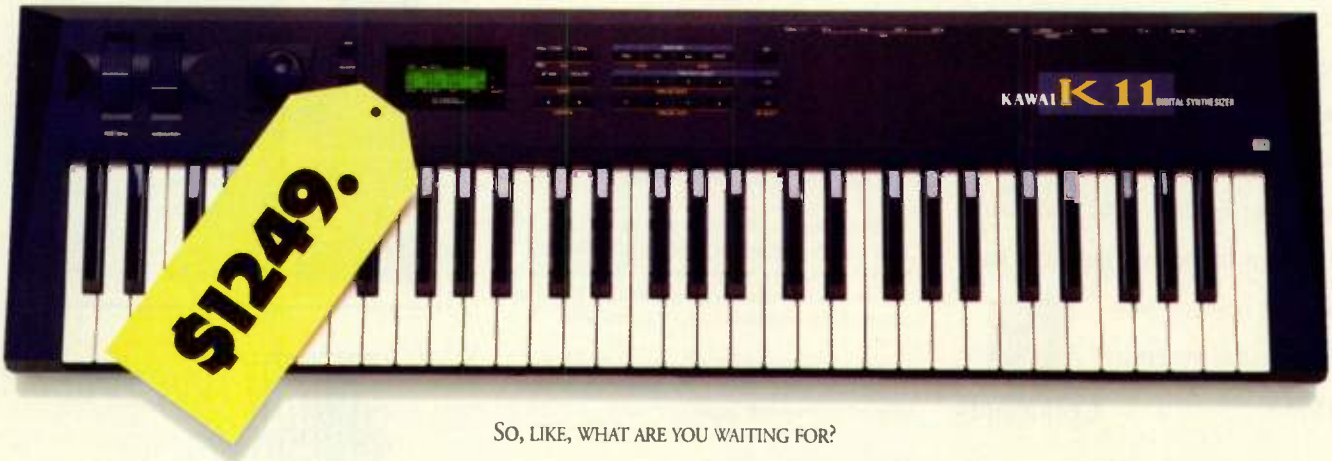
2 MIDI INPUTS:
LIKE NOBODY ELSE. WELL, YOU COULD BUY TWO KEYBOARDS TO GET THIS.

+

18 BIT DAC, 512 DIFFERENT WAVEFORMS, GENERAL MIDI, 384 TONE BANKS, CD-LIKE AUDIO QUALITY,
21 DRUM KITS, MONSTROUS LAYERS AND MULTIPLE SPLITS,
SOUND QUALITY RICHER AND THICKER THAN A STACK OF BLUEBERRY PANCAKES DRIPPING MAPLE SYRUP.

=

THE ALL NEW KAWAI K ELEVEN DIGITAL SYNTHESIZER.



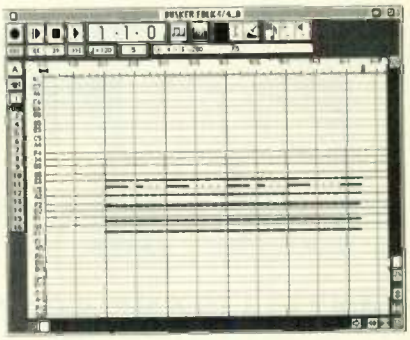
SO, LIKE, WHAT ARE YOU WAITING FOR?

KAWAI
Digital Magic.

▶ LION HUNTER MIDI BUSKER

Lion Hunter Music released Acoustic MIDI Busker ($24.95), a set of acoustic-guitar strumming patterns saved as type 1 Standard MIDI Files for the PC and delivered on 3.5-inch floppy disks. You load the files in your sequencer, assemble them into an arrangement, and play them with your favorite acoustic-guitar sample or synth patch.

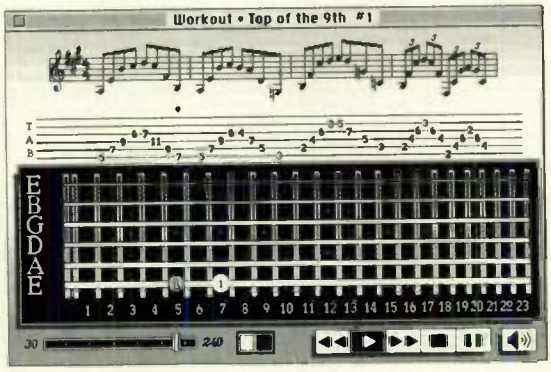
Each SMF contains several 4-bar tracks in a particular style. Each track contains a different chord (called "Chord Blocks") within the style. By stringing together Chord Blocks, you assemble a guitar track. Eight styles are provided: ballad, blues-rock, country (3/4 and 4/4), folk (3/4 and 4/4), fingerpicking (two types), straight strumming, accented strumming (two types) and vamp (two types). Each style contains up to 31 Chord Blocks. Lion Hunter Music; tel. (907) 349-2456; fax (907) 349-2456.



Circle #411 on Reader Service Card

▶ LYRRUS G-VOX

The G-VOX system ($399), from Lyrrus, is a hardware/software package that creates an interactive link between an acoustic steel string or electric guitar and a Macintosh or PC-compatible computer. The hardware includes a lightweight pickup that temporarily attaches to the guitar with suction cups, or can be permanently mounted. The pickup feeds the G-VOX Belt Pack, which uses a patented music-detection algorithm to convert the information into digital data that can be stored and processed on the computer. A *Utilities* program helps you set up the system and provides a real-time tuner with an onscreen virtual fretboard.



Several add-on software packages are available. *Midi* ($149) is a guitarist's composition program that lets you record, edit, and save guitar input to a Standard MIDI File. Recorded music is displayed in tablature. Although you can play back the file with a MIDI sound source, you cannot monitor while recording (i.e., in real time). The program supports alternate guitar tunings and offers a built-in metronome, an interactive tuner, and SMF import and export. The *Riffs* ($79) and *Chords* ($79) packages interactively instruct you by displaying, on the virtual fretboard, how the parts should be played and how you actually played them. A large library of riffs are available ($16.95-$24.95), including many created by Dregs guitar ace Steve Morse. *Tour* ($59) is an interactive game that helps you learn guitar basics by playing the guitarist in an animated cartoon performance. (Watch out; the audience throws fruit!) Lyrrus Inc.; tel. (215) 922-0880; fax (215) 922-7230.

Circle #412 on Reader Service Card

▲ JUICE GOOSE 'ZILLA 8LM

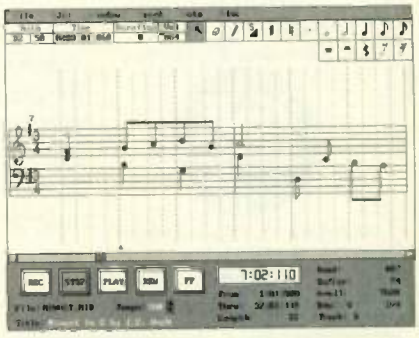
Juice Goose announced the 'Zilla 8LM 10-amp power-distribution device ($189). The 1U rack-mount power supply features eight switched outlets; pull-out, dimmable lights; and a 20-segment, color-coded LED meter that monitors incoming AC power levels between 90 and 130 volts. Juice Goose; tel. (713) 772-1404; fax (713) 772-7360.

Circle #413 on Reader Service Card

▼ BEBOP SYSTEMS LIMELIGHT

BeBop Systems introduced *Limelight* ($99.95), an entry-level, 72-track sequencer for the PC. In addition to event-list and piano-roll editing, the program provides standard notation-based note-editing. It also features a real-time virtual mixer (which supports General MIDI Reverb and Chorus parameters) and graphical editing of Velocity, Pitch Bend, and Controllers. The program supports MIDI Bank and Program Change and imports and exports SMFs. Joel Sampson MIDI Source (distributor); tel. (800) 775-5557 or (214) 320-2723; fax (214) 328-1092.

Circle #414 on Reader Service Card



ROLLS RM64 MIXMAX6

Rolls Corporation unveiled the RM64 MixMax6 ($320), a 6-channel, 1U rack-mount mixer. Each channel offers XLR mic input with individual phantom-power switch, ¼-inch line input, 2-band EQ, monitor send, effects send, and pan. The master section consists of left and right volumes and a mono effects return. Frequency response is rated at 20 Hz to 20 kHz (±2 dB), S/N ratio at 106 dB, and THD at .03%. Rolls Corporation; tel. (801) 562-5628; fax (801) 562-5655.

Circle #415 on Reader Service Card

Automatic Accompaniment has arrived – ...and just got better with Version 5

BAND-IN-A-BOX™

INTELLIGENT SOFTWARE FOR IBM (DOS & WINDOWS), MAC & ATARI

Type in the chords to any song, choose the style you'd like and Band-in-a-Box does the rest...

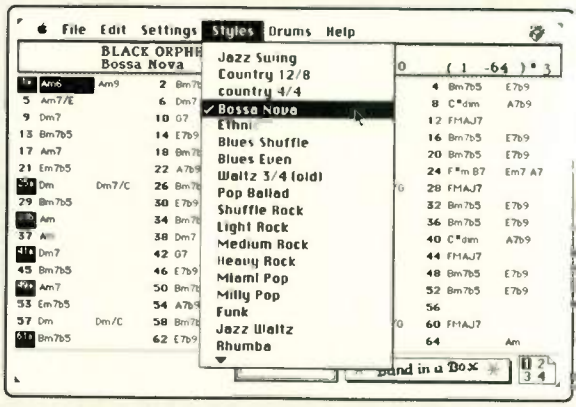
Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles

24 Styles built in...

Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle • Blues Straight Waltz • Pop Ballad • Reggae • Shuffle Rock • Light Rock • Medium Rock Heavy Rock • Miami Sound • Milly Pop • Funk • Jazz Waltz • Rhumba Cha Cha • Bouncy 12/8 Irish • Pop Ballad 12/8 • Country (triplet)

Version 5: 2 more instruments + built-in sequencer...

The built-in sequencer lets you record melodies (or buy our MIDI-FAKE-BOOK disks which include chords & melodies). Also make your own 5 instru-ment styles using the StyleMaker™ section of the program – or edit our styles to your tastes. Now there are 5 accompaniment instruments (including guitar/strings). General MIDI standard implementation (even for old synths). Plus 70 other new features!



1990
– FINALIST –
PC Magazine Award
for Technical Excellence

AFTER HOURS/ENTERTAINMENT
Band-in-a-Box
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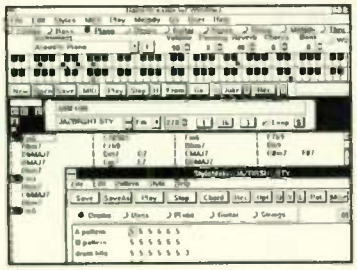

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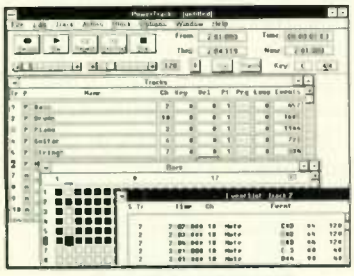

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Virtual Reality Audio, Part 1

Convincing 3-D audio for virtual reality is trickier than you might think.

By Scott Wilkinson

What comes to mind when you hear the words "virtual reality"? For most people, it's a headset with tiny twin TVs wired to a computer. But what about audio? To completely immerse the subject in a virtual world, the aural and visual stimuli must convey a similar sense of dimension. The visual part is relatively simple: Two video sources, one for each eye, produce convincing 3-D images. However, real-time 3-D audio is far more difficult.

Humans can determine the distance and direction of a sound source with uncanny accuracy. It's easy to see how distance is gauged: Close sounds are louder than those farther away. However, low frequencies travel farther than high frequencies, so there is relatively less high-frequency content in distant sounds.

Determining the direction from which a sound emanates is more complex. Of course, the amplitude perceived by each ear is important; if a sound is louder in the left ear, it appears to be located to the left. In this case, the sound generally reaches the left ear first, which provides an additional directional cue.

The size, shape, and orientation of the head and outer ears with respect to the source are equally important. As a sound wave arrives, it diffracts around the head and outer ears. If the sound includes high-frequency components whose wavelengths are significantly smaller than the head's diameter, a "shadow" is cast that reduces the amplitude at the farther ear (see Fig. 1). This diffraction induces subtle changes in the frequency and phase of each spectral component; the specific changes depend on the direction from which the sound came. Low frequencies are less affected by these phenomena than high frequencies, which explains why it's more difficult to localize low frequencies.

The brain analyzes the difference in the frequency and phase response of each ear, along with the difference in amplitude and arrival time, to provide a surprisingly accurate sense of the sound source's location. This analysis happens in real time, even as the head moves relative to the sound source. Things get even more complicated if the source is moving, which introduces a Doppler shift, among other effects.

These factors can be mathematically modeled with complex formulae called *head-related transfer functions* (HRTFs) and simulated with a series of *finite impulse response* (FIR) filters. These filters include a delay tap with independent, real-time gain control at each sample point, which produces a large, but finite, number of "reflections" in response to an input signal. (Short clicks, called *impulses*, are often used for measurement purposes.)

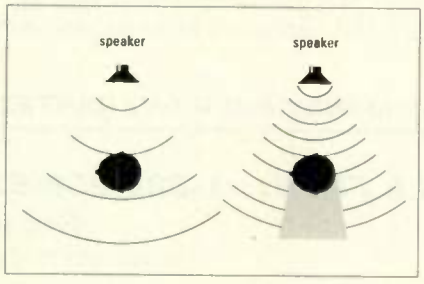

FIG. 1: When the wavelength of an incoming sound is significantly smaller than the diameter of the listener's head, a "shadow" is cast that reduces the amplitude at the farther ear.

FIR filters induce minute changes in the amplitude and phase of selected components in an audio signal to simulate the response of the human ear. The processing power and memory required by this process are enormous, which is why most 3-D audio systems are so expensive.

Several systems are designed to coax some degree of spatial localization from a pair of free-standing speakers, including the Roland Sound Space (RSS), Archer Communications QSound, and Gamma Electronics B.A.S.E. (see "3-D Audio" in the October 1992 EM). Unfortunately, 3-D audio systems utilizing two speakers are not entirely successful at simulating localized sound sources, particularly above the listener's head.

More important, these systems provide the same aural experience to all listeners. This defeats the primary purpose of virtual reality (VR), which is to immerse each participant in a simulated environment that remains consistent from their own point of view (POV), regardless of how they change their physical orientation. Like the stereo eye monitors in VR headsets, audio headphones are required to satisfy this condition in the sonic domain.

One way to simulate 3-D sound over headphones is *binaural recording*, a technique in which small microphones are mounted in anatomically accurate ears on a dummy head. Although this can provide realistic 3-D sound over headphones, the POV remains the same for all listeners, depending entirely on the orientation of the dummy head during recording.

Headphone-based VR sound systems must be capable of simulating localized sound sources that remain consistent for each participant as they move their heads. Next month, we will examine the efforts of a company that is performing some exciting research in this field.

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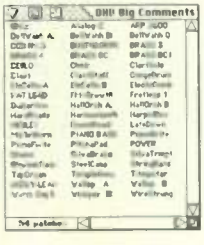

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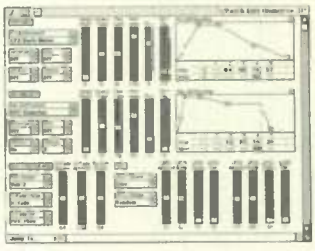

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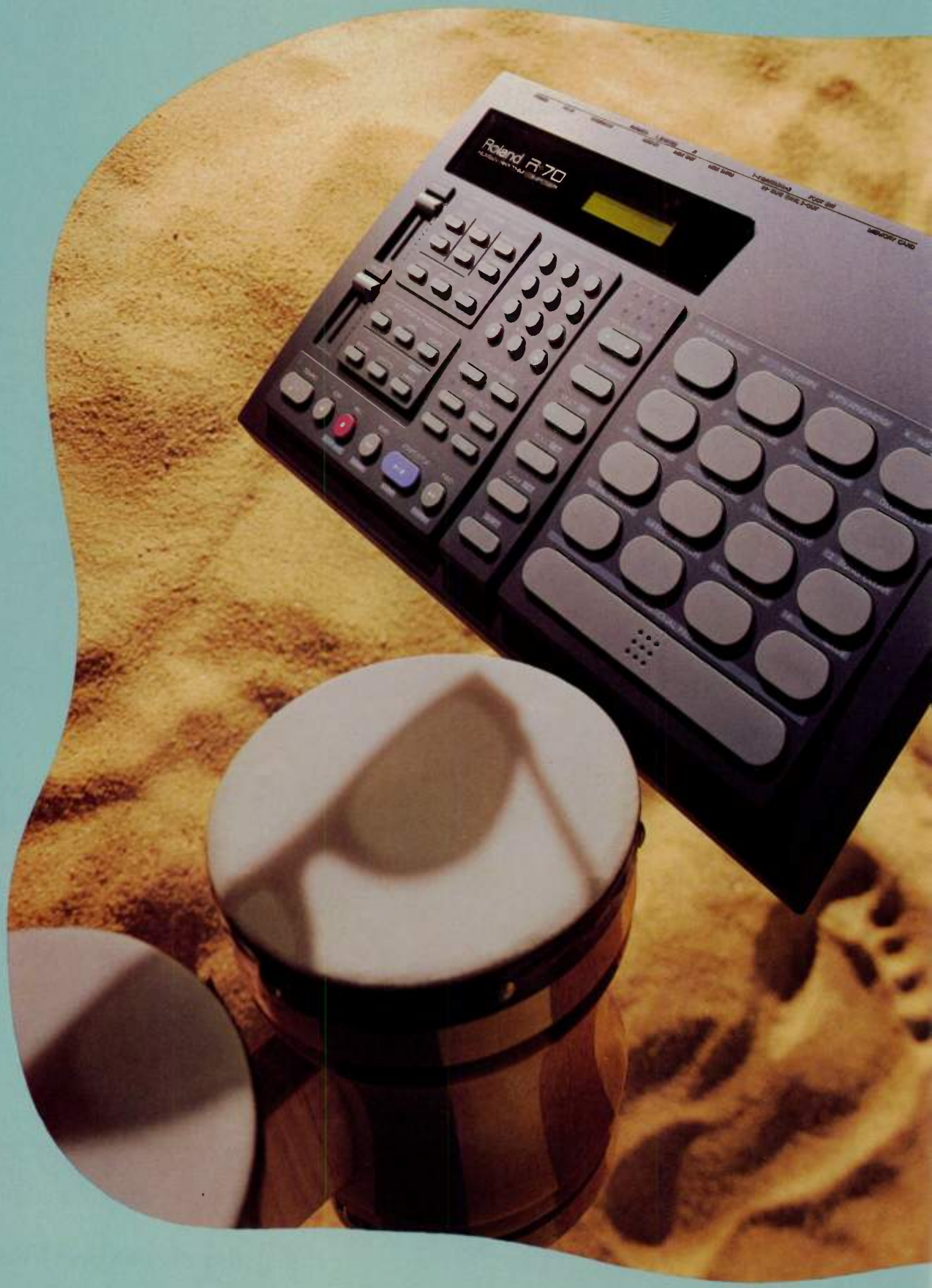

photograph by Mark Johann

On the Beat

By Michael McFall

In the 1993 world of electronic music, drum machines should be an anachronism. The characteristics that once made them unique have been overtaken by other species in the electronic-music realm. Contemporary synths are blessed with a generous collection of drum sounds, and most sequencers offer drum machine-style pattern-programming features. On top of that, digital samplers, which let you sample any drum sound you could ever want, are now easily affordable. But according to EM's most recent reader survey, more of you own drum machines than synthesizer sound modules, and ten percent of you plan to buy a drum machine this year. Obviously, the market for drum machines is thriving.

Of course, some people believe the writing is on the wall and think it's only a matter of time before stand-alone drum machines will be extinct. But those who use drum machines know that nothing is quite as convenient (and comforting) as having those pads underneath your fingertips. Plus, some musicians just aren't comfortable playing drum parts on a keyboard, and they enjoy having a variety of preset drum patterns to use as starting points. Finally, manufacturers keep developing innovative features that help maintain the viability and value of stand-alone drum machines.

The last time EM looked at the drum-machine market was nearly three years ago (see "Drum Machine Buyer's Guide" in the August 1990 issue). Since then, the market

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DRUM machines

has seen numerous changes: lower prices, improved features, discontinued or updated models, and all-new machines.

Currently, eight drum machines are on the market. The venerable Akai MPC60II (the "II" denotes a new external box) is the only sampling drum machine available; E-mu's SP-1200 was discontinued. Alesis replaced the HR-16 and 16:B with the SR-16, a low-cost machine with more and better samples than its predecessors. Roland upgraded the R-8 Human Rhythm Composer and the Boss (Dr. Rhythm) DR-550 to the R-8 MkII and the DR-550 MkII. Roland also introduced two mid-range machines, the R-70 and the Boss DR-660. Not to be outdone, Yamaha discontinued the RX5 and RX8 and introduced two machines, the mid-priced RY30 Rhythm Programmer and budget-priced RY10.

These eight machines, while comprising many new and/or revamped features and sounds, still follow the same tried and true methods for programming, memory management, and the like. If you know how to program rhythms, none of these offerings will force you into a steep learning curve. They mainly provide you with a specific set of sounds and programming features at a certain price point. Your job is to determine which machine has the qualities you're looking for in your price range. Our job is to point out the variables you should consider in making your decision.

THE CHART

That said, it's time to explain some of the terms used in the comparative chart on pp. 42-43. Along the top of the chart is a list of important features to consider when shopping for a drum machine. Along the side is a list of the current choices. What follows is a brief explanation of the listed features.

Number of Sounds: Factory/User

The number and variety of preset sounds in an instrument has an enormous impact on how you use it. Most machines let you edit the factory sounds and store your variations. Some machines allow you to stack multiple sounds on one pad to create composite sounds, but we haven't listed that here.

As a sampler, the MPC60II is a special case because you can have as many new sounds as you want, though the amount of RAM in the machine limits how many sounds you can load at once. The Alesis SR-16 is unusual because it stores edited sounds in kits, instead of in individual memory locations.

Additional Sounds

Some of the machines allow you to add additional sounds via waveform ROM cards. This a nice feature that doesn't lock you in to the original factory sounds.

Sound Editing

The different sound-editing parameters of each machine, such as tuning, reverse, and decay time, are listed here. The MPC60II and RY30 have much more extensive editing capabilities than the others.

Number of Pads/Number of Pad Banks

This refers to the number of pads for entering drum parts. Most machines have twelve to sixteen pads. You can use more than that many sounds in a pattern with the help of pad banks, which allow you to save predefined "drum kits," or sets of drum sounds. With multiple pad banks, you can press a button and switch instantly to another pad setup with an entirely new set of sounds.

Multi-Assign

A multi-assign feature lets you automatically assign one sound to all the drum pads, with different tunings or different levels for each pad. Multi-assign makes programming tuned percussion or bass parts easier, because you don't have to create differently tuned versions of a sound in memory to record them into your pattern. On some machines, this can be applied to decay levels, which is useful for hi-hat programming. Roland's Boss DR-660 is a special case; although it does not have multi-assign, it has two "kits" of basses for entering bass parts.

Touch-Sensitive Pads (Range)

Most machines offer velocity-sensitive pads, but some don't support the complete range of MIDI Velocity values. The number in parentheses refers to the Velocity range supported by the pads. Several Roland machines and the MPC60II from Akai also support Aftertouch (for modulating the volume of rolls).

Number of Preset Patterns (Rating)

This refers to built-in patterns that are preprogrammed by the manufacturer. You can use them as starting points to create your own patterns, or as the end product. Some machines come with one or two fills preprogrammed for each preset pattern, which goes a long way toward taking the staleness out of often-repeated patterns and makes them sound more musical. The rating in parentheses is a subjective assessment of the usefulness and musicality of the patterns (E = Excellent; G = Good; F = Fair; D = Don't Bother).

Pattern & Song Memory (Maximum Length)

Each machine has a finite amount of memory that can be divided into patterns and songs. This column lists the maximum number of patterns and songs the machine can contain, excluding preset patterns, which cannot be overwritten. Most machines cannot store the maximum number unless all the patterns are short and simple. The number in parentheses is the maximum length, in quarter notes, for each pattern or song.

EM DRUM MACHINE REVIEWS

Except for the Akai MPC60II and Roland DR-550 MkII, all the beat boxes discussed in this shootout have been reviewed in **EM**. The Roland R-8 MkII wasn't reviewed, but the original R-8 was, so it is listed instead. Back issues are available from Mix Bookshelf; tel. (800) 233-9604 or (510) 653-3307; fax (510) 653-3609.

Drum Machine	Issue Reviewed
Alesis SR-16	May 1991
Boss DR-660	January 1993
Roland R-8	May 1989
Roland R-70	August 1992
Yamaha RY10	February 1993
Yamaha RY30	November 1991

DRUM machines

Recording Resolution

The drum machine's recording resolution, measured in pulses per quarter note (ppqn), expresses the accuracy with which the machine records. The higher the resolution, the finer your control over timing. For example, at 24 ppqn, the smallest possible recording and playback increment is a 96th note (24 divisions per quarter note), or a 64th-note triplet. If you play notes in real time, and they don't exactly align to a timing grid of 24 ppqn, they will be recorded (automatically quantized) at the nearest point on the grid. (Most drum machines also let the user quantize note attacks to the nearest beat or note-marker, e.g., to 16-note triplets. Obviously, you can't quantize to a finer resolution than the machine can record. Quantization to 16th-note triplets or less, regardless of the record resolution, is common to most machines.)

At 96 ppqn, the smallest possible increment is a 384th note (96 divisions per quarter note). A higher resolution allows you to more precisely place each note's attack to make a rhythm swing, feel "up" (on top of the beat), or feel laid back (behind the beat). Thus, a low timing resolution limits the complexity of real-time recording, the degree of swing, and other timing adjustments.

Timing Adjustments

One of the most conspicuous problems with older drum machines was that the patterns sounded robotic, primarily because of low quantization values. Although the quantization levels are higher now, it's still hard to create realistic patterns without tweaking the timing of individual notes, which is a tedious process. To get around this, manufacturers have come up with a number of different functions that let you adjust the timing of multiple notes at once to affect the pattern's feel.

Swing, or Shuffle, is a common option that adjusts the timing of the second of a pair of notes by a user-specified percentage. For example, at a setting of 66%, straight eighth notes become jazzy-sounding triplets. Shift, or Offset, lets you move one sound's position forward or backward (by individual clock ticks) in relation to the other parts. If the machine supports a 96 ppqn or higher resolution, this can be handy for sliding a particular drum part around the beat to create a better groove.

Finally, though it doesn't directly affect timing and isn't listed on the chart, Roland's Human Feel parameters—found on the R-8 MkII, the R-70, and (to a limited degree) on the Boss DR-660—should be mentioned. These parameters allow you to incorporate subtle, random changes in a sound's tuning, level, and decay to help make the patterns sound more realistic. While this does provide a way to alter the groove, it requires tons of button pushing to get what some might consider insignificant results.

Synchronization

If you're using your drum machine in conjunction with a sequencer or tape deck, you'll want to synchronize the various elements so they play at the same time, from the same point, at the same tempo. If you're using MIDI, the machine should be able to receive (and send) MIDI Song Position Pointer messages, which notifies attached MIDI devices how far into a sequence you have progressed. These messages allow you to sync the drum machine to MIDI sequencers without having to start the sequence from the beginning each time.

Boss DR-660

Tape sync was very

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fax (310) 836-9192

Roland Corporation (Boss)
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important in the days when drum machines commonly served as the master clock source. But with the increasing sophistication of sequencers and MIDI interfaces, which often include tape sync, there is less need for it to be built into drum machines. Nevertheless, it can be handy in certain situations. Using a tape-sync function, you can record a sync tone onto a multitrack deck and control the drum machine's start and stop functions automatically when you start and stop the tape. Except for the MPC60II, which has a built-in SMPTE-to-MIDI converter, all drum machines offer simple FSK tape sync. The problem with FSK is that it doesn't incorporate any reference information in the sync tone, so you have to rewind the tape to the beginning of the song to maintain sync. Needless to say, this gets old fast. You're much better off using the sync-to-tape features of your sequencer/MIDI interface combination.

