MUSIC & COMPUTERS Keyboard Harmonies

SoftSide®

The Magazine For You & Your Computer

FEBRUARY 1984
ISSUE #47
$3.00
(Canada $3.50)

FOS CONTEST: Win A $3,000 Reward

PERFORMING ARTS DISCOVER TECHNOLOGY

Paul Lansky — Sound Photographer

Paul Earls On Lasers, Music & Theatre

NEWCOMP's MultiMedia Approach

COMPACT DISCS

Audio Enters Its Golden Age

REVIEWS:

Mockingboard: Sound II
Soundchaser • PC Parrot
Atari® Music Files
Synthy 64
And MORE!

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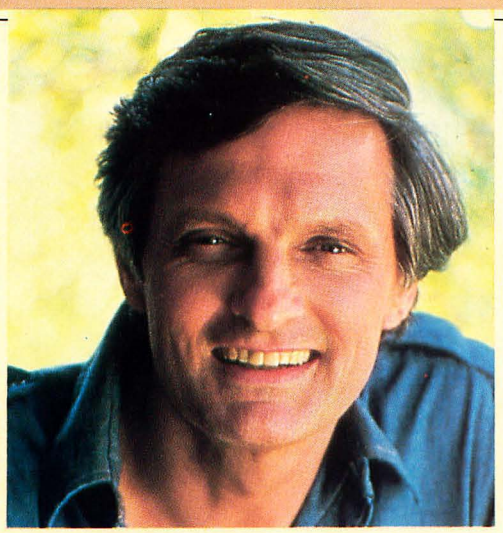

Computer enthusiast Alan Alda uses the ATARI 800XL Computer System. Alda reports: "It's going all the time!"

Introducing the Atari® XL Home Computers: We made them smart enough to know you're only human.

 A Warner Communications Company.

The new ATARI XL Home Computers prove that you can blend state-of-the-art technology with good old fashioned friendliness. What's a friendly computer? For one thing, it's a computer that speaks your language. Both the new ATARI 600XL™ and the new ATARI 800XL™ Computers come with a built-in BASIC language that uses the same simple English you use to converse with the rest of the world.

Press the HELP button, not the panic button.

Every ATARI XL Computer comes with a HELP key. Something you won't find on any other home computer. New programs are becoming available that let you use this key for helpful "prompts" when you're unsure of what to do next. Press another special key and your ATARI XL automatically performs a self-diagnostic check—a feature that can save you a needless trip to one of our more than 1,000 ATARI Service℠ Centers.

The ATARI 600XL: It Gets Smarter As You Do.

With 16K of memory, the inexpensive ATARI 600XL can handle over a thousand programs: including education, home management, word processing and personal development. Like all ATARI Home Computers, it gives you 256 colors, four sound channels and Atari's unsurpassed graphics. But unlike a lot of other computers, the ATARI 600XL is ready to grow when you're ready to grow. Every ATARI XL Computer is fully compatible with every ATARI peripheral ("peripherals" are added on to expand what your computer can do).

ATARI peripherals include: a low-cost, letter-perfect printer for word processing. A telephone modem that lets you use your telephone to connect your computer to other computers thousands of miles away. A disk drive and a cassette recorder to store data. And Trak—Balls™ and joysticks to use with Atari's unequalled lineup of great arcade hits. An ATARI 600 XL Computer can be turned into a very brainy 64K computer at a very affordable price.

The ATARI 800XL: Power Enough For Over 2,000 Programs:

With 64K of built-in memory (as much as the more expensive Apple and IBM computers), the ATARI 800XL can take on any of over 2,000 software programs. That's five times as many as a Commodore 64.

There's VisiCalc®[1] for electronic spreadsheets—faster than the fastest accountant. The Home Filing Manager™ to help keep track of everything from medical records to phonograph records. Family Finances to keep up with your cash flow. Educational programs like "Juggles' Rainbow"[2] that helps preschoolers develop skills necessary for recognizing the alphabet. Even "An Invitation To Programming,™" for learning how to program.

When You've Got Our Computer, You've Got Our Number.

