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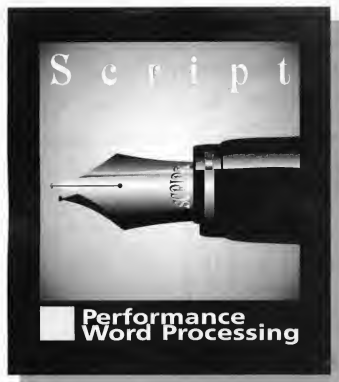
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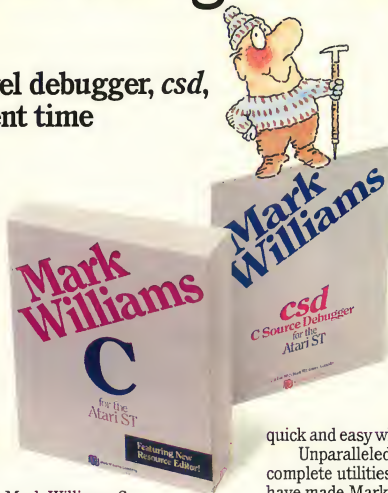
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JULY 1990

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#1 Guide To Atari ST

PUBLISHER
James Copparell

EDITORIAL

Thomas R. Byron, Editor

Amy H. Johnson, Associate Editor

Marta Deike, Junior Editor

Jim Pierson-Perry, Music/MIDI Editor

Contributing Editors: Tom Hudson, Jim Kent, Stephen Mortimer, Mard Naman, David Plotkin, David Romsden, Andrew Reese, David Small

Contributors: John Bell, Michael C. Gilbert, Tom Jeffries, Steve Johns, Donald Maple, Rebecca Rosen Lum, Bill Sethares, David Snow, Scott Wasser

CREATIVE SERVICES

Julianne Ososke, Director of Creative Services

Jim Warner, Art Director

Daniel C. Goodwin, Associate Art Director

Wendy Johnson, Advertising Production Coordinator

ADVERTISING SALES

Denny Riley

Director, Advertising Sales, (415) 957-0886

John Fellner

Western Region, (415) 957-0886

Michael Evans

Eastern Region, (415) 957-0886

CIRCULATION

Nick Clements, Circulation Director

Robert Smith, Distribution Coordinator

ADMINISTRATION

Chris Ballard, Credit Manager

Fidez Bitwin, Accounts Receivable Supervisor

General Offices, Catalog Customer Service: (415) 957-0886, 8 a.m. to 4 p.m. Pacific Time. START, 544 Second Street, San Francisco, CA 94107. Credit Card Subscriptions and Catalog Orders: (800) 234-7003. Subscription Customer Service: For change of address and inquiries, include subscription label and write to START Subscriptions, P.O. Box 535, Mt. Morris, IL 61054, or call (815) 734-6309, Monday through Friday, 7:30 a.m. to 10:30 p.m. Central Time.

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Editorial

IT'S A SMALL WORLD AFTER ALL

It's been a couple of days since World of Atari at the Disneyland Hotel in Anaheim (April 7-8) and I'm still debating whether the show was a success. For me it was, but I was there primarily to dig up stories and talk to readers.

To most vendors, however, World of Atari could have been better. Even show coordinator Rich Tsujiki hedged on the number of attendees, though he did admit the final figure was lower than last year's. An optimistic guess would put it at 4,000.

Charles Cherry, head of TOS development, was the highest ranking Atari official there, although Antonio Salermo, vice president of Atari development, was rumored to be lurking about. At the developers' party on Saturday night, Cherry and Atari programmer Dan McNamee demonstrated Softsource, a worldwide database available to registered Atari developers for uploading product information and software/hardware demos. Atari chose GEnie as Softsource's online carrier.

On the third-party hardware side, Dave Small and Jim Allen showed off their 68030 upgrade for the ST. It's not as fast as the TT — yet. Depending on demand, Allen and Small hope to have the board out by fall.



START is Now 100-percent ST Compatible

START is now set up to do all of its pre-press production on an Atari system. The decision to go fully Atari was an easy one — desktop publishing on the ST has matured considerably, and it makes sense to produce the magazine on the same computer we feature.

The difficult decision was choosing a DTP program. In the end, we picked Calamus from ISD of Toronto. Not only is it a rock-solid professional system, but support, in the form of Transcoat Systems of San Francisco (415/296-2572), is literally a few blocks away. Omnicomp of San Francisco, (415/398-3377) is our service bureau for Linotronic output. The complete system is as follows:

- 1 Atari Mega 4 with FAST Technology's Turbo 16 accelerator board
- 1 Monitem Viking 19-inch gray-scale monitor w/controller card
- 1 Carter Graphics SQ-44 Syquest removable hard drive
- 1 Atari SLM804 Laser Printer
- 1 Linotronic Interface (at the printing house)
- 1 Atari SX212 1200-baud modem
- Calamus
- Calamus Outline
- A full set of Compugraphic fonts

Special thanks to Nathan Potechin of ISD without whom none of this would be possible.


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START Editor

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I am concerned with the advertisement you are presently running for Avant-Garde. pc-ditto II is a nightmare for the novice computer user. I have had to replace chips off the board. I am now waiting for a GLU chip that has to be replaced before the board will work. None of the advertisements say you have to have a certain type of MNU or GLU for pc-ditto II to work. At the least, you should put a warning in the ad to alert potential buyers of the hazards.

James White
Vicksburg, MS

START magazine cannot be held responsible for any claims made by its advertisers. However, you have genuine concerns and we have forwarded a copy of your letter to Bill Teal at Avant-Garde who, despite the problems with his product, has a reputation for quality customer service. Hopefully he can satisfactorily answer your questions. — START Editor.

Tis Better To Have Tried And Failed ...

After all the time and effort I spent trying and failing to get pc-ditto II to run, I finally returned it to Avant-Garde, hoping they would find the board was bad and replace it. Unfortunately, however, they simply refunded my money minus shipping costs and an explanation. My advice is do not order this item and install it yourself (unless you're very capable in microelectronics). Let the dealer install the item and be responsible for giving you an operational system. Whether or not the board works as advertised is still a mystery to me.

Does it?

Roger Seeholzer
London AFB, ME

Getting pc-ditto II to work correctly, or in some cases, to work at all, appears to be a bit-and-miss situation — some do, some don't. David Plotkin, who reviewed the PC emulator in this issue, is one of the lucky ones — his unit installed satisfactorily into a 1040ST, though he did experience a problem refitting the radio-frequency shielding. Other than that, the unit appears to work fine.

A word of warning to all novices: any hardware add-on, especially those that require soldering, should be done by a certified repair person — there are simply too many things that can go wrong. — START Editor.

Shipping Stacy

Things with Atari still perplex me. For example, I am still waiting to get a Stacy. I was under the impression that they are ready to ship. Also, Atari customer service seems to be nonexistent. I sent software to Mr. John Townsend over a year ago and despite four certified letters inquiring as to where they went I still have nothing to show for. No reply, no information, nothing. I am also looking forward to seeing the Hotz machine in action. I was very impressed with your interview and articles on it. I hope to see it someday.

I am now a proud owner of a modem and once I get the hang of it I hope to get online with some of the Atari representatives if they are there and see if they can honestly give me some straight answers to questions that never seem to get answered. If it were not for you and our local users group, I would definitely be lost.

I would like to thank you for your magazine. Thanks to you I have made some very good investments in software and hardware. Keep up the fine work and thanks for letting me air my frustrations. Someday I hope

Atari will wake up and start listening to the many users that are out there.

Mike Mahan
Vidor, TX

As we reported in the May 1990 issue, Stacys are indeed shipping in the United States, though far below the numbers needed to satiate demand. This news comes in spite of reports that Atari's manufacturing facility in Taiwan is operating at full capacity. However, since 82 percent of Atari's revenue is generated from outside North America, it is likely that most of their machines are going to Europe where Atari does the bulk of their business.

Though you do not specify exactly what software you sent to Atari, the matter does deserve further investigation. Your letter has been forwarded to John Townsend at Atari. Also, you might give Atari customer service a call. The number is 408/745-2000. If you wish to voice your concerns via modem, Atari maintains a presence on both CompuServe and GENIE.

START also hopes that Atari "wakes up and starts listening," but that likelihood is fading as the computer company continues to grow in foreign markets. — START Editor.

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News, Notes & Quotes

BY STEPHEN MORTIMER, START CONTRIBUTING EDITOR

Inside Atari

This month, there was good and bad news from Atari. First, the good news: Positive corporate earnings for the fourth quarter of 1989 were released in March. Net sales for the quarter were \$170.6 million with net income of \$5.7 million or 10 cents per share. Compared to 1988, sales were up \$18 million while net income was down \$3.6 million. For the entire year of 1989, sales were \$423.6 million with net income of \$4 million or seven cents per share. This compares to a net loss in 1988 of \$84.8 million on sales of \$452.2 million.

As of the end of 1989, the sale of Federated Group's assets was completed. Atari's more positive earnings are a result of the sale and the introduction of the Portfolio and Lynx. Sales of the ST and PC line grew, while sales in the U.S. video-game

Fat Bits

- Apple Computer has taken a major move toward improving its customer relations by providing a one-year warranty with its computers. Previously, the warranty period was 90 days, the same span of time that Atari currently has established.

- In other Apple news, the Mac IIcx was first shown in March. While Atari still, as of press time, has not released its 16MHz TT, the fx features a 40MHz 68030, 68882 floating-point coprocessor and a 32K static RAM cache. The high speed of the unit and its \$9,000 price tag places it firmly in the workstation market. The unit features four dedicated ASIC I/O processors designed to enhance efficiency by managing low-level tasks.

market decreased overall. European sales increased in all categories.

The bad news was that Atari Corp. (U.S.) laid off 15 percent of its workforce on March 16, 1990. Most of the staff reductions were in low-end positions at Atari, many of which were in the accounting department. Research and development staff were not affected since the division is not

contained in Atari Corp. (U.S.), but in another division of Atari Corp. Mead Ames-Kline, president of Atari U.S., commented that the layoffs are part of a restructuring of the organization to make it stronger and more efficient. Ames-Kline stated that Atari is currently adding employees and is in the process of building a stronger sales and marketing department.

According to news reports, Atari is interested in purchasing an old Commodore factory in Philadelphia in order to produce LCD screens for its portable systems.

The CeBIT 1990 show held in Hannover, West Germany, gave the public a long look at Atari's upcoming product line (see *European Report*). For the Portfolio, five ROM cards were displayed. A new version of the Lynx, the Mark II, will have a slightly smaller screen and be without the left-handed controls. Finally, it was announced that there will be three versions of the TT. The TT030/2, TT030/X and TTX have more power and expandability. The entry-level system will have 2MB of RAM, a VME bus, with Ethernet and Unix version 5.31 available as options. ■

LaserJet III Debuts

Hewlett-Packard has begun shipping their LaserJet III, the latest in their popular line of laser printers. The price has been set at \$2,395 — \$300 less than the series II.

HP's Resolution Enhancement Technology smooths out the printer's 300 dpi (dots per inch) output so that it is of much higher quality than any other 300 dpi printer on the market. The R.E.T. achieves its results by placing smaller dots, moving dots and changing the size of dots on the page to create a smoother, sharper image. The LaserJet III also features PCL 5 with its fully scaleable and rotateable fonts with Postscript quality graphics capabilities. Another advance the LaserJet III has over its predecessors is an almost 50 percent decrease in the time required to print pages of graphics. The eight pages per minute text speed is still the same. One megabyte of RAM comes standard with the printer, compared with 512K for the series II.

HP offers a \$695 Postscript language cartridge and a \$275 Appletalk interface as optional add-ons. For more information, contact Hewlett-Packard at 19310 Pruneridge Ave., Cupertino, CA 95014, (800) 752-0900.

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European Report

Atari at CeBIT 90

The CeBIT show in Hannover is now officially the largest computer show in the world. Several factors have contributed to this, with the recent opening of Eastern Europe and the proximity of the unified market in 1992 tipping the scales. This year, CeBIT (March 21-28), was host to more than 3,500 exhibitors from over 40 countries with a total number of attendees easily surpassing the 500,000 mark.

Third-Party Hardware

Most exhibitors at the Atari booth displayed improved versions of their existing products.

One company that managed something new was SED-DOC with their Silent Drive hard drive. Besides being very quiet, the drive is removable. The disks range in capacity from 80M to 250M and the same box will also accept removable floppy and tape-cartridge drives. SED-DOC also showed Ctree Server, an accessory for distributed database applications that run across different systems (Apple, VAX, etc.) on a local area network.

The most impressive hardware on display was Maxon's MGE II interface to their high-resolution, large screen color monitors. With MGE II an ST owner can now also drive an array of impressive Matrix monitors. Depending on the model, the monitors range from 14 to 21 inches and can display up to 16 million colors.

IBP has been tearing STs apart and reassembling them as rack-mountable industrial-control computers for years. The MSI 190 is an example, sporting a 800 x 600 resolution with 256 colors. MSP 190v is an AC/DC portable drawing on either 12 or 24 volts.

Fischer Teschnik makes what can best be described as "electronic Legos." On display was a new version of their computer controlled robot arm. The complete system is comprised of software, a hardware interface



The Atari booth at CeBIT 90 was buzzing with excitement.

and the arm itself.

BioNet 100 by Biodata is a network running on a number of different configurations. With BioNet 100, an ST user can attain access to MS/DOS, Unix, DEC, NFS, Novell and TCP/IP systems.

Omikron, who wrote ST BASIC for Europe, ventured into hardware with their Copystation, a professional disk copier. The hopper takes up to 100 disks with automatic master recognition. The device reads a write-protected disk and then copies it to all subsequent floppies until another write-protected disk is encountered. For the rest of us, Omikron showed Easy Base, a database with fast search (0.2 seconds for 1,000 addresses) and Small Chart for graph plotting.

Third-Party Software

GFA, the granddaddy of German ST companies, was present in force.

GFA BASIC 3.5e lets you use STE specific features such as hardware scrolling. The same program runs on all machines by adapting itself accordingly and there is now a new library with extended sound and graphic commands. Converter-to-C translates GFA BASIC source into C. GFA Assembler, the integrated development package, is now up to version 1.5.

Calamus SL is the color version of the well-known desktop publishing program, that supports full cyan, yellow, magenta and black color separation. DMC, in cooperation with Atari Germany, showed the package, but a release date has not been set.

1st_Card by LogiLex is a Hypercard-like expert system sporting artificial intelligence. Graphics, text and buttons are all easily linked with the built-in editor.

Application Systems Heidelberg showed a monochrome game called Esprit. The stylish ASH is better known for its line of professional software such as the Signum word processor.

Tommy Software, the sound and graphic wizards from Berlin, were true to form with a finished version of Megapaint II Professional, a combined pixel/vector drawing package, and music/MIDI programs, SoundMerlin and SoundMachine.

TmS, another graphic programming giant, showed TmS Cranach, an image-processing system that supports

24-bit color pictures on large-screen multisync monitors. Its older brother TmS Cranach Studio is the professional version with pictures of up to 40MB and a 3D simulator. TmS 2.5 converts pixel drawings to vector graphics.

Technobox showed their professional Drafter and CAD/2 programs. Already translated into English, these are professional tools aimed at designers and architects.

On the music front, most software houses went to the simultaneously held Frankfurt music fair. However, Roland's Tentrax sequencer and Steinberg's Cubase MIDI recording software were shown at Hannover. C-LAB Software exhibited their Notator Alpha which converts music to notes in real time and the Aura music education program.

Richter Computer showed Shelterlook, a powerful character-recognition program that supports both monochrome and color scanners

and recognizes up to eight fonts automatically. Also at the Richter stand was Chili, a sophisticated video digitizer that works with 65,000 colors. Mixing any two video signals, it lets you define the "see through" window in any regular or irregular shape down to a single pixel.

CCD, best known for Tempus editor, nudged their new Tempus_Word word processor-cum-DTP package up another notch to version 0.91 with a full-blown version 1.0 due soon.

Weide Elektronik, famous for their RAM expansions and other hardware add-ons, are venturing into software. Address Direct is a database written specifically for mail-order companies. It supports both networks and GDOS, while the mail merge is possible with Tempus, 1st_Word and Calamus documents.

Advanced Applications SPC Modula-2 is now up to version 2.0 and supplied on five disks. IDA is an integrated, Adimens compatible, multitasking database.

Borland, synonymous with C on the PC, demonstrated Turbo C 2.0 (complete C development environment) and Turbo Debugger (source level) for the ST. At present, there are no plans to translate these into English as Borland believes there is no ST market outside Germany.

The Dusseldorf show is scheduled for August 24-26. ■



Sam Tramiel shows off the Lynx at the developer's conference.

THE INS, OUTS AND THRU OF MIDI

A Beginner's Guide

(Editor's Note: In the Spring 1987 issue of *START*, professional musician Tom Jefferies wrote an extensive beginner's guide to MIDI. Well, we thought it was so good that we decided to reprint it this issue. For a tutorial on programming in MIDI, see Steve Johns' "MIDI Programming Tips" in this issue.)

A surprising thing happened in 1982. Several of the leading manufacturers of electronic musical instruments, normally fierce competitors, decided to sit down together and develop a means whereby their instruments could communicate with each other. They wanted to set things up so that a synthesizer from company A could drive a drum machine from company B or even a synthesizer from company C.

Why? Well, for several reasons. It was, and is, very useful to have more than one synthesizer playing the same part. You can often get considerably more interesting sounds using two different instruments than you could with any one instrument, a fact

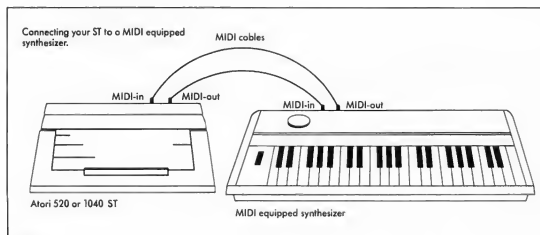


Figure 1

well known to classical composers. However, it's difficult for a single player to play several instruments at the same time, and rock bands generally don't carry more than one keyboard player.

Hardware devices called *sequencers* (actually dedicated computers) were coming into use. The problem was that a sequencer put out by one company would not work with a synth or drum machine put out by another company. Sound familiar?

Synchronization was also an issue. Drum machines were becoming popular, and many people wanted to synchronize their keyboards to their drum machines

and vice-versa.

So, in a move that should be an example to the computer industry, these brave souls carved out a hardware and software standard that defines *exactly* how electronic musical instruments would communicate.

They named their invention Musical Instrument Digital Interface, or MIDI.

Communication between musical instruments and personal computers was not the primary concern of the MIDI developers, but since in reality almost all digital synths, drum machines, and sequencers are dedicated computers, it was natural that the MIDI standard turned out to work so well with computers.

How MIDI Works

Let's take a look at how MIDI actually works. Suppose you have a MIDI-equipped synth and have attached a MIDI cable from the MIDI Out port of your synth to the MIDI In port of your ST (Figure 1). Every time you press down a key on your synth it will send a message over the MIDI cable to the ST telling it a key was pressed down ("note-on event" in MIDI jargon), which key it was, and how hard you pressed the key. (The latter is particularly useful with "velocity sensitive" keyboards, such as the Yamaha DX-7.)

A different signal is sent when you release that key. This signal will be a "note-off event" (logical enough), and will also specify which key was involved and, on some synthesizers, will tell how quickly the key was released.

You can see that if your computer is keeping track of these signals, and the amount of time between them, it now has a record of which notes you have played and how long they were. The software doing this is called a sequencer; I'll discuss it in some detail in the section on software.

Now, if you have a MIDI cable running from the MIDI Out port of your ST to the MIDI In port of your synth, and the proper software, your computer can make your synth play back the notes you played on the synth in the first place. All the software has to do is send those same "note-on" and "note-off" signals it saved, making sure it waits the appropriate amounts of time between notes.

Since MIDI sequencers function, in many ways, like tape recorders, there are some persistent misconceptions. MIDI sequencers do not "record" music like a tape recorder. They record a series, or sequence of events: note-on events, note-off events, pitch-bend events and so on, that are produced by an electronic musical instrument equipped with the appropriate MIDI hardware and

internal software. A MIDI sequencer cannot record your voice, unless you can find a way to equip your vocal chords with a MIDI Out port.

The wonders of MIDI come from the fact that the list of events you store in your computer can be treated as data and manipulated in ▶

START DICTIONARY

Cycle: One complete occurrence of a waveform, from start to finish (see *Waveform*).

DIN plug: The round connector at either end of a MIDI cable.

Envelope: The overall configuration of a waveform. If you draw a line around one entire cycle of a waveform, this constitutes a sound envelope. See *Waveform*, *Cycle*.

Frequency: How often a sound (from either an acoustical or electronic musical instrument) vibrates in one second. The higher the frequency, the higher the pitch.

Filter: A device that eliminates certain frequencies from an audio signal. A high-pass filter eliminates low frequency sound. Conversely, a low-pass filter eliminates high frequency sound. The point at which elimination starts is called the cut-off frequency.

MIDI: Musical Instrument Digital Interface. In 1982 several major musical equipment manufacturers decided upon a set standard, MIDI, for the transferral of sound data from one electronic instrument to another. All MIDI-equipped devices speak the same language and can "talk," or exchange data, with one another.

NAMM: An acronym for National Association of Music Merchants, a trade group of retailers and wholesalers who market music-related products.