Footswitch

A footswitch allows you to start and stop a song remotely, which can be a lifesaver for live performance. Some machines have more-sophisticated implementations that let you do things

like tap tempo, punch-in record, etc. The Roland R-8 MkII and R-70 also have an input for a footpedal that can control whatever is assigned to the front-panel Value slider, including tempo and pitch.

Outputs

All the machines offer at least a stereo pair of audio outputs (the Alesis SR-16 has two stereo pairs), and some have individual outputs. Obviously, the more individual outputs a machine has, the more control you have over processing individual sounds.

A DETAILED LOOK

No one would deny that a comparative chart is a useful tool when trying to make a buying decision, but there's nothing quite like working with all the available choices. After using each machine for a while, I got a much better feel for its capabilities and how easy (or difficult) it is to use. What follows is a summary of my thoughts on each of the choices.

Akai MPC60II

This machine is by far the most sophisticated of the bunch. It combines a sampler, drum machine, MIDI sequencer, and SMPTE synchronizer in one elegantly designed and implemented box. The unit ships with four factory sound disks, which sound good, if not great, and Akai has a library of sounds on disk from which to choose. Because it's a sampler, the sounds are limited only by your sampling skills and the amount of sample RAM. The onboard memory allows you 13.1 seconds of total sampling time (expandable to 26.2 seconds), but you are limited to a maximum of five seconds per sound.

The MPC60II has a marvelous hi-hat slider control that allows you to manually slide from closed, to half-open, to open hi-hat sounds for realistic programming. The unit has the most extensive set of timing controls and editing parameters on any machine. For example, you can set the Shuffle amount in 1% increments from 50% (no Shuffle) to 75% (where 66% is a technically perfect Shuffle). At its high resolution of 96 ppqn, it quantizes up to 32nd-note triplets, and with Quantize off, it will record up to 384th notes. It also has the most extensive MIDI implementation and tape synching options of any drum machine. If money is no object, this is the one to beat, but be prepared to delve into sampling big-time.

Alesis SR-16

This small-footprint, low-cost machine is a gem. The 230 onboard sounds are uniformly excellent. Some of the sounds have dynamic articulation (hitting them harder changes the timbre, much like real drums), some are sampled dry and again with reverb, and some are sampled in stereo.

Each pattern consists of an "A" and a "B" version, plus two fill patterns (again A and B), giving a total of four patterns available at each location. This feature is handy for having, say, a verse pattern with an associated fill that goes into the chorus pattern. The patterns and fills can be selected via footswitch and even extended to go along with a soloist's improvisation, making the SR-16 a unique live-performance machine.

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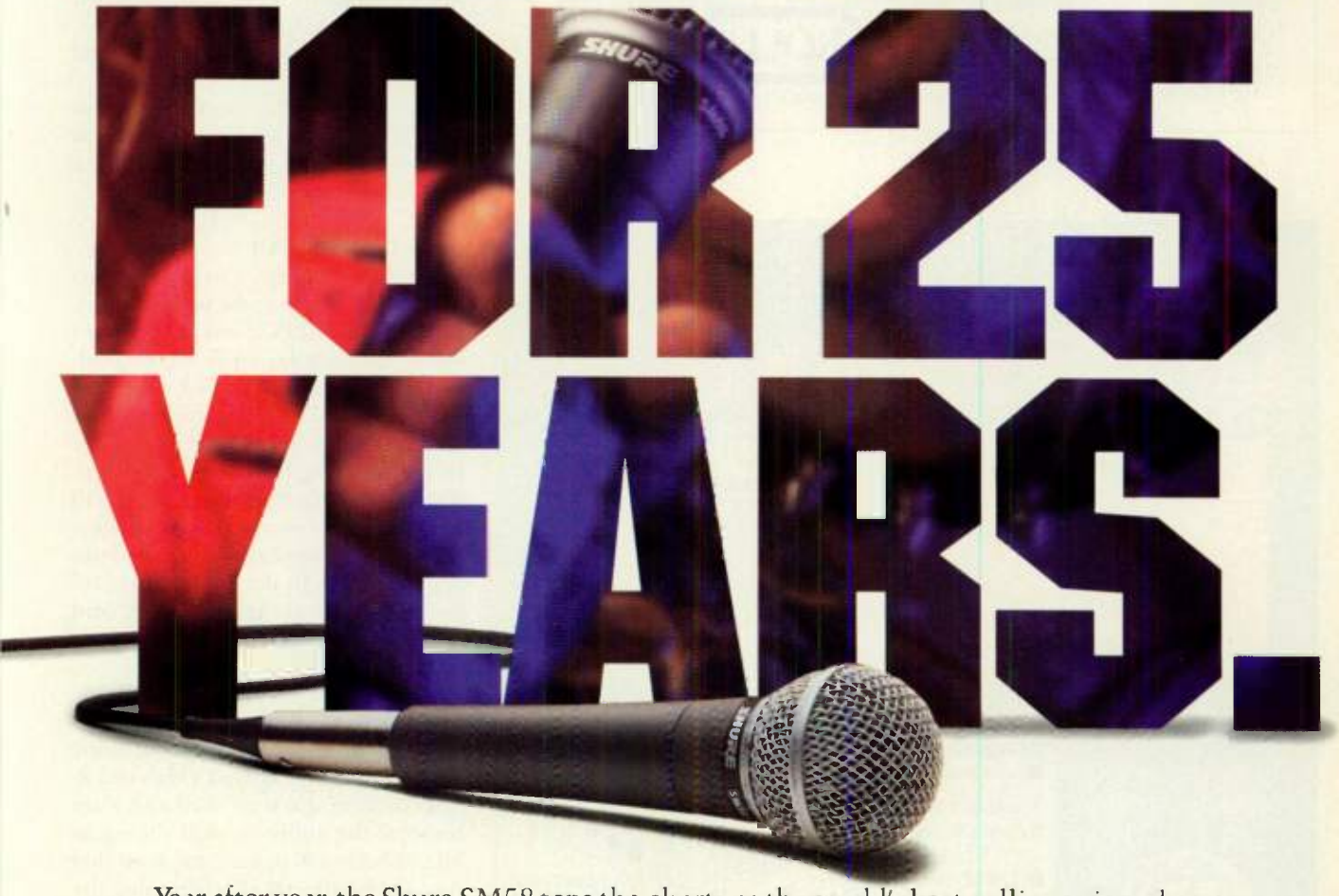

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DRUM machines

While a pattern plays, you can switch from Perform to Compose mode and change most functions, such as quantization, swing, pad velocity response, drum sets, drum set parameters, and MIDI parameters. This keeps the groove going even while you make adjustments prior to recording another part.

You can copy, append, and double patterns, and you can merge one pad's part to another drum pad (sound-stacking), which allows some monster combination sounds.

The SR-16 has a Map Drum Notes feature that can be set so that kits 40 to 49 are available simultaneously via MIDI. This means you can get 120 different user-selected sounds at once, placed in whatever order you want, which is great if you're an electronic drummer, or if you need a dedicated sound module.

Although the SR-16 isn't perfect, you get a lot of bang for your buck. I just wish it had a few bass sounds and a multi-assign feature for bass parts.

Boss DR-550 MkII

When this machine's original incarnation was introduced a few years ago, priced at just $295, it was an excellent value. The similarly priced, second-generation machine added more and higher-quality sounds, but Yamaha's RY10 (at $299) is a better value. The lack of a swing function (which the RY10 has), only 91 sounds (the RY10 has 230), and four pad banks (against the RY10's seventeen) are decided disadvantages. Still, the DR-550 runs on batteries, its sounds are good, and some of the preset patterns are nice.

Boss DR-660

Aside from having great sounds, this compact unit has variations of some features found on Roland's high-end R-8 MkII drum machine. Roll and Flam buttons, the ability to shift timing by MIDI Clocks (96 ppqn), and pads that respond to Aftertouch when using the Roll function are welcome additions to the Boss line. In addition, the sounds in Pad Bank A can be layered with those in Bank B at the touch of a button.

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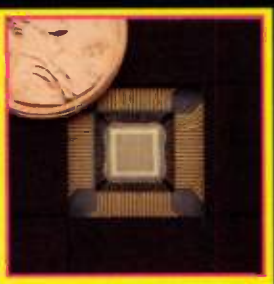

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feature, all the patterns can work together in groups of four: the Original pattern, Variation pattern, and two fill patterns to transition between them. Pressing the Forward button causes the Fill-to-Variation pattern to play, thus filling into the Variation pattern. Or, you can reverse the process by pressing the Backward button to play the Fill-to-Original pattern. With the user patterns, the four patterns don't even have to be the same length. Unlike the Alesis SR-16, however, the unit does not have a footswitch with which to change patterns during playback.

Although the DR-660 has 32 user drum kits, you can use only one per pattern. This means that only 32 sounds (Banks A and B) plus sixteen layered sounds (Bank A-B) are available to any one pattern.

On the plus side, however, the unit has two built-in, adjustable effects processors—reverb/delay and chorus/flanging—that, if purchased separately, would cost almost as much as the drum machine.

Roland R-70

Like the DR-660, the R-70 has all the unique features of current-generation Roland drum machines, including Roll and Flam buttons and two user-programmable, digital effects processors that produce reverb/delay and chorus/and flanging. The machine's Rhythm Expert feature algorithmically creates patterns and songs based on user-defined parameters about style, structure, feel, etc.

The R-70's preset patterns are excellent. The bass guitar with the drums makes the patterns sound like music; I could easily see doing an entire movie soundtrack using this machine alone. Functions are laid out intuitively on the front panel, with buttons for most of them. Thankfully, this layout means that searching through hierarchies of menus and submenus is minimal. And believe it or not, the manual is very good. Every topic can be found quickly, and the explanations are clear and organized (the occasional grammatical liberty taken with the English language notwithstanding).

In addition to the sixteen great-feeling regular pads, the R-70 has a long surface called a "Positional Pad." One sound can be assigned to the Positional Pad for each pad bank. By striking this pad in different places, you get variations in pitch, decay, nuance, and pan position of the assigned sound. Programming subtle nuances for, say, hi-hats and ride cymbals is easy using this innovative feature. Sometimes you can even fool real drummers. Very nice.

The sounds are uniformly excellent, and the R-70 provides a vast array of them. Available choices include all the traditional sounds, plus African, Latin, and Third World percussion, brushes, and so on. With the onboard effects and sound-editing parameters, creating cool sounds is easy.

Roland R-8 MkII

This machine is the successor to the tried-and-true flagship of Roland's line, the R-8, which was introduced in 1989. The main difference is that the R-8 MkII has more sounds than its predecessor. The famous Roland Flam and Roll buttons have been retained, along with the Human Feel feature, which I mentioned earlier.

One drawback is that preset patterns cannot be used in a song unless they are first copied to a user location. This is not the kind of thing I like to see on a machine

Akai MPC60II

EM Guide to Drum Machines

Manufacturer/ Model	Number Of Sounds: Factory/User	Additional Sounds	Sound Editing	Number Of Pads/ Number Of Pad Banks	Multi-Assign	Touch-Sensitive Pads (Range)
Akai MPC60II	0/34 (4 disks incl.)	sampling, 28 Akai disks/$9.95 ea.	tune, start/end time, reverse, decay, double play, attack, velocity-controlled attack and start point	16/2	auto pitch, velocity	yes (127)
Alesis SR-16	230/0	no	tune (+3/-4 semitones)	12/100	manual	yes (8)
Boss DR-550 MKII	91/0	no	tone, decay, mono/poly	12/4	manual	accent key (7)
Boss DR-660	255/32 user kits of 32 sounds ea.	no	tune (±2,400 cents), decay, nuance, poly/mono	16/2	manual	yes (127)
Roland R-70	210/32	no	tune (±4,800 cents), decay, nuance, attack damp, brilliance, velocity pitch, layering	17/18	auto pitch	yes (127)
Roland R-8 MKII	200/26	11 ROM cards, 26 sounds/$79.95 ea.	tune (±4,800 cents), poly/mono, sense, decay, nuance	16/5	auto pitch, decay	yes (127)
Yamaha RY10	250/0	no	tune (±2 semitones)	12/16	auto pitch	no
Yamaha RY30	96/128	8 ROM cards/ $79-$99 ea.	extensive; AWM2 percussion synthesizer	12/17	auto pitch	yes (127)

in this price range. On the other hand, you can edit the timing by shifting notes, instruments, or patterns in 384th-note increments. You can append, copy, and merge patterns, and you can even extract instrument data from a pattern and copy it to another pattern. You can also choke instruments (a crash cymbal, for example) by assigning a rest to one of the pads and then using the "rest" pad to cut off the crash, because both sounds cannot play at the same time if they are assigned to the same voice.

In addition, the R-8 MkII can determine the total playing time of a song and calculate the tempo needed to play a song within a specified time, which is great if you're writing cues for television or film.

Yamaha RY10

Yamaha's latest addition is a fun little machine. Compact and lightweight, it runs on six AA batteries and has an internal speaker that allows you to make music wherever you are. (An optional AC adapter is available.) It's also an excellent value, combining great sounds and preset patterns, each with its own fill that can be accessed at any time by pushing the Fill button. All patterns have a bass part, which can be muted if you're a drum purist.

Twelve one-finger pads are arranged like a one-octave keyboard (although the keys are gray, rather than black and white). On either end of the "keyboard" is an ACCent/OCTave button that adds a user-defined volume accent to a drum pad, or transposes the bass range up or down one octave. This effectively gives you a two-octave pad range and makes entering bass parts easy and fast. Although the pads are small, they feel fine, but they lack velocity sensitivity. (The sounds do respond to MIDI Velocity messages, however.) The LCD panel even shows a tiny keyboard outline where the bass notes appear as dots while a pattern is playing. Neat.

Alesis SR-16

The RY10 lacks a MIDI Out, so it can't control your MIDI sound modules or dump its patterns to a sequencer. But it recognizes incoming MIDI notes, Velocity, Program Changes, and Song Select messages. Another convenient feature is an input jack for an electric guitar, bass, electronic keyboard, or other low-level audio signal. This input signal is mixed with the RY10's sound and delivered via two output jacks, or the internal speaker, if it's turned on. The RY10 also functions as a guitar or bass tuner.

With the exception of some of the cymbals, which are too thin and weak-sounding, too short, or suffer from audible looping (the longer ones), the sounds are very good. The RY10's basses, acoustic and electronic drums, traditional percussion instruments, and effects (explosions, gurgles, growls, and hammer hits) not

Number Of Preset Patterns (Rating)	Pattern & Song Memory (Maximum Length)	Recording Resolution	Timing Adjustments	Synchronization (SPP/tape sync)	Footswitch	Outputs	Price
demo song (F)	99 pat. (30,969 qn), 99 songs (256 parts)	96 ppqn	Swing, Shift	send & receive SPP, receive MTC/SMPTE, FSK, click	2 inputs, 11 functions	L,R,8 indiv., send, L+R return, trigger	$3,699
50 X (2 var.+ 2 fills) (G-E)	50 X (2 var. + 2 fills) pat.(128 qn), 100 songs (254 parts)	96 ppqn	Swing, Shift	send & receive/no	2 inputs: start/stop & pattern/tempo select	2 stereo pairs; L or R (mono) for both	$349
64 (F-G)	64 pat.(4 qn), 8 songs (160 parts)	24 ppqn	no	no	no	L (mono), R, phones	$350
100 (D-F)	150 pat.(80 qn), 100 songs (250 parts)	96 ppqn	Swing, Shift	send & receive/no	no	stereo pair, 2 indiv., phones	$550
35 for demo song (E) plus Rhythm Expert	100 pat. (396 qn), 20 songs (999 parts)	96 ppqn	Swing, Shift	send & receive/FSK	start/stop + 3 functions	stereo pair, 2 indiv., phones	$870
32 (F-G)	200 pat.(396 qn), 10 songs (999 parts)	96 ppqn	Swing, Shift	send & receive/FSK	start/stop, value	L (mono), R, 8 indiv., phones	$1,195
50 x 1 fill ea. (G-E)	50 pat. (4 qn), 36 songs (199 parts)	24 ppqn	Swing	no	start/stop, fill pat./song select	L (mono), R, phones	$299
100 (G-E)	100 pat. (16 qn), 20 songs (999 parts)	24 ppqn	Swing	receive/no	start/stop	L, R, 2 indiv., phones	$595

only sound good, but there are lots to choose from to cover rock, reggae, rap, jazz, funk, Latin, techno, R&B, etc. The addition of bass guitar on the preset patterns makes the patterns come alive and shows you immediately how the drums fit into a more musical track.

My major gripes are the low, 24-ppqn resolution (in this case, quantization is restricted to 16th notes and 8th-note triplets only), lack of MIDI output, and the fact that patterns are limited to a disappointing 1-bar length. But despite these limitations, it's a fun way to make music, especially for the price.

Yamaha RY30

Unlike the other machines, the RY30 is a full-fledged percussion synthesizer. A voice is made up of two waveforms, each of which can be one of 96 percussion samples. After selecting the waveforms, you can reshape them by tweaking the filters (lowpass or highpass), envelopes, panning, pitch, decay time, velocity sensitivity (which can be used to modulate amplitude, pitch, and EG attack and decay times), and other parameters. (A little-known fact regarding RAM on the RY30 is that the 32 memory locations set aside for card memory can be used to store your own creations, even if you don't have a RAM card installed.) You can record using sounds from any of the pad banks, but if you edit a sound, its occurrence in a pattern will change to the edited sound. However, the RY30's Step Edit allows you to alter the velocity, pitch, decay, pan, filter cutoff, and balance between waveforms of each drum stroke.

The 100 preset patterns are mostly excellent. Some of them are reminiscent stylistically of Dave Weckl and others in Yamaha's stable of fine drummers. ROM cards containing wave, voice, and rhythm pattern data by Dave Weckl, Tommy Aldridge, Matt Sorum, and Peter Erskine are available, as well as Percussion, FX Drums, Dance & Soul, and House & Rap cards.

The RY30 offers a unique multifunction wheel with a 5-position switch that, when recording in real time, can modify pitch, panning, decay, filter cutoff frequency, and the balance between the two waveforms that make up a Voice. You can also use the wheel to adjust the timing of individual notes for specific drums. This is a powerful programming tool; however, the coarseness of the machine's quantization resolution limits its utility for subtly altering the groove.

The RY30's biggest drawback is its low resolution of only 24 ppqn (pulses per quarter note). Most pro machines these days record at 96 ppqn, and unless you're planning to strictly quantize your rhythms, the low resolution could be a problem. For example, a well-known technique for making programmed

Yamaha RY30

tracks groove is to have a couple of different instruments, such as cabasa and hi-hat, shuffling at slightly different swing settings, so that everything is not quite locked up. This subtle effect cannot be created with the RY30; one clock pulse is too coarse an adjustment.

Despite its disappointing recording resolution, the RY30 is a contender, thanks to excellent sounds that can be extensively edited and easy-to-use, complete programming features.

THE BOTTOM LINE

I can't stress enough that sound is the most important criterion for choosing a drum machine. There's no substitute for going to a store, checking out the preset sounds, and asking about sound cards or diskettes. Once you've found a machine with sounds you like, check out the sound-editing and pattern-programming details. Program some patterns, change the sounds, and try the machine out just the way you'd use it if you bought it.

Remember that you might not want control over every aspect of the sounds and rhythms. All that button-pushing could turn you into a programming nerd and take away the most important aspect of making music: spontaneity. Is it really necessary to have "feel" parameters, or can you add feel just by playing the pads expressively? Do you need eight individual outputs and tape sync, or are you just going to use the machine as a MIDI sound source? Ultimate control is nice to have, but you pay a price in time and money. Besides, you may discover that a lower-priced machine almost outperforms some of the high-end ones and would be a better choice for your needs. Less is more? What a concept.

▼

Manufacturers keep developing innovative features that help maintain the viability and value of stand-alone drum machines.

My overall favorite pick of the bunch is Roland's R-70. Its combination of sounds, programming features (particularly the Positional Pad), and overall gestalt makes it a real winner. If you're working on a tighter budget, Alesis' SR-16 is a great choice, and Yamaha's RY10 is tough to top in the pure fun category.

Michael McFall *is the former editor of* Rhythm *magazine. Currently, he heads VDO Productions, a video production company specializing in music-instruction videos.*

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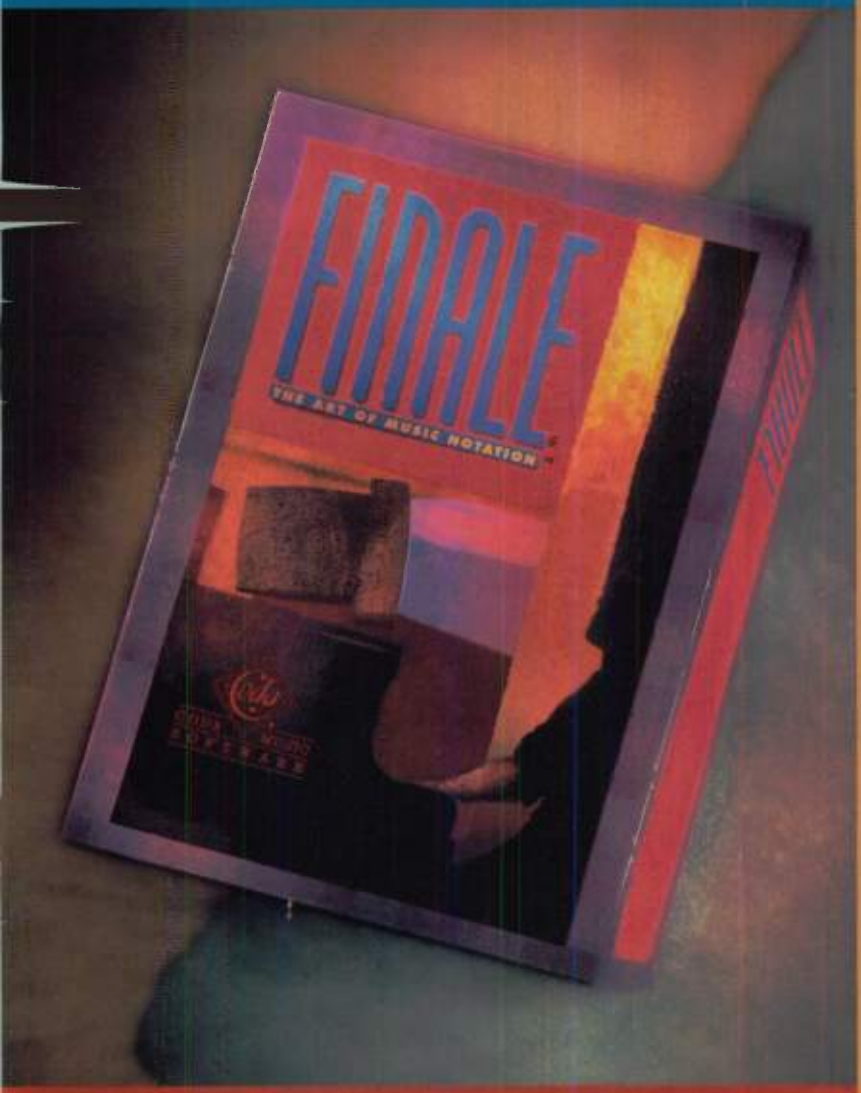

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Not many instruments can claim to have single-handedly created a revolution in the world of electronic music, but Roland's Sound Canvas certainly can. After its introduction at the January 1991 NAMM convention, the Canvas brought the concept of General MIDI (GM) into the spotlight, and the world has been a different place ever since. Those who have jumped onto the GM bandwagon include musicians eager to share Standard MIDI Files (SMFs), multimedia creators searching for a standardized way to add high-quality sound to their games and edutainment titles, and consumers curious about creating music. The result has been a much-needed renaissance of interest in MIDI instruments and MIDI-created music.

Create a new palette of sounds for your Roland Sound Canvas.

The Sound Canvas was the first product to be compatible with General MIDI, and its good sounds and reasonable price legitimized the concept. (The Canvas contains a Roland-developed superset of General MIDI called GS. See "MIDI For the Masses" in the August 1991 **EM** for more.)

The Roland engineers knew a good thing when they saw one and have since developed an entire suite of products around the Canvas/GS standard. In addition to the original SC-55 sound module, they offer the slider-equipped SC-155, the JV-30 keyboard, the JW-50 keyboard workstation, the SCC-1 PC plug-in card, the CM-300 and CM-500 computer sound modules, the SC-33 tabletop unit, and the SD-35 Sound Brush/Sound Canvas

photograph by Tetsuji Yoshida

By Andrew Schlesinger

The New S-series Samplers: S2800, S2800STUDIO, S3000, S3200

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The engineers at Akai have years of experience in designing extremely high quality digital samplers. Which in turn, has led to an on-going tradition - namely, the world-famous S-series professional sampling instruments.

Now, the latest generation has arrived in the forms you see pictured above, the S2800, S2800STUDIO, S3000, and S3200. These new models build upon the solid foundation of their predecessors, while offering even better audio quality and more powerful sound editing capabilities than ever before.

Akai samplers have always been associated with superb sound quality and clear, intuitive user interfaces, and these new S-series machines are no exception. Each features 16-bit sample resolution, with 64-times oversampling and 28-bit internal processing to ensure the crystal clear sound you expect from Akai.

In addition to Akai's legendary sound, all of the new S-series are loaded with features you need including 32-voice polyphony, resonant filters, digital effects, time compression/expansion, auto sample normalizing, sectional editing of samples, APM (Assignable Program Modulation), and much more. There's even built-in Help screens!

Naturally, the new series of samplers is fully compatible with the Akai S-series sound library, as well as libraries created by leading third-party sound developers. Gigabytes of sounds can be accessed via floppy disks, removable hard disks, magneto optical disks, and CD-ROMs.

The new S-series line is structured so that if your needs don't require the high-end power of the S3200 or S3000, the basic S2800 package still gets you into the upper echelon of sampling for less than $3000.00. The S2800 is equipped with 2 MB of RAM (expandable to 16 MB), and four polyphonic outputs (stereo + 2 assignable). The S2800STUDIO is supplied with 8 MB of RAM, and adds both SCSI and Digital I/O interfaces, so you're ready for connection to mass storage devices, CD-ROM, computers, and digital audio sources.

Moving up to the next level, the S3000 sports ten outputs (stereo + 8 assignable), and is supplied with 8 MB of RAM (expandable to 32 MB), SCSI, and Digital I/O. Options include a 105 MB internal hard disk and SMPTE time code I/O for creating cue lists.

The flagship S3200 comes equipped same as the S3000 while adding the SMPTE interface as standard, multi-mode filtering, stereo reverb, and stereo direct to disk recording. In place of the optional internal hard disk, a 3.5" magneto optical disk drive may be installed. Never before has there been a sampler like this!

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S3200 model shown with optional MO disk drive

Sound Canvas

combo unit. In addition, the SC-7 computer sound module, the Boss DS-330 tabletop unit, and the Roland Audio Producer RAP-10/AT PC audio card include most of the GS sounds found in the other products.

The specs of the Sound Canvas are impressive: 24-voice polyphony and 16-part multitimbral operation; 317 sounds in ROM, including 128 that conform to the GS standard, 61 variations of those sounds, and 128 recreations of MT-32 sounds (see sidebar "I Want My MT-32"); ten different drum sets; and built-in reverb and chorus. However, the Sound Canvas' audio quality is the real reason for its success. It's also extremely easy to use. Playing pre-programmed sequences that conform to the General MIDI spec yields predictable results every time.

The Sound Canvas and its siblings also offer something more: You can go beyond the instrument's presets and create your own sounds. The Sound Canvas is less programmable than many other synths, but once you've learned a few basic concepts, you'll be well on your way to programming unique sounds of your own.

PARTS IS PARTS

The Sound Canvas (SC for short) is divided into sixteen sections called "Parts." Each Part includes information such as the MIDI Channel to which the Part responds, the volume, the pan position, the chorus and reverb level, and the transposition from normal pitch (called Key Shift). It also includes the sound, or Instrument, that the Part plays. Each Instrument is a preprogrammed, sampled sound stored in ROM. To change the way the Instrument sounds, you must edit certain elements, or parameters, of the Part rather than the Instrument. This is the main difference between

I WANT MY MT-32

To access the "hidden" MT-32 patch emulations stored within the Sound Canvas, press both Instrument buttons together. A "/" appears before the Instrument name. Press the right Instrument button once, and the display jumps to 127. Next, press both Instrument buttons again, and the display includes a "#" before the Instrument names. These are the MT-32 sounds.

As you can see by their names, they are different from the regular Instruments and do not conform to the GM spec. However, you can use them in the same way you use the regular ROM Instruments. When the appropriate SysEx is loaded from a sequencer, the SC automatically calls up the proper ROM sound from the appropriate category.

To return to the original ROM instruments, press both Instrument buttons, then press the left Instrument button, followed by both Instrument buttons again. You should now be back to the normal preset sounds.

the SC and most other synths.

If you want to alter the timbre of a Part, there are a few things to understand. First, editing a Part parameter (filter cutoff, attack, pan, etc.) affects the sound of any Instrument assigned to that Part.

For example, let's say you're using Part 1 to play Instrument #26 Steel-str.Gt, and you decide to lower the filter cutoff to make the guitar less bright. (I'll explain how in a moment.) This filter edit is not stored with the Instrument, but with the Part. Consequently, if you then assign the Piano 1 Instrument to that Part, the new filter cutoff affects the Piano in the same way as the Steel-str.Gt, i.e., it is less bright than the original setting. This is true for all edits made to any Part parameter; they affect all Instruments played by that Part in the same manner. In other words, you can't edit an Instrument and store it as a "patch." Roland did not include any memory to store these patches, undoubtedly as a cost-cutting measure.

Unfortunately, you can't change or store names, either. When it comes to editing the sound of the Instruments, it's helpful to think of Parts more as "memory locations" for sound edits than simply just different Instruments, patches, or MIDI channels.

MAKING NEW SOUNDS

Okay, now for the fun stuff. Here's how to enter the Part edit area on the SC-55 and SC-155:

1. Choose the Part you want to edit and set its MIDI channel.
2. Make sure the All light is off, and the Part is not muted.
3. Choose an Instrument that you want to change. Let's use #54 Voice Oohs as an example.
4. Press both Part buttons simultaneously. You are now in the Part edit area.
5. The Mute button and the All button now let you scroll up and down through the available voice-edit parameters.
6. The Instrument left and right buttons now decrease and increase the parameter value, respectively.

The Sound Canvas also supports even more detailed editing in its well-hidden Micro Edit mode. See sidebar "Micro Edit Mode" for more.

Here's a list of the voice parameters you can edit in the Part Edit mode.

1. Part Mode determines whether the Part plays a normal instrument (Norm), or is one of the two Parts reserved to play drums (Drum 1 or Drum 2).

2. Bend Range determines how far the pitch bends in response to the pitch wheel or lever. It is set in half-steps; a value of 12 allows a 1-octave pitch bend up or down.

3. Mod. Depth determines how deeply the LFO (low-frequency oscillator) modulates the pitch when the mod wheel is moved (in other words, vibrato). The higher the number, the greater the depth of vibrato when you move the controller's mod wheel.

4. K. Range L sets the lowest MIDI note the Part will play. Use this parameter and the K. Range H parameter to configure a split keyboard.

5. K. Range H sets the highest MIDI note the Part will play.

6. Velo Depth determines how quickly the volume reaches its peak level in response to MIDI Velocity messages. As you lower this parameter, you lower the sound's ability to reach peak level, even with high MIDI Velocity messages. At a setting of 0, no sound comes out. As you increase this parameter above a setting of 64, it takes less Velocity to reach the loudest level.

7. Velo Offset modifies the basic Velocity level. An offset adds or subtracts a defined amount from the incoming Velocity message. For instance, with a Velocity Offset of 64, even the lightest attack yields a Velocity value over 64. With a negative Velocity Offset, a light keystrike might not even generate enough Velocity to trigger a note (i.e., produce a Velocity value above zero). When the Offset is high enough, the sound source receives maximum Velocity, regardless of the Velocity value. This parameter also affects the filter cutoff frequency.

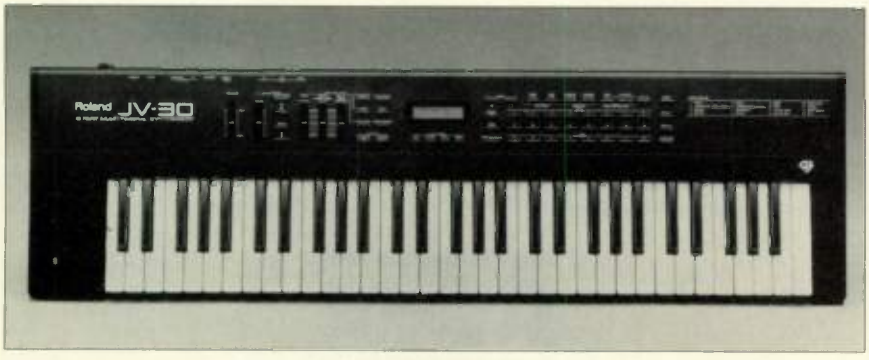
The Sound Canvas was the first product to be compatible with General MIDI.

8. Voice Rsv. specifies the number of voices (up to 24) that are always available for the Part. Setting this parameter to a number above 0 prevents a Part from shutting off and its voices from being stolen if you play more than the 24 available notes. Part 10 (the drum Part) always has top priority for voices, then Part 1, 2, etc., on down to Part 16, which has the lowest priority.

9. M/P Mode determines if the part is monophonic (i.e., can only play one note at a time) or polyphonic (i.e., can play many notes at a time). Mono mode is useful for lead voices and bass sounds that have a long decay.

10. Vib. Rate increases or decreases the speed of the LFO (vibrato) from the preset level stored with the Instrument in ROM.

11. Vib. Depth increases or decreases the depth of vibrato or tremolo stored with each Instrument. Even at the lowest value, it does not completely remove the vibrato from some Instruments.



Roland's JV-30 is a keyboard version of the popular Sound Canvas that also includes memory for user tones and performance setups.

12. Vib. Delay determines how long it takes from the time a key is pressed until the vibrato reaches its full level.

13. Cutoff Freq increases or decreases the cutoff frequency of the lowpass filter for each Part. Increasing the value often makes the sound "brighter," while decreasing the value often makes the sound "duller." If the preset cutoff of an Instrument is already fully open (i.e., at its highest level), increasing this value has no effect.

14. Resonance increases or decreases the amount of feedback to the filter. Increasing the resonance makes the filter more "sharp" and "peaky," creating an accentuated sweep; lowering the resonance makes the filter more "smooth" and "soft," creating a much more subtle sweep.

15. Attack Tm. determines how quickly the sound fades in from the moment a key is pressed. Raising the value increases the attack time, making it slower; lowering the value decreases the attack time, making it faster.

16. Decay Tm. determines how long it takes for the envelope of the sound to fade from the peak value after the attack to the sustain level (the level at which it stays as long as the key is held). Higher values increase the decay time, making it longer; lower values decrease the decay time, making it faster. Some sounds do not sustain—#47 Harp, for example—so the decay parameter controls how fast the sound dies away as the note is held. Other sounds, such as #45 Tremolo Str, have full sustain, so the decay has no effect.

You can add Sound Canvas sounds to a PC-compatible computer with the SCC-1 sound card.

17. Release Tm. determines how long it takes for a sound to die away after a key is released. Higher values increase the release time, making it longer; lower values decrease the release time, making it shorter.

(Note: The first seventeen parameters are available on all models of the Sound Canvas. The following parameters are available only on the SC-155 or the SC-55 with the version 2 ROM. See sidebar, "ROM Versions.")

18. Fine Tune adjusts the detuning of a sound. Higher values make the pitch sharp, and lower values make the pitch flat. This control lets you fine tune two sounds if they aren't in tune. In addition, you can create fuller sounds by layering the same Instrument in two Parts and detuning one a bit. The parameter seems to have a greater effect as you play lower notes, so use it with care and test the sound at both ends of the keyboard.

19. Portamento turns the portamento or "glide" between notes on or off for each Part. Polyphonic portamento is pretty cool.

20. Porta. Tm. determines the speed of the glide between notes. Higher values decrease the speed, making the glide time longer.

21. Modulation displays the position of your controller's Mod wheel: off=0, full on=127.

22. Expression is another volume control that works in conjunction with MIDI Volume messages. I suggest you leave it at 127.

FOR EXAMPLE

To continue the example using #54 Voice Oohs, set the following parameters to these values:

Mod Depth	10
Vib. Rate	-14
Vib. Depth	+10
Vib. Delay	+15
Cutoff Freq	-4
Resonance	+24
Attack Tm.	+8
Decay Tm.	+15
Release Tm.	+35
Portamento	ON
Porta Tm.	11

Try playing the sound; it should sound quite different from the original. Notice the length of the release. Press both Part buttons again to exit this level, and press the right Instrument button until you get to instrument #65 Soprano Sax.

When you play this sound, notice that the filter characteristics, modulation, and portamento are similar to those for #54 Voice Oohs, but the release is much shorter. As I mentioned, each Instrument has a preset group of parameter values stored in ROM as part of the Instrument. When you change the parameter values for a Part, you are offsetting these preprogrammed ROM values.

Voice Oohs has a fairly long release time stored in ROM, and increasing the Release Tm. parameter made it even longer. When you select the Soprano Sax, its release time changes proportionally, but it only gets marginally longer because its preprogrammed release is very short.

By the way, the default setting for all parameters is 0, except Pitch Bend (2), Mod Depth (10), Velo Depth (64), Velo Offset (64), and Expression (127). Also, the Voice Reserve parameters are different for each Part.

CANVAS TEMPLATES

The SC's restriction to editing Parts, rather than Instruments, can be a creative opportunity by thinking of all sixteen Parts together as a "song template." Let's say you want to use some edited sounds to give your music a personal touch. If you define each Part's role in the song, you can get a lot more timbral variety out of your music. Here's an example of what a song template might look like.

Parts 1 and 2: Normal (MIDI channels 1 and 2). Keep these Parts unedited and use them to play stock internal Instruments. Set the chorus and reverb amounts to low levels, and set the panning to mid-far left and mid-far right.

Parts 3 and 4: Slow Mellow Pads (MIDI channels 3 and 4). Use the voice edit parameters to slow down the attack (lower the attack time parameter), lower the filter cutoff and resonance, and increase the decay and release times. Set the chorus and reverb to medium-high levels, and set the panning to center.

MICRO EDIT MODE

Aside from the normal Part Edit mode, the Sound Canvas offers Micro Edit mode. In addition to the parameters described in the main article, Micro Edit lets you adjust controller routings, programmable alternate tunings, detailed effects parameters, and the ability to create graphic displays in the LCD. You can also enable and disable the response to individual MIDI messages.

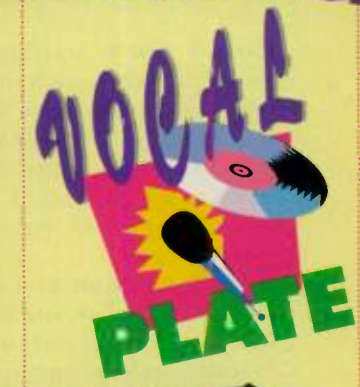
Using an editor program on a computer is the best way to access these parameters. However, they can be tweaked from the front panel if you are comfortable with hexadecimal notation (and have a lot of patience). Here's how, including an example in which the global reverb time is modified.

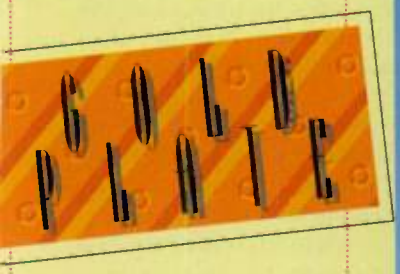
1. Turn on the All button to edit System, All Parts, and Drum Set parameters; turn it off to edit individual Part parameters.
2. Press both Part buttons simultaneously.
3. Press the All and Mute buttons simultaneously twice in rapid succession. The hexadecimal address and value of the last-edited parameter in the list appears in the upper portion of the display. (To see a list of all the available parameters and their addresses, turn to pp. 78-83 in the SC-55 manual and Appendices 29-34 in the SC-155 manual.)
4. If you want to edit individual Part parameters, continue to Step 5. If you want to edit System, All Part, or Drum Set parameters (including reverb time), skip to Step 9.
5. In the case of individual Part parameters, use the Part buttons to select the Part to edit.
6. Use the All and Mute buttons to select the parameter to edit.
7. Use the Instrument buttons to change the value of the parameter.
8. Repeat Steps 5, 6, and 7 as necessary until all desired parameters are edited. Skip to Step 12.
9. In the case of Drum Sets, use the Part buttons to select the key number to edit. In the case of System or All Part parameters, use the All and Mute buttons to select the parameter to edit. For example, to select reverb time, press All or Mute as necessary until the display reads "ALL >> 40 01 34: 40" (the address of the reverb-time parameter is 40 01 34, and its default value is 40).
10. Use the Instrument buttons to change the value of the parameter. For example, to change the reverb time, press the Instrument buttons to increment or decrement the parameter value from 00 to 7F.
11. Repeat Steps 9 and 10 as necessary until all desired parameters are edited.
12. To exit Micro Edit mode, press All and Mute simultaneously, followed by both Part buttons simultaneously.

Any changes you make in Micro Edit mode will be retained, even after turning the power off.

Alex

SO MUCH SOUND. SO LITTLE MONEY.





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Parts 5 and 6: Staccato Comping Chords (MIDI channels 5 and 6). Shorten the attack and release times, open the filter (raise the cutoff frequency), and add a little resonance. Set the chorus and reverb to medium levels, and pan the sounds just slightly left and right of center.

Parts 7 through 9: Lead Voices (MIDI channels 7, 8, and 9). Set Parts 7 and 8 to play staccato leads by shortening their release and attack times. Pan them far left and right with medium-high reverb settings and low chorus amounts. Use Part 9 to play a resonant filter-type lead by adding resonance, adjusting the envelope parameters like Parts 7 and 8, and panning the sound mid-right with high reverb and medium chorus levels. You may also want to use some portamento.

Part 10: Drums (MIDI channel 10). According to the General MIDI spec (and common practice), this Part should be reserved for drums. Leave the sounds unedited, and pan them center with no chorus and medium reverb. (Make sure you go into Edit mode to check that the Part Mode is set to Drum 1.)

ROM VERSIONS

To determine the ROM version of your Canvas, you need to know the secret club handshake (well, OK, maybe just the appropriate button pushes). Start with the machine off and the Standby light on. Hold down the two Instrument buttons, and then press the two MIDI Ch buttons simultaneously. If you've performed the handshake correctly, the Canvas will briefly turn itself on, show the ROM version and the date the software was created, and turn itself off. The latest version for the SC-55 is 2.0; it's 1.0 for the SC-155. If you have an earlier ROM version for your original Sound Canvas, you can upgrade to 2.0 for $40 (plus any service charges) at any registered Roland service center.

Part 11: Percussion (MIDI channel 11). Set the Part Mode to Drum 2, and choose a different drum set than Part 10. Lower the pan value to the left until it reads Rnd (random), turn off the chorus, and add more reverb than Part 10. Use this Part to play percussion and alternate drums that might not be available in the main set.

Parts 12 and 13: Stacked sounds (MIDI channels 12 and 13, or both set to channel 12). Use these Parts to layer two different instruments in a composite "stack." Set their pan, chorus, and reverb parameters similarly. If you set them to different MIDI channels, your MIDI controller must be able to transmit the same note information on both channels. Using two different channels makes it easier to create different "stacks" during the course of the song by letting you send separate patch change commands to each Part and call up different Instruments. If you aren't going to change the Instruments in the stack, setting them both to the same MIDI channel is much easier.

Parts 14 to 16: Various (MIDI channels 14, 15, and 16). Use these Parts for anything else you want. I often detune one Part down very low for space-like effects.

Thinking globally in this way provides a good foundation from which to tailor the sounds to your specific needs. Make a sketch on paper indicating the type of sound each Part will play.

You should also remember to choose Instruments that are suitable to a particular Part's parameter edits. For example, inserting Instrument #116 Woodblock into the Voice Oohs example will not work well as a pad Part. However, it might be fine for one of the staccato comping-chord Parts in the song template described earlier. You might also try using two different Parts with slightly different edits and different MIDI channels as alternate lead voices.

Don't forget the SC's 24-voice polyphony limit. Use the Voice Reserve (Voice Rsv.) parameter to keep voices from being stolen when you play more notes than the polyphony allows. Set lead Parts to low Voice Rsv. values (1 or 2), and comping-chord Parts to one more voice than required by the average chords you play. For example, if the average piano chord includes four voices, set this parameter to 5. This is especially important if the sound has a long release time. All the Voice Rsv. numbers combined cannot exceed 24; if you try to increase a Part's Voice Rsv., and the value doesn't change, you must subtract some voices from other Parts.

SAVING PART EDITS

The Sound Canvas lets you save Part edits as MIDI System Exclusive (SysEx) data in a sequencer or SysEx librarian. To dump the SysEx for one Part, stay in the Part edit area and press both Instrument buttons. The display reads "Dump PART, Sure?" Make sure your sequencer or librarian is in record mode, then press the flashing All button. The display reads "Transmitting..." until the SysEx dump for that Part is complete.

To save the edits for all Parts, including the global parameter settings, exit the Part edit area by pressing both Part buttons simultaneously, then press the All button, followed by both Instrument buttons. The display reads "Dump All, Sure?" Press the flashing All button to transmit or the Mute button to cancel.

There are a few limitations on the way the SC responds to Part edits when SysEx is sent to the unit. You can only send edit data to the Part from which it originally came. For example, if you save the edit data from Part 6 and send it back to the unit, it automatically goes into the temporary buffer of Part 6. You can't send it to any other Part. This is another reason to use song templates; they encourage you to load similar types of edit data to the same Parts. Also note that while the original Sound Canvas has no user memory, the SC-155 has memory for one user setup that stores the Instrument, level, and panning for all sixteen Parts.

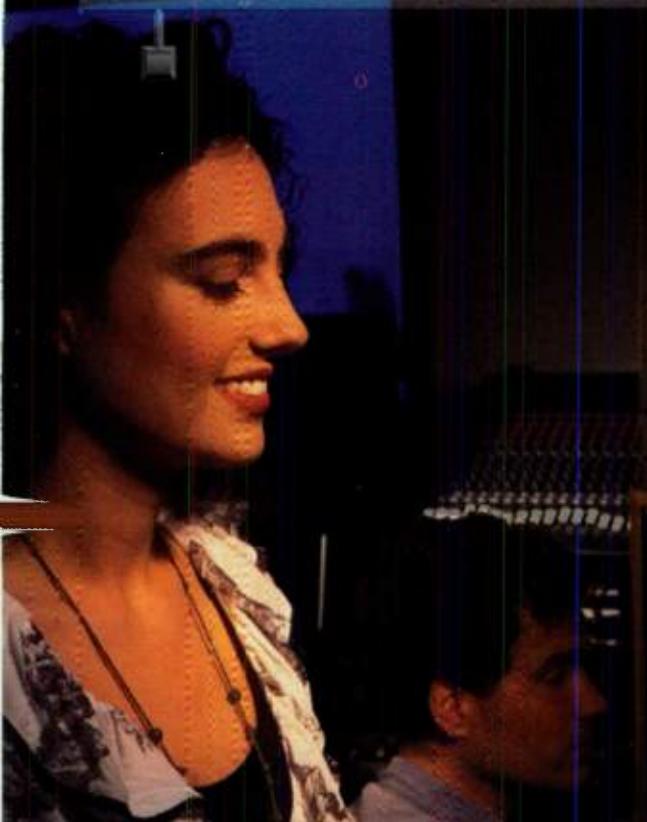
OTHER TRICKS

Here are some other tricks to develop a wider palette of colors for your Canvas.

Pseudo-stereo Parts. Set two Parts to the same MIDI channel, pan them hard left and right, and use Fine Tune to shift one Part up +0.2 and the other down -0.1. This technique uses twice as many voices as normal Parts, but it can be useful for full lead-type sounds. Also keep in mind that most of the Instruments use only one voice, but some use two. The instrument table in the manual indicates which instruments use two oscillators (voices) and which use one oscillator.

WHY PROS PREFER MACKIE... PART ONE

STARR PARODI • COMPOSER, PRODUCER, ARSENIO HALL SHOW KEYBOARDIST



"On the Arsenio Hall Show, many groups want to reinforce live drums with sampled loops from master DAT or master CD. I like to pump the volume of the samples high to get a big sound. When I do, the show's sound engineers come out of the booth and give me this 'you're doing it again' look...because the signal from the CR-1604 is so clean and hot that it regularly peaks their meters. Yet the 1604 never distorts. High headroom and dynamic range are why Jeff and I use Mackies in our commercial production studio and on the road...most other compact mixers in this price range artificially color the sound. Incidentally, not only does the Arsenio Hall Show use a total of four Mackies, but it's also the mixer I see most often in the racks of groups that we have on the show."

Starr Parodi/Parodi Fair Productions: Film trailers and television: El Mariachi, Trespass, Extreme Justice, Prelude to a Kiss, Mississippi Masala, Straight out of Brooklyn, Graduation Summer, Livin' Large, The Edge, Fame; Commercials: Subaru, Arco, Chrysler, Coors Pure Water 2000, Paramount Theme Park, Better Homes and Gardens, Charter Hospital and many more. In addition, Starr has released a stunning debut album, "Change," with another coming soon.

Before you buy a 16-channel mixer, call us toll-free. You'll learn why successful professionals who can afford to own any compact mixer overwhelmingly choose the remarkably affordable Mackie.

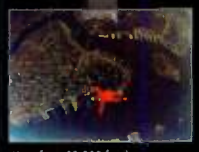
ABOVE: Starr Parodi and husband/co-producer Jeff Fair in their home studio. Essential equipment includes Akai digital samplers, Panasonic DAT, eight Korg keyboards and of course, two Mackie CR-1604 16-channel mic/line mixers.

WAYNE SHARPE • OMNIMAX FILM AND COMMERCIAL SOUNDTRACK COMPOSER

Marta awaits his orders to be transported on his mission to discover the "secrets of OMNIMAX." From the Liberty Science's signature film "Welcome to the Max." © 1993 Rosalini Film Productions Inc. Soundtrack by Wayne Sharpe.

Wayne Sharpe photo: Sheila Gracie
Starr Parodi photos: Peter Figen

Wayne Sharpe: Film music for 70mm "Welcome to the Max," "Atlantis," "Geresene Demonic;" Commercial scores for Revlon, Dristan, Cover Girl, NEC, Red Lobster and Hawaiian Punch national TV spots; MIDI consultant/programmer for Beach Boys, Tommy Shaw (Styx & Damn Yankees), Rick James, and others.



View from 10,000 ft. above Manhattan as Marta falls to earth from outer space. From Liberty Sciences' signature film "Welcome to the Max." © 1993 Rosalini Film Productions Inc.

"My soundtrack for 'Welcome to the Max' was mixed direct to six discrete digital channels at Toyland Studios through three Mackie CR-1604 16-ch. mic/line mixers combined via a MixerMixer. The producers wanted the cleanest possible sound and needless to say, the CR-1604s delivered as usual. I've used Mackies to produce my recent television commercials and movie soundtracks, and continue to be amazed at the sound quality that comes from such affordable mixers. I've also recommended CR-1604s to a lot of other musicians. All I can say is, 'Accept no substitutes.'"

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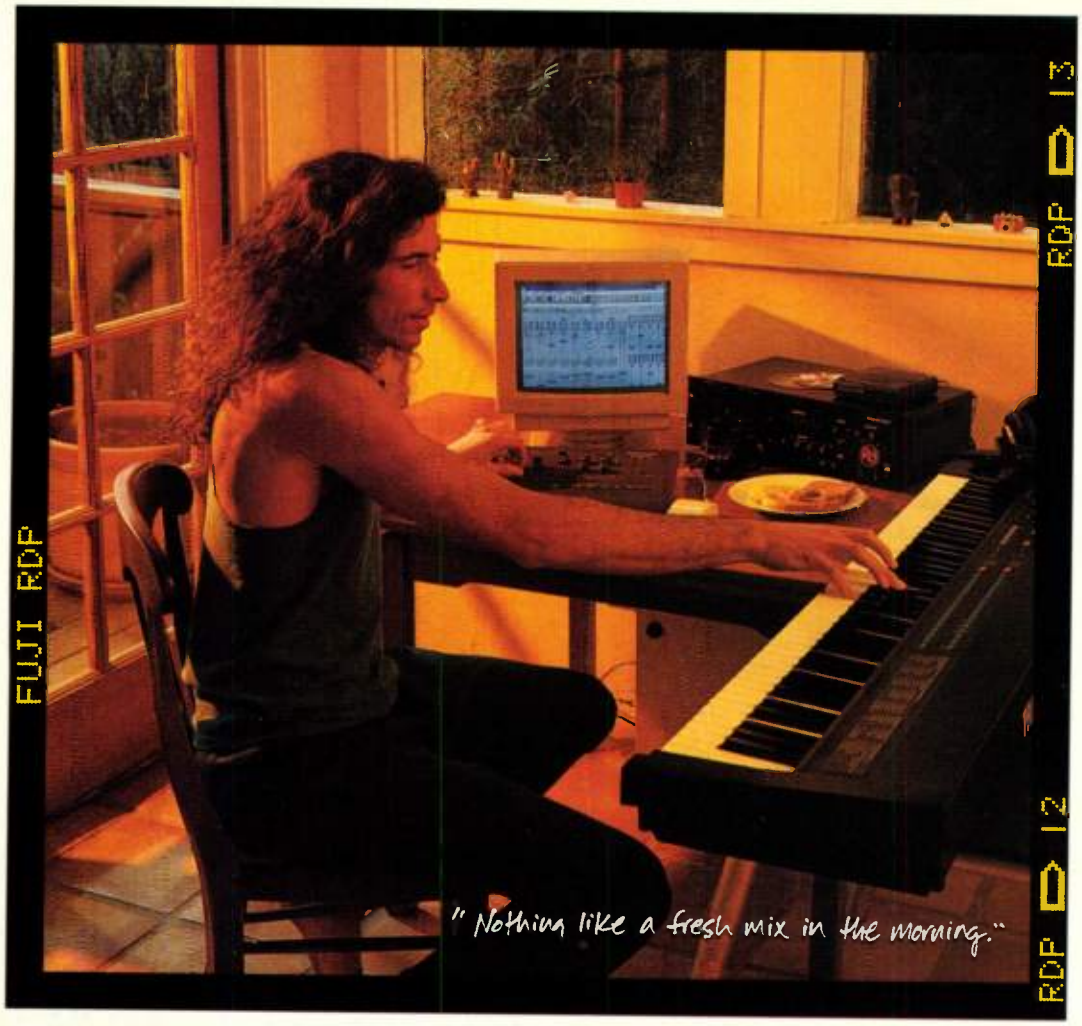

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Bigger bass sounds/Non velocity-sensitive sounds. Assign the same or different bass Instruments to two different Parts, transpose one Part down an octave using Key Shift, and change the pan slightly. Adjust the Velo Offset to 127 so the sound always plays at full volume. You may need to adjust the filter cutoff, because the filter also responds to the Velo Offset parameter.

▼

You can go beyond the Sound Canvas' presets and create your own sounds.

Animated panning. If you adjust the Pan parameter all the way to the left, it reads "Rnd," which stands for random. At this setting, the sound moves to a different location in the stereo field each time it receives a key trigger—a useful effect if used judiciously. If you follow the song template example described earlier, the percussion instruments in Part 11 move all around the stereo field and create some nice animation. The effect is also good for repeating parts, such as muted guitar and clav-type sounds.

Although it's impossible to teach everything about programming the Sound Canvas in a single article, I hope you've gained some insights from the information presented here. It's an impressive instrument straight out of the box, and when you know how to get the most out of it, the Canvas can be even more expressive. Good luck creating your own colors.

Andrew Schlesinger *of Synthetic Productions has programmed more sounds for more instruments than he cares to think about. His three Sound Canvas disks are available from Sound Source Unlimited.*

By Scott Wilkinson

The Age of Wireless

Unleash the motion in your music by cutting the ties that bind.

photos UPI/Bettmann

If you're old enough, you probably remember the precursor of the modern music video. Rock groups in the late '60s and early '70s would appear on television variety shows and lip-sync their current hit wearing peace symbols, bell-bottoms, and carefully coifed hair on a stage decorated in psychedelic paisley. Ah, the good old days!

One dead giveaway that they weren't really playing was the common absence of cables leading from the guitars and even the microphones. Apparently, producers wanted a clean, uncluttered look on camera. Besides, who would notice? Everyone would be listening with rapt attention to the canned music, right?

Wrong. Armed with a little knowledge of electronics, I remember thinking how strange this looked. Even stranger, why did they stand so still once they

were unencumbered by cables? I thought rock music was supposed to be wild and free. Except for Mick Jagger and Pete Townsend, most of those guys were glued to their spots. Maybe it was force of habit; after all, when they played for real, they could get hopelessly tangled up in cables if they moved around too much.

These days, live performers needn't choose between movement and music. The advent of wireless technology has freed musicians from the cable's leash. Today's concerts feature lead singers and guitarists running amok on stage while belting out their licks. Welcome to the good new days.

TUNING IN

The concept behind wireless technology is simple: A transmitter converts a signal into electromagnetic waves, which radiate from an antenna into the surrounding environment. The antenna on a nearby receiver detects these waves and converts them back into the original signal. This is the basis of all wireless communication, including radio, television, and satellite transmissions, as well as cordless and cellular phones.

Electromagnetic waves (also called radiation) occur at different frequencies; the entire spectrum encompasses an extremely wide range that includes the radio frequencies (RF), microwaves, infrared (heat), visible light, ultraviolet, x-rays, and gamma rays. Wireless audio transmitters convert audio signals into the RF portion of the spectrum before broadcasting them into the air using a technique called *frequency modulation*. (Most wireless MIDI systems use the same technique; see sidebar, "Wireless MIDI.")

Everyone is familiar with FM radio, which works in exactly the same way as wireless audio systems. An audio signal is fed into a transmitter, which varies, or *modulates*, a *carrier frequency* above and below its nominal value in a pattern that corresponds to the audio signal (see Fig. 1). The receiver, which must be tuned to the same carrier frequency, extracts the modulated information and converts it back into an audio signal.

The FCC approves, assigns, and licenses specific radio

frequencies for a variety of uses. The frequencies available for wireless systems differ from place to place depending on local television, radio, and other signals. If you try to operate a wireless audio system on a frequency already occupied by another signal, interference may render your system unusable.

Most wireless audio systems offer a selection of frequencies to choose from; if one doesn't work due to excessive interference, you can try another one. In addition, most wireless audio manufacturers offer a frequency coordination service that identifies locally used frequencies.

STRIKE UP THE BAND

There are several *bands* of frequencies in the RF region assigned to wireless audio and other applications. In an ironic twist of terms, the VHF (very high frequency) bands occupy the low end of the region. These bands include low (49 to 88 MHz), mid (150 to 174 MHz), and high (174 to 216 MHz).

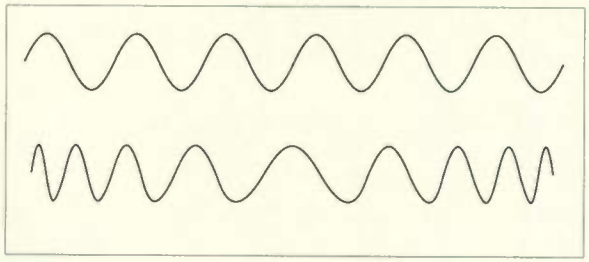


FIG. 1: During FM radio transmissions, the frequency of a carrier signal (above) is modulated around its nominal value in a pattern that corresponds to the audio signal (below).

The audio portions of television channels 2 through 6 use the low VHF band; wireless auditory assistance for the hearing-impaired uses 72 to 76 MHz. Cordless phones, radio-controlled toys, walkie-talkies, and other consumer products use 49 MHz, which doesn't require a user license from the FCC. Making equipment that works in this band is inexpensive, but few wireless audio products use it because it's so crowded. The mid band is also quite crowded with industrial and government signals. In 1988, however, the FCC allocated eight frequencies in the mid VHF band that can be licensed by commercial users of wireless audio systems, including musicians, churches, theaters, etc.

The best price/performance ratio for wireless audio systems is in the high VHF band, but broadcasters use it extensively (it carries television channels 7 through 13). These frequencies easily propagate through walls and sets, making them well-suited to live performance work. However, only broadcasters and video production companies can legally license this band.

The high end of the RF region is called UHF (ultra high frequency).

WIRELESS MIDI

Many keyboard players want to romp around along with the singers and guitarists, but it's just not the same lugging a 50-pound synth across the stage. Strap-on keyboard controllers are made for just this purpose, but they send MIDI to remote sound modules, not audio signals. How can you cut the MIDI cable without suffering stuck notes?

To answer the jumpy keyboard player's plea, several companies have developed wireless MIDI systems. For example, the MIDIMAN TransMIDI system uses any standard wireless audio system to send MIDI messages via RF. Simply connect the MIDI Out from the keyboard controller to the MIDI In of the special transmitter module and plug the module into any wireless body-pack transmitter. At the other end, plug the wireless receiver output into the TransMIDI receiver module and connect the MIDI Out from the module to the MIDI In of any MIDI device (see Fig. A). The Nady WML-50 MIDI Link works in essentially the same manner.

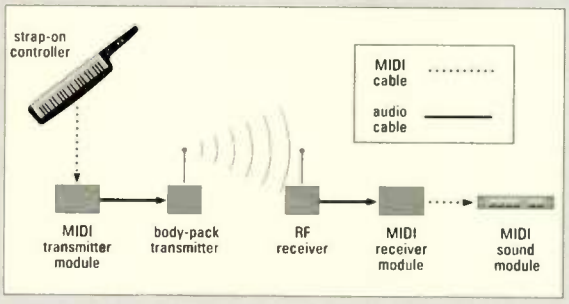
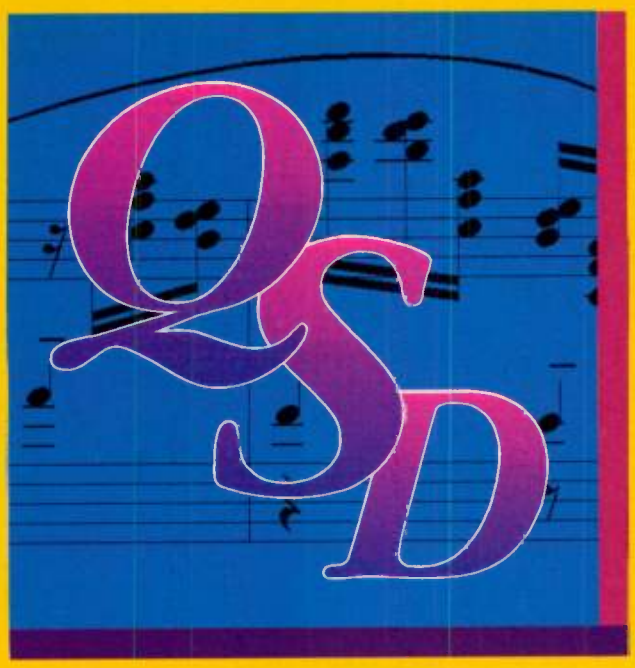


FIG. A: In this wireless MIDI system, a strap-on controller sends MIDI messages to a special transmitter module connected to a standard wireless body-pack transmitter. The RF receiver is connected to a special MIDI receiver module, which sends MIDI messages to a sound module.

Both the MIDIMAN and Nady systems use sophisticated error correction to minimize the risk of data corruption. They also use Manchester encoding to help ensure that the data gets through even at low RF signal levels. Deep-space probes also use the Manchester encoding scheme to send reliable data to Earth at astonishingly low power levels. If a total dropout occurs, both systems send Note Off commands to all active notes in as little as 1 ms. As soon as a reliable signal is detected, the data starts flowing again.

Gambatte! has taken a different approach with their MidiStar Pro wireless MIDI system, which doesn't ride on the coattails of a wireless audio system. Instead, it uses a technology called *spread spectrum*, or *frequency diversity*, to transmit digital data directly. Operating in the upper UHF band (902 to 928 MHz), this system distributes the RF signal over a range of frequencies in a complicated, pseudo-random encoding scheme. The receiver decodes the signal and sends it on its way. The system uses no error correction because a dropout at one frequency makes little difference to the overall signal.



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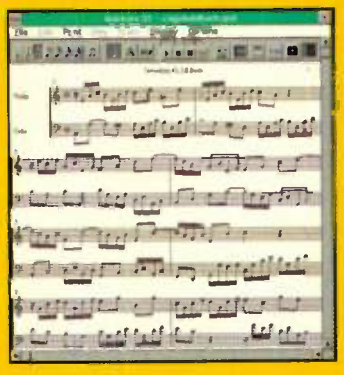

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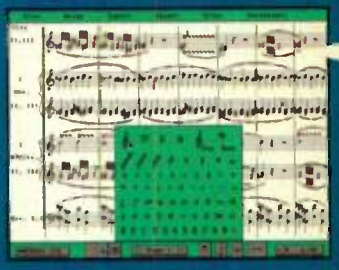

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THE AGE OF WIRELESS

surrounding surfaces, particularly those made of metal. If the difference between the lengths of the direct and reflected paths is a multiple of ¼ to ¾ of a wavelength, the two signals will partially or completely cancel each other out, resulting in a dropout. This is called *multipath cancellation* (see Fig. 2).

The exact locations of multipath cancellation zones depend on the relative positions of the transmitter, receiver, and reflective surfaces. In an onstage wireless audio system, the receiver and surfaces are generally stationary, while the transmitter is moving around with the performer. This causes the cancellation zones to move around, as well. When a cancellation zone coincides with the receiver antenna's position, the signal level drops. It's possible to map out the transmitter locations that cause cancellation at the receiver ahead of time, but it's hard to avoid these spots when you're running around during a performance.

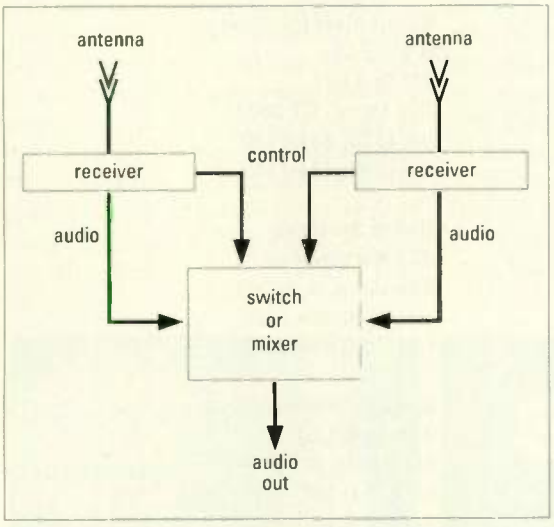

FIG. 3b: Switching- and combining-diversity systems use two complete receivers and mix or switch between them according to their relative signal levels.

LOUD AND CLEAR

Wireless receivers fall into two basic categories: *non-diversity* and *diversity*. Non-diversity receivers use a single antenna to pick up RF signals. This setup does nothing to reduce multipath cancellation, but it's inexpensive and works reasonably well with low-power transmitters over short distances. (FM radios are non-diversity receivers that work over long distances, but the transmitters operate at very high power levels.) The Nady Wireless One and 101, Samson VLP and Stage 2, Sennheiser VHF 1B, and Shure L3 are non-diversity systems that operate in the high VHF band.

Diversity receivers use two antennas to reduce the effect of multipath cancellation. If the antennas are placed at least ¼ wavelength apart, it is highly unlikely that both will fall within a cancellation zone at the same instant. There are several types of diversity, each with their own ardent supporters.

Phase diversity uses two antennas and one receiver (see Fig. 3a). If the signal level at the receiver drops below a threshold value, the phase of the signal from one antenna is shifted to compensate for the assumed multipath cancellation. In some systems, the phase is immediately inverted by 180°, while other systems continuously shift the phase according to the instantaneous signal level at the receiver. For example, the Telex FMR-100 continuously shifts the phase of one antenna to obtain the strongest possible signal.

The most common type of diversity is called *switching*, or *true diversity*. This method uses two antennas connected to their own separate receivers (see Fig. 3b).

The system monitors the signal level from each antenna and uses the audio output of the receiver with the strongest signal at any given instant.

FIG. 4a: The Shure SM57 is available with a built-in transmitter as part of a Samson Concert Series II VHF diversity wireless system.

This requires sophisticated circuitry to switch with no noise. Nevertheless, most high-end wireless audio systems use switching diversity to minimize multipath cancellation.

Combining diversity is a variation of switching diversity in which the audio signals from the two receivers are combined in the optimum proportion according to their relative levels. If both are strong, both are used; if only one is strong, it is used on its own. This scheme eliminates any noise that might be caused by switching from one receiver to the other. The Nady 201 and Shure EC4 and L4 receivers use combining diversity and operate in the high VHF band.

Another factor to consider is signal-to-noise (S/N) ratio. RF transmissions can achieve an S/N of no more than about 65 or 70 dB. As a result, virtually all wireless systems now use companding to improve the S/N ratio; this technology is probably responsible

FIG. 4b: The Shure L11 body pack wireless transmitter can be used with headset and lavalier mics. A similar type of transmitter is used for wireless guitar systems.

THE AGE OF WIRELESS

band, but it may not be possible to use them all.

If the number of antennas on stage is unwieldy, an *active antenna splitter* can streamline the system. One set of antennas picks up signals from several transmitters and sends them to their respective receivers. For example, the Nady AD-4, Shure WA404, Samson DA-4, and Telex AD-200 can each accommodate up to four diversity or eight non-diversity receivers; multiple units can be connected to serve more receivers. The Sennheiser SAS100, 200, 300, and 400 can accommodate up to six, twelve, eighteen, or 24 receivers, respectively.

Several companies offer multiple receivers in a single unit with one set of antennas. The Sennheiser EM 1046 offers up to eight switching-diversity UHF receiver modules in a single card cage and a computer monitor system. The Nady 750 offers two switching diversity, high-band VHF receivers in a single unit; up to five units can be connected for a total of ten simultaneous channels. The Samson UR5D includes two separate UHF synthesized receivers with 74 channels each.

FREE AT LAST

Wireless technology has broken the chains that bind musicians and actors to a fixed spot on the stage. However, this freedom has a price: Users of wireless systems must maintain a constant vigil to guard against insidious interference and dreaded dropouts. With the proper caution, however, this technology can liberate performers of all kinds to achieve new heights in aerobic entertainment.

(For more information on wireless systems, see "Cutting the Cord: Choosing a Wireless System," in the November 1989 EM, and "Look, Ma! No Cables: Wireless Systems Applications," in the December 1989 issue.)

Scott Wilkinson, EM *technical editor, welcomes any opportunity to run amok.*

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SCORING A FILM SOUNDTRACK

LEARN THE SHOCKING TRUTH ABOUT THE LOW-BUDGET SCORE OF *EL MARIACHI.*

By Michael Molenda

This is not a story about the tools of technology. This is a story about talent, ingenuity, and vision. A 24-year-old University of Texas film student grabs a few friends, borrows a movie camera, and shoots a feature-length action flick in Mexico. The movie wows the cinema snobs at the Sundance Film Festival in Park City, Utah, and wins the festival's Audience Award. The film student, who sold his body to science to finance the production, now sells his little film to Columbia Pictures and signs a two-year development deal with the studio.

If the preceding scenario sounds too gosh darn cute for even a Barney the Dinosaur episode, get over it. It happened. At a time when filmmakers must seduce a public raised on *Star Wars* trilogies and *Terminator*-type extravaganzas with big budgets, big stars, and slam-dunk special effects, a $7,000 movie with no stars is one of the season's hottest tickets. And no one in the film speaks English!

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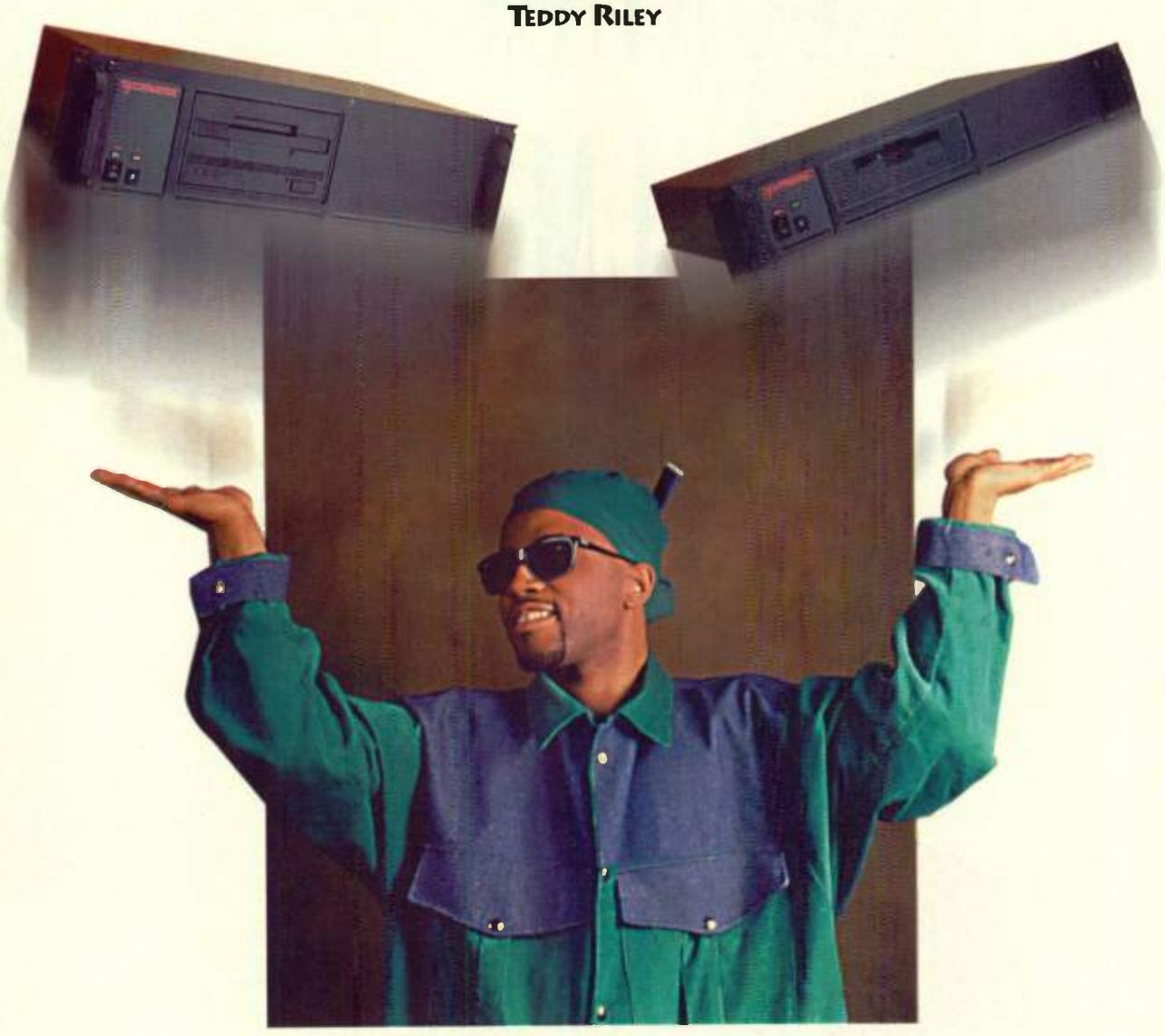

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FILM SOUNDTRACK

The critical and commercial success of the independently produced *El Mariachi* smacks of an exquisite Shirley Temple fable where good always triumphs. For example, the film's soundtrack was recorded in an apartment MIDI studio by Eric Guthrie, a pre-med student turned part-time film composer. Guthrie was given no salary, no SMPTE, and often no footage on which to base his score. You won't be reading about ADATs, DA-88s, or hard-disk recorders because Guthrie didn't even have the funds to exploit affordable digital technology. Yet, despite limitations that would torpedo most of today's up-and-coming film composers, Guthrie produced an incredibly evocative electronic soundtrack. What follows is a lesson in stretching low tech to the limits.

▼ A Tascam 488 8-track ministudio was the main tracking and mastering engine for the *El Mariachi* score.

THE REEL STORY

El Mariachi is the hype monster of the Spring 1993 movie season. The Spanish-language action thriller (with English subtitles) exploded from a handful of prestigious, exclusive film festivals and splattered all over the mainstream press. It doesn't hurt that the film's producer/director/screenwriter Robert Rodriguez is young, handsome, and knows how to deliver the quotable quote. But there's another hook to the story: *El Mariachi* was self-financed for approximately $7,000. Today, even C-level slasher flicks can cost millions, so completing a feature-length film for pennies on the dollar is near miraculous. Even so, Rodriguez had to sell himself to a 30-day medical research project to help raise the funds.

Of course, none of this precious budget could be wasted on luxuries such as equipment, a crew, and judicious retakes. Most scenes were shot by Rodriguez himself in *one take* with a borrowed Arriflex 16 mm camera. (Rodriguez reportedly provoked nervous giggles at a Sundance seminar when he asked, "How many takes do you need of somebody kicking in a door?")

A low-key, inexpensive shooting location was found in Acuña, Mexico, the hometown of *El Mariachi* star and co-screenwriter Carlos Gallardo. The city "cooperated" by not interfering in the production—although the police were nice enough to hand over their own guns to the actors for some of the shootouts—so locals and tourists were treated to the sight of assassins running wild in the streets. To prevent valuable takes from being ruined by background noise, all dialog and sound

exclusively from verbal discussions. When I was lucky enough to get a videotape of a scene, most of the time it wouldn't be the final cut. Robert would still be working out the editing, so I'd use the scene just to develop a feel. Because I never knew how long the finished scene would be, I'd record numerous versions of each piece with slightly different timings."

Rodriguez chose not to stripe the footage with SMPTE time code, which required Guthrie to visually sync cues with whatever footage was available and hope the completed scene matched with the music.

"It was frustrating to work so much in the dark," admits Guthrie. "I'd finish a piece and then Robert would come over and change things or want different mixes. But the situation also provided Robert the luxury of cutting the scene to match the music."

Unfortunately, jousting with the frustrations of no-budget movie production wasn't the only challenge facing Guthrie. Although he had played in pop and jazz bands for years and had scored one of Rodriguez's early college films, *El Mariachi* was his first feature-length movie soundtrack.

"I knew I wasn't good enough to rely on my chops to do the *El Mariachi* score because I had zero knowledge of the process," explains Guthrie. "I needed to find a good model to emulate, a template on which to base my own work. So, among other soundtracks, I studied Peter Gabriel's score for Martin Scorcese's film, *The Last Temptation of Christ*. I loved Gabriel's orchestrations, timbres, and overall feel. He really put a lot of emotion under the scenes.

"And Robert turned out to be a big help by teaching me how to 'build' a scene musically. He'd like an orchestration, but explain to me that it had to build up, break down, and then build up again. This ebb and flow of emotion is the essence of movie music. You try to develop a mood without the audience being aware of it. When you've done it right, the music just sweeps under a viewer and introduces new emotions and feelings."

In a dream sequence that portends violence, El Niño (Oscar Fabila) plays ball along deserted and decaying streets.

SPARTAN TRACKING

That the scoring of *El Mariachi* was a learning experience for Guthrie is obvious, but given the results, it's amazing how *much* of a learning experience it was. Prior to getting the gig, Guthrie had upgraded his equipment and was still in the process of figuring everything out when Rodriguez hired him.

"I bought *Vision* two weeks before the project started, so I had to learn the program as I was working on the soundtrack," he says.

The technical naiveté didn't stop there, however. Guthrie was also experimenting with optimum recording levels for his Tascam 488 ministudio. The 8-track cassette recorder was the main tracking and mastering engine for the *El Mariachi* score. (No, you didn't read that wrong.)

"Pretty much everything was recorded and mixed through the 488," says Guthrie. "Some of the pieces, such as the love scene and the jailhouse riot, were sequenced and mixed within *Vision* and recorded directly onto a Maxell metal cassette. The other pieces were recorded onto separate tracks of the 488. I wasn't able to sync tape tracks with the sequencer (virtual) tracks because I didn't have time to figure out the JLCooper PPS-2 sync box that I bought halfway into the project. But I really didn't need unlimited virtual tracks to produce the parts I wanted.

"Also, I was able to get by with one Quadraverb for signal processing because I used the onboard effects of my sound modules. I really didn't view all these limitations *as* limitations. Robert and I agreed that it was more important to have content in the work, rather than well-produced tracks. It's all about how the music works with the film, not how many synth tracks you can stack."

BIG STUDIO FINANCING

However, it *is* nice to have clean tracks. Because every piece was mixed to cassette, hiss was a problem. In addition, Guthrie's earlier compositions for the film were often compromised by his lack of recording experience.

"Initially, I didn't know about recording the levels hot to diminish tape hiss," he admits. "I'd record a soft scene at minimal levels. The final love scene, for instance, is just strings and piano, and the background hiss sounded like a snowstorm. Luckily, when Columbia picked up the film we had the opportunity to re-mix the pieces that were too noisy."

The backing of Columbia Pictures, however, did not mean Guthrie could shuffle his MIDI gear to a world-class studio and tweak away in a technoid wonderland. Most of the movie studio's money went into making 35 mm prints and preparing *El Mariachi* for a wider release. The soundtrack was a low priority.

"When Columbia bought the film,

Peter Marquardt, who portrays a gringo drug lord called Moco, does not speak Spanish. His lines were fed to him phonetically.

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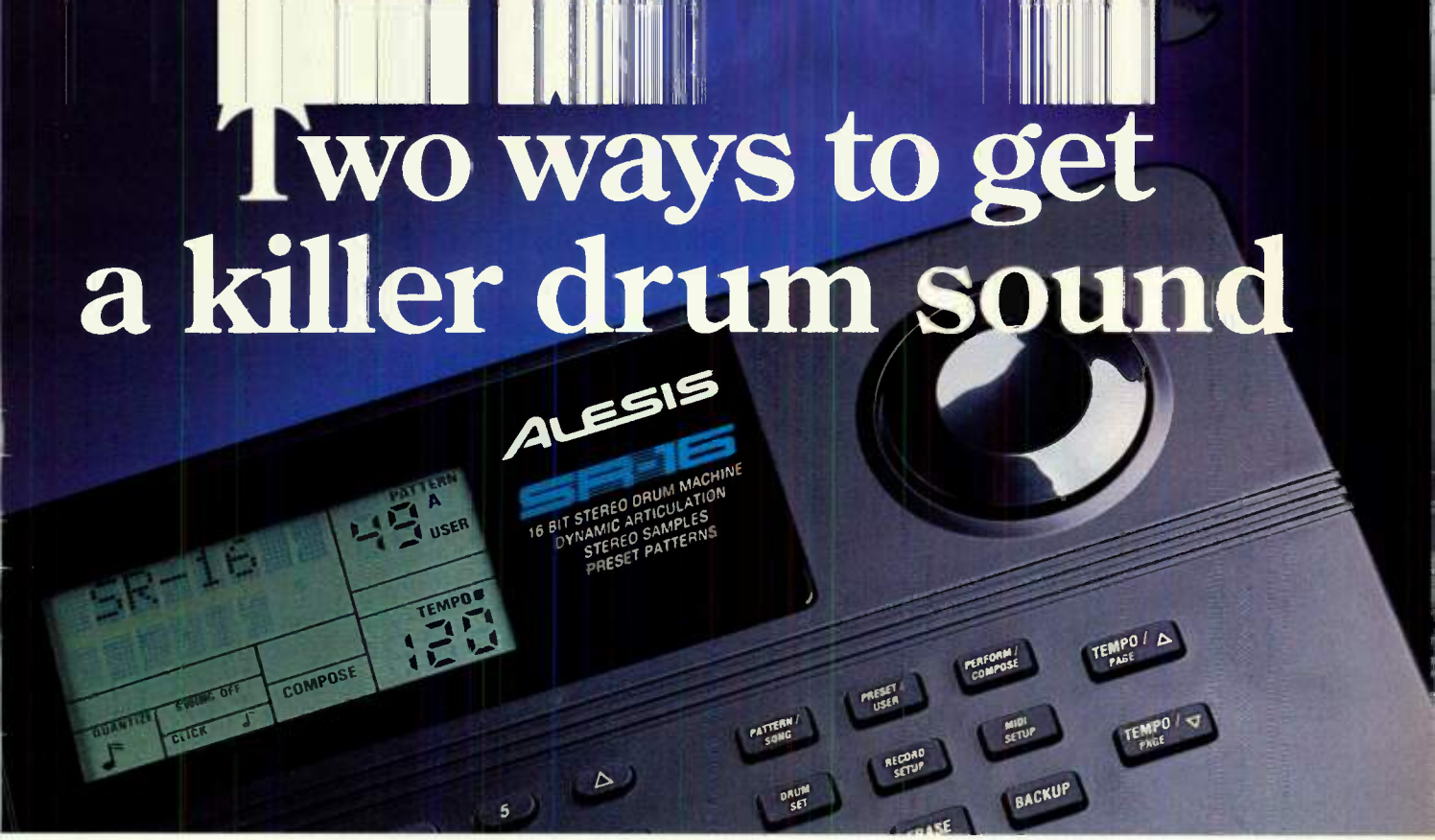

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things didn't get any easier," relates Guthrie. "It was great to be able to fix some things and have the opportunity to work closely with Robert, but there was still no budget. To make matters worse, we had four days to complete the remixes, and I had an organic chemistry final coming up. I just couldn't put the time in. Especially when Robert is in the habit of sleeping until 5 p.m., then working all night. My partner, Chris Knudson, who helped with some of the composing and engineering, really saved me. He and Robert worked, while I studied and fell asleep."