If you ever find yourself stuck, or have any questions at all, just give us a call. 800-538-8543. (In California, 800-672-1404.) Feel free to talk it over. Because if there's anything friendlier than an ATARI Home Computer, it's the humans who make them so friendly.

You'll do more with Atari Home Computers.

[1] VisiCalc is a registered trademark of VisiCorp.
[2] Trademark of The Learning Company.

SoftSide®

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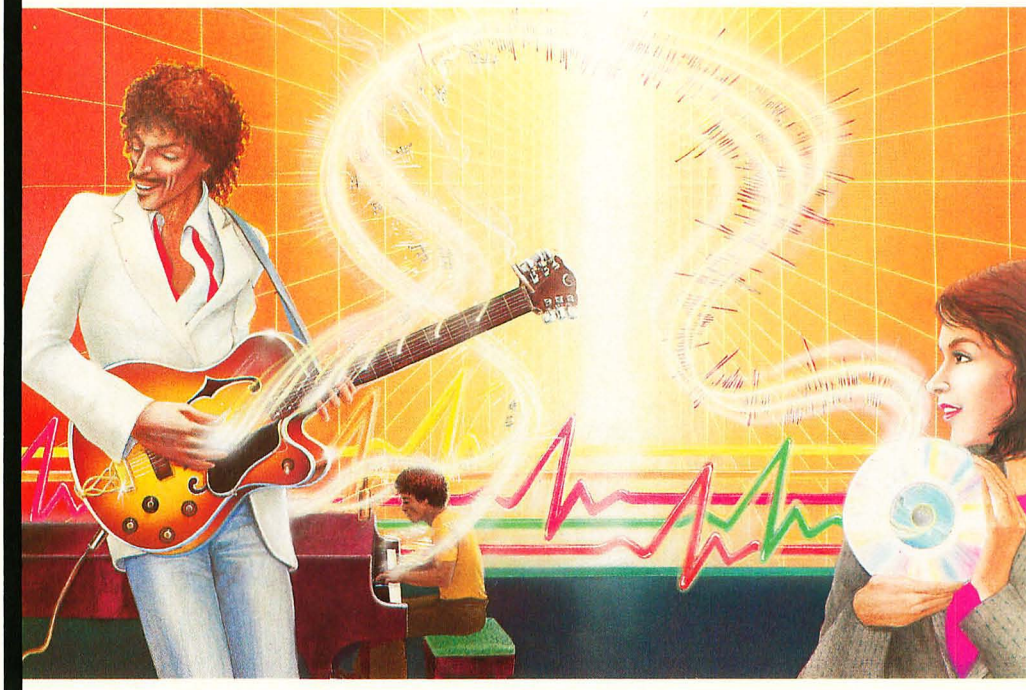
FEATURES



Cover illustration and Centerspread by William A. Giese.

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ATARI SOFTWARE FOR THE WHOLE FAMILY

Here are four software packages designed for the different people in your family.

A BASIC COMPILER FOR THE PRO-GRAMMER

ABC (A BASIC Compiler) automatically translates Atari BASIC programs into high-performance integer P-code that runs up to 12 times faster!

Perfect for developing system software and commercial games, ABC accepts most BASIC programs (unless floating point dependent) with little or no modification. Compiled P-code is a self-standing DOS object module that is unLISTable and runs without the BASIC cartridge.

ABC allows expressions in DIM, GOTO, GOSUB, and RESTORE statements, doesn't require you to re-order lines, and fully supports string and sub-string operations.

Give your BASIC programs the look and "feel" of professional products with ABC. 40K Disk ***$69.95***. Manual alone ***$9.95*** (credited toward compiler purchase).

MAKEBOOT lets you create self-booting disk or cassette versions of your ABC compiled software. Reduces overall program load time and saves memory and disk space by eliminating DOS. 40K Disk ***$14.95***.

AN EDUCATIONAL TOY FOR PRE-SCHOOLERS

Monarch is proud to present ***SofToy***, an educational program smart enough to act simple.

Bells ring, balls bounce, owls hoot as SofToy and its colorful interactive display gently introduce children (two years and older) to spatial relations, letters, numbers, even elementary programming! SofToy lets kids become familiar with computers, without arbitrary demands, competition, or intimidation. SofToy grows with children, too. At more difficult levels, the match game is a real challenge for the whole family. 24K Disk ***$29.95***.

TOOLS FOR THE SERIOUS USER

Power Tools I combines four sophisticated text processing tools on one easy-to-use utility disk.

DIFF shows you differences between two ATASCII text files: for example, changes you made in a program or document from one version to the next.

Manually searching for a particular text file can take hours. But now, with *SEARCH,* you specify a search string and a list of files. *SEARCH* examines the files and points out which ones have that string. You'll never lose your Fudge Brownie recipe again!

CHANGE is a powerful search and replace utility that operates on multiple files with one command. For example, you could change character names throughout your novel with a single command, even if each chapter is a separate file.

The special pattern-matching and multiple disk capabilities of *SEARCH* and *CHANGE* are an added plus.

TRANSLIT lets you swap one character set for another (for example, upper case for lower case) throughout a file with one command.

Power Tools I is ideal for professional business and software development text applications. 40K Disk ***$34.95***.

Look for these fine products at your nearest ATARI dealer, or order direct. Include $2.00 for shipping and handling in U.S./Canada. Checks or money orders accepted. MasterCard/Visa add 3%. COD higher. MA residents add 5% tax. Dealer and distributor inquiries invited. ATARI is a trademark of Atari, Inc. ABC, Makeboot, PowerTools, and SofToy are trademarks of Monarch Data Systems, Inc.

MONARCH DATA SYSTEMS

MONARCH DATA SYSTEMS, INC., P.O. Box 207, Cochituate, MA 01778 (617) 877-3457

THE MIND APPLIANCE

In 1960, when Botswana(?), then called the Belgian Congo, received its independence, many of its citizens rushed into town with wheelbarrows to get their share of freedom. Obviously there was a lot of confusion. In a similar way, we have been told since the early 50's that someday computers will revolutionize our lives. Well, the computer age is not coming anymore, it's here. Where's that wheelbarrow?

As consumers, we are accustomed to having a clear purpose associated with our purchases. We are most comfortable when our purchase is associated with convenience. Radar ovens do cooking chores more quickly and easily. Video tape recorders (VCR) let you watch what you want when you want it.

So how does a home computer make your life more convenient? What chores does it do more quickly and easily? Not many. The truth of the matter is that the kinds of jobs that computers do well tend to be near impossible ones to do without them. Personal living conducted without them tends to avoid those problems.

To Use Or Not To Use

The computer has been called the mind appliance. It's *forte* lies in aiding its user in creating and manipulating information, the food of thought. Some problems in our personal lives would seem to qualify as likely candidates for computerization. Our pantry, for example. Just think of all those items just waiting to be entered into a data base. It could tell you how much you have invested in your foodstuffs, produce shopping lists, even offer menu ideas based on your available stocks. The problem is that it is more trouble than it's worth. You would have to have a spreadsheet for a heart for the project to seem worthwhile.

Many executives have hobbled themselves by associating keyboards with low level clerical functions.

But, if you are a collecting type of individual, be it 45 rpm records or salt and pepper shakers, you may, in fact, have a database problem worth computerizing. The larger that collection is, the more likely that the computer will lend valuable service.

The most significant thing a computer will do for us in our personal lives will be to permit us to conduct our lives in ways that were never before possible. Many of these possibilities require some sort of connection to the outside world. Telecommuting, teleshopping and telegossiping all depend on the telephone wire as a medium of sharing. The fullness of these possibilities must be realized by our learning to use them.

As the mind appliance, a computer will seem to be demanding. With all the facility it supplies, it doesn't so much solve problems as it answers questions. What questions we want answered always will remain the human contribution.

The Entertainment Factor

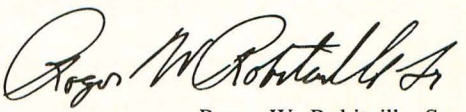
Computer games have been the object of controversy since they were invented. And yet, you have to admit that they do require you to get up off the sofa to play them — whether you are an executive or a kid. Personally, I feel the fact that they require interaction is, in itself, a substantial step forward in preparing us, the human resources, to regard the television in a dynamic, interactive manner — at first, via the keyboard.

The keyboard is coming into it's own. It has been estimated that by 1990, the number of keyboards in use in business will number 70,000,000 of all types — more than one per white collar worker in the United States.

Keyboard literacy, is one of the stumbling blocks to computer use. There once was a time when successful careers could be launched and maintained without having to touch a keyboard. Many executives have hobbled themselves by associating keyboards with low level clerical functions — which has caused a peculiar strain of computer phobia. Today, such thinking can be hazardous to your professional health.

Eventually, voice recognition techniques will reduce or eliminate the need for finger entry. Everyone who has watched Battlestar Galactica's commander, Adama, speaking his reports into a computer has caught a glimpse of their own future (mid 1990's).

Tomorrow's living will center around knowing what can be done technologically and how. Those who participate early and learn their possibilities will have a competitive advantage. What questions will you be asking? What services will you require? Those choices will, when massed together as markets, shape our very future.



Roger W. Robitaille, Sr.
Publisher

TIMES THEY ARE A CHANGING

The year 1984 will bring a transition for the microcomputing industry. The IBMjr, Apple's Macintosh and Tandy's Model 2000 are just the castings out of the silicon foundries. The capabilities of these new piles of parts sold to their respective marketplaces will profoundly influence the environment of the products of the next generation of human creativity.

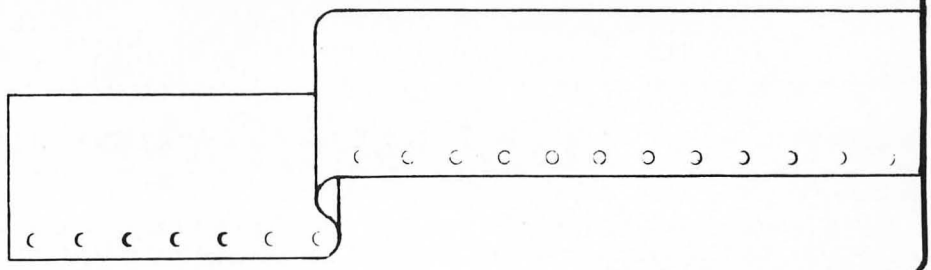
Recognizing these trends, ***SoftSide*** has been evaluating its role as we join the revolution. The new technologies demand new techniques, and new problems demand new solutions. Magazines, like people, are a product of constant change, and ***SoftSide*** welcomes the challenge.

We have already implemented some important changes in our pages, like the centerfold used as a graphic editorial in issues #46 and #47. Our next issue (#48) will be filled with surprises. No more hints, now; however, whatever you do, don't miss our database issue next month!

You can help us to perfect a dynamic new approach in the magazine. Please, write us with your comments.

Line listed software lovers: What would you say to a new quarterly publication called "CODE" to satisify your hacker's appetites? More on this next issue. Until then, thanks for your continued support.

Input



FOS Praises

Dear *SoftSide*:

Because I was totally unfamiliar with stock market operations and manipulations, I have thoroughly enjoyed the column by J. M. Keynes, or whoever he really is. The author has always provided help in making intelligent decisions that otherwise would be impossible for me...even if I did not follow through and buy the securities. And so far I haven't since I still feel too uninformed. But JMK seems to write for the laymen who need the information spelled out in detail...and I do appreciate that since I am one of those! So please, tell him to keep up the good work...

David Proffitt
Vallejo, CA

Reply: For everyone's information, the Financial Operating System (FOS) column stands out as one of *SoftSide's* most successful offerings ever. Hello, Mr. Keynes, wherever you are. The readers love you!

Connections

Dear *SoftSide*:

Your readers may want to know about our national association, the Computer/Investor Users Group, Inc.

We share information on databases and programs converting all aspects of using computers and terminals to aid in investment decisions. Our members range from individual investors to financial professionals, and from first-time computer users who own no equipment to people who write their own investment programs.

Membership includes a newsletter, consultation, seminars, a group discount card, telephone assistance and optional database services.

We will be pleased to send information to your readers who phone or write to: Computer/Investor Users Group, 36 Highland Avenue, Metuchen, NJ 08840, (201) 494-1200.

Sharon Cote
National Coordinator

Dear *SoftSide*:

Your readers might be interested in a relatively new user's group devoted specifically to graphics applications for the Apple family of computers. The High Resolution Picture Library is primarily concerned with the compilation and dissemination of public domain graphics software. We are interested in collecting hi-res pictures, shape tables, fonts and graphics demos. A modular graphics system is being developed which will include modules for creating and manipulating shape tables, fonts and pictures. Membership in the HRPL is free.

Anyone who would like to receive the HRPL software currently available can send a disk in a returnable mailer to HRPL. Return postage in the form of stamps is required. Any software suitable for contribution to the library (programs, shapes, fonts, etc.) may be included on the disk. Artists are encouraged to contribute their high-resolution pictures. We are also interested in comments, suggestions and questions about graphics.

The disk or request for more information should be sent to: H. R. P. L., c/o Paul Pritchard, 2353 S. 8th Street, Omaha, NE 68108.

Paul Pritchard
Omaha, NE

What To Do With A Review

Dear *SoftSide*:

I was interested in your recent reivew of my "Music Games" in *SoftSide* #43. Since Howard W. Sams & Co. is planning a fall reprinting of "Music Games," your suggestions are being incorporated into the new package.

I would like to respond to your criticisms individually.

- The bad intonation of varying Apples seems to be greater than I had originally anticipated. "Solfeggietto" was played on at least five computers with no ill effects. However, with students in mind, any problem of this sort must be corrected.
- Editing errors are being corrected and should never be tolerated.
- My response to the suggestion of "Flash Cards" to play the pitch being tested was, "Why didn't I think of that !" These will be included.

My competitors at $150 and higher a package plus $2000 worth of equipment have not discouraged me as my aim is affordable teaching aids. I feel that if a reasonable solution can be found to the intonation problems, the field would significantly open to more musical programs on the un-enhanced Apple. I would very much appreciate any other suggestions you might have.

Lydia V. Bell
Lakewood, CO

Reply: This response is what we hope for when we run a review containing criticisms of the product. Such reviews are intended as support for software developers, and it is gratifying when they are received with such enthusiam.

Under Advisement

Dear *SoftSide*:

I just received issue #45 dated November 1983 and am so happy that you've come to your senses and have restored *Dating* to your publication. Any publication is timeLY, not timeLESS, and the documentation of new material as related to the calendar is part of the unending flow of new information. Knowledge feeds upon prior information and this must be known with the time frame of the calendar year rather than an arbitrary numbering system. I am a 62-year-old educator with 28 years of experience with textbooks and innumerable periodicals, and I can say without hesitation that dating is absolutely essential for archival purposes — especially in scientific publications.

As a subscriber of several years standing, I continue to enjoy your publication...

I make this suggestion to you as I have done to other vendors — mail your disk version on *tape* and let your subscribers save the programs to disk as they please. This procedure will accomplish several goals:

- Tapes are cheaper than disks and are easier to mail.
- The tape will serve as an inexpensive backup, no need for another disk.
- Tape programs can be recorded independent of any particular DOS.
- As I receive tapes, each with relatively few programs, I can store many programs on one disk.

I would urge you to resist the temptation to devote too much of your space to reviews. You should concentrate on programs. Too many computer magazines offer nothing of substance, only opinion...

Jerome S. Miller
Grand Rapids, MI

Reply: Thanks for so many good suggestions. Anyone else out there have anything further to add?

Roses and Thorns

Dear *SoftSide*:

Please find enclosed a money order to the value of $25.00 for a copy of "The Best of *SoftSide*" book.

A few months ago I purchased an Apple and had the problem of finding a suitable publication that would cater to my needs. After spending a small fortune on different books and periodicals I found a stray copy of #41 at a bookshop. After reading your book, I spent most of the day establishing how to obtain further copies. I am glad to say that my efforts were successful and now I can look forward to future publications.

Even here in Richards Bay, population 10,000, there is a growing band of home computerists, and each one that saw your publication has expressed an admiration for it.

In closing, I want to wish you all of the best and may your *SoftSide* always come up with the best.

Ford B. Venter
Richards Bay, South Africa

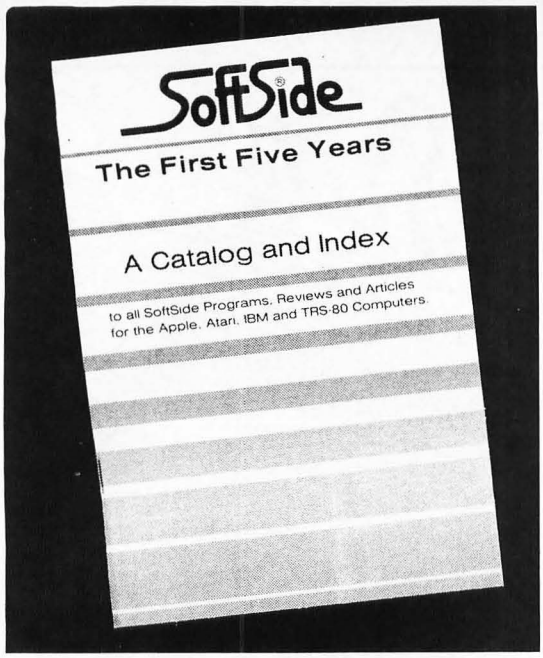
Dear *SoftSide*:

I have been getting *SoftSide* since 1979, and it is one of my prize possessions. I look forward to the new magazine and disc every month.

I think the new format is great. The second cover and the pull-out for each machine is great. I think you do more for computing and trying to help your subscribers than any other magazine on the market. Keep up the good work (and I'm sure there is plenty of that)!

Johnny Verderber
Pittsburgh, PA

Reply: To be sure!



SoftSide®

The First Five Years

A Catalog and Index

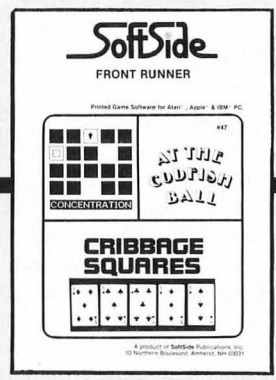
to all SoftSide Programs, Reviews and Articles
for the Apple, Atari, IBM and TRS-80 Computers.

Many of you have asked us for particular articles from past issues. Until now, finding them has been difficult. To help you locate articles and order back issues, we present the first edition of the **SoftSide Index and Catalog** — a handy reference guide you will want to keep. It lists all the articles, reviews, and programs in each issue of **SoftSide, Appleseed,** and **Prog-80**, from our beginnings in October, 1978 through the end of our fifth year, Issue #45. The index cross-references all entries, listing them by category, system and author.

If you are a recent subscriber, you'll find a wealth of useful information, programming tips, and tutorials — and if you've been with us for awhile, this is an excellent opportunity to plug the gaps in your personal library. In many ways, this **Index and Catalog** documents the early history of microcomputing. You'll find the names of several now-famous authors and programmers who had their first work published in **SoftSide.** These volumes provide a fascinating glimpse into the beginnings of personal computing.

For your FREE COPY, just fill out one of the Postage-Paid Cards bound into this issue and check the box for your free copy. But HURRY! Supplies are limited.

THIS ISSUE'S
FRONTRUNNER



Bound into the center of this issue is our #47 FrontRunner Booklet containing all the instructions, listings, documentation and STOMP tables you will need to enjoy this month's programs.

This month we feature:

Cribbage Squares for the Apple®

Card game lovers, here is another fine game to play as solitaire or with up to three other players.

At The Codfish Ball for the Atari®

Your skill and timing are all-important in this arcade-style shooting gallery.

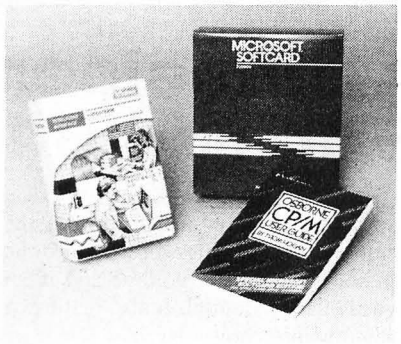
Concentration for the IBM® PC

Your memory will get a serious workout with this computer version of the television game of the same name. How well can you concentrate?

Upgrade Your Apple!

MICROSOFT

SoftCard System



Digital Research's CP/M™ (Control Program for Microprocessors) is alive and well, and it could be living inside your Apple II/II+/IIe if you had the **SoftCard Plus** system from Microsoft.

Why CP/M? It's the operating system used most often in business, scientific or word processing programs. CP/M data is easily transported from one system to another, either by modem or direct file transfer. And CP/M itself is a powerful programming tool for developing your own programs in BASIC, BASIC Compiler, FORTRAN, COBOL or Assembly Language.

The Microsoft **SoftCard Plus** system includes the 16K RAMcard (to bring your system up to 64K RAM), the Z80 Softcard (4 Mhz), which supports a full 60K CP/M-80 environment and the Videx VideoTerm, an 80-column interface that supplements Apple's 40-column display, producing 80 characters by 24 lines of text or graphics for CP/M and other programs.

The **Sofcard Plus** system also includes the CP/M 2.2 operating system, Microsoft's BASIC, ten utility programs (COPY, CON FIG IO, BOOT, CAT, MFT, PATCH, TURNKEY, APDOS, CPM 60, and UPLOAD/DOWNLOAD), extensive documentation and Thom Hogan's ***CP/M User's Guide***, a concise and complete introduction to CP/M.

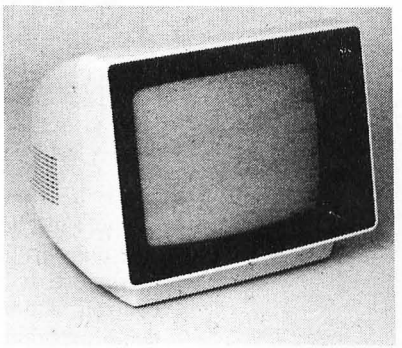
There is also a **SoftCard Plus** system without the 16K RAMcard, for the Apple IIe and Franklin ACE series, which already have 64K.

Join the 60,000 other Apple owners who have installed CP/M on their systems with the Microsoft **Softcard Plus** system.

Microsoft Softcard Plus
System w/16K RAMcard..... **$479.88**
System w/out 16K RAMcard..... **$444.88**

NEC

JB-1205M



Here's a superior amber monitor that features smart styling with impeccable display quality: NEC's **JB-1205M**.

The 12" diagonal screen supports 40 or 80 characters by 24 lines (18Mhz bandwith), with a resolution of 900 video lines at center and 800 lines in corners. Front panel controls include on/off, brightness and contrast; recessed controls for horizontal and vertical are located in the back. The **JB-1205M** accepts composite video input (NTSC) from an RCA phone jack (a cable is not included).

We think amber is much easier on the eyes, and that this monitor has one of the best amber "tones" we've seen, neither too yellow nor too orange. The character contrast is sharp, and graphics are quite clear. It s an excellent choice for an amber monitor.

NEC JB-1205M
12" Amber Monitor **$179.88**

DC HAYES

Micromodem IIe

The world outside your computer awaits you, and the costs of admission is $249.88, complete. That's the price of the DC Hayes **Micromodem IIe**, a 300-baud modem/software package for the Apple II/II+/IIe.

The **Micromodem IIe** is an auto-dial/auto-answer type modem board that slides into one Apple slot and connects directly with your telephone line. Once installed, you can communicate at 110 or 300 baud, with a wide selection of data formats (serial, binary asynchronous; 7 or 8 data bits; 1 or 2 stop bits; odd, even or no parity,). **Micromodem IIe** accomodates pulse and Touch-Tone dialing (Bell 103 compatible), full or half duplex operations and full auto-dialing/auto-answering capability.

The Smartcom I communications package controls the modem and fully supports all the hardware features with simple commands. Smartcom I supports Apple DOS 3.3, CP/M 3.0, CP/M Plus and Pascal operating systems. Smartcom I handles auto-dial/answer; stores three phone numbers and one prefix stores the last number you dial; stores communications parameters; create sends, receives, names, lists, prints and delete files; prints files directly; creates a file directory; and transfers files to a Corvus hard disk.

The **Micromodem IIe** comes with a two-year limited warranty.

DC Hayes Micromodem IIe
With Smartcom I Software **$259.88**

Technical Sales/Orders:

(603) 881-9855

Toll Free Orders Only:

(800) 343-0726

How to Order:

All our prices include FREE UPS shipping & insurance, FOB destination. We accept all major credit cards by phone or mail, we never charge a fee, & your account is never charged until we ship. We accept certified checks, money orders and company checks by mail. We also accept CODs up to $1000, but add $10 to your order for handling. CODs are payable by certified check or money order.

We are an authorized dealer for these products to insure full warranty support. We offer a 10-day return policy on all our hardware products, & we replace defective or damaged products. Call Customer Service at (603) 881-9857 for full details.

We also have a **Computer Showroom** located in Amherst, NH, about one hour north of Boston. Take Exit 7W in Nashua, NH, go west 5.1 miles to Amherst and turn right at Paul's Way. We're Number 7 in the Ranscourt Business Center.

Write for our Catalog:

Our 40-page catalog, which lists over 100 printers and 70 Apple peripheral products (and IBM), is now available. Send $1.00 with your name, address and the type of computer you own. to:

THE BOTTOM LINE
PO Box 423
Milford, NH 03055.

HIGH TECHNOLOGY AT AFFORDABLE PRICES

THE BOTTOM LINE

MILFORD, NH 03055-0423 □ TELEPHONE (603) 881-9855

Compiled by Joyce Smith

Singing Speech Synthesiser For The 64

The *Voicebox* speech synthesizer, now available from the Alien Group for the Commodore® 64, plugs directly into the users port. It has its own speaker, built-in volume and pitch controls, and unlimited vocabulary potential. It also features a demo program, which demonstrates how easy it is to incorporate speech into your own programs.

Software included with the *Voicebox* features a machine language text-to-speech program that you can merge with your BASIC program to produce spoken English words. A similar text-to-speech program incorporates the "Alien" face, whose mouth moves in sync with the speech. A demo program of the *Voicebox's* ability to sing in tune, as well as a spelling quiz program utilizing the talking Alien face, are also included. An additional feature is also available, for an additional charge, which allows you to enter your own melodies by converting the bottom two rows of the 64 keyboard into a piano keyboard.

The *Voicebox* is available from Commodore dealers, or directly from The Alien Group, 27 West 23rd Street, New York, NY 10010, for a retail price of $95.

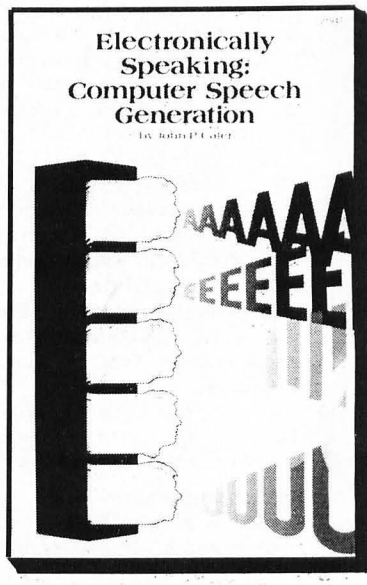
Music Business Software Introduced

Passport Designs, Inc. has added six business software packages to their catalog, specifically designed for songwriters, studio musicians, and concert or club bands.

Pickers and *Pickers* + are for singers and musicians who earn their living through studio and live performing. *Writers* and *Writers* + are for composers and songwriters who earn their living through royalties. *Tour* and *Tour* + are for both professional and amateur touring musicians and bands. All of the packages (the + versions are enhanced versions of the basic packages) help the professional musician manage his business more efficiently.

The packages are available worldwide for the Apple® II family of computers and the IBM® PC from Passport Designs, Inc., 116 N. