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Electronic MUSICIAN

OCTOBER 1986

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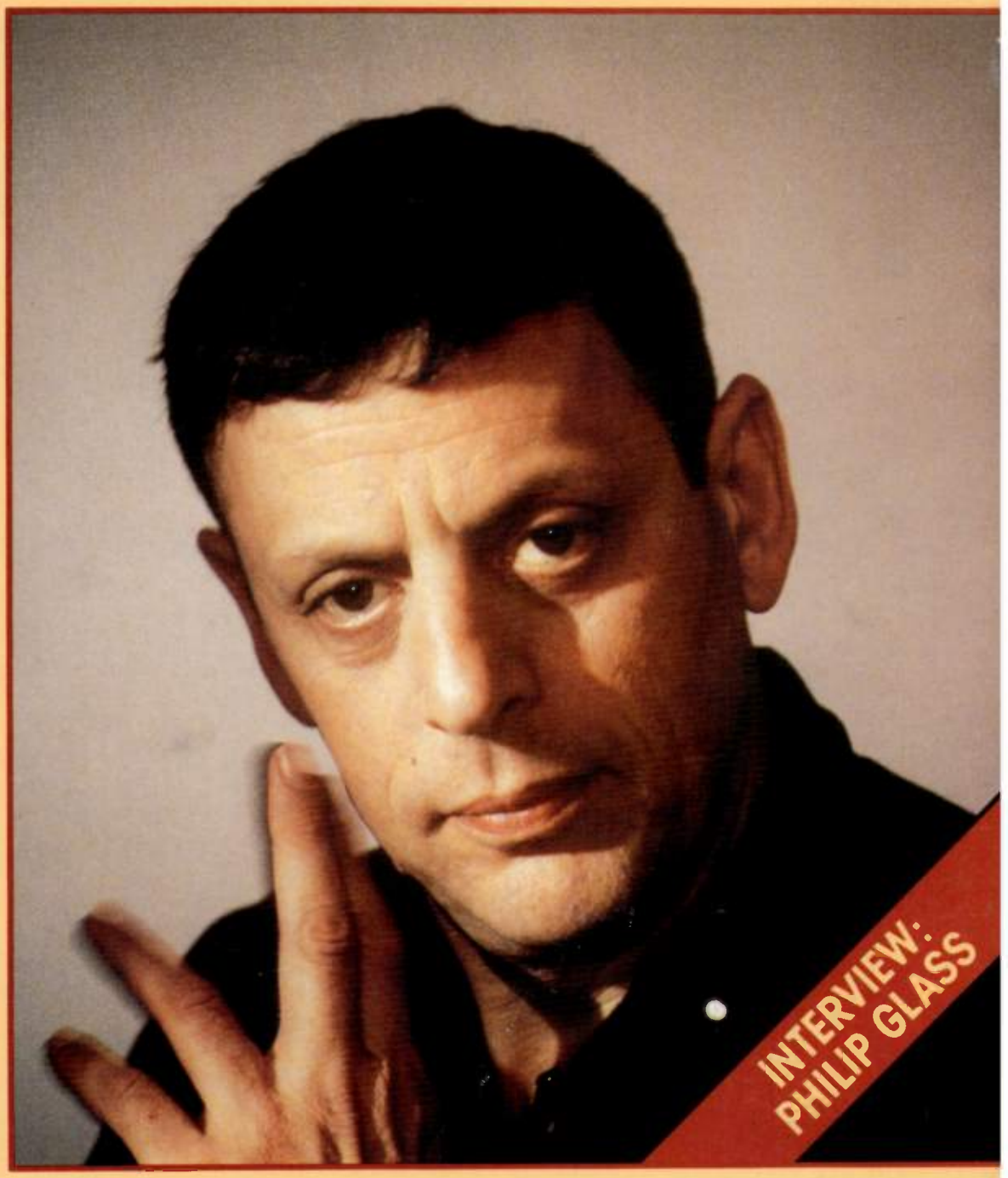

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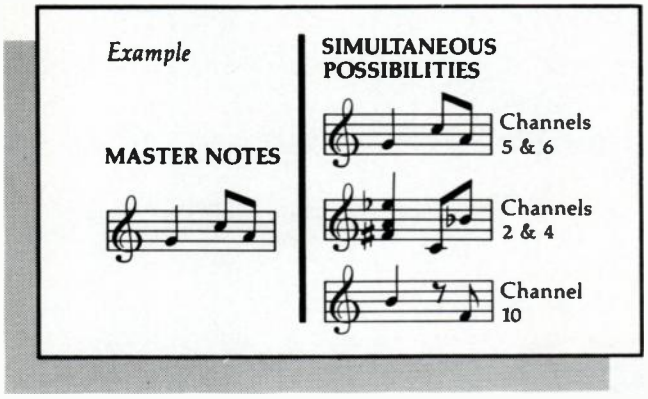
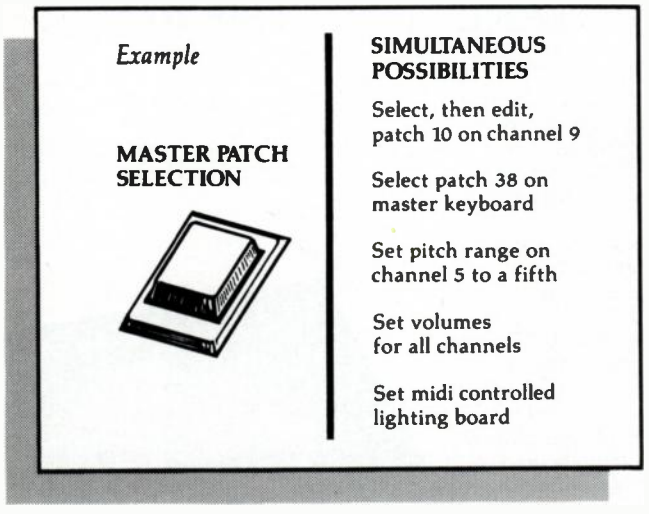


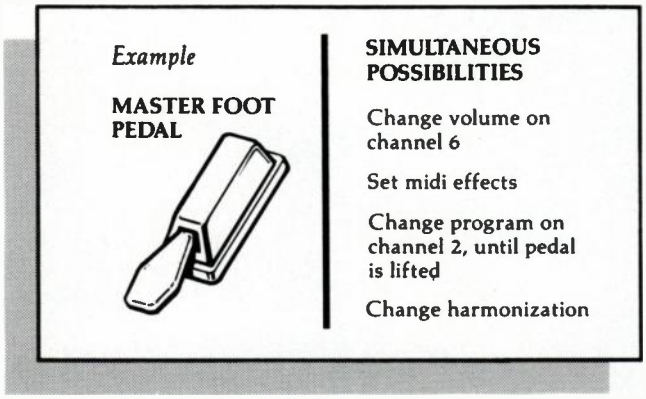
Performance Setup

The Mapper can send any midi messages on any channel at your command. That includes patch changes, control presets, and exclusive commands.



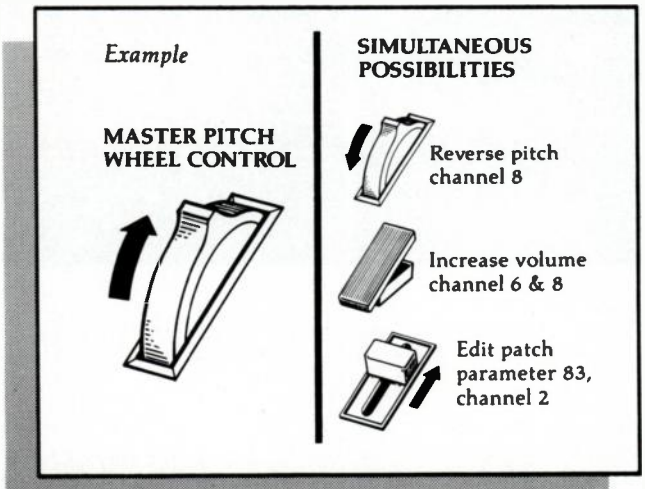
Switch Redefinition

Midi switches, such as the sustain pedal, can be assigned to any selected channels, or redefined to be any midi message. Notes can be used as switches.



Cross Modulation

A master control (mod wheel, pitch wheel, after touch, breath, foot modulator...) can affect each of its several slave controls in dozens of ways. Master controls can also be used to change exclusive parameters.



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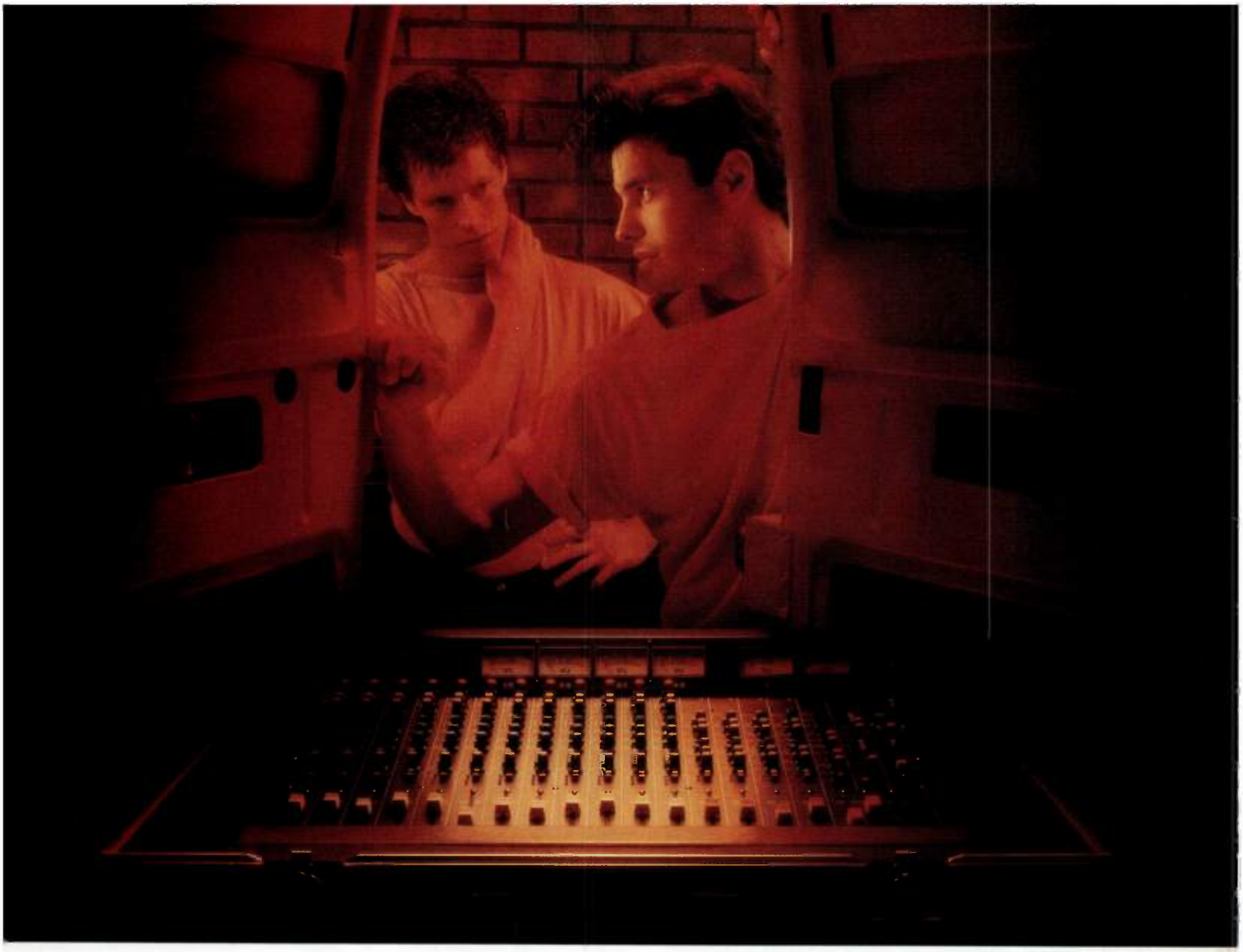

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VOL. 2, NO. 10 OCTOBER 1986

Electronic MUSICIAN

A MIX PUBLICATION

DEPARTMENTS

COVER

The highly original music of Philip Glass has been heard in operas, on stage, and in films; now, with his album *Songs from Liquid Days* hitting the pop charts, you can even hear his music on the radio. And don't be surprised if you hear lots of samplers and synthesizers—they, as well as traditional acoustic instruments, are part of the unique Philip Glass sound. Photo by Chris Callis.

Electronic Musician is published at 2608 Ninth Street, Berkeley, CA 94710 and is © 1986 by Mix Publications, Inc. This is Volume Two, Number Ten, October 1986. ***Electronic Musician*** (ISSN: 0884-4720) is published monthly. Second Class postage paid at Berkeley, CA and additional mailing offices.

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ARTICLES

APPLICATIONS AND BASICS

INTERVIEWS AND OPINIONS

RECORDING

COMPUTERS AND SOFTWARE

CIRCUITS AND MODS

REVIEWS

Editor's Note

During my seminars, attendees often ask what is the "best" synthesizer, or the "best" computer, or the "best" guitar, or the "best" sequencer software. I always hate to disappoint people, but in this case, it's just not possible to give an answer. "Best," like beauty, is usually in the eye of the beholder.

The problem (as well as the charm) of humanity is that we're all different. Some of us are more into composition, some more into chops. The "best" amplifier for a heavy metal guitarist is probably not the "best" amplifier for an electronic percussionist. Different people have different needs; a music teacher might require a program that can print out high-resolution sheet music in traditional notation, while a person who scores films might not care a bit about music printing but demand a sequencer with SMPTE synchronization to sync images and music.

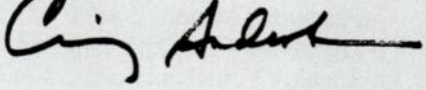
So don't spend your time looking for the best—you'll never find it. Instead, concentrate your search towards finding what's best for your needs. The best way to do this is to define those needs as precisely as possible. The clearer your idea of what you want, the easier it is to find something that fulfills your desires.

If you don't know what you want, or don't know what types of features are available, then it's time for some research. Go to your local music stores and compare devices. Read reviews in **EM** and related publications. Talk to people who are further along the learning curve than you. Eventually, you'll find out about the factors and options involved in a particular decision-making process.

Sometimes these options may not be ideal. For example, you can't expect a vehicle to both haul your band around *and* be fun to drive on back roads; you need different vehicles for different needs, and a sports car won't substitute for a van (or vice-versa). Computers are often the same way—you may need one for business, and a separate one for music or high-quality graphics. Or how about synthesizers? These days, many keyboard players feel they need a digital, analog, and sampling machine, because each creates sounds the others can't. In an imperfect world, nothing can be everything to everybody.

Then there's the matter of personal taste and quirks. You might like a modulation wheel; I might like a lever. As with preferences in, say, hair color, we don't always have rational reasons for liking something. This particularly applies to instruments such as guitar, where "feel" and "sound" are the ultimate determining factors of what makes an instrument desirable...and interpretations of those two terms are about as subjective as you can get.

Is there truly a best? Not that I've ever found. The reality is that magazine reviews, other people's opinions, ads, brochures, and so on can only provide data; the decision-making process isn't complete until you draw your own conclusions.



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Calling All Parts

I saw the letter in EM concerning the PC900 opto-isolator and its limited availability; I use and suggest a 4N37 or TIL111 as a substitute. These two parts are almost identical and more than fast enough for MIDI. If a high-speed part is desired, the 6N136 has a response time capable of passing 64 character line video information and can handle MIDI data with no problem. At one time, Radio Shack offered the TIL111 (RS 276-132) opto-coupler but it has been removed from their catalog. Still, I continue to see it in a few stores. Incidentally, my company carries the 4N37, TIL111, 6N136 and the PC 900; please send S.A.S.E. for current price and availability.

Jack Orman
Armada Sound Lab
Box 858
Southaven, MS 38671
tel. 901/396-6758

Digital in Our Lifetime?

What might be around in multi-track digital recorders (as opposed to sequencers), and would they be financially practical for us non-major labels?

Randy Leipnik
Detroit, MI

Randy—Multi-track digital recorders are, at present, very expensive and certainly beyond the reach of the small studio. However, if the past is any lesson, costs will decline at a fairly rapid clip. Eventually, several companies will probably figure out how to bring the cost of digital multi-track technology down to consumer levels—but it's hard to say when.

Ideas Are for Sharing

I almost had a heart attack when I saw "Build Your Own MIDI Program Change Footswitch" by Tim Dowty (EM, June 1986) as the circuitry was very similar to "The Switch," a programmable effects switcher made by my company, and recently adapted to send MIDI program change commands (inspired by Tim Dowty's "Small Tock" article). However, after receiving CPR and recovering somewhat, I realized that the number of readers able to build such a complex circuit wouldn't greatly diminish the market, and I noticed that Tim's modification was simpler (and hence, better) than mine. For the benefit of those readers who won't be "rolling their own," MIDI Program Change is available ready-made from Hi-Tech Musical Services (14850 Calvert, Van Nuys, CA 91411; tel. 818/785-6461).

Despite my initial shock, I would like to thank Tim Dowty for his excellent articles, and EM for presenting them. There are few enough technically competent people, and "build it" articles formed a large part of my own electronic education.

Tim Caswell
Van Nuys, CA

MIDIPrint Revisited

I'm now offering a more advanced version of my C-64 MIDIPrint program (published in the September, 1986 issue of EM) on diskette for $15 plus $2 postage and handling; it provides for a bigger data buffer, printer option and selectable filtering.

Jim Johnson
1970 N. Hartford #17
Chandler, AZ 85224

MPS EGAds!

First off, let me say that the July '86 issue was one of the best yet! Your publication continues to provide the kind of in-depth articles that today's MIDI musicians desperately need.

In Allan Tamm's article "IBM PC Display Systems for Musicians," page 56, he is incorrect in stating that MPS is not compatible with the EGA card. I don't know what version of MPS he used, but the current version, 1.03, works perfectly on the EGA card using its CGA emulation mode. He was unable to get the STB EGA Plus adapter to work, but doesn't say what actually appeared on the screen. Some EGA cards, upon booting MPS, display what appears to be a blank or "white" screen. This "whiteout" effect occurs when MPS's default colors on a CGA card, white on black, display white characters on a white background on an EGA card! There is an easy fix to this situation: Boot MPS. Type (COLOR) function key F8 (don't worry if you can't see anything on the screen), then type a number 0 and hit Return. This will set the screen to black on white. You can experiment with all 16 available colors (try using a #1 for blue on white) to find a combination that suits you best.

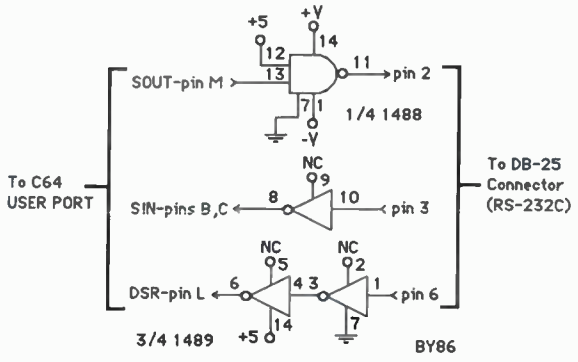
I hope you can print this soon to clear up any confusion caused by an otherwise superb article.

Lawrence E. Ullman
RolandCorp U.S.
Los Angeles, CA

Commodore RS-232 Revisited

Thomas Henry's article on the Commodore 64's RS-232 port (July '86 EM) was interesting and should be useful to readers, but I'd like to clarify some things. The C-64 User Port was not really intended to be an RS-232 interface. The inclusion of a free parallel port for user applications dates back to the original PET 2001 computer, which Commodore introduced in 1978. Back then most of the people buying computers were hackers who liked to hang additional hardware on their computers. With the introduction of the VIC-20, a new wrinkle was added in the form of a built-in software driver which simulated the operation of a hardware serial port using the lines of the *parallel* User Port. In fact, the software simulates a Motorola 6850 ACIA, the same part used in most MIDI/computer interfaces (however, don't get excited—the simulator can't run any faster than 2400 Baud). The primary purpose was for connecting a low-cost modem to the User Port, rather than attaching standard serial peripherals (the VIC implemented its own serial peripheral bus). One design criterion of the C-64 was to maintain peripheral compatibility with the VIC, so the same software driver and port were included.

Commodore and a number of other manufacturers have offered an RS-232



RS-232 Interface for Commodore 64

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Features:

- 40 kHz Sampling Rate
- 32 Sample Points
- 12-Bit Resolution
- 8 Individual Audio Outputs Plus Left, Right, and Mix
- 12 Seconds of Sampling Time at Full Bandwidth
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- 3.5" Disk Drive
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SL505	Orchestra
SL506	Strings 1
SL507	Brass
SL508	Harp Gliss, Cello Viola, Pan Pipes
SL509	Pizz Strings, Eastern, Kalimba, Piza Strings
SL510	The Island—Steel Drum, Shaker, Island Bell, Bass Marimba
SL511	Bell JVT, Strings, String Bell 1, String Bell 2
SL512	Guitars, Fuzz Guitar 4, 4-in-1 Guitar, Fuzz Guitar 1, Fuzz Guitar 2
SL513	EFX1 Baby, Lotus, Zipper, Can, Gong, Glass

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There's no telling what a drummer might do with a Mirage ...

If you're a keyboard player, don't ever let a drummer borrow your Mirage . . . you might never get it back. If you're a drummer, ask a keyboard playing friend to lend you his Mirage . . . "for a while." In either case, if you're into percussion, there's a score of good reasons to get your hands on a Mirage.

The buzz on the buzzword

"Sampled Percussion" is a pretty catchy buzzword. Some high-end electronic percussion systems offer sampling as a creative option. Others offer a selection of sampled sounds on ROM's that plug into the system.

The Mirage can sample any sound in the percussion family — or any other family, for that matter. There's also a wide range of percussion sounds on 3.5" diskettes in the Ensoniq Sound Library, from acoustic and electronic drums to kalimba and Fu Yin gong.

The Ensoniq Percussion Library

Sound Disk	Sound
4	Acoustic Drums, Electronic Drums, Orchestral Percussion
10	Tabla & Bayan Drums
11	Rack Bell, Kalimba, Wind Gong, Slit Drum
14	Cup Gongs, Che Cymbal, Crotales Orchestral Bells
16	Latin Percussion
18	Fu Yin Gong, Opera Gong
20	Ambient Drums

MIDI makes the magic

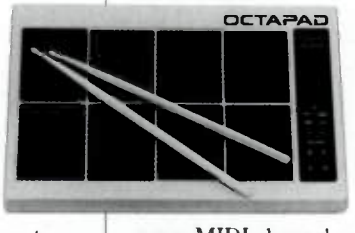
Now that we've gotten all these great percussion sounds into a Mirage, how do we get them out? Naturally, all the sounds can be played in real time from the keyboard. Since the Mirage can hold up to 16 samples, you can play a full drum set or complete percussion at any one time.

You can use the on-board sequencer to build up patterns, or use an external MIDI sequencer to create and edit complete songs. Just play the part on the keyboard or, if your sequencer has step editing, write the appropriate MIDI note number on the right beat and lock in a solid groove.

How to become an Octaman

Most drummers will argue that playing percussion is no fun unless you get to hit something. We agree. MIDI features that can put you in touch with a Mirage are showing up on electronic drum kits. And our friends at Roland have come up with a MIDI percussion item that's simple and inexpensive — the Octapad*.

As the name implies, the Octapad gives you 8 pads to hit and each pad can be assigned a MIDI channel and MIDI note number. Add a Mirage, a MIDI cable and a pair of drum sticks and you've got a potent percussion instrument.



Let's start by creating an electronic drum kit. Connect the MIDI out of the Octapad to the MIDI in of the Mirage and load Sound 2 (Electronic Drums) from Sound Disk 4. The Mirage now has 12 distinct electronic percussion sounds ready to go, including full octaves of toms, ride cymbals and flanged crash cymbals.

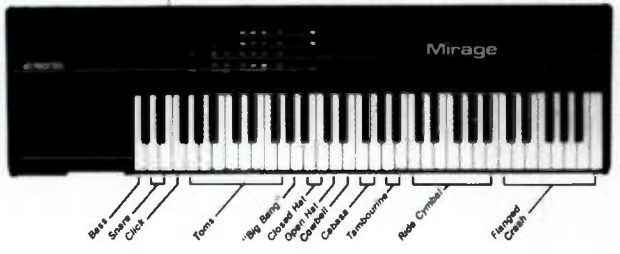
Set the Octapad and Mirage to the same MIDI channel and choose any 8 sounds by entering the MIDI note number into the Octapad for each sound. The keyboard map shown here will give you a guide. You've now got an 8-piece electronic drum kit that's ready to record, sequence or play live.

Mirage means melodic percussion

You can follow the above procedure to use any of the Mirage percussion sounds with the Octapad — but why stop there. One of the strongest advantages of the Mirage/Octapad combo is the ability to play percussion using any sound in the Ensoniq Library.

By selecting MIDI note numbers you can easily program scales into the Octapad to use with Mirage steel drum, marimba, hammered piano, bass, harp, vibes or whatever. Because the Octapads are velocity sensitive, you'll be able to control the dynamics just as you would any acoustic percussion instrument.

If you want to get a bit more outside, try playing brass and orchestra hits, guitar power chords, sound effects and pipe organ through the Octapads — there are over 300 sounds in the



Ensoniq Library just waiting to get pounded.

All this and a keyboard, too

As you can see, the Mirage isn't just a great keyboard, but a versatile drum machine, too. With some additional MIDI gear, it can be downright amazing. Visit your authorized Ensoniq dealer for a full demonstration. There's no telling where a Mirage and your imagination can take you.

ENSONIQ Corp.: 263 Great Valley Parkway, Malvern, PA 19355 ■ Canada: 6969 Trans Canada Hwy., Suite 123, St. Laurent, Que. H4T 1V8 ■ ENSONIQ Europe: 65 Ave de Stalingrad, 1000 Brussels ■ Japan: Sakata Shokai, Ltd., Minami Morimachi, Chu-O Building • 6-2 Higashi-Tenma, 2-Chome • Kita-ku Osaka, 530

ensoniq®

Adapter Cartridge that converts the User Port signals to RS-232 standards. These cost around $50 initially, but can be purchased for less than $20 these days (in some cases less—check your local toy store!). For those who simply must build one themselves and don't have a large spare parts box or don't like wiring lots of little components, refer to the schematic.

Radio Shack sells the 1488 and 1489 line driver chips for $1.79 each. These chips were specifically designed to interface the positive true, TTL logic levels of UARTs and ACIAs to RS-232 levels and require no additional components.

Although the C-64 is over four years old, it is gratifying that people are still buying and using them, especially in the electronic music industry.

Bob Yannes
Media, PA

(Bob, a former contributor to Polyphony, *was a driving force in the design of the VIC 20 and Commodore 64 computers, and designed the C-64's sound chip. After leaving Commodore, he helped found Ensoniq and develop the Q-chip, the heart of the Ensoniq soniq Mirage. Wonder what he'll come up with next...Ed.)*

Error Log: In "Casio CZ-101 Memory Expander" (July '86 **EM**) the IC part number in Figs. 1 and 2 should be 74HC04 and *not* 75HC04. The text is correct.

In the schematic on page 65 of the June '86 **EM** (The MIDI Program Change Footswitch) the 74C922 needs a cap from pin 5 to ground (100nF with a 1μF debounce cap) to make it run. Thanks to Tim Caswell for pointing this out.

Due to a production error, the August Table of Contents used was the preliminary, and not the final, version. Jim Cooper's excellent article ("MIDI Muting and Mixing for the Masses") was not listed (sorry Jim!!), and Michael Dosa's article on MXR Drum Computer mods appeared in the September issue, not August. Our apologies to all concerned.

OK, gang—pull out the June, July, and August issues of **EM** *and* ***write in these corrections*** *to keep your files current and correct.* **EM**

Operation Help

Product without a home: I have finished a software/hardware project called TEC DRUMS for the C-64; it is a real time programmable drum trigger sequencer that will play anything with a "Trig In" jack. I feel it's a remarkable package but my marketing and manufacturing talents are limited. If anyone has ideas or suggestions of what I can do, wants to get involved in this or other projects, or if you just want to talk shop (I speak fluent MIDI too), please contact me. Bob Damiano, 1128 Hoyt Ave., Binghamton, NY 13901; tel. 607/722-8885.

ARP 1613 sequencer: Does anyone have the schematics to the ARP model 1613 synthesizer sequencer? David Harper, 2242 Farmington Lane, Charlotte, NC 28205; tel. 704/536-8213.

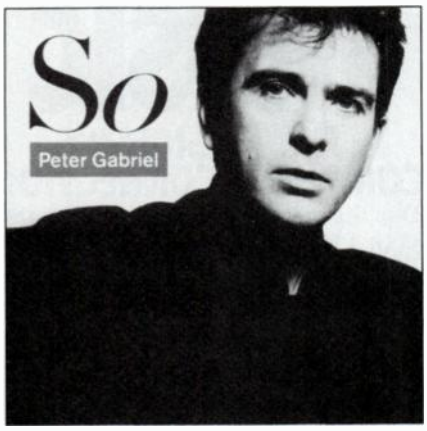
Seeking antique video gear: Since reading your June '86 article on graphic and video synthesis systems by Don Slepian, I have been searching fruitlessly for any of the mentioned systems. Can any of your readers help me in my search, particularly for the Vectrex or Chromaton? Also, how can I locate any large distributors of surplus or obsolete video equipment (cameras, recorders, editors, etc.)? Any information at all will be greatly appreciated. Ted Hermanson, 30 Lynnwood Dr., Palmyra, PA 17078; tel. 717/838-4734.

Bank on it: HELP!! Does anyone know how I can reprogram the factory presets on the Preset Bank of my CZ-101? The Internal Bank allows for reprogramming, but I would like to know if anyone has had success with a modification that will allow the Preset Bank to be programmed. Paul M. Barboza, 135 Sixth Avenue, #7, Brooklyn, NY 11217.

Cry Baby: I am searching for the schematics and any documentation on the Cry Baby Fuzztone from England—a product of the late '60s. Ernest Gusella, 118 Forsyth St., New York, NY 10002.

SCI Model 64 Interface: A local music store was going out of business and I managed to pick up a Sequential Circuits Model 64 MIDI interface for $20! However, I did not get a user's manual with it. Could any reader send me a photocopy (I will of course reimburse them for photocopying and postage costs).

Also, how I can interface my Roland TR-707 Drum Machine to the Model 64? The Model 64 accepts drum sync in via a 1/4-inch phone jack, but the TR-707 output uses a five-pin DIN connector. Mr. S.S. Naimpally, 80 Sandcastle Dr., #104, Nepean, Ont., Canada, K2H 9E7. **EM**



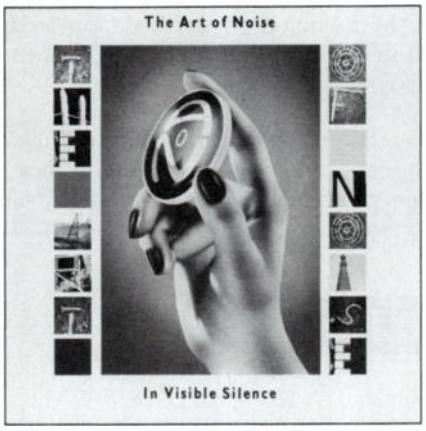
Peter Gabriel, *So* (Geffen 9 24088-2). Gabriel has been elevated to some sort of popgod largely through pronouncements and the promise of *Security*. In reality, though, he's always been a mainstream rocker, evidenced by the first three *Peter Gabriels* and now *So*. What we have here is a Motown album in style, form, and production, with a few electronic signatures and duets with Kate Bush and Laurie Anderson thrown in. Somebody said "Gabriel has finally listened to Phil Collins;" which is accurate except for the "finally."

M-1 Alternative, *M-1 Alternative* (cassette). Four songs in the Simple Minds mold. Singing monotone except when reaching unsuccessfully for a high note, "B." also plays bass and background synthesizer. "J." plays a fairly musical EBow guitar (with mass delay) and rhythm box. It's not badly done, and there are certainly a lot of bands making a living with this style. $5 (or $2 with a C-45 blank) from 1260 Leavenworth #11, San Francisco, CA 94109.

Yellowjackets, *Shades* (MCA 5752). You couldn't slip a credit card between the sound of this quartet and David Sanborn's band, but there's a definite market for this hip, ultra-commercial funk/jazz. Shadows of Weather Report and Jeff Lorber Fusion indicate their other musical influences.

Signs of Life, *F-Leg Fission* (cassette). Side one consists of an overlong (21:48) treated-guitar piece with Chapman bass and drumbox accompaniment. Imagine "An Index of Metals" (Fripp & Eno) done electrobeat. Side two is three shorter pieces (four to six min.) similar in execution but much stronger for their brevity. Overall, this trio has come up with a unique sound in an increasingly crowded marketplace. $7.50 postpaid from 46 Elm Street, Albany, NY 12202.

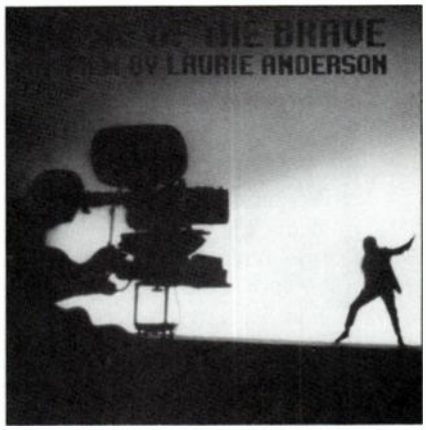
Ron Nicosia, *Sun Paths* (cassette); ***White*** (cassette). Minimalist New Age modal improvs on electric piano and synthesizers. Tasteful blending of tonalities and the lack of a discernible formula make these easier to endure than most. A third tape of solo piano is also available for $10.50 each postpaid, P.O. Box 29, Richmond, TX 77469.



The Art of Noise, *In Visible Silence* (Chrysalis 41528). Yes producer Trevor Horn is one of the few practioners using the new digital sampling technologies to explore previously unavailable procedures. Classical and big band music, vocal segments, TV and radio clips, recognizable and unrecognizable excerpts are sampled and reworked with digital drums and synthesizer. It recalls (in a weird circular way) Herbie Hancock's sampling of Yes on *Sound System*. Although fascinating on technical grounds, it'll take someone more commercial to break it through to popular acclaim.

Michel Genest, *Ascension* (Sona Gaia 143). Genest's second album (see 2/86) still uses string synthesizer chords and arpeggiated bell-tones in slowly modulating patterns. This time, though, he's got a few new tricks: choir samples, rhythm box, nature recordings. It's still pretty blissed-out, but at least it's sonically virile.

Holophonics, *Aldebaran* (cassette). A demonstration cassette of a new binaural recording process which helps localize up-down and front-rear as well as left-right. On headphones, the sound of a haircut or getting a newspaper wrapped around your head is eerie. The fireworks, cannons, and thunderstorms are also nicely reproduced, but the music on side two (in several styles) sounds like any binaural recording. $15 from Zuccarelli Holophonics, P.O. Box 64770/294, Los Angeles, CA 90064.



Laurie Anderson, *Home Of The Brave* (Warner Bros. 25400-2). Anderson has come a long way. From her first releases as a one-gimmick artist (using digital delay loops and harmonizer to alter her voice), to *Mister Heartbreak, United States,* and now *Home of The Brave*, she has outgrown (or outlasted) the gimmicks to emerge on her own as a singer/songwriter. State-of-the-art production and a hot backing band make her as accessible as possible. Some people still don't like her enigmatic, rather sarcastic vocals, but you can't please everybody—unless you're Spyro Gyra.

Spyro Gyra, *Breakout* (MCA 5753). If Mike + The Mechanics and GTR define corporate rock, then Spyro Gyra must define "corporate jazz." Slick, professional, well-played and flawless to a fault—is it possible to be too perfect? Only if you can't accommodate the marriage of business and music.

Alston Neal, *Kinetic* (Elfin SAN 101; cassette). Utilizing short-envelope DX/TX xylophone/marimba/steel drum voices, Neal constructs long, hypnotic pieces based around rhythms on a Drumulator. The Drumulator is set up with the sounds of small percussion instruments (not a drumkit), giving the whole affair a very human dimension in spite of the totally electronic origin. $9.98 from Elfin Music, P.O. Box 915, Camden ME 04843. EM

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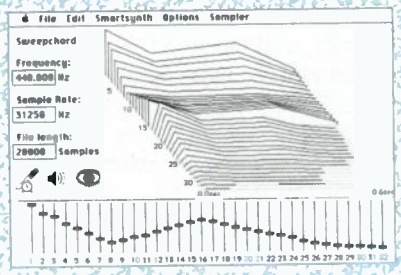

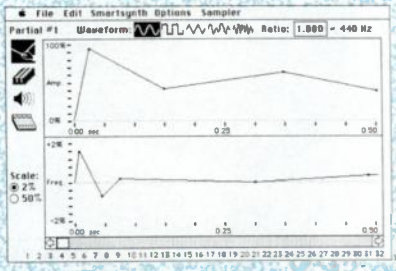

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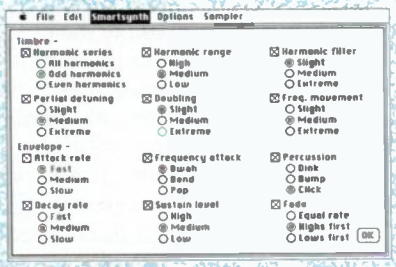

Because Softsynth's sounds are software generated, they don't suffer from input sampling noise. Your Softsynth samples will sound "cleaner," and take advantage of the full playback frequency response and dynamic range of your sampler.

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Palo Alto, CA 94303

920 Commercial
(415) 494-8811

Current version works with: Ensoniq Mirage™/Multisampler,™ Sequential Prophet 2000/2002,™ Akai S900™ and S612,™ Korg DSS-1,™ E-mu Systems Emax™ and Emulator II™ (Emulator II version requires *Sound Designer*.™)

Requires Macintosh 512K, 512Ke or Macintosh Plus with a MIDI interface.

On With the Show!

BY CRAIG ANDERTON

Current Events is being pre-empted this month by this special report, but will be back next month in its regular format.

The National Association of Music Merchants (NAMM) holds two trade shows a year, which are *the* place to go to find out about the latest gear and trends. Since these shows aren't open to the public, most musicians rely on reports such as this one to fill them in on what's going to be on their dealer's shelves in the coming months.

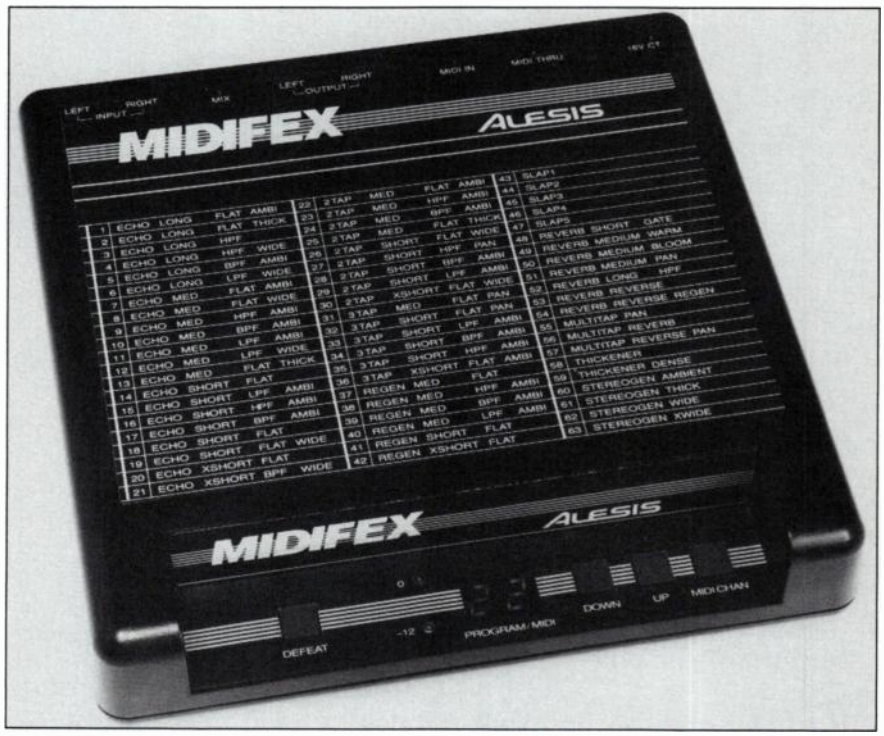
For this report, I've concentrated on some of the smaller companies, as well as lesser-known products from larger companies. We're all so used to the steady stream of innovative products supplied by leading companies such as Yamaha, TOA, Roland, Ensoniq, Peavey, Simmons, Korg, DOD, Fender, Ibanez, Otari, and so on that it's easy to forget about some of the less mass-market items out there.

There were some interesting trends. One was towards alternate controllers—guitar synths were happening, electronic percussion was exploding (we'll cover that separately next month in *Current Events*), and there were even such things as MIDI mallet controllers. I also noticed that the Amiga seems to be finally coming into its own; impressive Amiga software was sprouting up next to the Atari ST and Mac software. There was much more interest in lighting controllers, and relatively low-cost automated mixdown was everywhere—from dedicated units, to retrofits, to computer-based systems.

Of course, it's impossible to see *everything*—and I'm sure I'm leaving out some significant stuff—but here are some of the things that caught my eye (arranged alphabetically according to manufacturer) at this summer's show. To all those who got left out, either due to poor note-taking on my end, low visibility, or the limitation of 24 hours in a day, my apologies . . . corner me at the next show!

Addresses and telephone numbers are included so we don't get a zillion phone calls asking where to find out more about these products. Fine print: All prices are list prices as quoted at the show, and they, as well as the products themselves, are subject to change without notice.

AHB (5 Connair Rd., Orange, CT 06477; tel. 203/795-3594): The *CMC24:-16:2* and *32:16:2* feature programmable routing to the 16 output buses, and programmable muting on all channels and monitor inputs. The accompanying *CMR* remote programmer includes memory for the various CMC functions and a ten song MIDI sequencer with synchronization and MIDI song pointer.



Alesis MIDIfex

Akai Professional (P.O. Box 2344, Fort Worth, TX 76113; tel. 817/336-5114): In addition to their already well-known *S900* rack-mount sampler, Akai showed the *X7000* ($1,699) six-voice sampling keyboard and *X3700* ($1,299) four-voice sampling keyboard.

Akia Electronics (16740 S.W. 301 St., Homestead, FL 33030; tel. 305/245-2727 or 800-225-3675): The *X-Z 100* peripheral for the Commodore-64 provides automated mixdown functions for small studios. $1,799 for 16 channels.

Alesis (P.O. Box 3908, Los Angeles, CA 90078; tel. 213/467-8000): The *MIDIFEX* ($399) is sort of a "digital delay's greatest hits," and includes 63 different presets (reverb, echo, triple tap delays, stereo synthesis, etc.) selectable via MIDI program change control.

ART (215 Tremont St., Rochester, NY 14608; tel. 716/436-2720): New products in the pipeline include a programmable *MIDI Parametric EQ* and MIDI *Pitch Transposer*.

Axxess Unlimited (P.O. Box 8435, Fort Collins, CO 80525; tel. 303/482-5656): The *Mapper* ($995) is a "do-all" MIDI accessory that does such diverse tasks as reassigning notes and channels, "mapping" one controller to modulate several parameters at one, perform system master patch selection, and much more.

Bacchus Software Systems (2210 Wilshire Blvd. #330, Santa Monica, CA 90403): The *Voice Manager* program for the IBM PC provides extensive editing facilities for the DX/TX user.

AKIA automation system

Brick Audio (102 S. Porter, Elgin, IL 60120; tel. 312/742-7425): The *Proverb* plate reverb system ($600 and up) uses piezo-electric transducers for clean sound at a reasonable price.

Casio (15 Gardner Rd., Fairfield, NJ 07006; tel. 201/575-7400): Casio entered the "official" pro market with their *CZ-1* ($1,399), basically a CZ-101 with a full-size, velocity and aftertouch sensitive keyboard; and the *AZ-1* ($549), a powerful remote keyboard with velocity and aftertouch.

D&J Electronics (25 W. 646 St. Charles Rd., Wheaton, IL 60187; tel. 312/665-7799): The *Afterburner* mini-amp series includes the AB-10 (5 Watts, for guitar), AB-20 (8 Watts, for guitar) and AB-20B (8 watts with heavy-duty woofer for bass and keyboards).

Digidesign (920 Commercial St., Palo Alto, CA 94303; tel. 415/494-8811): The *Burner* ($595) lets Mac owners program EPROMs from Sound Designer sampled sound files. *Softsynth* is a Mac program that generates additive synthesis sounds suitable for transferring directly to an Emulator II, Mirage, or Prophet 2000.

Dr. T's Music Software (66 Louise Rd., Chestnut Hill, MA 02167; tel. 617/244-6954): A Commodore 128 version of the *Keyboard Controlled Sequencer* (with SMPTE!) is now available, with an upcoming version scheduled for the Atari 520/1040ST. *CZ Patch* is currently available for the Atari 520/1040ST.

Dust Cover Company (160 West 97th St., New York, NY 10025; tel. 212/316-2864): The *Gotcha Covered* dust cover line includes products for the DX7, Mirage, RX11, RX15, LinnDrum, and others.

E-mu Systems (1600 Green Hills Rd., Scotts Valley, CA 95066; tel. 408/438-1921): The *Emax* sampling keyboard ($2,595) is a "baby Emulator II" that even manages to do some things the E-II can't do—crossfade looping, five-stage envelopes, and two samples per voice. And, according to rumor, there will be an update for the Emulator II to enhance the sequencer and SMPTE.

Fast Forward Designs (17700 Raymer St., Suite 1001, Northridge, CA 91325; tel. 818/993-4091): *MIDI Step* is a 13-note pedal controller that can trigger over an eight octave range; it also features sustain, repeat, and add octave effects.

Fostex (15431 Blackburn Ave., Norwalk, CA 90650; tel. 213/921-1112): The *Fostex Automated Media Editing (F.A.M.E.)* software for the Apple II allows for audio assembly editing using the 4030 synchronizer and SMPTE-reading recorders.

PHOTO: GEORGE PETERSEN

EM/Mix *publishers and support staff.*

PHOTO: GEORGE PETERSEN

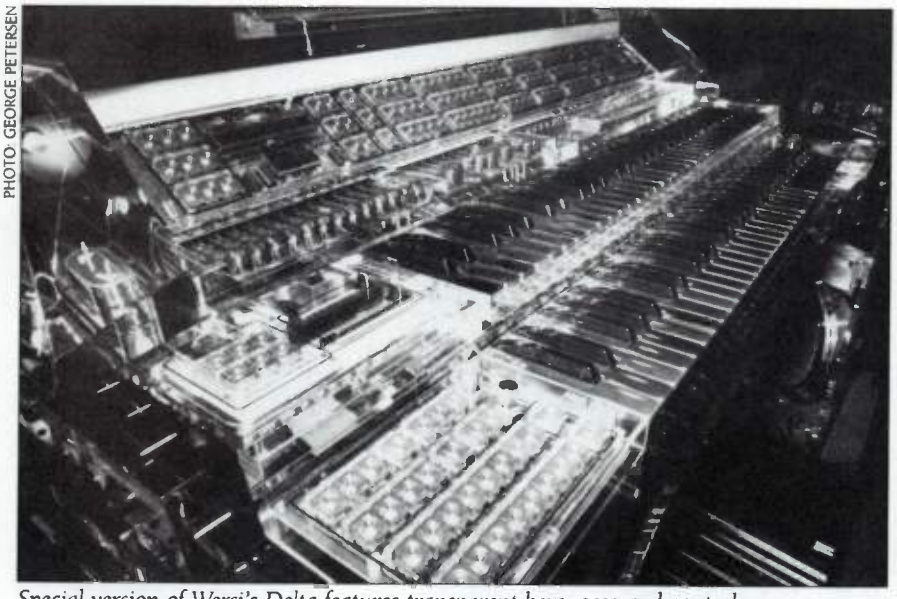
Genesis-Nova (727 State St., Suite C, Santa Barbara, CA 93101; tel. 805/966-7751): Yes, guitarists, you *can* take it with you. The reasonably-priced *Nova* acoustic and classic guitars fold up into a 21-inch long bag you can tuck under your arm.

Grey Matter Response (15916 Haven Ave., Tinley Park, IL 60477; tel. 312/349-1889): Their *Rev 2.0 E!* retrofit for the DX7 allows microtonality (all right!), more program storage, program mapping, and MIDI mono mode.

Hybrid Arts (11920 West Olympic Blvd., Los Angeles, CA 90064; tel. 213/826-3777): The *ADAP SoundRack* ($1,995) for the Atari ST computer provides 20 seconds of 44.1 kHz, CD-quality sampling with 16-bit linear resolution. It is polyphonic, MIDI-compatible, and includes real time digital effects processing (echo, reverb, etc.). Also, a CZ version of *DX Droid* will soon be available.

Image N Magic (2000 Center St., Rm. 100, Berkeley, CA 94704; tel. 415/562-4984): The *Rackmate* series, among other things, prevents having to replug MIDI instruments when changing modes from

PHOTO: GEORGE PETERSEN



Special version of Wersi's Delta features transparent keys, case and controls.

record to playback. IM also offers *Amiga* products.

Intelligent Dimmer Paks (P.O. Box 8665, Wichita, KS 67208; 316/264-7266): For those who want MIDI-controlled lighting, the *IDP 612* is a six channel, 1,200 Watts per channel programmable dimmer pack.

JBL (8500 Balboa Blvd., Northridge, CA 91329; tel. 818/893-8411): The *Control 1 Monitor* ($159 per pair) two-way speaker is optimized for home studio applications and is magnetically shielded to allow for use next to video monitors. The *G 125* and *G 135* speakers are designed for overdriven guitar and instrument sounds.

JL Cooper Electronics (1931 W. Pontius Ave., W. Los Angeles, CA 90025; tel. 213/473-8771): *SAM* ($849), the SMPTE Automation Manager, is essentially a sequencer optimized for automated mixdown that locks to SMPTE. It's useable

D&J Electronics Afterburner AFT-20

with the *MIDI Mute* ($549) control element.

Juice Goose (10830 Kinghurst, Houston, TX 77099; tel. 713/933-5121): Their line of AC line regulators maintains a constant 120 Volts output with input voltages from 85 to 140 Volts, thus promoting more reliable operation from electronic instruments.

Kawai (P.O. Box 438, 24200 S. Vermont, Harbor City, CA 90710): The *R-100* digital drum machine ($795) has 24 12-bit sampled drum sounds, eight individual velocity-sensitive drum trigger buttons, and MIDI song pointer. Also, the *K-3* synthesizer is now available in rack mount form for $849.

Key Clique (3960 Laurel Canyon Rd., Suite 374, Studio City, CA 91604; tel. 818/845-7866): *ROM cartridges* for the Super Jupiter, and disk samples for the SP-12 drum machine, are now available. For the Apple II computer family, there's the *Roland Super Jupiter Secretary* library program, *Film Music Tool Kit* for correlating "hits" to time code, and the latest version of *SysEx*.

Key Products (11684 Ventura Blvd., Suite 640, Studio City, CA 91604; tel. 818/508-0139): The *Cartridge Caddy* ($14.95) hooks on to the side of a DX7 and holds ten cartridges.

K-Muse (8954 Mason Ave., Chatsworth, CA 91311; tel. 818/998-7555): Their long-awaited *Photon* guitar synth ($1,995 with guitar; $1,295 as retrofit to existing guitars) uses an optical-based pickup to provide very high speed and accuracy.

Marc (130 N. Second Ave., Villa Park, IL 60181; tel. 312/941-7090): The *MX1+*

PHOTO: GEORGE PETERSEN

Inventor Emmett Chapman demos the new polycarbonate version of "The Stick"

($695) provides six channels of dynamic drum triggering.

Mellotron (36 Main St., Port Washington, NY 11050; tel. 516/944-6789): You have *not* entered a time warp, and you are not now in the '60s. There *is* a new Mellotron, the *ES-2000XT*; it includes a hard disk for instant downloading of sounds, music editing/scoring software, and a voice manager for DX/TX sounds.

Mimetics (P.O. Box 60238 Sta. A, Palo Alto, CA 94306; tel. 408/741-0117): *SoundScape* ($149) for the Amiga computer provides sequencing, internal sampling, MIDI mixing, synchronization, and makes extensive use of the Amiga's multitasking capabilities. An *Amiga MIDI Interface* is $49; a *Digital Sampler* package is $99.

Music Mouse (175 Duane St., New

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- ☐ 6-inputs. Synth players and MIDI users will especially appreciate the extra line inputs.
- ☐ 4-track recording. 3-3/4 ips with advanced noise reduction, the best the format offers.
- ☐ Independent stereo buss, dedicated stereo tape mix (cue or send), extra stereo line inputs, 2 independent send controls and convenient patch points — more routing flexibility than any unit on the market today.
- ☐ 2-band parametric EQ. ± 15 dB from 80Hz to 10,000 Hz, continuously variable.
- ☐ Auto stop with memory.
- ☐ Switchable meters can read either the 4-track recorder or the stereo mixer.
- ☐ True rolling punch-ins: rehearse with the recorded track and the input signal; when you punch-in, the monitor switches automatically to input. Optional remote foot control.

In short, the brash new Fostex 260 is everything the top of the line should be, except expensive.

Fostex 260 • $995*

*Actual retail prices are determined by individual Fostex Dealers.

York, NY 10013): This is "intelligent" software for the Mac that creates its own harmonic and melodic accompaniment according to mouse movements. It now features MIDI and in the hands of a good player, is very impressive. A demo tape is available for $5.

Musically Intelligent Devices Inc. (3 Brian St., Commack, NY 11725; tel. 516/864-1683): The *MegaMix* automated mixing system runs on the IBM PC. Features include muting, grouping, and fader volume control. Sixteen channels and software, $1,995; eight channel expander, $595.

MusicSoft (P.O. Box 274, Beekman, NY 12570; tel. 914/724-3668): Roger Powell's *Texture* is now available for the Amiga as well as IBM PC and Apple II; the *Pyramid* DX/TX editor ($60) for the PC includes pop-up graphics, selective random patch generation, and library functions.

Opcode Systems (707 Urban Lane, Palo Alto, CA 94301; tel. 415/321-8977): New for the show was Version 2 of the *MIDIMac* sequencer (with step entry) for $200, and the *MIDIMac CZ Patch Editor/Librarian.*

Palmtree Instruments (5666 La Jolla Blvd. 81, La Jolla, CA 92037; tel. 619/452-5199): Yes, *Airdrums* is a percussion controller—but it has other uses as well. The two Airdrums tubes can generate six triggers when shaken in six different directions, with full MIDI dynamics, and drive synths as well as drum machines. Or strap them to dancers to correlate sound to movement...

Passport (625 Miramontes St., Half Moon Bay, CA 94019; tel. 415/726-0280): In addition to showing software for the *IBM-PC,* Passport announced it had licensed an *advanced music printing technology* developed by Dr. Leland Smith of Stanford University in California.

PPG (Wandsbeker Zollstr. 87-89, Hamburg 70, Germany 2000; American office tel. 213/827-0952): Their *Realizer,* shown in prototype form, produces, processes, records, and sequences sounds. Sounds of other instruments, such as the minimoog or FM types, can be emulated with uncanny accuracy.

Sampleware (P.O. Box 182, Demarest, NJ 07627; tel. 212/969-0130): Samples on disk are now available for the Mirage, Prophet 2000, and Emulator II, as well as cartridges for the ESQ-1.

Sonus (21430 Strathern, Suite H, Canoga Park, CA 91304; tel. 818/702-0992): *SuperSequencer 64* ($225.95) and *SuperSequencer 128* ($275.95) include a built-in MIDI system-exclusive librarian as well as extensive editing capabilities and flexible synchronization.

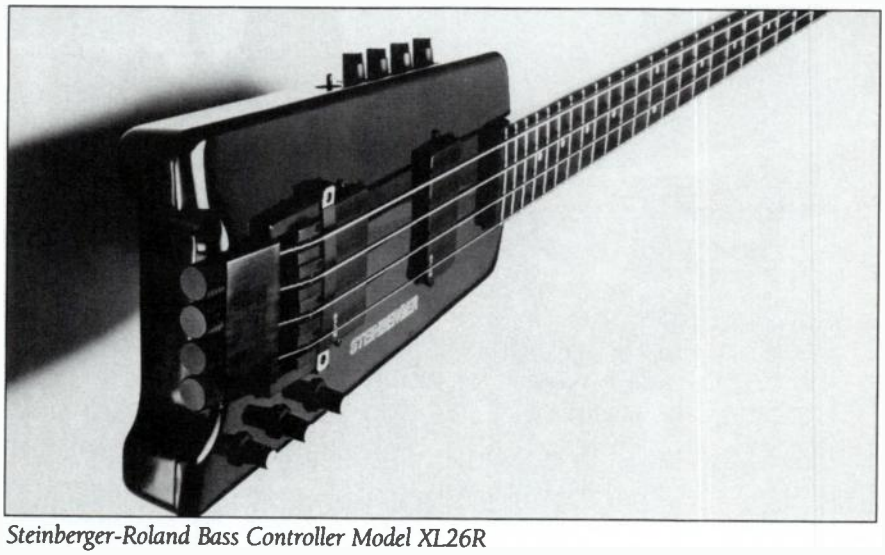
Southworth Music Systems (91 Ann Lee Rd., Harvard, MA 01451; tel. 617/772-9471): The *JamBox* interface ($389) for the Macintosh merges four inputs, provides four independent (not Thru) outputs, and includes a SMPTE reader/generator.

Staribinski Matrix Fingerboard Controller Co. (21668 WoHeLo Tr., Chatsworth, CA 91311; tel. 818/882-5247): The *StarrSwitch* retrofits a Strat to eight-position electronic switching. No cutting or drilling is required.

Steinberger Sound (122 South Robin-

—page 21

PPG Realizer



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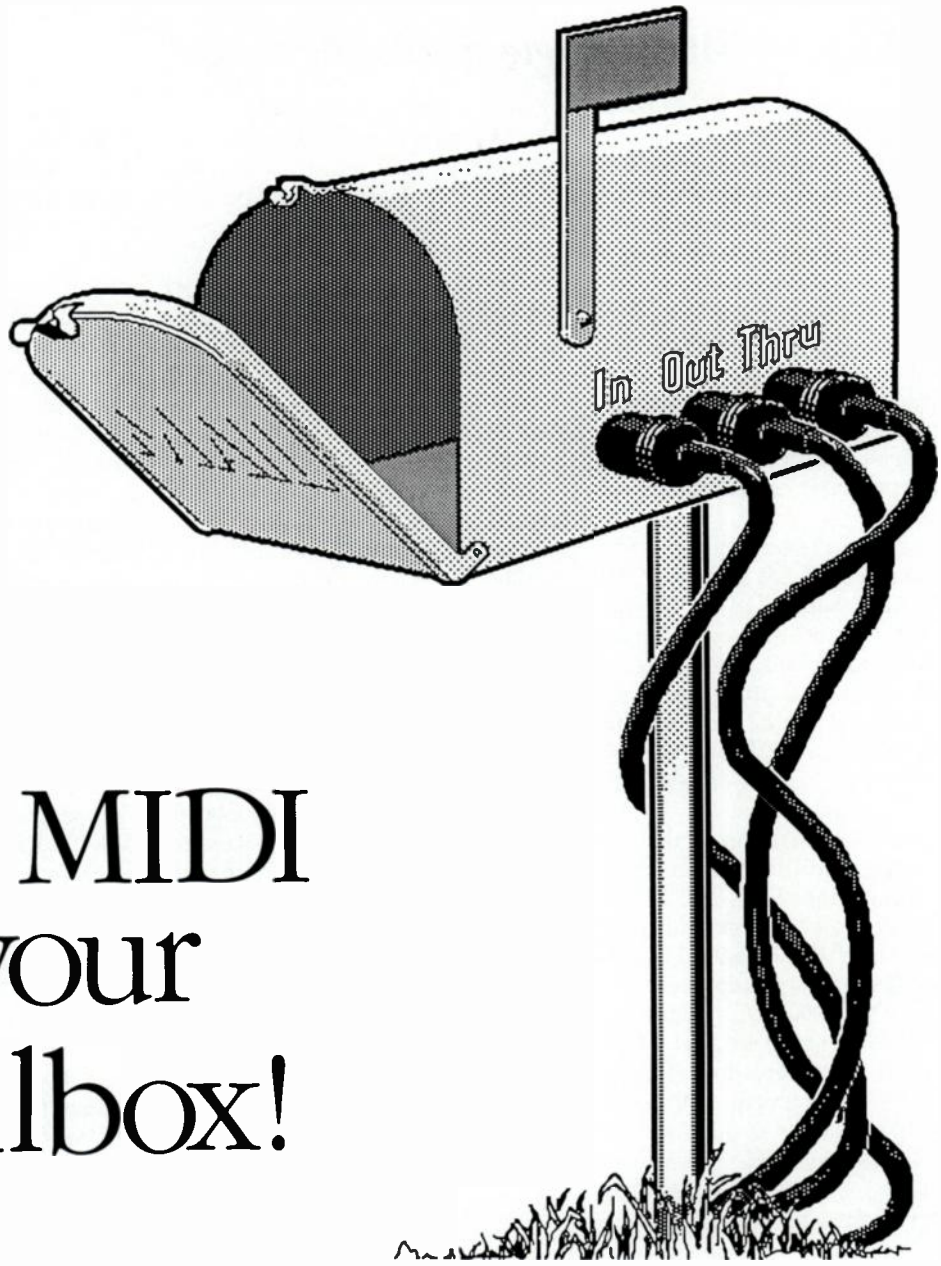

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EuroReport: MIDI Magic at Musik Messe

BY ROB SENSO

Europe's musical electronics manufacturers, while not as well known in the United States as American manufacturers are in Europe, have their own unique qualities and character. Although the Musik Messe was held in Frankfurt, Germany several months ago, many of these products are still unknown in the United States; and some products that have proven popular in Europe have not received much attention in the U.S. So, this exclusive report for **EM** readers will cover both.

Akai's products are very popular in Europe, and the *ME-25S* keyboard splitter will prove handy for MIDI users. This box turns any MIDI keyboard into a master keyboard with options such as multisplits with overlapping areas. Part of the keyboard can be dedicated to patch selection on MIDI controlled effects, sequential changing of programs, octave transposing, etc. All this can be stored in 64 internal memories that include assigned MIDI channels, mod wheel settings, and so on. The *Z-1000* music system garnered much interest; this consists of the CPZ-1000 music computer, RZ-1000 operational control board, and MZ-1000 display monitor. The CPZ-1000 has up to three MIDI inputs for real time recording of three different MIDI instruments; the 500K disk drive stores up to 16 tracks of 999 bars each, with a total capacity of 50,000 notes. The CPZ-1000 generates MIDI sync, tape sync, and SMPTE, with an optional board for video tape recorder control.

Braintech from Belgium showed their *Miditronics System 15* MIDI control system. The M15 19-inch MIDI computer is the basic version; the MK15-K is dedicated to keyboard players. Both units are designed to control a large number of MIDI machines and replace several computers, disk drives, interfaces, and additional cable spaghetti. System 15's main function is to generate, filter, reroute, or store any MIDI code. Features include 384 (!) MIDI program steps; a 16 character alpha display; ten MIDI outs; song create; and so on. The keyboard version adds several step data functions, such as six keyboard destination channels, six low and six high split limits, six transpose positions, six keyboard mode memories, sub-octave doubling, 128 MIDI exclusive message edits and 128 exclusive message selects.

It's equipment such as this that shows the industry is getting hip to the secrets of MIDI control. More and more, one encounters unobtrusive black boxes that hide an amazing array of functions. No longer can you see at first glance what kind of equipment you're dealing with; is it a bird? A plane? A digital delay? Keyboard expander? You've got to read the specs!

Casio showed the *ZZ-1* sampler, which still hasn't made it to the other trade shows. It features a 40 kHz sampling rate, 128 note range, editing, an internal 3.5-inch disk drive, and an expansion connector for a 16-bit computer. A dual mode data input allows real time or musical notation input, and of course Casio wouldn't be Casio if there wasn't auto-accompaniment.

Commodore's successful *mini budget sampler*, which is oddly enough not available in the U.S., now has a little twin brother. It looks the same on the outside, but internally it houses a complete FM synthesizer—no doubt Yamaha has supplied the chip. Leaving their stand, I noticed a mockup of what is supposedly going to house a sampler, FM synth, computer and software... well, seeing is believing.

Commodore's plug-in FM Synthesizer Module

Italian keyboard manufacturer **Elka** presented the *LX-600* six-voice analog synth with 64 factory and 32 programmable sounds, velocity, and aftertouch. The *LX-900* digital synth is multitimbral and has nine voices; both models are available as expansion modules. Elka also showed two drum boxes, the *Sidekick 64* with 64 preset rhythms and 20 PCM-recorded sounds, and the *Drumstar 80*, with 80 preset rhythms (20 programmable), 32 sounds over 12 outputs or stereo mixed outputs, MIDI, and sync.

And in case you wondered, guitar synth vaporware is not restricted to American shows. **Europa** (not to be confused with the American company Europa Technology) showed a guitar-to-MIDI interface...sort of. Unfortunately, no more was to be seen than a lump of buttons and components, provisionally and unprofessionally taped on to a guitar.

The *PC-2* MIDI percussion controller from the French company **Gong** includes eight pad inputs that can also convert audio signals into MIDI data. Two additional parameters, delay time and delay feedback, create new options for electronic drummers. All necessary switching between banks and programs is done by footswitch, thus leaving drummers' hands free for what they are trained to do best: hit 'em!

Jellinghaus, one of the first European companies to throw itself into the MIDI software arena, now offers the *DX Programmer*. This control panel, twice as big as the DX7 itself, houses 148 control knobs and 30 switches for direct analog-style DX7 programming while playing or sequencing.

Of interest to drummers, the *DPU* Digital Percussion Unit lets you store 16 sounds (maximum length, 2.6 seconds) in an eight-voice 19-inch rack module. Samples can also be combined into voices, where velocity can choose be-

Rob Senso runs Sensomania in Amsterdam, the Netherlands, a distributor of periodicals, hardware, and software that relates to electronic music.

tween the two sounds of one voice (e.g. playing softly produces a snare sound, and playing loudly plays a rimshot or whatever).

Fader-C-Mix updates older mixing consoles for automation. 16, 24, and 32 channel models are available, and custom versions are available for up to 64 channels. The software runs on an Atari ST computer and allows for on-screen editing. Channels can be combined into one group and controlled by one fader; at any stage of the mixing process, a back-up can be stored on floppy.

Finally, the Italian company **Lemi** has created a very interesting product line. Their *Future Shock* software for the Apple II includes an extensive step sequencer, printing program, and several editing and dump programs for various synthesizers. Also, their *MIDI-SYNC* is touted as the answer to all sync problems. On the input side it caters to MIDI clock, Roland/Korg switchable DIN sync, 384 ppqn tape sync, and 24, 48, 64, and 96 ppqn clock. All of these "standards" are available as separate outputs, and there are several LED indicators.

The *P.C. Box* takes over all necessary patch switching on a whole score of MIDI machines. 15 memory banks are available for 127 patch changes for your stack of keyboards, sound processors, expanders, and so on. And for accordionists, the *MIDI Accordion* retrofits accordions with internally-mounted contacts that connect to the rack-mount "brain" through a multi-conductor cable. Solo and bass sections each operate through their own MIDI channel and for connection to equipment with auto-accompaniment, a MIDI channel can be selected.

There's a lot going on in Europe these days, from the levels of pure academe (IRCAM, Steim, and such) down to the musician in the street. I hope this report will serve as at least a small bridge between musicians on both sides of the Atlantic, and that future collaborations will occur that improve the lot of musicians everywhere.

—from page 18, NAMM

son Ave., Newburgh, NY 12550; tel. 914/565-4005): The *XL2GR* bass is fully compatible with the Roland GR77B synthesizer as well as MIDI interfaces from Roland, Ibanez, and others.

Studio Digital Samples (18653 Ventura Blvd., Suite 560, Tarzana, CA 91356; tel. 818/344-5692): The *Linn 9000 Library* ($499.95) contains five disks (184 samples) with 30 to 40 sounds on each disk. A demo tape is available for $5.

Symphony Series Inc. (tel. 801/566-1683): The *S-16* and *S-64* RAM cartridges provide four times the storage of Roland's M-16C and M-64C cartridges.

360 Systems (18730 Oxnard St., Tarzana, CA 91356): *MidiMERGE+* ($295) is a two-channel merger, data filter, and transposer. *MidiPATCHER* ($295) is a four-in, eight-out MIDI routing system with memory.

Tote-A-Note (16448 Sealark, Houston, TX 77062; tel. 713/486-0126): The *Tote-A-Note* ($29.95) all-aluminum carrier attaches to the back of a bicycle to allow for transportation of musical instruments such as guitar, horns, and even snare drum kits.

Vesta Fire USA (10 McLaren, Bldg. E, Irvine, CA 92718; tel. 714/380-7314): The *MR-10* personal multi-track ($399) combines a mixer and 4-track cassette transport with dbx noise reduction.

Zeta (2823 Ninth St., Berkeley, CA 94710; tel. 415/849-9648): Zeta's *Guitar and Bass MIDI Controllers* were shown in prototype form. The company claims 12 times faster pitch detection than other Pitch-to-MIDI devices. EM

To make a career, you'll need an education. But what's the best school, the best program, and—most importantly—the best approach?

Assembling An Education

BY JAN PAUL MOORHEAD

This is an odd sort of article, since it isn't designed to give you information as much as it is intended to create questions. If you want to have a career related to electronic music, or merely a totally out of control hobby, you are going to need information and skills. This should help you ask some of the right questions.

SET A GOAL

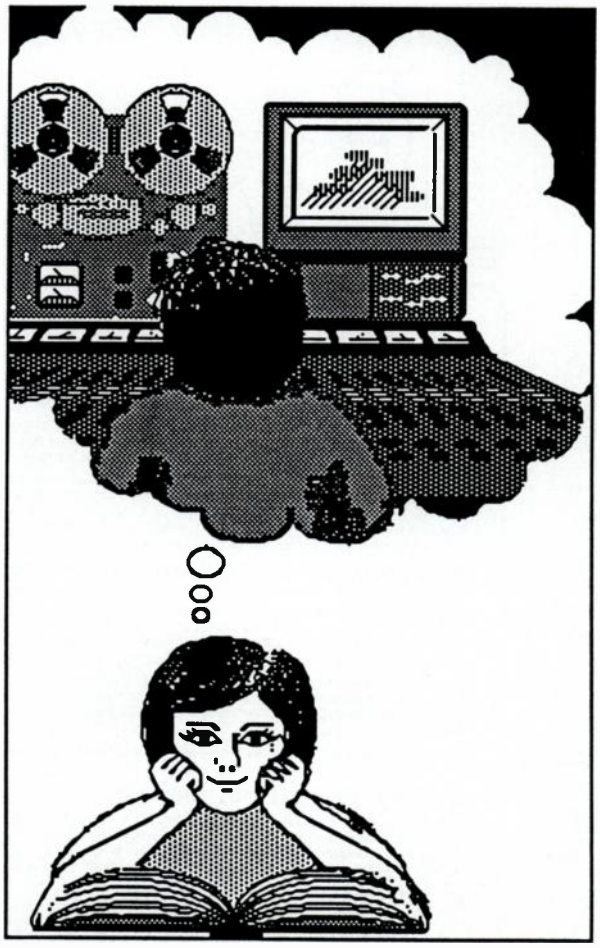
The first question to ask yourself is "What do I really want to do?" It's always a big help to know where you're going. Amazingly, people often start with only a vague desire to be rich or famous or to push buttons. The answer to this question will very likely change, but at least you have something on which to base your game plan.

There are hundreds of occupations in the music field and you may find yourself working in more than one. Study the various fields—intentionally or not, you may find yourself working in a different field than you intended (e.g. instrument servicing) while you build your skills or develop the opportunity to work in the area where you really want to be (e.g. engineering and production).

If you aren't sure where you want to be, try fantasizing about a work situation that seems appealing. Then study that area of work to find if it's all it's cracked up to be and whether you are motivated enough to work at developing the necessary skills. An excellent book for helping you understand the industry better is David Baskerville's book, *Music Business Handbook & Career Guide*. Be realistic about what the work actually entails and, if possible, try to get close to people who do that sort of work.

WHAT TYPE OF EDUCATION IS BEST?

Once your goal is nailed down, the next question is whether you want to rely on self-education or on the various institutions that offer courses in your chosen field.



I have never known of a person in professional music losing out on a gig because of a lack of a degree or good grade point average. A very large proportion of the people working have gotten most of their education in the field. This is the most practical and accurate sort of information as well; people getting out of school may only be ready to begin to learn.

The negative side of self-education is that there is tremendous competition for any jobs in these fields. You may start as janitor at Megabuck Studios and ten years later still be a janitor. This approach lacks organization and leaves a lot to chance. One problem is that you may not know what you need to know—it helps to have a guide. Another problem is that you may spend a great deal of time doing things that do not prepare you to function in the job you want. The days of the illiterate or semi-skilled musician or technician are numbered. Sure, there are still lots of garage bands that show up on the scene each year, but fewer and fewer of them survive their initial successes. Many of the functioning musicians who portray themselves on stage as good-time party animals are actually very disciplined, hard-working, and have a strong educational background.

Whether or not you go to a school, self-education will have to be part of the process. With the computer revolution upon us, the one thing you can count on is change. I know of no one surviving in the music business today who is not constantly engaged in self-education. This consists of reading journals, such as this one, books, manuals, advertisements, going to the trade shows, and hanging out with other people who are on top of the current scene. Since you are reading this magazine, this may be beating a dead keyboard, but if you don't have enough interest to pursue these avenues on your own, no school is going to be of any use to you. In this industry, you have to be extremely self-motivated to have any chance of success.

In the past, music education institutions have had a very bad attitude about teaching anything that actually allowed you to earn a living once you finished their program. Due to declining enrollments and competition from private music schools, these attitudes are changing. Some advantages to acquiring a degree are:

✓ You can follow a consistent and organized course of study.

✓ People are available for consulation (they are paid to answer your questions, but just try to call up Quincy Jones to find out how to thread your tape deck).

✓ There are other students at your level with whom you can work.
✓ You can get your hands on the equipment you need without having to buy it.
✓ And, of course, you get a swell piece of paper with fancy lettering that you can hang on the wall to cover up the splotch where your last roommate glued the Madonna poster.

Selecting The Right School

If you are selecting a school, take a look at the people and the hardware. Are the people who will be teaching you actively involved in the industry? The music business is changing rapidly and you want to be taught by people who stay current. Some schools make this a condition of employment; "publish or perish" should now be "gig or split." Can the teachers communicate and relate to different musical genres? They don't have to have purple hair to be relevant but they should be "visible" in the community outside of academia. On the other hand, some private schools will have big names on the letterhead and in their advertising, but they show up at school only once a year (usually to pick up a check!). See if there are a variety of backgrounds represented at the school. You'll learn more from a diversity of tastes, opinions and experiences among the staff. If you can, check whether past students have found a place in the industry. The teachers may have connections to help you find work after you graduate or while you are in school.

When taking a look at the hardware and available work environments, keep your short term goals in mind. It's nice if they have a complete Synclavier system at the school, but what are the odds of you working with one when you leave the school? If you're an undergraduate, are only graduate students allowed to use the good equipment? A large proportion of the music being produced today is coming from low-end (i.e. relatively inexpensive) systems. Knowing how to program Roland, Yamaha, Korg, Sequential Circuits, Ensoniq, etc. synthesizers, sequencers, and drum machines is much more likely to guarantee you some work in the marketplace. Also, starting with smaller and less intricate systems and getting the most out of them is a better place to start in really understanding the technology.

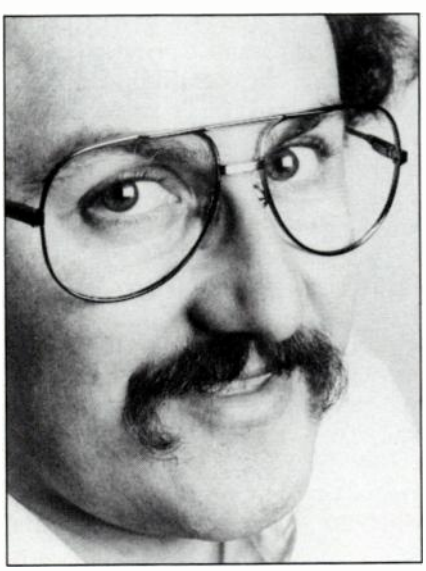
Look for schools that have 4- and 8-track facilities as well as the more prestigious 24-track studios. It's a lot easier to book time and learn something if the school has a number of small studios rather than one super slick setup on which 200 people are competing for time. Remember, the key words in this kind of education are *hands-on experience*. If you have this kind of opportunity, you'll leave school with some hard proof of your abilities, such as tapes of your involvement in demos and other projects. Many students are able to turn their skills into a positive cash flow before they leave school if they can run the machines that are in abundance in the real world.

Selecting A Program

In general, look for programs that are flexible and allow you to customize the program to your needs. Rigid curriculums quickly become dinosaurs. You may see a particular niche in the music world that you like and where you think you can get work; the program should allow you to direct your studies accordingly. Or, you may find that you only want to get specific information and then get to work. Schools that put too much emphasis on the de-

"In this industry, you have to be extremely self-motivated to have any chance of success"

Jan Moorhead *works in the Los Angeles area as a freelance musician, instructor in commercial music at Long Beach City College, corporate computer consultant, and as owner/operator of Pulse Music, a 16-track MIDI/SMPTE-based production studio.*



New Approaches to Musical Education

Although more colleges and universities are adding electronic music courses to their curriculums, what about those people who have already gone to college, or those who have no desire to get involved in a full-fledged program? Fortunately, there are alternatives.

Local music shows, such as the NARAS-sponsored San Francisco Music Fair and events put on by local music stores, offer an invaluable opportunity to get hands-on experience and make contacts within the industry. These types of shows are on the increase and are worthy of support by the musical community.

There are also applications-intensive programs and seminars put on by schools and manufacturers. One of the most ambitious of these, the FM/MIDI Seminar created by the University of Chicago Department of Music and actively supported by Yamaha, was held over a 12 day period last July. The $1,100 tuition included 30 hours of classroom lectures and 18 hours of small group tutorials; lecturers included such authorities as John Chowning, Jim Cooper, Terry Fryer, Howard Sandroff, Morton Subotnick, Suzanne Ciani, Gary Leuenberger, Howard Massey, Gary Kendall, and others. In addition, several small studios and three production studios gave students an opportunity for "hands-on" experience and a chance to apply the knowledge learned during the lectures and tutorials. Although the major emphasis was on FM synthesis and MIDI, topics such as psychoacoustics and sound reinforcement were also covered.

Manufacturers have long been aware of the need to educate musicians about new musical products; however, this is easier said than done. Events such as the FM/MIDI Seminar show that manufacturers and schools can work together in a complementary fashion to educate the working musician. —*Editor*

gree may discourage this kind of creative class programming. Schools that accurately reflect the nature of the music business will not inhibit that sort of approach to your education. You are the one who ultimately takes the responsibility for your education, and you have to live with the results. You're paying for it so reserve the right to make the final decisions.

In your studies, look for the principles, concepts and skills, not just facts. The facts will change. They are changing as you read this. The principles will allow you to understand and adapt to new systems as things change. Look for the method, not just which button to push next. Find teachers that can explain the concepts. People who are valuable in the marketplace are those who can solve problems and get things done. Even though the world is full of problems and reasons why things can't be done, the person who signs your check is not interested in problems, but results. Working

"...any program that doesn't have some focus on computer technology is going to be of limited use"

with small systems and finding creative solutions to limitations and problems will develop skills that translate directly into paying the rent.

One particularly valuable skill is the ability to read manuals. Undoubtedly after buying your first piece of equipment, you began to suspect that all manuals are originally written in Japanese, translated to Portuguese, and then to ancient Persian. The manuscript is photocopied; the copy is then photocopied 17 more times, and finally read aloud over satellite link to someone who knows neither Ancient Persian nor synthesizers, who finally types a copy for final publication. However, being able to read manuals can be learned. It does not require magic potions or the services of witch doctors, but mainly practice. Read many manuals. Push many buttons. Eventually you will become proficient at understanding their lore and you too will become an oracle of MIDI knowledge.

My personal opinion is that any program that doesn't have some focus on computer technology is going to be of

—page 69

If you're already making joyful noises on your synthesizer, there might be a career opportunity in making a joyful noise unto the Lord.

300,000 Jobs Available—Experience Helpful But Not Required

BY PETER STAPLETON

Church music is beginning a major revolution, and the electronic musician will be the winner. The U.S. alone has over 317,000 church buildings, give or take a few thousand. Every Sunday 300,000 instrumentalists are scheduled to make some kind of music; add choirs, and you're up to 1,000,000 musicians. This happens 52 weeks a year, and that doesn't count holidays, weddings, funerals, concerts, sing-alongs, midweek gatherings, or even youth programs. Somebody's making a *lot* of music.

In this era, electronic keyboards are on a roll, and churches and these instruments were made for each other. Not only does church music open up possibilities for electronic musicians as players, but also for those who sell, maintain, service, and program these new instruments. Let's take a closer look at what this all means.

But It Doesn't Sound Like An Organ...

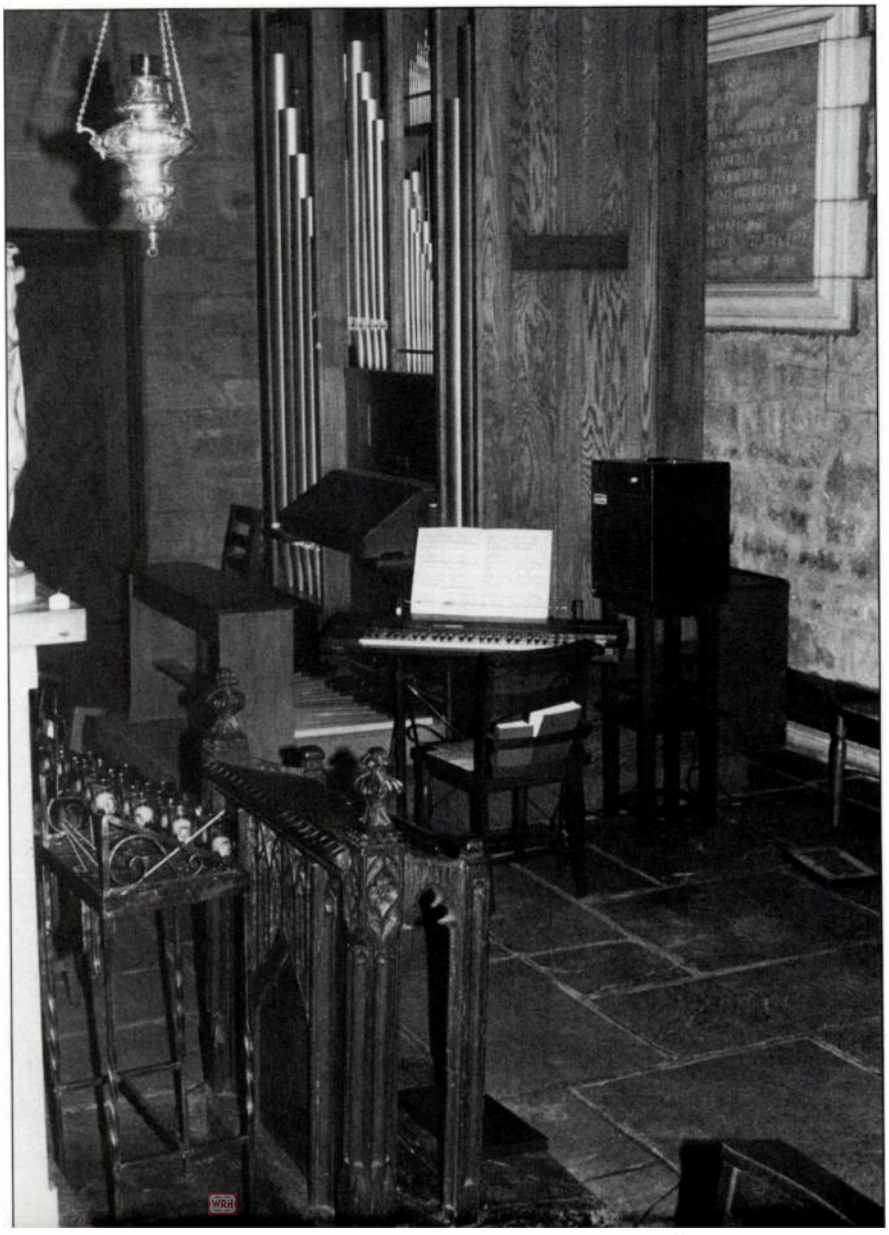
Say "church music" and most people think "organ." That's an association that goes back centuries, but it's about to change.

First, pipe organ prices have become prohibitive for most churches. A stock model costs $30,000, but it's going to need servicing, tuning, and a major overhaul in ten years. A pipe organ with mechanical action (wires and rods instead of electropneumatic circuits) will last longer but cost twice as much to purchase. Pipe organs at these bottom-of-the-line prices will produce only a small variety of sounds, and in the carpeted conditions of most church buildings will be at a distinct disadvantage. This is not the case with electronic instruments and their amplifiers; a good power amp and speakers will overcome most acoustic damping problems.

Electronic organs are cheaper, but still not cheap; $10,000 is a bargain. While the European organ manufacturer, Johannus, can retrofit their keyboards for MIDI, they're still selling an organ. And organists themselves are getting rarer. Colleges, universities, and music schools show a radical downturn in their enrollments of organ performers.

Enter The Electronic Musician

Not every electronic musician will want to play in a church. Church salaries are small or non-existent. But those organists who learn the potentials of the electronic keyboard, with its astounding MIDI capabilities, will be on the leading edge. I read the organ magazines, and in mid-1986 electronic keyboards sure look like a well-kept secret to me. The first organists who learn to read EM will be few, and many will resist learning a new vocabulary. Some will deny the electronic phenomenon altogether or fight it. And although the organ is probably the acoustic instrument most similar to the electronic keyboard, it still took



me, an organist, a term's course at UCLA with synth guru Clark Spangler *and* a year of snooping around to even begin to learn what EM's talking about. The first job open to the electronic musician is a teaching job: teaching music makers to love the instruments we love.

One way to encourage acceptance of electronic instruments is to play some "serious" music on them. I play Brahms chorale preludes that sound great with the lush strings sounds of the Roland JX8P; Baroque keyboard literature plays well on the lean, clean sounds of the DX7. For a finale, try playing "O Come All Ye Faithful" with the DX MIDIed to the Roland (organ and strings respectively).

If you use a sequencer, there's a whole repertoire for keyboard instruments and small ensembles such as the easy Mozart Church Sonatas, Telemann, or Bach suites. Another way to begin is to have a keyboard player play familiar pieces for weddings or for a concert and then do the programming, engineering, or sequencing of patches necessary to show off the instrument.

So how do you land your first gig? One of the most likely customers for the services of electronic musicians will be choir directors desperately seeking an accompanist—let them see what you can do for them, and you'll be on your way.

But It Still Doesn't Sound Like An Organ

No, a synth is not an organ. I learned that fast when I played one in church for the first time; the choir of adults (over age 25) was amazed at the sounds—harp, horns, recorders, and bells—emanating from my synth. Not a single adult knew what the instrument was called, but during practice, a seven-year-old toddled up to watch, and murmured "synthesizer."

"What is it?" asked the priest, who was taking a chance on me and the DX because the organist was out of town and it was Christmas and they had to have *something*. "Synthesizer," the kid said again. Afterward a teen punk rocker in full regalia came up and asked what I was playing; I replied "A synthesizer," at which point she impatiently said "I *know* it's a synthesizer, but what kind is it?" When she heard it was the DX7 she was impressed, because she knew how much it cost and what it could do.

"One of the most likely customers for the services of electronic musicians will be choir directors desperately seeking an accompanist—let them see what you can do for them"

The kids know our electronic instruments. Any of them going to church are going to be wondering in a few years why the church doesn't use electronics. And if in no other way, the churches will start wondering too.

So There You Are

We've got the right instruments, the right skills, the right place in the youth culture (tomorrow the adult culture). And we've got just about 300,000 chances to fit our resources into a ready-made group that makes music now, will keep on making it, and will soon be making more and more of it with us.

Are you weighing your options about how to use your sequencer, keyboard, MIDI skills and knowledge? Maybe the pay isn't great, but the live experience, the exposure, the psychological rewards, and the opportunity to work with other musicians are all there...experience is helpful, but not necessary. **EM**

Peter Stapleton is president of Church Music Systems. He holds an AB from Yale, an MA in Teaching from Harvard, and Master of Theological Studies (with distinction) from the Episcopal Divinity School. EM *readers can request a sample copy of his "The Church Keyboard Newsletter" from Church Music Systems, 980 Memorial Drive, Cambridge, MA 02138.*

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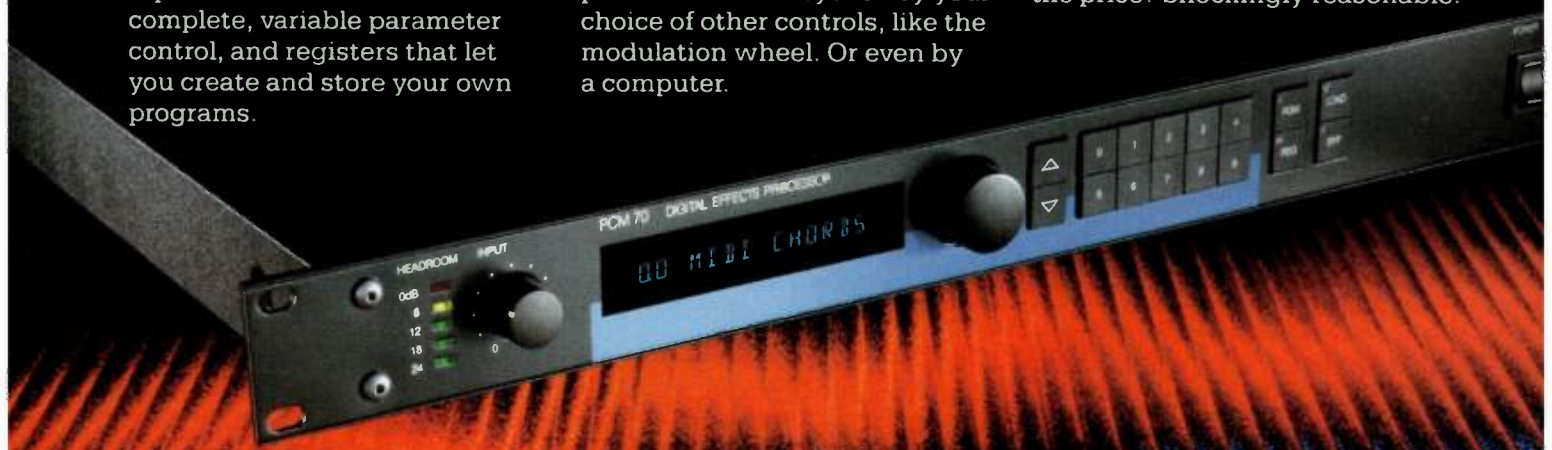

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Teachers, awake! MIDI and computers cannot only simplify and speed up the learning process, but make it more enjoyable too.

Educating The New Musician

BY NEIL WALTZER

For me, the exciting challenge of creating the curricula for the new Music Synthesis program at New York's Center for the Media Arts (CMA) is the *integration* of traditional areas of musical study (harmony, counterpoint, form, orchestration, and arrangement) into a course aimed at educating the new electronic musician who works with analog/digital synthesis, sampling technology, computer software, SMPTE/MIDI, etc. Integrating these two creates a powerful new teaching combination that accelerates the learning process and involves the student more completely in the subject.

MUSIC READING MEETS THE COMPUTER

Consider music notation and reading, which is always a concern; many musicians do not read well or cannot read at all. The computer keyboard, a mouse, and step entering provide one solution.

"I've always believed that faster paced learning was possible, and that possibility has arrived thanks to MIDI"

Copying music by hand, while often viewed as a dull and arduous task, is a direct pathway to musical literacy (Beethoven studied and learned the Mozart quartets by copying them). To bring this concept into the computer age, I had my students bring pieces of their choosing to class. The pieces ranged from Bach to Schumann, to contemporary popular songs. The assignment was to *meticulously enter and store the piece.* Now, we all know how easy it would be to enter a piece by simply playing the notes on a MIDI keyboard and storing the data in the computer, but that was a no-no. This assignment was intended to not only improve the students' reading skills, but also, to demystify the computer as a musical tool. I expected good results, but what occurred was incredible! Although most of my students had little or no experience with computers, in a matter of hours they had learned the computer software and were eager to enter and save the music they chose. Within days they were at it like pros—old pros at that, working rapidly and accurately. The pieces they had entered and saved also served as a source of material to "play" with as synthesists, and provided familiar examples for their study of form, harmony, counterpoint, and orchestration.

THE PROGRAM

At CMA there is a computer at each station. The Basic Lab has a Commodore-64; the Pro Lab has a Leading Edge 640K with graphics card. Basic Lab software includes Passport's Music Shop and MIDI 8+, as well as Dr. T's Keyboard Controlled Sequencer. The Pro Lab uses Octave Plateau's Sequencer Plus and Jim Miller's Professional Composer.

Program hours are divided equally—two hours of classroom and two hours of hands-on lab, five days a week. CMA emphasizes an intensive hands-on policy (as in "practice makes perfect").

The center offers 600 hour, 450 hour, and 300 hour courses of study. The 300 hour course is reserved for holders of a musical degree or equivalent, and therefore concentrates on MIDI equipment with less emphasis on theoretical studies. For the orchestration module in this course, we analyzed "The Rite of Spring" by Igor Stravinsky. Stravinsky's choice of high bassoon to carry the opening melody has made it an oft-quoted piece in orchestral study. Here the assignment wrote itself; students used an oscilloscope to examine the timbre of the bassoon, which allowed them to "see" the effect of stretching the bassoon into a higher range. They would then program the opening by entering the required notes. These newly created/synthesized timbres, including a "proper" imitation of the high bassoon, were discussed and compared via the oscilloscope. This is far from rote work; great fun abounds in the experience of being a synthesist with orchestral problems to solve. Of course, this is just one example. The computer-MIDI Synth Lab can be an extraordinarily powerful tool in all traditional areas of music study.

In the 600-hour program, one assignment involved bass line realization. There was a time when the operating concept for this type of work was "you must hear it all in your head," which brings to mind Ravel's comment concerning his use of piano in composition. When asked whether he relied upon the instrument as part of the process, he replied, "Of course, how else can one create new sounds?"

It's an experience to realize (i.e. fill in all the notes above a given bass line) and hear it back almost instantly. Nowadays, thanks to new technology, this "filling in" of notes is only step one; step two is playing with voicings. Open and closed voicings, ranges between voices, and voice leading are all immediately *viewed and heard.* Also, the "lessons" learned are

In addition to his educational work as a teacher and consultant, Neil Waltzer has composed spots for ABC-TV, the United Way, CBS-TV, Pan Am, and others. He has twice been a Clio Finalist, and has won both a Clio and the Big Apple Award. His work has also been heard in movies (The Great Wallendas), *TV* ("Marcus Welby, M.D."), *plays* (MacBird), *and records.*

immediate. It is now possible to do five times as much per class. I've set up the following step pattern for this particular part of the learning process:

✓ *Create the bass line on paper.*

✓ *Enter the notes* (in our Basic Lab, one student enters the notes using the computer while the other uses the Casio CZ-5000's on-board sequencer).

✓ *Listen and explore voicings.* We have eight stations (two students per station) and the instructor can "punch up" any individual student's work on a pair of speakers in front of the room. This system allows all to hear and observe possibilities at every turn. And, of course, it is great fun to hear and share your work. Once again, immediacy is the key. I've always believed that faster paced learning was possible, and that possibility has arrived thanks to MIDI.

✓ *Set the voices with different timbres.* This process introduces concepts of orchestration not usually introduced this early in traditional approaches. Meanwhile, the students become expert at using equipment that once intimidated them.

✓ *Compose an obligato over the progression,* and again explore variety in timbre. This is where we really take off. Having learned how to handle chord progressions, the student enters the domain of the composer. By following a disciplined path, *integrity and unity of all the musical elements becomes apparent as an operating procedure.* Each student begins to develop an individual stylistic approach, and therefore creates more to share with other students.

✓ Finally, *add an additional line to arrive at the subject of counterpoint.* With a monitor in front of you, it's easy to play and control the elements. Even the most basic software allows multi-function editing, so structural (i.e. form) training is also immediately at hand. I decided that all of the above skills would be taught in preparation for work in our Pro Lab, which implements full SMPTE-to-MIDI techniques and covers video/film work as well as audio. The Pro Lab is also where the student digs into the real world of independent production.

Current music technology allows for the integration of the skills traditionally associated with the craft of music, yet at a much faster pace. Meanwhile, the student becomes a master of the tools in the art of music synthesis. Truly, MIDI has opened up a new world to music educators—one that can sometimes be as educational for the teachers as it is for the students. EM

Fast Forward

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Now there's a faster, easier and more productive way to make music with your IBM PC—and it comes from Passport. The same people who brought you the best-selling MIDI sequencers for the Apple and Commodore computers.

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- Each pattern is a free-form, 64-track scratch pad.
- Create and save any part of a pattern as a phrase, solo, bass line, song section, etc.
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- Change tempo instantly or gradually at each step.
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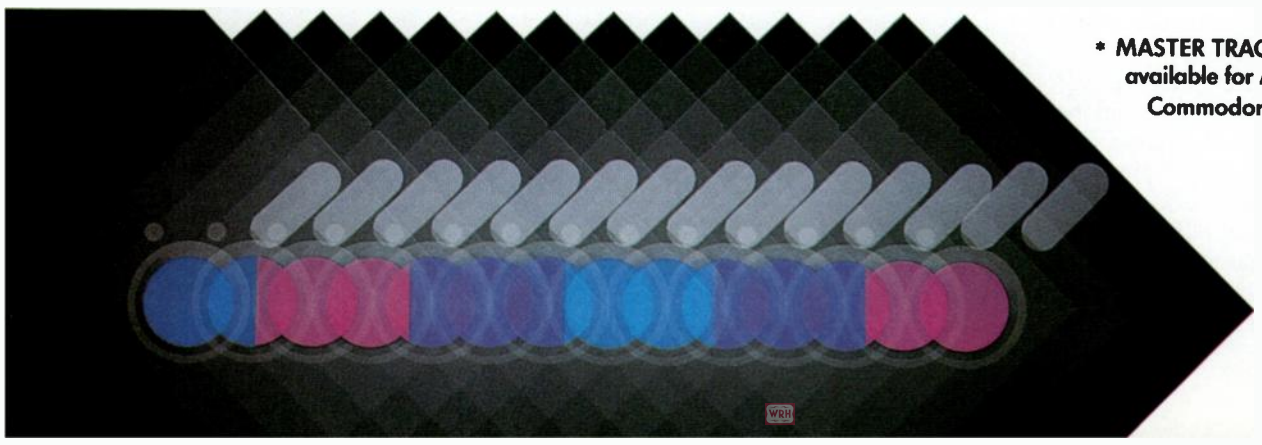
Color monitor courtesy of AT&T.



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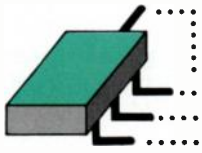

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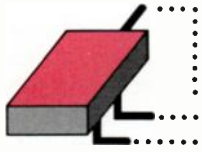

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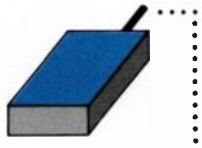

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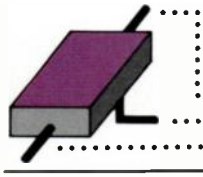

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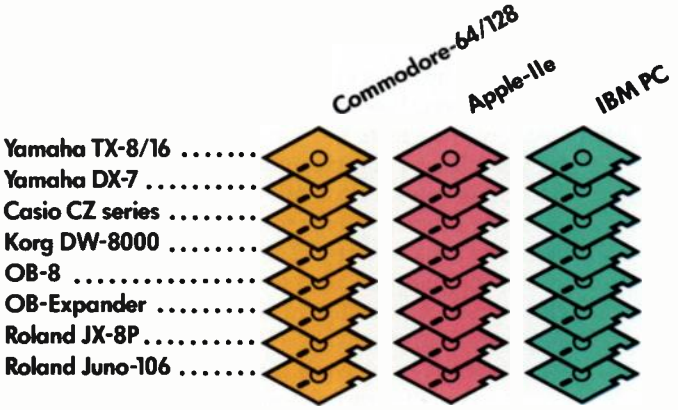
That's not all. Our Librarians are compatible with DX Pro,™ DX Heaven,™ Data 7™ and a multitude of other popular voicing programs. Preset editors are also available for select synthesizers.

Without a doubt, Passport's MIDI Voice Librarians are the lowest-cost alternative to expensive RAM cartridges or unreliable cassette tape recorders.



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After years of success with MIDI music software and interfaces, Passport is still pushing the limits. We are the first company to bring you MIDI Interfaces and MIDI music software. Others come and go, but Passport continues to set the pace.

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For full specifications on Passport's complete product line, see your authorized Passport dealer. Or contact us direct: Passport Designs, Inc., 625 Miramontes Street, Half Moon Bay, California USA 94019. Phone: 415/726-0280. Fax: 415/726-2254.

PASSPORT

The Speed of Sound.

End-users expect equipment to work. Repair techs expect it to fail. Manufacturers expect to sell it, regardless. What's going on here?

Service Clinic: Product Reliability

BY ALAN GARY CAMPBELL

Before I became a technologist/techie/hardware-hacker/whatever, if I purchased some new gear only to discover that it didn't work, I would usually interperet this as a bad omen, and exchange the unit for a new one.

Later I learned about "Infant Failure Mode," a mysterious process by which you could apparently get all your equipment failures in right away. This seemed like a good idea; I mean, if it's going to fail eventually, then why not get it over with? But, still, I wondered how to keep from getting stuck with a lemon.

Some years later, I began to understand that certain types of electronic music systems were inherently more reliable than others, and that certain processes of manufacture, shipping, use, and service could effect product reliability in often predictable ways. Statisticians will tell you that, all other factors being equal, a simple system that contains few parts will be more reliable than a complex one containing many.

Following this line of thinking, modern highly-integrated equipment designs should exhibit enhanced reliability, relatively speaking. At the practical level, the field experience of service centers seems to support this: the Yamaha DX and Casio CZ synths (highly integrated), Moog Rogue (simple circuitry) and other low-parts-count designs are very reliable. This is not to say that a more complex design cannot be made with enhanced reliability; it all depends on how much the manufacturer is willing to invest in engineering, quality control, reliability studies—*and* product improvements.

Reliability engineers will tell you that, all other factors being equal, a system that is treated gently is less likely to fail than one that experiences rough handling or is pushed to its operating limits; and a system that is young (after the Infant Failure Mode period) is less likely to fail than one that's old.

Service field experience also supports this, although some gear that was truly built to take what the musician can dish out seems to utterly defy the rules. When I think of the countless minimoogs and B-3s that still belt it out night after night yet are literally held together with gaffer's tape, I'm amazed. This doesn't give anyone a license to kill gear by abuse and neglect; if you want the highest reliability from your gear, you'd better take care of it. My own subjective evaluation is that with proper care, there is little need for concern over failure due to old age—but, then, not that much gear is properly maintained.

If you want to select equipment based not only on features, but also on reliability, here are some tips:

✓ Buy the best gear you can afford. If equipment is made to be inexpensive (the reader may want to insert the word "cheap" here), it's probably not also made to be rugged. It's better to wait and save for the equipment you really need than to buy cheaper gear that won't hold up.

✓ Purchase equipment produced by an established manufacturer; garage-type operations can turn out some high-quality stuff, but wait until they have a good reputation before you invest in their gear. Also, in these dynamic times, it's wise to inquire into the financial health of a company before you buy their product. You want them to be around if it requires service; and if they're having problems, these problems may be reflected in their gear.

✓ Make inquiries of fellow musicians and repair techs concerning the reliability of the gear in question. You may be suprised, or even shocked by their candor. But don't let one person's comments overly influence you. A disgruntled owner of a perceived lemon could have some pretty negative comments; conversely, some gear acquires an almost mystic reputation after a while, largely due to marketing hype and subsequent gossip. This is politics, not science. Get a balanced viewpoint from several sources before you make a purchasing decision. (An aside here: there really are those occasional "magic" instruments, where everything just comes together to create a unit that

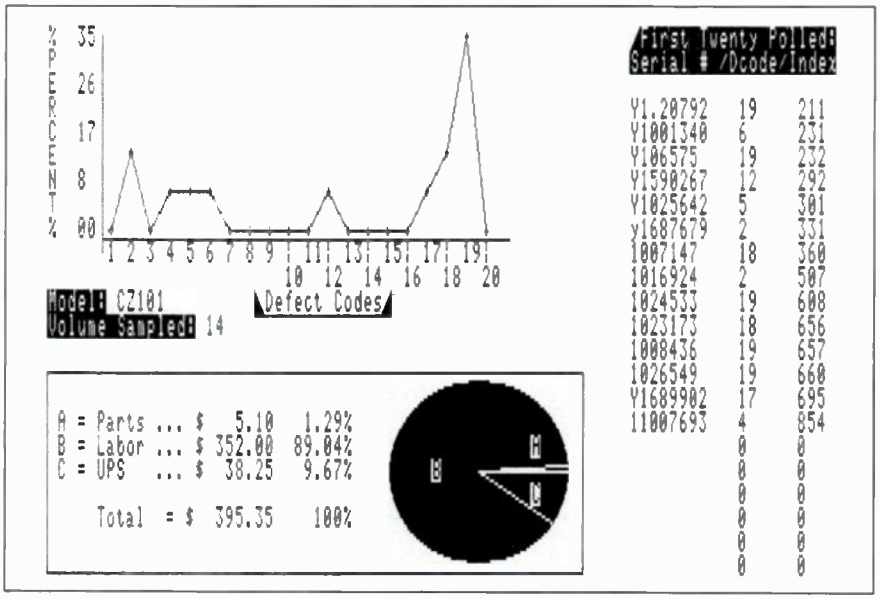

Fig. 1

Alan Gary Campbell is owner of Musitech™, an electronic music consulting firm. Musitech is highly involved in electronic music service and modifications, and has been cited by Moog Electronics, Inc. as one of its top ten authorized service centers worldwide.

How Casio Does It

Casio's approach to product service and reliability assessment is rather remarkable, and I wanted to give **EM** readers a glimpse of it.

Monthly, each Casio Authorized Service Center uses a proprietary interactive program to generate data disks containing information on all in-warranty service performed. These diskettes are forwarded to Casio, where the data is combined into a master database, and statistically analyzed. The processed data is used to generate software "reports" that describe equipment reliability and failure modes, and pinpoint problem areas in the service process.

Each report describes the total number of repairs per category (equipment type); the percentage of total repairs per category; and the volume of each model repaired, and its percentage of the category and total.

The report can even generate detailed graphic displays of data regarding a specific model. **Fig. 1** shows such a display for a report on CZ-101 repairs. The graph in the upper left section is the *Failure Rate Signature*, a method of analyzing repairs relative to defect codes (i.e., failure modes). The columnar graph on the right is a list of CZ-101 serial numbers correlated with defect codes and service center codes. The pie chart in the lower left section gives a breakdown on warranty repair costs (look how much was spent on labor and how little on parts!).

It's easy to see just how much a system like this enhances the ability of Casio Authorized Service Centers to evaluate service problems and increase efficiency. This is the only such system that I know of in the electronic music industry, but I'll report on any others that I discover.

seems determined to work forever. Unfortunately, this sort of thing is often just a statistical coincidence—but it's great when you get a whole production run of "magic" synths.)

✓ Buy your gear from an authorized dealer, and establish a working relationship with an authorized service center *before* you buy. If the dealer is not authorized (i.e., is "bootlegging" products) the equipment warranty may be in question, and if you don't have a working relationship with a service center, who you gonna call if and when it breaks? Don't kid yourself; it's always worth paying a little more for the gear if you can be assured of proper warranty service. New gear frequently requires *warranty updates* to solve reliability problems or bring it up to spec.

✓ Some people are going to write in and complain about this statement, but I feel you should never buy equipment when it's first introduced. Wait until they get the bugs out—six months, at least. When your career partly depends upon utilizing the latest technology, this can be a hard criterion to justify, but it's worth the wait. I do service for a living, and believe me, I *know*.

✓ Avoid buying a "floor sample." Now, this may be hard to do, since virtually everything in a music store is a kind of floor sample. Some techs will no doubt say that I'm indulging in overkill here. But, you never really know just how many hours a demonstrator unit has been run, nor through how many electrical storms it's been left on, nor if it's been loaned out, etc. There's something reassuring about a factory-sealed carton. But remember, a factory-sealed unit has not been checked out locally, so, again, a good working relationship with your service center is recommended.

✓ Finally, take care of your gear. Even considering the time-investment, this is definitely cheaper than replacing it.

Readers may wonder how I approach product reliability, given that I'm both an equipment tech and an end-user. Well, I normally receive the gear, inspect the carton for damage, carefully open it and remove the instrument, then disassemble it to fix whatever is wrong with it!

Okay, so I'm trying to inject a little humor here. Granted, broken gear is not funny, but you should expect your equipment to require some service during its lifespan. Plan for required service before the fact; previous Service Clinics have covered obtaining service, preventive maintenance, and basic do-it-yourself service. Don't forget to plan for the financial requirements of service, too. Allocate some of your equipment budget for necessary maintenance and repairs. **EM**

Even if your music starts as a piece of junk, your sampling mic better not.

The new Shure SM94 Condenser Mic can make a big improvement in your digital sampling–at a surprisingly affordable price.

If you've made a major investment in a sampling keyboard or drum machine, don't overlook the importance of the microphone you're using. A vocal mic, for example, might "color" instruments you are sampling.

To capture your sample as accurately as possible, we suggest the new SM94. Unlike many popular mics, the SM94 has no high-frequency peaks, accentuated presence boost, or excessive low-end rolloff. This prevents overemphasis of high frequencies on instruments like strings and brass, while allowing you to retain the important low-frequency response essential to capturing the fullness and richness of many live sounds.

And its extremely low handling noise minimizes the introduction of extraneous handling sounds that might otherwise creep into your sample. What's more, the SM94 offers exceptionally high SPL capability–up to 141 dB–all but eliminating distortion on transient peaks.

For convenience, you can power the SM94 with a standard 1.5 volt AA battery, or run it off phantom power from your mixing board.

In addition to offering a unique combination of features not normally found in condenser mics in its price range, the SM94 is built with Shure's legendary emphasis on ruggedness and reliability. Features like a protective steel case, machined grille and tri-point shock mount make it rugged enough to go wherever your inspiration takes you.

And for voice sampling, we suggest the new SM96 with its vocal contoured response and built-in three-stage pop filter. Both these fine microphones can bring a new dimension of realism to your digital sampling.

For more information, write or call: Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60202-3696, (312) 866-2553.

First he turned his back on the establishment . . . now he's part of it. But for Philip Glass, success was on his terms.

The Electro-Acoustic World of Philip Glass

BY JOHN DILIBERTO

The success of Philip Glass is a product of the American work ethic and an attitude akin to punk rebellion. Like punks rejecting their rock heritage, Glass, nearly 20 years ago, rejected his traditional classical background. He had nothing to lose; orchestras were never going to play his music anyway. So Glass hit the road with Farfisa organs in the late '60s and early '70s, an unprecedented move for a classical composer (unless your taste for the classics run towards ? Mark and the Mysterians).

Philip Glass is now, of course, regarded as one of the pioneers of minimalism, a stylistic term that he only grudgingly acknowledges. With his ensemble of electronic keyboards, reeds, and voices, Glass created a music that has evolved from the hypnotically repetitive cycles of Music With Changing Parts, *with its juggernaut eighth note patterns, into expansive and dynamically wide-ranging opera orchestrations like* Satyagraha.

Glass has become the best-known classical composer of our era. His music is courted by international opera companies, film producers, and pop luminaries. His recent recording, Songs From Liquid Days *on CBS records, features pop figures like Paul Simon, Linda Ronstadt, Suzanne Vega, The Roches, and Laurie Anderson. It's not "Fifty Ways To Leave Your Lover," but it's actually on the pop charts, a virtually unprecedented feat for a contemporary classical composer and certainly a long way from his first LP,* Music With Changing Parts, *pressed on the small Chatham Square label in 1971.*

While Glass was creating a new music audience coalition that had never existed before, he began to receive recognition from the establishment music world in the form of several opera and theater commissions. First came the avant-garde opera, Einstein On The Beach *(1976), scored for his ensemble. It was followed by* Satyagraha *(1980), a sweeping opera with full string and brass sections and choirs.*

Much of his success can be traced to the electronic/rock instrumentation he's employed. "It may be easier for a younger listener to hear this instead of a string quartet," Glass admits. As Glass's popularity has grown, the technology has become updated with digital synthesizers and Emulators. The interface between synthesizers and symphony orchestras, new music and traditionalism, has generated a bubbling crosscurrent that he's riding through the '80s.

Tuesdays are interview days for Philip Glass. For several years now, he has set aside that day to talk with the press—an act that is both a means of self-promotion, and a way to establish his unique aesthetic. Our interview, which occurred during a recording session for a new Twyla Tharp dance piece, was interspersed with calls from Time, Newsweek, *the* Los Angeles Times *and a half dozen other media outlets, all trying to tap into a phenomenon that has not only changed the course of contemporary classical music but is also . . . popular.*

> *". . . the first problem that a composer has is to find his own voice and the second problem is to get rid of it"*

Electronic Musician: *How does it feel to be part of the mainstream?*
Philip Glass: My God! I never thought of it that way. I suppose that's going to happen . . . do you think it's already happened?

PHOTO: RICHARD PASLEY, © 1983

John Diliberto *is the producer of* Totally Wired: Artists in Electronic Sound, *a weekly program on electronic music produced for Pennsylvania Public Radio Associates and broadcast on public radio stations across the United States.*

EM: *I think so; you're definitely part of a certain establishment.*

PG: Oh, well, that's true. See, mainstream means to me mass culture, and that hasn't quite happened. I'm told *Liquid Days*, the new record, has sold 150,000 copies. Now, that's not a million and a half. That's a lot of records, though, for someone who's spent his life writing concert music and working in opera houses. But I wouldn't call it a mass audience. Mainstream might be closer to the truth in some ways; there are many people in the true music establishment—I'm talking about the people that run the committees, give out the Pulitzer Prizes, and give out the grants and so forth—to whom this music will never be their cup of tea. And they will never acknowledge it as being important or serious. So having said that, how does it feel to be part of the mainstream? It's terrific.

EM: *In the beginning, up through at least* Music In Twelve Parts, *you were using singers more as another instrument. It seems that you've gradually come around to a more traditional way of vocal writing.*

PG: You're talking about classically trained singers and I think that's true. It's important to note that I began working with real opera singers in '78 and learned a lot about singing from them. I solicited their advice on vocal writing; how, for example, the voice can be used for long periods of time without straining it, without tiring it, where the best parts of the voice were. During the first years I worked with a very talented singer and composer, Joan La Barbara, who was interested in the voice as an instrument. What Joan provided when she sang with me was very much that attitude.

EM: *Another aspect of the voice is the way you've been using the Emulator, at least in concert.*

PG: We use the Emulator as a chorus to back up Dora Ohrenstein, a live singer. Since I can't really travel with a large vocal

Artists Under Glass

The sound of the Philip Glass Ensemble is the product of its members as well as its composer. Kurt Munkacsi, who had previously worked as a junior engineer for John Lennon, has been with Glass since 1970 as both producer and live/studio sound engineer. Like an ensemble member, he sits on stage with the musicians during performances, running his mixing console. In addition, he runs Philip Glass's 24-track recording studio and does many of his own productions, including Lucia Hwong's recent *House of Sleeping Beauties.*

Michael Riesman came to the ensemble approximately 12 years ago. A trained conductor, he now leads the Philip Glass Ensemble on record and in performance, as well as playing his increasingly complex keyboard parts. Riesman has worked on several of his own film and theater works and has his first solo recording due out on the new Rizoli label. He claims it will be much more improvisational than his work with Philip Glass.

When I spoke with Munkacsi and Riesman, they were recording the voice track for a Twyla Tharp theater piece with vocalist Dora Ohrenstein. Riesman was not only conducting the singer, but was operating the tape machine with a remote control unit, executing what turned out to be an almost bar by bar punch in of Ohrenstein's voice track. He didn't learn that at Harvard, where he obtained his MA and PhD.

Munkacsi and Riesman talked about how they've helped bring rock recording and performance techniques to the classical music of Philip Glass.

PHOTO: JACK MITCHELL

The Philip Glass Ensemble: Richard Peck, Jack Kripl, Jon Gibson, Dora Ohrenstein, Martin Goldray, Michael Riesman, Kurt Munkacsi, Philip Glass

EM: *How did it evolve that you ended up on stage with the Ensemble?*

KM: First, we were making a statement about how we considered the technical aspects—the electronics, the amplification, and the mixing console—to be part of the music. The other part was very practical; we couldn't afford a separate monitor mixer and stage monitors, so we found the easiest way to keep the sound together was for me to sit with the musicians and hear what they were hearing.

EM: *What kinds of problems did you have to solve with the Philip Glass Ensemble and the mix of instruments that they use?*

KM: In the beginning it was mixing the acoustic saxophones, voice, and violins with the Farfisa organs. Basically what I did was put together a sound system that was like a rock and roll sound system. I miked everything like you did a rock and roll band, at least in those days, which was to stuff the mics up the saxophone bells so everything was really bright and present.

EM: *I understand you use a Macintosh now?*

KM: Yes, we have a Macintosh and Southworth's Total Music program. With this piece, Michael entered all the music into the Macintosh, then we set it up with all of the synthesizers and we did Macintosh-to-synthesizer—direct to 2-

ensemble—I do about 50 concerts a year—I bring Dora and the Emulator, and if she has to have a vocal ensemble with her, she plays along with herself singing. Using this approach with, for example, *The Photographer,* which we recorded with many voices, comes very close to creating the effect of a larger vocal group.

EM: *How did you arrive at the ensemble set up you have which is essentially electric keyboards, reeds, and voice?*

PG: At the outset it was what was available to me. I was working with a number of other composers in my ensemble and since we all played keyboards, the only way to get three keyboards together was to use electric ones. That meant we had to amplify the other players. So what became the sound of the ensemble was really happenstance.

EM: *Do you feel that the new generation of instruments has helped expand your original concept, or have you altered your conception because of new technology that has developed?*

PG: As you probably suspect, both things have happened. We began to use (synthesizers) as they became polyphonic; we're all two-handed keyboard players. Before that I used electric organs and the Yamaha double keyboard. The first synthesizer was maybe the Prophet 5 and then came the Rolands, Oberheims, OBXs, and the DX series. Yamaha has been a big mainstay since that became available; then there's also the Emulator and Emulator II. That's all been within the last eight or nine years.

EM: *What kind of effect has the new instrumentation had on the music you make?*

PG: Let me put it this way: it's given me more possibilities. I've written a lot of symphonic-type music for operas. It's allowed me to take large-scale symphonic works and adapt them for the ensemble so that the ensemble now sounds symphonic.

Michael Riesman, the ensemble's mu-

track tape—as a rehearsal tape for Twyla. Now we've gone back and started adding real instruments.

MR: Total Music is the first program that I've worked with that actually is useable for doing a complete piece of music. Before that I'd been working with the Commodore 64; its deficiencies were aggravating to the point of making it useless.

But this software still has a lot of bugs in it and it's constantly being updated. Once I got used to the system and figured my way around a few quite catastrophic bugs, though, it became pleasurable to work with it.

As far as adding the real instruments is concerned, since we're running out of tracks, we're going to try linking up Total Music to the SMPTE time code on the tape while we're mixing it, and play a lot of synthesizers live while we're mixing.

MR: It seems to be possible. One of the latest updates is that Total Music is completely slaved to the MIDI clocks, so it gets its own song pointer and follows the tape wherever you go.

KM: We're using a Roland SBX-80 to read SMPTE from the 24-track tape; the MIDI output with the clock and song pointer data feeds the Southworth, which follows the tape machine amazingly well.

EM: *Michael, you're a classically trained keyboard player. I assume you have a certain amount of technical expertise. What's it like playing this kind of music that depends so much on really precise repetition of parts?*

MR: That's the challenge of it really, the precise repetition. It's demanding physically and mentally to keep the rhythm steady and not lose your place. Since I've been doing it for such a long time, I've managed to develop a light touch on the synthesizer keyboard so that I can manage to sustain this for a whole performance. If I was playing this as a piano and pushing hard on all the keys I'd wear myself out.

EM: *But you do use the touch-sensitive DX7...*

MR: That's the first of what will probably be a growing army of touch-sensitive keyboards. We tend to sort of not jump in with the latest technology. We let it settle down a little bit and then when it becomes fairly standard we add it and work it into the live performance.

EM: *Your recording methods for* Satyagraha *were unusual for a large orchestra.*

> *"We tend to not jump in with the latest technology. We let it settle down a bit and then when it becomes fairly standard we add it..."*

MR: Christopher Keene was the conductor of the New York City Opera and he was the one we chose to do this performance of *Satyagraha* since he'd conducted the work several times. He came with his rehearsal pianist and we recorded him conducting the rehearsal pianist to get the tempos he liked, the vibratos, tempo shifts, etc. Then I created a click and synthesizer guide track based on that performance. That's what we used when we went into the studio to record the orchestra. Then after the orchestra was on the tape, I replaced that guide track, which was a very simple synthesizer sound, with the appropriate sounds, like strings, woodwinds, etc. Also the performance of that guide track was done on a computer and it was very mechanical and uninteresting.

KM: When we recorded the orchestra, we broke the orchestra, the chorus, and the principal singers up into sections. We did the strings, basses, winds, chorus, and principals by themselves. That way we could set the EQ for each section the way we wanted, and we also got into different types of reverb for each section.

EM: *In fact, I noticed that the reverb on Douglas Perry is a little unusual sometimes. He's in one channel and the reverb, especially on hard consonants, is in the other.*

KM: I like that actually. It was quite intentional. In pop music this isn't very extraordinary, but in classical music—when we make records, the records are the art. Our records are not a sonic photograph of the performance. Our records are the performance and only meant to be heard on the record. We're not interested in reality.

MR: We have occasional arguments about just how far to go in that direction; I like things that are not too extreme. I think we keep it reasonably close to what the real voices and instruments sound like.

—John Diliberto

sic director (see sidebar), does all the programs. Michael told me the other day that he estimated there were something like 50 separate programs that we use in a concert. Now that we have seven synthesizers, I can take a work like the opera *Akhnaten* and adapt that work, which was scored originally for winds, brass, strings, percussion—a symphonic type orchestra—and project that kind of sound from the ensemble. So we're not really doing arrangements; we're really doing transcriptions, where we take the sound of an orchestra and make the ensemble sound like the orchestra.

I tend not to use synthesizers for invented sounds, but either to extend or imitate acoustic instruments. Recently I did a work called *The Descent Into The Maelstrom* which I wrote directly for the ensemble using the programming possibilities of all the synthesizers, and there's no doubt that the way that the synthesizers have evolved so rapidly has extended to a great degree the way I can write for the ensemble. The next stage for us is the MIDI system so we can link several synthesizers together to make composite sounds.

EM: *Oh, you haven't done that yet?*

PG: Well, we do it in the studio and we do it live to a limited degree, but we're going to do more. (MIDI) will allow us to make a much better string sound than we can currently get, and I think it will improve the vocal sounds a great deal. So in a certain way, people who really do electronic music would probably consider this not very adventurous, because what we're doing is trying to perfect and make a kind of neo-realism in terms of acoustic and symphonic and vocal sounds using electronic instruments.

But I have to remind you that all through the '50s, the '60s, and '70s, there was a whole development of pure electronic music where the main currency really was invented sounds rather than found sounds. And for the most part, by and large, it was not successful. I'm not sure why. I suspect that our taste is very conservative in the sense of what we'll accept as real sounds, that largely, the invented sounds are a little too strange for most people, and that we eventually can learn them.

EM: *If I'm not mistaken, one of the reasons that you formed the Philip Glass Ensemble was because it was the only way you could get your music performed at that time.*

PG: That was true and right up through 1979, I would say 1980.

EM: *But now, even though you have access to orchestras and players, you still keep the ensemble.*

PHOTO: CHRIS CALLIS

"I certainly looked at the older generations of composers as people that were my enemies"

PG: Well, the ensemble may not be the only group that can play the music, but it happens to be the best. Remember that we've got a 12 year head start on everybody. I'm playing with people like Michael Riesman, Richard Peck, and John Gibson; Jack Kripl has been with me for 20 years practically, Michael Riesman for 12. Kurt Munkacsi's been designing the sound equipment and overseeing the making of the records as a producer since 1970. I'm talking about an ensemble that plays regularly all year long, 50 concerts a year.

It's not that a full orchestra can't do it justice. Last summer Dennis Russell Davies played several programs with the Philadelphia Orchestra in Saratoga. They were wonderful, wonderful concerts. But I can't go on tour with the Philadelphia Orchestra.

EM: *You've often talked about your music being a reaction to the academic music and the serial, atonal music that was going on up until that point; I would say you were composing more modern orchestral music. Of all the reactions you could have had to that style, why this particular one?*

PG: In 1964, '65 and '66, I certainly looked at the older generations of composers as people that were my enemies. I had to displace them. Everything they did was wrong, almost anything I could do would be right as long as it wasn't that. It was a very emphatic point of view that I had, and for a young man beginning in a highly competitive business as is composition, the music world, writing serious or concert music, it was a psychological boost to have an attitude like that, which was crucial. After all, there were some pretty heavy guys around at that time. Stockhausen, Boulez, Berio and Carter, they're still around and still important, but at that time they seemed like they would be there forever and they were going to run things as long as they wanted to.

Well, it turned out not to be that way, and it's not necessary for me to denounce them as strongly as I did then. I'm not saying that I didn't believe that at the time. I did. From time to time I will resurrect that attitude in all its strength and glory when necessary.

But I think you have to look at what it must have been like. Here I was 26, 27, and there were these guys who had the music world sewn up. And the only thing we could do, I mean we as a younger generation, was to blow them out of the water one way or the other. We just denounced them and got on with our own work. It turns out now, 20 years later, that there seems to be room for everybody. In fact, we seem to have more room than they do which I don't mind at all.

EM: *Your exposure to Indian music seemed to affect the change of styles from serialism to minimalism.*

PG: I had the good fortune to meet Ravi Shankar at a very important part of my life. I would say it wasn't a switch in style because I had no style before. I wrote in the manner of my music teachers. My first real voice came after this period I spent with Ravi Shankar and my travels in the east. I formed an amalgam of ideas about rhythmic structure and my own ideas about pitch structure and that was the beginning for me. Prior to that I had no voice of my own. I wrote a lot of music but it was not particularly interesting.

EM: *You've done five full-fledged operas to date, is that right?*

PG: No, it's six now, *Einstein On The Beach, Satyagraha, Akhnaten, CIVIL warS, The Juniper Tree* with Robert Moran, and the sixth one, *The Making Of The Representative For Planet Eight*, is based on a novel of the same name by Doris Lessing.

EM: *There's an incredibly pristine quality to your music. There's no grit, and I don't mean that in a negative sense at all. There's a perfection to the whole sound that you create.*

PG: Partly, it has to do with the care with which the actual pitches are chosen. There are no extra notes in the music—only the notes that you need. I don't clutter up a score with a lot of altered

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notes or altered chords or passing notes or things. It's fairly spare in that way, isn't it? You might say "minimal." (laughter) But that's a use of the word of quite a different kind. I think that kind of spare writing gives you a lot of space and I think we all fill that space in ourselves. That's part of the aesthetic of it in a way, isn't it?

EM: *Concerning* Songs From Liquid Days, *I know a lot of people are calling that your rock album which it obviously is not. Musically it's not much of a departure from previous Philip Glass music.*

PG: I think the reference is to the people on the record, not to the music on the record. I think you're right. There is no bass, guitar, or drums on the record. There is percussion but not a drum kit. There is hardly a song on the record under six minutes, and one of them is ten minutes. It's really a cycle of songs where each song means more in the group than by itself.

EM: *Have you had friendships or musical relationships with most of the writers you used?*

PG: Yes, I think, all of them. Suzanne Vega is the one I've met most recently and that was about a year ago. I met her just before she did her first record for A&M. But Paul (Simon) and Laurie (Anderson) and David (Byrne), I've known them for years.

EM: *It seems like on* Mishima *that you were writing in a few modes that were not typical Philip Glass styles.*

PG: That was one of the most successful things I've done in recent years, and maybe that's what I liked about it. I'm always interested in things that don't sound like me. There is more of that in *Mishima*; Paul Shrader gave me the script about six months before he shot it and I wrote the music to the script, not to the picture, and he also cut to the music—not the other way around. Were you talking about the guitar things, the Duane Eddy type things? You'd have to see the film to appreciate that the guitar music goes with that character, which is from one of the novels called *Kyoko's House*. It seems obvious, once you see the material, that it would have to go there. I had no compunction about writing guitar music and I'm very pleased with it.

You know, films don't come my way very often. I've done three in my life and I've been writing music for a long time. Mainly I'm not interested in industry films. There's no time to work on them. I insist on the collaborative mode and to be given a finished film and be told that a score is needed in six weeks is simply not interesting; it's like digging ditches to me. And the money isn't worth two months of your time when you could be doing a violin concerto or a scene from an opera or something else. But every once in a while a good film project comes along and another one has. Godfrey (Reggio) has come back with a new film project, a *Koyaanisqatsi* type film. It takes place in the southern hemispheres. It's being shot in Africa, South America, India, Hong Kong, Nepal, a little bit in Northern Europe and New York.

EM: *I spoke with a German composer, named Peter Michel Hamel, who performs a cyclical style music and he said there was a hypnotic aspect to it for the performers in the same way that maybe knitting is hypnotic.*

PG: No, quite the reverse. If you get spaced out you start making mistakes. It takes a state of alertness that I don't associate with hypnosis or trance. The music doesn't repeat that much; it just appears to. If you talk to anyone in the group they'll talk about how attentive you have to be.

"Mainly I'm not interested in industry films . . . it's like digging ditches to me"

I used to do solo concerts. I've been playing the piano lately at home and I'm getting interested in that again. I'm thinking of writing a series of piano pieces next year that I could perform by myself.

EM: *When you're composing, do you ever feel the need to throw in a blaring atonal chord or something dissonant?*

PG: You know, it's funny, I look for moments like that but they don't come up as often as I would like them to. What I mean by that is you're always trying to shake up your own language; the first problem that a composer has is to find his own voice and the second problem is to get rid of it. I'm at the point in my life where there's such a body of work that I'm constantly looking for other ways of doing it.

EM: *But couldn't you create those moments if you wanted to?*

PG: You're getting into the subject of process, and finally music has to have an emotional truth to the person who's writing it. You don't want your music to be lies about what your real impulses are. If it doesn't have that emotional truth to you, then what's the point of doing it? EM

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Sure, music schools teach you to play music . . . but do they prepare you to be a working musician?

Being A Starving Musician Is No Fun . . .

BY ROSANNE SOIFER

. . . but neither is waiting tables or processing words. The decline of mid-sized venues for live music, non-paying showcase clubs, escalating rents for studio, commercial, and apartment space in many urban areas, and diminished governmental support for the arts have all been blamed, and sometimes rightly so. In cities like New York, this has produced an ever-increasing underbelly of creatively unemployed artists and musicians. While making the gross national product even grosser is probably *not* the goal of too many musicians, many of them, no matter what their musical persuasion, are having a hard time paying the bills through no fault of their own. Or is it?

As a professional musician and freelance music journalist, I've seen my share of lean times, but at least I'm always working. However, many musicians with a classical or traditional music education haven't been so lucky.

As one producer/keyboard programmer said, "A producer will come to me and say, 'Give me a sound *like* a clarinet,' never 'Get me a clarinettist.' Also, you can get a Hammond organ sound with a DX7 via MIDI; in other words, you don't have to *play* the organ in order to sound like one. All young musicians should be aware of this."

"Any money-making job, even slinging hamburgers at McDonald's, gives a musician a better grasp of reality than playing six years in a student orchestra"

Whose responsibility is it to make them aware? I recently sat down with Janet Nepkie (who directs the Music Industry Option program and teaches a course entitled "Music and The Marketplace" at SUNY Oneonta) and Richard Broderick (program director for the Music, Business, and Technology Program at New York University) to ask some questions.

EM: What attitudes and misconceptions exist among musicians and music students regarding their work?

JN: We all know that very few people who go into music get rich. Most classically trained musicians don't tend to see their work as a 'product' the way commercially-oriented musicians do, so they tend to do the worst economically. Also, as a music student, you get used to being a music student in a controlled environment. As a music teacher or performer out in the real world, probably teaching and playing the same stuff you did in school, you'll make next to nothing. Most music students have very little commercial work experience when they come to school as well as when they leave. *Any* money-making job, even slinging hamburgers at McDonald's, gives a musician a better grasp of reality than playing six years in a student orchestra.

RB: Talent is the easiest thing in this business. Music programs should train students who are musicians to go into the business end, or if they make it as musicians, to *know* the business, and not starve giving lessons or playing Bar Mitzvahs. Musicians in general tend to have a very limited outlook as to their place in the world of business.

EM: Do these attitudes exist among professional musicians as well?

JN: Yes! Most musicians commonly expect that if they're competent, they *will* make a living, they *deserve* to make a living, and if they're not, it's due to momentary ill chance. We as performers have learned nothing more than to hope the phone rings.

EM: What more could most "traditional" music departments or conservatories do?

JN: Since success in music depends so frequently on referrals, the music faculty or placement service must keep current in all aspects of the business. Giving a recital, for example, is an area that's a prime learning situation for a music student. Most music departments don't take advantage of it. Laying out a program, doing posters, advertising and publicity through campus media, arranging for the recording, etc., should be an invaluable

***Rosanne Soifer** received her BS degree in Music from Indiana University. She has worked as a staff pianist for the dance departments of several colleges, and currently freelances as an accompanist for professional dance studios around New York. She also writes for* Pro Sound News, Mix, Video Systems, *and several other magazines.*

experience. All a student usually does is learn the music and sign up for the hall.

EM: Have job opportunities for musicians in certain areas diminished, and if so, have new jobs in other areas resurfaced to take their places?

JN: Any musician who refuses to learn about and deal with synthesizers is acting the way horse dealers did in the early 1900s regarding cars. Musicians don't realize that we are uniquely qualified to tackle any job at all because of our discipline, training and dependability. Someone who works as a traditional musician should realize, for example, that he or she probably uses good marketing skills to stay alive—and these skills could be turned into a better paying advantage.

RB: Many openings exist today in electronic music because of the creation of new sounds. This will open up more job opportunities in different areas.

NYU and SUNY Oneonta are not the only universities aware that the times are changing in music education. Many schools show some improvement, but *where* are the courses—or at least workshops—in popular piano accompaniment for dance, cabaret, and musical theater (skills which keep most pianists, including yours truly, employed), contracts and entertainment law, self-promotion and music marketing, programming electronic keyboards, jazz, pop, and commercial arranging and lead sheet writing, business and accounting for musicians, music journalism, music video, and so on?

It seems the only time classical or traditional or serious music (what lousy terms!) promotes itself is on public television when the station produces its biannual begathon so it can continue programming classical music, opera, and dance. This, to me, is negative advertising at its worst, since it seems to depict those art forms as corporate or governmental "extras." This, of course, is the opposite of how Europe and the Far East treat artists and musicians—but that's for another article.

Possible classical or "serious" musicians could maybe learn something from their brothers and sisters in pop music. Where are the newspapers, fanzines, and local video shows for classical music? Why are the DJs on most classical music radio shows about as vibrant and hip as boiled cabbage? Both Nepkie and Broderick seem to feel that traditional type music jobs aren't really disappearing due to changing musical tastes, but are becoming less *visible* to the public's eyes and ears. This unfortunately can become the start of a vicious cycle where these jobs *do* disappear. As Nepkie says, "For whatever reason, the word 'marketing' is anathema to most classical musicians—they seem to be more comfortable with 'presentation.' Classical music is killing its own audience through inaction."

I have no hard and fast solutions. Perhaps music departments should start to think more along the lines of total integration with other arts and media departments. It's absolutely ridiculous in this day and age for a university to house radio and TV in one department, music in a second, stage technology and costuming in a third, and dance and theater in a fourth. Business and accounting are usually in a fifth and are not geared to the arts.

No wonder so many musicians have trouble finding work. They don't see themselves as an integral part of an entire multifaceted industry. What's worse, they often learn too late that an expensive traditional music education often prepares them for nothing more than frustrating under-employment. EM

High fidelity stereo recording was never so inexpensive.

Mastering with Beta Hi-Fi in the Home Studio

BY TIM FLUHARTY

The recent explosion of music/electronics technology offers us new possibilities for music creation and production. Never before has there been as much access to professional quality tools as now, or as many different ways to approach being creative with music.

No matter how you create your music, if you want to distribute it you should ultimately produce it in a final, high-quality form suitable for audio cassette or vinyl album production. This is called "mastering" your music, and the finished tape recording is the "master." There are several existing formats: audio cassette (dbx noise reduction recommended), ¼-inch open reel (quarter or preferably half-track), half-inch open reel (half-inch, half track at 30 ips is digital mastering's biggest rival), or a PCM-encoded digital recording on videotape for the penultimate in high fidelity. If you saw Freff's PCM adapter articles in the March and May '85 issues of EM, you know about the wonders of digital recording. But a VCR/PCM adapter combination will cost around $1,000 to $2,500, which is beyond the means of many small studio owners. Don't despair, though—there is a lower cost alternative, Beta Hi-Fi, whose audio is almost as good as digital!

Tim Fluharty is a composer/synthesist who has been experimenting with music and electronics for 15 years. A former Polyphony *contributor, Tim is a freelance engineer/producer and avid home recordist. He is also a member of* Human Folly, *an L.A.-based experimental music collective whose first LP,* Reactivation, *will be released shortly.*

WHAT IS BETA HI-FI?

In the long video format war of Beta versus VHS (basically Sony against the world), "one-upsmanship" has become the name of the game. For a while it seemed the half-inch Beta format might be declining into obsolescence, but the "one-up" that changed all this was Sony's introduction of Beta Hi-Fi (BHF) audio circuitry into their Beta VCRs. The BHF's extremely high-fidelity audio surpasses nearly all formats except digital in frequency response, depth, and clarity of sonic detail.

BHF records sound using the Audio Frequency Modulation (AFM) process. As with FM radio transmission, the audio modulates a high-frequency carrier wave, which is then recorded onto the videotape as part of the normal Beta video signal (actually, four separate carriers of different frequencies are used, two for each of the two audio channels, for superior stereo channel separation).

AFM liberates an audio signal from some of analog tape's liabilities. The rotating video heads produce an effective tape speed of 270 ips, and, while a direct comparison cannot be drawn, the high speeds involved contribute to a high degree of stability. Wow and flutter become, for all practical purposes, inaudible. Since the audio signal is FM until it is decoded, it is largely insensitive to amplitude related problems like tape over-saturation and minor tape dropouts (although major dropouts are another thing altogether).

The FM-encoded audio signal is "squeezed" between the video Chrominance (color) and Luminance (brightness) portions of the video signal (See Fig. 1). The same helical-scan rotating heads used for video also record the BHF audio signal on tape (Fig. 2); thus, if you are also recording video information along with your audio, the two become one signal and are thereafter inseparable (i.e. you couldn't erase the BHF audio without erasing the video signal and vice-versa). If you want to coordinate your high quality BHF sound with a video image, you would either have to have another VCR to play a pre-edited video master, or generate real time video images (from camera, computer, etc.) in order to simultaneously feed an audio and a video signal into the BHF machine (Fig. 3).

To insure compatibility with non-BHF machines, the conventional audio tracks and stationary audio heads are retained. The audio input feeds the conventional audio and BHF tracks simultaneously. However, on some machines, once the BHF tracks are recorded you can then record a different signal onto the conventional audio tracks. This can be additional audio information (although there is no way to precisely sync this track with the BHF tracks) or you can stripe SMPTE time code onto this track; thus you wind up with a high quality stereo master with a SMPTE sync track that you can use to precisely lock your audio to film or video.

However, all this "video talk" needn't concern us (unless we're mastering home-made music videos!) because all BHF VCRs can be operated in "audio only" mode which switches out the video signal. (Of course, not applying any video signal accomplishes the same thing.)

WHY BETA HI-FI?

The price/performance ratio of BHF is hard to beat; consider the following audio

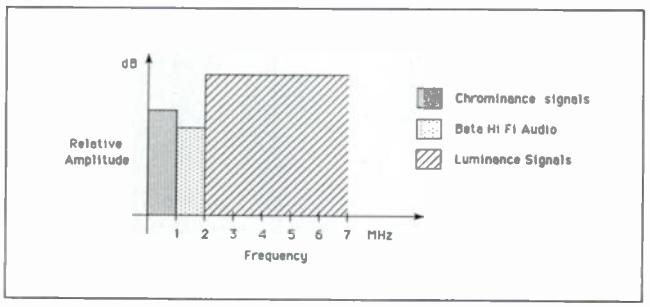

Fig. 1 *Beta HiFi Video Spectrum*

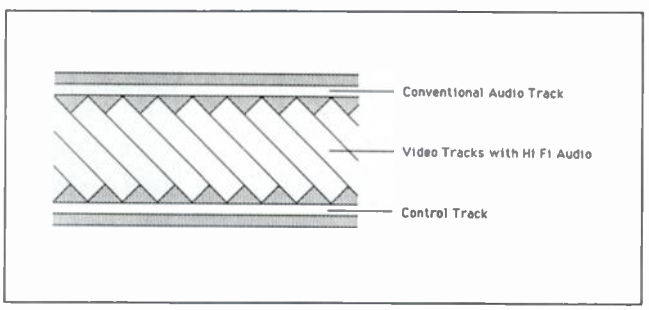

Fig. 2

What about VHS Hi-Fi?

There is also a VHS version of BHF, called (surprise!) VHS Hi-Fi. VHS Hi-Fi offers similar audio performance, but there are important differences between the two systems. Sony thoroughly patented the Beta Hi-Fi concept before introducing it; VHS has tried to catch up by implementing Hi-Fi in a roundabout way. Basically, VHS Hi-Fi machines have two extra video heads that record the encoded audio signal on the tape, after which the normal set of video heads puts the video signal on top of the already recorded audio. VHS Hi-Fi is theoretically just as useful to us as BHF, but I prefer Beta because (1) due to its "underdog" status, in my experience BHF VCRs are typically $100 to $200 *less* than their VHS counterparts; (2) VHS machines have those extra recording heads, which means more expensive parts to replace come servicing time; and (3) Beta utilizes a simpler, more precise tape path. This means less stress on the tape, and that's easier on the video heads.

specifications.

- ✓ Frequency response: 20 Hz-20 kHz, +1,-3 dB
- ✓ Dynamic range: Over 80 dB
- ✓ Signal-to-noise ratio: 74 dB typical.
- ✓ Wow and flutter: less than 0.005%
- ✓ Harmonic distortion: less than 0.3%
- ✓ Stereo channel separation: 62 dB typical.

The figures are impressive, but most importantly, these machines sound *great!* You must hear one to truly appreciate its importance to a home studio. I feel the overall performance is superior to vinyl LPs, though still a notch below PCM digital. And you can get four and a half hours of audio on one five dollar L-750 tape!

You could even combine a PCM adapter (to record audio on the video tracks) along with recording on the BHF tracks and end up with a very high-quality four-channel deck. Simul-sync would, of course, be impossible, but it would still be useful for live recording, archiving all those old 4-track tapes some of us have lying around, or recording dialogue and music simultaneously.

Limitations and Caveats

The biggest limitation of BHF is that, like most PCM encoder systems, any kind of useful editing is out of the question. When you put the machine into record mode, you may get a glitch or a small pop on your tape. Likewise, pressing the "pause" button while recording may or may not produce a click. In practice, you learn to allow plenty of dead silence around potential glitch points.

Because of the switching mechanism in the helical scan rotating head which is spinning at 30 Hz (cycles per second), Sony does not recommend using BHF machines for mastering very critical, sensitive audio information such as sine wave test tones. However, any minor 30 Hz buzz is not noticeable when recording music and other sounds. (Also note that when mastering LPs from a finished 2-track tape, everything below about 50 Hz is usually rolled off to reduce excessive bass information during the mastering process.)

Also, like PCM systems, Hi-Fi VCRs do not let you monitor off the tape, so you won't know for sure what it sounds like until playback. In practice, this is not too much of a problem. Once you get accustomed to the "sound" of BHF, all that's necessary is to keep a watchful eye on recording levels (more on this later). Monitoring *through* the VCR (connect your monitor amplifier to the VCR's *line out* jacks) is highly recommended.

Higher-priced VCRs often have an "index" function; every time you engage "record" mode, an "index mark" is recorded onto the tape. When scanning through the tape on playback, this mark enables you to quickly and easily find the beginnings of different recorded sections (the VCR can be set to stop automatically at each index point). Depending on your budget, this feature could be worth its weight in gold for all the time you'll save trying to locate specific recordings. My BHF machine (a Sanyo VC7200, price approximately $350) lacks this feature, and I miss it. Remember, four and a half hours is a very long time, and searching through a videotape by hand is *slow*. Other useful features are "memory rewind" (machine rewinds to zero on tape counter) and wireless remote control. It's very handy to control the VCR from wherever you happen to be; this saves time and lets you concentrate more on being creative.

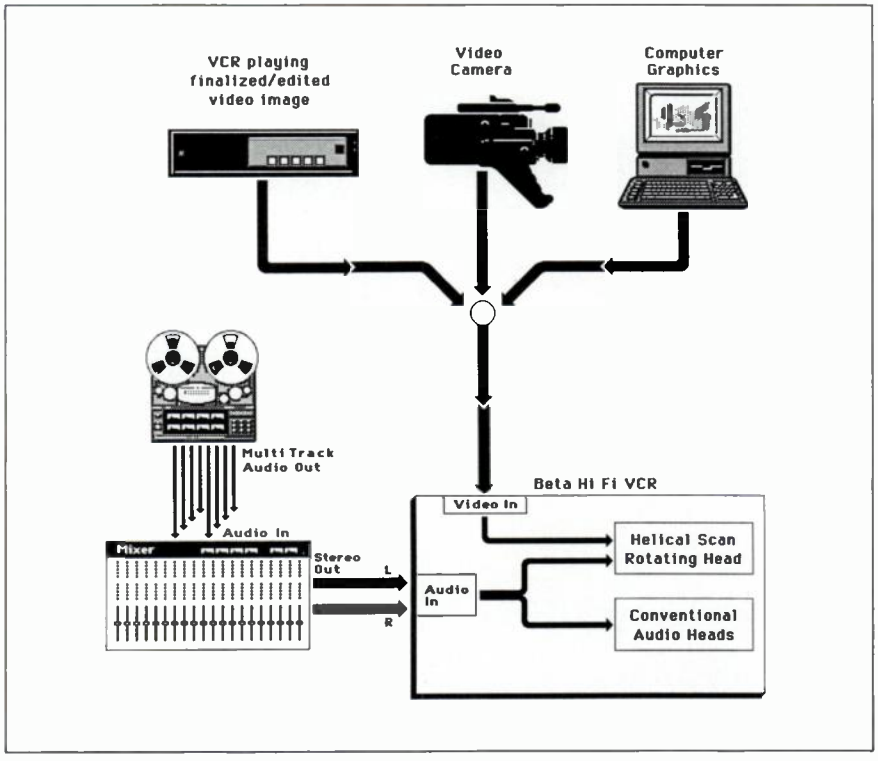

Fig. 3 *The BHF audio and video information are inseparable. Therefore, soundtracks—with coordinated video images—must be fed to the BHF machine simultaneously.*

Tapes and Recording

Which Beta tape to use is a somewhat tricky question. "High Grade," "Extra High Grade," and the like are good bets; I've tried just about every cheapo tape on

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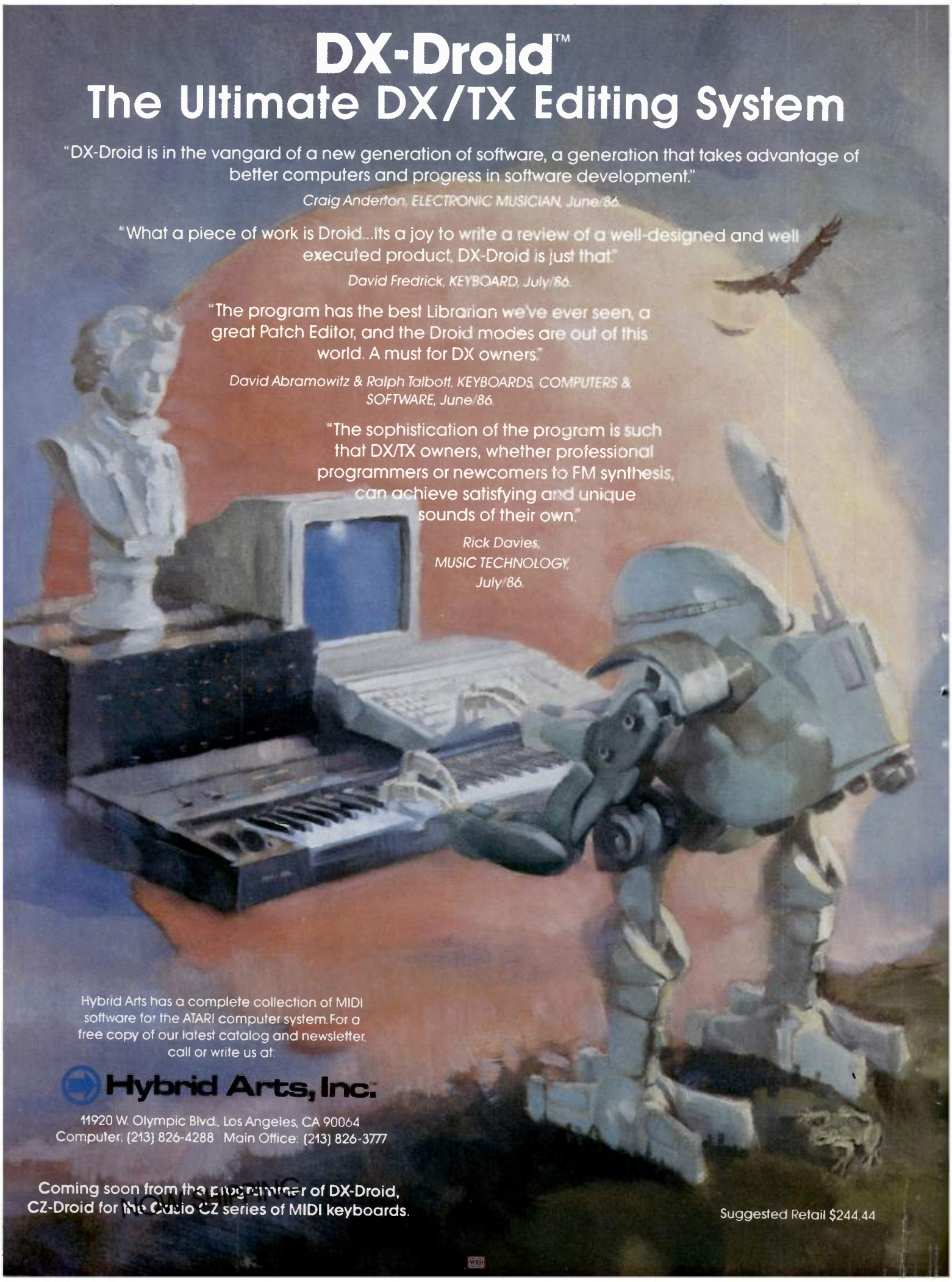

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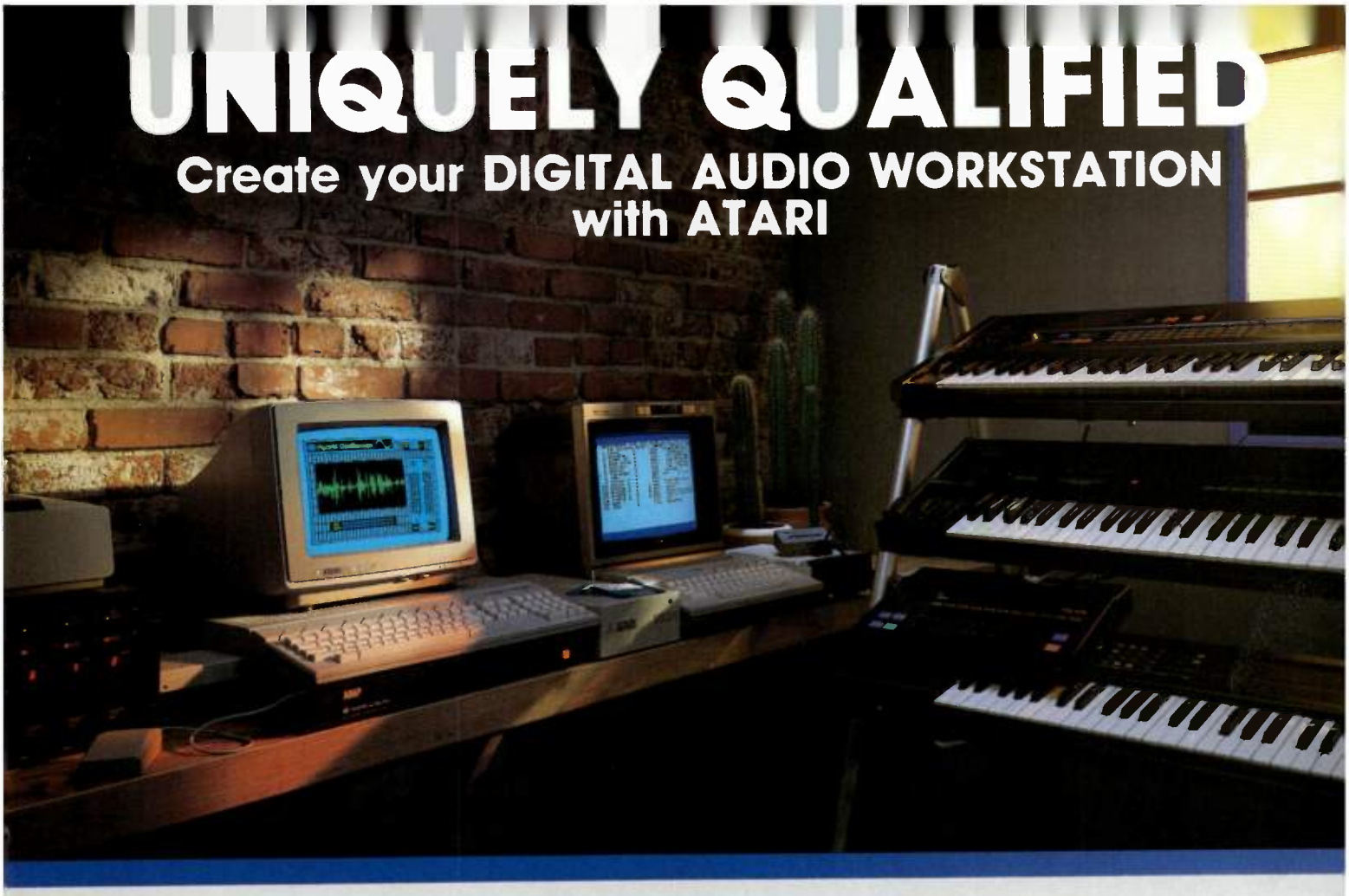

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the market, but the results have not been too consistent. High grade tapes have never given me any trouble. Inexpensive tapes often perform as well as the high grade, though not always. Symptoms of tape problems include major video drop-outs, in which your audio just goes away (silence) for major fractions of a second (sometimes accompanied by a pop), and a kind of "noise pumping," where a subtle white noise type of sound suddenly appears when certain frequencies are present in program material. Some tapes are useless for critical recording (I use these to tape things on TV and such).

My advice is to find a tape that you and your machine like and stick with it. My personal favorite is Sony Dynamicron L-750 UHG, which has never let me down. The shorter length L-500 Beta tapes are becoming less common, but if you can find them, you might want to stock up because L-500 tape is often thicker than L-750, which means better performance for BHF use.

Before beginning a critical BHF recording session, fast-forward and then rewind your new blank tape. This gives the tape a chance to stretch, and smooths out any anomalies in the pancake's windings.

When recording, make certain you are in BHF mode. There will be a switch to select between BHF and conventional audio mode (don't laugh—I've had tracks accidentally recorded on the 37 dB S/N conventional tracks at least once!) Also select *manual* control of recording level—most machines have an automatic recording level function which should be avoided, unless intentionally used as an effect (high fidelity, noise-free pumping can be interesting). Generally, you want your levels to peak at 0 VU. Levels much higher than 0 VU can often be used without producing distortion, but don't get in the habit of doing this, as some day you'll be stuck with less tolerant tape and maybe ruin a session. At elevated levels, the relationship between tape and machine becomes more critical.

As you are recording video signals, it is essential that the VCR's video circuits and transport be well maintained. Clean the video heads every 12 to 20 hours of use. The VCR's *tracking* control should be set near its midpoint and left in that position (tracking affects the head-to-tape positioning, and is usually adjusted if there is a problem playing back a tape made on another VCR).

Taking Your Heads to the Cleaners

There are two ways to clean the video and audio heads on your VCR. The official method is to use one of a number of commercially available head cleaning cassettes. Following the instructions that come with it, you INSERT the cleaning cassette, (with or without adding cleaning solution) and PLAY it. You can either buy or rent these cassettes and, of course, some are better than others.

The other method, which is against almost all manufacturers' recommendations, involves voiding most warranties by opening the case (except for the JVC BR-7000UR, which is one of the only video decks to include a door for easy access to all the heads for cleaning) and cleaning the heads manually. This is not for the frail of heart and should be done only by qualified technicians. I suggest that you have your heads manually cleaned at least twice a year because then they will be cleaner than if you use only a head cleaning cassette.

If you clean the heads yourself, never use cotton swabs because they leave fiber residue; the video head is very similiar in shape to a ¼-inch razor blade and can easily slice cotton fibers into even tinier cotton fibers. I also don't recommend using the foam rubber swabs that people sell as video head cleaners. I feel the video head itself is far too fragile and if you catch the edge of the head with the foam, it is possible to damage the head.

The only manual head cleaning tool I use is a small stick with a piece of chamois on the end. Chamois is the hide of a small goatlike antelope (Rupicapra rupicapra) and is very soft and porous, thus allowing you to soak it with cleaning solution and clean the video heads without fear of damage or leaving fibrous residue. Sony sells chamois-on-sticks (part number X-360-901-90; $4.57 list for a package of five—contact: Sony Corp., 1 Sony Drive, Park Ridge, NJ 07656; tel. 1-800-222-7669) as well as TEAC (item number 1012; $4.99 list for a package of six—contact: TEAC, 7733 Telegraph Road, Montebello, CA 90640; tel. 1-213-726-0303) which you purchase from your local dealer, or you could probably make them yourself if you are handy and have the time.

The video heads rotate and are visible in the diagonal slot in the head drum. The drum should be rotated carefully by hand and held as the heads are cleaned. Depending on your model, there may be from two to five video heads spinning in the drum. Carefully clean all the heads, the face of the drum, the capstan, tape guides, and audio and control track heads (the latter are cleaned like standard audio tape recorder heads).

-Davideo Karr

Life With Beta Hi-Fi

The BHF VCR has transformed my studio—the savings on recording tape alone have been enormous. One of the first things I did was record a friend's digital drum machine. On subsequent A/B listening tests, we couldn't tell the difference between the original and the tape! The transparency of BHF has given me an "extra bounce" in many recording situations. I find I can do something on my 4-track reel-to-reel, do a stereo mix to BHF while adding more first generation tracks, and then bounce back to 4-track to repeat the process with very little loss of quality. The dynamic range is so large that you have plenty of room for dynamics. Having such a high quality medium has encouraged me to develop more music that can be realized in one take, using my sequencers synergistically with live performance. High quality, first-generation master tapes can be produced by those with large MIDI sequencing systems.

During the (BHF) mastering sessions of a recent album project, the BHF audio was compared to a dbx-encoded reference metal cassette, which theoretically has a larger dynamic range than BHF. Comparing the two recordings, I felt the dbx metal cassette was good, but the BHF tape had more depth and detail, which gave a feeling of "hugeness." The BHF tape was then directly transferred to ¼-inch, half-track open reel tape and edited to produce a master tape suitable for mass duplication.

If you are doing *big things* on a budget, investigate Beta Hi-Fi's potential. Very often we home tapers are operating on the fringes of acceptable fidelity, using limited equipment, and the mastering job can make or break a recording project. Using Beta Hi-Fi has relieved me of much anxiety about the quality of my finished work. EM

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It was the first personal computer to make serious inroads into the world of music—but its reign is far from over.

The Musical Apple II

BY ALAN GARY CAMPBELL

The venerable Apple II has been, and remains, one of the most popular and successful personal computers yet produced. In both hardware- and software-intensive applications, including electronic music production, it is an important work and recreational tool for well over a million technologists, educators, small-business owners, musicians, and hobbyists.

The II was the first personal computer for which professional quality, dedicated electronic music peripherals were created, and for which a MIDI interface and sequencer software were available. Now in its fourth generation, the capabilities of the II and its spinoffs keep growing as system prices plummet, and accessory manufacturers continue to produce new hardware and software for the unit (see the software reviews in this issue). Let's take a look at the II, examine the reasons for its success, and review some electronic music products designed to work with it. (Editor's note: As the first serious microcomputer on the market, the Apple II has long been a favorite of "tekkies"; this overview reflects that particular orientation. Also note that addresses for selected manufacturers are included in the text.)

DEVELOPMENT OF THE II

The II is a descendant of the original Apple microcomputer, designed by Apple founders Steve Wozniak and Steve Jobs, using an 8-bit Fairchild 6502 processor they purchased at the first West Coast Computer Fair in 1976. The basic II is an "open system" configuration (see **Fig. 1**); eight internal expansion slots allow the user to plug in interface cards or even complete *peripherals* (accessory devices). This allows fast communication between the cards and processor—a property used to advantage by many Apple-compatible music cards, as we'll see. A minimum complement of cards usually includes a disk drive interface and printer interface.

IIs provide color or high-resolution-monochrome graphics display. Text display is 40 columns by 24 lines, expandable to 80 columns. The keyboard is a standard QWERTY layout, with no numeric keypad. Apple disk drives are 5.25-inch single-sided 16-sector 35-track types (early IIs had 13-sector drives, and also a cassette interface); drive-access speed is relatively fast. An internal speaker provides simple sound-generating capability.

The original Apple II is a 48K machine incorporating the 6502 processor and a slew of TTL support chips. It has an integer BASIC in ROM (i.e. BASIC is available immediately on power-up), but the more advanced operating system, *Applesoft*, must be loaded from disk. The keyboard driver is limited to upper case only. The II (and subsequent models) suffers from a somewhat undersized power supply that tends to overheat if all the slots are filled.

The Apple II+ is a 64K unit; the extra 16K RAM and Applesoft are contained in a "language card" plugged into slot 0. (The language card is available as an upgrade for older units.) The keyboard can access both upper- and lower-case characters.

The present incarnation, the IIe, is a completely redesigned model that replaces the II's TTL logic chips with proprietary VLSI chips (Very Large-Scale Integration). It can access up to 128K RAM via bank-switching, and has 80-column text display.

The IIc (a later design than the IIe) is a departure from standard II hardware. This device uses a low-power CMOS 65C02 processor in a 128K "quasi-portable" design, with a single internal disk drive, ports for a second drive and serial printer, and no card slots (a clone, the Laser 128, has a single slot—see sidebar). A battery pack and LCD display are optional.

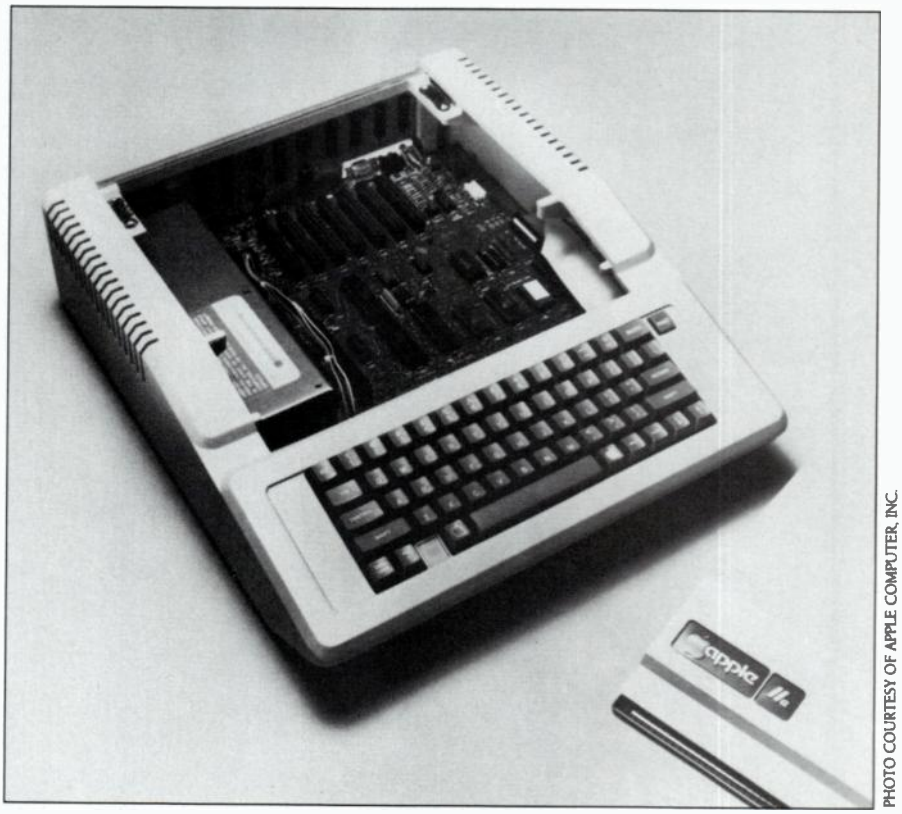

PHOTO COURTESY OF APPLE COMPUTER, INC.

Fig. 1

Alan Gary Campbell is owner of Musitech™, an electronic music consulting firm. Musitech is highly involved in electronic music service and modifications, and has been cited by Moog Electronics, Inc. as one of its top ten authorized service centers worldwide. Campbell is also a synthesist and technical writer.

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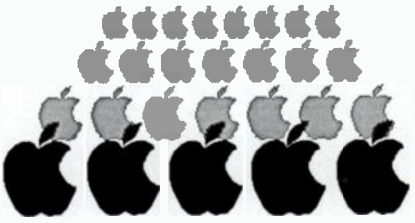
Will the Real Apple II Please Boot Up?

During the II's heyday, many manufacturers wanted a piece of the Apple "pie." There were numerous offshore clones, like the Pineapple and Orange+; American copies, like the Franklin Ace 1000; and even a high-end European non-clone that was Apple-compatible, the Basis 108.

Many of these clones contained copies of the II's circuit board artwork and mechanicals. Some even contained duplicates of Apple's complete operating system in ROM! Apple decided to crack down on such patent and copyright infringement, and sued Franklin Computer Corporation. Franklin was required to pay damages to Apple, and to replace its infringing ROMs. The U.S. Customs Service now seizes attempted imports of infringing offshore clones,



but there are still a lot of them out there.

If you're considering a clone, be wary. Clones are notorious for being incompatible with certain hardware and software, and it's often very difficult to obtain service, parts and documentation. Besides, you can often purchase a used Apple for about the same price. Apple groups sometimes support clones as well, but not always.

Your best clone bet is probably a Franklin 1000 (cross between a II+ and IIe, with 64K, upper/lower case, a heavy-duty fan-cooled power supply, and excellent keyboard with numeric keypad—early models are preferred), or an "unclone" Basis 108.

There are some legal clones in production, like the recent Laser 128, a IIc look-a-like/work-a-like. The Laser gets around the ROM infringement problem by licensing its own version of Microsoft BASIC (on which Applesoft BASIC is based), and altering the code to provide compatibility. The 128 improves on the Apple original by the addition of a single card slot on the side of the unit. However, the -5V, INT, and DMA signals are not available on the card connector, so any MIDI cards or other cards that require these will not work with the Laser.

Numerous independent manufacturers supply hardware for the II. In addition to the electronic music gear mentioned below, there are tons of disk drives, hard disks, printer interfaces, modems, monochrome and color monitors, industrial devices, etc.

The II's Success

Apple waged a highly successful campaign to place the II in educational settings by offering subtantial discounts to educational institutions, and thorough after-the-sale service and software support. Then they blitzed the small business and home-user markets.

The II's principal competition in the early days consisted of the Commodore C-64, and the Timex/Sinclair 1000. It was fairly easy for Apple to convince "serious" users that the II could out perform those units.

Software Overview

The excellent documentation provided by Apple for all of its computers has encouraged software (and hardware) developers to create substantial packages for Apple products—especially for the II. The II may have the broadest range of commercial and public-domain software available for any computer. Literally thousands of programs exist, including some nearly legendary titles. Before getting into music programs, let's take a look at what else the Apple II can do for you.

Popular word processors include MicroPro's *Wordstar*, Artsci's *Magic Window I & II*, Broderbund's *Bank Street Writer*, and Apple's *Applewriter*. Applewriter deserves special mention: it's a uniquely powerful control-driven word processor, incorporating a Macro supervisory languge called "WPL" (for *Word Processing Language*). WPL programs augment the already-comprehensive functions of Applewriter to produce form letters, mailing lists, complex find/sort/replace operations—even camera-ready graphics when used with Apple's Laserwriter printer. I word processed this article using Applewriter.

> *"The II may have the broadest range of commercial and public-domain software available for any computer"*

Spreadsheets for the II include Visicorp's *Visicalc*, and Artsci's *Magicalc*. Combination database/spreadsheet/text packages include Software Publishing Corporation's *PFS File/PFS Report/PFS Write* and Apple's *Appleworks*.

There are applications packages for the II on nearly every subject from Pong to prehistory. The above list of titles is more noteworthy for its omissions than its inclusions.

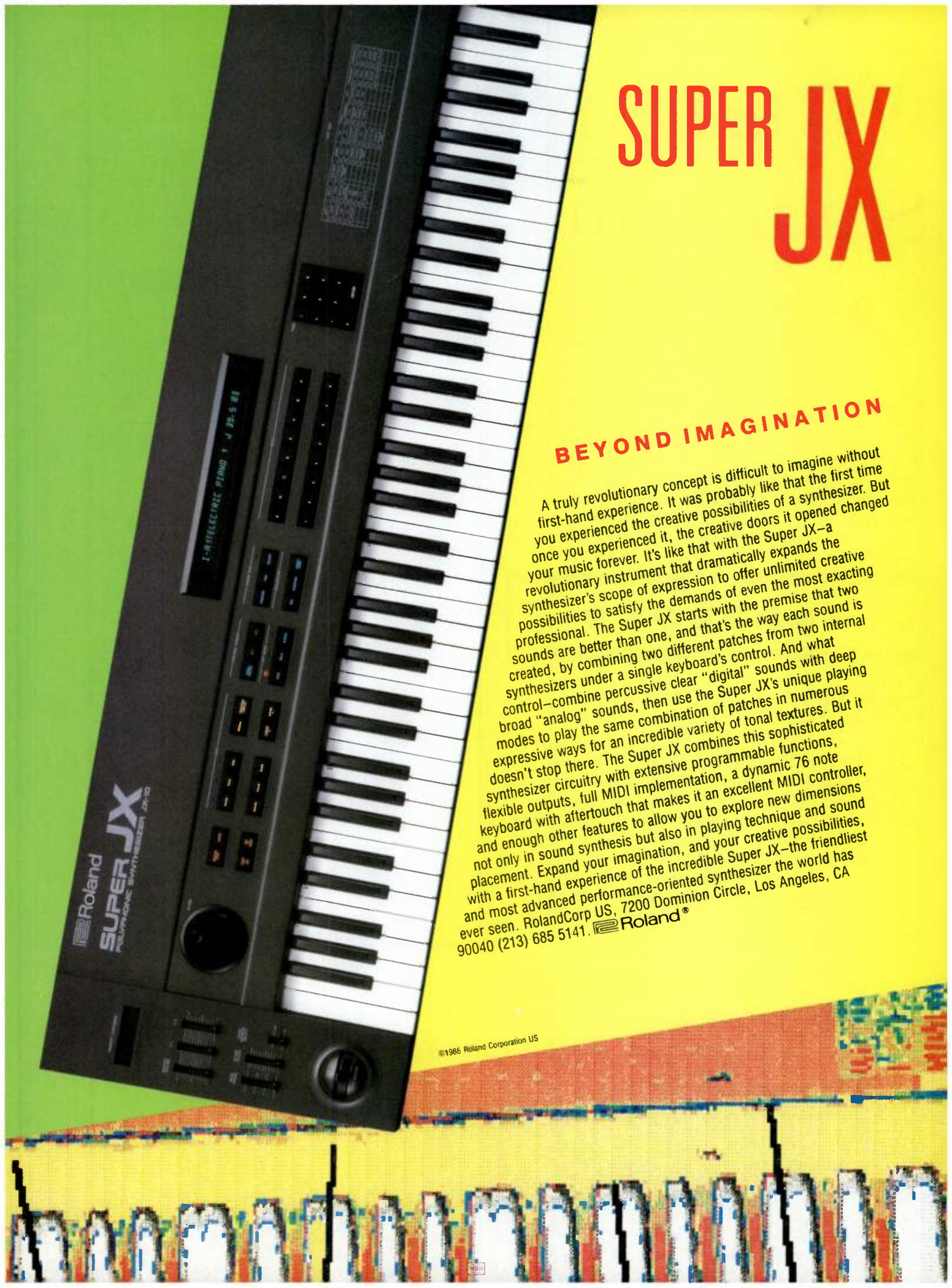
For jobs you would normally expect an 8-bit micro to handle, such as word processing or MIDI sequencing, the II is limited mostly by its RAM capacity. A 64K Apple II+, for example, could contain the RAM-resident portion of the word processor or sequencer software and probably have room left over for about 5,500 words, or 8,000 notes. This is enough for many applications; however, Apple has recently upgraded its operating system from the previous DOS 3.3 to *PRODOS*, which allows the II to access hard disk and high-density floppy drives, and provides simplified I/O routines.

Apple II programming languages include: BASIC, FORTRAN, COBOL, Pascal, Forth, Logo, CP/M (with a Z-80 card), and C—and the II is an excellent 6502 assembly-language machine.

Apple has active users groups in nearly every major city. There are several magazines devoted solely to the II and other Apple products, including: *inCider, II Computing, A+, Nibble*, and *Call A.P.P.L.E.* (see sidebar).

Electronic Music Applications

The internal sound-production capability of the II is rather limited, and is probably best reserved for error "honks" and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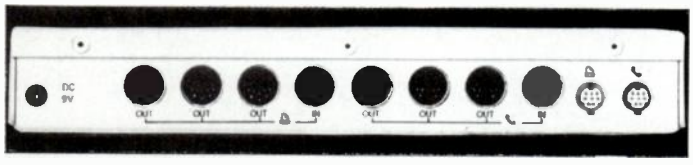

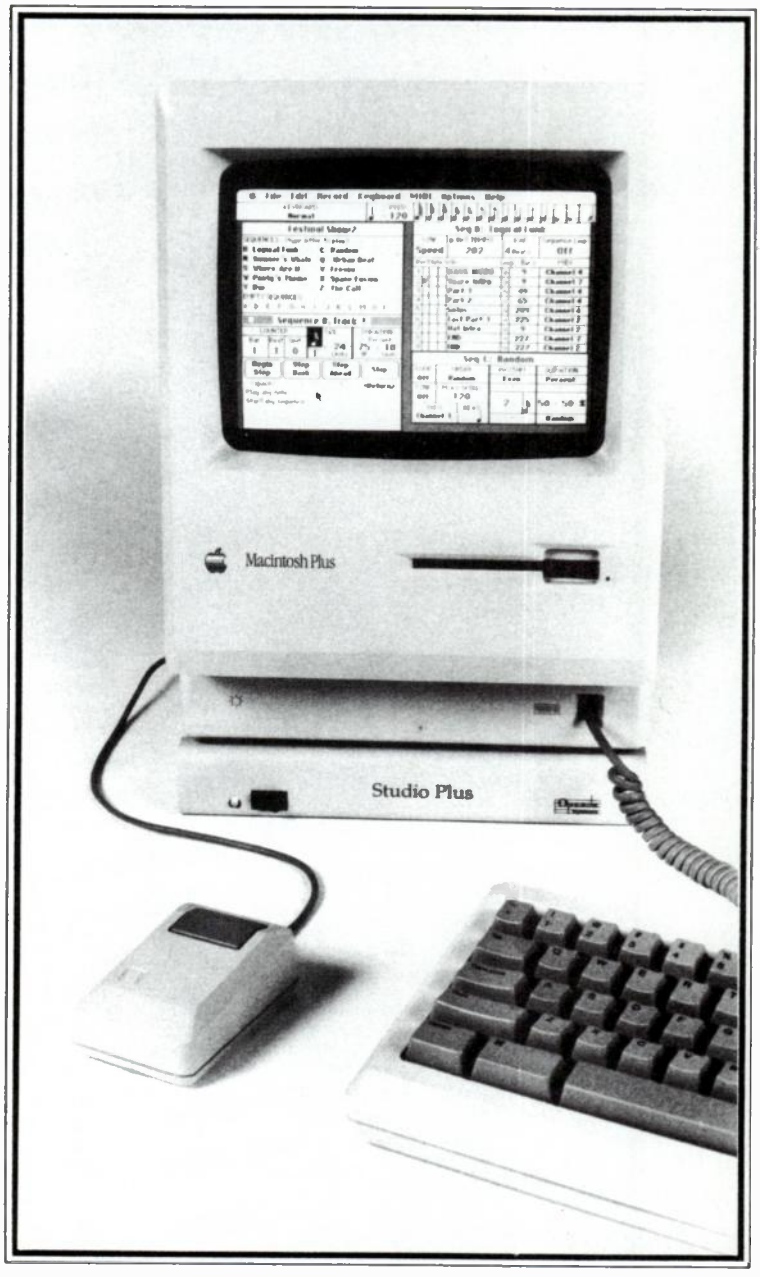

Sequencer 2.5

Did you ever move text or pictures or spreadsheet data from one Macintosh program to another but wonder why you couldn't do the same thing with your music? No problem! In the latest version of our popular Sequencer, you can print out your music files using Electronic Arts' *Deluxe Music Construction Set 2.0* or Mark of the Unicorn's *Professional Composer*. **Sequencer 2.5** also has MIDI files so you can move your sequence data from one program to another. Watch for many other programs to support MIDI Files in the near future.

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programming experiments. Music devices for the II generally hardware-assist the CPU with secondary logic, math blocks, or even co-processors on plug-in cards. The combined hardware is then driven by disk-based software.

The devices listed below are still in production unless otherwise noted. In any case, the descriptions are given in the present tense, since there is a lot of this stuff out there, and you should be able to find those items that are of interest.

MOUNTAIN COMPUTER MUSIC SYSTEM

The MCMS is a complete (hardware and software) 8-bit digital music synthesizer. The hardware consists of a pair of plug-in cards: a processor card that hardware-assists the II to do digital synthesis, and an output card that contains the system DACs, output filters, and audio interface. The MCMS provides 16 logical oscillators configured as two eight-oscillator groups that output in stereo. Each logical oscillator can have its own waveform, ADSR amplitude envelope, and pitch envelope, making the system poly-timbral. The output card includes a sector-oriented light pen that can graphically enter waveform harmonic levels and music data.

The software, contained on two double-sided diskettes, includes additive synthesis programming routines that allow the user to specify the relative levels of the first 24 integer harmonics (phase is not controllable), the envelope parameters, and oscillator panning. Also included are comprehensive music notation and printing routines, notation-to-sequence conversion, and pre-recorded sequences.

The audio quality of the MCMS is, in context, excellent. The system delivers surprising performance and features. It's a common peripheral in physics and engineering classes; it makes an excellent Fourier synthesis demonstrator. Several of the devices below either work in conjunction with or support the MCMS.

SOUNDCHASER

Passport's Soundchaser system is a music keyboard/interface/software set that works with the MCMS to provide real time keyboard performance and sequence control. In fact, it doesn't function without the MCMS (it *can* drive the Decillionix DX-1; see below); when you purchase a Soundchaser you get an MCMS with it. The Soundchaser has been used by artists as diverse as Grateful Dead keyboardist Brent Mydland and Japanese multimedia artist Dr. Masami Kuni.

The Soundchaser incorporates additive synthesis similar to the MCMS, but only the first 16 harmonics are controllable, and the pitch envelopes are replaced by LFOs. The Soundchaser, however, allows the user to draw or edit waveforms with a joystick or game paddles, perform digital filtering, and replace sine harmonics with complex waveforms.

The Soundchaser appears in several versions. The SC-01 is a four-octave keyboard with 4-track, and later, 16-track sequence/performance software. The MX-5 is a five-octave keyboard that replaces the three cards of the SC-01 system with a single, proprietary card designed by Passport.

Numerous utilities are available for the Soundchaser, including alternate tuning routines (just, meantone, microtonal, etc.), music transcription and editing software, advanced sequence editing software, and several educational (ear-training) packages.

The SC-01 is out of production, but the MX-5 design and associated software were purchased by Wenger Corporation (555 Park Dr., P.O. Box 448, Owatonna, MN 55060; tel 507/451-3010), and are still available. Passport has converted the Soundchaser music transcription and educational packages for MIDI operation.

ALPHASYNTAURI

Like the Soundchaser, the alphaSyntauri is a musical keyboard/interface/software set that works with the MCMS. The capabilities of the two products are similar. The alphaSyntauri has been used extensively by jazz-fusion artist Herbie Hancock.

The alphaSyntauri, too, uses additive synthesis routines; additionally there is a Hammond B-3 drawbar simulation mode, and simple waveform spectral analysis. The Syntauri has both four-and five-octave keyboard versions; the five-octave version is velocity-sensing, with sustain and portamento footswitches.

Numerous utilities are also available for the alphaSyntauri, including alternate tuning routines, music transcription and editing software, advanced sequencing software, and several educational packages. There is even a stand-alone (uses MCMS only) "Dolphin Communications: Sounds" package, developed by the Dolphin Research Center, Marathon Shores, Florida, to study whistle codes.

The alphaSyntauri is out of production, and Syntauri Corporation is out of business. However, user support is provided by *S.U.N.*, the Syntauri User Newsletter, a bimonthly Australian publication. (Editor's note: I once received an e-mail message from what I thought was an alphaSyntauri/Soundchaser Users' Group in the U. S., but the text was too garbled to be intelligible. If you're out there, please send a notice to **EM's** User Group Listings.) S.U.N., 14 Bennalong St., Granville, N.S.W. 2142, Australia.

DECILLIONIX DX-1

The DX-1 is a hardware/software set that turns the II into a monophonic 8-bit sampler. Sampling rate can be varied from 780 Hz to 23 kHz, with up to ten seconds of sample time. Eight "multi-samples" can reside in memory, triggered from the Apple keyboard, or triggered externally via the joystick port. Samples can also be played chromatically from the Soundchaser or alphaSyntauri keyboard. Common sample-manipulation features are provided, including truncation, playback-rate adjust, and forward/reverse modes; but samples cannot be looped. The basic software includes drum-machine-like sequencing, and preprogrammed rhythms. Twenty-two pre-recorded samples are included, and additional pre-recorded samples may be purchased separately.

Numerous utilities are available for the DX-1, including *P-Drum*, an advanced rhythm sequencer program, and *Echo*, a real time digital delay program. Compu-

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"Into a nearby phone booth. . . look, up in the sky! It's wholesale! It's retail! No, it's. . . *nonprofit?*"

It's the Apple Puget Sound Program Library Exchange (A.P.P.L.E., for short), an independent support group of Apple product users, and *the* source for nifty, powerful, low-cost Apple software and accessories. Officially, A.P.P.L.E. is a non-profit co-op; if they make a profit, members receive a rebate. Non-members can order from their catalog, too. A.P.P.L.E. sponsors development of super (no kryptonite) software packages at budget prices, *and* most of their titles are not copy-protected. They publish the semi-technical *Call A.P.P.L.E.* magazine, and maintain a technical assistance hotline. A.P.P.L.E., 290 SW 43rd St., Renton, WA 98055; tel. 206/251-5222.

ters & Music offers second-source software for the DX-1, including: *Interpolator,* a Fourier analysis/resynthesis package compatible with the Soundchaser, Syntauri, and MCMS that also converts DX-1 wavetables to MCMS format; and *MIDI Madness,* a program that allows an external MIDI keyboard or sequencer to control DX-1 chromatically, with velocity sensitivity and multiple keyboard "splits."

PVI DRUM-KEY

The Drum-Key is a "drum machine on a card," and includes system software that turns the II into a fairly respectable rhythm programmer. The unit provides 28 read-only percussion sounds (user sampling is not provided); all sounds can be played in real time via the Apple's keyboard. Patterns are programmed via an interactive graphic display, and autocorrect is provided. The unit can access up to 100 patterns and 26 songs. A Sync Out jack allows the Drum-key to clock external sequncers or other drum machines. The user can select an audio or visual metronome.

The Drum-Key is out of production. However, the PVI group went on to form Ensoniq, makers of the Mirage, ESQ-1, and other VLSI marvels from Malvern.

IQS SPECTRUM ANALYZER

The IQS Series 401 is a Fast Fourier Transform (FFT) Spectrum Analyzer card for the II. Up to 4,096 sample points (expandable) may be acquired with sample rates of 0.2 Hz to 200 kHz. The 401 provides screen displays of waveforms, power spectra, and phase and group delay. Log or Linear Spectral decay curves may be produced with a plotter or printer, with various user-selected weightings or "windows." A separate utility, *TimeSpectrum,* allows greyscale plots of the analyzed data. IQS also manufactures *IQSynth Wavepak 1* (Version 2.0), a stand-alone utility that can be used with or without the 401 to generate wavetables for the MCMS. IQS Inc., 12812-J Garden Grove Blvd., Garden Grove, CA 92643; tel. 714/539-7842.

COVOX VOICE MASTER

The Voice Master is an inexpensive speech synthesizer/voice recognition hardware/software system. The hardware consists of an external audio digitizer module that plugs into the II's joystick port, and an attached boom-mike/headset. The software contains several separate utilities: *Speech Synthesizer* allows you to digitize and store up to 64 words, phrases, or sounds for recall under program control. Complete vocabularies and phoneme banks can be created using your own voice. The sample/playback rate, volume, and playback mode (forward/reverse) are user-selectable. *Word Recognition* allows programmers to train Voice Master to recognize words or phrases and execute program commands. There is also a utility to display real time voice spectra in bar graph form.

Voice Master's most interesting utility is *Voice Harp,* a pitch-recognition program that allows you to enter music data by humming or whistling. Voice Harp provides real time music transcription in conventional notation, which can then be edited, transposed, harmonized (also under voice control), played back, saved to disk, or printed. Voice Master uses the Apple's internal speaker for monophonic sound output; an optional output processor card, *Sound Master* provides three-part harmony, sound effects, and improved speech synthesis capability. Covox, Inc., 675-D Conger Street, Eugene, OR 97402; tel. 800/523-9230.

MIDI FOR THE II

Many manufacturers offer MIDI products for the II, including MIDI interface cards from Passport Designs, Decillionix, Syntech, Mimetics, Lemi, Steinberg, Greengate Productions, Korg (same as Passport model), and Roland; Roland also has its high-power MPU-401 intelligent MIDI interface. Passport Designs offers a MIDI interface for the slotless IIc, that plugs into its printer port; J.L. Cooper offers an internal mod that allows the IIc to drive the MPU-401.

Apple II-compatible MIDI sequencer software is available from Passport Designs, Dr. T, Syntech, Mimetics, Lemi, Steinberger, Greengate Productions, Korg, Roland, and others.

Various II-compatible MIDI patch voicing and librarian programs are available, including some rather advanced software, such as the Nexus *FM Drawing Board* for DX/TX synths, and Ensoniq's *Mirage Visual Editing System.* Decillionix offers *Synthestra,* a MIDI keyboard sequencer/control processor.

Passport's *MIDI Pro Tool Kit* (IIe and IIc versions available) is a software development utility (manual and disk) for programmers working with the Passport MIDI interfaces. Included are assembly language driver routines for communication between the II and interface; object code and fully-documented source code are included.

STAND-ALONE MUSIC SOFTWARE

Several manufacturers produce stand-

—page 88

The Non-Musical Apple

Here are some Apple plug-ins that you might want to have in your workshop or studio, even though they don't make a sound:

Northwest Instrument Systems' *Model 85 aScope* turns the Apple II into a 50 MHz programmable dual-trace digital storage 'scope. The unit provides normal and auto trigger modes with a sweep range of 10 ns/div to 1 ms/div, and vertical sensitivity of 5 mV/div to 5 V/div. Stored waveforms may be printed or saved to disk. Direct voltage readings may be obtained from the waveform display. Northwest Instrument Systems, Inc., P.O. Box 1309, Beaverton, OR 97075; tel. 800/547-4445.

I-tek's *Model 200 Digital Oscilloscope* card turns the II into a 200 kHz digital memory 'scope. Up to 2048 sample points may be acquired at a sample rate of 400 kHz. Stored waveforms may be printed or saved to disk. Direct voltage readings may be obtained from any sample point. I-tek, 237 Prentiss Industrial, Boston, MA 02166; tel. 617/265-1100.

JDR Microdevices has some great Apple II products, including their *Digital IC Tester* card, *EPROM Programmer* card, and *300 Baud Modem* (this is the Total Telecommunications modem covered in last month's "Budget Modems" article). JDR Microdevices, 1224 South Bascom Avenue, San Jose, CA 95128; tel. 800/538-5000.

Cyborg has their *Isaac* family of instrumentation and control interfaces, to allow your II to automate laboratory apparatus and test equipment. Cyborg Corporation, 55 Chapel Street, Newton, MA 02158; tel. 800/343-4494.

For the hacker who has access to an Apple II, a DX7, and a Passport MIDI interface, here's the structure for programming your own patch librarian.

Apple II Memory Dump Program

BY ANDREW NEWELL

A *memory dump* involves the transfer of either a part or all of memory from one device or medium to another, usually for the purposes of safe storage. Since internal memory on most synthesizers and drum machines is limited in size, the full power of the instrument is dependent on the ability to save its data and use memory anew.

Although cassette storage is faster than recording patch data with a pencil and paper, the synthesist must take extra pains to get the record and playback levels just right or else it won't work. (My observation is that more expensive tape decks don't work as well as the cheaper ones, and that tape quality never seems to make a difference.)

By far the most accurate and simplest way to regularly maintain records of song and program data is with a computer and disk drive. It is also the most expensive and complicated method since it involves the purchase of a computer, an interface, and software.

THE HARDWARE

The software discussed below was written for the Apple IIe, whose heart and soul is the much-maligned yet stalwart 6502 microprocessor (μP). This chip runs at a speed of 1.2 MHz and can perform up to 500,000 single byte instructions per second. Communication between MIDI-equipped synthesizers/peripherals occurs at the rather high rate of 32.25 KBaud (31,250 bits per second) for an effective transfer of 3,000 bytes per second, thus minimizing time delays between separate pieces of equipment. The IIe runs many times faster than MIDI, and that is good.

The required interface for my software is the popular Passport Systems interface; it includes a 6850 asynchronous communications chip (see sidebar) and 6840 programmable timer module. The software discussed herein concerns itself only with the 6850 chip, which is programmable and looks to the computer to be two distinct locations in its memory. These locations are 49320 ($C0A8; see sidebar on Number Systems) for the control/status register and 49321 ($C0A9) for the send/receive data register. Information concerning the handling of the MIDI data being communicated is available at some time at the control/status register, while the actual data is at the data register. When you write to location $C0A8 you affect the 6850's control register, and when you read location $C0A8 you obtain the information currently in the 6850's status register. Similarly, when you write to location $C0A9 you transmit data, and when you read location $C0A9 you receive data.

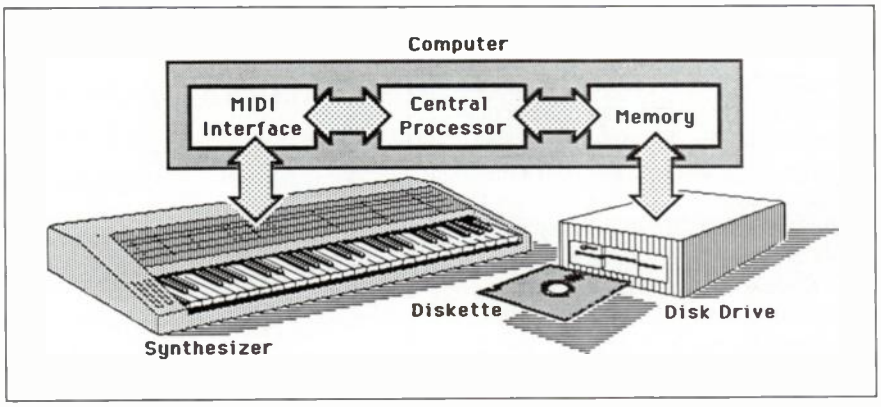


Fig. 1 *Apple Patch Librarian*

Interfacing to the Apple

The interface is crucial to the communications link between synth and computer. The Passport interface fits into the standard serial slot of the Apple, which indicates that MIDI communication is accomplished by a *serial bit* transfer. This process transfers data one *bit* at a time, from one device to the next, thus explaining the need for a high rate of data transfer.

The 6850 asynchronous communications chip accepts these bits and configures them into *bytes*. Once eight bits (which equals a byte) have been received, the status register flags the computer, which hopefully has been programmed to grab the byte and stick it somewhere into its own memory for use later on.

In this case, the data to be stored comes from the Yamaha DX7. **Fig. 1** shows how these various devices communicate with one another.

THE MIDI CONVENTION

Within the language of MIDI, certain bytes signify certain events. This process depends on a predetermined hierarchy, therefore making the order in which bits are transferred crucial to accurate communications between devices. MIDI structures its DATA into five categories: *Channel, System Common, System Real Time, System Exclusive* and *System Reset*. Each of these categories is identified by specific bytes known as *Status* bytes, which are distinguished from actual *Data* bytes (in this case the actual voice parameters in the memory dump) in that the MSB (Most Significant Bit or the eighth bit) of any status byte is *set*. This means that MIDI data is only expressed by the rightmost seven bits in any byte.

A memory dump falls within the cate-

Andrew Newell has taught on the music faculty of the University of Illinois, and served as music consultant to Baldwin Piano & Organ Co. He is currently a freelance composer/producer in Santa Cruz.

gory *System Exclusive*, whose primary Status byte is 11110000 ($F0 or 240). The MIDI category, System Exclusive, is set up to enable each manufacturer to control those features of an instrument peculiar to itself and no other, as opposed to something universal amongst keyboards such as NOTE ON or NOTE OFF. Memory organization is unique for each instrument, thus anything pertaining to the manipulation of memory falls into the MIDI category System Exclusive.

Each device transfers a distinct pattern of information when it performs a memory dump. The actual data is preceded by a set of Status bytes that give information about the device and what is being dumped. The first of these Status bytes is the System Exclusive identifier, $F0. **Fig. 2** presents the byte configuration for a complete voice dump on the DX7.

This is the order and description of the bytes transferred between DX7 and computer. As we will see later on, however, there are a few tricky aspects in actually performing the dump.

The simplest way to perform a memory dump from the DX7 is through the synthesizer's FUNCTION 8. When FUNCTION 8 is selected, you are presented with three windows (**Fig. 3**).

The first allows you to select the MIDI channel. The second sets SYSTEM INFORMATION AVAILABLE/UNAVAILABLE and the third prompts MIDI TRANSMIT? The DX7 only transmits over channel 1. Therefore, from window 1 set MIDI ch = 1. Press FUNCTION 8 again and the second window will be displayed. If this is the first time into FUNCTION 8, SYS INFO UNAVAIL will appear. Hit the YES button, and this will switch to SYS INFO AVAIL. This makes the DX7's system data and data space accessible to external devices such as the computer. Press FUNCTION 8 again and you will see MIDI TRANSMIT? Now press the YES button in order to send a complete 32 voice data dump from the DX7. The LCD will go blank for a few moments and then will redisplay MIDI TRANSMIT? That is how long it takes the DX7 to perform the dump. The computer must therefore be ready on the other side of the MIDI link to accept and store the information as it comes. The following program does just that. By the way, all of the above steps can be instigated from the computer itself.

Fig. 4 outlines the basic structure of the Memory Dump program. It is written mostly in "C," and partly in Assembler.

Byte Configuration for a Complete Voice Dump on the DX7

$F0	STATUS byte
$43	Yamaha id number
$00	Sub status and channel
$09	Format number
$20	byte count Most Significant Byte
$00	byte count Least Significant Byte
0ddddddd	Data (1st byte)
0ddddddd	Data (4096th byte)
0eeeeeee	Check sum
$F7	END SYSTEM EXCLUSIVE EOX

Fig. 2

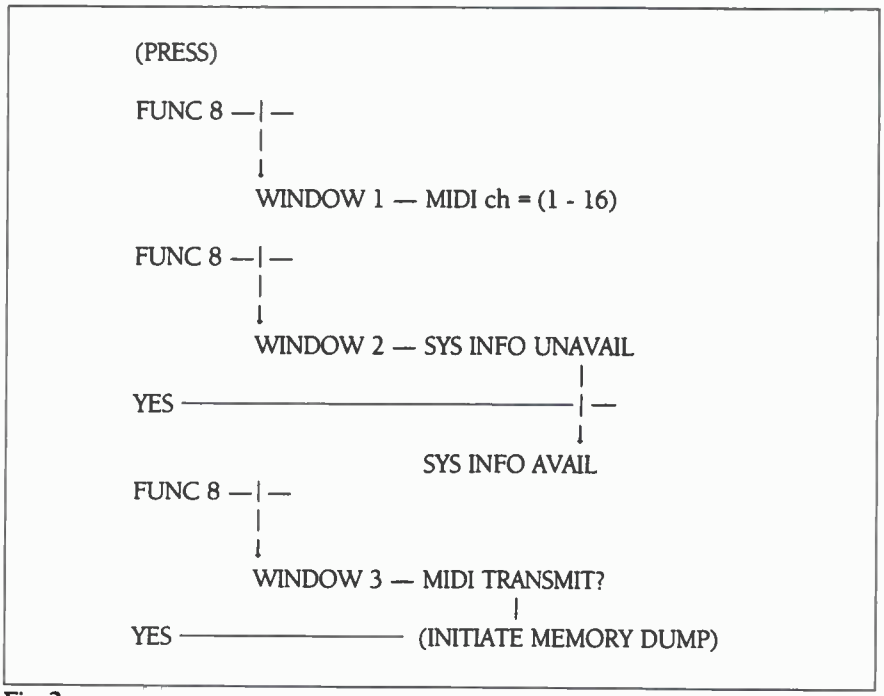


Fig. 3

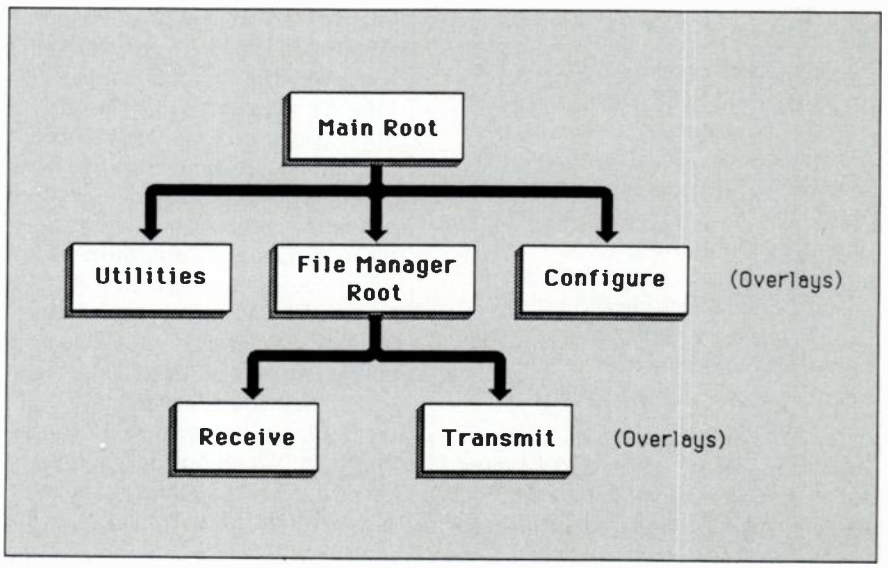


Fig. 4

Yamaha has been hearing voices again.

And you can hear all 240 of them for only $345.*

Presenting the Yamaha FB-01 FM Sound Generator. A surprisingly compact black box containing the largest selection of Yamaha digital FM voices since the introduction of the DX synthesizer.

Its incredible affordability is even more dramatic when you consider that in addition to 240 pre-programmed voices, the FB-01 accommodates 96 user voices. For a total of 336 voices at the unheard of price of only $1.02* each.

But what is even more incredible is the amazing versatility the FB-01 affords the amateur and the professional musician alike.

Each natural acoustic instrument or synthesizer voice features independently programmable functions such as pitch bend, detuning, octave transpose, and up to eight 4-operator digital voices simultaneously.

Plus four preset configurations that enable the FB-01 to be used as a single-voice 8-note polyphonic sound source, as well as a split sound source and dual sound source. And a Mono-8 mode offers monophonic performance of up to 8 voices simultaneously.

You can also create your own configurations and then store them in one of the FB-01's 16 user memories.

A lit LCD exhibits all performance data, system set-up, and voice names with dozens of operations carried out via a simple key layout on the front panel. The FB-01 is designed for ease of operation by any musician, even those without any detailed knowledge of MIDI or computers.

Its exceptional adaptability makes it well suited for MIDI applications ranging from live performance to computer music systems, MIDI recorder and sequencer systems, and MIDI studio systems.

Weighing in at a slight 4.6 lbs., the Yamaha FB-01 provides left and right stereo outputs and is also capable of microtonal tunings by computer.

All the more reason for you to stop by an authorized Yamaha Digital Musical Instrument dealer today for a complete demonstration. So you too can soon be hearing voices.

ROM 1 (BANK 3)	ROM 2 (BANK 4)	ROM 3 (BANK 5)	ROM 4 (BANK 6)	ROM 5 (BANK 7)
1. Brass	1. Up Piano	1. Horn 2	1. Fnk Syn 2	1. JOrgan 1
2. Horn	2. SPiano	2. Horn 3	2. Fnk Syn 3	2. JOrgan 2
3. Trumpet	3. Piano 2	3. Horns	3. Syn Organ	3. COrgan 1
4. Lo string	4. Piano 3	4. Flugelh	4. Syn Feed	4. COrgan 2
5. Strings	5. Piano 4	5. Trombon	5. Syn Harm	5. EOrgan 3
6. Piano	6. Piano 5	6. Trumpet 2	6. Syn Clar	6. EOrgan 4
7. New EP	7. Ph Grand	7. Brass 2	7. Syn Lead	7. EOrgan 5
8. EGrand	8. Grand	8. Brass 3	8. Huff Tak	8. EOrgan 6
9. Jazz Gt	9. Dp Grand	9. Hard Br 1	9. So Heavy	9. EOrgan 7
10. EBass	10. LPiano 1	10. Hard Br 2	10. Hollow	10. EOrgan 8
11. Wod Bass	11. LPiano 2	11. Hard Br 3	11. Schmooh	11. Sml Pipe
12. EOrgan 1	12. EGrand 2	12. Hard Br 4	12. Mono Syn	12. Mid Pipe
13. EOrgan 2	13. Honkey 1	13. Huff Brs	13. Cheeky	13. Big Pipe
14. POrgan 1	14. Honkey 2	14. Perc Br 1	14. Syn Bell	14. Sft Pipe
15. POrgan 2	15. Pf Bell	15. Perc Br 2	15. Syn Pluk	15. Organ
16. Flute	16. Pf Vibe	16. String 1	16. EBass 3	16. Guitar
17. Piccolo	17. New EP 2	17. String 2	17. Rub Bass	17. Fnk Gt
18. Oboe	18. New EP 3	18. String 3	18. Soi Bass	18. Pluck Gt
19. Clarine	19. New EP 4	19. String 4	19. Pluk Bas	19. Brite Gt
20. Glocken	20. New EP 5	20. Solo Vio	20. Uprt Bas	20. Fuzz Gt
21. Vibes	21. EPiano 1	21. Rich St 1	21. Fretles	21. Zither 2
22. Xylophn	22. EPiano 2	22. Rich St 2	22. Flap Bas	22. Lute
23. Koto	23. EPiano 3	23. Rich St 3	23. Mono Bas	23. Banjo
24. Zither	24. EPiano 4	24. Rich St 4	24. Syn Bas 1	24. Sft Harp
25. Clav	25. EPiano 5	25. Cello 1	25. Syn Bas 2	25. Harp 2
26. Harpsic	26. High Tin	26. Cello 2	26. Syn Bas 3	26. Harp 3
27. Bells	27. Hart Tin	27. Lo Strg 3	27. Syn Bas 4	27. Sft Koto
28. Harp	28. Perc Pf	28. Lo Strg 4	28. Syn Bas 5	28. Hit Koto
29. SmadSyn	29. Wood Pf	29. Lo Strg 5	29. Syn Bas 6	29. Sitar 1
30. Harmon	30. EP String	30. Orchest	30. Syn Bas 7	30. Sitar 2
31. Steel Dr	31. EP Brass	31. 5th Str	31. Marimb 2	31. Huff Syn
32. Timpani	32. Clav 2	32. Pizzic 1	32. Marimb 3	32. Fantasy
33. Lo Strg 2	33. Clav 3	33. Pizzic 2	33. Xyloph 2	33. Synvoice
34. Horn Lo	34. Clav 4	34. Flute 2	34. Vibe 2	34. M. Voice
35. Whistle	35. Fuzz Clv	35. Flute 3	35. Vibe 3	35. VSAR
36. Zing Pip	36. Mute Clv	36. Flute 4	36. Glockn 2	36. Racing
37. Metal	37. Mute Cl 2	37. Pan Flt	37. Tube Bel	37. Water
38. Heavy	38. Syn Clv 1	38. Slow Flt	38. Tube Be 2	38. Wild War
39. Funk Syn	39. Syn Clv 2	39. 5th Flt	39. Bells 2	39. Ghostie
40. Voices	40. Syn Clv 3	40. Oboe 2	40. Temple G	40. Wave
41. Marimba	41. Syn Clv 4	41. Bassoon	41. Steel Dr	41. Space 1
42. EBass 2	42. Harpsi 2	42. Reed	42. Elect Dr	42. Sp Chime
43. Snare Dr	43. Harpsi 3	43. Harmon 2	43. Hand Dr	43. Sp Talk
44. RD Cymb	44. Harpsi 4	44. Harmon 3	44. Syn Timp	44. Winds
45. Tom Tom	45. Harpsi 5	45. Harmon 4	45. Clock	45. Smash
46. Mars to	46. Circust	46. Mono Sax	46. Heifer	46. Alarm
47. Storm	47. Celeste	47. Sax 1	47. Snare Dr	47. Helicop
48. Windbel	48. Squeeze	48. Sax 2	48. Snare Dr	48. Sin Wave

Banks 1 and 2 can be used for storage of 48 original voices each.

Yamaha International Corporation, Digital Musical Instrument Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S 3R1. *USA suggested retail price subject to change without prior notice. Canadian price will vary.

YAMAHA®

The MAIN ROOT is permanently resident in memory. Basically, all it does is call either UTILITIES, FILE MANAGER or CONFIGURE, only one of which can be in memory at a time. This program is designed to perform memory dumps on many popular synthesizers and drum machines. Therefore the system must be properly configured using the CONFIGURE overlay before doing anything else. After configuring the system to a particular instrument, you can call the FILE MANAGER and from there choose to send or receive a file. The FILE MANAGER then calls either RECEIVE or TRANSMIT. I chose to use this system of overlays in order to conserve memory. By doing so, I allow for over 32K of storage space in the Apple.

Because the "C" language that I used compiles into pseudo-code, it does not run fast enough to perform a MIDI voice data transfer. That part of my program is written in 6502 Assembler. The appropriate code appears in the respective overlays, RECEIVE and TRANSMIT. (See **Figs. 5-8** for flow charts and listings.)

Once the system has been configured to the instrument at hand, and the DX7 has been prepared for transmission, the "C" code calls one of the above assembly language subroutines. As you must have

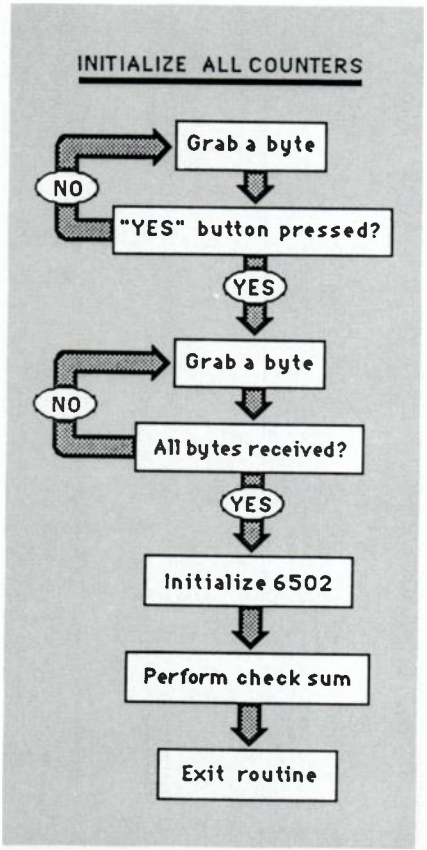
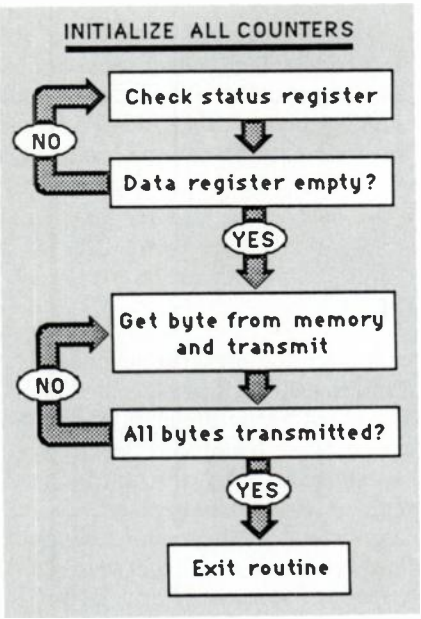


Fig. 5 *Control Flow Receive Subroutine*

RECEIVE SUBROUTINE

```
rec ()
[
#asm
          ldx     #01
          ------------------------------------------
get       jsr     waitd     /*  WAIT FOR YES
          cmp     #176      /*  BUTTON TO BE
          bne     get       /*  PRESSED
          sta     ($8f,x)
          inc     $90
          ------------------------------------------
get2      jsr     waitd     /*  START GRABBING
          sta     ($8f,x)   /*  bytes
          inc     $90
          bne     get2
          inc     $91
          dec     $301
          bne     get2
          ------------------------------------------
          jsr     waitd     /*  GET LAST byte
          sta     ($8f,x)
          sta     $307
          inc     $90
          jsr     waitd
          sta     ($8f,x)
          ------------------------------------------
          lda     #$10      /*  CONFIGURE 6502
          sta     $301      /*  TO PERFORM CHECK
          lda     #$00      /*  SUM
          sta     $90
          lda     #$3a
          sta     $91
          ------------------------------------------
          ldx     #01       /*  PERFORM CHECK
loop      lda     ($8f,x)   /*  SUM
          clc
          adc     $305
          sta     $305
          inc     $90
          bne     loop
          inc     $91
          dec     $301
          bne     loop
          lda     $305
          eor     #$ff
          adc     #01
          sta     $305
          lda     #00
          sta     $306
          sta     $308
          jmp     quit
          ------------------------------------------
waitd     lda     $c0a8     /*  HANDSHAKE LOOP
          lsr     a
          bcc     waitd
          lda     $c0a9
          rts
          ------------------------------------------
quit      nop
#endasm
]
```

Fig. 6



Left: **Fig. 7** *Control Flow Transmit*

something in memory before you can send it, let's consider the RECEIVE subroutine first. The one and only subroutine within this subroutine is the *Handshake* loop, and it is the heart and soul of the whole process (**Fig. 9**).

The Handshake allows the computer and the synthesizer to synchronize while running at their own speeds, without having to use *interrupts*. The Handshake monitors the MIDI interface's Status Register, which signals the computer as to when a byte has been received in the data register by setting its Least Significant Bit (LSB, Bit 0) to 1 (i.e., turning it on). The loop in the Handshake first grabs the current byte in the Status Register with the instruction LDA $C0A8 (LoaD

TRANSMIT SUBROUTINE

```
sendx7 ()
[
#asm
          ldx     #01     /*  End
start     lda     #02     /*  HANDSHAKE
waitr     bit     $c0a8   /*  LOOP
          beq     waitr
          lda     ($8f,x) /*  GRAB byte
          sta     $c0a9   /*  AND TRANSMIT
          inc     $90
          bne     start
          inc     $91
          dec     $301
          bne     start
again     lda     #02     /*  GRAB LAST 2
wait 2    bit     $c0a8   /*  bytes AND
          beq     wait2   /*  TRANSMIT
          lda     ($8f,x)
          sta     $c0a9
          inc     $90
          dec     $305
          bne     again
#endasm                   /*  End
```

Fig. 8

```
waitd     lda     $c0a8       STATUS REGISTER
          lsr     a             |     loop
          bcc     waitd         |
          lda     $c0a9   —   DATA REGISTER
          rts
```

Fig. 9

Accumulator with the contents of memory location 49320. The accumulator is where all mathematical operations are performed in the μP). It then performs a Logical Shift Right, which moves the LSB into a part of the μP called the CARRY FLAG. It then tests the CARRY FLAG with the instruction Branch on Clear Carry. In

Number System Basics

There are several number systems we can use to represent the numerical quantities that, within the computer, are expressed in *bits*.

The three most common are *decimal* (base 10), *binary* (base 2) and *hexadecimal* (base 16). *Octal* (base 8) is also used on certain processors. The following will give a quick explanation of the first three bases.

Here is an example of how the quantity 254 (decimal) can be expressed in different numbering systems (note that decimal notation, of which we are most familiar, is used on the right side of the equality symbol):

IN BASE 10 (DECIMAL)
$254 = (2\times10^2) + (5\times10^1) + (4\times10^0)$
$= 200 + 50 + 4$

IN BASE 16 (HEXADECIMAL)
$\$FE = (15 \times 16^1) + (14 \times 16^0)$
$= 240 + 14$

IN BASE 2 (BINARY)
1111 1110 (MSN)(LSN) $= (1\times2^7) + (1\times2^6) + (1\times2^5) + (1\times2^4) + (1\times2^3) + (1\times2^2) + (1\times2^1) + (1\times2^0)$
$= 128 + 64 + 32 + 16 + 8 + 4 + 2 + 0$
$= 254$ (decimal)

In order to facilitate using Base 16, the convention has been adopted to use the letters A, B, C, D, E and F to represent the numbers 10 through 15 respectively. Therefore, the decimal number 15 is written "F" in hexadecimal and the decimal number 16 is written "10."

In the example for Base 2, the letters MSN and LSN stand for *Most Significant Nibble* and *Least Significant Nibble*. In this example, the MSN is equal to 240 decimal, which equals F0 in Hex. The LSN is equal to 14 decimal, which equals 0E in hex. Added together, we get the appropriate quantity for 254 decimal, and in hexadecimal, FE. This illustrates the important relationship between binary and hex. Every set of four binary digits (counted from right to left) can be replaced by a hexadecimal number equal to the value of that four-digit set; this would be a number between zero and 15. (For example, the binary number 100 0011 1010 equals 43A in hex.) This relationship facilitates conversion between the two numbering systems, and is useful when going between *machine language* (the basic digital logic language of ones and zeros that the computer understands) and *assembly code* (an English-oriented, mnemonic language representing machine language code that is simpler for humans to interpret than strings of ones and zeros).

Hexadecimal quantifiers are identified by an H at the end of the number(C0A8H) or a $ at the front ($C0A8); binary numbers are usually identifiable by the long string of only ones and zeros (00011000); and, unless otherwise specified, numbers are usually written in decimal form.

other words, if the carry flag is still zero, i.e. clear, a jump is made and the whole process is repeated. However, if the flag is set, signaling there is now data in the DATA REGISTER, the program falls through to the next step which LOADS the μP Accumulator with the current contents of the Data Register. This LOAD operation forces the 6850 communications chip to reset the Status Register and clears the LSB, thus readying it to signal for the next arrival of a Data byte.

This Handshake allows us to grab all the bytes that are sent by the DX7, and put them into memory for use later on. As I stated earlier on, the Apple is running much faster than the DX7 so that we can perform operations in between grabbing bytes and still not miss any of those coming in. All we need to know is when certain bytes are arriving, and then we need to decide where to put them.

MEMORY ORGANIZATION

The computer's memory is divided into what are known as *pages*; each page consists of 256 bytes. If you look at **Fig. 10** on the total number of bytes being sent by the DX7, you will see that 256 goes into the total number of data bytes 16 times. Therefore, the total number of bytes will occupy 16 pages in the computer's memory. This makes the task of memory management quite straightforward: Space for the additional Status bytes must be provided at the tail end and front end of two extra pages in memory.

In addition to the first six bytes transmitted by the DX7 during a memory dump, there are three extra bytes transmitted when you press the YES button in response to the MIDI TRANSMIT? query of window 3. You can see that the program waits for the first of these bytes, which is the number 176 ($B0) in decimal. The DX7 transmits a System Exclusive byte and a Yamaha ID byte, as a pair, every 80 milliseconds. This means that while the program is waiting for you to respond to the MIDI TRANSMIT?, it is actually receiving bytes. If the program didn't watch out for a cue as to when the actual dump was happening, it would immediately start grabbing bytes, and the pages that were meant to contain only Data bytes would end up holding several extra bytes of System Exclusive and Yamaha ID numbers. In the end, the *check sum* would not check. However, once the program receives a byte equal to 176, it indicates that the YES button has been pressed and that the dump is under way—so it's time to actually start grabbing bytes. (By the way, the DX7 stops transmitting those extra two bytes every 80 milliseconds during the memory dump.) All the transmitted information is stored sequentially starting at memory location $39F7 and ending at $4A01. The actual data, however, is stored in an even number of pages from $3A00 to $4A00. Once all the information has been transmitted, we can reinitialize the necessary memory addresses and perform a check sum on all the Data bytes that had been picked up by the computer during the transfer. This check sum can be compared with the check sum that the DX7 transmitted. If they are equal, it means the computer picked up all the information. If they are not equal, something was missed, and you must re-transmit. The actual comparison of these two numbers is performed in a part of the program that is written in

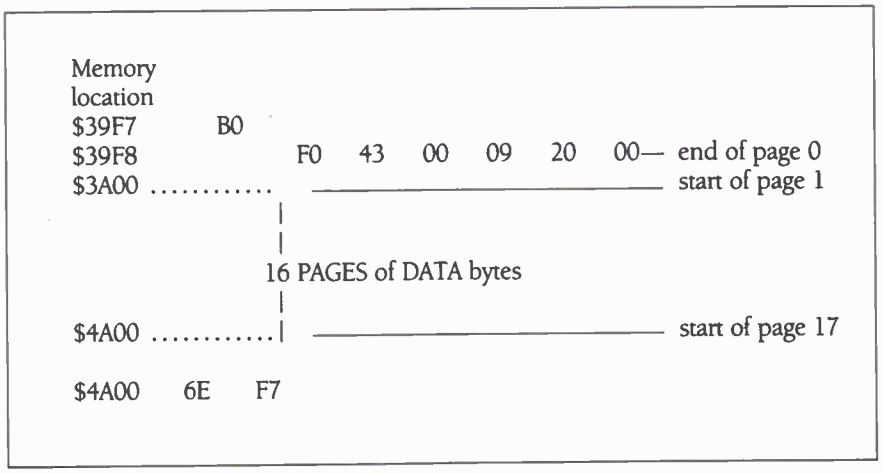


Fig. 10

"C," and is not shown here. In order to perform a check sum, you must add up all the bytes received, turn all 0 bits to 1s and all 1s to 0s (this is known as *One's Complement),* MASK off the MSB (set the 8th bit in the byte to 0) because MIDI data uses only the lowest seven bits in a byte, and then add 1. The result is the Two's Complement of the sum of the Data bytes.

The TRANSMIT Subroutine is quite a bit simpler than RECEIVE. It has a slightly different handshake loop that also permits the computer and synthesizer to synchronize communication. If the data register is empty and ready to receive a byte for transmission, the 6850 sets the second bit of its status register. In the handshake loop, the instruction LDA #02 initializes the accumulator with the number 2, which has only the second bit set (0000 0010). The instruction BIT $C0A8 then checks the status register against the value in the accumulator. If the values are equal, the BIT instruction sets the 6502 zero flag. If they are unequal, the zero flag remains clear. The BEQ instruction then checks to see if the zero flag is still clear, which would indicate that the data register is not yet empty. If this is the case, a jump is made to WAITR and the process is repeated. If the zero flag is set, the register is empty and ready to receive data for transmission. The program then proceeds to grab a byte from memory (LDA ($8F,X) and send it to the DX7 (STA $C0A9). Once all the necessary bytes have been transferred, the program falls out of the Assembler code and returns to the FILE MANAGER.

Conclusion

The above program is fairly simple, but contains enough pertinent information to provide a solid foundation for further and more involved MIDI programming that does not involve interrupts. It should also provide the reader with an understanding of how communication via MIDI actually takes place. For those who want to type in the above code as part of a BASIC program, please note that some of the zero page addresses will need to be changed. Either a complete listing of this program, or the complete package of programs on diskette that will perform memory dumps for most popular synths and drum machines, is available. For more information write to Andrew Newell, 345 Tenth Ave., Santa Cruz, CA 95062, and include a SASE (self-addressed stamped envelope). EM

PAID NEWSLETTER FROM PASSPORT DESIGNS

THE INTERFACE

Volume 1, Number 5 | PASSPORT DESIGNS, INC. | October, 1986

Greetings From Passport
This month we'd like to pass on a few tips on incorporating your Passport software "studio" into a practical recording studio environment.

In, Out & Thru

By Jay Lee

The first thing to do is familiarize yourself with the software in a basic setup (i.e. interface MIDI out to MIDI in, and keyboard MIDI out to interface MIDI in). Work through the program's manual and try different features, create a simple piece of music to run things through their paces. You would be surprised at how many people try to learn a new program with a project deadline on their heads. This isn't smart: the usual outcome is frustration, and the waste of a useful tool.

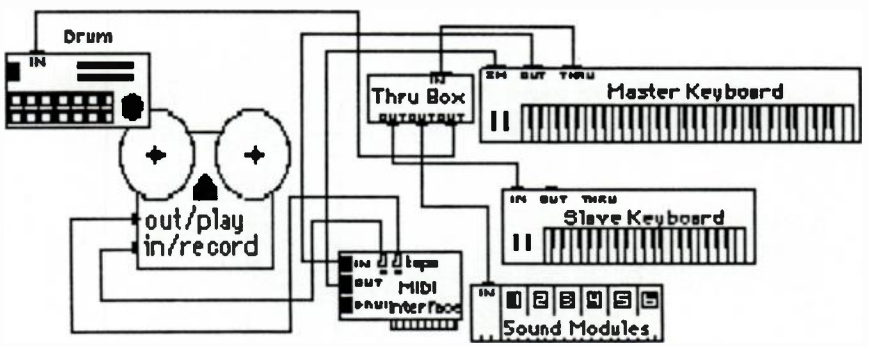
Using non-MIDI drums
Your Passport interface for Apple or Commodore comes standard with a third DIN connector (the one that looks like a MIDI plug) provided to get pre-MIDI drum machines into the act. Contrary to appearances this is not a MIDI out, but a connector specifically for starting and clocking non-MIDI drum boxes.

Using sync to tape
If you wish to link your computer system with your multi-track recorder you must have a Passport tape sync interface and sequencer software. First connect your interface to your tape recorder. Apple interfaces use two RCA (phono) connectors and Commodore requires a five pin DIN to RCA connector (Passport's model DCK-3).

Do not use noise reduction while using tape sync. If your tape deck has a non-defeatable noise reduction (i.e. TASCAM 244) experiment with higher record and playback levels. Also remember to record the tape sync signal by itself. It might seem like a good idea to lay an audio track at the same time, but it does not work. The audio track is synched to the computers' internal clock and not the tape.

A sample session
You've got the song written, now let's get it on tape. The sequencer is loaded with the basic parts, now lay the sync track (for best results use an outside track), while playing back the song on the sequencer. Next, record your non-sequenced tracks while using the tape sync on the tape recorder to control the sequencer.

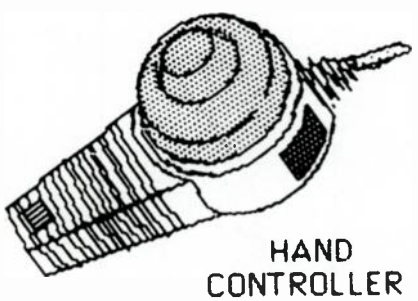
Now that you've recorded all your tracks, it's time for the mix down. You can add MIDI control tracks for your effects and basically have an automated effects mix down. The advantage of using a computer to record virtual tracks, is that you avoid any signal loss due to the medium of tape. Let's face it, most low end machines don't exactly have the greatest signal to noise or frequency response that we're used to hearing. Your drums will have punch and your synths will sound great. There are a lot of ways to approach this, so use your imagination.



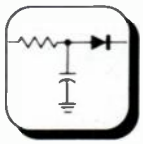
Mastertricks

By Denis Labrecque

I'm sure some of you have had questions about the availability of "game paddles," for use with Master Tracks. These are not as readily stocked by computer dealers as they were a short time ago; they are however still available from Apple and a number of other sources.



Part of the confusion about availability stems directly from a difference in terminology. We have referred to the devices in all our literature as "game paddles," as this is a common (though outdated) name for them. This is a hang-on from the days of "Pong" and other early computer games. The confusion arrives in that Apple now refers to the devices as "hand controllers." If you think about it, the new name makes sense, few games use them these days.



Don't retire that control voltage based system! Instead, increase its usefulness and power with a couple of choice accessories.

The Mini-Controller (Part 1)

BY THOMAS HENRY

Recently, I was configuring a stand-alone analog sequencer unit and discovered that I needed a few extra control functions—specifically, a LFO (low frequency oscillator), trigger extractor, white noise source, and lag processor. I envisioned the LFO as being good for vibrato effects, and the trigger extractor as a real must if I wanted to synchronize signals to the sync track of a multi-track recording. The noise source would be needed for percussive effects, and possibly for random control functions. Noise generators are also handy for subjective testing when doing A-B comparisons of audio gear. Finally, the lag processor would be perfect for processing the sequencer output to create portamento (glide) effects.

Unfortunately, space was at a premium in this application. In fact, I only had room for one more single-width rack panel! Letting the mother of invention take over, I came up with a Mini-Controller module that incorporates all of the features mentioned above. Not only does the Mini-Controller do a lot, but it fits quite comfortably behind a standard 1¾-inch by 19-inch rack panel. While this unit was specifically designed with an analog sequencer or synchronization system in mind, I think you may find it useful as an expander module for just about any analog synthesizer setup... read on and see why.

I've split this project up into two parts. This month we'll tackle the noise source and the lag processor. The next installment will cover the LFO, along with the mechanical considerations of the project. The trigger extractor has been discussed in a previous issue (see "Panel Fillers," *EM* June, 1986), so we'll just copy it unchanged.

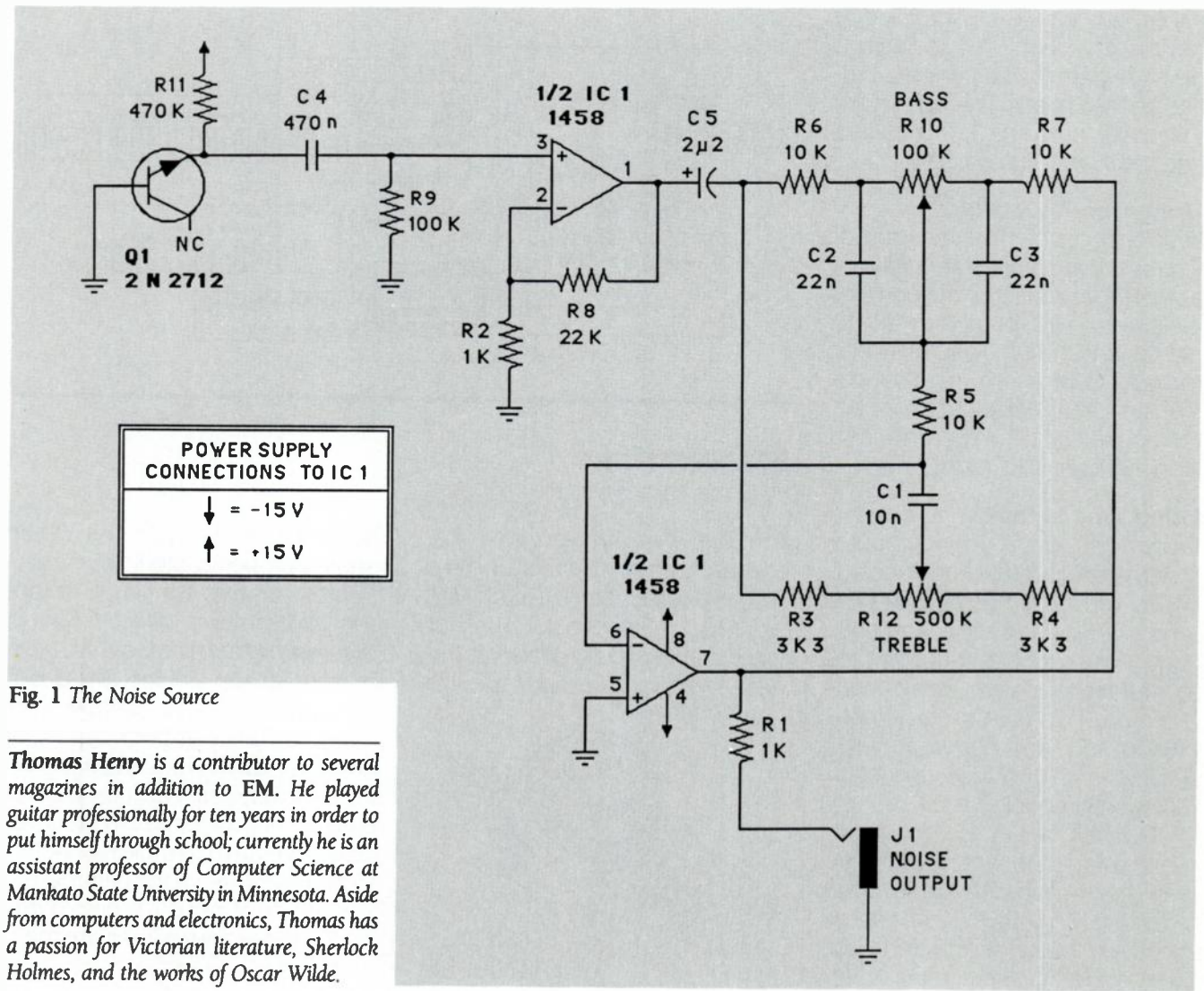


Fig. 1 *The Noise Source*

***Thomas Henry** is a contributor to several magazines in addition to* **EM**. *He played guitar professionally for ten years in order to put himself through school; currently he is an assistant professor of Computer Science at Mankato State University in Minnesota. Aside from computers and electronics, Thomas has a passion for Victorian literature, Sherlock Holmes, and the works of Oscar Wilde.*

THE NOISE SOURCE

Fig. 1 shows the noise source schematic. This is an analog circuit, not one of the digital pseudo-random noise generators that have been so popular in recent years. Now, I like to think that I'm modern and up-to-date, but I confess that I like the sound of these old-fashioned analog noise sources much better than the new-fangled pseudo-random digital types (I agree, Thomas—Ed.). You don't hear the repetitious clock cycles feeding through, there's no periodicity (i.e. the noise doesn't follow any repetitive pattern), and in general the noise is much less "gritty." So, just because something is the new way doesn't mean it's the best way.

A back-biased transistor generates the actual noise. To be precise, transistor Q1 in **Fig. 1** is set up as a diode since we're ignoring the collector. The Zener effect comes into play here, and the transistor generates a very nice array of noise. To keep Q1 from self-destructing (back-biasing is *not* standard operating procedure), R11 limits the current flow. Capacitor C4 couples the noise to the amplifier configured around half of the 1458 dual op amp. Since the noise created by Q1 is quite low in amplitude, the amplifier boosts the signal by a factor of about 20.

To make the noise source more useable for audio effects, I've added a tone control network built around the second half of the 1458. The bass and treble tone controls tailor the sound as desired—from the bassy, low rumble of waves washing on a shore to the trebly screech of a boiling teapot.

The design of the tone control network is beyond the scope of this article; to learn more about it, refer to National Semiconductor's *Audio Handbook*, (Dennis Bohn, editor, Santa Clara: National Semiconductor, 1977, pp. 2-44 through 2-47). Using the equations from the above source, I designed the circuit so that the bass control has a 20dB boost or cut at 72 Hz and the treble control has the same response at 4.8 kHz. This gives lots of control in the audio band and sounded the best to my ears. Incidentally, the tone controls (both bass and treble) should be linear, not logarithmic; otherwise, the pot's mid-position will not be the "flat" response position.

The tone circuitry is buffered by the second half of the 1458, and R1 limits the maximum output current. This gives the noise source the standard output impedance (1k) we have come to know and love (or at least use to our advantage in analog synthesizer modules).

The addition of the bass and treble controls really adds to the usefulness of this circuit. In fact, if I do say myself, this is the best noise source I have ever heard! By the way, part of the success of this circuit depends on the proper choice for Q1. I have used the "old standby" noise source, the 2N2712, since this has a rather low reverse breakdown voltage. Other transistors may be substituted with varying results. If you do attempt to use a different transistor, check that the noise monitored at the junction of C4 and R9 has a peak value of about 200 mV.

Incidentally, noise circuits such as this one tend to have poor power supply rejection (in other words, any audio signals that "hitch a ride" on the power supply lines will make it into our circuit). With a well-regulated, low output impedance power supply, this will not be a problem. If power supply noise does get into the circuit, the solution is simple: Add a 10 Ohm resistor between R11 and the +15V supply, then connect the positive lead of a 33 to 100 μF capacitor to the junction of these resistors, and the negative lead to ground.

Before leaving the noise source, let's quickly consider one fine detail. Noise, by its very nature, consists of energy at a bunch of frequencies at various amplitudes, so it's hard to describe the output "volume." In addition, the tone controls, as mentioned above, can cut or boost the signal by 20 dB, which corresponds to a loss or gain of 10. Thus, the signal presented to jack J1 may vary between 1V peak-to-peak on up to 10V peak-to-peak, depending on the control settings. So, protect your ears at all times and watch the volume of your audio amplifier when playing with the controls!

NOISE SOURCE PARTS LIST

Resistors

R1, R2	*1k*
R3, R4	*3k3*
R5-R7	*10k*
R8	*22k*
R9	*100k*
R10	*100k linear pot*
R11	*470k*
R12	*500k linear pot*

Capacitors

C1	*10nF mylar*
C2, C3	*22nF mylar*
C4	*470nF mylar*
C5	*2µ2/16V electrolytic*

Semiconductors

Q1	*2n2712*
IC1	*1458 dual op amp*

Mechanical parts

J1	*¼-inch open circuit phone jack*
Misc.	*Socket, wire, knobs, solder, etc.*

LAG PROCESSOR PARTS LIST

Resistors

R1	*100k*
R2	*1M linear pot*

Capacitors

C1	*220nF mylar*

Semiconductors

IC1	*353 bi-FET dual op amp*

Mechanical parts

J1, J2	*¼-inch open circuit phone jack*
Misc.	*Socket, wire, knob, solder, etc.*

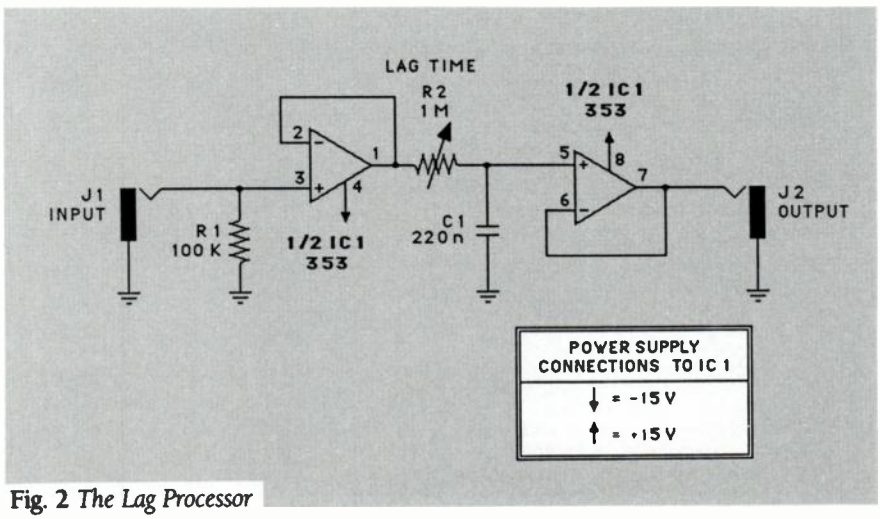


Fig. 2 *The Lag Processor*

THE LAG PROCESSOR

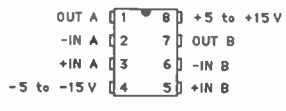
Fig. 2 shows the lag processor. This is not exactly a new circuit, but is still very useful in any synthesizer system and is also the basis of several types of tone controls. Suppose you feed a rapidly changing signal into jack J1. The first half of the 353 bi-FET op amp buffers this signal. The amplifier output passes through potentiometer R2 on the way to capacitor C1; these two components create a time constant, thus slowing down, rounding off, or smoothing out the signal (depending on your point of view). For example, if you feed a square wave into the lag processor, it comes out looking more like a triangle wave; triangle waves become more like sine waves. The second half of the 353 buffers capacitor C1 to prevent current from leaking off the capacitor, and the output finally appears at jack J2.

The lag processor is great for creating portamento effects. Simply pump the keyboard or sequencer control voltage into J1 and connect J2 to the VCOs. Now adjust R2 to dial up the amount of portamento or glide desired. You can get effects all the way from simple glissandos on up to monster sweeps.

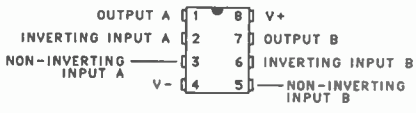
Incidentally, the lag processor is another example of old-fashioned technology still getting the job done. This type of circuit has been around for at least 15 years, yet still is a must for any analog-based synthesis system or studio.

So we've seen two of the Mini-Controller's sub-systems. Next time, we'll learn how to combine them with the trigger extractor and LFO to create an extremely useful module. Be sure to stop back then, for we'll also look into the construction details of this simple yet necessary module. Until then, keep soldering! EM

1458
Dual Operational Amplifier



353
Wide Bandwith Dual JFET Input Operational Amp



—from page 24, EDUCATION

limited use. They're here. They won't go away. Even if you have no intention of being a computer programmer, take at least one programming class. It will help you understand the machines learn to think more clearly—it's like push-ups for the brain.

Be open to information in many different fields. If you're tech-oriented, you may want to be sure that you get some physics courses, such as acoustics. Learning the English language and basic logic is a decided plus in anyone's career. A person who can intelligently articulate thoughts and needs will usually get more respect and attention than someone who is limited to grunting and pointing. There have been a lot of stars that made everyone but themselves rich because they couldn't really read a contract. As tedious as they may be, classes that teach the business side of music are a real asset.

The business is constantly changing, so look for school programs that can roll with the punches. Don't overlook smaller schools, city colleges, and privately run schools as they will often be more open to change. Large universities can become buried in their bureaucracy and the safety of the institution; private schools are more subject to the vagaries of the marketplace.

Finally, and obviously, *what does it cost?* This is a major drawback to private schools. I have talked to students about to enter a program who, when they were asked to add up the total costs for the program, found that for the same amount of money they could buy a very hip studio and extensive private lessons for a few years! You may have to relocate to attend the school you like. Can you afford that? Take into account the cost of living in the city you'll be moving to. You may want to start your education nearer to home to get your basics. Later on, being near a major music production center has many advantages for getting work, and just being close to the nuts and bolts of the business.

In the long run, there are no perfect programs, (or perfect students) and no matter what the program, you will get out of it what you put into it. It's amazing how many students sit there term after term thinking that education is a passive act like TV contemplation. They think teachers are supposed to pour information into them and at the end of the prescribed amount of time they leave and voila! a Star Is Born! That's not reality—it takes work. The moral is if you're going to do it, *do it!* EM

Not content to rest on the laurels of the CZ series, Casio sets its sights on sampling.

From Ha! to SK-1: Casio's Sampling Keyboard

BY JAMES A. LISOWSKI

Casio has done it again! Not long ago, if you told a "serious" musician you played a Casio, the next thing heard would be laughter. Justified or not, that response could be understood in light of Casio's initial products of a few years ago—cheap, plastic, fixed voice, battery-operated keyboard "synthesizers" that you could hold in one hand. Actually, though, they were (and are) not that bad of a deal; and after you process the output with reverb/delay or a phase shifter, no one would ever guess the sound source was something that looked like a free prize from a breakfast cereal box! These marvel mites brought synthesizers to the consumer masses, thus spurring the inspired novices onward to "more powerful" music machines.

Then, suddenly, Casio rocked the synthetic world with their low price, high performance "CZ" series. The CZ's crowd-pleasing features are well-known at this point, but most importantly, the sound quality could compete, patch for patch, with the best in both the analog *and* digital voice universe. Even had this blockbuster possessed average, "me too" sound, broods of bedroom beat bangers would have purchased a CZ just because it presented the lowest cost entry to MIDI. Hordes of cottage industries grew up around the CZ—computer editors, patch collections, expanded RAM cartridges, circuit modifications (gee whiz magazine articles!), until, once again, Casio became a generic word and instrumentalists slipped back to slumber.

BLAM!!! What was that? Just the sound of Casio exploding another myth: digital audio sampling keyboards must be expensive or require a degree in computer electronics to operate. "Sa Sa Sa Sampled Sou Sou Sound" is the rage on today's radio airwaves (from its roots in the "found sound" tape splicers of old, to resurgence in Rap music and currently, Pop), but most garage artists just don't have the credit lines to add an Emulator, Kurzweil, or Fairlight to their stack. That's why Casio is shocking the industry again—the Casio SK-1 digital sampling keyboard retails at under $130, in department and music stores across the nation.

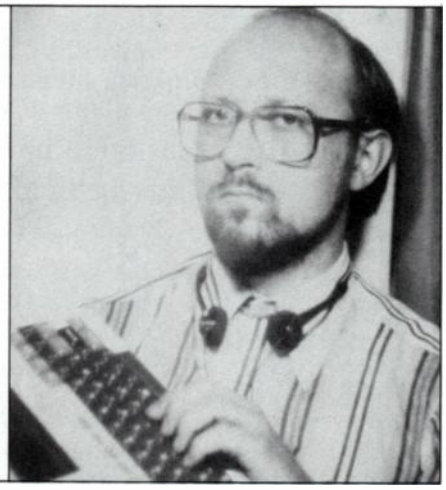
The SK-1 is a bitty black, plastic box, has lots of tiny colored buttons, a couple of (wow!) slider controls, is powered by dry cells (or AC adapter) and has miniature keys. It has eight factory preset sounds, comparable to the quality found on other "pocket synths." (Just what kind of piano or jazz organ voice were you expecting on a C note-priced organ?) You can never believe those patches are going to sound anything like what it says on the label, especially outside of the instrument's normal frequency range, but the horn, synth, drum and human voice buttons here give a good enough show. Some of the sounds also have a built-in repeat/fade effect, which saves the cost of a digital delay or mixer channel. Yes, you also get preset rhythms, including one triggered by a button marked "Demo" (a boon to dealers if they don't "Demo"lish the nasty noisemaker after hearing the tune play for the nth time), preset electronic percussion riffs, a selection of synthesizer and envelope parameters, and one-finger chords—the SK is polytonic, with up to four notes playing at one time, including combinations of sequence/drums plus real time solo playing. These are all nice touches for such a low cost item. Other goodies include a real time note recorder with many seconds of sequence playback—complete with fixed step tempo increase/decrease and note edit/pointer and delete (simple editing, but simple to use, too), built in amp/speaker/audio output jack (miniature) and several voice modes.

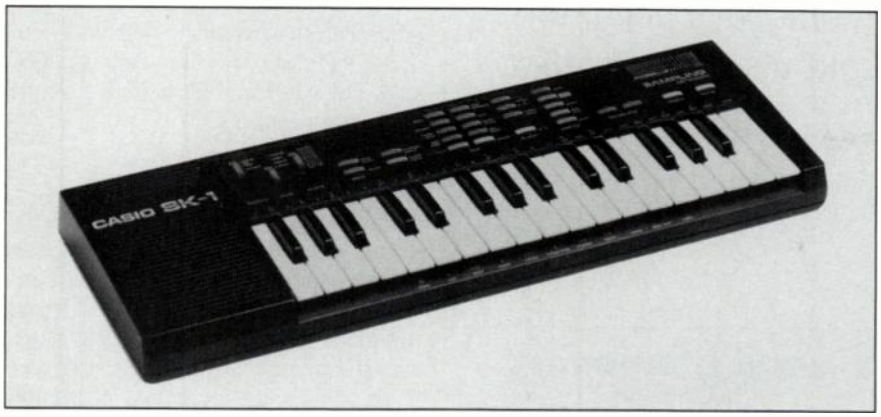
As a preset box, the SK-1 is impressive; but as far as I'm concerned, you can trash all that junk—the digital sampling/playback feature *alone* is worth the price! Just push two buttons, speak (clap, bang a gong, pinch the cat, or do anything else that makes an interesting sound) into the internal microphone (or plug a mic into the external input jack), and you've recorded an audio sample. Touch the keyboard to play back your new sample; it will be transposed to higher, equal, or lower frequency ranges, depending on which of the two-and-a-half octave, 32-

Product Summary

Type: Portable, polyphonic (four-note) sampling keyboard
Keyboard: 32 mini-keys, two-and-a-half octaves
Sample time: 1.5 seconds
Sample quantization: 8 bit
Power source: Batteries or external AC adapter
Other features: Preset rhythms, one-finger chords, sequencer, built-in amplifier
Price: $129.95
Manufacturer: Casio, 15 Gardner Rd., Fairfield, NJ 07006; tel. 201/575-7400

James A. Lisowski is a high Technology Consultant whose A/V interests span audio through holography on out to video. Usually at work on some computer, electronic, music, optic or robotic design, he takes time out to read tech magazines, science fiction, and do some word processing or artwork.





note keyboard keys you press. Flip a switch to record, play a real time sequence with your new (monotonic) sample, and then play back your sequence—complete with its original note durations and rests—and adjust the tempo as desired or edit out the undesired parts. The sequence and sample stay stored in memory, and, if you want to add a twist, punch up one of the preset voices and play the preset sound with your note sequence. You can also do looping effects. Not even the more expensive sampling digital signal processors can do all of these things. And the sound quality is amazing! The samples are much better than my 8-bit A/D-then-D/A computer experiments—great high end frequency response, absence of annoying aliasing or distortion, excellent pitch transposition, and perky keyboard action—even with samples recorded from the built-in mic. The SK-1 is a "must hear to believe" kind of instrument.

Yes, there are negative aspects—lack of MIDI being the most prominent, and volatile sample memory. Some people will find fault with the sound quality, sample length, sequence length, amount of memory, sample load/save, etc., but I'll bet that in six months there will be a new model or third party memory/MIDI modifications that should take care of most of the SK's limits. But no, it won't replace a Fairlight. (Then again, you can buy 450 SK-1s for the price of a Series III Fairlight.)

As a low cost, portable sampler, the SK-1 has no equal. As sampling becomes a mass-market item, new ideas will develop. Handicapped persons may gain new voices or aids. Audio researchers, doctors, even auto mechanics may find new diagnostic tools. New patterns and understanding will emerge from common sounds played back much faster or slower than "normal." And music will incorporate sounds from all realms of experience—imagine sound sampling at a zoo, a forest, under and on the water, from a factory or street, and from our friends, relatives, children or social events—each crafted with unique, human expression and blended to express new, personal meanings.

So, the next time you hear "Casio" mentioned, and then a laugh—you may have just heard a sample of what's to come... EM

If you want to put some joy back into sequencing, check out a sequencer that uses a joystick.

Roland's Muse

BY TIM TULLY

Muse, an 8-track sequencer for the somewhat neglected Apple IIe, requires only 64K of an Apple's RAM to store and manipulate up to a maximum of 6,000 notes. Once booted, Muse talks to the world of synthesizers, drum machines, and tape recorders through the intelligent Roland MPU-401 interface. Additional required equipment includes one disk drive, a monitor, a blank disk or so and—a joystick.

Yes, a joystick.

Over the last few years, the Apple Macintosh (a fine machine in its own right) has become, for many, the recording studio computer of choice. This is partly because of the mouse technology that Mac and its sequencers employ. We musicians are a tactile bunch, and the abstraction demanded by a typical computer (QWERTY) keyboard takes away some of the physical excitement that music is all about. Macintosh's mouse puts that fun factor back in, and the joystick-intensive Muse is onto the same trick. Not that using Muse to sequence the music for your next answering machine message will offer quite the same somatic thrills as blowing Baritone underneath James Brown's reed section, but there's an eye-hand elan here that speaks in a way keyboard controls don't.

Muse doesn't offer the full bag of mouse tricks, but you can hop from menu to function with a good deal of abandon. And though the joystick is an optional feature with Muse, if (as most of us do) you have to *think* to type out verbal commands on a keyboard, pointing and clicking will probably do a lot less harm to your musical concentration than will typing menu names. One of the more immediate and friendly aspects of Muse is that it allows any Apple IIe owner with a spare pong paddle or joystick lying around to enjoy nearly QWERTY keyboard-free sequencing.

***Tim Tully** is a composer, producer and writer who lives and works in New York City's scenic Hell's Kitchen. Tully owns and operates* Sound Suite, *a MIDI-intensive audio facility specializing in music, voice, and sound effects for all sorts of video productions.*

Product Summary

Product: Muse
Type: MIDI sequencer
Price: $150
Hardware requirements: Apple IIe with 64K memory, disk drive, monitor, Roland MPU-401 MIDI interface, joystick.
Sequence architecture: Tape recorder simulation
Note capacity: 6,000 notes
Track capacity: Eight tracks assignable to any of the 16 MIDI channels
Manufacturer: RolandCorp U.S., P.O. Box 22289, Los Angeles, CA 90022-0289; tel. 213/685-5141.

Note that a truly "high-resolution" controller, such as the Apple Hand Controller Paddles or the Trac Ball, is necessary. The CH Mach III joystick gave me resolution problems.

FUNCTIONS

Muse's functional operation matches the friendliness of its paddle approach. After a short loading time (about 20 seconds), the Main Menu appears. This displays information about tempo, time signature, available memory, current measure, loop, metronome and sync status, record and play status, and shows a track display. It also lists 13 joystick-accessible functions, mostly centering around "record" and "play." A 14th function, "Extras," brings up the secondary menu of 11 more joystick functions that cover essentially pre- and post-record chores.

The two menus look and act the same: shove your joystick around until the function you want is highlighted, then push the "fire" button. Once you figure out how to get to one function, you've nailed all the rest as well. The only exception to this is a third screen that comes up for functions that need more information from the user. This screen asks unambiguously for what it needs and, once again, a quick point-and-click or two from the joystick does it all.

What this adds up to is quite a high degree of friendliness for the Muse user. Learning to use this package is a fast and

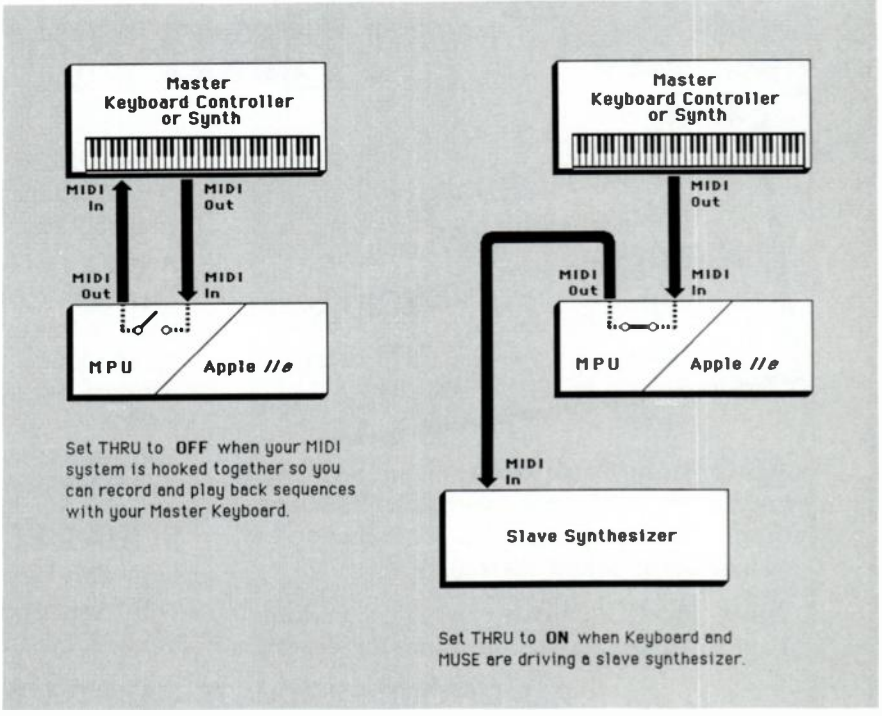


Fig. 1

easy task, and the ready availability of functions truly puts the joy back in joystick.

Briefly, the functions themselves go like this. The "Extras" menu begins with on/off toggles for three filters: Aftertouch, Program Change, and Mod Wheel. These filters determine whether Muse records the MIDI data generated by the respective parameters of a synthesizer. Thus, if you're interested in saving computer memory—often a very real consideration—you can leave this data out of the recorded MIDI stream. If memory is not a problem in a given composition, set the toggles appropriately and you can imbed mod wheel and aftertouch effects, as well as automatic program changes (that is, going from one sound in your synthesizer's memory to another providing that it has this capability) right into a sequence.

If you find the computer is short of memory *after* recording a sequence, no problem. Just copy, for example, your mod wheel-laden sequence from one track to another with the mod-wheel filter on. *Mirabile dictu*, Muse will strip the unwanted data from the track. . . very nice.

"Thru," "Transpose," and "Sync Mode" on the Extras menu behave in standard fashion. "Thru" opens and closes the line that sends MIDI data from your master keyboard to instruments (usually including itself) connected to the "Out" of the MPU-401. Setting Thru to "on" lets you hear your slave instruments as you play them from your master keyboard, a good thing (see **Fig. 1**). Setting Thru to "off" lets you hear the master without the master being fed back its own notes and getting everything all confused (a bad thing). "Transpose" changes any track's pitch by half-steps across the full ten octaves of the MIDI range. "Sync Mode" is a three-way toggle (a triggle?) that sets the software to start, play and stop according to either: 1) its own joystick and internal clock; 2) an external device like a drum box or sequencer that generates MIDI clock; or 3) to tape. This is another of Muse's good points. It uses the MPU-401 to print FSK code onto one track of your multi-track tape recorder, and then reads it back to sync its sequences to tape. The MPU is a nice, reliable unit for this function, and any time you can get reliability while synching a computer, a multi-track and a bunch of synthesizers together, you're doing just fine, thank you.

Merge Tracks combines the data from any two tracks onto a third. This is handy if, for example, your keyboard technique

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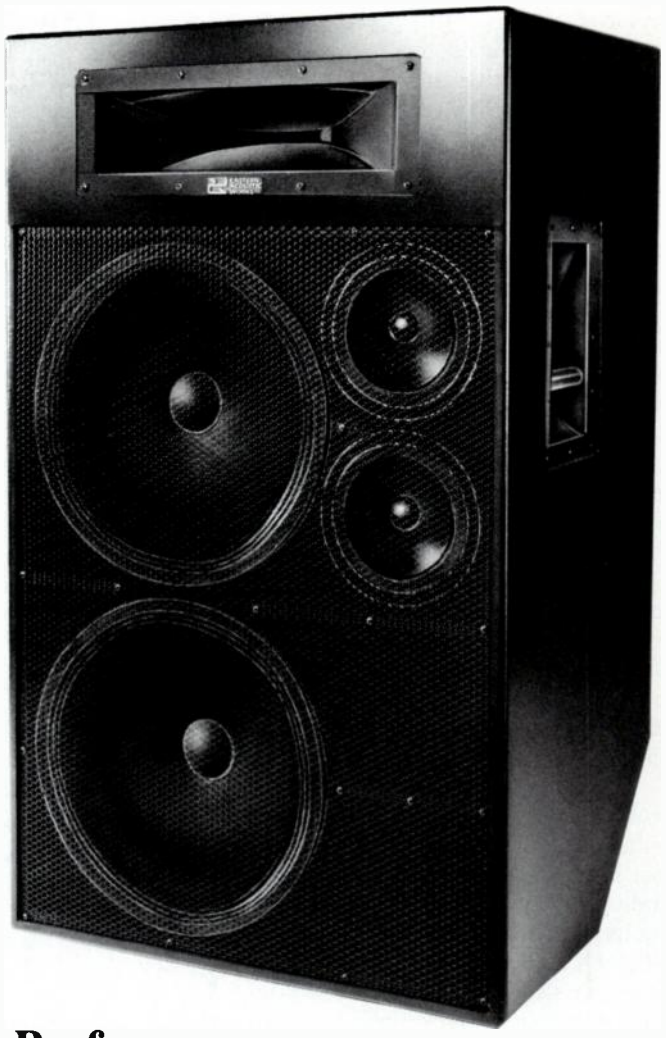

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isn't all it should be and you need to build a three-voice section passage. Play one line at a time, merge the three to one track, and *presto*—it's a section.

Clear Memory wipes out any sequences in RAM so you can load a new composition from disk or begin from scratch.

Going from the Extras Menu to the Main Menu, we pass from the setup or "housekeeping" kind of functions to those more central to sequencing. The Main Menu is simplicity itself; just point and click to set a Time Signature or New Tempo. To Mute or Erase any of the tracks, the "I need more information" screen comes up and a second point and click gets the job done. Up Tempo and Down Tempo let you click the tempo up or down a beat at a time. I found these a bit redundant, but they don't get in the way.

Before recording, the Metronome and Tempo functions let you hear and set a tempo beeped out by the MPU-401, even while the sequencer is quiescent. Metronome can then be set to its more standard mode: playing a two-bar count-off and continuing to keep time during Record. For the free-spirited among us the metronome can be set not to play at all. You can also tell Muse to record either a specific number of bars, or to record until it hears one last joystick click.

If, upon playback, you find your performance was rhythmically off, the Autocorrect function can quantize a track. Muse has a "phrase coherent" quantizing system that supposedly leaves the musician's original phrasing intact. Although I found it difficult to tell how well this worked, the function was certainly no less useful than any other quantizer: that is, sometimes it works very well, sometimes it destroys your sequence. One of the difficulties here is that Muse doesn't offer a byte-by-byte display of the MIDI stream. If a sequence is fine except for one note, no micro-surgery is possible. (There's still no substitute for chops!)

More sophisticated manipulations of recorded MIDI data (copy, edit, punch-in and punch-out) are done from the "Extras" screen. Since Muse isn't set up in drum machine-like patterns, to extend an already-recorded track, or to punch-in a change to its middle, you must juggle a bit. First record the new sequence onto another track, then use Copy/Chain and/or Copy/Edit from the Extras menu to copy the first track, and then append the new section, onto a third track.

The ease with which Muse works makes this easier than it sounds. Nonetheless, my preference tends toward leaving track one on track one (which is what one normally does with the tracks on a multi-track tape recorder), and not push it from place to place. Mitigating the confusion problem to some degree is that Muse seems to be written with MIDI channels in mind; whenever you copy or merge a track, the original MIDI channel number tags along. So if you keep your Bass synth on MIDI channel 1, Piano on 2, etc., you can copy or merge different instruments onto the same track *and retain their individual MIDI channel assignments*. Thus, one track can play different parts when driving different synths because the single track can access more than one MIDI channel.

A Channelize function lets you send the data on any track to any of the 16 MIDI channels. An unfortunate aspect here is that Muse does not display which MIDI channel(s) are assigned to which track(s) unless they've been set by the user with Channelize. This can be confusing, and it's a bit mysterious why this feature was ignored.

Auto Locate, which causes Play or Record to begin from any point in a composition, is another feature that reduces one of the potential difficulties of being a non-pattern-type sequencer. This way, the user doesn't have to listen to the whole composition before recording or reviewing, say, bars 68 to 72.

Muse is very easy to learn, and a great deal of its functions are equally easy to use; thus, Muse seems to be a good tool for education. Of course, after playing with a sequencer any user is going to have a wish list. As for my own suggestions, I'm not entirely happy with the absence of track naming capabilities, the inability to do a tape recorder-like punch-in or punch-out, and the lack of a display of MIDI channels or track names. The inaccessibility of the MIDI data stream for editing, or even viewing, is also a drawback. The best of all possible worlds would be an expanded Muse that would exhibit the performance of the current model, but add greater functionality.

Let's hope Roland's Muse is listening. Still, even without these improvements, Muse is a robust system whose basic functions are so fast, reliable and non-intrusive to the music that you can actually have fun playing with this sequencer. EM

Passport was one of the first companies to design software for the Apple II... and they've learned a lot over the years.

Passport's Master Tracks

BY LOWELL LEVINGER

Master Tracks takes the faithful Apple II up into the realm of the Mac and IBM PC for sequencing. Requirements are a 64K Apple II+ or IIe, one disk drive and controller (two drives are preferable), video monitor, game paddles (joystick acceptable), Passport MIDI interface (or compatible), and, of course, MIDI gear. A drum machine (preferably MIDI), while not absolutely essential, makes using any sequencer a lot more fun—and the beep of an Apple speaker makes a pretty wretched click track.

Master Tracks has three main sections: Real Time—Sequencer, Step Time—Editor, and Song Mode.

SEQUENCER MODE

The Sequencer Main Page will be familiar to those who have worked with Passport's earlier MIDI Sequencer programs. Eight simultaneous playback tracks are available, each with selectable MIDI channel, preset number, and name. The sequencer remembers preset changes made during recording and will even direct my DX7 to switch to cartridge voices (cartridge voice #1 equals preset #33).

Also selectable are tempo (from 25 to 200 BPM; I wish it went to 250), transposition (± 24 semi-tones), beats (number of count-off beats before start of recording), and channel MIDI Thru (useful when programming from a master keyboard, but playing back over an expander module).

The bottom of the screen displays the MIDI clock showing Bar #, Beat #, Number of Clock Pulses (24 per beat) and the amount of memory used and remaining.

Product Summary

Product: Master Tracks
Type: MIDI sequencer
Price: $250
Hardware requirements: 64K Apple II+ or IIe, one disk drive and controller (two preferred), video monitor, game paddles (joystick acceptable), Passport MIDI interface (or compatible)
Sequence architecture: Sequence/song
Note capacity: 8,000 notes
Track capacity: Eight tracks, capable of containing merged information from several tracks and retain MIDI channel assignments, assignable to 16 MIDI channels
Manufacturer: Passport, 625 Miramontes St., Half Moon Bay, CA 94019; tel. 415/726-0280.
Note: Master Tracks is also available for the Apple IIc, Commodore 64/128, and IBM PC computers.

REAL TIME RECORDING

The Sequencer acts like a multi-track tape recorder that records one track at a time. Tracks can be muted or soloed although soloing a track disrupts the MIDI clock and throws the drum machine out of sync, whereas muting tracks does not.

Particularly useful is the cue/review feature. In Cue mode, while the sequencer is paused you may move forward or backward through the piece one clock pulse (24 per beat) at a time or "fast forward" and "rewind." You can resume playback at any time. Most importantly, you can punch-in and punch-out in Cue mode as well as in real time. Thus, you can locate the exact punch point and do the punch in step time. This works by holding down the keys on the MIDI keyboard for as long as you want them to last as you manually advance the clock, then release the keys and advance the clock for a rest (if there is one). Or—you can locate the exact spot in step time, punch in, and then start the recorder in real time—or—just do the punch in real time like you would on a tape recorder. With this flexible system, lacking only an auto-punch feature, you can punch in long passages or just do edit/corrections one note at a time, all the while hearing all your other tracks play—as opposed to working with one track at a time in the Step Editor section of the program (which has advantages of its own, as discussed below).

UTILITIES PAGE

The drum timebase for non-MIDI drum machines is selectable between 24 and 48 pulses per quarter note. Start/Stop, when toggled from Int to Ext, allows you to start recording or playback from an external audio source connected to the Apple II's "Cassette In" jack; this substitutes for tape sync if no tracks are available on the tape recorder for sync tone. Master Clock toggles from Int to MIDI to Tape and back. There are also non-rhythmic utilities: Punch In Track must be set just prior to each punch in, Aftertouch can be disabled (and should be unless you need it) to save memory, and Loop Tracks toggles looped tracks on/off.

THE EDIT PAGE

The Edit Page provides several features, starting with autocorrect (for individual tracks or all tracks at once). However, save tracks before autocorrecting them since notes with durations shorter than one half of the selected autocorrect value are eliminated entirely from the track, and once a track is autocorrected, it cannot be un-corrected. Truly sloppy playing will not autocorrect properly—keeps you on your toes. When it's time to erase, tracks can be Erased one at a time or en masse to start from scratch.

The Link feature is wonderful. A track can be copied by "Linking" it to an empty track (the source track is not erased in this process). Blank measures can be inserted

Lowell Levinger, a/k/a Banana, is best-known for his work with the Youngbloods in the '60s and early '70s, and as accompanist for Mimi Farina. He started the Raccoon School of Recording Engineering, one of the first, in the early '70s; recently, he co-authored Syntech's JXPRESS Editor/Librarian for the Roland JX-8P synthesizer, and is recognized as an accomplished programmer for the DX7.

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at the beginning of a track by recording the rests on one track and then linking the music track to it. This also means tracks can be built drum machine style.

Mixing two tracks together merges the information on the source track with the destination track and erases the original source track—so save the original sequence to disk before mixing. For some reason, during "mixing" all individual tracks are saved to disk, but cannot be accessed by the program or deleted without leaving the program, so don't try to mix large tracks together with an almost full data disk. MIDI Channel information is preserved in the merge, which means that tracks recorded on different channels can still play different synths. Tracks can be re-mixed as many times as you like (memory permitting) so up to 16 channels can play on each track.

All this manipulation has been done in the Sequencer section of the program. The real MIDI massaging takes place in the "Quikstep Editor."

QUIKSTEP

This is a step editing function. First, remember (or jot down) the track on which you are working. That track must be converted from a Track to a Step File by the Converter, and then back again when you are done fine tuning it. If you can't remember which track you got it from—big trouble.

The Step Editor looks a little foreboding at first, but it lets you hear, view, and control each MIDI event on a track with a resolution of 1/24th of a beat.

While the part plays, the events will scroll up the bottom three-quarters of the screen. The top portion of the screen contains MIDI parameters and their values. Markers can be inserted in the file at any point; commands let you move back to the last marker, which makes it easy to move around to different parts of the piece and isolate sections to be edited.

Another convenience, the "Buffer" (like the Mac's "clipboard") is provided for editing. This word processor-like function enables you to move entire sections of the track or repeatedly copy an event or section. There's also an Erase menu where you can erase the whole file, erase the Buffer contents, erase from current position to beginning of file, or erase from current position to end of file.

The Step Editor screen's top section is controlled by the number keys and game paddles (preferred) or a joystick. The number keys are listed in parenthesis on the top row for orientation (see Fig. 1).

The next row of numbers represent time values expressed in clock pulses (24 per beat). Pressing a number key will select the displayed time value. Time values for each selected number key are user definable, so at any time you can have ten different time values at your disposal. Your setup can be saved as (what else?) a Setup File.

The next line on the screen lists the different parameters available, and below them, their current values.

CT# represents Controller number. Unfortunately, the documentation doesn't correlate Controller numbers to controllers (i.e. 1 = mod wheel, 2 = breath controller, etc.).

The next parameter, CTV, is Controller Value (or Range) and sets the amount of effect that controller will have.

Parameter Pre is preset number; AFT represents monophonic aftertouch. PWL lets you select plus or minus amounts of Pitch Wheel (otherwise difficult to program in step time). ACC accents the current event (i.e., decrease or increase the velocity value by a fixed amount). ART, articulation, represents the percentage of total note duration that the note is actually on. Eight settings are available, including TIE. If TIE articulation is selected, any notes in that step which exist in the previous step will not be retriggered. TMP controls tempo and is continuously adjustable during playback when selected.

When the desired parameters have been set, any note/chord played on the keyboard will be entered at the current

```
SET UP
    (1)   (2)   (3)   (4)   (5)   (6)   (7)   (8)   (9)   (0)
     4     6    12    18    24    36    48    72    96   144
    CT#   CTV   PRE   AFT   PWL   ***   ACC   ART   TMP   FLA
    49    56    48    56    10          32    75   138
                                                (measures) (tempo vel artic)
MEMORY=36588    VELOCITY=0-127    001.1.00        T V A
```

Fig. 1 *(Courtesy Andy Newell)*

position in the track with the selected parameter values. Rests are entered with the "Return" key.

The last line of the top screen display, the Header Line, shows MEM (remaining memory) and VEL (the current selected velocity value). Next comes the current clock position (measure, beat, clock pulse; this would be handy to have in the Song Mode as well) and last on the Header Line are the letters T, V, and A.

When the events scroll by on the lower part of the screen, each event lists the notes played and then the time duration (number of clock pulses) of the event under "T," the velocity value under "V," and the articulation value under "A."

On the Quikstep Disk Page, Step Files as well as the Setup Files mentioned previously can be Saved, Loaded, Deleted and Catalogued.

The Quikstep Configuration Page offers additional options. Play Channel selects which MIDI channel to play during editing. RCV Transpose transposes the pitch of incoming notes up or down anywhere within a two octave range; Play Transpose similarly transposes the pitch of the Step File during playback. Velocity Scale lets you select from six different velocity scales for use with the Step Editor. Maximum Notes determines how many notes (how large a chord) may appear per line with a maximum allowable of ten. Drum Clock toggles between 24 and 48 pulses per quarter note for use with non-MIDI drum machines.

"Master Track's degree of flexibility and controls certainly rivals more expensive programs; its menus and logical commands are quite clear, even for an inexperienced operator"

SONG MODE

Song Mode operates similarly to a drum machine, i.e., it assembles a song from sequences that may be repeated, inserted, or deleted. A Song Page loads sequences from disk into a "Song." Each sequence is given a Seq. number and its size (amount of memory used) is displayed. There is a perfect spot at the bottom of the screen to display the name of the song you're working on, but for some reason, Passport only shows you the name of the song when you are in the process of saving or loading it. The rest of the time, that space is blank. This line also shows available memory. Finally, a Disk/Edit command menu appears at the bottom of the screen.

Once all sequences are loaded into memory, the Playback Page lets you assemble and listen to the song. Unlike the Sequencer mode, the Song need not be played from the top each time; it can be started from any section. Across the top of the page are the following column headings:

SEQ REP VC TMP TR MEMO

Enter the sequence number under the SEQ column. The next column shows the number of repeats, from 000 (the sequence will be skipped during playback) to 255 repeats. VC selects whether or not preset changes will be sent out at the

beginning of each step. (This doesn't work too well unless a sequence starts with a rest; if the sequence starts with a note, as most do, then the preset change must occur at the end of the previous sequence to avoid a hesitating glitch at the start of each sequence.) A different starting tempo may be selected for each sequence if desired in the TMP column, and the TR column selects ± 1 octave transposition. The MEMO column holds notes or comments.

At the bottom of the page, Clock may be set to Internal, MIDI, or Tape Sync. Number of Beats for count-off can be set and Drum timebase can be toggled from 24 to 48 for non-MIDI machines.

Active Tracks are displayed below this. Tracks can be toggled on/off with the number keys, but not while the song is playing—muting/soloing must be done prior to playback.

Tape Sync

I have worked with tape sync systems that are less than reliable, but this one works perfectly, providing that you record the sync tone by itself first and obtain a playback level of -3 dB. On the tape recorders I have worked with, from the Studer 24-track to a Fostex 16-track, there is always unacceptable leakage of the sync tone onto the adjacent track, so the sync tone actually eats up two tracks. Still, tape sync is worth it for the great flexibility it offers and the ability to do virtual tracks.

Conclusions

There are probably a lot of Apple II and Commodore 64 owners out there feeling the pressure as more and more superior software appears for the Mac and the IBM. Many of these programs are in the $500 range and the computers ("clones" excepted) are in the $2,000-$4,000 range. Well, for $250, Master Tracks can stave off the perhaps inevitable upgrade a while longer. The degree of flexibility and control certainly rivals the more expensive programs, and while it's not as easy to use as just pointing a mouse and clicking, its menus and logical commands are quite clear, even for an inexperienced computer operator. It makes excellent use of the limited amount of memory (64K) in the computer, particularly when Song Mode is utilized.

All in all, this is an excellent piece of software. It's well thought out and user friendly, with a lot of power for a reasonable price. EM

If you love the sound of rotating speakers but hate the inconvenience, you're in luck.

Dynacord CSL222 Rotating Speaker Simulator

BY CRAIG ANDERTON

Remember the rotating speaker? This electro-mechanical dinosaur provided a brute force, mechanical approach to chorusing. It had two speakers (one for bass and one for treble) that rotated to produce various phase, time, and frequency response shifts. These kinds of speakers were big, heavy, and expensive—and when stomp box chorus units started to appear, the rotating speaker's days were numbered.

But electronic boxes only approximated, and never duplicated, that distinctive sound . . . until now. The CLS222 comes as close as I've heard to creating a true rotating speaker sound; it simulates both the horn and bass rotors of the rotating speaker, and allows for choosing a mix of the two. A three-position slide switch chooses between stop, slow (or remote box, if connected), and fast speeds. The CLS222 accelerates and decelerates smoothly between these options, just like the real thing. A curiously-labelled "basis" rotary switch switches the audio placement from mono to three progressively greater degrees of stereo. Both balanced and unbalanced outputs are available, as is a mono output.

Other controls include two rear-panel trimpots for tweaking the speed, input gain (with overload LED), ouput level, effect on/off, power on/off, and two blinky lights that show the "bass" and "horn" speeds.

So does the CLS222 really and truly sound like a rotating speaker? Well, I patched a synth organ into the thing and it indeed sounded like the real thing . . . 90 percent of the time. However, the box does not distort in the same way as the amps powering the rotating speakers of yore, and this distortion effect was frequently used to great effect by many rock organists in the '60s. If you want that distorted sound, you'll have to patch a device with a smooth overdrive effect before the CLS222. Incidentally, in my tests the CLS222 also did a very creditable job with guitar, voice, and bass.

As for suggestions, a blend control that could inject some straight, mono signal into the stereo field would be welcome. I hooked up the CLS222 this way into my board and got a brighter, more cutting sound. Maybe this kind of mutation isn't totally faithful to the authentic rotating speaker concept, but the effect definitely sounded better when it came back from tape.

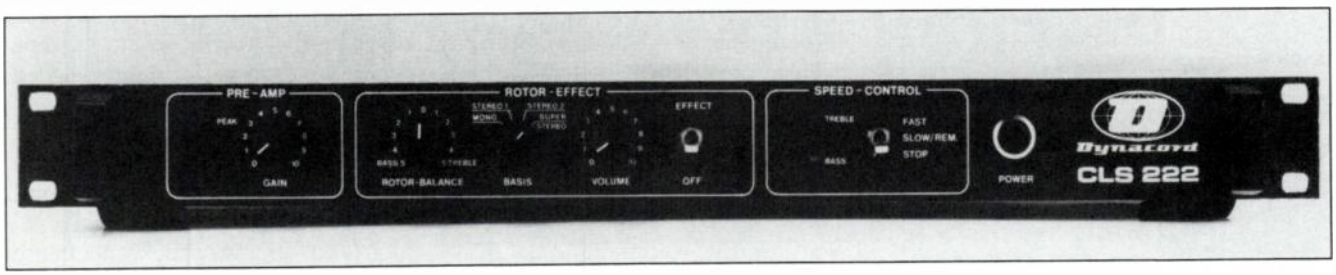
"The CLS222 comes as close as I've heard to creating a true rotating speaker sound"

At $595, the CLS222 is not exactly inexpensive. But one look at the provided schematic is enough to convince me that a lot of time was put into making this box sound as close as possible to the real thing. If you've always had a soft spot for that rotating speaker sound—or if, Heaven forbid, you're still lugging around those electro-mechanical cabinets—this is the effect for you. EM

Craig Anderton's checkered past includes such gigs as doing session work for RCA, Epic, United Artists, and MGM records; writing ad copy; modeling; and acting in an Italian detective movie.

Product Summary

Type: Signal processor—rotating speaker simulator
Rack units: One
Recommended input: 50 mV to 10V (¼-inch phone, unbalanced)
Outputs: ¼-inch phone mono unbalanced, ¼-inch stereo unbalanced, XLR stereo balanced.
Price: $595
Manufacturer: Dynacord, distributed by Europa Technology, 1638 W. Washington Blvd., Dept. D, Venice, CA 90291. Tel. 213/392-4985.



Sequencers for the Apple II are alive and well—and Syntech has come up with a pretty nifty tape recorder simulation.

Syntech's Studio II

BY JEFF BURGER

Sequencing software for computers all too often falls into one of two categories—insultingly unuseable programs from the toy department, or everything you could possibly want if you're willing to weed through unfriendly screens and hostile documentation. Happily, Syntech's Studio II for the Apple II+/IIe falls in that narrow middle ground; it's reasonably powerful yet fairly simple to grasp and operate. Much of the program is intuitive enough after learning a few basic concepts that it's easy to find your way around, and constant reference to documentation is not required. (Note: Syntech's Studio I, which is their sequencing software for the Commodore 64, was reviewed in the February, 1986 issue of **EM**).

The best way to judge software is to use it for a real-world project, and fortunately, a song deadline coincided with the review deadline. My song was your basic pseudo-techno/post-punk/funk-rock/pop formula, and building it one section at a time matched up perfectly with Studio II's architecture. Before getting into specifics, though, let's look at the basics.

Product Summary

Product: Syntech Studio II
Type: MIDI sequencer
Price: $225.95
Hardware requirements: Apple II+ or IIe with 64K memory, Passport-compatible interface
Sequence architecture: 16 sequences, arrangeable into one song
Note capacity: Approximately 7,500 notes
Track capacity: Eight tracks
Manufacturer: Syntech, 5699 Kanan Rd., Agoura, CA 91301; tel. 818/704-8509.

Jeff Burger began composing in electronic music in 1970 and has been programming computers since 1979. His credentials include past employment at Moog Music and MusicData, plus album, commercial, video and technical writing work. He is currently president of Jeff Burger Creative Technologies, dedicated to all aspects of technology in the arts.

MEET STUDIO II

This program is a direct port of Syntech's "Studio I" for the Commodore-64. The Apple version requires a minimum of 64K of memory and a Passport-compatible interface in Slot #2. I successfully used an Apple 16K Language Card in Slot #0 to take my II+ to 64K and used a Passport interface card with tape sync.

The sequencer's architecture is 16 variable-length sequences or song sections (labeled A-P), each of which comprises up to eight polyphonic tracks (labeled 1-8); arrows indicate the currently selected sequence/song. Real time and step-entry are both available, as is "blind" step editing (e.g. you hear what happens on each step, but there's no note listing or notation), auto-correct, punch-in/punch-out, and song mode.

Most commands are displayed in four highlighted boxes at the bottom of the screen; you page through sets of these commands, then select the desired box (see **Figs. 1** and **2**). Some of these boxes represent categories with their own sets of sub-commands. For instance, to save a sequence to disk you would locate the Disk box, select the Disk sub-menu, scroll through the various Disk commands until you reach Save, then select that function. This method has advantages and disadvantages; while you don't have to remember a slew of commands, once you learn the program you may yearn for some shortcuts to the process of scrolling through menus. The + and - keys increment and decrement values for such menu choices as tempo, auto-correct, etc. Note that any operations selected from the menus apply to the currently selected sequence or song.

IN SESSION

Studio II simulates tape operation and shows an on-screen mock-up of a set of transport controls; various keys invoke record mode, "fast-forward," and "rewind" (you can move forward and back by a beat or one pulse at a time). When recording, a drum machine is mandatory as there doesn't appear to be an audible metronome to match the visual one on-screen. There are four different possible timing references. Studio II defaults to Internal Drum which is an internal sync that can send 24, 48 or 96 pulses-per-quarter note (ppqn); Internal click provides sync to tape out; External Click is selected to retrieve a sync from tape; and MIDI clock will retrieve a MIDI clock signal.

With my trusty LinnDrum saddled up for external sync, I recorded that first fateful track—a bass line—in real time (more on time warps later, Scotty). After playing the last note, I reflected on just how cool a bass track it really was (and, okay, just how cool a guy I really was to have played it) instead of doing what I should have been doing, namely stopping the transport. Fortunately, there's an on-screen counter—similar to a tape counter but showing measures, beats *and* individual pulses (yeah!)—so I just set the counter to the desired sequence end point, and invoked the Set End command to create a loop of the perfect length.

Studio II's auto-correction works after-the-fact and in every case I tried, it actually corrected my playing properly rather than mutating the tracks into some strange kind of Martian music, as some systems do. Each track can be assigned to output on channels 1-16. Since I was inputting on one channel and wanted the data to come back over a *different* channel, I quickly found the command ("play thru") that lets you do this sort of thing. (I did discover a trick you can use

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instead of repatching when you want to play a MIDI device remotely *without* recording: after channelizing everything properly, toggle to *step mode* and enter record. Since the clock doesn't advance automatically, you have set up a simple MIDI thru. We'll talk more about step mode in a bit.)

Down For The Count

Next came a chord pattern to work against the bass. Surprise! I had stopped the transport in the middle of playback, and that's where the new track started recording! The counter is a blessing, but like a tape recorder, you must remember to "rewind" to the beginning of the track for each fresh take (I hear they used to have to do that with tape back in the dark ages). The advantage is that you can begin playback or record anywhere instead of wasting time listening to seven measures to check something in measure eight. Where this really comes into play is in punch-in/punch-out. You can punch live; combining this with step mode makes it easy to clean up errors. The other punch method is *auto-punch*, a very tasty feature. There are counters for In and Out points; you move the transport counter to the desired points, enter them, and voila—you have isolated the area where the computer will punch you in and out automatically. You can even do a dry run in which the counters are highlighted during the auto-punch passage.

If your tracks sound too metronomic, use the Shift Track command to shift a track a pulse at a time (up to 96 pulses per command) to humanize things a bit. Tracks can be transposed, muted in real time by simply pressing the analogous track number on the computer's keyboard, or bounced if you want to control multiple instruments with the same or similar data.

Taking The Big Step To Step Mode

With step mode, after selecting a step value from 1/4 note to 1/32 triplet, you can enter notes *and* rests of that value or increment the clock by pulses if you so desire. The counter always lets you know where you are in the piece. Step mode also lets you put real time tracks "under the microscope." Other useful functions available on a per track basis are aftertouch filter on/off (conserves memory), volume offset (-7 to +7) to scale the level of velocity-sensitivity MIDI gear and thus give a rudimentary automated mix, and

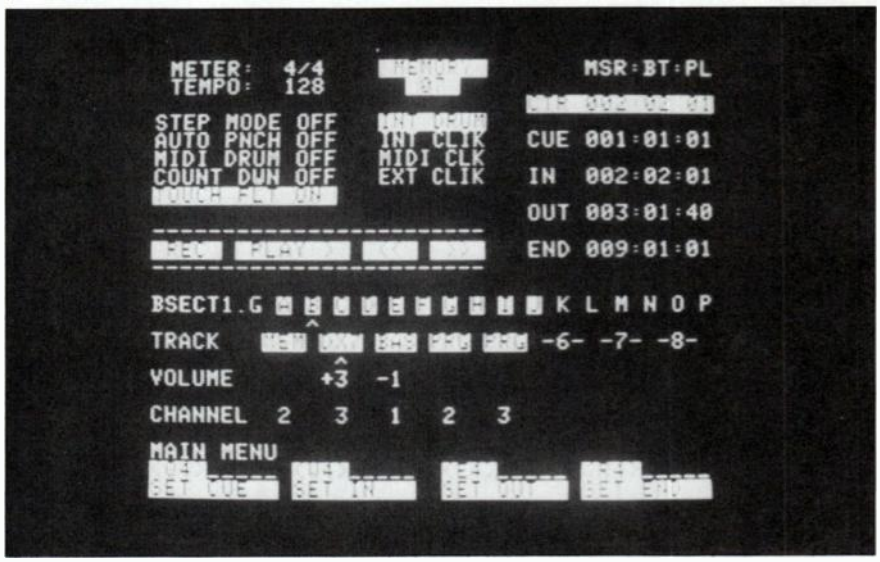

Fig. 1 *Main Menu*

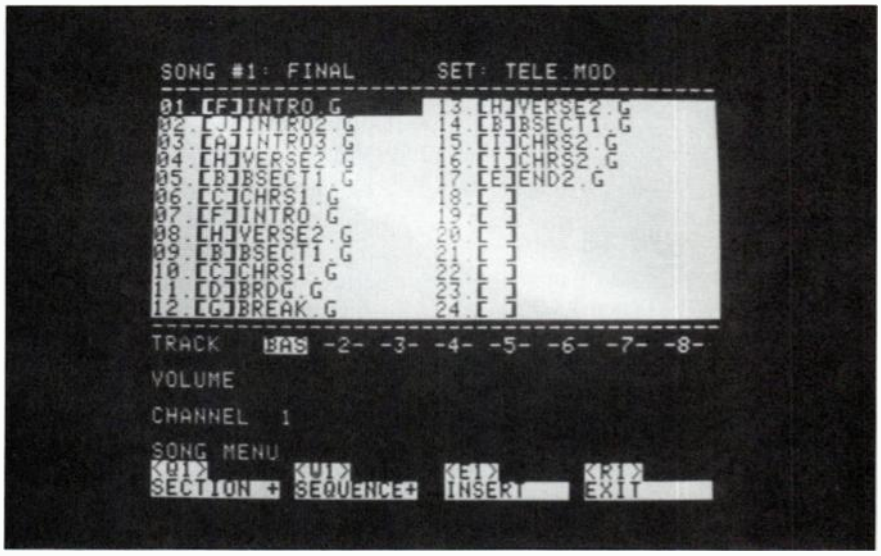

Fig. 2 *Song Menu*

name track (only three characters, though). You have eight letters available for naming sequences.

Sequences can be appended and individual sequences can be saved to disk by name, which is nice if you want to experiment with different versions. Each sequence can have its own meter and tempo, but tempo can only be changed in increments of 4 BPM! Let us all bow toward Silicon Valley in silent awe of the extra byte of system memory the programmers saved while preventing the product from being flexible enough for real-world applications!

Construction Ahead...

Putting a song together from the sequences is simple. As you move through each of 24 available positions in the song mode listing (see **Fig. 2**), you scroll through a list of your sequences by name and leave the appropriate one in that location. You can always change, insert, and delete passages until your arrangement is right. Playback can start from the beginning of any section and each occurrence of a sequence can have its own transposition—a real memory saver in applicable music. Having only 24 positions is limiting; if you run out, you have to go back to sequence mode and append sequences to themselves. In my particular song, one sequence was too long so I cut it in half with set end. Finally, I added program change commands to the tracks (this is best done in step mode at points where the given instrument is not sounding to eliminate glitching). This data is usually best recorded on separate tracks on most


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The AX73 is a 73 note velocity sensitive polyphonic midi synthesizer with voltage controlled oscillators, two stereo chorus modes, midi transmission channel spliting for driving two midi sound sources, two independent envelope generators, 100 user programmable sounds, and a cassette interface to externally store sounds to create a library.

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The ME25S programmable midi note separator converts any midi equipped keyboard into a keyboard controller. Its 64 internal memories will retain midi channels, split #, split point, program change information, octave shift, and modulation wheel setting. You can step thru the 64 memories via the front panel switch or step up by footswitch.

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systems, but Studio II allows you to strip off program changes from a given track. Pitch bends and modulations can also be deleted independently.

Trial By Synchronization

Studio II offers sync-to-tape (given an interface that supports it), but with some strange drawbacks. The manual tells you rather nonchalantly that when the computer retrieves a clock from tape while driving a drum machine, the drum machine will run at half speed. Thanks—if your drum machine doesn't have a programmable clock input divider (mine doesn't), trouble. Bear in mind, though, that all drum machines and their sync tones are not created equal, and the following scenario centers around a LinnDrum.

I striped my multi-track with sync from the Passport card under control of Studio II, recorded at the recommended -5 VU. The first thing I learned is that you can't record something in sync on an adjacent tape track, much like not being able to bounce to an adjacent tape track. Upon retrieving the sync, to compensate for the half-speed problem I rewrote one basic drum pattern at double speed (which also synchronized successfully), but decided it was ridiculous to rewrite entire drum songs. Would the LinnDrum itself read the Passport/Syntech sync from tape? Yes!...no! Halfway through the track they went their separate ways. I tried rebooting Studio II to tell it the LinnDrum was really at 96 ppqn, so that when sync to tape cut it in half I'd be at the desired 48 ppqn, but this had no effect.

"Would the LinnDrum itself read the Passport/Syntech sync from tape? Yes!...no!"

So...I re-striped the tape with the Linn's sync, fed the tape out to the Linn's input, and fed the Linn's sync output to the Passport/Syntech's sync in. Oh no! *The LinnDrum doesn't pass the external clock through, but passes its internal clock setting regardless.* At this point, I began looking for razor blades and I wasn't thinking of editing the tape! Solution: take a stupid Y-cord and Y the sync from tape to the inputs on both the Apple and the drum machine. This gives the added advantage of using the Linn's totally variable clock rather than being limited to Syntech's 4 BPM increments. With all due respect, however, the business about cutting the drum machine in half while in sync-to-tape mode....come on, folks!

Last Respects

All in all, Studio II performed flawlessly. The counters and step editing are *very* effective; I noticed no obnoxious hanging notes upon stopping the transport while notes were sounding, so the software must (unlike some programs) send an all-notes-off command. Bouncing tracks can give you more than eight tracks, but you do lose flexibility by bouncing. I would like to see independent track looping and an optional mode where the transport counter returns automatically to the beginning of the sequence upon stopping the transport. Also, song mode needs to allow more entries and tempos should be completely variable ...and don't talk to me about synchronization! Nonetheless, the bottom line is I was able to learn the system quickly, get my song done without much craziness and, coincidentally, finish this article. If you are an Apple owner, you could easily do a great deal worse than Syntech's Studio II. EM

—from page 56, APPLE II

alone ear-training and composition software for the II. Temporal Acuity Products produces the *Micro Music Software Library*, a line of 45 titles that range from children's aural discrimination training to college-level harmonic and rhythmic dictation. Teacher utilities are available for many of the programs. The software works in conjunction with the Micro Music DAC card; a separate software package, Micro Composer, allows the card to be used to compose music in four-part harmony. Temporal Acuity Products, Building 1, Suite 200, 300 120th Street NE, Bellevue, WA 98005; tel. 206/462-1007.

Electronic Arts' *Music Construction Set* (Apple version), though touted as an educational product, is primarily a compositional tool. Compositions of up to three parts can be played back through the Apple's internal speaker, and up to six parts can be accommodated by an optional plug-in card. Music Construction Set is not as sophisticated as other scoring systems for the II, and it doesn't support the MCMS or MIDI operation. However, it does provide music printing, and is very inexpensive. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; tel. 415/571-7171.

Metrognome, Inc., offers a full line of music business software (once distributed briefly by Passport). *Tour Plus* is a database/file management system for the band/artist manager that keeps track of show/concert schedules, club/arena data, show/concert income, promotional income, equipment inventory, expenses, personnel, contracts, contact lists, etc. *Pickers Plus* and *Writers Plus* are similar packages optimized for the musician/vocalist and songwriter/composer, respectively. *Labels Plus* is a printing utility for producing mailing labels, tags, cassette inserts, and cassette and tape box labels. *Sessions Plus* and *Catalog Plus* are two high-end packages for recording studios and music publishers, respectively. Metrognome also produces these and other software packages for the IBM PC. Metrognome, Inc., 602 West Iris Drive, Nashville, TN 37204; tel. 615/298-4948.

THE FUTURE II

II evolution doesn't stop with the IIe/IIc. Rumor has it that Apple has already completed design of the super-secret IIx—supposedly an open system hybrid of the IIe and Macintosh, using a Western Design 65C816 processor and containing advanced sound synthesis ICs developed by a leading American synth manufacturer. Thanks to magazine lead times, it

Meet the Guru

Techno luminary Don Lancaster is a one-man Apple enhancement factory, and author of the legendary Sams "Cookbooks" on electronic devices and micro stuff. Don's books are such a critical reference source that without them western civilization would probably collapse. His columns in *Modern Electronics* and *The Computer Shopper* are, alone, sufficient reason for many readers to subscribe to those magazines. If you haven't read Don Lancaster, you're in for a treat.

Don's Apple stuff includes books and software utilities. For example, there are some outrageous utilities that let Applewriter do just about everything you'd ever want a word processor to do *and then some* (and it already does a lot in the factory version). There are even routines that allow you to generate complex Laserwriter schematics and graphics with Applewriter. Most of Don's graphics for his books and magazines are created that way—*wild*.

In addition to his technical writing and software development, Don heads *Synergetics*, a technology consulting firm. Synergetics, Box 809, Thatcher, AZ 85552; tel. 602/428-4073.

may already be out by now; in any event, it should be available soon. It will be able to address megabytes of RAM, yet run all existing Apple II software. It is also rumored that Apple may develop, or convince others to develop, 8088, 80286, and 68000 co-processor boards. Don Lancaster (see sidebar) reports, in the July 1986 *Computer Shopper*, that the Apple II division of Apple has been significantly revitalized, and that "Many aggressive new Apple II products are most certainly in the works."

If you're going to purchase an entry-level personal computer for electronic music applications, consider the Apple II's advantages—quality, service, support, and wide availabilty of hardware and software. These days, second-hand IIs can be had for a song (pun intended). Their only major price-competitor is the Commodore-64, a computer they can readily outperform, especially in terms of disk-drive-access speed. The II may no longer be "state-of-the-art," but its remarkable utility insures that it will see productive use for a long time to come.

A Don Lancaster Selected Bibliography

All titles published by Howard W. Sams Co., Inc., unless otherwise indicated. Available from many bookstores, and from Synergetics. The * indicates titles available from the *Mix Bookshelf*.

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Also recommended: *TTL Cookbook*; *CMOS Cookbook**; *Active Filter Cookbook*; *Don Lancaster's Micro Cookbook, Volume 1**, *Don Lancaster's Micro Cookbook, Volume 2**, *The Incredible Secret Money Machine* (a guide for those with their own businesses).

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Advertiser Index

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KORG® Sampling Products Division

SAMPLING IS ONLY THE BEGINNING

For a free catalog of Korg products, send your name and address, plus $1.00 for postage and handling, to: Korg USA, 89 Frost St., Westbury, NY 11590.

How do you put musical energy into drum programming?

"Whether or not you're a drummer, a drum machine should play like an instrument, not a machine. These pads respond dynamically in smooth and realistic increments. Until now, I haven't seen a machine with these features in this price range."

Jimmy Bralower,
Studio Drummer/Programmer
(Steve Winwood, Billy Joel, Cyndi Lauper)

Start with a great set of PCM digital sampled sounds, developed with leading players, producers and engineers. Then assign them to 14 long-throw pads that respond to your touch. Program dynamics, tuning and decay for every drum on every beat, or edit them with the data slider in real or step time.

Set cymbal, drum or percussion sounds to retrigger with each hit or to overring and decay naturally. Then bring those sounds to life. The DDD-1 is designed with powerful, responsive, easy controls that let you cut through mechanical programming to build massive beats or supple grooves — spontaneously, while your ideas are fresh.

For building blocks, use any sound you can think of. Korg's growing library of "credit card" ROMs covers any musical situation, every musical attitude with a full range of acoustic and electronic drumsets and percussion instruments, many sampled with state-of-the-art effects. The DDD-1's internal memory and four ROM card slots hold up to 48 sounds, each one assignable to any pad. The optional 3.2 second sampling card lets you add your own sounds.

Program and play the DDD-1 from MIDI keyboards or drum electronics, or use the assignable audio trigger input. Store program memory (including 100 patterns and 10 songs of up to 9999 measures) on tape, on RAM cards or via MIDI System Exclusive to Korg's disk-based SQD-1 sequencer. On playback, assign any sound to stereo outs with seven step sweepable panning, or to one of the six assignable programmable multi outs.

Put your hands on the new DDD-1 Digital Dynamic Drums at your authorized Korg Sampling Products dealer. And discover how you can make drum programming a performing art.

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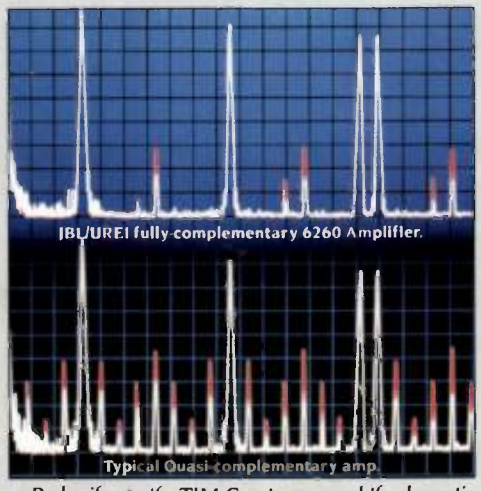
DDD-1

What To Look For When You Listen To A Power Amplifier.



Red spikes in the TIM Spectrum reveal the dramatic differences in distortion output.

When it comes to evaluating amplified sound, seeing is believing.

In fact, when engineers judge the sound quality of an amplifier, they often rely on *two* precision instruments: the human ear, and the industry-standard Transient Intermodulation Distortion Test, because when measuring sound with T.I.M. what you see is what you get.

And what you see can be eye-opening. Amplifiers that seem to square off evenly spec. for spec., often perform very differently under the scrutiny of T.I.M. Pushed to their limits, many produce brittle, edgy or distorted sound especially during high frequency passages and sharp transients.

Many manufacturers deal with distortion by using massive amounts of feedback through a single overall feedback loop, placing greater demands on the amplifier and producing an inferior sound.

When we built our new JBL/UREI Amplifiers, we committed ourselves to designing the industry's purest-sounding amps that would not only score highest marks on the T.I.M. Test, but deliver the truest amplified sound ever heard.

Instead of sloppily force-feeding massive amounts of output signal back into input stages, and congesting it all into one circuit loop, we've established operating points at *each* gain stage. This allows signal purity to be maintained along the entire circuit. And permits optimized use of the type and amount of feedback for each individual gain stage.

In a simple analogy, the new JBL/UREI Amplifiers do each signal track right the first time, so that you don't have to fix it in the mix. The result is sound far cleaner than typical quasi-complementary and fully-complementary output stages only. And far more pleasing to the ear.

Put JBL/UREI's remarkable new Amplifiers to the test at your local JBL/UREI dealer today. We're confident you'll think it's the finest amplified sound you've ever heard. Or seen.

For an informative Technical Paper on the unique design philosophy behind the new JBL/UREI Amplifiers, please write to:

JBL Professional
8500 Balboa Boulevard
Northridge, CA 91329

JBL UREI ELECTRONIC PRODUCTS