Note-off: The point at which a key is released. The speed of the key rising is called the note-off velocity.

Note-on: The point at which a key

is hit. Note-on velocity is how fast and with what force you are hitting a key.

Patch: A piece of music created on and played by a synthesizer.

Patch Editor: Software enabling you to alter a sound's specific values such as pitch, volume and frequency. The patch editor also allows you to save patches on disk and transfer patches into a synthesizer.

Sample: A section of digitally-recorded sound. Turning an audio signal into digital (computer-readable) sound is called sampling.

Sequencer: A device that stores a series of notes for later playback on other instruments.

SMPTÉ: An acronym for Society of Motion Picture and Television Engineers. Also used to describe a timing code which allows the various parts of a production (film, tape, sound, special effects) to be synchronized.

Sustain: The continuation of a note or sound after the key is released.

System exclusive message: A MIDI message directed only to devices that can use its specialized data.

Waveform: The changes in air pressure over time, displayed graphically as a line, as a sound is created. In MIDI, the waveform is the changes in voltage over time. If a waveform completes one cycle and returns to its starting configuration, it is called a periodic waveform. See *Cycle*.

Wavelength: The distance between the consecutive peaks of a waveform. See *Cycle*.

many ways, just as a word processor allows you to manipulate your words much more easily than you can on a typewriter.

The MIDI standard provides for 16 channels of communication. This means your ST could send a different set of notes (in the form of note-on and note-off events) to 16 different synthesizers, or even to 16 different sets of synths, with all of the synths in each group set to the same channel. In reality, such a system is rare, mostly because of the expense, and MIDI does run into some trouble when it is pushed that hard, but the capability is there.

Non-Professional Uses of MIDI

MIDI was designed for professional electronic musicians, and has become extraordinarily popular with them. MIDI is such a useful tool, however, that it was only a matter of time before it came into general use. With synthesizers dropping in price to the point that you can buy a very useful instrument for \$300 or so, a lot of people who do not make their living by music are buying instruments and MIDI software.

An example of non-professional MIDI software is Activation's popular Music Studio (Editor's Note: *Dr. T's new Tiger Cub is also geared toward beginners.*) With the mouse, you enter a series of notes on a staff and can play them back either through the ST's sound chip or through any MIDI-equipped synth. The program is too limited for professional use but is highly entertaining and educational. It has quite a strong following from music hobbyists, resulting in hundreds of song files available from user's groups and bulletin board systems such as CompuServe and GENie. It doesn't really fit into any category — it's not a sequencer since it doesn't record notes in real-time from the synth, but it's fun!

Another clever use of MIDI comes from QRS, the people who sell

mechanical piano rolls. They have converted many of their piano rolls to MIDI data and sell a program called MIDI Magic that plays them back while displaying a moving piano roll on the screen. I'm biased about this program, since I wrote the Atari ST version, but I enjoy listening to George Gershwin playing my Casio CZ-101 while I watch his piano technique on my computer screen.

There's a huge potential for MIDI as an educational tool, but it's still

with the best equipment you can rent or borrow for the actual session.

Even more significant is the manipulation you can do on the music once it's stored. The best sequencers allow you to edit each note of your music much like a document in a word processor. Missed a note? Take it out and put in the right one!

In addition, with a good sequencer, you can transpose the notes, "quantize" them (take out certain

They named their invention Musical Instrument Digital Interface, or MIDI.

largely undeveloped. (Are you listening, software companies?) MIDI also takes away some of the need for years of intensive training in the physical act of playing, considered "paying your dues" by performing musicians. The transition from amateur to professional may well become easier because of MIDI. The jury is still out on whether or not this is a good thing, but technology evolves whether we like it or not, and music is no exception.

MIDI Software

The most important kind of MIDI software is the sequencer. In its simplest form, a sequencer stores the sequence of events (or notes) coming in over MIDI so they can be played back either through the same synth or through any other MIDI equipped synthesizer.

Note that last bit. Once you've stored the sequence, you can play it back over any instrument or instruments you want, as long as the receiving instrument is properly equipped. This means you can prepare a piece of music at home on a relatively inexpensive keyboard, then go into the recording studio

kinds of rhythmic imperfections), add dynamic changes (changes in the loudness), set up repeating patterns, and overdub. You could also record one line, or track, at a time. Many sequencers actually allow you to exceed your synth's capabilities several times over.

Although sequencers were developed for professional musicians, they can be just as useful to amateurs. A good professional sequencer, however, can cost several hundred dollars. Several companies are selling "consumer" sequencers for under \$100; but as with all software purchases, make sure what you're getting. Some of the inexpensive packages offer little or no editing. Those of us who are not expert keyboard players need more editing facilities than, say, Jan Hammer or Stevie Wonder. Unless your fingers never miss when they tickle the ivories, look for a sequencer that lets you edit individual notes.

There are some other, very useful, kinds of MIDI software, such as patch editors and librarians. The sounds produced by a synthesizer are determined by the "patch" the synth is set to (the term is a holdover

from the 1960s when synthesizers consisted of modules connected with patch wires; you set the sound by plugging and unplugging wires). Most synths will hold only a limited number of patches, and patch storage with plug-in cartridges gets expensive very quickly when the cartridges for some leading synths cost \$75 or so apiece.

Floppy disks, however, are pretty cheap, and it didn't take long for people to start writing programs to get the patches from the synth and store them on disk. Programs that do this are called patch librarians.

Originally, patch librarians just worked with a single kind of synthesizer, so, if you had four different synths you had to buy four different patch librarians. That got old quickly, especially since the synthesizer manufacturers kept coming out with new machines. So, somebody got the bright idea of writing universal patch librarians that could handle patch information from a variety of synths. This gets difficult also, since every synth has a different way of storing its patch data and the software companies have to keep updating their software to match new instruments, but from the user's point of view it's a vast improvement.

Patch editors are often confused with patch librarians, but, although there is some overlap they really serve quite different functions. Most synths are very complex machines, and the process of setting up a really interesting sound on them can be extremely difficult and time consuming since they only provide buttons (and maybe a slider or two) for input and a tiny LED display to let you know what's going on.

A computer, with its full screen display, keyboard, and, in the case of the ST, a mouse, is a much better environment for editing the sounds or patches to be used by the synth. A program allowing you to edit patches is called, reasonably enough, a patch

editor. Some patch editors even employ artificial intelligence principles, facilitating the creation of new sounds.

Patch editors normally include patch librarian functions. They only function with a single synthesizer, however, because the inner workings of each synth are so different it is not really possible to build an editor that will deal with all of them.

Now companies market patch editors that can be co-resident in memory and work in conjunction with a sequencer, letting you have your cake and eat it too. This is only possible with computers like the ST, providing large amounts of memory at reasonable prices.

There are several other types of MIDI software. There are filters that change the data coming from one

synthesizer on its way to another. There are composition programs that generate pieces of a composition according to rules you set out. There are score printing programs that, while not MIDI based, can read a file from a MIDI sequencer and turn it into printed music.

MIDI and the ST

The MIDI interface was designed to be inexpensive and easy to implement; still it was a pleasant surprise when Atari announced they were going to include it in the ST. With other computers you had to spend between \$50 and \$450 to add a MIDI interface.

Atari did a reasonably good job of it, too. They provide the standard 5-pin DIN connectors for MIDI In and ▶

START BOOKSHELF

COMPILED BY AMY H. JOHNSON, START ASSOCIATE EDITOR

C Programming for MIDI, Jim Conger, M&T Books, \$22.95. Fairly technical reference; better know your C. Optional IBM disk. M&T's order number is 1-800-533-4772 outside California; 1-800-356-2002 inside California.

MIDI and Sound Book for the Atari ST, Bernd Enders and Wolfgang Klemme, M&T Books, \$17.95. More about digitized sound and the ST's internal sound chip than MIDI in particular. Optional Atari disk.

MIDI for Musicians, Craig Anderson, Amso Publications, \$14.95. A little dated, but an excellent introduction by an authority in the MIDI field.

MIDI Programmer's Handbook, Steve De Furia and Joe Scacciaferro, M&T Books, \$24.95. Begins by

dissecting a MIDI instrument and ends with a generic application written in Pascal. Optional Atari disk.

MIDI Sequencing in C, Jim Conger, M&T Books, \$24.95. Analyzes an eight-track sequencer, whose C code is scattered throughout the book. Optional IBM disk.

MIDI 1.0 Detailed Specification version 4.1, International MIDI Association, price unknown. An absolute must. Write to 5316 W. 57th St., Los Angeles, CA 90056 (213) 649-6434.

Music Through MIDI, Michael Boom, Microsoft Press, \$19.95. Wide focus. Discusses MIDI/music from bass clefs to brand names, MIDIphiles from home to Hollywood. Jim Pierson-Perry says it's the single best reference.

An excellent source for more specialized books is the MIX Bookshelf. Call 1-800-233-9604 and ask for a catalog.

MIDI Out, attached to the internal circuitry of your ST through devices called optoisolators which prevent certain kinds of noise which occur because of connections between your computer and your synth.

MIDI Cables

Unfortunately, Atari decided to get fancy and included a feature called MIDI-thru without spending the money to add another 5-pin DIN plug for it. A MIDI-thru port simply copies exactly what is coming in the MIDI In port and sends it through unaltered. So, if you are playing on a MIDI-controller keyboard that doesn't produce any sound you can hook up a synth which *will* produce a sound to the MIDI-thru and hear what you are playing into the sequencer.

According to the MIDI standard, only three of the five pins of the

Casio CZ-101, 1000, 3000, and 5000. It was quite popular, but customers called us, saying it caused their synthesizers to lock up or exhibit other bizarre behavior. Long discussions with Casio, many experiments, and considerable hair-tearing were to no avail. The worst thing was that we could not recreate the problems on our equipment.

Finally, one of the customers having this difficulty took a look at the cable he was using. Much to his (and our) surprise, it had the two pins which should be unused wired to the two signal pins. Since the unused pins on the Atari MIDI Out were sending a copy of the MIDI In signal, the handshaking required to exchange patches with the synths was impossible. In fact, the effect was so confusing to the CZ it locked up.

Both Atari and the company making the cables had deviated from

disconnecting your ST. Let's say you have a synth with a keyboard and also one without — maybe one of the popular Yamaha TX7 modules, or the FB-01. You've laid down some hot rhythm section parts using your favorite sequencer software and your keyboard connected, via MIDI cables, to your ST.

You want to try out some lead lines, but you think they'll sound better on your synth with no keyboard. With MIDI-thru, all you have to do is connect a MIDI cable from the MIDI-thru port on your ST to your keyboard-less synth, set the sequencer to playback, and play your lead lines on your CZ. The signal will go straight from the keyboard to the keyboard-less synth while your rhythm parts are being played back on your keyboard.

Of course you can accomplish the same things with the right combination of cables and splitter boxes, but MIDI-thru is a convenient and inexpensive way to handle quite a number of situations. With this adapter, you can add something new to your MIDI bag of tricks.

This is a very simple project, but if you have no experience with hardware you will need more instructions than I have space to provide here. There are a number of books and magazines covering the basics of putting together circuits; if you want one of these adapters and don't want to go to the trouble to make it yourself, I'm sure you can find a TV, stereo, or musical instrument service center to make it for you at a reasonable cost.

You'll need very few parts to make this adapter: one male 5-pin DIN connector, two female 5-pin DIN connectors, and some short connecting wires (*Figure 2*). It would probably be best if you used shielded cable for connections, but I used plain wire and haven't had any trouble. The secret is to keep the wires short to minimize the possibil-

The MIDI interface was designed to be inexpensive and easy to implement.

MIDI Out port should be used. Atari connected the two signal lines (the third line is used for shield/ground) from the MIDI In port to the two unused lines on the MIDI Out port. The idea was to provide MIDI-thru, although such a non-standard implementation should have been called something else to avoid confusion in the first place.

Atari's version of MIDI-thru isn't much use without some kind of adapter that will split the signal into a proper MIDI Out and MIDI-thru, so I have provided directions to build this extremely simple adapter. Limited usefulness, however, is not the biggest problem with the "MIDI-thru" on your ST.

Not long ago I wrote a commercially-available patch editor for the

the standard, although with non-malevolent intentions. Both, however, assumed that no one else would deviate from the standard. Unfortunately, they were incorrect in that assumption.

There are two solutions to this problem. One is to cut the wires connected to pins 1 and 3 (the two outermost pins) on the cable you connect to the MIDI Out port on your ST. The second is to run down to your local electronic parts house, pick up a few inexpensive parts, and put together an adapter that will upgrade your ST to the proper MIDI standard.

The Adapter

MIDI-thru provides a way to play one synth from another without

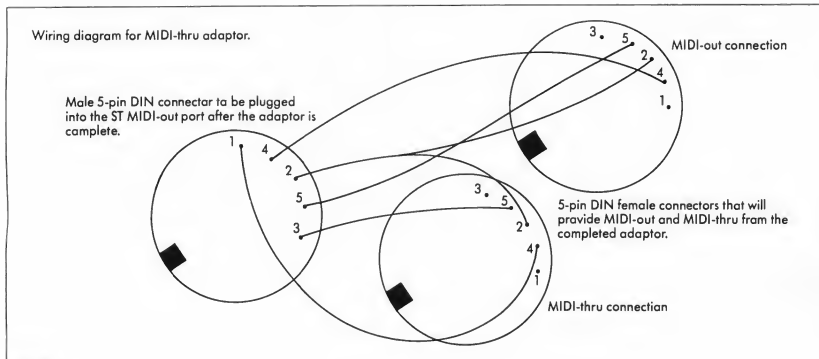


Figure 2

ity of interference. If you can find them, get DIN connectors with solder lugs and your work will be easier. You should find a little number near the solder connection for each pin on your sockets. That number is the pin number and corresponds to the numbers you will see in Figure 2. Make sure you connect the correct wire to the pin and there are no solder connections or pieces of wire between the pins.

You need to solder six wires to the 5-pin male DIN connector — the middle pin (#2) needs two wires. If you are going to be fancy and use shielded cable, the shields for the two cable sections should both be attached to this pin in place of two wires.

After that it's just a matter of soldering the correct wire to the correct pin on the female 5-pin DIN sockets. Pin 2 (ground) on the male socket has to be connected to pin 2 on both of the female sockets, either through a short length of wire or through the shield on your shielded cable if you are using shielded cable. Pins 1 and 3 of the male socket have to be connected to pins 4 and 5 of one of the female sockets (this will be your MIDI-thru port), and pins 4 and 5 from the male socket have to

be connected to pins 4 and 5 of the other female socket (for normal MIDI Out operation.)

Make sure you get all the wires connected correctly, and make sure no wires can short out against each other at the 5-pin DIN connectors. I tend to use pieces of electrical tape for extra insulation if it looks as if anything might ever be a problem; think about what a few years of abuse might do to loosen things up.

Now, put the sockets themselves back together, and plug the male socket into the MIDI Out port on your ST. The female socket connected to pins 1 and 3 of the male socket should now function as a proper MIDI-thru port, and the female socket wired to pins 4 and 5 of the male socket is now a correct MIDI Out port. Be sure to label the two female sockets so you know which is which without tearing the whole thing apart!

With the addition of a MIDI-thru adaptor, the ST's MIDI hardware is complete. A built-in external clock sync would be nice, but we can't have everything, and that's not actually a part of the MIDI specification.

And There You Have It

Confused? Good, join everyone else

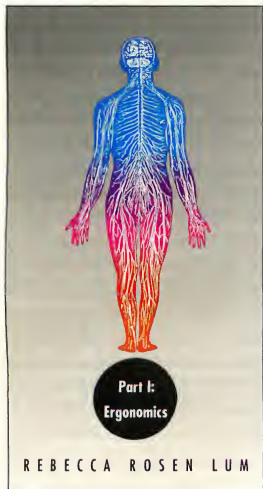
who has dealt with MIDI. The point is, at least some things are very simple to do, and the others will become easier as you absorb more information. The MIDI specification is a powerful tool and, while it has limitations, accomplishes a great deal. The more I work with MIDI the more respect I have for its originators.

If you want to do anything serious with MIDI, get the *MIDI 1.0 Detailed Specification* (version 4.1) from the International MIDI Association (see *START Bookshelf*).

Several magazines offer strong coverage of MIDI. The most important is *Keyboard Magazine*, which publishes columns about MIDI constantly, often by the people who wrote the specification in the first place. Another magazine to look for is *Electronic Musician*. There is also an online service called PAN, which specializes in the arts. Their office number is (215) 584-0300. Of course, each of the major online services such as CompuServe, GENIE and Delphi, include special MIDI sections. ■

Tom Jeffries is a professional musician turned programmer who lives in Oakland, Calif.

The Body



Labor saving devices are supposed to help, not hurt. But the computer, the wunderkind of productivity tools, has been associated with health hazards ranging from inflamed wrists to miscarriages. In the first of two articles, Rebecca Rosen Lum explains how a properly designed workstation can prevent crippling injuries.



Incorrect chair height: The seat is too high; her heels are off the floor and the front edge of the chair puts pressure on her thigh behind the knee.



Correct chair height: Feet are flat on the ground and thighs are parallel to the floor. She feels even pressure along the length of her upper leg. Use a footrest if you can't lower the chair enough.

Electronic

The last thing syndicated newspaper columnist Denise Caruso expected while working at home on her personal computer was an on-the-job injury. When the 33-year-old San Franciscan began experiencing numbness in her arm, she chalked it up to an old shoulder injury and kept on typing.

But the numbness, as it turned out, was the harbinger of tendonitis, which required medical treatment, wrist braces worn day and night, and — most worrisome for a writer — no typing for a month. Despondent, Caruso wondered if she would have to find a new career.

Caruso says she believes her tendonitis is the result of years of typing at a too-high table while “twisted up like a pretzel.” By the time she sought medical help, she says, “I couldn’t move my fingers more than a half an inch.”

Injuries Increase

Ailments like Caruso’s are on the rise. Occupational health specialists call them repetitive strain injuries, or RSI. Such injuries are caused by continuous, repeated movements of the hands, arms or shoulders — like those made while keying at the computer. Overstressed, tissues and tendons swell, rubbing against bone and ligament, and sometimes compressing nearby nerves. The result: tingling, numbness, burning sensations, and, all too often, chronic, teeth-grinding pain.

Until recently, RSI was thought to strike mostly blue-collar workers who labored in assembly lines and packing plants. But sufferers can include musicians, surgeons and others whose work involves articulated, repetitive hand movements. To their dismay, computer users are learning that they, too, are at prime risk for this debilitating injury.

Like Caruso, Caroline Rose, writer, editor and manager of a small computer firm, ignored the burning sensation in her forearm until it became unbearable.

“I continued to work for about two months before I realized I couldn’t go on,” says the 42-year-old Redwood City, Calif., resident. Ten months later, her suffering continues unabated. The diagnosis: tendonitis.

“I tried it all,” she says. “Oral anti-inflammatories, steroid injections, acupuncture. Every doctor I saw said, ‘It will go away in six or seven months.’”

Instead, the pain worsened, spreading to her elbows. And she doesn’t know when, or if, her tendonitis will end. “After trying everything, my doctor is now saying to just ‘work through’ the pain,” she explains.

Rose is not alone, as she discovered when she put out the word recently that she would like to start a support ▶



Incorrect backrest position: The backrest’s arch is too low and the top of the backrest is not supporting her upper back.



Correct backrest position: The curve of the backrest follows that of her spine. The backrest’s arch nestles in the small of her back (approximately belt height), providing lumbar support.

group for RSI sufferers and was deluged with calls before her first meeting.

In some workplaces, the injuries are epidemic. At the Los Angeles Times, for example, one fourth of reporters and editors have sought medical treatment for RSI. The union at U.S. West telephone company in Denver, Colo., reports 187 cases of RSI, many of which have required surgery.

"Computeritis"

Caruso and Rose's bouts with RSI, known in computer circles as "the VDT disease" and "computeritis," are the unexpected side effect of the computer revolution. *Business Week* magazine pronounced it the fastest-growing of all work-related ailments. Occupational health experts dubbed it "the worker's disease of the 90's." Since 1978, the number of RSI cases surged from 14 percent of all work-related illnesses to 50 percent in 1989.

Often misdiagnosed as arthritis, the number of RSI cases may be much higher than the 200,000 reported by government officials in 1989. Research scientist Dr. Barbara Silverstein of the

University of Michigan recently told a congressional subcommittee that RSI may hit workers at 100 times the rate reported by OSHA. In California's high-tech capital, Santa Clara County, she said doctors reported treating nearly 4,000 cases of work-related RSI in 1987 — the same year the State Department of Industrial Relations claimed the number to be 71.

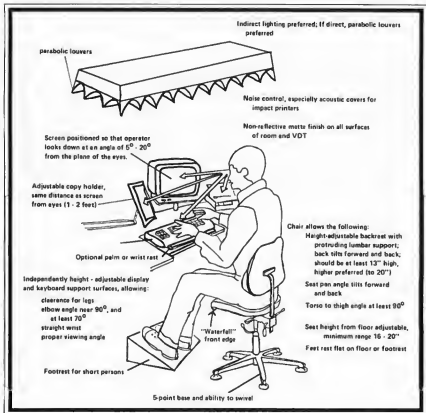
Along with the rate of injury, the cost of treatment is soaring. The worker who develops carpal tunnel syndrome, a particularly crippling form of RSI in which swollen tendons hit the median nerve of the wrist

within its tunnel-like casing, may run up a tab of \$10,000 to \$100,000 in one year alone in combined lost wages and medical care, one study revealed. Nationally, Dr. Roger Stephens of the U.S. Labor Department estimates employers spend \$4 billion a year on the treatment of RSI.

One reason for the high medical cost of RSI may be delayed treatment. Doctors stress that RSI does not result from a single injury, but from a series of micro-traumas. When tendonitis sufferers continue using their

hands or arms they keep injuring the tendon in tiny little ways. Delaying treatment of carpal tunnel syndrome is worse; chronic sufferers may find relief only through surgery.

No one knows this better than Bill Growney, an Arizona resident and carpal tunnel sufferer. "My arm felt like a hunk of meat that didn't belong to me," he says. By the time he sought treatment, he recalls, "I couldn't hold the telephone for more than 30 seconds without switching hands. I couldn't reach over the edge of the pot to stir the soup without waves of pain spreading up my arm."



COURTESY-NEW JERSEY STATE DEPARTMENT OF PUBLIC HEALTH



Incorrect keyboard height: She is reaching forward and resting her wrists on the edge of the table. Note how the table's height is even with that of the desk beyond it.



Correct keyboard height: The keyboard is almost resting in her lap. Her upper arms hang naturally at her sides, and her wrists float and are lower than her elbows.

KEYBOARD DESIGNERS TACKLE ERGONOMIC PROBLEMS

California inventor Tony Hodges has been getting a lot of press lately.

Hodges designed a split keyboard known as "The Tony!" The prototype, shaped like an inverted "V," lets the user type with palms tilted toward each other — a more natural position than the flat keyboard.

Hand surgeon Dr. Robert Markison calls The Tony! an excellent example of "design flowing from human anatomy."

But other experts, like Dr. David Rempel of the University of California at San Francisco Medical School, says too much is made of keyboard designs like Hodges', or the less radical split keyboard designed by Barbara and Stuart Herzog of Arizona.

"All the elements of good ergonomics have to be in place," he maintains. "The keyboard doesn't change that. And the keyboard doesn't address the issue of pressure."

A keyboardist applies the equivalent of 10,000 pounds

of pressure in just four or five hours of typing, researchers estimate. Rempel says one of the most exciting innovations in keyboard technology is the "tactile feedback" built into new IBM units.

"You hear a little click when you hit the key, so you can withdraw your hand before the key hits the end of its run, which is a hard surface," he says. This cuts the pressure the typist needs to apply in half.

The irony in the controversy surrounding The Tony! is that the keyboard may never be sold. New designs "rarely see the light of day," says Wang industrial designer Peter Macdonald, "because management and marketing are loathe to produce or promote products that they see no demand for. Ultimately, the very best designs cannot be produced unless the user population lets the computer industry know that ergonomically poor products will not be tolerated."

— Rebecca Rosen Lum

A Utah surgeon performed a simple, brief procedure on both hands, but weeks later, Growney is still recovering his grip. "I can barely take the lid off the peanut butter jar," he says. "Every faucet in the house is leaking because I can't twist them hard enough to shut them all the way off."

Prevention Is The Best Medicine

Like many other victims of this tenacious condition, Growney stressed that prevention beats medical intervention. Ergonomists, who study the best placement of objects for safe and effective use by humans, say the

best defense is a workstation tailored specifically to the user's physical dimensions.

Laura Stock, associate director of the Labor Occupational Health Program at the University of California at Berkeley, warns that personal computer users have only an illusion of safety while working at home.

"At home, you have control, you can move about more freely," says Stock, who also directs the VDT Coalition, a group of 25 unions promoting computer safety issues. "But I see very little difference [between home and the workplace] if you work

long hours in an awkward position. The issues are the same." Other experts agree.

"The keyboard, the document, the chair and the floor rest have to be fully adjustable," says physical therapist Terry Hansford of Hand Therapy, a clinic in San Francisco. "The kitchen table is not adjustable."

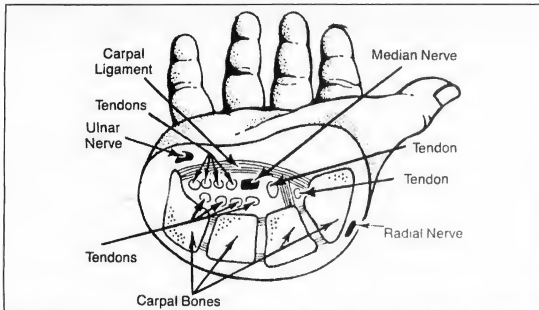
Yet that's exactly where many people plunk their computers to plunge into hours of work. A risky mistake, says Dr. David Rempel, an epidemiologist, research scientist and assistant professor at the University of California at San Francisco Medical School. ▶



Incorrect chair arm position: Most fixed-arm chairs, like this one, have incorrect arm heights, causing the shoulders to droop if too low or hunch if too high.



Correct chair arm height: Her elbow rests naturally upon the arm when not typing. Note the use of wrist rests to keep hands in proper position.



COURTESY 1989-910-5, NIOSH

Poor ergonomics at the keyboard usually affects the hands and arms. Tendonitis causes the tendons to swell and rub against bones, ligaments and nerves. Carpal tunnel syndrome results from swollen tendons hitting the median nerve.

Rempel, an affable man who clearly enjoys his role in demystifying ergonomics, works out of a small, immaculately organized office at the Department of Public Health in Berkeley, Calif., filled with examples of good and bad computer setups.

"I tell people, 'Keep your table as low as possible,'" he says, demonstrating by sliding his own long legs under a simple, adjustable table.

"There should be one inch of clearance between the table and your legs." Raising the hands to touch a too-high keyboard, he says, is rough on the biceps, shoulders and back and stresses the nerve tunnels that run through the wrists. He cautions against raising the keyboard to an angle for the same reason. "And, if you weren't taught to 'float' your wrists above the keyboard like trained typists are, use wrist rests" — foam rubber supports that keep the wrists parallel to the ground.

A crucial piece in the ergonomic puzzle is the chair. The angle of the seat, the chair height and the back should all be adjustable, he says. And the backrest should be at a slight backward angle; otherwise, the weight settles flat on the base of the spine, defeating the purpose of a back rest.

Expensive? Well, yes. "I think people should put a lot into their

chairs," says Rempel, who vows his own was well worth the \$700 he paid for it. "We're sitting in the bloody things more than we're in bed."

Take Five

But if the chair is so comfortable the user never wants to leave it, another problem arises. Studies by the National Institute for Occupational Safety and Health (NIOSH) have revealed

that long periods of time spent sitting at a keyboard lead to a condition called "static loading." Because the muscles are not being flexed, but continually contracted, circulation slows down. Fresh nutrients do not flow to the muscles as fast as they need to, and waste products, like lactic acid, settle there much longer than they should. The upshot: soreness and pain.

"I believe in moving around," says Rempel. "Don't tie up one muscle group all day long."

Breaks, at least, are free. Many home computer users lament that they do not have an employer to pick up the tab for costly ergonomic equipment. Fortunately, home users do not have to choose between physically crippling ailments and a financially crippling, state-of-the-art workstation, says the VDT Coalition's Stock.

"You can retro-fit existing equipment," she says, suggesting inexpensive alternatives, "like foam rubber strips instead of specially made \$20 wrist rests."

Rempel, who perches his own



Totally incorrect: She is leaning forward to see the document placed flat upon the table. Her back is unsupported and the armrests are too low. The chair height is too high; her heels are off the floor and the edge of the table digs into the top of her thighs.



Totally correct: The top of the monitor is at eye level; the document is placed next to and level with the monitor. The backrest provides lumbar support and the armrests and seat of the chair are at the proper height.

monitor atop a fat occupational medicine textbook, advises others to use books to buoy their monitors. And he would rather the home user rig a table from a piece of plywood and two sawhorses than buy an elegant hardwood desk with drawers under the top surface that make it impossible to get the keyboard low enough.

"Medical treatment, if you are not working at the right workstation for your body, will do you no good," he warns.

A Light Touch

In a 1989 study he made of 137 VDT users, Rempel found 50 percent suffered from RSI symptoms — all directly attributable to poor ergonomics. Yet he stresses that RSI symptoms frequently result from the amount of pressure a typist brings to bear on the keyboard.

"You have to look at technique," says orthopedist and hand surgeon Dr. Robert Markison. Before designing treatment programs for his patients, Markison first watches them work the keyboard to see whether they are using undue pressure and sending shock waves through the already aching tendons of their forearms.

"Some people really hammer away," says Markison, who is having his San Francisco highrise office suite enlarged to accommodate the crush of RSI sufferers. "In a seasoned typist, like a court reporter, there is an incredible economy of motion," he says. "Creative people sit down, and, after a while, they're pounding away like Rachmaninoff."

They're also vulnerable to overwork, a nemesis so threatening to a keyboardist's health that Markison proposes that all software should include a built-in timer to mandate breaks.

David Kaplan, now a patient of Markison's, blames his tendonitis on the three-month stint he put in at the keyboard writing a book. His doggedness culminated in a 12-hour session

— "with breaks, mind you" — that brought him into Markison with swollen, aching hands.

"The problem is, you get enraptured," he says. "An hour can pass quickly, which is one of the magic things about writing. Unfortunately, in these days of computers, that can be dangerous."

Now, instead of writing, the 34-year old Kaplan spends hours each day doing gentle stretching exercises, squeezing sponges to rehabilitate his muscles and tendons, soaking his hands and resting them completely, with frequent hand massages from his wife, a physical therapist. He expects to recover, but "there will be no more 12-hour days, that's for sure."

"The hand is a dynamic piece of equipment, and nobody knows what the warranty is," says Markison. He ad-

vises computer users to gently stretch their fingers before beginning work and to take stock of their total health. "The heavier your forearm, the thicker the mantle of fat" compressing the tendons, he says. "Keep your weight down. Limit caffeine intake; that prevents spasms of the blood vessels. Smoking shuts down circulation."

The Body Electronic

Writer Kaplan says to follow the experts' advice.

"RSI is sneaky," he says. "It will creep up on you, even if you are aware of its effects. Prevention is a hell of a lot easier than getting RSI. It puts you out of commission for weeks. And your hands are everything." ■

Rebecca Rosen Lum is a San Francisco-based freelance writer.

RSI RESOURCE LIST -WHERE TO WRITE

Center for Office Technology 1801 K St. NW, Suite. 905L Washington, DC 20006 C.O.T. is a national coalition of industry officials and large-scale workplace buyers. They conduct research and publish their findings.

Human Factors Society PO Box 1369 Santa Monica, CA 90406 In cooperation with the American National Standards Institute, has published a detailed guide to ergonomics and VDT workstations.

9 to 5, National Assoc. of Working Women 1225 Huron Rd. Cleveland, OH 44115 Together with the AFL-CIO, they head the "Campaign for VDT Safety," a project monitoring and reporting on VDTs and health hazards in the workplace.

National Institute for Occupational Safety and Health (NIOSH) PO Box 36165 Cincinnati, OH 45236 NIOSH is a research agency that publishes findings and issues guidelines which are generally tougher than OSHA's.

New Jersey State Department of Public Health CN360 Trenton, NJ 18625-1360 This agency has published a set of "voluntary guidelines" for VDT use in the workplace, and will send them to you at no charge.

New York Committee for Occupational Safety and Health (NYCOSH) 275 Seventh Ave., 25th Floor New York, NY 10001 This progressive advocacy group tracks and reports on VDT and safety issues, and offers a comprehensive range of materials on the subject.

Statistical/Technical Support, Occupational Health and Safety Agency (OSHA) 200 Constitution Ave., Rm. 2625 Washington, DC 20210 They set workplace health and safety standards and monitor industry compliance through inspections.

Laura Stock, Labor Occupational Health Program University of California at Berkeley 2515 Channing Way Berkeley, CA 94720 The VDT Coalition is a group of 15 labor unions promoting safety issues. They have a VDT and health library, and a variety of publications and reports available to the public.

VDT News PO Box 1799 Grand Central Station New York, NY 10163 The first and only of its kind, VDT News offers cutting-edge information on VDT health and safety. Physicist and publisher Louis Slesin dogs pertinent industry, government, insurance and research developments.

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MULTITASKING ON THE ST



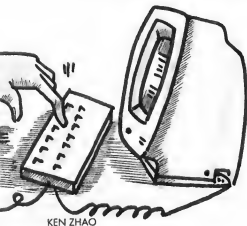
BY JIM PIERSON-PERRY

They said a multitasking TOS couldn't be done. For years, high-level engineers at Atari claimed the ST's 68000 microchip simply wouldn't handle the added workload. Yet multitasking on the ST has existed in one form or another ever since the computer's debut. In the first installment of a special two-part series, Jim Pierson-Perry discusses the history of multitasking TOS and the recently announced MIDI-Tasking from Atari.

A restatement of Prouelle's Law is "one user, one computer." Under the normal Atari TOS operating system, this becomes further restricted to "one user, one computer, one job at a time." While many users accept this as standard ST behavior, the situation is actually a gross waste of the computer's resources. While you're staring at the

PART 1

Introduction and TOS Solutions



screen — thinking of the next "what if" for your spreadsheet or brush strokes for a painting — your ST is locked in stasis, wasting thousands of operating cycles.

A multitasking operating system "fills in the gaps," enabling two or more programs to seem as if they're running at the same time. It can make more effective use of both the computer's capabilities and your own time than the present Atari operating system can. Activities such as formatting disks, downloading from a BBS

or compiling a program can be done automatically while you concentrate on writing a letter. Some of the most demanding uses for multitasking are in the music/MIDI area where there is a vital need for several applications (sequencer, mixer, mapper) to run simultaneously in order to exchange data and I/O port accesses with millisecond timing accuracy.

The Basic Terms

A *process* (or task) is a generic term for a set of commands to be executed by the computer. For our purposes, we can consider each program to be a single process.

At any point in time, a particular process is in one of three states: *actively running*, *ready to resume running* (just waiting for the processor) or *blocked* (needs access to a system resource and cannot proceed even if picked up by the processor). Examples of a blocked process are ones that wait for a timer or a keypress.

Processes are swapped in and out of execution by a scheduling routine called the *process dispatcher*. The operating system sets a priority level for each process. Each process also has certain memory needs which must be kept inviolate of other processes. For multiple processing to work, developers must "follow the rules" for proper software. For example, failure to release memory after an application finishes is a frequent problem with multitasking on the Amiga. Newer processors, such as the Motorola 68030 used in the TT, contain a special hardware memory management unit (MMU) that facilitates multitasking.

The actively running process is in the foreground; other ongoing processes are in the background. Many simple processes are well suited to background operation, such as printer spooling and disk formatting. A direct example of this is the Shadow terminal program (Antic

Software) which lets you automatically download from a BBS in the background while running a program under the standard GEM operating system.

While some processes are content to run in a vacuum, others thrive on sharing data or status messages between themselves. A relatively simple example is via the desk-accessory pipeline, typified by the add-on functions for DEGAS Elite described in the Summer 1987 issue of START. A much more sophisticated system is used by the M-ROS system from Steinberg/Jones which lets a MIDI program send its output either to an external port or as input to another MIDI program running concurrently.

Switcher Solutions

Although multitasking of multiple GEM programs has only recently become a reality on the ST, several earlier variations on the theme have been successfully exploited. The most common substitute is a switcher program where applications run in isolated memory partitions. This is not true multitasking as only one process runs at a time. The others are suspended and only resume when switched to active status. When an application is switched in, it takes over all ST resources (except memory previously reserved for other partitions) exactly as if it were running by itself. Switching is done on an as-needed basis by the user, through some command/function keystrokes.

There are several limitations to switchers. A major one is that memory sizes are fixed and cannot be altered without restarting from scratch. This also applies to memory released when you quit one of the applications; it is not made available to the remaining processes. There is typically no support for interprogram communication. The only solution is to save data as a disk file from one ▶

partition, then read it back in after switching to another partition.

For the ST, switchers come in several levels of capability and complexity. Juggler II (MichTron), Revolver (Intersect), K-Switch (Kuma) and HybriSwitch (Hybrid Arts) are examples of simple switcher programs.

Moving up the ladder in capability takes us to switcher programs designed to share data and functions between concurrent processes and govern shared system resources. These systems were exclusively

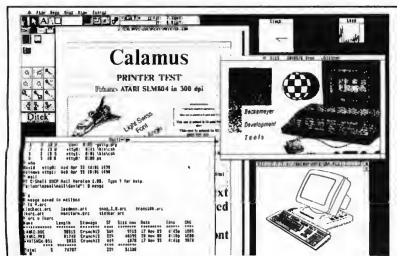
updates and some auxiliary tools on national BBSs. It is intended as a project to explore systems programming on the ST, rather than a basis for commercial software development. Those interested in pursuing MX2 should try to reach Brooks through his message area in Category 3, Topic 25 of the GENie BBS ST Roundtable.

Significantly more information, in fact an entire book, is provided for MINIX (short for Mini UNIX), which was written by Andreas Tanenbaum to teach systems programming. It is

succeed, largely due to problems with existing software that did not follow proper guidelines. Multifinder had similar problems but, thanks to support from Apple, developers had to fix their software or be out of the market. Juggler had no such support from Atari, thus no driving force for developers to seek compatibility.

The only viable commercial offering is Micro RTX from Beckmeyer Development Tools. This is a robust multitasking/multi-user system that can run several TOS programs and one GEM program concurrently; desk accessories are also supported. Up to 12 users can be logged in together using a hardware expansion on a Mega ST. It was first released in 1987 and has been constantly refined and improved since then.

A UNIX-like command-line interpreter interface (Micro C-Shell) is available to control the Micro RTX system. A visual shell interface (VSH), based on the UNIX graphics interface used in Sun workstations, can be used in conjunction with Micro RTX. This enables individual applications to run within standard GEM windows, all on screen together. Efforts are underway to mate Micro RTX with other graphical user interfaces such as NeoDesk. A shareware version of Micro RTX was recently released on national BBSs. Several commercial applications are available from Beckmeyer that are based on Micro RTX, including a version of the Citadel BBS program and a multi-user point-of-sale system.



Beckmeyer's MT C-Shell, with the Visual Shell Manager, running on the Monitorm 19-inch monitor.

developed to support MIDI applications, which are fairly unique in their demands for real-time interaction between processes and system hardware resources. Examples of this include the Multi-Program Environment (Dr. T's Music Software), Soft Link (C-Lab) and M-ROS (Steinberg/Jones). As with the other switcher programs, applications must be assigned to fixed memory partitions and can only be viewed and/or controlled one at a time.

Experimental Systems

There are two TOS (non-GEM) multitasking environments for those interested in studying operating systems: MX2 and MINIX. There is precious little information available regarding MX2 other than that it's a TOS multitasking kernel from Fred Brooks. It was written in Modula-2 and is posted with source code,

available for the ST, IBM and Macintosh from Prentice-Hall along with the companion book, *Operating Systems: Design and Implementation*.

The ST version shipped is MINIX 1.1; additional code is available on national BBSs to upgrade it on par with the IBM version 1.5 release. For more information, check Category 3, Topic 31 of the GENie BBS ST Roundtable.

Commercial Multitasking

The original version of MichTron's Juggler was a noble attempt to provide multitasking for both TOS and GEM programs. According to author Tim Purves, it was virtually identical in concept to Multifinder on the Macintosh. Unlike other switchers, it used dynamic memory allocation and was based on extensions to the inherent GEM kernel. It did not

Stay Tuned

Next time we will explore the concepts and implementation of MIDI-Tasking, the official Atari GEM multitasking system developed and supported by Intelligent Music. It is currently in beta test and developers are working to validate (or modify) their software to run under it. ■

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MIDI PROGRAMMING TIPS

Secrets Of The Inner Circle Revealed!

BY STEVE JOHNS

AT A GLANCE

Program:	MIDI Programming Tips
Type:	Tutorial
Requirements:	512K, any rez
Arcfile:	PROGMIDI.PRG
Files:	SEEMIDI.C SEEMIDI.TOS
Language:	C

MIDI programming on the Atari ST and Mega computers may seem like an arcane art, open only to ordained techno-musicological wizards. In fact, with a few exceptions, MIDI programming is no different than any other kind of applications programming. You spend the majority of your effort conceptualizing the program, creating nice displays, handling mouse and keyboard inputs, managing files, dealing with GEM and processing data. In addition, MIDI programmers deal with I/O from the MIDI In and MIDI Out ports.

To get you started, I will review the system calls (ROM subroutines) per-

taining to MIDI and how MIDI data is captured and stored by the ST. This will include hints on how to avoid the subtle and disastrous system MIDI buffer overrun error. I will not cover basic MIDI commands and protocol. If you need to brush up on these, I suggest reading this issue's *The Ins, Outs and Thrus of MIDI* or the *MIDI 1.0 Detailed Specification* (version 4.1) available from the International MIDI Association (see *START Books* belf).

Nitty Gritty ST

Before going any further, we need to agree on terminology. The **system MIDI buffer** is a memory region where incoming MIDI data is automatically stored by the operating system. Once placed in this buffer, the data is available to your program. This buffer is limited in size (default is 128 bytes) and can be overrun if too much MIDI data comes in before your program reads it out. Information about this buffer is found in the buffer descriptor structure, located through the IORECV(3) call mentioned below.

An **interrupt** is a hardware signal

generated by a peripheral device — in our case, the ACIA or MIDI chip — which alerts the ST to the occurrence of an event, such as MIDI data arrival, requiring some action on its part.

When an interrupt occurs, a ROM-based **interrupt service routine** takes over. The MIDI interrupt's service routine places each incoming MIDI-data byte into the system MIDI buffer.

Nitty Gritty MIDI

Six MIDI functions are built into the ST operating system. They are listed here under their common names, found in most C language compilers and ST reference books. Other languages (Hisoft BASIC, Personal Pascal, etc.) allow access to these calls, under these or other names.

BCONSTAT(3): Returns a non-zero value if bytes are available to be read from the system MIDI buffer, zero if the buffer is empty.

BCONIN(3): Returns the value of the next byte in the system MIDI buffer. You will typically call BCONIN(3) after detecting MIDI bytes

continued on page 37

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continued from page 34

in the buffer via BCONSTAT(3).

BCONOUT(3, int data): Sends a single byte to the MIDI Out port. Although data is a 16-bit integer variable, only the lower byte is sent.

MIDIWS(int count, char *pointer): Sends multiple bytes to the MIDI Out port.

IOREC(3): Returns a pointer to the system MIDI buffer descriptor. This is a data structure containing four elements describing the system MIDI buffer: a pointer to its start, its length and pointers to its head and tail.

KBDVBASE0: Returns a pointer to a data structure containing nine system vector pointers, each pointing to an interrupt service routine.

The overall sequence of events is: A MIDI byte arrives at the MIDI In port and the hardware generates an interrupt. TOS acts on the interrupt by running the MIDI interrupt service routine, which places the MIDI byte into the system MIDI buffer. After the MIDI data is stored in the buffer, your MIDI program may access the data, via simple function calls, then use the data in your program.

The Dreaded Buffer Overrun Error Explained

Of the four system MIDI buffer descriptors returned by the IOREC(3) call, two, start and length, are used by the operating system to define the buffer's starting memory address and length, and two, head and tail, are used by the interrupt service routine to track the incoming MIDI data.

The head pointer flags the next byte of MIDI data to be read. It increments each time your program reads a byte. The tail pointer flags the last byte of MIDI data placed in the buffer. It increments before each incoming byte is placed in the system MIDI buffer. When the tail pointer reaches the end of the system MIDI buffer, it wraps around and writes data at the beginning of the buffer. The same with the head pointer.

When the last byte of data is read from the end of the buffer, the head pointer starts reading from the beginning of the buffer. This behavior

interrupt service routine will automatically place incoming MIDI data in your enlarged buffer and you will avoid the overrun error.

A fast and furious dump can cause the tail pointer to circle around and bite the head.

makes the system MIDI buffer a circular buffer.

Suppose, however, that the tail pointer is writing data twice as fast as the head pointer is reading data. Eventually the tail pointer catches up with the head pointer and the two are equal. Unfortunately, no data can be written at the tail pointer's location; to do so would overwrite MIDI data already in the buffer. This is the dreaded overrun condition — MIDI data coming in is lost because there is no room to store it.

This problem tends to rear its ugly head during a large system-exclusive dump where bytes are sent in a burst. Even if your program runs a tight loop to read data from the system MIDI buffer, a fast and furious dump can cause the tail pointer to circle around and bite the head pointer. The result is lost MIDI data. The system only needs to get 128 bytes ahead of your program to cause this disaster.

The Dreaded Buffer Overrun Error Solved

The solution is for you, the programmer, to define your own MIDI buffer to replace the default system buffer. You can declare this user MIDI buffer to be any size within the memory allocation bounds of your language. Make it big enough to accommodate the largest dump of MIDI data that your program will be required to handle. For example, if you are writing a synthesizer patch librarian which sends 10K blocks of MIDI data, define your user MIDI buffer to be just over 10K. Done properly, the MIDI

SEEMIDI.C is a short example in C that captures and displays up to 32K of MIDI data. The overall logic is:

- 1) Save the system MIDI buffer information so we can restore it upon exit.
- 2) Set aside memory for a user MIDI buffer.
- 3) Clear the screen and prompt the user.
- 4) Enter a loop to read in MIDI data; immediately output each byte to the screen in hex.
- 5) Clear the screen when the user presses [c], or exit the loop when the user presses [Esc].
- 6) Restore the system MIDI buffer, restore the memory you used, and exit.

MIDI-Thru

Although this simple program just displays incoming MIDI data, it is a fairly simple matter to add file capability in order to save the data to disk. Another enhancement is to store the incoming MIDI data in an array and implement scrolling so that any part of the data could be viewed at will. Yet a third possibility is to alter the MIDI data and pass it through to the ST's MIDI Out port. In fact, it only takes a few lines of C code to implement a MIDI-thru. Replace the display code inside the escape key loop with the following:

```
if(Bconstat(3)){
    midi=Bconin(3);
    /* Put your processing code here, if desired */
    Bconout(3,midi);
}
```

This is a high level MIDI-thru since it is written in C and involves function calls. Although it works fine and it is convenient to write processing code in C, it has two disadvantages. First, the function calls, which involve the stack, make it slow. Second, you must be constantly polling for incoming MIDI data.

Fast MIDI-Thru

Suppose you just wanted a MIDI-thru function that worked fast in the background while your program was busy doing other things. This calls for a low-level MIDI-thru.

A low-level MIDI-thru function involves replacing the built-in MIDI interrupt service routine with one of your own. SEEMIDI.C also shows an example of low-level MIDI-thru, written in assembler. Note the actual thru-function code only takes four instructions; the rest of the routine duplicates the action of the system

MIDI interrupt service routine. By replacing the ST's routine with your own, you are not trapped in a polling loop and MIDI-thru takes place totally in the background.

Although interrupt-handling code can be complex, the technique for doing the swap (also called stealing the vector) is simple. The functions THRU_ON() and THRU_OFF() are used to swap your routine in and out respectively. The state of the variable THRUFLAG indicates when your function is in control. One important note: Always restore any swapped system vectors before exiting your program or subsequent programs will not find the interrupt service routines in place when they need them.

Ordination

Well, that's it. You now possess the two (count 'em) secrets of MIDI programming on the ST: replacing

the system MIDI buffer and swapping in a custom MIDI interrupt service routine. Everything else depends on your knowledge of MIDI specifications, your creativity as a programmer and perhaps a few tricks (some would say trade secrets) pertaining to time stamping, which will have to be covered another time. Congratulations, and welcome to the secret society! ■

Steve Jobs is an electrical engineer and the founder of Jobsware, a MIDI software development company. He resides in Hyattsville, MD with his wife Erica, whose loving patience makes his fine GEM MIDI programs possible. He can be reached on GEnie as S.JOHN or on CompuServe through the Jobsware category under the Worldmusic (MIDI) forum.



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ATARI

What backstage secret do the Beach Boys, Blue Oyster Cult, Hall and Oates, Madonna and the Rolling Stones share? They have Atari hardware and software hidden among the cables, amps, synthesizers and mikes. *START* talked with the people who work with the ST in live performance, studio recording, synth sound banks and home demos.

Mike McKnight

On Tour with Madonna

While not a household name to her legion of fans, Mike McKnight is one of the key people keeping Madonna's "Blonde Ambition" tour true blue and pumping out the music, night after night.

He uses two Stacy 4s to coordinate MIDI and keyboard activity for the show. Although McKnight's MIDI experience stretches over six years, beginning with a Commodore 64 and a Dr. T's sequencer, his colleagues questioned his judgement when he brought his Atari on the Madonna tour.

"Some guys at first pushed me to bring in a 'real computer,' a Macintosh," McKnight recalls. "I said give me a week with the Atari and if you don't like the way it feels then I'll gladly get a Mac."

These days, they sing a different tune. "Everybody on the tour is driving me crazy wanting a lot of Stacys," McKnight laughs. "We've got some Macs out here. One guy in particular,

in the last three weeks his Mac has broken down three times. It has eaten up everything on his hard drive.

"Over all those years [my 1040ST] has never once broken down. I've had it in monsoons in the Philippines and horrible power situations and it never, ever gave me any problems."

McKnight describes his role on the

tour as "enhancement. Some songs have a lot of sequenced bass or other parts that are kind of mundane but necessary. My sequencing frees the live band up to play much more interesting parts. It's a nice combination. Some background or lead vocals are sampled but used strictly to enhance the live singing. I play parts underneath the stage ... because I've

The only drawback he sees to KCS is its 16-channel limitation. "Hopefully they'll go up to 32 or 48," he says.

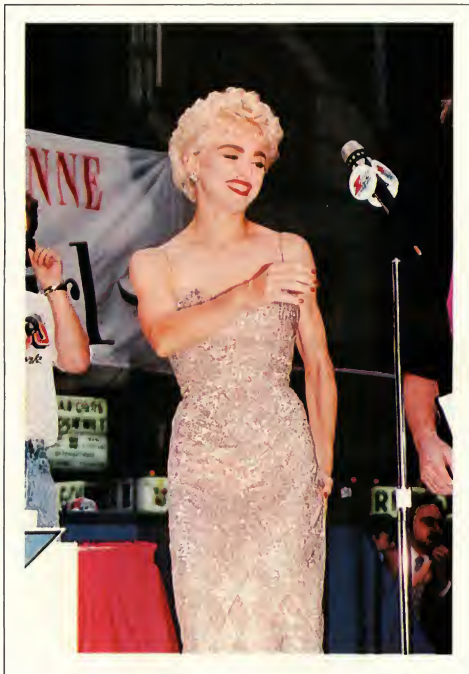
McKnight automates his end of the show, setting the timing to tight precision. "Sometimes I have to start a hard drive loading at a specific time and, as soon as it's done, boom — a quarter note later there are parts coming out of it. There's no margin for error," he

explains. "They push a button on a TI [synthesizer] on stage and all their program and volume changes are done. Other times I'm doing things where I have an audio patcher switch between samplers. There might not be enough time between songs to load up the next sampler, so you have to switch to another one going down the same audio line."

Despite all the seeming complexity and frantic pace, McKnight follows one rule to keep control. "I prefer to keep things simple and separate so that if one thing crashes the whole show won't stop. There have been times when the guys miss the count-in on a click, the drummer picks up the time and I have to punch in on bar 10 manually — that gets

the heart going! There are some songs with a real important sequenced-bass part that the dancers do moves to. If it's not there..."

In keeping with his rule, McKnight starts all sequences with commands to set MIDI controllers and volumes to default states. "The less you have to go wrong, the better." ▶



got too much going on down there to be out on stage."

A pair of 4MB Stacys drives the sequencing. For software, McKnight sticks with the latest incarnation of Dr. T's KCS Level II for sequencing and X-OR, Dr. T's new generic patch-editor librarian program, to handle sound backup for the different synthesizers.

Everybody on the tour is driving me crazy wanting Stacys.

Hall and Oates

Starting Over

START caught up with John Oates and technical coordinator Pete Moshay at the Hit Factory in New York, where the group is putting finishing touches on their forthcoming "Change of Seasons" album.

Their current effort returns to live ensemble playing. As Oates explains: "The technology for recording today is just fantastic. [You can] stay in the digital realm and keep the music within the sequencer and never really have to go to tape. We've come full circle now, I think. Instead of using sequencing and sampling as the heart and soul of our music, it has been integrated into the totality of the way we create. It's now just another tool. Some of the more high-tech equipment is really playing much more of a supporting role than a feature role."

Possibly a surprise to many, Hall and Oates have used synthesizers and related electronic-music technology almost since they began recording together. "On our 'Abandoned Luncheonette' album in 1973 we used an ARP 2600," Oates recalls. "We also had one of the first consumer Mellotrons which came into the country." While electronic music was important

in their work, it never really came to the front until 1985's "Big Bam Boom" album. This featured top-of-the-line instruments such as the Synclavier and Fairlight, along with drum machines and experimental tape techniques.

Now they use a 1040ST. Why Atari? Moshay explains: "You didn't have to

been road testing the MegaFile 44 removable hard drive with great success. They store sound sample files for an Akai S1000 sampler on it. Notator software handles the sequencing chores while OmniBanker organizes their synthesizer patch files.

"We use it [the ST] a lot of ways," Oates states. "The last album we did was very much sequencer/synthesizer oriented. Finished songs were basically sequenced and went to tape that way. The [new] record isn't something that was recorded and created on sequencers. A lot of times we'll use a drum-machine loop or certain sequence pattern that will be a starting off point. We'll record the keyboard part live but also record it into the sequencer as well, then come back and quantize it later if the part isn't

feeling right. It gives us a lot more flexibility. [The ST is also used] for librarian purposes ... so that our keyboard players can easily access all these millions of sounds that we have.

"You really need to have something to manage those possibilities or it becomes overwhelming," he adds.

Moshay points out that the ST "makes the music process more visual for everybody. Instead of a little two-line readout you get a full-color screen of what you are doing. You can call up a bank of 200 sounds at one time and see them in front of you



John Oates and producer Pete Moshay use the 1040ST as a sequencer and patch librarian.

use peripherals to get into the system and start using it. It is a more compact system and more music-oriented than other computers."

The band's current configuration includes a color monitor, hard drive and modem. Hall and Oates also have

The next Cult album may feature "Don't Fear the Modem!"

—something might inspire you."

After the album wraps, Oates expects to make more use of sequencing for live shows. "There are certain things that we'll come up with on the record that perhaps we don't have the right personnel or instruments for on stage, especially background vocals. We'll sample them and use those on stage to enhance the live background."

The crew also relies on the ST for telecommunications. "We go on-line and get chart information as well as transmit letters to the office from the road," Moshay explains. And for the odd free minute, ST versions of Monopoly and bowling help pass the time.

Electronic-music technology appears likely to continue as part of the Hall and Oates sound. "I'd like to have an open avenue to pursue anything I want to," Oates muses. "The way technology has become more and more user friendly over the years makes it even easier and more fun to use it because you don't have to break the creative flow in order to get into an electronic instrument. Writing songs is my main interest; anything that makes that process go quicker and fulfill the expression you want is positive."

Ron Riddle

Keyboards for the Cult

Ron Riddle, keyboard player for heavy-metal group Blue Oyster Cult, is a recent convert to Atari-based music systems. "I used to have an IBM and used the sequencer program Texture. I did a lot of work in that and actually wrote an entire album with it. Last November, I moved up to an Atari 1040ST."

Because of space constraints, a common problem for both hobbyist



A relative newcomer to Atari, Ron Riddle, keyboardist for heavy-metal band Blue Oyster Cult, uses his 1040ST mainly for songwriting.

and pro, Riddle set up his home studio with a single controller keyboard (DX7) and assorted rackmount synth units (Proteus and M3r). The 1040ST acts as the central controller, for both sequencing and patch editing. "I have the Dr. T's patch editor for the Proteus, but am just starting to get into it," Riddle confides.

No hesitation about sequencing software, however. "I use Notator, it's great," Riddle says. "The scoring display is great for editing. You have the score right there to check things out, edit right from it."

With Blue Oyster Cult, Riddle plays live, but he's begun to use the Atari on stage in a song he plays with The Red and the Black, a spinoff band of three-

fifths of the Cult.

An enthusiastic new Atari user, Riddle looks forward to exploring other ST applications, especially games and telecommunications. Who knows? The next Cult album may feature "Don't Fear The Modem!"

James Grunke

Cruising with the Beach Boys

Synth programmer, keyboard technician, resident MIDI wizard—James Grunke handles all these roles for the Beach Boys. A trained classical pianist and arranger in his own right, Grunke happily discusses anything about music, from theory to the nuts and bolts of its production. And the Beach ▶

Boys, Grunke states, produce their music on Atari.

"We have two systems [1040STs, hard drives, monochrome monitors plus musical gear] so we can set up and do two shows in two different cities in the same day," Grunke says. "The computers are primarily used on tour to handle patch storage and editing. All Beach Boys vocals are done live; there are no sampled vocals at all."

While the 1040STs currently work well, Grunke hopes to

move to the new Stacy portable, using it as the main patch point for the whole keyboard rig. He applies the same forward thinking to mass storage hardware, after seeing the MegaFile 44 removable hard drive at the NAMM show in January.

Grunke chose C-Lab's Notator for the group's sequencing needs. "It is awesome," he raves, having used the program for a video's theme song and the "Island Girl" cut on the latest Beach Boys album. He has no problem reconciling his classical training with sequencing. "I think it is a great tool. With the resolution they [sequencing programs] have now, I don't see any difference between MIDI data and just going directly to tape."

Off the tour circuit, group members often are found using Atari-based, home music studios that Grunke helped set up. While sequencing remains an at-home need, patch editing and management is a major task both in the studio and on tour.

"We use a lot of keyboard gear so I keep all the editing stuff on the Atari," Grunke says. "I bought GenEdit because I met Tom [Bajorus, the program's author]. He offered me individual support on it so I decided to take advantage of it. I hope to ... have a program

where the Stacy would receive one program change and set up my entire rig. One button-push for the whole thing; that's yet to be developed."

Beyond music applications, Grunke uses ST word processors and data managers. His latest interests are in



Macintosh and IBM emulation. "I need to be compatible with our management," Grunke explains. "That way, I can keep track of our [equipment] manifests without having to go over to their laptops."

Grunke is firmly convinced that Atari represents the most realistic choice for a musician. "My first computer was an Atari 800XL," he recalls. "I've used Macintosh and IBM computers quite a bit, but was turned on to the Atari STs at the Grove School of Music. Because of their price point, they are going to sell the most units and have the most support by third-party software writers. I see the Atari as the musical-standard computer for the future."

John Morales

Record Producer, Atari Rep

Turning to the other side of the console, START spoke with independent producer John Morales. Morales' client list reads like a who's who of rock'n'roll: Mick Jagger, Hall and Oates, Heart, Debbie Gibson, Stevie Wonder, The Thompson Twins. "I've been involved with 576 records over the past eight years," he says, and, as if he's not busy enough, Morales acts as Atari's MIDI representative in New York City.

Morales uses several Atari systems in his lower-Manhattan reproduction studio. "We've got two Mega 4s and a 1040ST. [The studio] has a 16-track

[recording] room and two workstations. People do the [synth and sampler] programming in the other rooms and, once we get to a certain stage, we move them into the big room.

"Before I got the Atari stuff, we did it live. I've only been using computers since 1985. I started with [Hybrid Arts'] Edit Track on the old Atari 8-bit, but it was bogus and short lived. I got a 520ST which I upgraded to 2.5MB, and still have around, and used [Steinberg/Jones'] Pro 24 sequencer. [Later] I moved up to Creator and Notator."

Morales is a software fanatic and tries as many programs as he can find. "Most of the software I discovered in my travels. I was using Notator at least a year before it came into the country. [On] all my travels abroad I'd try to get whatever the hippest thing was. Even though KCS was around, it was too complex for me to get into. I'm basically a Notator guy now."

Morales' client list reads like a who's who of rock'n'roll.

Besides sequencing, a major portion of Morales's work involves finding the right synth patches or samples to give particular sounds to a song. "I use a lot of Steinberg/Jones editors — the M1, D50 and Avalon. We also use the C-Lab Explorer programs, OmniBanker, GenWave and some Dr. T's stuff. Basically, it depends on what [songs] I'm getting. As I got new editors, I never converted [existing patch] libraries over [to the new format] — no time! Slowly now, we're getting to where manufacturers will read others' file formats, but it's not happening yet."

Outside the studio, Morales is an Atari MIDI sales representative, specializing in New York and New Jersey accounts.

"It's weird the way I got hooked up with Atari," he says. "I was working on a project and my computer had a problem. Mikail [Graham, of C-Lab] introduced me to the old Atari rep in the area and I made an arrangement with him to get a loaner for my gig. [Later], the rep got fired and there was no one in the area. I met Frank [Foster, head of MIDI and special projects at Atari] and we danced around for a year with the idea of me being a rep for them. Finally, I gave in. I think I'm the only guy [for Atari] that just deals with MIDI accounts — I'm also the guy that they send everybody with a problem to."

Other Voices

Many other professional musicians, song writers and producers make use of Atari hardware and software in their craft. Those profiled in previous issues of START include producer Jimmy Hotz (Special Issue 2 and April 1989), Mick Fleetwood (Summer 1988), Tangerine Dream (October 1988) and Donny Osmond (November 1989).

Nor does the list stop there. Many other artists have gone on record (literally and figuratively) as Atari users. Multikeyboard star Rick Wakeman uses an Atari with the Pro 24 sequencer. Tony Banks of Genesis also prefers Pro 24, along with the Steinberg/Jones Synthworks patch editors. Keyboard player Matt Clifford, most recently of the Rolling Stones' "Steel Wheels" tour and album-recording session, sings the praises of Notator. It was used on the "Continental Drift" cut from the album.

Notator is also the choice of Paul Carrack and Adrian Lee, of Mike and the Mechanics, both for recording and live performance. New York producer Fred Zarr uses Notator in his 16-track home studio along with MIDI-Mouse patch editor software. Some artists who have benefited from Zarr's equipment are Samantha Fox, Pretty Poison and Debbie Gibson. In fact, Zarr supplied a sequence from one of Gibson's albums for her tour because there weren't enough stagehands to play all the parts in a song.

Guitarist Lee Ritenour uses Hybrid Arts' SMPTE Track sequencer, as does composer David Grusin, who used it to write his Academy Award-winning score to the film "The Milagro Beanfield War." Grusin uses a 1040ST, Mega 2 and SLM804 laser printer in his studio. "I'm sold on using the ST," Grusin says, "not only for storage of a final product, but in film, as well. I can take the film home on video and can actually write, record and store music on the ST and then play what I've recorded back with the picture." ■

START MIDI/Music Editor Jim Pierson-Perry is a clinical chemist for DuPont and a semiprofessional musician. Steve Mortimer is a contributing editor for START. He writes "News, Notes & Quotes," on a regular basis.

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START CONTRIBUTING EDITOR

AT A GLANCE

Product:	pc-ditto II
Type:	IBM PC emulator
Company:	Avant-Garde Systems 381 Pablo Point Drive Jacksonville, FL 32225 (904) 221-2904
Price:	\$299.95
Requirements:	Any ST or Mega
Summary:	An excellent PC emulator.

After several false starts, Avant-Garde is finally shipping pc-ditto II.



After a long and painful wait, pc-ditto II, the hardware successor to the original PC emulator, is here. Its birth was marked by missed delivery dates, optimistic press releases, manufacturing problems and a run of boards that didn't work in most STs. The good news, though, is that pc-ditto II, in its current configuration, works well and is relatively easy to install.

The Hardware

pc-ditto II is a large circuit board, measuring about 7-1/2 x 5 inches. It fits inside the RF shielding of your ST

and requires no soldering. Included with the package is a clip-on connector that fits over the 68000 microprocessor and a pair of ribbon cables that clip to the connector. These cables then plug into the pc-ditto II circuit board. The circuit board itself sits inside the ST and is not anchored in any way. Also included is a non-conductive rubber sheet that sticks to the bottom of the circuit board to keep it from shorting any circuits in the ST.

While installing pc-ditto II is not difficult in theory, there have been some problems reported, primarily with the physical size of the board.

The fit inside a 1040ST is tight (but can be done; I have one to prove it), and some users have reported being unable to replace the shielding. Further, as with MichTron's PC Speed, you must have access to the 68000 microprocessor, so some non-Atari enhancements that block that access (notably the JRI JATO board) make pc-ditto II difficult to use. The manual mentions a bus adapter that Mega owners can use instead of attaching the clip to the 68000, but at the current time, this adapter is not available because different versions of the Mega have buses that are wired differently. ▶

The Software

Once pc-ditto II is installed, run the software that comes with it. A menu-driven configuration program lets you vary the Disk, Video, Keyboard, Colors and Mouse installations. With Disk, you can set your A drive to be the internal or external (if you have two), specify whether the external drive is 3.5 or 5.25 inch and whether a hard drive is attached. Video lets you choose between a monochrome and a color IBM adapter. Keyboard lets you set the key repeat rate, delay and country. Colors lets you specify the RGB values for the 16 colors, and which colors to use for the 80 column (four color) and monochrome/high resolution (two color) modes. Finally, Mouse lets you specify whether to emulate a serial or generic mouse, and assign keyboard keys to the left and right mouse buttons.

Once pc-ditto II is fully configured, click on PCDDITTO.PRG. After the software runs, you're prompted to place a DOS disk in the drive and press [Return]. Shortly thereafter, you're looking at the ubiquitous DOS prompt: A>. From here, pc-ditto II works pretty much like a PC clone. There is a place to plug an 8087 math coprocessor into pc-ditto

because you must reformat it under MS/DOS as a system disk. After you have performed this step, you can restore your files and reset drive C to autoboot under GEM. This is an unwieldy procedure, especially since many people have largely unused partitions that would be easier to use than C. Fortunately, it only needs to be done once.

pc-ditto II is relatively easy to install.

II, and programs that can make use of this chip will do so. Sixteen-color EGA mode is supported, as is CGA and monochrome graphics.

Hard Drives Supported

pc-ditto II can use any hard drive attached to your ST, though it seems to have some trouble with Atari hard drives — at least there's a lengthy .DOC file on the disk detailing work-arounds for using Atari's SH204 hard drives. These problems are not unlike those encountered by other hardware enhancements, though I was not able to test Avant-Garde's recommendations, having had the good sense to buy a third-party hard drive.

To use a hard drive, you must copy a file to your MS/DOS startup disk that not only lets you use a hard drive, but also lets you use multiple partitions (up to 12) just like GEM. Note, however, that multiple physical hard drives cannot be used — only SCSI 0, LUN 0 is recognized by pc-ditto II. MS/DOS can be booted directly from the hard drive, but, unlike the other PC emulators that let you assign partition C to any physical partition, you can only boot pc-ditto II from the actual drive C. This means that you'll need to back up your C drive,

Final Thoughts

Handling the ST's high capacity 3.5-inch drives is tricky under MS/DOS 3.2 or 3.3, and the pc-ditto II manual gives a detailed explanation of how to set up your system to be able to use and format these disks. In fact, the entire manual is extremely well written and informative — a far cry from the PC Speed manual. Avant-Garde's technical support is good, and Bill Teale's policy of refunding money to anyone who's unhappy with the product is commendable and highly professional.

A long list of applications that work with pc-ditto II is included on a file on the program disk and the list is impressive. It includes most of the major packages, TSR (terminate and stay resident) programs, utilities and even operating system enhancements like GEM (PC) and Microsoft Windows. Notably missing are copy-protected games, but we have better games on the ST anyway.

pc-ditto II is an excellent PC emulator. It boasts straightforward installation, an excellent manual and support software, and, most importantly, it works. If you're looking for a PC emulator but are uncomfortable with a soldering iron, look no further. ■

HELP WANTED

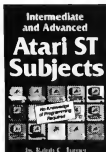
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GILBERT'S

OR, HOW TO DRIVE YOURSELF

CHALLENGE

CRAZY PLAYING A COMPUTER GAME

BY MICHAEL C. GILBERT

Sturgeon General's Warning: playing Gilbert's Challenge  has caused laboratory subjects to spend countless hours  in front of their monitor attempting to master the intricacies of this seemingly simple  game. Symptoms include bloodshot eyes, twitching  mouse-button  fingers and mumbling, "Just one more marble, please." 





AT A GLANCE

Program:	Gilbert's Challenge
Type:	Game
Requirements:	512K, low rez
Arfile:	GILBERT.PRG
Files:	BALLS2.P11 PEGBOARD.RSC BALLS3.P11 TITLE.P11 CHALLENG.PRG
Language:	Laser C

by a marble of the same color. In most cases that color is the board's lowest-ranked color. In order to change a marble's color to the next lower rank, jump it with a marble of a color ranked equal to or lower than that of the jumped marble.

For example, if a board uses only the top two colors in the hierarchy — white (high) and blue (low) — you must convert a marble to blue before you can remove it. Jump a white marble with a white or blue marble to change it to blue. Jump a blue marble with a white marble to change it back to white, because white is higher in the hierarchy. Jump a blue marble with another blue marble to remove it from the board.

Gilbert's Challenge is a variation on old peg games such as Hi-Q. The goal is to remove all the marbles on a board save one, scoring extra points if the last marble is in the center position. The twist, and challenge, of this variation is that there are up to five colors of marbles with rules of precedence as to their removal.

A play consists of one marble jumping another. In order to jump, you need two adjacent marbles and an empty hole on the opposite side of the jumped marble for the jumper to occupy. What happens when you jump depends on the colors of the marbles.

The five colors are ranked from highest (white) to lowest (plum). Not all colors will be used during a game, but the colors used will follow the hierarchy. In order to remove a marble from the board, it must be a certain color and it must be jumped

Getting Started

If you feel you're up to the challenge, double-click on the archive file GILBERT.PRG and choose Extract when the dialog box appears. Select a destination disk and the files will be un-ARCDed directly onto that disk. Make sure that BALLS2.P11, BALLS3.P11, CHALLENG.PRG, PEGBOARD.RSC and TITLE.P11 are in the same folder. To start the program, double-click on CHALLENG.PRG. After a few moments, the title screen will appear. Left-click when you're ▶

Figure 1: Gilbert's Challenge screen layout. **A:** Playing Board, **B:** Extra Marbles, **C:** Scoreboard, **D:** Timer, **E:** Lives, **F:** Level, **G:** High Score, **H:** Hierarchy, **I:** Reset Button



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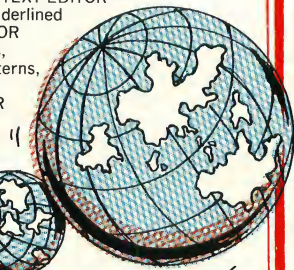
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GILBERT'S CHALLENGE

ready to play.

In Gilbert's Challenge, each level becomes progressively more difficult. At first only one color is used; higher levels have more colors and bigger boards. There are 25 levels with pre-designed boards. After that, the computer generates random game boards.

Sound easy so far? Well, just to make it a challenge, you have a limited the number of lives, extra rules and traps in the higher levels, and a timer.

Refer to *Figure 1*, the game's screen layout. Let's discuss each element separately.

Playing Board

Any marble can be moved on the

playing board provided there is a neighboring marble to jump over and a free hole to jump into. Left-click on a marble to select it; the marble will turn yellow. Move the mouse cursor over a legal free hole (you don't need to use any mouse buttons) and the marble will automatically jump into the free hole.

To unselect a marble, press [Spacebar]. Press [Undo] or click on Undo under the Options menu to take back the last move made.

Extra Marbles

You often need extra marbles to complete a board. At any time during play, you can use an extra marble, if available, by left-clicking on it, then placing it into an empty hole on the playing board.

The first four extra marbles don't cost you any points. You can see how many points each additional marble costs by clicking on the scoreboard with the left mouse button. If the marbles cost more than your score they won't be available to you.

Scoreboard

Each marble removed from the playing board scores points, according to its color.

White	5 points
Blue	10 points
Red	15 points
Brown	20 points
Plum	25 points

Additional points are awarded for the following:

Each second remaining when done	3 points
Each unused extra marble	50 points
Last marble occupying the center hole	100 points

Timer

Each game is timed. When there are 10 seconds left, a beep sounds each second in warning.

In some configurations, the blitter chip will speed up the timer. If you have a blitter chip, double-check the timer and turn off the blitter chip if you need to.

Lives

You start each level with three lives. If you don't complete a board within the allotted time, you lose one life. If you restart a board, you also lose a life. The game ends when you've used up your three lives.

Level

Gilbert's Challenge comes with 25 levels of prefabricated game boards. The higher the level, the more difficult the board.

High Score

The high score is the most number of points you earned during the current play session.

Hierarchy

The hierarchy gives the order of precedence for a game. Jumping a marble changes its color one step up or down the hierarchy, depending on the color of the jumper.

Reset Button

Click on RESET if you want to restart that level's board without waiting for time to run out. Since it costs one life, it is disabled if only one life remains.

Game Menu

To play Gilbert's Challenge, select one of the four play modes under the Game menu, or click on New Game under the Options menu to begin a game using the current mode.

The four play modes are:

Practice: Select any of the 25 prefabricated boards or choose level 99 to practice on a random board in the Advance mode.

Beginner: Play the prefabricated boards starting at level 1.

Advance: Play increasingly difficult random boards as you reach higher levels.

Tournament: Replay an Advance-mode sequence. Since the same boards are repeated, use this mode to play against another person.

More Challenges

As you progress in the game, you'll encounter new tricks to further challenge your skill.

Low Lives: In some cases the lowest color of the board's hierarchy is not the same as the color a marble must be in order to be removed. In this case, the color of the marble will "loop around" when jumped. For example, a plum marble will become white.

ALL: Sometimes the word ALL is



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Gilbert's Challenge is a variation on old peg games such as Hi-Q.

displayed when a board is being set up. This is a warning that all the marbles on that board must be the same color as the lowest marble in the hierarchy before any can be removed. A red dot on the right side of the hierarchy indicates an ALL mode.

Arrows: In the higher levels arrows appear on the board. The hole covered by an arrow will be revealed when the hole to which it points is occupied by a marble. If the marble moves, the hole will be covered once again by an arrow. A black arrow indicates an empty hole; a red arrow means that a marble is hidden behind the arrow. You cannot move a marble onto a hole covered by an arrow.

Study the arrows and plan your strategy during setup. The board will freeze when the arrows are in place; left-click to continue setup.

An impossible play may result from the positioning of multiple arrows. To escape this situation, move the mouse pointer to the marble in the trouble spot. Hold down [Control] while left-clicking on the marble and it will be removed from the board. This will cost you some points.

Flasher: If a marble flashes a short time after being changed to a different color, it must be jumped very soon or it will change back to its original color.

The Editor

You can create your own game boards using the editor. You must be in Practice mode, playing a game. The editor will not work if the "Game Over" message is displayed. Click on Edit under the Options menu. All five marbles in the hierarchy will be displayed; a blue dot appears at the left of the marble lowest in the board's hierarchy.

To create or modify the board, add or remove marbles. To add a marble, left-click on the desired color in the hierarchy; this marble will turn yellow. Move the mouse to an empty hole and left-click again. A marble fills the hole.

To remove a marble, position the mouse pointer over the unwanted marble and simultaneously hold down the left mouse button and [Control].

Modify the time by mouse-clicking in the time box; left increases time and right decreases it.

Modify the board's lowest hierarchy level by placing the mouse pointer over the desired marble in the hierarchy and simultaneously pressing the left mouse button and [Control].

File Menu

Load Board and Save Board: These options are only available in Practice mode. They load or save a particular gameboard on disk.

Load SEQ and Save SEQ: These options load or save an entire sequence of boards played in the Advance and Tournament modes. You can replay the exact boards over again.

Load Game and Save Game: These options are the same as Load SEQ and Save SEQ except that your score, high score and all other features are included. These options let you stop at any point and resume at a later time. ■

Michael C. Gilbert is a professional programmer whose sideline is game software. He wrote Cinko (September 1989 START) and Mountain Solitaire (March 1990 START).

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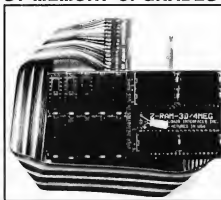
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VIDEOTEXT

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REVIEWED BY ANDREW REESE
START CONTRIBUTING EDITOR

AT A GLANCE

Product:	Videotext
Type:	Character generator for video titling
Company:	Water Fountain Software 13 E. 17th St., 3rd Floor New York, NY 10003 (212) 929-6204
Requirements:	1MB, medium or low rez
Price:	\$125.00
Summary:	Best titler for the ST despite key limitations.

What is a C.G., you ask? Well, C.G. stands for character generator — that's the computer-based device that puts all of the titles and credits on your television screen. Every TV station and production house has a character generator. It's a vital part of television today.

If you use your ST for graphics that you pipe out to videotape, chances are that you have wished for an easy way to add titles and credits to your productions. Now, Water Fountain Software has released Videotext, a character generator program for your ST or Mega that

makes adding titles and credits (almost) painless.

Videotext runs in medium and low resolutions on color systems and lets you change palettes almost whenever you want, so the ST's color limitations aren't quite as much of a problem as you might think. It was written in GFA BASIC, a remarkable achievement, both for the programmer and the language itself. Videotext uses GDOS fonts and you can load up to nine at one time. You can import up to 200 screens in DEGAS uncompressed format (.PI1 or .PI2, depending on the resolution). Videotext is quite tolerant of desk accessories and terminate-and-stay-resident utilities, and makes good use of Codehead Software's G+Plus.

Paging Through Video

Videotext is quite a sophisticated program with nine text display methods and 14 wipes built in. This definitely isn't a program that you're going to master in one quick session. It takes a few hours of work until you understand how to control all the effects available to make the program do what you want.

Videotext uses the concept of a "video page" throughout. A video

page is simply a group of related text lines using the same palette and background. But a video page is not necessarily limited to the number of lines that you can fit on a single screen. For example, you could add up to 200 lines of credits on a single video page and then scroll them up the screen at the end of your production. Then after the last credit scrolls by, you could wipe to a second video page of a DEGAS logo image and use it as a background for your copyright notice. Videotext is that versatile.

Each video page can have its own palette and you can customize each palette or "borrow" one from a saved DEGAS file. This can be helpful, since when you wipe a new screen over an old, whether it's a text screen created in Videotext or a DEGAS image from disk, the program first switches the palette to that of the incoming image and then wipes the image in. If you aren't careful in managing your palettes, you can get some jarring and unwanted effects. Videotext even has color cycling capability, but it cycles the entire screen through the entire palette. If you use it, be sure to define the palette carefully to cycle through only a few colors; it's a mess otherwise. ▶

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VIDEOTECH

There is a basic text editor in Videotext in which you can enter your text lines directly. Or you can load ASCII text created in any word processor with an ASCII option. You do have to be careful with your line lengths, however, as Videotext lets you choose any available font size for any line, even if that means that some of the text will be off screen to the right.

It's Not Easy, But ...

To create a video sequence with Videotext you must plan carefully. Make sure you know what you want to show, how and in what order. First, enter your text and define the display for each page and line. If you're going to import any pictures, choose them and define how they're going to be used, as slides between text pages or as backgrounds for text. Then define the transitions to and from each image. When you've got

all this done, save your file. Now choose SET-UP and see what you've produced. Then, unless you're awfully good or lucky, you'll have to go back and debug your presentation or just refine it and try again. If you change anything or delete a line, make sure that everything relating to that video page is internally consistent. It's definitely not fall-down easy, but if you're striving for professional results, you'll want and need to take the time and trouble to get it right.

Videotext does have its own built-in debugger that checks for internal presentation consistency. I found the messages confusing at first, but once I'd spent enough time with the program to learn its language, they were much clearer (and I was able to avoid most of them anyway). Hint: Don't get carried away with the endless variety of display methods and styles. Like desktop publishing, just because you can put ten different

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There's just nothing else on the ST that even comes close for titling.

styles on a page doesn't mean that you should. Stick with a simple, consistent style that will let the viewer take in the information without spending his or her time marveling at the effect and missing what you said! Watch how credits and titles are done on TV, especially during the news; it's a great source of ideas and styles.

Flaws in the Ointment

There are some troubling aspects to Videotext. It crashed on me several times in ways that I was not able to repeat. Once, I lost the use of my mouse buttons; another time, the screen just went blank and would not reappear. The program was obviously written in medium resolution and then adapted to low resolution — the menus at the right side of the low-rez screen wrap around onto the left edge of the screen. Some dialog boxes in low-rez are partially off the screen. They're still useable, but it shows that the program was not quite polished enough before release.

There's a mysterious entry on the Text Look menu that's grayed out, never active and nowhere referred to in the manual: Anti-alias. Perhaps it's a feature that will be implemented in the next version of Videotext.

There's also a lack of consistency in the use of keys and mouse buttons in Videotext. Sometimes you back out of a function by right-clicking, other times by pressing any key on the keyboard. And there's even a call for double-right-clicking, the first I've seen in any ST program!

When you save a presentation to disk that uses imported screens, Videotext saves the path for each

screen as a part of the file. If you want to create your presentation on one machine and then play it back on another, you'll have to make sure that the paths are consistent or reset each one. If Water Fountain could have devised an automatic Find function as used in Universal Item Selector II, it would have made life much easier.

The manual covers the program reasonably well, complete with three tutorials which help quite a bit in understanding the interrelationships in the program. The manual is a lot like the program; in fact, it just needs polishing.

A screen composed in Videotext.



Of course, there are inherent limitations to using the ST for titling. Because the ST (and the STE) don't have overscan, anything scrolled up from the bottom of the screen or crawled in from the right side start at the screen border, which is not the edge of the visible area of the monitor. It's a problem that should have been addressed by Atari long ago and certainly by now in the STE.

One substantial lack in Videotext

is that it can't call animations created by Cyber Paint or any of the GFA animation programs; it would be natural to use Videotext to create a complete presentation with titling, animation and still images. Given the memory demands, however, this may not be possible except in a program tailored for Mega 4 users. Still, it would be nice ...

The Bottom Line

Despite these flaws, would I still recommend Videotext to serious ST graphics users? Yes. Even though you can do titling with Cyber Paint or even CAD-3D 2.0 and Cyber Control, there's just nothing else on the ST that even comes close to this program for titling.

Videotext is full of nice features, like automatically starting on a black screen so that you can set up your video equipment and start your

recorder. It's designed to work with the JRI Genlock and should produce some rather professional images with it. Unfortunately, I was not able to test this combination.

If your dealer has a copy of Videotext, take a look at it before you buy, just to make sure that it's what you want. If there's no dealer nearby or if he doesn't stock Videotext, it's still well worth a "blind" purchase by mail. ■

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Features: Earthquake; Upgrading Your ST; Dave Mason Interview.

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SUPER CONDUCTOR

Turn Your ST Into A Professional MIDI Studio

PROGRAM BY PHILIP MACKENZIE AND JEFFREY SORENSON
MANUAL CONDENSED BY DAVE GREGG

AT A GLANCE

Program:	Super Conductor
Type:	16-track MIDI sequencer
Requirements:	512K, high or medium rez, any peripheral (synthesizer, drum machine, etc.) that accepts MIDI data
Archive:	CONDUCT.PRG
Files:	BALLOONS.MUS STINGO.MUS FLASHDAN.MUS SUPER.PRG MISTY.MUS SUPER.RSC MORK.MUS THUNDER.MUS PRESSURE.MUS

Through a special arrangement with MichTron, and in honor of our annual music/MIDI issue, we're pleased to offer you a fabulous disk bonus, Super Conductor. This GEM-based, 16-track MIDI sequencer has all the features of professional studio equipment costing thousands of dollars.

The following documentation is condensed from the original Super Conductor manual and assumes a working knowledge of MIDI equipment and principles. For more information on MIDI, see Tom Jeffries' article *The Ins, Outs and Thrus of MIDI* elsewhere in this issue. Also, check the end of this article for a special offer from MichTron.

Getting Started

First make sure that your MIDI peripherals — synthesizer, drum machine, etc. — are properly attached to your ST. From your START disk backup, double-click on the archive file CONDUCT.PRG and choose

Extract when the dialog box appears. Select a destination disk and the files will un-ARC directly onto that disk. Make sure that the files SUPER.PRG and SUPER.RSC are in the same directory.

Double-click on SUPER.PRG to run Super Conductor. The program will begin with the Main Menu (Figure 1).

F1 through F10 correspond to the ST's function keys. To select any of the individual song buffers, press the corresponding function key, or click on the desired song. Super Conductor can store 10 songs simultaneously in memory with each maintaining its own separate tempo, notes, controllers, etc.

The main menu display determines

what the Play Entire Set mode will play. When you use this command, all of the songs that have a check next to them play in sequence. Click where the checks appear to alternately enable and disable them. The word to the right of the song name determines what will happen between songs. Click here to change its status to one of three values: No Delay to change tempo and proceed to the next song; Pause to change tempo and delay a few seconds before beginning the next song; and Keypress to wait for any key (other than the spacebar) before proceeding.

Super Conductor has two screens: the Main Menu and the Song Edit Menu (Figure 2).

THE MAIN MENU

File

The Load Set and Save Set commands let you load 10 songs and save them as a group. A set does not contain the 10 songs, it simply lists the songs.

Load Set: Loads a list of filenames then automatically loads each individual song.

Save Set: Does not save individual files, only saves the file names associated with the songs currently in memory. Save each set with the extender .SET.

Quit: Returns you to the Desktop.

MIDI

The MIDI commands can be accessed in both the Main Menu and the Song Edit Menu. The explanations below are for both menus. The commands focus on special codes that are often sent to instruments connected through the MIDI port.

Timer Sync: Used by many drum machines to synchronize rhythm patterns to the speed of the music. It will transmit continuously when check-marked to let slower instruments synchronize. Tempo changes cause the frequency of the Timer Sync to change immediately. This option is on as a default; instruments that do not use this code will ignore it.

Active Sensing: Used by many keyboards to determine whether or not MIDI cables are still attached. If a cable should fall out during a performance, notes can be stuck in the "on" position. With Active Sensing, the keyboard can tell that the cable has been removed and that it should turn off all notes. The Active Sensing code is sent only in the absence of other MIDI signals to verify connections.

Song Position: Involves a number of different MIDI codes. Whenever a song plays from the beginning, a start code is sent to all the MIDI devices. Upon termination of the song, a stop code is sent. If a song starts from a

beat other than the first, a song position code is sent, followed by a continue. If you own a rhythm device that does not accept the Song Position code, you can start songs only from the beginning.

Song Number: When active, sends a song number code to the various MIDI devices whenever you select a different song in the Song Edit Mode. Because you can store 10 different songs, the song number sent will equal 1 through 10. This code will also be sent during the Play Set mode in between songs.

Manual Notes Off: For keyboards that will not receive an all-notes-off command, this option sends a manual note-off command of every key individually.

All Notes Off: Sends an all-notes-off command to each of the 16 MIDI ports and also disables the internal sound generators in the ST. Some keyboards do not recognize this command.

Release Pedal: Sends code to release

the sustain pedal to all channels.

Send System Reset: Sends the system reset code to all attached MIDI devices. It also checks each device to determine that this code is supported.

Send Tune Request: Sends the tune request code to attached MIDI devices. It also checks each device to determine whether or not this code is supported.

Mode

Echo Back: Sends all data received by the MIDI In port back out the MIDI Out port unmodified.

Play Entire Set: Plays the songs in memory. Which songs play is determined by the display of the Main Menu. It also lets you incorporate tempo changes within a song using the No Delay method to proceed from one song buffer to the next.

System Exclusive: Loads and saves synthesizer data that is transmitted through the system exclusive codes. ▶



Figure 1: The Main Menu screen.

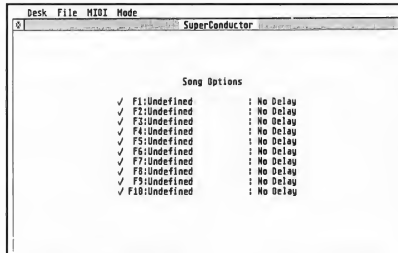
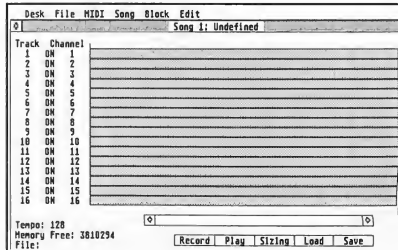


Figure 2: The Song Edit screen.



THE SONG EDIT MENU

File

Load Song: Reads a Super Conductor .MUS file into the current song buffer.

Save Song: Saves a song file using the current filename. It also automatically saves songs with the extender .MUS.

Save Song As: Lets you specify a filename before you save it.

Delete File: Deletes other files to make room for a save.

Main Screen: Returns you to the Main Menu screen.

MIDI

See under "THE MAIN MENU."

Song

Change Name: The song name is displayed at the top of the screen next to Song 1 where the 1 corresponds to

the number of the buffer currently displayed. This field does not affect the song in any way, it simply reminds you where each song is stored. To change the name from its default value of "undefined," click here and type in the new name.

Change Tempo: Lets you change the rate at which the song plays and records. When you choose this item, a slider box will appear where you can change the tempo value. Super Conductor supports tempos of 40 to 213 beats per minute.

Metronome: Displayed during recording. When a check appears beside it, and the internal sound channel I3 is not in use, an audible click will sound every quarter note.

Time Signature: Determines the number of beats per bar. The default value is four.

Clear Song: Empties the song buffer

and frees up memory.

Play Song: Plays a song from the beginning or from any beat measured from the beginning.

Block

Record Block: Displays a dialog box that requests a name for the block, the beat in the song to begin playing from and the number of beats to record.

Block names are arbitrary and are intended to keep track of what music is stored where. Space permitting, they're printed in the Song Buffer display. Start At also applies to the Play Song command. Start at a position other than the first beat to cause Super Conductor to begin in the middle of a song. Length lets you set the number of beats to be recorded. Click on OK to begin the recording session.

List Blocks: Produces an alphabetical

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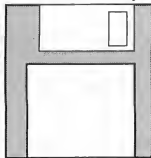
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listing of all the names of blocks that have been created so far. Up to 255 different blocks may be stored in each buffer.

Delete Block: Removes blocks from memory.

Copy Block: Lets you make duplicate copies of block data. To make a copy, specify both the source and the destination name and a copy will automatically appear with the new name.

Mix Blocks: Combines the information of two different blocks. For example, you can record notes in one block and place them in a track on channel 1. Use Record Block to create a new block that contains just pitch bend, which may then be placed on another track also set to channel 1. When both sets of data are satisfactory, you can mix the pitch-bend data into the block that contains the notes.

Append Blocks: Copies the informa-

tion of one block onto the end of another block.

Split Blocks: Takes all of the information up to the click before the specified "split point" and keeps it in the original block. All data after that point is placed into a new block.

Edit

Quantize Block: "Centers" notes with respect to the time frame you select. It lets notes play back exactly on the proper counts in case you record them slightly off beat. This is especially useful to give more punch to a bass or rhythm part.

Transpose Block: Raises or lowers the values of all the note-on and note-off commands in a block. You can specify the amount of shift as any number of half steps. Notes that exceed the highest or lowest values allowed will cycle around.

Filter Block: Selectively removes specified types of data from a block then leaves all other data unchanged. Specify the block name and click on the data types you wish to filter out of the block.

Edit Block: Lets you see and change each and every note and controller change in a block. ■

SUPER CONDUCTOR MANUALS AVAILABLE FROM MICHTRON

Super Conductor has more features than can be covered in a three-page article. For a more in-depth look at the program's many capabilities, you can purchase the 60-page Super Conductor manual directly from MichTron. To order, send a check or money order for \$5 plus \$2 shipping and handling to:

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OF BUCCANEERS AND BARROOMS

In which Wasser waltzes with warships and Plotkin paddles pucks

PIRATES!

REVIEWED BY SCOTT WASSER

AT A GLANCE	
Game:	Pirates!
Company:	MicroProse 180 Lokefront Dr. Hunt Valley, MD 21030 (301) 771-1151
Requirements:	512K, color monitor
Price:	\$44.95
Summary:	A game that's as intriguing and exciting as the period in history it portrays.

ST owners can now get a taste of 17th century buccaneer life, thanks to MicroProse Software's "Pirates!" An award-winning program on other computer platforms, the ST version of Pirates! is as special as the swashbuckling era it recreates.

The Main Thing

What makes Pirates! so special is its design. It deftly blends the best elements of role-playing, arcade action, strategy and simulations into an engrossing adventure.

The adventure revolves around you as a buccaneer of English, Dutch,

French or Spanish nationality. In addition to nationality, you select the historical time period during which your adventure will take place and pick one of five special skills to help you succeed. Your adventure can be played at one of four different skill levels.

The instruction manual included with the game is absolutely wonderful. It provides easy-to-follow detailed instructions on all of the game's aspects, as well as interesting historical narratives and "The Memoirs of Capt'n Sydney."

Trading Over The Sea

During the course of playing Pirates!, you'll have to trade with merchants, negotiate with politicians and scoundrels, sail and navigate the Caribbean, search for buried treasure, plunder towns and fight battles using cannons, swords and muskets. Each of these elements is represented in a different way in Pirates! Unfortunately, it's impossible to describe them all in detail in a review of this length, but here's a brief synopsis of what happens on screen:

When you go into a town, trade with a merchant or visit a politician, the screen shows a portrait of the person with whom you're dealing. Some of the characters are slightly

animated (they may wink or smile) and you converse with them via dialog boxes. While sailing and exploring the Caribbean, you view your ship from overhead and use an on-screen cursor to guide it. The perspective is similar when engaging another ship in battle or attacking a land-based fortress.

You can board another ship or storm a fort by maneuvering your craft next to the target. The screen changes at that point to show you and an adversary engaged in a sword fight. Your actions are controlled by mouse and your fate tied to that of your men. Their spirit and numbers and your skill determine the outcome of a battle.

Although you'll encounter some variations on those themes, these are the three main scenarios of Pirates! Each one is characterized by clear and vivid graphics. The drawings are rich in character and detail, although animation is a bit choppy and not overly impressive.

Sound, on the other hand, is terrific. Pirates! supports output of its catchy baroque soundtrack through the ST's MIDI port. Hook a synthesizer to the port to let the music pipe through it, while other sound effects such as clanking swords and cannon blasts will be heard through the ST monitor's speak-

Your opponents in Shufflepuck Cafe are a motley crew.

er. Although I was unable to take advantage of the MIDI support, I was still impressed with the program's sound.

Copy Protection and Recommendations

Pirates! comes on two single-sided disks and uses "key-disk" copy protection. This means you can make backup disks or install Pirates! on a hard disk. But you'll be asked to insert the original program Disk A briefly before the game will load.

Loading Pirates! leads to an experience offered only by the very best ST programs. It will provide countless hours of entertainment by transporting you to another time and place where your success and survival depend on your ability to negotiate and navigate, swing a sword, and plot, plan and plunder.

SHUFFLEPUCK CAFE

REVIEWED BY DAVID PLOTKIN

AT A GLANCE	
Game:	Shufflepuck Cafe
Company:	Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 492-3200
Requirements:	512K, color monitor
Price:	\$39.95
Summary:	Configurable skill levels make this fast-action game appealing to the slow and nimble handed.

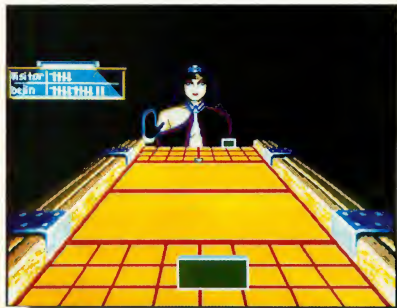
Shufflepuck Cafe is a fast-action game reminiscent of air hockey. It's fun to play, and, as with most games of this type, adds some features that can't be found in the real-world counterpart.

Shufflepuck Cafe is played on a long table with curbs down the sides to keep the "puck" from going off the edge. You're at one end of the table, your opponent is at the other end.

The puck slides along on an almost frictionless cushion of air and can attain very high speeds. To move the puck, both you and your opponent must hit it with a small paddle. The object is to send the puck into your opponent's goal — the open end of the table at his or her end. Of course, your opponent is trying to do the same thing to you.

Your opponents in Shufflepuck Cafe are a motley crew, each with a

Broderbund's Shufflepuck Cafe offers fast and furious game-play for any skill level — just watch out for the General!



unique style of play. You can select your opponent from the opening screen, or use the practice droid, which can be programmed to be a worthy opponent (not that the inhabitants of the Cafe are easy to defeat!). They range from Skippy, a wimpy opponent who is a dead sucker for bounce shot, to Biff Raunch, a distasteful sort who has no weaknesses I could find. In between there are, among others, the General, who has a wicked return, and the Princess, who uses a magic hook on her serve that was impossible for my 30-plus-year-old reflexes to handle. The opponents even have their own characteristic mannerisms, grunts and groans that you'll hear and see as the games progress.

To make Shufflepuck even more interesting, you can customize it. The "Bouncer" moves back and forth in front of your goal, and its size and speed can be adjusted. You can set the size of your paddle, though the bigger paddles are not as nimble when it comes to bouncing and spinning the puck. You can also program the paddle as to how sensitive it is when applying spins and edge shots. The paddle can even

have a different response depending on whether the button on the mouse is up or down. By the way, it's best to play this game with a standard mouse — even the slightest hesitation in a wireless mouse and you lose the point with the better opponents.

Once you get good at defeating some of the opponents, you can enter tournaments. These can be loaded and saved to disk, and if you win, you get to put your name on the vanity board, and store it to disk.

Shufflepuck Cafe has fast action so expect to feel it in your mouse-hand muscles after you play it for awhile. It's exciting and fun, with good graphics and sound. If you like air hockey, or any fast-paced game that requires nimble movement, check this out. ■

Disk Contents

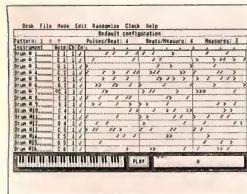
Programs on Your START Disk



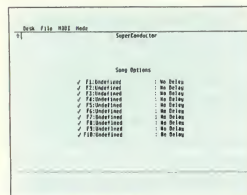
ALTERTUNE PAGE 91



GILBERT'S CHALLENGE PAGE 50



MASTER DRUMMER PAGE 78



SUPER CONDUCTOR PAGE 83

ALTERTUNE *By Bill Sethares and John Bell* Page 91

Guitarists have always been able to slip into alternate tunings by tightening or loosening their guitar strings. For other instruments, like the saxophone, such redefinition is considerably more difficult. With AlterTune, however, any MIDI instrument can be tuned as easily as left-click-click.

GILBERT'S CHALLENGE *By Michael C. Gilbert* Page 50

STurgeon General's Warning: playing Gilbert's Challenge has caused laboratory subjects to spend countless hours in front of their monitor attempting to master the intricacies of this seemingly simple game. Symptoms include bloodshot eyes, twitching mouse-button fingers and mumbling, "Just one more marble, please."

MIDI MASTER DRUMMER AND SOURCE CODE *By David Snow* Page 78

Drum-machine programming is an often daunting and tedious process that consists mainly of abstract pattern shuffling and button pushing. Wouldn't it be nice to have a graphic, music-friendly environment in which to create, edit and organize drum patterns? Look no further — MIDI Master Drummer is here.

MIDI PROGRAMMING TIPS

By Steve Jobs Page 34

MIDI programming on the Atari ST and Mega computers may seem like an arcane art, open only to ordained techno-musical wizards. In fact, with a few exceptions, MIDI programming is no different than any other kind of applications programming. In this month's Programming In MIDI column, those exceptions are covered, and on disk is C code to handle them.

SAMPSYN *By David Snow* Page 70

If you've been following developments in electronic music over the past few years, you know that "sampling" (audio digitization) is one of the new buzzwords. A sampling device is basically a circuit system that converts audio signals into binary data (analog-to-digital) and back into sound (digital-to-analog). If you've always wanted to make your computer talk, sing or sneeze, Sampsyn is your conduit.

SUPER CONDUCTOR *By Philip MacKenzie and Jeffrey Sorenson* .. Page 83

Since July is our special music/MIDI issue, we're pleased to offer you a fabulous bonus, MichTron's Super Conductor. This 16-track MIDI sequencer has all the features and functions of professional studio equipment costing thousands of dollars.



Disk Instructions

HOW TO GET START PROGRAMS UP AND RUNNING

- 1) Write protect your disk.
- 2) Make a backup copy. We format the disk using TWISTER.PRG (written by Dave Small and Dan Moore, Summer 1988 issue of START) to increase the size of a single-sided disk to 400K. You can back up onto one Twisted, single-sided disk; one double-sided disk; or two GEM-formatted, single-sided disks.

NOTE: TWISTER DOES NOT WORK WITH GEM'S DISKCOPY. To make a backup, open a window for your START disk, then drag the files from the window to the backup disk.

- 3) Store the original and use the backup hereafter.
- 4) Un-ARC the files. We use Double Click Software's DC SEA utility to create self-extracting archive files. To un-ARC a program, simply double click on the filename.
- 5) When the dialog box appears, choose Extract.
- 6) When the file selector appears, choose a destination disk (hard disk, RAM disk or floppy disk) for the uncompressed files. Make sure the destination disk has enough space for the uncompressed files, whose sizes are given in the chart below.

The screen goes blank, then the files are listed as they are extracted, and marked "OK" if the uncompression is successful.

	Arc-file	Un-ARCed Size	Memory				Resolution	Notes
			32K	1MB	HIGH	LOW		
AlterTune	TUNER.PRG	29K	Compatible	Compatible	Compatible	Compatible		
Gilbert's Challenge	GILBERT.PRG	207K	Compatible	Compatible	Compatible	Compatible		
MIDI Master Drummer	MIDIDRUM.PRG	114K	Compatible	Compatible	Compatible	Compatible		
MIDI Master Drummer Source Code	DRUM_SRC.PRG	186K	Compatible	Compatible	Compatible	Compatible		
MIDI Programming Tips	PROGMIDI.PRG	17K	Compatible	Compatible	Compatible	Compatible		
Sampsyn	DIGITIZE.PRG	37K	Compatible	Compatible	Compatible	Compatible		
Super Conductor	CONDUCT.PRG	163K	Compatible	Compatible	Compatible	Compatible		

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Spotlight on programming!

**So You Wanna Be an
Atari Developer?**

Former START Programs Editor Heidi Brumbaugh gives you a realistic view of developing and marketing your software for the ST.

ON DISK:

CardMaster

A veritable tour de force of programming, CardMaster by Susan Phillips will shuffle your brain.

Metamorph

Turn your pictures around in this CAD 3D tweening program by Mark Kimball.

Look for these and more surprises in the August 1990 issue of START!

MORE HYPERTALK

BY DAVID PLOTKIN
START CONTRIBUTING EDITOR

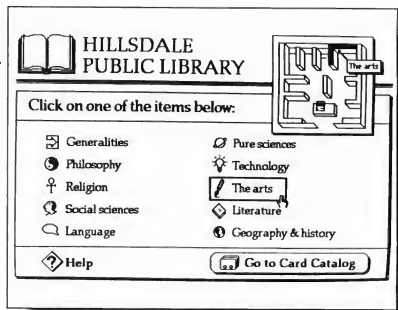
In the March 1990 issue, I introduced you to Apple's Hypercard, the powerful program which utilizes Hypermedia. The genius behind Hypercard, however, is its built-in programming language, Hypertalk. In this last segment on Hypercard, we'll take a quick look at this impressive language.

Hyper Language

Hypertalk is a structured language similar, in some respects, to GFA BASIC and Pascal. It does not use line numbers and contains short blocks of structured code. It can use procedures and user-defined functions, and pass variables. It is, however, very different from other programming languages.

For instance, the syntax rules are extremely flexible: "Go to the first card" is just as acceptable as the more sophisticated "Go to card 1." You can refer to objects by their name, ID, or sequential position. Hypertalk also stores data as a string, converting numbers when necessary, so you don't have to worry about mismatching data types. There is also a variable, It, that automatically receives the result of many commands. Among its numerous commands, Hypercard includes Put (moves text

Apple's Hypercard utilizes Hyper-media, a nonlinear database system.



to any position in different fields), Get (recovers any section of text) and Delete. You can Go to cards and Pop back to them, Find text in any field and Send messages.

The Send command is quite useful, since you can Send a message directly to a high-level object (such as a card), bypassing the scripts in lower objects (such as a button) which might otherwise trap your message. The Do command executes the first line of any text field provided that line is a valid Hypercard command. Open lets you launch another Mac application from within Hypercard if you have the memory available. Hypertalk includes Trigonometric (Sine and Cosine) and Transcendental (ln, Log and

Exp) functions for standard mathematical applications.

But there are also some pretty unusual functions, such as a Compound option, which returns the future value of a periodic payment, and Annuity, which returns the present value of one payment. The Value Of function evaluates any formula that has been entered into a field, which essentially lets you write your own spreadsheet in Hypercard. The standard If/Then/Else command is supported in a variety of formats including both single and multiple lines. A command such as Repeat coupled with the command Next Repeat generates any loop conditions that you deem necessary.

Talking to the Script

Hypertalk speaks to Hypercard through "scripts," small programs written in the language. Every object in a Hypercard stack (buttons, cards, backgrounds, stacks and fields) can hold a Hypertalk script. The mechanics of writing a script are fairly simple. Select the tool for the object you want to modify (i.e., the button tool to modify a button), select the object and choose the script editor. The script editor is not unlike other Mac or ST program editors. A scrollable window lets you see your script and you can type your program into the window, using automatic indenting, cut and paste, and search and replace.

Virtually every application of Hypercard is carried out by a script. For example, click on the Home button to activate its script, which might look something like this: " On MouseUp Go Home End MouseUp." The script checks for the

proper condition (that the mouse button has been released) and then executes the command (Go Home). Different conditions can be written into a script; you can make them as

press the mouse button, you can put the script in the Card (or the Background, etc.) on up the line, and not have to write a script for each button.

Virtually every application of Hypercard is carried out by a script.

long and complex as you like.

Hypertalk follows the established hierarchy of Hypercard objects, the Card, Background, Stack, Home Stack and finally, Hypercard itself. Your messages move up the line, looking for matching conditions in the scripts of each object. Your command is executed at the level that matches the conditions of your message. This is useful because if you want all the buttons on a card to respond the same way when you

The Final Word

Clearly, Hypertalk is a powerful language in its own right. You will inevitably have to learn it if you are serious about using Hypercard. Unfortunately, Apple's Hypercard documentation does not include any information about Hypertalk. But the language is remarkably easy to learn and there are books available in local retail stores if you want to be a Hyper programmer. ■

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SAMPSYN

BY DAVID SNOW

An Audio Digitizer/Synthesizer for the ST

AT A GLANCE

Program:	Sampsyn
Type:	Audio digitizer
Requirements:	512K, high or medium rez
Archive:	DIGITIZE.PRG
Files:	SAMPSYN.BIN SAMPSYN.PRG
Language:	BASIC

DIGITIZE.PRG and choose Extract when the dialog box appears. Select a destination disk and the files will be un-ARCDed directly onto that disk. Make sure that SAMPSYN.BIN and SAMPSYN.PRG are in the same folder. To start the program, double-click on SAMPSYN.PRG.

Sampsyn's menu options consist of

Desk, Output, Rate, Threshold and Exit. Desk includes information about the author and copyright. Output lets you choose between output from the ST's monitor speaker and the Sampsyn line-out jack.

Rate lets you determine your sampling/playback frequency. Sampsyn supports six frequencies. The higher the sampling rate, the higher the playback fidelity; the lower the rate, however, the longer the sample.

Threshold lets you set the loudness level at which recording begins. In the Record mode, Sampsyn waits for audio input before starting to record. The loudness of the input needed to trigger recording is adjustable to three levels. The threshold can also be turned off so that recording starts immediately after you click on the Record button.

Exit returns you to the desktop.

There are four function buttons on the screen, RECORD, PLAY, SAVE and LOAD.

RECORD: Start your sound and click on the

Sampsyn is an 8-bit sampling device that works with your ST through the cartridge port, channelling audio output through an external amplifier or the monitor's built-in speaker. Even if you don't build the digitizer, you can still use the Sampsyn program on this month's START disk to play back and edit SPL sound files from other sources. You can create files of up to 150K in ST Replay format, or add sampled sound to your own programs with playback modules in LDW and ST BASIC.

Getting Started

To run Sampsyn, double-click on the archive file



If you've been following developments in electronic music over the past few years, you know that "sampling" (audio digitization) is one of the new buzzwords. A sampling device is basically a circuit system that converts audio signals into binary data (analog-to-digital), and back into sound (digital-to-analog). If you've always wanted to make your computer talk, sing or sneeze, Sampsyn is your conduit.



RECORD button. A recording will continue until the 150K sample buffer is filled. At the default sampling rate of 19.8kHz, the total time span is about eight seconds.

An amplitude-envelope display of the sound is drawn in the window. Ideally, the loudest parts of the sound bring the envelope contour just to the top and bottom edges of the window display. If the amplitude of the input exceeds the dynamic range of the A/D converter, however, the signal will clip and cause distortion. On the other hand, if the input level is consistently too low, there will be a greater proportion of noise (hiss) in relation to the sound. Adjust the gain of the pre-amp to obtain the cleanest signal.

PLAY: To hear your sample through the monitor speaker, switch to Internal mode under the Output menu — don't forget to turn the volume up — and click on the PLAY button.

Select External from the Output menu. With Sampsyn's line-level

output (J3) connected to the line input of your stereo, click on the PLAY button again, and you're in hi-fi.

The two small arrows at the bottom of the envelope display window define the portion of the sample to be played and saved. To set the left arrow position, click anywhere in the window to the left of

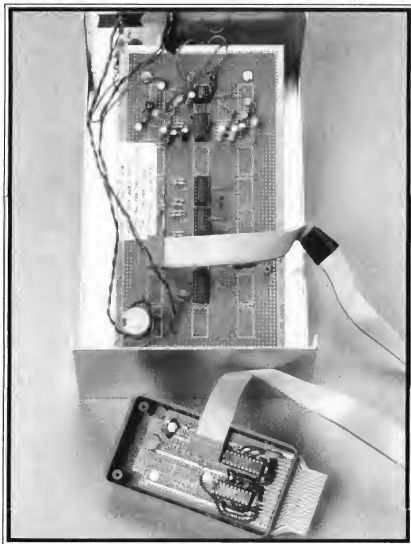
the right arrow; to set the right arrow, double-click to the right of the left arrow.

SAVE: Click on the SAVE button to call up the GEM file selector. Remember, only that portion of the sample between the arrows will be saved.

Sound files tend to be large, so be sure you've got room on disk.

LOAD: Clicking on LOAD also gives you the standard selector box.

That's it, folks! Now, let's make some noise. Thanks go to Jim Kent for his help, to Joel Snow who came up with the name of this project and to Tom Jeffries for tech-checking. ■



David Snow holds degrees in music composition from the Eastman School of Music and Yale University, and is the recipient of numerous commissions, awards, and grants, including those from BMI, ASCAP, and the National Endowment for the Arts.

Building

GETTING STARTED

A good place for the technically-inclined audiophile (or musically-inclined technophile) to begin is *Electronic Projects for Musicians* by Craig Anderton (Amso Publications, 1980). The book devotes four chapters to such fundamentals as the basics of electronics, proper soldering and construction techniques, how and where to find components, and safety precautions. There are also 27 useful projects of various difficulty levels to get you started.

— David Snow

SAMP SYN PARTS

Capacitors (25 WVDC or greater)

C1, C3, C4, C7, C9, C22, C23, C25	1uF electrolytic
C2, C6, C8, C11, C14, C21, C26, C28	10uF electrolytic
C5, C24	2200 pF ceramic disc
C10, C27	5pF ceramic disc
C12, C17, C18, C19, C20, C29, C30	.1uF ceramic disc
C13	2200 uF electrolytic
C15	4.7uF electrolytic
C16	47uF electrolytic

Semiconductors

IC1	TL072 dual op-amp
IC2	NE570 compander
IC3	AD7575JN A/D converter
IC4	74LS02 quad NOR gate
IC5	74LS373 octal latch
IC6-7	74LS244 octal buffer
D1	1N4001 diode
LED1	general-purpose LED

Resistors (1/4W 5% except as noted)

R1, R12, R15	1K
R2, R3, R9, R38	100K
R4	10K
R5	1M potentiometer
R6, R7, R37	120K
R7, R8, R35, R36	20K
R10, R11, R39, R40	47K
R13	1M 1% metal film
R14	324K 1% metal film
R16, R41	100 Ohm
R17	5.6K
R18	220 Ohm
R19-R27	2K 1% metal film
R28-R34	1K 1% metal film

Misc.

XTAL1	3.579545 MHz crystal
J1	1/4" phone jack
J2	1/8" mini phone jack
J3	RCA phone jack
DS1-2	16 pin DIP sockets

Also: circuit board, cartridge port plugboard, 16-pin DIP jumper cable, sockets for ICs, enclosure, etc.

Douglas Electronics (718 Marino Blvd., San Leandro, CA 94577) sells ST-compatible cartridge plugboards suitable for wire-wrap.

Analog Devices Inc. (One Technology Way, Norwood, MA 02062-9106, (617) 329-4700) manufactures the AD7575JN.

Jameco Electronics (1455 Shoreway Rd., Belmont, CA 94002) and **Digi-Key Corporation** (701 Brooks Ave. South, P.O. Box 677, Thief River Falls, MN, 56701-0677) are two reliable mail order houses which might supply all other components.

Sampsyn is not a beginner's project. If you're not experienced with electronics, you'll need the help of someone who is.

The Sampsyn prototype was constructed on a large 2-bus circuit board using point-to-point wiring. The interface was built on a separate cartridge plugboard, and the two boards were connected with a 16-conductor DIP jumper cable.

Since both digital and analog circuitry are combined on the board, they each need separate ground returns. Otherwise, digital switching noise can bleed into audio output. The schematic denotes the digital ground with the conventional three-line symbol, and the analog ground with the letter A enclosed in a triangle. The only point at which the two grounds meet is the power-supply junction on the board.

The analog circuitry requires an external power supply which can range from +9 to +15 VDC. An inexpensive DC wall-outlet adapter is sufficient. Sampsyn obtains its +5V power supply from the computer.

Putting It Together

While you're assembling Sampsyn, keep the component leads and wire jumpers as short and direct as possible. Don't bundle the wires or else you'll get crosstalk. Use sockets for all ICs and shielded cable for connecting audio input and output

jacks to the circuit board — connect only one end of the shield to ground. Check for solder bridges and cold joints; observe proper polarity of diodes and electrolytic caps, and don't use too much heat on semiconductors. Before inserting the ICs, check your connections with an ohmmeter.

Housing the circuit in an aluminum chassis box keeps it safe, and shields the audio circuitry from external noise.

Building the Converter

The first part of this tutorial refers to the first schematic (Figure 1).

First of all, before digitizing the audio input with the analog-to-

digital converter IC3, you can boost it at J1 with a pre-amplifier IC1A and condition it with a compressor IC2A.

The AD7575JN is a successive-approximation converter. It converts

your computer to lower the pulse of pins 1 and 2 of IC3. Twenty clock cycles later, the chip's internal register stores an 8-bit binary representation of the analog input. Your

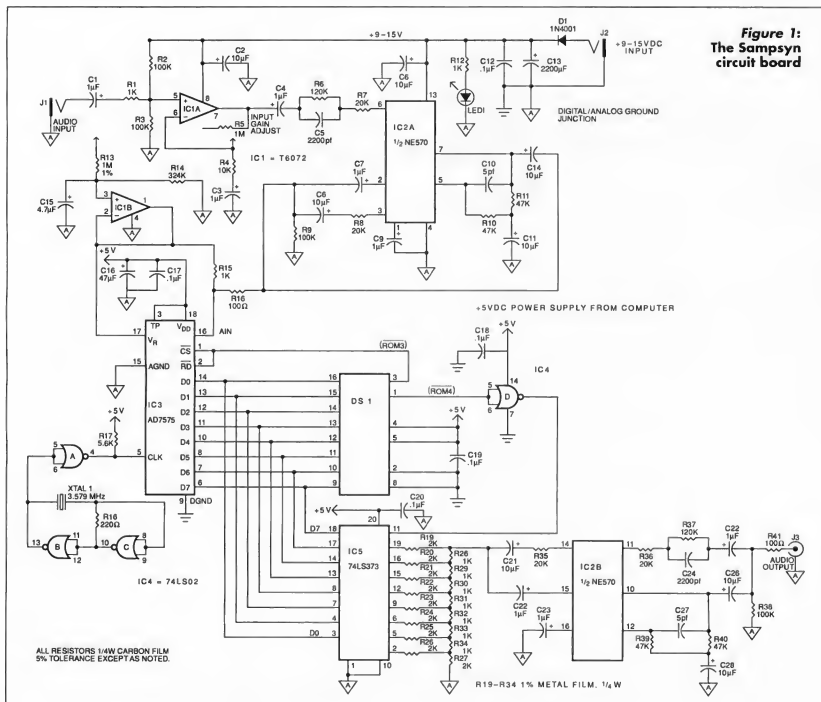
Plug in the microphone and you're ready to go.

in six microseconds with a 3.579 MHz clock input (provided by the oscillator built around NOR-gate stages IC4A, B and C, and crystal XTAL 1).

To initiate data conversion, use

computer reads the data by strobing pins 1 and 2 again, enabling the register's tri-state output buffer and restarting data conversion.

To construct the digital-to-analog circuit, use an 8-bit data latch (IC5)



and an "R-2R" resistive ladder (R19-R34). Strobe data from the computer into the latch by pulsing enable pin 11 on IC5 high. The resistor network divides logic-level signals when latch outputs to binary-weighted currents; the result of this division appears at the junction of R19 and R28. You can suppress quantization noise with the IC2b expander and IC2a.

Building the Cartridge Port Interface

The second schematic refers to the cartridge port interface (Figure 2). A pinout of the ST's cartridge port (Figure 3) will help orient you. The view is external, as if you were looking straight at it.

The cartridge port is memory-mapped from addresses \$FA0000 to \$FBFFFF. This lowers the pulse of the port's ROM3 pin during any read operation (i.e. a PEEK in BASIC) from \$FA0000 to \$FAFFFF, and the pulse of the ROM4 pin from addresses \$FB0000 to \$BFFFFF.

ROM3 is connected directly to both the CS and RD pins of the analog-to-digital converter. Reading address \$FA0000 is really reading the contents of the converter's output register, which restarts the conversion for the next read operation.

Connecting the digital-to-analog converter to the ST presents a special problem, since the cartridge port was designed solely as a read-only interface. Any attempt to write to (i.e. POKE) the cartridge address range causes a bus error and, ultimately, a crash. So how do you pass data to the D/A converter?

Paradoxically, place the data on the lower address lines during a read cycle (rather than the data bus during a write), and invert ROM4 to strobe the data into the D/A latch from the address bus. Since any address from \$FB0000 to \$BFFFFF pulses ROM4, you can place data that you want to send to the DAC onto address lines A1-A8 and read from address \$FB0000+[data*2]. For example, the

Figure 2: The Cartridge Port Interface

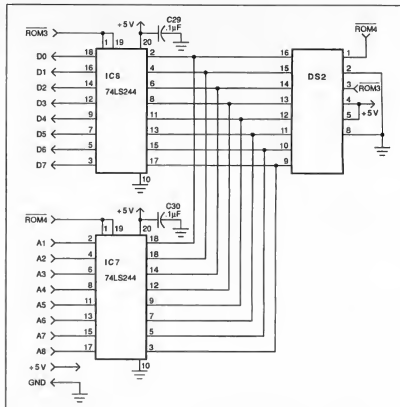
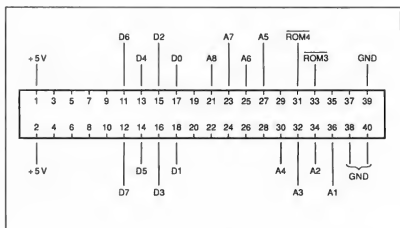


Figure 3: The ST Cartridge Port Pinout.

Don't mix up the ROM3 and ROM4 lines. ROM3 goes low when addressing the \$FA0000 - \$FAFFFF range; ROM4 goes low when addressing the \$FB0000 - \$BFFFFF range.



BASIC statement
 $X = \text{PEEK}(\&hFB0002)$

sends a value of one to the D/A converter. Before it's placed on the address bus, the data byte is multiplied by two (shifted left one bit). Since reading from an odd address is illegal to the 68000, this ensures that the address is an even number.

Use octal buffers IC6 and 7 to combine input and output lines from the cartridge port into a single 8-bit bus. This is not a requirement, since data lines D0-D7 can go directly to the AD7575 and A1-A8 can go directly to the 74LS373. But it is necessary if you want a circuit with a general-purpose interface for bus-oriented peripherals. You can omit ICs 6 and 7, but you'll need a cable

with at least 20 conductors to carry the eight data lines, eight address lines, ROM3, ROM4, five volts, and ground from the interface card to Sampsyn.

To play with Sampsyn, connect the interface card to Sampsyn with a 16-pin DIP jumper cable. With your computer off, plug the interface card into the ST cartridge slot and the external power supply into Sampsyn's power supply input jack (J2). The power-on indicator LED1 should light up. Now turn the computer on. Plug a microphone or line-level output into the audio input jack (J1). Set input gain pot R5 all the way up for a microphone, and all the way down for line input. You should be ready to go. ■

MIDI MASTER

BY DAVID SNOW

Drum – machine programming is an often daunting and tedious process that consists mainly of abstract pattern shuffling and button pushing. Wouldn't it be nice to have a graphic, music-friendly environment in which to create, edit and organize drum patterns? Look no further. MIDI Master Drummer is here.

AT A GLANCE

Program:	MIDI Master Drummer
Type:	Drum sequencer
Requirements:	512K, high or medium resolution
Archive:	MIDIDRUM.PRГ
Files:	MSTRDRUM.BIN MSTRDRUM.PRГ
Language:	LDW BASIC and assembler

MIDI Master Drummer is a specialized sequencer for drum programming that lets you graphically construct up to 99 different patterns in any meter and edit them in real time. Patterns can be linked into phrases and phrases chained together into songs. Patterns, phrases and songs can be saved to disk, and songs also can be converted to standard MIDI files that load into any commercial sequencer that reads them. MIDI Master Drummer also generates randomized patterns and offers a variety of MIDI synchronization options.

Connect the MIDI Out of your ST to the MIDI In of your drum machine or synthesizer. To run MIDI Master Drummer, double-click on the archive file MIDIDRUM.PRГ and choose Extract when the dialog box appears. Select a destination disk and the files will be un-ARCD

directly onto that disk. Make sure that MSTRDRUM.BIN and MSTRDRUM.PRГ are in the same folder. To start the program, double-click on MSTRDRUM.PRГ.

Drum Roll, Please

The first screen that appears is the pattern programming window. The Instrument column to the left lists drum names. For the purposes of this tutorial, change Drum #1, #2, #3, and #4 to Bass Drum, Snare Drum, Low Tomtom and High Tomtom respectively.

To the right of the Instrument column is the Note column, which assigns a MIDI note to each drum sound. To set a note, left-click on the one that you want to change and click on a key in the keyboard icon at the bottom of the screen. The note assignments depend upon your drum machine or synthesizer. For our tutorial, assign appropriate drum sounds for the Bass Drum, Snare Drum, Low Tomtom and High Tomtom.

Next to the Note column is the MIDI – Channel column, labeled Ch. If you're using just one drum machine or a synthesizer with a drum patch consisting of multiple drum sounds, leave all the Instrument entries assigned to the same channel. If you're using several drum machines or synthesizers, or a multitimbral synthesizer with drum sounds on different channels, assign the channels accordingly.

To the right of the Channel

DRUMMER



MIDI Drum Sequencer

column is the Enable column, labeled En, which controls the playback and editing status of each drum sound. Left-clicking in the column enables the drum which is indicated by a check mark. Right-clicking replaces the check mark with an M for mute. Clicking both mouse buttons at once changes the status to S, which means the drum is selected for global editing.

The Instrument, Note, Channel and Enable settings constitute a custom configuration for your drum machine or synthesizer setup. Click on Default Configuration in the title bar, enter your configuration name and save it. Then click on the Configuration button and enter a file name in the selector box (configuration files are automatically given a .CFG extender). If you want the configuration to load automatically, name it DEFAULT.CFG and save it in the same directory as the program.

To the right of the Enable column is the Pattern Grid, which represents one or more measures of music. Each measure consists of one or more beats and each beat consists of one or more pulses (subdivisions of the beat). On top of the grid are the Pattern settings: Pulses/Beat, Beats/Measure and Measures. By changing the values of these measures, you can change the pattern.

To enter a note in the pattern, left-click on your desired point in the grid. Right-clicking enters an accented note, and clicking both buttons at once, erases a note. Click on the PLAY button to both stop and start your pattern. When you play the pattern, only notes within the grid will sound.

You can change pattern settings without disturbing the notes you have already entered. You can also enter and delete notes while the pattern plays, and change tempo by dragging the arrow in the TEMPO bar. Any combination of pulses, beats and measures is legal as long as the total number of pulses does not exceed 48.

The Grand Pattern of Things

MIDI Master Drummer lets you create up to 99 different patterns, each with its own arrangement of measures, beats and pulses. The up and down arrows take you to the next or previous pattern. You can go to any pattern by entering the

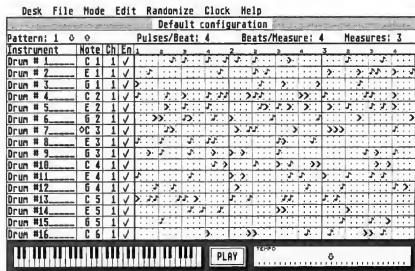
pattern number.

If you create a song, you'll probably want most or all of its patterns to be in the same meter. You can either set the Pulse, Beat and Measure parameters for each individual pattern accordingly, or you can copy the settings from one pattern to another with the Copy meter option under Edit. A dialog box will ask you for a range of patterns. For example, if you're working on pattern number one and want to copy its parameters to patterns number two to 32, enter two in the left edit field, 32 in the right, and left-click on the Copy button. Entering the number two in both fields copies your pattern to only the second pattern.

To copy one drum part to another, click on its name in the Instrument column and drag it up or down to its destination. To delete a drum part, click on its name and drag it up to where the column reads "Instrument."

If you make a mistake during

Pattern programming window.



editing and wish to start over, Backup pattern under the Edit menu copies your current pattern into a buffer. The buffer only holds one pattern at a time.

Instant Rhythm

MIDI Master Drummer automatically generates individual drum parts or entire patterns. The randomizing process for each drum part is controlled by four interactive parameters: note density, accent probability, quantization probability and quantization value. All are expressed as percentages ranging from zero to 99. Note density identifies the probability of notes appearing in any particular pulse. Accent probability defines the likelihood of notes becoming accented. Quantization probability identifies the nearest quantization block to which the note position is

likely to shift. Quantization value is the number of pulses in each block of the quantization grid. Set Parameters under the Randomize menu option, lets you edit these values.

Randomization parameters are saved to disk as part of a configuration file. You can create and save several configuration files with multiple settings to produce different rhythmic effects. A song will commonly employ 8- or 16-bar phrases made up of repeating 1- or 2-bar patterns. To add variation to a repeating pattern, make several copies of it and randomize one or more drum parts within each copy. This is a slick way to generate interesting drum tracks that have a solid bottom groove offset by complex, evolving counter rhythms.

You can also modify a drum part

by rotating its notes left or right. Select Shift pulses from the Edit menu. The Select button in the dialog box rotates those parts that have been selected in the Enable column; the All button, obviously, rotates all parts of the pattern. The Left and Right buttons in the next dialog box determine the direction of the shift.

Saved Pattern files are automatically given a .PAT file extension. If you want a pattern to load automatically, name it DEFAULT.PAT when you save it.

Going Through a Phrase

Once you've composed several patterns, it's time to put them into musically useful phrases. Click on Phrase under the Mode menu. The phrase window consists of 16 PHRASE buttons and their associated edit lines. In the phrase edit line, enter the numbers of the patterns you want included in the phrase.

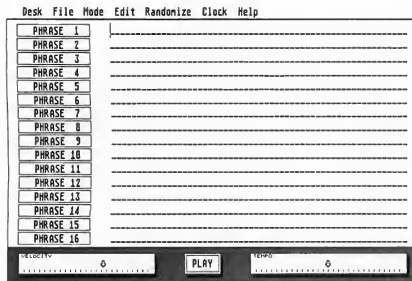
You can include tempo and velocity information within the phrase itself. Identify tempo by the letter T, and enter the tempo in beats per minute. Master Drummer lets you have tempos between one and 240 bpm. You can have velocity (or V) values between one and 99.

If you want a sequence of patterns in a phrase to repeat, enter the phrase numbers, the letter R and the number of repeats. The rest of the phrase plays after the last repeat. You can have only one repeat figure per phrase.

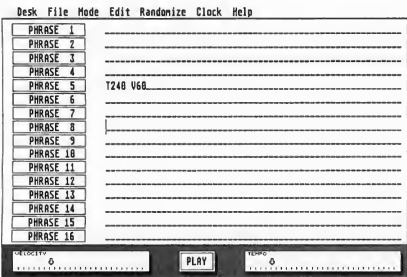
To copy phrases to different edit lines, drag the PHRASE button to another. [Esc] deletes the currently selected phrase; Erase phrases under the Edit menu deletes all phrases.

Song Mode

The Song option under the Mode menu operates almost identically to the Phrase mode. A song consists of up to 16 parts which are composed



Phrase mode window



Tempo and velocity data in a phrase edit line

of phrases. There are 16 PART buttons and their associated part edit lines in the Song mode window. You can include tempo and velocity data in each part line. If there is a

MIDI Master Drummer automatically generates individual drum parts or entire patterns.

conflict between the tempo or velocity values in a part and one of its phrases, the value of the phrase takes precedence.

You cannot edit phrases and song parts while they're playing, but you can jump from one phrase to another, or from one part to another, by clicking on their respective buttons. This way you can control song form in realtime. If you jump around with the arrow keys, you won't have to wait for any current pattern to end.

Save a song and its phrases in a single disk file with the Save file option under the File menu. Click on the PHRASES/SONG button in the dialog box. A song file is automatically given a .SNG file extension. If you want a particular song file to load automatically, name it DEFAULT.SNG.

To save a Master Drummer song as a standard MIDI file (format 0), select Save file under the File menu and click on the MIDI FILE button in the dialog box. The MIDI file and the currently selected MIDI clock resolution are saved together. MIDI files are automatically given an .MID extension. [Esc] aborts the conversion process at any time.

More Neat Stuff

There are other functions you may

wish to explore once you're more familiar with MIDI Master Drummer.

Select Auto—set tempo under the Clock menu. Tap zero (0) twice on the numeric keypad to set the tempo. This sets the value automatically into the edit line in phrase and song modes.

If you wish to create more subtle gradations of dynamics, you can set a new loudness value for accented notes by selecting Accent velocity from the Edit menu. Loudness values range from one to nine. Accented notes with a loudness value between one and eight are represented in the Pattern Grid by the numeral itself, instead of the accent sign (^).

MIDI Master Drummer defaults to an internal clock which acts as a master MIDI clock source to drive

of MIDI clocks per pulse. To change the number of MIDI clocks per beat, select Resolution under the Clock menu and enter a value between 24 and 120. It's important to remember that in Beat=Beat mode, the number of MIDI clocks per beat must be evenly divisible by the number of pulses per beat in any pattern.

The Metronome option under the Clock menu activates MIDI Master Drummer's audible metronome. To set the number of MIDI clocks per metronome click, select Clocks/click from the Clock menu and enter the appropriate value in the dialog box. Generally, the number of MIDI clocks per metronome click should equal the number of clicks per beat. Desk accessories are deactivated in MIDI Master Drummer. They cause

Graduated accent values in a pattern

Desk File Mode Edit Randomize Clock Help
Default configuration
Pattern: 5 0 Pulses/Beat: 4 Beats/Measure: 4 Measures: 3

Instrument	Note	Ch	En	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Drum # 1	C	1	✓																
Drum # 2	E	1	✓																
Drum # 3	E	1	✓																
Drum # 4	C	2	1																
Drum # 5	E	2	1	✓															
Drum # 6	B	2	1	✓															
Drum # 7	OP	3	1	✓	447	2	225	2	667	2	225	2	667	2	225	2	667	2	225
Drum # 8	C	3	1	✓															
Drum # 9	G	3	1	✓															
Drum #10	C	4	1	✓															
Drum #11	E	4	1	✓															
Drum #12	G	4	1	✓															
Drum #13	C	5	1	✓															
Drum #14	E	5	1	✓															
Drum #15	B	5	1	✓															
Drum #16	C	5	1	✓															

PLAY

other sequencers in sync. External sequencers might require MIDI start, stop and continue messages in order to synchronize properly. Select the MIDI start option under the Clock menu to output these messages. An external clock might require MIDI start, stop, and continue messages in order to sync properly. Select MIDI start under the Clock menu to receive these messages.

MIDI Master Drummer calculates tempo based on the equal duration of pulses (Pulse=pulse mode), or beats (Beat=beat mode). Each mode requires different allocations

conflicts over the mouse in the program's editing modes. You can reactivate them with the Desk Accessory option under the Edit menu. ■

David Snow holds degrees in music composition from the Eastman School of Music and Yale University, and is the recipient of numerous commissions, awards, and grants, including those from BMI, ASCAP, and the National Endowment for the Arts.

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ALERTUNE

Mix Up Your MIDI Instrument

BY BILL SETHARES AND JOHN BELL

AT A GLANCE

Program:	AlterTune
Type:	MIDI tuner
Requirements:	512K, high or medium rez
Arcfile:	TUNER.PRG
Files:	ALERTUN.PRG HIGHMAJ.CHD BLUES1.ALT OCTAVES.CHD BLUES2.ALT REVERSE.ALT CIRCLE4.ALT STRUMINA.ALT CMAJ.CHD STRUMINC.ALT FIFTHS.CHD
Language:	GFA BASIC 2.0

Guitarists have always been able to slip into alternate tunings by tightening or loosening their guitar strings. For other instruments, like the saxophone, such redefinition is considerably more difficult. With AlterTune, however, any MIDI instrument can be tuned as easily as left-click-click.

Certain songs flow more smoothly in particular tunings. A "new" tuning can inspire new musical thought. But traditional keyboards have always been locked into the linear, half-step-per-key system inherited from our musical ancestors. AlterTune is an alternate tuning program that lets you redefine the notes on your MIDI controller, within the capability of your sound source, of course.

Getting Started

There are a few pieces of equipment you'll need: a MIDI controller, a MIDI sound module and, of course, an ST running AlterTune.

To retrieve AlterTune, double-click on the archive file TUNER.PRG

and choose Extract when the dialog box appears. Select a destination disk and the files will un-ARC directly onto that disk. Connect the controller's MIDI Out to the ST's MIDI In and connect the ST's MIDI Out to the sound source's MIDI In. Set your controller to transmit on channel 1, and the sound source to receive on channel 2. Double-click on ALERTUN.PRG to start the program.

You'll see a functional, no-nonsense menu with two items. Info lets you know who to thank for AlterTune; the Control options do all the work.

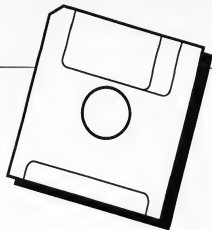
The Control Menu

Load .ALT tuning file: A file selector appears. Choose the alternate tuning file you wish to load; six .ALT files are on the START disk.

Load .CHD chord file: A file selector appears. Choose the chord redefinition file you wish to load; four .CHD files are on the START disk.

Inactivate .ALT or .CHD: A dialog box appears. Choose which file, .ALT or .CHD, you wish to inactivate.

Play: Once a tuning and/or chord redefinition file is loaded, select Play and then ... play. The notes of your ▶



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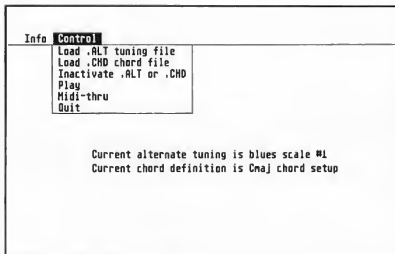
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ALTERNATE

controller will be converted according to the files you chose. If both .CHD and .ALT files are loaded they operate simultaneously. If they conflict (that is, they wish to do different things for a given note), then the .CHD instructions take precedence.

MIDI-Thru: Returns to the standard key mappings.

Quit: Exits AlterTune.



Give your MIDI instrument a different face, by simply changing .ALT and .CHD files.

Creating Your Own .ALT File

The file formats are fairly simple, but must be followed exactly or bizarre sounds may result.

The easiest way to create a file is to load an existing .ALT or .CHD file into your favorite word processor and modify it. Always save a copy of the original. Save the new file in ASCII format, using a .ALT or .CHD extension.

The first line of an .ALT file contains the tuning scheme's title. Keep the name between three and 16 characters. You can put any number of comment lines after the title as long as the comments don't begin with numbers.

The next section of the .ALT tuning file is the tuning data, consisting of 128 numbers between 0 and 127, representing notes. The tuning data is just a list of alternate MIDI notes that will be sent out the MIDI port when a MIDI note is read in.

If you're not familiar with MIDI,

here's a short tutorial. MIDI information is sent as numbers (no sound goes through a MIDI cable). MIDI-note 0 is equivalent to a C on the lowest octave of an 11-octave keyboard. MIDI-note 128 means a G note in the 11th octave. For reference, MIDI-note 60 is a middle C on the standard piano.

When AlterTune receives a MIDI note, that number is used as an index into the array of tuning data

stored in the .ALT file. For instance, when the ST reads in note number 0, it looks up the first entry in the alternate tuning data and sends it out the MIDI Out port. If the first entry in the alternate tuning data is a 7, then the sound source would be sent and would play a G. If the second number in the .ALT file is an 11, then a B note will sound whenever you hit the C# (MIDI-note 1) key.

Once the 128 entries of alternate tuning data are complete, you have a second chance to add comments to the file. Just remember that the comments can't start with a number.

In addition to converting MIDI-note data, you can also change the channel over which the data is sent. Since there are 16 MIDI channels, a list of 16 MIDI channel numbers is added in a format similar to the tuning data. If data is sent on channel 1, and the first entry listed in the channel data is a 2, then AlterTune will convert the note and send it over channel 2. Similarly, if the

second entry in the channel data is a 7, then any notes received on channel 2 will be sent out on channel 7. The datafiles on disk are set to increase the channel number by one.

Creating Your Own .CHD File

The .CHD format also begins with a comment, usually a name, on the first line. The second line should contain only a -1. Subsequent lines contain chord data, consisting of the MIDI note read in, followed by up to eight MIDI notes to replace it, then -1.

Each line looks like this:

MIDI-note in, MIDI-note 1 out, ... , MIDI-note 8 out, -1

Not all eight notes need to be used. For instance, the first line of data in the CMAJ.CHD file is 36,36,55,60,64,-1. This indicates that when a low C (MIDI-note 36) is played, the MIDI-notes 36, 55, 60 and 64 are played. The -1 indicates the end of data.

Datafiles

Ever wonder why the low notes are at the left side of the keyboard while the high notes are at the right? REVERSE.ALT lets you explore the alternative, where the low notes are at your right hand and the high notes are at your left.

Imagine playing the blues with every piano key, black and white alike, tuned to the blues scale. Check out two variations, BLUES1.ALT and BLUES2.ALT.

CIRCLE4.ALT provides an interesting wide open sound, in which the distance between consecutive keys is a perfect fourth.

STRUMINC.ALT is slightly different. Think of it as a keyboard version of the autoharp. Each octave is redefined to sound the notes of a particular chord. All keys in the first octave play tones in a C major chord, the second octave is G major, the third octave is A minor, and the

fourth octave is F major.

STRUMINA.ALT works similarly.

But why limit yourself to one note out for each note in? CMAJ.CHD defines the bottom octave of your keyboard as a family of chords in C major.

HIGHCMAJ.CHD does the same thing with an octave higher. FIFTHS.CHD plays a series of consecutive fifths for each note you play and OCTAVES.CHD sends out five consecutive octaves.

Play It Again

Now you're off, into the wonderful world of alternate tunings. When you come up with cool new tunings, let us know, OK? ■

Bill Sethares lives in Madison, Wis.; John Bell lives in Stamford, Conn. This is their first program for START.

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Products Update

COMPILED BY MARTA DEIKE, START JUNIOR EDITOR

NeoDesk Accessory

Gribnif Software has released its command line interpreter, **NeoDesk CLI**, an accessory to the popular NeoDesk 2.0 - The Desktop Alternative. The CLI interpreter is completely GEM based and supports MS/DOS and UNIX-style commands. Owners of NeoDesk 2.0 can use the interpreter to create powerful batch files and pop-up menus, and automate multiple-file housekeeping. Along with a detailed manual, the CLI package includes several sample batch files. NeoDesk 2.0 works with all machines, ROM versions and displays. NeoDesk CLI, \$29.95. **Gribnif Software, P.O. Box 350, Hadley, MA 01035, (413) 584-7887.**

Simulated Gambling

If you've ever been seduced by the casino lights of Atlantic City or Las Vegas, you probably know about those addictive little slot-type machines that play poker. Now you don't have to leave your home or lose your money to gamble. Micro Creations brings **Realistic Video Poker** to your ST. Designed



Hit me, you say? Micro Creations gives you this hit game in their gambling simulation, Realistic Video Poker.

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ALERT BOX

The correct address for Twilight Zone Software (mentioned in Products Update, May 1990 issue) is P.O. Box 7264, Louisville, KY 40257.

The phone number for ISD Marketing (distributor of Calamus) is (416) 479-1880. The number listed in the Desktop Publishing overview by Scott Wasser in the April 1990 issue is ISD's FAX number.

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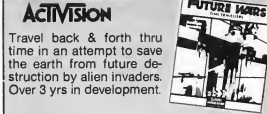
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Why just about everybody who has an ST; User Groups, Store Owners, Hardware Vendor's, Software Publishers, Writers, Programmers, Distributors, Disk Duplicators, Game Merchants, Graphic Artist's, Bankers, Lawyers, Doctors.....

WHAT CAN I SELL IN START CLASSIFIEDS?

Rom Chips, Games, Books, Drives, Monitors, Computers, 8-bits, 8-byte, Services, Programs, The Kitchen Sink, Used Cars.....If you want to sell something you've come to the right place, we'll show you ad to 60,000 ST users who may be trying to find your product RIGHT NOW!

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Just fill out the coupon below and SEND TO:

START CLASSIFIED

544 Second St

San Francisco, Ca. 94107

Name _____ Company _____
Address _____ Phone _____
City _____ State/Zip _____
Mastercard/Visa _____ Expiration Date _____
Signature _____
Number of words _____ Enclosed is my payment for \$ _____

RATE: \$2.00 PER WORD—twenty (20) word minimum..

STARS: Add \$10.00 for one (1) line of six (6) stars ***** at top of ad.

TERMS: Prepayment is required. Check, Money Order, Visa, MasterCard, or American Express is accepted. Make check payable to Antic Publishing.

FORMS: Ads are subject to publisher's approval and **MUST BE TYPED.**

GENERAL INFORMATION: Advertisers using Post Office Box numbers in their ads must supply permanent address and telephone numbers. Ad will appear in the next available issue after receipt unless otherwise specified.

DEADLINE: 15th of the month, 3 months preceding desired cover date.

Clip or copy this coupon, attach to typewritten copy and send with remittance.

HANDWRITTEN COPY WILL NOT BE ACCEPTED

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(415) 957-0886

Central Region
Director of Advertising and Sales

DENNY RILEY

544 Second Street
San Francisco, CA 94107
(415) 957-0886

Eastern Region
Advertising Sales Representative

MICHAEL EVANS

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Next Advertising Deadline October Issue: Insertion orders July 6, 1990;

Ad copy due July 10, 1990; On sale July 1990

The **MASTER 3S** light years ahead of the rest . .

ATARI® ST™
FULLY COMPATIBLE

- FULL 1 YEAR WARRANTY
- QUALITY DRIVE MECHANISM
- ON/OFF DISABLE SWITCH
- SMALLER SLIMMER DESIGN
- DIRECT DRIVE MOTOR
- EXTREMELY QUIET OPERATION
- ADVANCED INTERNAL CIRCUITRY
- FCC APPROVED
- READY TO RUN
- LSI ELECTRONICS
- PASS THROUGH CONNECTOR FOR DAISY CHAINING
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Let the **MASTER 3S** add new
dimension to your **ATARI® ST™**.



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NEW Optical Mouse
for **ATARI® ST™**.



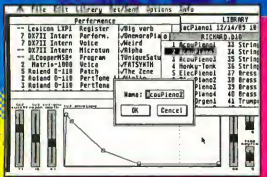
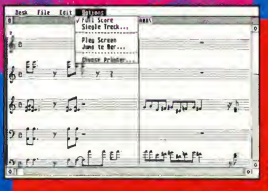
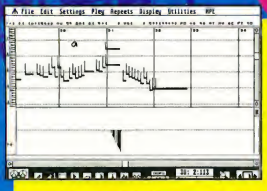
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Totally radical!
Music software from Dr. T's.

Good music software should be as personal as a vintage guitar, and as powerful as a 300 watt amplifier stack. Our sequencers have always configured themselves to the way you want to work, and now V3.0 Level II™ and KCS™ are even more powerful, intuitive, and easier to use than ever before.

For starters try TIGER Cub™; sequencing, graphic editing, and scoring, only \$99! With our MPE™ you can transcribe and print your music in standard notation with QuickScore™ or Copyist™ from within the sequencer, play sequences from your Caged Artist™ editor, or use TIGER to give you total graphic editing. For sync-to-tape, our Phantom™ SMPTE box locks up quick, and we've added Music Mouse™, "M"™, and RealTime™ to our creative musical tools.

Software of quality and power never goes out of style!



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KCS 3.0 w/QuickScore
TIGER Cub w/QuickScore
MRS V1.1
REALTIME

EDITORS/LIBRARIANS

X-OR (UNIVERSAL EDITOR)
CASIO VZ-RIDER (VZ SERIES)
CZ RIDER (CZ SERIES)
DX HEAVEN (DX/TX7)
EMU Proteus/PROTEUS XR
ESQ*apade ESQ-1/SQ-80
4-OP DELUXE (inc. TX81Z)
KAWAI K-1
KAWAI K-5
KORG M-1
LEXICON PCM-70
OBERHEIM MATRIX 6/1000
ROLAND D-110/10/20
ROLAND D-50/550
ROLAND MT-32/CM-32/64

COMPOSITION/SCORING

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COPIYST PROFESSIONAL
COPIYST DTP
FINGERS
"M"
MUSIC MOUSE
T-BASIC
TIGER (GRAPHIC EDITOR)
TUNESMITH

MISCELLANEOUS

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Jim Alkin
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"**TIGER Cub** blows away all other programs in its class."
Jim Pierson Perry
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Dr. T's
MUSIC SOFTWARE

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