At this point in the process, a final video copy of the movie was available to watch and polish music cues. However, there was still no time code. ("I think we watched each scene a million times," says Knudson.) And there was no suitable mastering deck.

Chris Knudson (left) and Eric Guthrie in the cramped apartment MIDI studio where the soundtrack was recorded.

"Chris had to check out a portable Sony DAT recorder from the University of Texas audio lab," says Guthrie. "And it's really lucky that he had the access, or else we would have remixed to cassette. In the end, we gave Robert a non-time-coded DAT with a zillion versions of every song, just in case he needed a different timing or whatever. This is what he used to finished the film's soundtrack."

EPILOG

So what are the financial rewards for scoring a hit independent film? Well, initially, the payday is one big zero. Guthrie accepted the gig for no pay because all of Rodriguez's meager funds were tied up in production costs.

El Mariachi was originally conceived as a large-scale "demo tape" for all the talents involved. Columbia's involvement upped the ante a bit, but there are no plans to release a soundtrack album, and Guthrie will not share in the profits for the film's U.S. theatrical run. Where Guthrie *will* benefit from the Columbia deal is through the studio's large distribution network. Guthrie only earns royalties from cable and network TV and non-U.S. theatrical performances, so Columbia's ability to exploit those markets provides his sole chance for revenue. After the Columbia deal was signed, Guthrie secured a contract with ASCAP, a performing rights society that charts and collects performance royalties.

"I was advised by Jamie Richardson, ASCAP's associate director of film and television repertory, that I shouldn't even dream about seeing any money for at least a year," says Guthrie.

But beyond the tentative financial rewards, *El Mariachi* has been a good experience. Guthrie and Knudson are now writing partners and have formed a production company, GK Productions. And, unlike the hardships awaiting young composing teams, the success of *El Mariachi* provides a grand calling card.

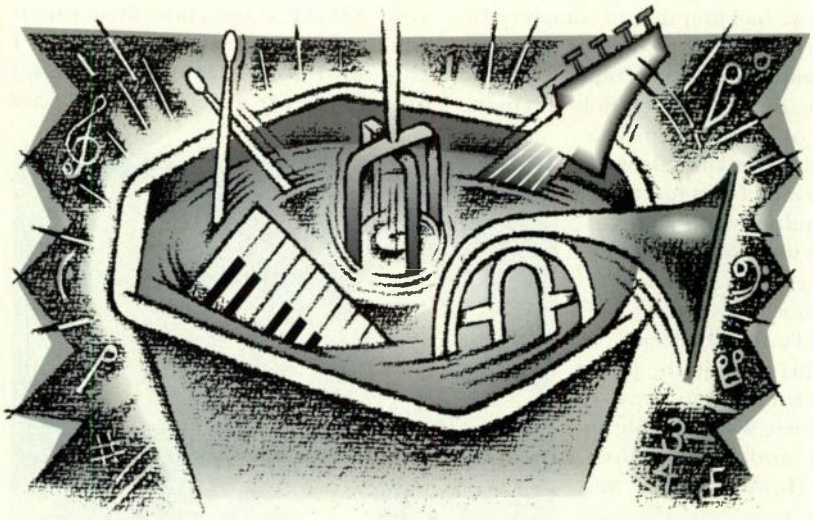
"We've already got some deals in the works," says Guthrie. "In addition, the sequel to *El Mariachi* is being prepared, but we'll probably get only ten minutes of music in it. Robert wants to get more of an authentic border feel, so he's trying to get Los Lobos and some other acts to contribute. I can't complain, that's good company. And anyway, I can't help but feel very lucky at how all of this turned out."

EM *managing editor* **Michael Molenda** *salutes the recent baby boom in the magazine's extended family: his niece, Rebecca; his sister-in-law, Rachel; editor Bob O'Donnell's new son Ryan; and* **EM** *contributor Scott Mathews' little drummer boy, Will.*

Mixdown Basics

By Scott Wilkinson

Now that all the parts are overdubbed, it's time to mix the master tape.



Last month, we covered overdubbing different musical parts on a multitrack tape deck. We also discussed the use of MIDI sequencers in conjunction with multitrack tape. With these tools, a lone musician (or band) can record an entire composition one part at a time.

Of course, hearing the final result on a stereo system is the ultimate goal, so all the parts must be *mixed down* into a stereo recording. This process is not as well-defined as overdubbing. How an artist or producer conceptualizes a "good" mix depends on the recording's musical style and the personal taste of the decision makers.

GETTING READY

Before you start mixing your own material, play commercial recordings of similar music on your studio sound system. Try to get a feel for what professionals do with your type of music. Pay close attention to the relative level of each part, its position in the stereo field, the use of effects, and so on.

Now you must set up your studio for the mixdown process (see **Fig. 1**). Connect the main stereo outputs from the mixer or ministudio to the inputs on the stereo mastering deck (typically a cassette or DAT recorder). Set the input selectors on the mixer to "tape," so that the channel faders control the level of the tape tracks. Assign each track to the main stereo output; the pan pots control the apparent position of each track in the stereo field. Connect the *aux* or *effects send* output from the mixer to the input of your signal processor and the output from the processor to the *aux* or *effects return* inputs on the mixer.

BALANCING YOUR IMAGE

One of the most important aspects of mixing is the volume, or *level*, of each instrument. You should be able to hear each instrument clearly in the final mix, although some parts are obviously louder than others. For example, the lead vocal is usually the most important part of a song, so it's usually the loudest element in the mix.

There are several general approaches to setting volume levels. You can start with all faders fully down and raise the master output level to its "0" mark. Then, bring the drums up to a level of about -10 VU on the meter, and raise the monitor level until the drums are as loud as you like to hear them. Now bring in the bass and other rhythm instruments until they are balanced with the drums. Next come the background parts, followed by any instrumental solos and the lead vocal. Mix all parts relative to the drums.

Another approach begins by bringing the lead vocal to a level of -5 to 0 VU on the meter and raising the monitor level. Then bring in the rhythm instruments, followed by the background parts, and finally the solos. Mix everything relative to the lead vocal.

Another important factor is the position of each part in the stereo field. In commercially recorded tunes, the instruments appear to come from the right, left, or center in varying degrees. This right-left placement of each part adds variety and interest.

The *pan pots* for each channel on the mixer determine the placement of each track in the stereo field. The pan-pot settings are sometimes specified with a clock metaphor. For example, five o'clock indicates that the pan pot is *hard right*. A hard-right position routes all the signal to the right side, and the track is not audible in the left channel. (Obviously, hard left does the

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opposite.) A setting of one o'clock places the track just to the right of center, and twelve o'clock is dead center (effectively mono).

Here is a specific example in which the tune includes drums, bass, rhythm keyboard, rhythm guitar, background horns, background vocals, lead guitar solo, and lead vocal (see Fig. 2). The level of the rhythm section is relatively low, although it's loud enough to drive the track. The drums were recorded in stereo, so the two tracks are panned hard left and right to preserve the original stereo image. (If the drums must be recorded or bounced to mono, they are placed in the center along with the bass.) The rhythm keyboard is placed at the ten o'clock position, while the rhythm guitar is placed at two o'clock.

The background vocals and horns are more widely spaced at nine o'clock and three o'clock, respectively. Both parts appear intermittently, which heightens the dimensional effect of the wide spacing. The background vocals are mixed somewhat louder than the horns because the words should be clearly audible. The guitar solo is just under the level of the lead vocal and placed near the center at eleven o'clock. The lead vocal is the loudest of all and placed at one o'clock.

It's important to rehearse the mix many times before you actually record it, especially if the levels of certain instruments change during the song. If this happens, mark the levels with a wax pencil or white tape along the fader's travel on the mixer so you can repeat the correct levels during each pass. In addition, try to mute any tape tracks during long periods of silence to reduce tape hiss. The input levels on the mastering deck should be set so the loudest section of the tune registers about 0 VU on the meters (slightly less if you're using a DAT; the levels should *never* go above 0 VU).

If you decide to fade out the ending of a song, take care to move the master fader downward slowly and smoothly. Slower tunes usually fade out more gradually than fast tunes. In any case, it's often musically pleasing to reach zero volume at the end of a phrase.

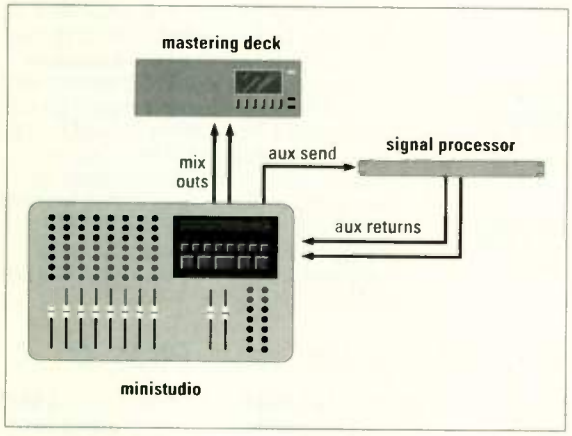

FIG. 1: The mix outputs from a ministudio are connected to the inputs of a stereo mastering deck. The aux send is connected to the input of an external signal processor, and the outputs from the processor are connected to the aux returns on the ministudio.

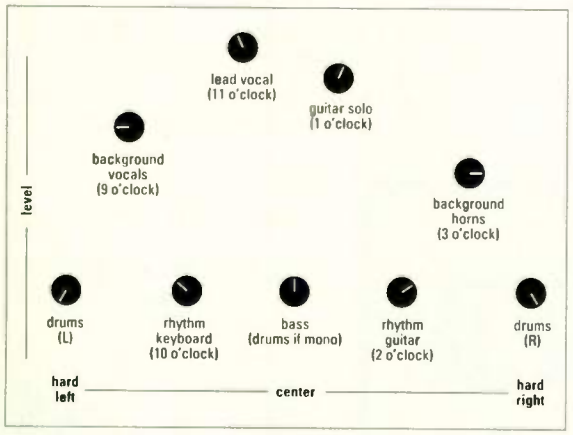

FIG. 2: In this example of a mix, the rhythm section is at the lowest volume. The background horns and vocals are spaced relatively wide, and the guitar solo and lead vocal are close to the center.

EQ AND EFFECTS

Each input channel on the mixer includes some *equalization* (EQ). These might include simple controls for treble and bass, while more sophisticated mixers include controls for high, high-mid, low-mid, and low frequencies. These controls let you tailor the tone quality of each track by reducing or amplifying (cutting or boosting) the selected frequency range. If one track sounds too dull, boost the high end. If another track sounds too tubby, cut the low end. In general, try to cut rather than boost because boosting frequencies can also add noise.

Effects such as reverb, delay, chorusing, and flanging are generally added during mixdown. Most mixers and ministudios have at least one *aux* or *effects send*, which is an extra output from the mixer that sends the signal from all channels to an external signal processor. The processed signal is sent back to the mixer via the *aux* or *effects return*, where it is mixed with the original, unprocessed signal. Typically, there is a master aux control for each aux send that determines the overall level of all signals routed to the processor. A master return control—which is the master volume level for the processed signals—helps determine the proportion of original and processed signals in the final mix.

▼

One of the most important aspects of mixing is the volume, or level, of each instrument, which determines its relative importance.

If the mixer has only one aux send, all tracks selected for processing are sent to the same effect. However, each track can be processed more or less than other tracks according to the level of its individual aux send control. If the mixer has two or more sends, each track can be processed by any or all of the connected processors.

VIRTUAL TRACKS

If you use a MIDI sequencer in conjunction with multitrack tape, you must record a sync tone on one track of the tape before recording any parts. The sync tone is sent from the multitrack to the sync input of the sequencer, which then plays the synthesizers directly along with the recorded parts on tape (see Fig. 3). The sequencer tracks are often called *virtual tracks* because they

are not recorded onto tape.

When it's time to mix, the virtual synth tracks are mixed to the master tape along with the parts recorded on the multitrack deck. Most ministudios don't have enough inputs to accommodate several synths in addition to the tape tracks, which makes it necessary to *submix* the synths with an external *line mixer*. A line mixer is simply an external mixer designed to accept line-level instruments such as synths and samplers. (Line mixers do not have microphone inputs.)

The relative levels and pan positions of the virtual synth tracks are established on the line mixer. The stereo output of the line mixer is then sent to two free channels on the main mixer. This routing is usually no problem because many ministudios include a 4-track cassette deck and six or more mixer inputs. The channels connected to the line mixer are panned hard left and right to maintain the stereo image. The input selector on these channels should be set to "line" rather than "tape." The levels of these two channels affect all the synth parts together and should be adjusted to blend properly with the tape tracks.

IN THE CAN

Mixing is a dynamic process that often requires many passes before you get it right. Be sure to listen periodically at a very low volume to make sure you can hear everything.

Once the mix is finished, wait a few days and then play a copy on a home or car stereo to listen under "normal" conditions. If you notice that your mix does not sound clear or punchy in these environments, it's probably an indication that you should try remixing the song.

Always strive for a clean, clear sound in which all parts are audible without getting in each other's way. The key to a good mix is experimentation, so don't be afraid to try different things. You're bound to find your own unique "sound" in the process, which can only help you realize the potential of your music.

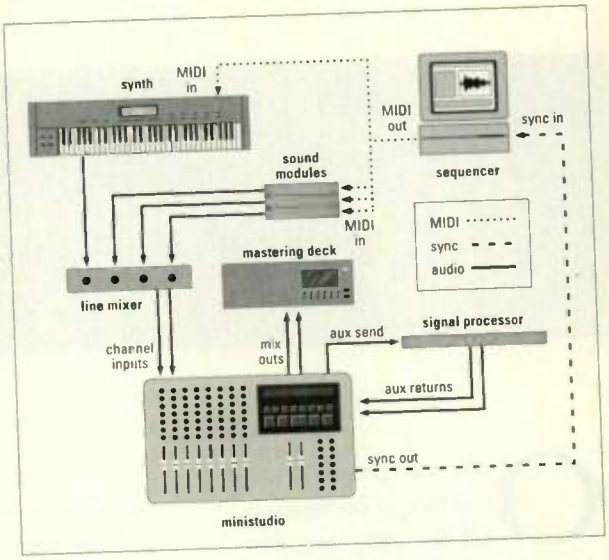

FIG. 3: A MIDI sequencer plays several synths in sync with tape tracks. The synths are submixed through a line mixer.

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Card Tricks

By Carter Scholz

Use a computer sound card to create audio magic.

Home recordists have watched incredulously as street prices for 16-bit sound cards have fallen below $1,000, below $500, below $200. Some have seized the day and bought the latest, greatest, or cheapest cards for their systems. Others have been wary, or simply confused; the burgeoning multimedia market has spawned an explosion of products, all of which claim (with the charming license of hype) "CD-quality sound."

The convenience, and now the economy, of onboard audio is seductive. However, while "16-bit recording" with a $300 price tag may sound temptingly similar to that $6,000 model you can only dream about, low-end cards aren't really geared for audio production. Even a well-designed card with good wave-editing software (often a separate purchase) is unlikely to do real-time mixing or simultaneous record and playback. Mixing is usually a matter of recording sound files individually, combining them into a mix file, then auditioning the mix file. It may be possible, but it's tedious. Still, even modest cards are capable of quite a bit when used creatively within their limits.

S-S-SPEED K-K-KILLS

Sound cards need all the help they can get moving audio data to and from the hard disk, relying heavily on the computer's CPU. A 20 MHz 80386SX may not cut it; instead of hearing glorious music, you may get only stuttering or break-up during recording or playback.

To minimize this effect, try to keep sound files physically contiguous on the hard disk. Before you start recording, run a disk-optimizing program. This process clears a large, unbroken space for recording, while defragmenting any existing files. Disk heads move less when reading contiguous files, so data flows more smoothly. As a last resort, lower the sample rate to reduce data flow. This means lower fidelity, but it may be the only way to play sound files without hiccups.

If another device in your PC-compatible shares the card's IRQ line or DMA channel, problems may arise. Try changing these settings with the installation software or jumpers on the card. Another cause of stuttering might be the card's driver software. Call the manufacturer's tech support to make sure you have the latest versions of hardware and software.

Installing the software for any sound card may significantly alter your system files. PC users should back up their system files to a floppy before installation, including AUTOEXEC.BAT and CONFIG.SYS; if you're using *Windows*, back up WIN.INI, SYSTEM.INI, and CONTROL.INI, as well. That way, you can return to where you started if you have problems.

SIZE MATTERS

Sound files are hogs; CD-quality stereo takes 10 MB per minute. Even a short song with several tracks and alternate mixes can run into hundreds of megabytes. Therefore, storage and backup devices are critical to any digital audio system, and they're usually the most expensive components.

Removable magneto-optical (MO) disks, which can store up to 600 MB on a disk cartridge, have lost some of their attraction as hard-disk prices continue to drop. A 1.2 GB hard disk now costs around $1,400 (street price), compared to $2,000 for an MO and $140 each for the cartridges. A DAT data-backup drive adds $1,000 to storage costs, but projects can be archived on tapes that cost $10 each. In addition, hard-disk access

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speeds are significantly faster than MOs, which is important with CD-rate audio.

(Note: Generally, audio DAT machines can't double as data backup devices. The error correction that works on fault-tolerant audio destroys unforgiving data. However, Digidesign's *DATa* backup utility does let you back up Sound Tools and Pro Tools audio and playlist data on audio DAT drives.)

Some low-end boards trade fidelity for disk space by offering ADPCM (adaptive pulse-code modulation) data compression. However, there's no free lunch; don't compress, unless you *want* your music to sound like voice mail. A few high-end boards, including Antex' SX-20, support Dolby's AC2 audio-compression scheme. AC2 is said to maintain "CD-quality" sound while reducing data storage requirements by a factor of six. Antex' Z1 (see **Fig. 1**) supports other audio-compression schemes. Look for more developments like this in the future.

NOISE FLOORS

The inside of a computer is one of the noisiest electrical environments this side of the Van Allen belts. No amount of engineering can keep a card noise-free when it sits inches away from the hash and grunge generated by hard disks, switching power supplies, and video cards. Many pro-audio companies, such as Digidesign and Spectral Synthesis, simply place the critical circuitry *outside* the computer, with only the noise-resistant digital interface in the machine itself.

If a manufacturer is design-savvy and uses high-quality parts, noise can be minimized. For instance, Digidesign's Audiomedia II goes inside a Mac's case (see **Fig. 2**). It uses high-quality converters from Crystal Semiconductor, separate digital and analog sections on the circuit board, and a multilayer board design with large ground planes to help shield signal pathways. The rated S/N exceeds 88 dB. Still, Digidesign positions it as a "home" or "semi-pro" system, reserving the "pro" designation for their external systems that exceed 93 dB.

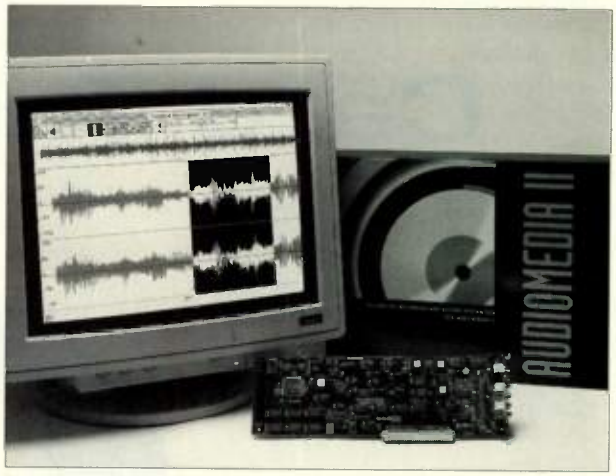


FIG. 2: Digidesign's Audiomedia II board for the Macintosh utilizes high-quality audio components.

On the other end of the spectrum, some cards use less-expensive converters that may not be fully linear to 16 bits. The resulting hiss (quantization noise) can't be overcome. The quality of parts in a card, especially the converters and op amps (in the analog sections), reveals something about a manufacturer's priorities.

The electrical-noise problem is somewhat worse for PC clones than for Macs. (Digidesign abandoned an Audiomedia/PC for this and other reasons.) Any given Macintosh is consistent from one machine to another, while a clone is a conglomeration of parts from a dozen sources slapped into a case by a more-or-less competent wholesaler under cutthroat price competition. A sound-card manufacturer may design, test, and fairly rate their board on an expensive (and quiet) PC system, but that's no guarantee the same card will provide "greater than 72 dB S/N" when you pop it into your CompuClub '386SX.

If you have a poorly designed, badly shielded card made with inferior parts living inside a computer of similar description, nothing will turn it into a Synclavier. Nevertheless, you can minimize certain types of noise.

Analog hum. Ground the CPU chassis. Make sure the third prong on the power cord really goes to earth. (See "On Solid Ground," in the September and October 1992 **EM**.) The ⅛-inch-stereo to twin-RCA adapter cables included with some cards are often poorly shielded; use better cables.

Digital hash. The hard disk, video card, power supply, and CPU chip are the primary sources, although a poorly designed motherboard can radiate noise at almost any point. Try moving cards to different slots; the sound card should be as far as possible from noise sources. Try listening to the card's output while accessing the disk, redrawing the screen, and so on, to identify the worst offenders.

Analog hiss. The analog input/output/mixing sections of a sound card use op amps. Cheap op amps (e.g., 1558) hiss a lot; better ones (e.g., 5532) hiss less. If your card's op amps are noisy, try to keep them out of the signal path. Don't use the onboard mic preamps. Zero all unused inputs on the sound card's internal mixer, and make sure the output is hot. If the card has an onboard amplifier to drive speakers, bypass it. (This may involve changing jumper settings on the card or simply using a different output jack.) If you *really* know what you're doing, replace noisy op amps with low-noise pin equivalents (Precision Monolithics' OP series, for instance).

Mechanical noise. The computer itself

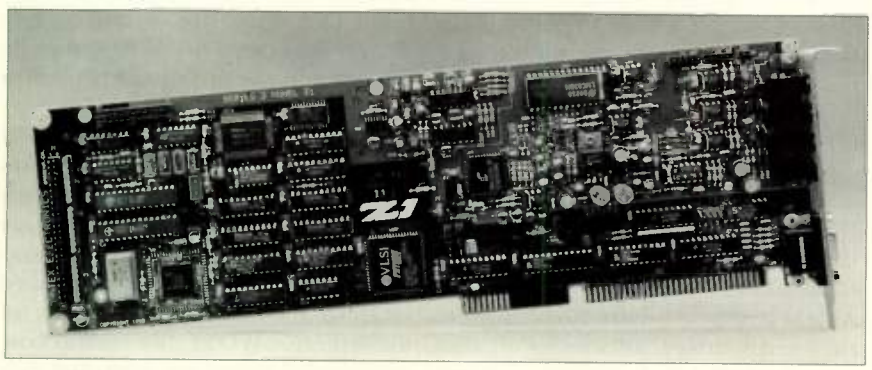


FIG. 1: The Antex Z1 sound board for the PC allows you to simultaneously record and playback 16-bit digital audio.

adds a whirring, whining ambience to the studio, which is hardly ideal for monitoring or recording. With sufficiently long cables and a convenient closet, you can move the CPU out of the studio entirely, leaving only the monitor (which may generate its own high-frequency noise) and keyboard. External hard disks can likewise be moved. Unless there is sufficient ventilation or a fan in the area where these devices are moved, however, this may lead to other troubles.

Manufacturers discourage long cable runs, and for good reason: Signals degrade and devices start to misbehave. Six feet is the conventional limit for a video or SCSI cable, but you might be able to stretch it in some cases.

If you can't find a long SCSI cable, try an RS-232 serial cable with all pins wired. Just remember that SCSI is serious voodoo, and all kinds of unpredictable and difficult-to-debug problems may result from poor cabling (see "Computer Musician: The Story of SCSI" in the June 1991 **EM**). Always use double-shielded cable.

A MIDI cable with all pins wired can be used to extend the reach of a PC keyboard. A Super-VHS cable is a less-expensive, pin-equivalent alternative to an Apple ADB cable.

If you don't have a closet handy, it may be tempting to put all the noisy gear in a padded box, but lack of air circulation makes electronic equipment very unhappy. A noisy fan can be wired to a switch and turned off for short periods, but don't forget about it. If you leave it off for long periods, your computer will die a premature death.

SOFTLY...

Going beyond the supplied software can open new horizons. With *Windows*' multimedia support, some software can access a card through the driver software without knowing anything about the card, which is called "device independence." For example, *Cakewalk for Windows*, from Twelve Tone Systems, can sync .WAV files (one at a time) to MIDI playback with just about any *Windows*-compatible card. A growing number of third-party programs support full-featured .WAV file recording, playback, and editing, as well.

Software that manipulates AIFF files is just as useful on Macs. For example, *Sound Designer II*, the software component of Digidesign's professional Sound Tools II, can mix four 16-bit AIFF files to one. Surprisingly, *Sound Edit Pro*, the software for Macromedia's hobbyist MacRecorder, can perform the same operation with as many 16-bit AIFFs as you want.

With the rapid advancement of digital audio technology, sound cards are blurring the boundary between professional and hobbyist products. Creative Labs, makers of the Sound Blaster, recently acquired E-mu, which indicates that differences in technology are likely to become even less significant compared to differences in market definition. As more musicians move into multimedia, even low-end companies will become more responsive to their particular needs.

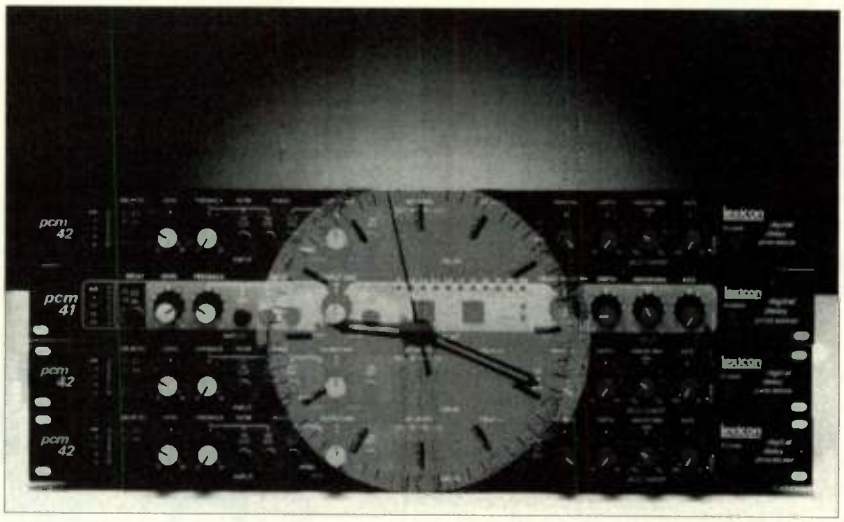
(Thanks to Robert Rich and Charles Ochre for their assistance.)

Carter Scholz *is a freelance writer and musician who writes frequently about electronic and computer music. He's a strong proponent of monomedia.*

Mixing With Delay

By Neal Brighton with Michael Molenda

Clever use of delay can put your tracks through some nice ch-ch-ch-changes.



In the early days of recording, you got one delay effect: echo. The most common variety was slapback, and getting this effect wasn't as easy as pushing a button, either.

Someone had to lug an extra reel-to-reel, 2-track deck into the control room. When the desired signal was routed to the deck, the time delay of the slapback was determined by the time between the signal reaching the record (input) and playback (output) heads. That meant you had to keep tape running on the 2-track with the tape speed adjusted to produce the desired slapback time. An accelerated speed meant the recorded signal reached the playback head fast, producing a quick slapback; slower speeds produced a longer, echo-like slapback. And guess what? If a second signal cried out for a different slapback effect, another deck was required. Whew!

Once again, we thank our lucky stars for the digital revolution. Today, a home recordist can buy a single-rackspace, dedicated delay processor, or a multi-effects box boasting a full menu of delay parameters. But easy access doesn't mean easy application. I've heard countless mixes butchered by relentless overuse of delay. If you want clear, punchy mixes, it helps to get some "delay discipline."

OPENING THE TRICK BAG

Effects such as delay lines usually are wired in one of three ways: in-line (i.e., between the instrument and mixer), on the mixer's auxiliary send and return, or from a mixer-channel direct output. If you use the aux send, you may have a choice between the pre-fader and post-fader send. If you use a pre-fader aux send, a constant level is sent to the effects processor no matter how you adjust the channel levels, which can help keep levels under control.

Most signal processors allow the user to select a wet/dry mix (the balance between the original sound source and the delayed signal). This is especially useful if you are using the delay in-line. On the other hand, if you use the delay line on the mixer's aux bus, you can keep the delay line's output at 100% wet and set the wet/dry mix by routing the processor output through a mixer's input module or effects return. Running the delay output into a channel fader or effects return knob also makes it possible to manually "fade in" the delay, even if you're not using a MIDI sequencer to control effects levels. (This method came in handy during a demo mix when San Francisco alternative country artist Mike Coykendall wanted his vocal delay to rise up for the choruses and disappear on the verses.)

Returning the delayed signal through a channel input is especially handy because it lets you EQ the delayed signal. In addition, you can route the delayed signal to other processors (such as a reverb) via the remaining aux buses and the direct output. If you put the delay on a pre-fader send, return through a channel, and use a post-fader send to feed the delayed signal to a reverb, you can even mute the original (dry) signal and use 100% wet signal in the mix. (Channel mutes come after the pre-fader send in the signal chain.)

To further ensure optimum sonic quality, adjust the input signal going into the processor to the maximum level before overload. (Remember to account for sonic spikes, such as drum attacks.) It can also save you headaches to confirm that the output level from the processor is free of audible distortion or preamp hiss. If your input levels are optimal, and you still hear distortion

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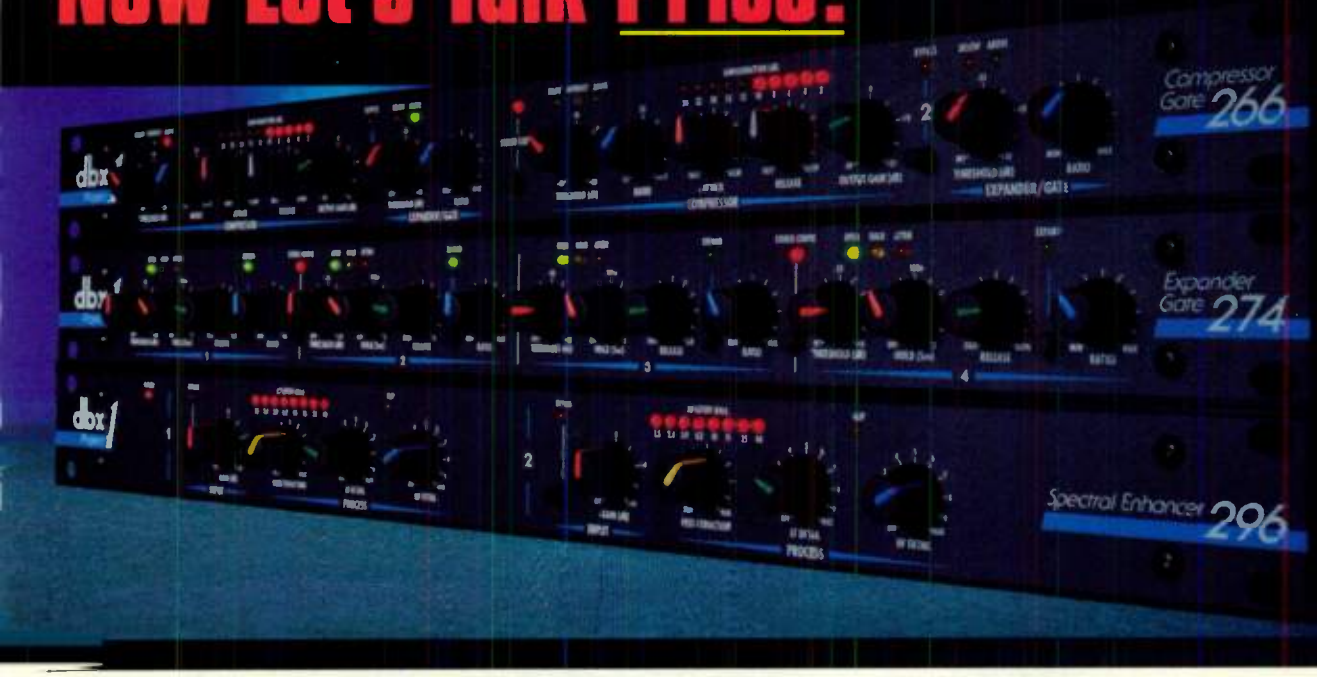

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Home recordists often seek more bang for their buck by purchasing multi-effects units. Zoom's 9120 offers solid delay programs and the added bonus of a delay-time calculator. The user simply inputs a tempo (in beats-per-minute) and note type, and the 9120 automatically computes a complementary delay-time setting.

or noise, back down the output level. In addition, make sure that none of the parameter settings compromise your signal path. I've noticed that the internal EQ of some units defaults to a high-frequency boost. This "enhancement" may make the device sound sharp as lightning in a noisy music store, but through your (hopefully) pristine mixer, those attenuated highs can stir up a hiss cocktail.

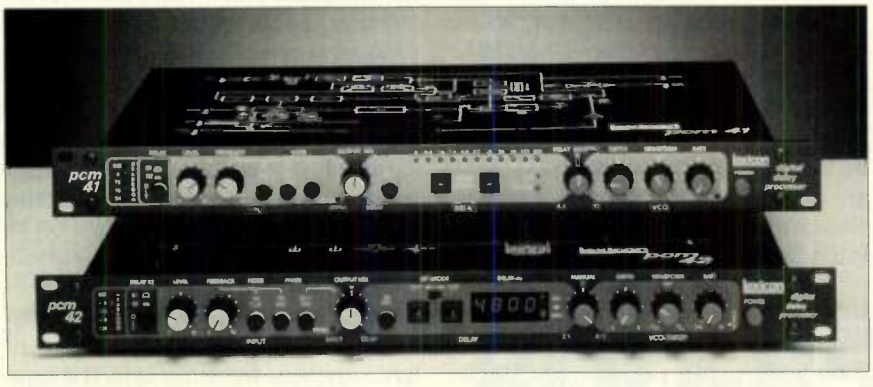
Hiss isn't the only sonic saboteur waiting to ruin your mix. Delay, like reverb, can drastically mess with perceived acoustic environments. In some instances, overuse can be a bad thing. A delay set for multiple repeats during fast passages can do some damage to instrumental clarity. Also, a delay time that is off-tempo to the actual beat of the song can roll the listener into a ball of confusion. Unless you're experimenting with "virtual vertigo," it's a good idea to seek delay times and feedback parameters that complement a work's tempo.

You can verify that your delay and song tempos match by soloing the delay signal along with the rhythm tracks. Simply determine if the repeats fall in time with the snare hits (or another primary time-keeper). If you don't have solo or channel-mute features on your mixer, mark your fader levels with a grease pencil, and bring down everything except the rhythm tracks and delay returns. After you've tweaked the delay times to complement the song tempo, move the other faders back to their original levels.

This "human" fader automation is a rather clumsy way to emulate solo and mute functions, but taking the trouble to ensure rhythmic harmony between delays and song tempos can save your mix. Some units have keypad functions that allow the user to "tap" in the rhythm of a track to automatically set complementary delay times. A quick-and-dirty method for checking delay tempos is pushing the Stop button on the tape deck. When the music stops, the delay repeats will continue to be audible for as long as the feedback parameter is set. Listen to the timing of the repeats to determine if they match the song tempo.

FAUX STEREO

One of the simplest delay tricks involves transforming a mono signal into a pseudo-stereo image. This application is particularly valuable if you're limited to four or eight tape tracks. For example,



Lexicon's PCM-41 and PCM-42 were among the earliest high-quality digital-delay processors. Extraordinary effects can be created by modulating the delay time with a footpedal, the onboard envelope follower, and/or the LFO. The latter can produce either a square wave or a sine wave, with continuously adjustable frequency.

July 1993 Electronic Musician 91

Rave New World

By Teri Danz

Dance club DJs and live musicians come together in the new groove underground.

It could be the Sound Factory in New York or a small, cutting-edge dance club in San Francisco. It's crowded, it's dark, and the music is loud and furious. But something is different. The grooves aren't just blasting from a DJ's turntable, someone is actually playing the beats *live.*

This is the new underground; musicians collaborating with club DJs to create a new "live" house, techno, or techno-tribe experience. And everyone can join the party. Drummers and percussionists can bang along with the beat of the dance tracks; guitar players can intertwine melodies and sonic textures; and keyboardists can play sequences, patches, and samples over the mix.

"Adding live performance intensifies the sound quality and creates more excitement at an event," says San Francisco dance promoter and host Martel, who regularly hires musicians for his roving parties and club nights. "The performers energize the crowd—it's almost like a concert experience—and give the club scene a new twist."

MIXING IT UP

Few of the new breed of live rave artists are new to the music scene. Zoe Magik recording artists Mouse and Kelix are club veterans who have released a series of 12-inch dance tracks in the United States and Europe. However, one of the duo's current projects, Tasti Box, has stepped out of the record grooves and onto club stages. Mouse and Kelix enhance Tasti Box's psychedelic party music by performing live parts over prerecorded and mixed backing tracks.

The duo mixes backing tracks to DAT in their home studio, usually stockpiling at least six "sets" of material so that each performance is different. For club shows, the DAT machine (for playing back the premixed tracks) is run through an Alesis 1622 mixer along with the Ensoniq EPS-16 and ESQ-1 keyboards used for performing live samples, percussion, and other sounds. A solitary Alesis Quadraverb handles effects processing. The club soundperson or DJ is provided a stereo output from the 1622, so Mouse and Kelix can maintain complete control over the mix. "We pump more bass than anyone," boasts Mouse. "And we've blown up even the best sound systems."

Because the cardinal rule in clubs is "don't break the beat," Tasti Box comes on without an introduction. The DJ usually fades a record, and the duo takes over, but sometimes the DJ spins in sound effects during the performance. Because Tasti Box performs an actual set—many live rave performers improvise over whatever record the DJ plays—any musician/DJ interplay is rehearsed prior to the show.

DISCO DRUMS

Sometimes trends happen by accident. JuJu, an accomplished drummer who has performed with Dizzy Gillespie and Pete Escovedo, began playing along with club DJs merely to have a free place to practice. Crowd response was so favorable that JuJu and fellow percussionist Henry Flood formed the Rave Brothers to entertain dancers at San Francisco Bay Area clubs.

To maximize the impact of their performance, the Rave Brothers developed a drum kit—consisting of congas, floor toms, timbales, cymbals, and hi-hats—that can be played while standing up. The duo performs right on the dance floor and often invites the dancers to hit a few drums. JuJu defines the Rave Brothers as "tribal techno drummers" and stresses that rhythmic precision is the key to successfully playing live to

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records. Playing with dynamics and finesse is also essential.

"If you just play real hard, you'll start competing with the music, and people will get bored," says JuJu. "Ideally, you want to make your performance sound as if it's part of the record. The object is not to overwhelm the music, but to bring it to another level."

DANCING GUITARS

A live guitarist may be the last thing a dancer would expect to see at a rave, but San Francisco-based Chris Capriotti finds the cutting-edge dance parties to be a perfect forum for "expanding the boundaries of guitar technology." To explore these new sonic frontiers, Capriotti (an ex-student of guitar guru Joe Satriani) plays an Ibanez 540 SLR guitar through a wah-wah pedal into a Chandler Tube Driver. A Roland SDE-1000 digital delay and a TC Electronic chorus provide effects processing, and the mono guitar signal is split into stereo via the outputs of an Ibanez SD-1000 stereo digital reverb. The right output is sent to a Marshall half-stack amp, and the left to a Roland JC-120 amplifier.

Capriotti was introduced to the live rave scene by JuJu, and the guitarist was immediately drawn to the freedom that such events offer performers. Anything

TERI DANZ

Guitarist Chris Capriotti performing in front of a video collage in a club ante room.

TERI DANZ

To bring their beats closer to the people, drummers JuJu (left) and Henry Flood (sitting, right) developed a "rave" drum kit so they can play standing up on the dance floor.

is acceptable, so long as it doesn't mess with the groove. For musicians who enjoy experimenting with sonic textures, live raves are the perfect gig. And Capriotti feels that his command of electronics makes him well-suited for the demands of improvising to records *and* the "vibe" of a particular club.

"My first priority is playing the guitar well," stresses Capriotti, "but I also try to create sounds that fit the mood of the event. Sometimes the promoters put me in a side room where people drink, play pool, and hang out. In those situations, I'll play kind of quiet and spacey. But if I'm in the main dance area, playing to the records, I'll go full techno psychedelic."

I AM THE DJ

In contrast to situations where the DJ simply provides the foundation for a live performance, many acts use DJs as integral members of the band. For example, the very hot Digable Planets relies on its DJ (Silkworm) as a major component of the band's "beatnik jazz rap" sound.

In the case of San Francisco-based hard-core dance act, STEPCHILDREN, adding a DJ transformed a conventional rock band into a genre-breaking mix of hip hop, house, and rock 'n' roll. The more urban sound also enhanced the group's politics of partying and working towards a harmonious world; a sentiment expressed in their song "Color Blind." The band's mix master, DJ Blackstone, uses a Technics 1200 turntable and a NuMark mixer to scratch and drop sounds into STEPCHILDREN's onslaught of guitar, keyboard, bass, and drums.

"The most important thing is the [band's] message," says DJ Blackstone.

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TERI DANZ

Record producers Kelix (left) and Mouse step out of the studio to bring their Tasti Box project to life at underground dance parties.

"I'll play and manipulate spoken words to reinforce what the song is saying. I believe that the political overtones of rap have started to push rock music into a more intellectual phase. Given this more thought-oriented atmosphere, I do my part toward raising consciousness by dropping important words and phrases into the music mix."

RAVE UP

Live musicians in dance clubs is a relatively new phenomenon, and many artists see it as an evolving art form. Many of these performers practically live in the clubs, watching the crowds and studying what makes people dance. Because dance trends change rapidly, it's essential that an artist be flexible enough to mutate along with the market. And don't forget that the club scene stretches into the wee hours, so if you're not a late-night person, this career can kill you. But if your act clicks with the dance crowd, the financial rewards can be worth all the lost sleep.

Free-form solo artists earn approximately $75 a night, and more established band-oriented acts such as Tasti Box often command fees of $2,000. These paydays are for acts who don't have a hit record. An artist with a charting dance hit can grab up to $15,000 for a single performance.

Obviously, playing live at dance clubs is not a traditional route to mainstream success. But for musicians who love dance music and the underground scene, this new performing arena can provide a lot of exposure. After all, Madonna began her career by playing her demos on the dance floor. You could be next!

A performer and veteran night owl, San Francisco-based singer/songwriter **Teri Danz** *is constantly amazed at the magic that happens in her music and in her life.*

Reviews

Akai S01 Sampler

By Bob Lindstrom

A brand-new, 16-bit, 8-voice sampler for under $1,000.

A few weeks ago, that statement wouldn't have had any more credibility than the latest Elvis sighting, but it's now a reality with the release of Akai's functional and affordable S01 MIDI Digital Sampler.

The S01 is a 2U rack-mount, 8-Bank, 8-voice sampler. Akai made it affordable with intelligent compromises in features and performance, notably a fixed, 32 kHz sampling rate; limited editing abilities; and mono audio output.

Make no mistake; this is an entry-level unit. Owners of Akai's S1000 and S1100 samplers won't be tearing their hair out and trading in those more powerful boxes. Similarly, owners of 13-bit EPS samplers who are considering a move to the S01 should weigh the value of 16-bit fidelity against fewer features. However, if you need a simple, utilitarian sampler—especially a first sampler—with no bells and whistles, and you still want to eat and pay the rent, the S01 sampler is for you.

Akai clearly targeted its 8-voice, 16-bit S01 sampler at the entry-level user. The company kept the price down by offering a fixed, 32 kHz sampling rate; minimal editing and continuous-control features; and mono audio output.

HOW THEY DID IT

The S01 represents a new price/performance standard in 16-bit samplers. But there's no real mystery about how Akai managed this feat. All features in the S01 represent quality; it just has fewer of them. Each beneficial feature seems accompanied by a carefully chosen limitation to keep the cost down.

For example, the S01 boasts a 16-bit recording resolution, but it only samples at 32 kHz. This gives you CD-quality sample resolution, but the frequency response tops out at 16 kHz. (According to Nyquist's theorem, the highest frequency that can be accurately reproduced in a digital audio system without generating aliasing noise is one-half the sampling frequency.) Still, in many real-world applications, the 32 kHz sampling rate is satisfactory, especially because the S01's audio chain is clean, as you'd expect from Akai.

The S01's eight sampling Banks can be configured as individual instruments for multitimbral MIDI setups, or you can combine the Banks for multisamples. Sampling RAM can be expanded to a maximum of 2 MB. Since sampling is monaural, even the standard 1 MB of RAM provides 15.6 seconds of sampling time. Even so, a 4-octave multisample uses half the Banks. You cannot layer or combine samples in a single Bank. You can overlap the key ranges of samples, but crossfading is not possible.

The MIDI implementation is basic. The S01 recognizes Note On Velocity, but not Note Off Velocity or Aftertouch. Pitch Bend is supported, but not Mod Wheel. Volume and Sustain pedals work, but not a Soft pedal. Of course, the S01 sends and receives SysEx, and I successfully transferred samples to the S01 from my Macintosh using *Alchemy* 2.6 and the MIDI Sample Dump protocol.

FRONT AND BACK

Some may view the S01 front panel as

PETER DIGGS

spartan, but I found it refreshing in its simplicity. Akai kept buttons, knobs, and LEDs to a minimum and, in so doing, brilliantly achieved both low cost and ease of use. Most of the front-panel controls and displays do double or triple duty. Even so, the S01 interface is unusually accessible. I was sampling and playing with scarcely a glance at the manual.

On the left of the S01's front panel is a 3.5-inch, high-density, floppy-disk drive, which is not compatible with Mac or PC formats. The S01 can import and export samples on Akai S1000 and S1100 disks. According to the manual, a noise may be present in S1000/S1100 samples that use the "at:loop start point" parameter, and a noise occasionally shows up in exported S01 samples on the S1000/S1100. In both cases, you can edit out the noise. However, I imported about two dozen randomly selected samples from S1000 disks and never encountered the noise.

There is no hard-drive or SCSI option, but you can save large samples across several floppy disks. (However, the S1000/S1100 will not load S01 samples saved across multiple disks.) A high-density disk stores about 25 seconds of samples. The drive can save individual samples, or an entire S01 setup, including all sample Banks and settings.

Above the drive, an Edit mode button and two cursor buttons navigate through the S01's parameter-list matrix. A switch selects between the two MIDI In ports on the back panel (discussed shortly).

The matrix is a printed table of all S01 features and parameters on the front panel. Red LEDs line up on the left side and across the top of the matrix; press the up/down or left/right cursor buttons to select each option. For example, to set a sample at constant pitch, press the right cursor three times to light the Transpose LED, then cursor down twice to select Constant Pitch. Initially, this approach is a bit like finding square D4 on a map of Kansas, but it quickly becomes second nature because all options are visible at all times.

Below the parameter-list matrix are a Record button and eight buttons that trigger playback of each sample bank at pitch C3. It's an extremely accessible way to test samples during editing. However, transposed samples aren't reproduced at their original pitch, because all pitches play back as if you pressed C3. When multisampling, edit the sample before you transpose it to its proper keyboard range. By the way, the buttons do not transmit MIDI, so you cannot use the front panel as a surrogate drum machine.

▼

All features in the S01 represent quality; it just has fewer of them.

A large Data knob sits under a 3-character LED display; these are used to alter and view parameter values. The LED also doubles as a status and directory display when loading and saving files. Finally, there are knobs for Record Level, Main Volume, and Record Gain (-52 or -12 dB) in addition to ¼-inch unbalanced input, output, and headphone jacks.

On the back panel are two MIDI In ports; MIDI Out and Thru ports; a duplicate audio-output jack; a footswitch jack to trigger sample recording and playback; and a 3-blade AC socket. At first, I wondered why there were two MIDI In ports, considering the unit is only 8-part multitimbral. Akai anticipates that, for example, a DJ might want to attach the S01 to a simple MIDI keyboard to trigger special sound effects, while also connecting the sampler to a sequencer or other MIDI device. However, you can only use one In port at a time; a pair of merging MIDI Ins would have been a lot cooler.

HOW IT WORKS

Sampling on the S01 is as it should be: simple. Plug into the front-panel input jack. Set the gain for -12 or -52 dB, then adjust the record level. The red LEDs on the left side of the command matrix double as a level meter. You can trigger sampling manually, or set a threshold level. Choose a voice Bank and make a noise. It's done.

Editing options are also simple. There are rough and fine controls for setting the start point, end point, and loop point. If you want to play a sample in reverse, simply dial the start point past the end point. This is sampling without frills, folks. Similarly, if you want a crossfade loop or a little help finding a zero point, look elsewhere. The S01 doesn't provide either.

Samples are assigned to one of 128 program numbers and to any MIDI channel. When creating multisamples, place a sample for each octave in the Banks, set keyboard range for each Bank, then assign the banks to the same program and MIDI channel number.

Editing operations include adjusting the overall sample-playback level, setting the release time, and fixing or transposing the pitch of a sample. When you import a sample created at another sampling rate, you must transpose to compensate for the rate difference; you cannot automatically convert the rate or resample at 48 kHz. Akai provides a chart to help determine what transposition and fine-tune settings are required for converting samples recorded at rates between 15.7 kHz and 48 kHz, in 100 Hz intervals. Unfortunately, if you want to fine-tune converted samples, you must do it by ear or with a tuning meter.

Sampling was a breeze. Identifying loop points was less appealing because everything is done by ear. (If you have a computer, I recommend editing samples there and downloading the results to the S01.) The 32 kHz rate sounded fine for almost everything, and the clean preamp stage kept timbres clear and high-impact. In fact, even if you already have a more advanced sampler, you may actually prefer the S01's

Product Summary

PRODUCT:
S01 MIDI Digital Sampler
PRICE:
$999
MANUFACTURER:
Akai Professional/IMC
1316 E. Lancaster
Fort Worth, TX 76102
tel. (817) 336-5114
fax (817) 870-1271

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ◖
EASE OF USE	● ● ● ● ◖
SOUND QUALITY	● ● ● ●
VALUE	● ● ●

simplicity for many applications.

THE LAST LOOP

The Akai S01 is a strong performer, simple in its features, but also simple to use. Even a sampling beginner will quickly grasp its use and, in so doing, learn the fundamentals of sampling technology.

The ingenious compromises that help the S01 hit that surprising price point limit its usefulness for those who are not beginners. If you're even a moderately sophisticated MIDI user, you may be frustrated by the S01's modest feature set and 8-voice polyphony.

However, if your sampling needs are simple, Akai's S01 MIDI Digital Sampler may be the right sampler for now. And with its high-quality, 16-bit sound, the S01 will remain a valued part of your setup even if you move on to a more full-featured unit.

(Special thanks to Denis Labreque at Passport Designs.)

Bob Lindstrom *is a nationally syndicated computer columnist and freelance composer/conductor.*

Lexicon Alex Effects Processor

By George Petersen

The legendary Lexicon sound at a record-low price.

Many companies build digital effects gizmos, but only Lexicon has been doing it for over twenty years. During that time, Lexicon built an enviable reputation for excellent, high-end studio processors. Recently, the company also has championed the concept of real-time MIDI parameter control for signal processors. A few years ago, Lexicon broke the high-price barrier with its splendid, $549, LXP-1 and LXP-5 half-rack boxes. At $399, Lexicon's Alex is the company's most affordable digital effects processor to date and its first MIDI-less effects box in many years.

The new unit provides a wide range of onboard sounds that are reminiscent of the LXP-1. Reverbs include rooms, halls, and plates. You also get gated and inverse reverbs, chorus, flange, echo, and a few other delay effects. Except for the chorus, Alex provides just one effect at a time; the multivoice, stereo chorus feeds a delay line. There are sixteen factory-preset programs, each with sixteen variations on each of three adjustable parameters, providing a total of 4,096 (16^3) possible combinations. The variations can be saved in any of sixteen user-memory registers.

The simple front panel of Lexicon's Alex digital effects processor makes it easy to select factory presets and set levels, but because of its small display and lack of MIDI support, tweaking parameters is best done by ear.

Alex should be considered a mono-input/stereo-output device, where the stereo inputs should only be used when it is an in-line processor (using the wet/dry control to vary the effect amount). When using it with a mixing console, only one effects send is required, although two return channels are preferable to take advantage of the unit's stereo effects.

LAYOUT

Alex has a single-rackspace chassis that, at just over four inches deep, should have no problem fitting into any studio or live performance rack. The unit's front panel is sparse, with pots for setting input, output, and wet/dry mix levels; an input-overload LED; a simple, 2-character LED display; a rotary data-wheel; program-select controls; and buttons for memory store/clear, parameter select, and factory or user presets.

On the back panel are ¼-inch jacks for the unbalanced stereo inputs and outputs, a footswitch input, and a jack for the external 9-volt power supply. Everybody hates these ubiquitous "wall warts," but they play a major role in reducing manufacturing costs and make it easier to get FCC approval. They also reduce induced line noise by keeping the power supply away from the audio circuits.

PROGRAMMING

A more significant means of reducing Alex's cost is the elimination of MIDI control. MIDI continuous control, as implemented in Lexicon's PCM-70, Model 300, and LXP series, provides an extraordinarily powerful tool for creative expression. MIDI also offers the ability to remotely change programs and/or effects parameters (via external controllers, or automatically in sequenced playback), as well as a convenient way to save, store, and edit effects patches.

Nonetheless, there are plenty of occasions when MIDI control of a signal processor is unnecessary. In fact, for many musicians, it's unnecessary 90 percent of the time, either in the studio or onstage. And when your application demands a MIDI-controlled processor, the Alex still can prove useful as a second or third device; you can never have too many good-sounding effects boxes.

Besides, the unit is not brain-dead. Instead of accepting MIDI Program Changes, Alex simply lets you step through a user-configured program chain with a footswitch. The footswitch jack is wired with a 3-conductor, ¼-inch, tip-ring-sleeve connector and accepts a single or dual, latching or momentary switch. If the tip conductor of the jack is switched to connect with the ground (sleeve), the footswitch functions as a bypass. (The bypass is actually an input mute, so the reverb tail and echo effects are not truncated.) When the center (ring) conductor is switched to contact the ground, Alex steps to the next numbered factory preset or user patch, which Lexicon refers to as a "Register." With a dual switch, you get both functions. If you set up your Registers in the proper order, Alex can provide a practical, cost-effective alternative to using a MIDI footswitch for Program Change, although it is not as elegant or powerful.

A Clear control can be used to erase existing Registers, or create short chains of Registers. When the Preset Select knob is set at 1, the footswitch selects the Registers in numerical order, while skipping over cleared Registers. If the Preset Select knob is set to any other position, the footswitch starts with the number of the selected preset and

continues stepping until a cleared Register is detected, at which point Alex loops back to the first Register in that chain. The process of numbering and creating footswitch chains is actually easier than the above description, once you get used to it.

Accessing the factory presets is a simple matter of spinning the 16-position knob. If desired, each sound can be tweaked as needed. Of course, any combination you create will disappear unless saved into a user Register. The factory sounds are stored permanently in ROM and cannot be changed, so you can tweak away without fear of destroying the presets.

With only a 2-digit display and a couple of LEDs to guide you, programming Alex can be a somewhat daunting process. Thankfully, the brief, but complete, manual includes a chart that translates the front-panel display into real terms. For example, when the unit is set on Echo (preset 15), how is one supposed to know that the Decay-2/Delay-16 setting equates to a 1,500 ms delay with no recirculation (feedback), while Decay-9/Delay-7 means a 166 ms delay with 49% recirculation? Some advice: Don't lose the book; or better still, photocopy the chart and keep it handy. Fortunately, as most effects tweaking is done by ear, rather than by chart, this is a minor problem.

SOUND QUALITY

Alex uses 16-bit digital conversion operating at a sampling frequency of 31.25 kHz, which provides an upper frequency response of 15 kHz for the wet signal. The dry component is virtually unchanged and goes out to 20 kHz. While such specs are somewhat less than those offered by Lexicon's $5,000 Model 300 (no surprise), Alex's audio performance is clean and far better than one might expect from a unit in this price class.

The factory presets are of high quality and are useful right out of the box. They fit most of my music applications without tweaking. The chorus is top-notch. The flanging presets have a big, deep, rich sound reminiscent of an expensive analog flanger. The room reverbs are dense, full, and natural sounding, the sort of stuff for which Lexicon is famous. Used alone, some of the plate settings are a little bright for my taste, although there are many cases when a bright plate sound can help keep a drum part or vocal track from getting lost in the rest of the mix.

Product Summary

PRODUCT:
Alex Digital Effects Processor
PRICE:
$399
MANUFACTURER:
Lexicon
100 Beaver St.
Waltham, MA 02154
tel. (617) 736-0300
fax (617) 891-7914

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ●
EASE OF USE	● ● ◐
SOUND QUALITY	● ● ● ●
VALUE	● ● ● ●

● ALEX

OVERALL

The Lexicon Alex offers a lot for the price. It combines a tasteful selection of excellent reverb and effects programs with the ability to create custom presets and user-defined performance chains. And of course, you get the Lexicon sound, which is generally unimpaired by the lower sampling frequency.

True, there is no MIDI control. Of more concern to some users, Alex doesn't offer nearly as many programmable parameters as Lexicon's higher-end gear. But given its price and sonic quality, Alex will find its way into a lot of studio and live performance racks.

George Petersen *is the products editor of* Mix *magazine and co-author of* Tech Terms: A Practical Dictionary for Audio and Music Production.

Musicator GS for Windows

By Tim Tully

An integrated sequencer/notation program optimized for GS instruments.

Musicator GS for Windows, from Norwegian developer Musicator A/S, is an unusual combination. It's designed to be both an editable, printable notation program and a MIDI sequencer. While it is becoming more common for aging sequencers to seek rejuvenation by adding notation capabilities, it's less usual to see such hybrids come right out of the gate.

Musicator GS for Windows (*MGW*) follows its own muse regarding its feature set, too. While it offers impressive editing of both MIDI data and notation and has a selectable timing resolution up to 480 ppqn, it cannot sync to time code or any other external source, nor can it record more than sixteen tracks in a song. The latter limitation comes from the program's dedication to addressing Roland's 16-part multitimbral GS instruments (the Sound Canvas, SCC-1 PC expansion card, JV-30,

and so on). But while its GS orientation creates some limits, it also inspires a number of useful features, such as an onscreen mixer that takes advantage of GS functions. (For more on Sound Canvas/GS applications see "Colors For Your Canvas" on p. 46.)

THE OPENING

When *MGW* opens, it immediately gives you a look at four of the main screens (called "Views"). The Notation, Overview, Bender, and (Piano) Roll Views appear tiled in a four-way spread below the program's tool bar and menu bar (**Fig. 1**). This is a convenient arrangement, as you tend to use these four Views the most, and you can expand them to fill your monitor screen and contract them again with just a click.

When setting up a recording session, *MGW*'s Window menu offers three Setup screens: Part, Channel, and Drum. The Part Setup lets you name, transpose, solo, and mute a Part; select its clef; and set its MIDI channel.

The Channel Setup window is one of the places *MGW* gives you direct control over GS functions. You can set four parameters—mute status (on or off), maximum pitch-bend range, portamento on/off, and whether the channel will play monophonically or polyphonically—for each multitimbral Part on your sound module. These functions are particularly convenient if you're using a GS sound card (as opposed to an external module), because cards have no physical controls and must be controlled with software.

The Drum Setup window (**Fig. 2**) lets you assign a drum Instrument name to any note, determine what note on the staff will represent the various drums, select one of four note symbols for each Instrument, choose one of 32 beam groups, and select whether the note stems go up or down.

You can also select the MIDI device and patches for each Part. (*MGW* uses the term "Part" where most sequencers use "Track," again, from the program's Roland GS orientation.) You select a Part by clicking on its name in the Overview window and choosing Instrument from the Window menu. A submenu displays nine different devices, including a generic "Any Module." Selecting one of them brings up a patch map, or you can get to the patch map directly by clicking on the Instrument button on the tool bar. If you wish, you can create your own patch maps with a text editor, and you can change patches in mid-song.

ENTERING NOTATION

The simplest way to record, and probably the most familiar to people used to composing on staff paper, is by clicking in the Notation window with the mouse. Clicking on a staff record-enables it and sets *MGW*'s Ruler above that staff. Click on the Note button in the tool bar, and the cursor becomes a note in a crosshair; thereafter, wherever you click on the staff, you record a note.

The Ruler shows you the duration of the notes—actually subdivisions of the beat—you are about to enter. The ticks on the Ruler also create a comfortable graphic guide to placing notes. To enter a note longer than the current Ruler setting, you click on the point where you want the note to start, then drag the cursor to where you want the note to end, which is a nice, intuitive touch.

To enter chord names, click above

or below already-entered notes; enter accidentals by pressing any of five designated keys as you click. You can delete the last note you entered with the Undo command in the Edit menu. Drawing a rectangle around a group of notes with the arrow tool, then hitting the Delete key takes out a whole bunch of them, and you can beam groups of notes with a button in the Note Attributes window.

RECORDING WITH MIDI

Step-time recording with a MIDI keyboard is even easier. You set everything up the same way, then simply play the keyboard. You can play single notes or chords and enter notes longer than the current Ruler setting by playing and dragging the mouse, or by pressing the synthesizer's Sustain pedal once for every additional subdivision. In MIDI step-recording, as in real-time recording, *MGW* records the Velocity value for each note, which helps keep the music sounding "live."

Recording in real time requires the same setup as step recording, but also requires setting the time signature and metronome. The latter conveniently defaults to using the GS Sidestick patch as its click. Once you're set up, real-time recording works as it does in most sequencers: click the record button, listen to the metronome, and play.

MGW has no automatic punch-in/out functions, so to record new music over already recorded material, you need to erase the old music and record the new music into the empty bars. The program does not erase any material while recording, so you can start the music before the "punch-in point," then let the sequencer run after you're done without erasing what you want to keep. So while automatic punch-in would help, its absence isn't completely debilitating.

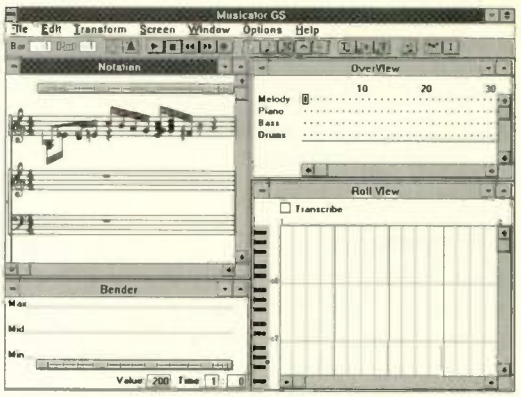

FIG. 1: *Musicator* opens to a four-window spread and the toolbar and menu bar.

EDITING WITH WINDOWS

Any good MIDI notation program allows you to distinguish between editing MIDI data and editing notation. This is due to the nature of notation, as well as that of MIDI. Notation is meant to be played and interpreted by a musician, but MIDI data is meant to describe a musical performance exactly, in terms a computer can understand. As a result, much of the data in a MIDI file (e.g., Program Changes and certain Control Change messages) has no relationship whatsoever to the elements

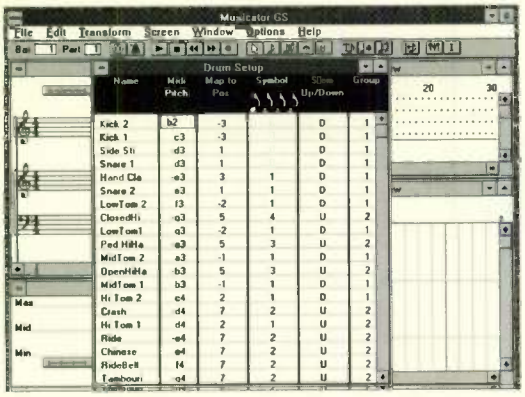

FIG. 2: You have many options for setting up drum Parts.

of notation. *MGW* does a good job at maintaining this distinction, giving you flexible editing of both a score and its corresponding MIDI sequence.

The Notation, Roll, and Overview windows are optimized for editing notes and the Bender, Program Change, and Other Controllers windows for non-note events, as their names imply. One of *MGW*'s nifty features is that as soon as you click on a Part or measure in any window, all the other windows immediately display the same section of the music. This kind of intelligence in a program can save a lot of time and frustration.

All the windows allow you to edit their contents both with menu commands and by dragging and dropping with the mouse in various ways. Mouse-editing is different in each window. In the Notation window, which can display up to six bars at a time, you can drag and drop any individual note or selected group of notes to any location or pitch. All these moves are undo-able, and edits you make in the Notation window are immediately reflected in the MIDI file, so the score and the MIDI music are always in sync.

The Roll window (see Fig. 3) gives you more editing control over MIDI notes than any other *MGW* window. It includes a Transcribe option that duplicates in the Notation window edits you make in the Roll window. The ability to disable the Transcribe option can be quite convenient in situations where you want to edit the MIDI playback without compromising the look of the score.

In the Roll window, you can drag a note to a new pitch or location—*MGW* plays each pitch you drag the note across—and change the note's Velocity value or duration. Shift-click inserts notes on the piano roll grid. For fine adjustments, mouse-click and arrow-key combinations adjust a note's location by ticks, its pitch by semitones, and Velocity by small (but, curiously, varied) increments.

The Bender (Fig. 4), Program Change, Tempo, and Other Controllers windows look and function essentially identically. Clicking the right mouse button inserts a value where you click, and dragging enters a continuous series of values that apply to whatever MIDI event is displayed. This is a fast, intuitive way to enter continuous-controller data. Readouts at the bottom of the window tell you the location of the mouse and the controller value to which it's pointing.

The Overview window is best for editing large sections of a piece and works somewhat like the Overview windows in *Master Tracks Pro*, *Cakewalk*, and other sequencers. The notable exception to this similarity is that you can't drag-and-drop in *MGW*'s Overview. Instead, you have to use the Edit or Transform menus to manipulate a selected section.

EDITING WITH MENUS

Any selection in any window can be edited by menu commands. The Edit menu offers Cut, Copy, Paste, and Undo commands. *MGW*'s Undo deserves special praise. Many programs—and not just MIDI sequencers—have severely limited Undo commands. They work with some of the program's functions, but

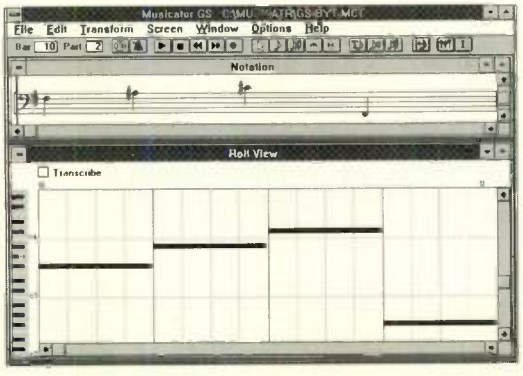

FIG. 3: The Roll window uses a piano-roll display to give you a clear graphic view of your MIDI notes.

not others. But if there's any move you can make in *Musicator GS for Windows* that cannot be undone, I didn't find it. This rates four stars.

The Paste command varies depending on the window you're in. When you're in the Overview, you have the option of either replacing or merging the material in the clipboard with the existing material. You can also delete or replace just the bar(s) in only the Part you've selected, or the same-numbered bars in the entire piece. In the program's Notation, Roll, and Controller windows the Edit menu has only a simple Paste command.

The Transform menu offers more, and more complex, functions. Transpose allows you to change a selection's pitch up or down in semitones. It changes accidentals when you invoke it from the Overview window, but not from the Notation window. This is an eminently sensible bit of design; it allows score-oriented transposing and MIDI-oriented transposing in exactly the places you usually want them.

MGW's Quantize is notation-oriented and is conceptually a little different from quantization in most sequencers. *MGW* compares the notes you select to the way they're written in the Notation window and lists their locations in terms of offsets from those notation points. It then shows you a dialog box

Product Summary

PRODUCT:
Musicator GS for Windows sequencer/notation software
PRICE:
$299
SYSTEM REQUIREMENTS:
IBM PC-compatible with *Windows* 3.1 (does not support *Windows* 3.0); MIDI sound card/module (optimized for Roland GS); MIDI controller
MANUFACTURER:
Musicator A/S
PO Box 410039
San Francisco, CA 94141
tel. (916) 756-9807

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ◖
EASE OF USE	● ● ● ●
DOCUMENTATION	● ● ●
VALUE	● ● ● ●

in which you can set the percentage by which the command will move the music closer to this value. You can quantize the ends of notes, if you wish, and can set offset percentages for eighth or sixteenth notes to create various swing or shuffle feels. Shift Clock moves a selection earlier or later by ticks (1/480 of a quarter note).

MGW's Velocity command lets you change the Velocity of selected notes to any value from 0 to 127. Every sequencer does this, but *MGW* is unique (as far as I know) in that it also lets you compress or expand the range of Velocity values in a selection, with a single command. Compression makes the differences between the loudest and quietest notes smaller; expansion makes them greater. These commands can give the music more character, or smooth it out in subtle, but noticeable, ways. It is a useful feature and deserves kudos.

EDITING NOTATION

In addition to MIDI editing, *MGW* has a nice set of score-editing features. In the Notation window, you can drag-and-drop individual notes, selected groups of notes, or copies of either, to any point. You can change beaming, flip stems, add grace notes, and change enharmonic spellings. Note-spacing can be set globally, or for individual notes, by dragging the tick marks on the Ruler. You can set note-spacing to follow note duration or density, set the vertical spacing between systems, and set the number of bars in a system.

Standard cut, copy, and paste commands are available, as are some less-usual commands. When a keyboardist plays, he or she often plays legato where that articulation is not necessarily intended. A notation program that scores this literally will show one note sustaining over the attack of the next, making it difficult to read. *MGW*'s One Voice command rewrites such lines in the notation window so they are notated as a standard (monophonic) line. Conversely, lines unintentionally played staccato are scored with unintended rests following notes that should be notated at full value. The Minimize Rests command removes these rests to create more standard notation.

MGW has an intuitive set of controls for setting and adjusting the polyphony in a staff from one to four voices. A number of features provide automatic assistance for turning a performance on a MIDI instrument into a score. To extract individual parts from a performance played in real time, you simply draw lines between notes with the mouse. Clicking an icon then sets notes above and below the line to different parts, and you can easily set stems up or down. You can select whatever part or parts you want to print.

Adding musical symbols, text (lyrics), and chord symbols is done by clicking on the score. You can then cut, copy, and paste or mouse-drag these graphic elements wherever you want. All these functions are intuitive and easy to learn. The program also offers a useful Page Layout dialog box where you can set the margins, positioning, and text characteristics of your score.

THE MIXER

MGW's Mixer feature is exceptionally useful in multimedia productions. Like the rest of the program's features, it's designed for GS instruments. The Mixer has sixteen panels, one for each of *MGW*'s Parts. Each panel has a fader

that controls the volume of the Part, as well as virtual knobs that control the Part's pan position, chorus depth, and reverb level. When you click on a module, the name of the patch to which it is set appears in the upper right of the window, and the other Mixer controls are routed to that Part. Three knobs control the rate, depth and delay of vibrato, and two more set the cutoff point and resonance of the instrument's lowpass filter. The last three controls are sliders that set the attack, decay, and release stages of the patch's amplitude envelope.

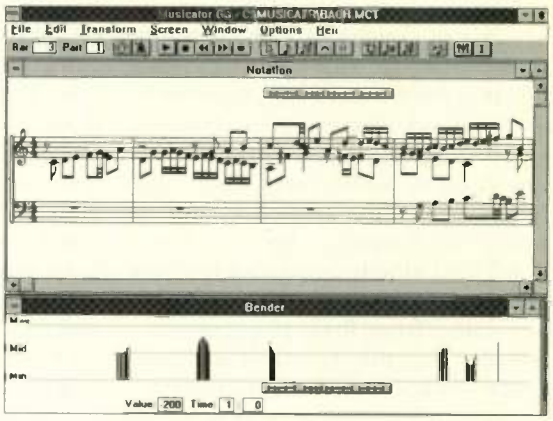

FIG. 4: Entering and editing values in the Bender window works the same as in the Program Change, Tempo, and Other Controllers windows.

It was a revelation to control synth parameters from a sequencer in such a simple way. This feature makes control of your sound source easy. Unfortunately, none of these controls can be recorded in real time; they stay where you leave them until you move them. This omission diminishes an otherwise praiseworthy feature.

OVERALL

MGW's goals are to give you the benefits of a good MIDI sequencer combined with a notation program and provide specific compatibility with Roland GS instruments. It can be quite useful for arranging and generating parts for small (under sixteen pieces) groups. The program has a few standout score-editing features, such as the powerful and unusual One Voice and Minimize Rests commands, though its feature set cannot rival that of high-end notation programs, and it can't handle large scores. I find its interface less intuitive and immediate than Passport's *Encore*, but it is easier to use than Coda's *MusicProse* and *Finale*.

The program's features are generally stable, intuitive, and powerful. Its few serious gaps—an inability to synchronize to an external timing source, a 16-track limitation, and the omission of automation from its otherwise well-endowed mixer—make it less a serious production tool than a composer/producer's scratchpad that also generates printed scores and parts. But within that realm, *Musicator GS for Windows* can cover a lot of bases and is well worth a look.

(Portions of this review will appear in *The Audible PC*, by Tim Tully and David M. Rubin, and are published with the permission of Sybex, Inc.)

Tim Tully *is a writer and multimedia producer who is currently co-writing his second book.* The Audible PC *will provide comprehensive coverage of the hardware, software, techniques, and technology of multimedia sound under* Windows.

Fatar Studio 2001 Master Keyboard

By Steve Oppenheimer

This roadworthy package provides plenty of power and an archetypal action.

In this era of MIDI omnipresence, a new generation of MIDI master keyboards has taken root, with a variety of features not even dreamed of a half-dozen years ago. Peavey, Akai, and Doepfer offer new keyboards, and Roland, Elka, and Yamaha still sell their tried-and-true warhorses.

Fatar is no newcomer to the master-controller market, having long produced master keyboards with few features, but good actions. (See the review of Fatar's Studio 88 Plus in the December 1991 EM.) The Italian manufacturer has also produced superior weighted actions for MIDI master keyboards by Peavey, Elka, and the Ensoniq KS-32

synth. Not content to rest on its laurels, Fatar teamed up with American developer Forte Music (the former MIDI-retrofit experts) to introduce the parameter-laden, new-generation Studio 2001.

THE BIG PICTURE

The Studio 2001 doesn't have every possible MIDI feature, but it has more than most studios will ever need. Just for starters, you get eight independent, overlapping keyboard zones; four programmable sliders; jacks for two CV pedals and four footswitches (which can be programmed as momentary or toggle); four independent, multi-purpose MIDI Ins; four independent MIDI Outs; and numerous special features.

Fatar's latest pride and joy features an 88-key, weighted, Velocity- and Channel Aftertouch-sensitive keyboard with the company's latest-generation action. The Studio 2001's action feels virtually identical to the KS-32's 76-key action and is packaged in a similarly contoured, piano-like case.

Some master keyboards are great studio tools, but you wouldn't want to haul them around. However, I wouldn't hesitate to take the Studio 2001 on the road. It's not a featherweight, but I had no problem lifting it, and as 88-key controllers go, it's reasonably compact (52 × 14 × 5 inches). Its connectors, sliders, and wheels are recessed; its buttons are low-profile; and the case is sturdy and scratch-resistant. As an old road warrior, I heartily approve. Incidentally, the 2001 can be bought with a built-in road case ($2,495).

The front panel is remarkably uncluttered, containing two wheels, three groups of buttons, and four sliders. The unit offers a small, alphanumeric LCD display and a 4-digit LED display, which I'll discuss later. All rear-panel jacks are marked on the edge of the front panel, so you don't have to poke around the rear with a flashlight when wiring. Don't be deceived by the clean front panel, though; there is a lot going on inside.

YOUR OWN DEVICES

Before you can send and receive MIDI data through the Studio 2001's four independent MIDI Ins and four independent MIDI Outs, you must identify the MIDI gadgets that are attached to each port and the MIDI channels to which they are set. To accomplish this,

you define and name a Device for every MIDI channel you wish to address on each port.

Thereafter, when you program a Zone (a key-range assignment and set of controller parameters for a specific Device) or Preset (a complete setup containing multiple Zones and special features, detailed later), you select the named Devices from an onscreen list, automatically instructing the 2001 which ports and MIDI channels to address.

There are three types of Devices: Output, Input, and Auxiliary. Output Devices represent destination units, such as synths, samplers, and signal processors. If you have a 16-part multitimbral sound module (or two daisy-chained, 8-part multitimbral units), you must define sixteen Output Devices on the same MIDI Out port. If you attach modules to all four MIDI Outs, using all sixteen MIDI channels on each port, you must define and name 64 Output Devices.

Input Devices are external controllers attached to the 2001's MIDI In ports.

Fatar packed its 88-key Studio 2001 master keyboard with features, including eight independent Zones; a plethora of programmable controllers; and a sweet, weighted action.

For instance, I defined Input Devices for a strap-on keyboard, an Ensoniq EPS 16 Plus (to access its Poly Aftertouch keyboard), a MIDI fader box, my Rad Pad XYZ controller, and a MIDI interface (for SysEx loads).

If you wish, you can route data from Input Devices through a keyboard Zone, adding the 2001's control and processing functions to the incoming data stream. You can filter or remap external MIDI Control Change messages (continuous controllers and switches), and scale controller depth. This added considerable flexibility to my XYZ pad and would be great for a wind controller. The Init parameter sets a default controller value that is sent when the Preset is called up.

Alternatively, you can use the Zone Bypass feature to route a MIDI Input Device directly to a MIDI Out port on all channels, without processing. This feature is designed for sequencing, when you want the 2001 to serve as a patch bay to route sequencer playback to the sound modules.

Auxiliary Devices are specialized Output Devices to which you send Program Changes, but not MIDI note or Control

Change messages. You can define up to eight Auxiliary Devices, which are independent from the Zones. According to the manual, this category is intended for use with audio effects processors and programmable EQs, and as long as you just need to send Program Changes, Aux Devices serve nicely. However, if you define your effects processors as Auxiliary Devices, you can't use the Studio 2001's controllers for real-time, MIDI continuous control over effects parameters (such as reverb time).

Once you define and name your Devices, you can scroll through the list and see them. Unfortunately, they're listed in the order you created them, not alphabetically; when you accumulate a lot of Devices, it becomes difficult to quickly locate the one you want. Naming is no treat, either. Overall, the Device concept is good, but the implementation needs improvement.

PERFORMANCE PRESETS

At the front panel's right-center are two rows of eight buttons each, marked "Preset/Function" and "Zones," with an LED status indicator for each button. In Performance mode, a pair of left/right cursor keys step between Banks, and the eight Preset/Function buttons select Presets.

A Preset is a complete setup that includes up to eight Zones, switch on/off status, Auxiliary Device Program Changes, and special functions (such as MIDI delay). The 2001 has 64 user Presets, configured as eight Banks of eight Presets, stored in non-volatile (lithium battery-backed) memory. An optional RAM card (not yet available)

Product Summary

PRODUCT:
Fatar Studio 2001 Master Keyboard
PRICE:
$2,275
DISTRIBUTOR:
Music Industries Corp.
99 Tulip Ave.
Floral City Park, NY 11001
tel. (516) 352-4110
fax (516) 352-0754

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ●
DOCUMENTATION	● ● ◖
VALUE	● ● ● ◖

can hold 64 additional Presets.

The Presets are numbered 11 to 18, 21 to 28, and so on up to 88. I'm not crazy about this numbering scheme, but it's usable. However, you need both hands to select a Bank and Preset, which is inconvenient onstage. Once you're in a Bank, though, you can move around its eight Presets with one button-push. Fortunately, the 2001 holds up to 26 user-programmable chains of up to eight Presets each, which you can step through with a footswitch or button.

FIG. 1: The asterisk in the Studio 2001's Zone screen indicates that by hitting the Star button, you can access a hidden screen. In this case, the hidden screen lets you set the key range directly from the keyboard. (Courtesy Fatar/Music Industries Corp.)

The Studio 2001 can also change Presets via MIDI Program Change messages from an external controller, such as a strap-on keyboard. Program Changes 0 to 63 call up Presets 11 through 88 (which is a bit confusing), and numbers 64 through 127 call up Presets from the RAM card. If you wish, a global parameter lets you keep the Preset from changing while the sustain pedal or notes are held; the 2001 changes Presets when you release the notes or pedal.

ZONING REGULATIONS

The front-panel Zone buttons activate and deactivate the eight Zones independently in Edit and Performance modes. Even more convenient, any combination of Zones can be activated and deactivated with a button or footswitch.

In Edit mode, each of the Preset/Function buttons (acting in their Function role) step through three parameter screens to access the vast majority of programming features. Unfortunately, the screen functions are marked in hard-to-read blue on the black front panel.

Most of the commonly used parameters are at the keyboard Zone level. Each Zone addresses a separate Device, with independent settings for Transposition (±60 semitones), Volume, outgoing Program Change, Continuous Controller and switch assignments, and so on.

For each Zone, key Velocity can be scaled, and you can program an offset, which adds a value to the initial Velocity. (Negative scaling means that as key Velocity rises, lower Velocity values are sent to the Output Device.) Four preset Velocity curves are provided: linear (1:1, the default), shelf (in which mid-range key Velocities are output as a constant value), positive exponential, and negative exponential. Other than scaling and adding an offset value, you can't edit the curves, or program your own.

Each Zone can send a Program Change message for its Output Device. The 2001 facilitates this with a Format parameter that lets you match the numbering scheme used by each gadget. You can number outgoing Program Changes starting with 0 or 1; display them in eight banks of eight patches (Program Change 9 is displayed as "21," for Bank 2, Preset 1); or designate them by a letter plus a number from 1 to 8 (A1, A2, A3, etc., as on the Roland JX-3P). Very smart, Fatar.

WISH UPON A STAR

Below the LED are six buttons, including the left/right cursor keys that take you through the Banks of Presets in Performance mode and the Zones in Edit mode. The Edit button simply switches between Edit and Performance modes, and the Store button saves to the Preset location of your choice. If you press Edit and Store simultaneously, they act as a basic Panic button, sending All Notes Off, Reset All Controllers, zero-value Pitch Bend, and zero-value Sustain messages on all sixteen channels. Unfortunately, it does not send individual Note Offs 0 to 127 for instruments that don't understand All Notes Off.

The other two buttons, labeled "*" (Star) and "∂" (Alpha), are multifunction switches. When you want to store a Preset, they act as "no" and "yes" keys to confirm your intent. In some editing screens, an asterisk appears next to one of the parameters, indicating that a hidden extra screen can be accessed with the Star button (see **Fig. 1**). For instance,

you can set Zone key ranges in the Zone screen, using the sliders, but if you hit "*," you go to a screen that lets you set the range from the keyboard.

The Star and Alpha keys can be programmed to send MIDI Control Change messages for each Zone, with depth and initial value settings. They can be used as toggle switches (separate presses for on and off), or as momentary switches (hold/release for on/off), and can default to on or off for each Preset.

The switches, like the sliders, can only send Control Change messages up to CC 95, so you can't set the Star and Alpha keys to send data increment and decrement (Control Change 96 and 97). In addition, I had hoped to send Start, Stop, and Continue messages to my drum machine, but System Real Time messages are not supported. (According to the manufacturer, this will be implemented in the future.)

SPECIAL FUNCTIONS

Fatar has included and augmented the usual bag of MIDI keyboard tricks in the 2001. On the commonplace side, a Key Hold feature creates a sostenuto effect for a Zone, letting you play a chord, sustain it with a pedal, and play an unsustained lead line on top. Some of the Zone-level note functions are more out-of-the-ordinary, though. You can delay data passing through a Zone by up to ten seconds, which is nice. But the feature delays controller data, as well as note data, which carries a much higher coolness factor.

Note messages can be filtered according to several criteria. For example, a Zone can be programmed to just pass even-numbered notes (using MIDI note numbers), or just odd notes. When used with equal-tempered sound sources, this produces whole-tone scales. More unusual is Key Map filtering, which passes any specific combination of notes you choose.

Going the other direction, the Chord feature adds up to three notes for each note you play. The supplemental notes can be transposed up to ±60 semitones. The intervallic relationship between the original and added notes is fixed, however, and is not related to scales or chords. However, you can set up custom harmonic relationships with the Key Map function.

A simple, but useful, feature is a MIDI Activity Monitor that shows if MIDI data

FIG. 2: In the Controls screen and many others, each slider controls the parameter located above it. The LED at right indicates that Preset 24, Zone 1 is being edited; pressing the right-arrow button steps through the other eight Zones in the same screen. (Courtesy Fatar/Music Industries Corp.)

is present at the In and Out ports but does not identify the data type.

WHEEL FUNCTIONS

The pitch wheel and programmable mod wheel lie above the left side of the keyboard, recessed in a small alcove. This somewhat unusual location proved easier to reach than the traditional spot beyond the keyboard's left end. The programmable, spring-loaded Fatar pitch wheel is small, but it feels good; it's neither too stiff, nor too sloppy.

Setting the pitch wheel (Wheel A) Depth had surprising results. At any Depth value except 100%, the 2001 sends Pitch Bend messages that act like an offset. If you set Depth to +50, the root (pre-bend) pitch drops by a semitone, e.g., playing A on the keyboard sends A♭ to the synth. (The change doesn't take effect until you touch the wheel.) But there's no true depth or bend-range control. This implementation rates a thumbs down! As with the other controllers, an Init parameter sets an initial value when you call up the Preset.

After a few weeks, the unit started intermittently sending spontaneous Pitch Bend messages, which dropped the pitch by just over a semitone. Apparently the unit's memory had become corrupted; reinitializing it solved the problem.

USER INTERFACE

The Studio 2001 failed the "idiot test," in which I see how far I can get before requiring the manual. I certainly felt like an idiot for awhile. The biggest problem is the small LCD; with the far superior graphic LCDs on the Peavey C8, Roland A-80, and Akai MX1000, you can see more parameters at once and better understand what you're doing.

The main LCD, located directly above the sliders, is just large enough to show two lines (parameter name and value) of 25 characters each. You can't adjust the contrast, but I had no trouble reading it unless I was well off to the side. All parameter values are displayed in the LCD and set using the sliders. When editing Zone parameters, such as Transpose, the LCD shows separate values for four of the 2001's eight keyboard Zones; the values are adjusted by the sliders below. The left/right cursor keys take you to the next screen, where you can set values for the other four Zones.

The Preset/Zone LED has two sections. The left side shows the current Preset number. In Edit mode, the right side of the LED display also becomes active. Usually, if you are editing Zone-level parameters (e.g., wheel, pedal, and slider assignments), the display shows which keyboard Zone(s) you are editing (see Fig. 2). This is tremendously useful; using the left/right cursor keys, you can step between Zones to adjust the same parameter for each Zone.

All parameter values, as well as letters and symbols for naming Presets and Devices, are chosen with the four sliders. There are more possibilities than you can access in a single slider throw, so when you reach the end of its travel and start pulling back, the slider continues to scroll through the next set of symbols. Sliders are fine for coarse adjustments, but Fatar's implementation is imprecise and tedious. The product absolutely begs for up/down increment keys that step and scroll through values.

In addition, the sliders are highly unstable; the current value sometimes changes spontaneously, even when you're not touching the 2001. This is a persistent pain, unless you consider sloppy sliders a new approach to random patch-generation. The manufacturer assures me this should be fixed by the time you read this, and upgrades will be available. In Performance mode, the sliders can be programmed to send all the standard MIDI Control Change messages up to CC 95.

▼

I wouldn't hesitate to take the Studio 2001 on the road.

Many of the parameters are easy to locate once you've used the 2001 for awhile, but some parameters that I'd like to view simultaneously are spread among several screens. Given the small display, somewhat scattered parameters, and the need to preprogram Input and Output Devices before getting a byte of output, you'll need to rely on the manual a lot.

On the other hand, Fatar has supplied several nice touches to help out. It's a simple matter to copy all parameters between Zones or Presets. A Memory Used screen shows how much of the 2001's memory has been filled (in percentage). You can easily erase the current preset, reinitialize the memory, and load and save the entire memory to a RAM card or via SysEx.

The manual is mediocre. The basic information is there, but the explanations lack detail, and it has no MIDI implementation chart. Still, I've seen a lot worse.

CONCLUSIONS

The Studio 2001's hardware is of high quality. I have expressed a few reservations about the software, but it is still good stuff and can be updated in the future. In fact, a Special screen is provided for future expansion.

The Fatar keyboard is priced in the same ballpark with comparable 88-key weighted master keyboards: a few hundred bucks more than the C8, much less than the overpriced Roland A-80, and about the same as Cheetah's new MS7000. It boasts a truckload of MIDI features; provides a smooth keyboard action; and offers a nice selection of fully programmable sliders, buttons, wheels, and pedal and switch jacks.

The unit's biggest drawback is the user interface. If you operate a facility in which lots of new gear is coming and going, you might find the small display makes programming somewhat cumbersome. Of course, if you have a high-end sequencer and a powerful MIDI patch bay/processor, you probably don't need this much MIDI power. A Fatar Studio 90 will save you a cool grand and might serve your purpose. Alternatively, for a few hundred bucks more, an Ensoniq KS-32 provides a similar-feeling, 76-key, Fatar action and a synth "workstation."

On the other hand, if you use a basic sequencer and your studio lacks a MIDI patch bay/processor, or just has a basic patcher without a ton of processing, you can probably put the Fatar's MIDI muscle to good use. This is especially true if you're the kind who likes bells and whistles such as MIDI delay, note filtering, and MIDI chords. There are just a few missing pieces, such as Aftertouch curves and programmable Velocity curves.

For live performers, the Studio 2001 is a good choice. It lacks SysEx storage for external devices and the ability to send Start/Stop/Continue messages, but the latter issue should be resolved soon. Once the sliders are debugged, their ability to access eight functions at once will be quite useful. And you'll really enjoy the unit's action and flexibility. If you're on the road with a moderately sophisticated MIDI rig, this baby could act as MIDI patch bay, processor, and reliable partner.

This last point—reliability—should not be underestimated. Fatar built this thing to take the kind of punishment that would waste many of its competitors' products. Regardless of price, if your gear has no staying power, it's like the song says: "Your cash ain't nothin' but trash."

EM *products editor* **Steve O***'s cash ain't nothin' but gone.*

KRK 7000 Close Field Monitors

By Larry "the O" Oppenheimer

Excellent imaging and smooth response for a moderate price.

In my opinion, speakers and microphones are the most critical components of a recording studio. Why? Because they are the only devices that deal with *sound.*

Mixers, digital recorders, reverbs—all that stuff does nothing more than chase electrons (or bits) to and fro. Speakers and microphones deal with moving air. It is odd that this distinction is missed by so many recordists, while many audiophiles insist that half the budget for a basic audio system be allocated to speakers.

KRK's model 7000 close-field monitor has a 7-inch woofer and a 1.5-inch, inverted-dome tweeter. A larger model, the 9000, also is available.

So it's interesting—as professional engineers and producers have relied more and more on small, close-field monitors—that Yamaha's inexpensive NS-10M speakers are practically a worldwide standard. To my ears, however, these speakers are not even close to accurate. The only reason I can see that everyone has them is that everyone has them, making the NS-10M a consistent reference between studios. Personally, I'd gladly spend the bucks to acquire a pair of portable, close-field monitors with more trustworthy specifications.

This brings us to the KRK 7000 close-field monitors. Taking up less than a cubic foot of space and weighing in at

30 pounds, the 7000s can fit in restricted spaces and are light enough to be lugged around to other studios. Pricewise, the $1,095/pair tag makes them about twice as expensive as NS-10Ms, but a fraction of what upscale models (from manufacturers such as Genelec and Meyer Sound) cost. The larger KRK 9000s come in at $1,900/pair.

For your eleven hundred bucks, you get a vented cabinet made of high-density fiberboard and a 2-way driver system consisting of a 7-inch, Kevlar woofer and a 1.5-inch, Kevlar, inverted-dome tweeter. (Kevlar is a synthetic material that, according to KRK, provides an optimal ratio of strength to weight.) The drivers are crossed over at 3 kHz, and 14-gauge wire is used throughout to prevent conductor-related, low-frequency loss. The rated frequency response is 50 Hz to 15 kHz (±3 dB), with a sensitivity of 91 dB (1W/1 meter).

WHAT MEETS THE EARS

I listened to the 7000s while mixing projects for two bands; auditioning a wide variety of familiar recordings (rock, classical, jazz, electronic music, and spoken word); and playing several synthesizers. The first thing I noticed about the 7000s was their excellent imaging. Positioning in the stereo field was easily pinpointed for sources that were mixed "normally," and those that I deliberately diffused to smear placement were satisfyingly spread across the panorama. I sometimes pan-modulated delays of a signal to "animate" it (give it some motion), and the 7000s clearly reproduced the movement almost as noticeably as headphones.

Product Summary

PRODUCT:
Model 7000 close-field monitors

PRICE:
$1,095

MANUFACTURER:
KRK Monitoring Systems
16462 Gothard St., Unit D
Huntington Beach, CA 92647
tel. (714) 841-1600
fax (714) 375-6496

EM METERS	RATING PRODUCTS FROM 1 TO 5
SOUND QUALITY	● ● ● ●
VALUE	● ● ● ●

• KRK 7000

The 7000's maximum power-handling is 150 watts, but with 30 watts going into each side, things were as cranked up as I would ever want in a close-field environment. I relied strictly upon my ears to test frequency response, as clinical bench-testing was not an available review option. The low end rolls off substantially (a common trait of smaller speakers), but it seemed very smooth down to 70 or 80 Hz. Drums and synthesizers were reproduced with plenty of kick, but I would consider using a subwoofer if you really need that bottom octave. I also detected a bit of unevenness in the midrange, a peak in the low mids, and a dip in the high mids. None of these tonal characteristics were severe enough to complicate my mixing or listening.

▼

The first thing I noticed was the 7000's excellent imaging.

As for the high end, the response seemed even all the way up. (Being a drummer, I often use cymbals to judge a speaker's high-frequency capabilities.) My only real complaint with the 7000s is one that is common to most speakers in this price range: The high frequencies lacked the smoothness and clarity found in premium monitors such as Meyer HD-1s. Of course, premium monitors command premium prices. (The HD-1s cost almost four times as much as the 7000s.)

Interestingly, of the sources I auditioned, the 7000s reproduced acoustic guitars with stunning results. Listening to Alex de Grassi, Pat Metheny, and Egberto Gismonti (not together, I'm sorry to say) was truly thrilling.

Yes, I heard some imperfections in these speakers. But for the price, the KRK 7000 speaker system is an excellent choice for any close-field monitoring environment, including remote recording and small editing suites, as well as home, project, and professional studios.

Larry the O *performs with Stone Fiddle and Amazon Queen and is an engineer, producer, and consultant.*

Steinberg Cubase Score 1.0 (Mac)

By Bob O'Donnell

This sequencing powerhouse adds notation printing to the equation.

In case you hadn't noticed, sequencing programs have undergone a major metamorphosis over the last few years. Feature lists have exploded at the seams, showering musicians with an overwhelming cornucopia of capabilities. Menu choices are growing longer and more complete, with powerful new editing and convenience features that help turn any miserable collection of MIDI messages into a dazzling spectacle of sonic showmanship.

The inevitable tradeoff for all this power has fallen at the feet of the increasingly ponderous user interface. These days, using sequencer software isn't all that easy. Ironically, just as some sequencer users began feeling burdened by the overpowering developments in technology, manufacturers started incorporating another bit of techno-wizardry: music notation.

Notation is unquestionably the hottest new trend in sequencing software. Developers on all platforms are working to incorporate various notation capabilities into their sequencing applications (with varying degrees of success). In some cases, notation is used to display the sequenced data for editing in a form that is familiar to many musicians. In other cases, the notation can be printed to create lead sheets, scores, and parts for musicians to play.

German software stalwart Steinberg has addressed the notation question in several different ways. First, they incorporated notation editing into their popular *Cubase* sequencing program for the Atari ST and TT, Mac, and *Windows*-equipped PCs. Then, they added page layout and printing capabilities to the package and christened it *Cubase Score*. For the purposes of this review, I looked at the Mac version of *Cubase Score*, but versions for *Windows* and the Atari offer identical features. Version 1.1 of *Cubase Audio* for the Mac also includes all the *Score* functions.

OVERVIEW

Cubase Score has all the features of regular *Cubase*, including some nifty quantization options and powerful editing features. (See the review of *Cubase Audio* in the December 1992 **EM** for more on the sequencing features of all the *Cubase* siblings.) Unfortunately, it also continues to use dongle-based copy protection, which caused problems with my Mouse Systems' optical Little Mouse. The only differences between *Cubase Score* and the other versions of the program include one new menu, a few new options in an existing menu, and a 36-page addendum to the manual. But don't let these numbers fool you; there are a lot of features lurking within the additions.

Because of its lineage, *Cubase Score* is first and foremost a sequencer. The scoring capabilities of the program convert MIDI sequences into good-looking notation, but the program is not intended to compete with *Finale* and other dedicated notation programs.

The notation-editing capabilities and interface of *Cubase*'s Score Editor have been enhanced with the addition of a Page Mode for layout and a Symbol Palette for adding symbols to the score (see **Fig. 1**). The program offers a logical extension to the basic sequencing metaphor. Sequences are created in the normal manner. When you're ready to generate printed notation, simply enter the Score Edit mode, add the appropriate symbols, adjust the layout, and print. Compare this process to the more common approach: quantize the life out of your work, save it as a Standard MIDI File (SMF), and import it into a separate notation program, where the score is edited, formatted, and printed.

Cubase Score maintains the feel and timing of sequenced MIDI data while displaying the music as legible notation. The program achieves this by only quantizing the display in the notation mode. For example, if you recorded eighth notes with a slight swing feel, you can quantize the display to appear as a series of eighth notes rather than the dotted-eighth-plus-sixteenth, or quarter-eighth triplet figure indicated by the notes' absolute timing. This feature also avoids the spurious 32nd- and 64th-note rests and other anomalies that often occur with unquantized sequence data. In addition, a display-only transposition function lets you create parts for instruments that are not written in concert pitch.

HOW IT WORKS

To enter notes into *Cubase Score*, record a sequence in real time or step time, highlight the tracks you want to notate, and enter the Score Editor. Each track appears in its own staff, although you can put any track in a piano grand-staff with a user-definable split point. You can also manually enter note symbols with the mouse, but this is tedious and intended primarily for editing.

A different clef and key signature is possible for each staff. The sequence's Master Track determines the time signatures throughout the piece. Track names can be associated with staves, and you can turn off the clef for all systems after the first one, which is handy if you're creating lead sheets or jazz charts.

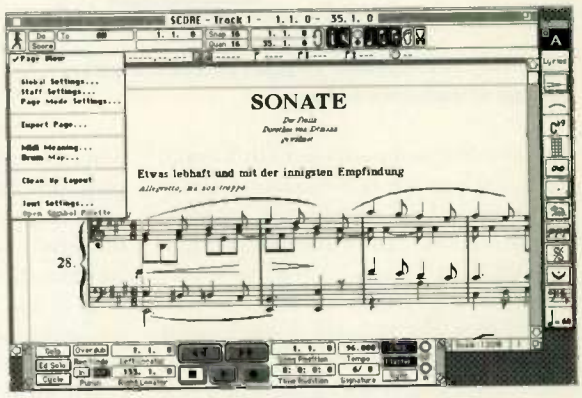

FIG. 1: The main screen of *Cubase Score*, showing the Score menu and Symbol palette.

You can edit up to sixteen staves at once (fifteen in *Cubase Audio*), which is fine for smaller ensembles, but prohibitive for large orchestral scores. To create individual parts, simply highlight one track in the Sequencer mode and enter the Score Edit mode. Unlike other programs that offer part extraction, however, titles and other info that should appear on all parts must be entered separately for each one.

Generally, all notes on a staff act as a single voice; notes in a chord share the

same rhythmic value. If notes of different duration appear at the same time in the same staff, they are all notated in terms of the shortest rhythmic value. For example, if a half note and quarter note start on the same beat, the half note appears as two tied quarter notes. This does not pose a problem for block chords, but many piano and guitar parts include notes of different duration on the same beat.

This difficulty can be overcome with the Polyphonic Voices feature, which allows two separate voices in a single staff and four separate voices in a grand staff. Each voice is notated independently with their stems set to a particular direction. This works well on guitar and piano parts, as well as 4-part choral arrangements. However, you're out of luck if you have a single-staff part with more than two independent voices, or a grand-staff part with more than four.

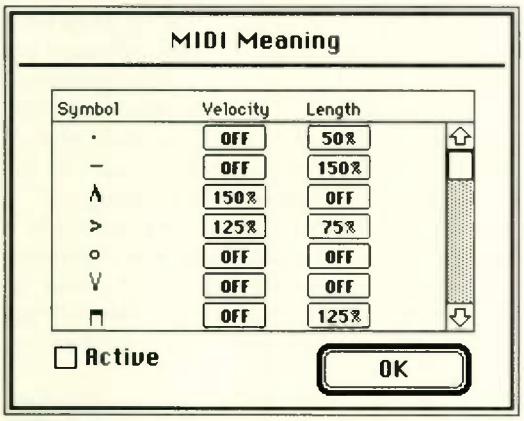

FIG. 2: You can assign MIDI playback parameters to many common articulation markings.

Each note in a staff is assigned to an independent voice according to its MIDI channel. For example, all notes on MIDI channel 1 are assigned to voice 1, etc. If a note's MIDI channel does not correspond to one of the voices, it doesn't show up in the staff at all if Polyphonic Voices is enabled. This is confusing if you're not careful.

The program also handles syncopation in an unorthodox manner. The default syncopation setting sometimes results in notationally incorrect music (such as dotted quarter notes that fall on the second half of a beat). Fortunately, you can shut this option off.

To its credit, the program supports 1-line drum staves with a percussion clef and nine optional noteheads. You can also use the slash heads—one of the nine choices—to create comping guitar parts. Another advanced feature is the ability to "explode" a group of notes on a single staff into several single-note staves. This is a big time-saver if you want to convert a piano part into, say, four individual string parts.

OTHER STUFF

Once you've entered the notes, it's time to insert symbols, lyrics, and other text. *Cubase Score* includes a decent selection of common musical symbols, but you may not find everything you need. Missing symbols include glissandos, complex articulations, and repeat-measure markings, among others. There is no way to create your own symbols.

Many of the articulations can be associated with MIDI messages that affect the score's playback (see Fig. 2). For example, any notes with staccato marks can have their length reduced by 50 percent. These adjustments are somewhat limited; you can affect a note's duration or Velocity value from 25 to 200 percent in increments of 25 percent. Nevertheless, this feature adds a great deal of musicality to the program's MIDI playback.

Placing symbols on the notes is a bit tedious because each one must be added individually. For example, if you want to add accents to a series of notes, you must individually place and adjust the spacing of each symbol.

The program also supports chord symbols and user-definable guitar-fretboard symbols. Unfortunately, the chord selection is limited (no direct support for major chords with added 9, augmented chords, dominant 7 with suspended 4, etc.), and you can't create your own. In addition, you must use the sometimes-confusing Chord font supplied with the program. For example, this font makes it unclear whether C♭9 indicates a C major triad with a flat 9 or a C♭ dominant 7 with 9.

On the other hand, the ability to define your own guitar-chord symbols is a capability many more-expensive notation programs lack. However, there are no preset guitar-chord symbols, and you can't save your own symbols in a library; they must be manually entered into each new piece.

One cool feature is called Make Chords. This function looks at the music in all staves, determines the implied chords, and puts the appropriate chord symbols into the score. Despite this musical intelligence, however, I was surprised that the chords it places (and any you place manually) are simply text elements that do not transpose or play over MIDI. I was also disappointed to find that repeat marks do not affect MIDI playback.

Text can be placed anywhere in the score, and you have complete control over the font and size of each text block. Lyric entry works fairly well, but there's no direct support for syllables that extend over multiple notes; you must add your own dashes under the notes to be sung on that syllable. I also had difficulty moving lyrics into the proper position beneath the staff.

EDITING

Editing in *Cubase Score* is generally straightforward click-and-drag, but selecting the proper onscreen tool can be confusing; sometimes the black-arrow pointer is used and other times it's the white-arrow layout tool. Because of the difficulties with multiple voices on a staff, the result of your edits isn't always what you expect.

However, you will soon learn to

Product Summary

PRODUCT:
Cubase Score 1.0 sequencing/notation software
PRICE:
$695 Mac or Atari; $549 *Windows*
SYSTEM REQUIREMENTS:
Mac Plus or higher, 2 MB RAM, System 6.0.7 or later (System 7-compatible), hard disk
MANUFACTURER:
Steinberg/Jones
17700 Raymer St., Suite 1001
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tel. (818) 993-4091
fax (818) 701-7452

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ◖
EASE OF USE	● ● ◖
DOCUMENTATION	● ● ●
VALUE	● ● ◖

expect the program's frequent but slow screen updates. Every time you make any change, *Cubase Score* redraws the entire screen, which quickly becomes annoying. In addition, any layout changes made in Page Mode are not undo-able, while everything else in the program is.

On the other hand, *Cubase Score* has comprehensive spacing functions. Staff- and measure-spacing are fixed in the Edit mode, but they can be freely adjusted in the Page Mode. You can set the number of measures per staff and the width of individual measures, which comes in handy after entering lyrics (the program doesn't automatically adjust the note-spacing for them). You can also turn off the default proportional spacing algorithm and switch to equal spacing, in which four sixteenth notes take the same space as one quarter note.

Another neat feature is the ability to hide certain elements. If you need to create some non-standard music notation such as a cadenza with no bar lines, or a few short examples without the time and key signatures, this feature can be a real lifesaver. The program also exports individual score pages as EPS files for use in page-layout and graphics programs.

Cubase Score comes with its own PostScript and TrueType music and chord fonts. It also supports high-quality printing on PostScript laser printers and QuickDraw printers such as the popular HP DeskWriter. I had no problems printing on a LaserWriter, but most of the pages I printed on my DeskWriter using the DeskWriter 3.1 driver were missing at least part of a staff line somewhere on the page.

WHO'S IT FOR?

Clearly, *Cubase Score* is a sequencer user's tool; it's not meant for notation buffs. You won't find cross-staff beaming, complex tuplets, mixed meters, or any of the other advanced functions that copyists demand. However, it has very powerful sequencing and editing capabilities.

Taken as a whole, *Cubase Score*'s notation features are a mixed bag. The program clearly has more oomph than the notation features added to MOTU's *Performer*, but it doesn't have quite as much notational bang-for-the-buck as Coda's *MusicProse*. *Cubase Score* includes many features, and the limitations can usually be worked around, but it may not be easy to get the results you want. Particularly frustrating is the difficulty entering and editing music with independent voices.

On the other hand, if you're a sequencer user who just wants a good-looking printout of relatively simple music, the convenience of integrated notation capabilities cannot be overlooked. There's nothing quite like recording a sequence, going into Score Edit, making a few tweaks, and hitting Command-P.

Ultimately, it boils down to your notation expectations and how you like to work. For the right user, *Cubase Score* is a well-focused package.

Bob O'Donnell, *the editor of* **EM,** *is a notation software junkie and the proud new father of Ryan Gregory O'Donnell.*

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PRO FILE

Punk Grows Up

The Skatenigs bring punk production into the '90s.

By Daniel Levitin

I have to admit it, I am a fan of production. Give me drums that sound as if they're at the back of an indoor coliseum, an electric guitar submerged in an empty 300-gallon oil drum, and a vocalist who sounds as if he or she is right in the room with me.

I also like the energy of punk rock and even engineered my share of punk albums in its heyday. But punk has always suffered from poor recordings for reasons philosophical and pragmatic: low budgets and poor equipment. Production was a matter of getting all the instruments recorded as quickly as possible before someone's amp blew a tube.

With *Stupid People Shouldn't Breed*, Austin's Skatenigs have crossed over into Major League Production. The Skatenigs bring to their latest release the high-end production tools we don't usually associate with punk rock: blistering, doubled guitars; large, gated drums; lots of samples; and heavily EQ'd and chorused vocals, all with varying ambient spaces and delays. In short, the album has *polish*.

"We used an SSL-E Series console," says lead vocalist Phildo Owen, "and Studer 24-track analog and Mitsubishi 32-track digital recorders. We wanted to explore studio technology as much as we could."

However, the Skatenigs had to do their technical explorations on a limited recording budget of $20,000. By necessity, the band came to terms with saving time in the studio. Owen explains, "When we write a song, we'll lay kick and snare on the computer and record the groove along with some samples. Then we'll lay the rest of the drums live. If we could track drums by miking as fast as we could by sequencing, we probably would, because it would be more fun. But the reality is that it's faster with the computers."

"We bring all the sampling gear to gigs," Phildo continues. "Our outboard rack has Aphex gates, dbx compressors, TC Electronic parametric EQs, White graphic EQs, an Eventide 2000SE, and some Yamaha SPX900s."

Isn't there a stigma in using "sissy-woosie electronic stuff" at a punk show? Owen concedes that, initally, he did harbor some reservations. "I wondered about bringing this stuff out until we did the Fear tour. We got thrown in front of some of the most hardcore punk-rock kids there are. But we discovered that if you're hittin' them hard and have the songs to back yourself up, they don't care. And anyway, when you have an album that is so sonically in-your-face, you can't deny the production that got you there."

Unlike the skate and thrash bands of a decade ago, who took pride in using the worst equipment, the Skatenigs believe in using the right equipment and ensuring it is functioning optimally. "With the guitars, we make sure all our amps are in top-notch shape before we go in the studio; that's just common sense. As far as production goes," Owen advises, "we stick with the Cadillacs and leave the Pintos alone."

As the lyrics in their opening song, "Chemical Imbalance," states, "Immaturity may be the result of certain chemical imbalances." The Skatenigs have achieved a sonic, chemical balance without sacrificing power, passion, or vision. Could it be punk has grown up?

Daniel Levitin *is a researcher in cognitive science at the University of Oregon.*

The Skatenigs

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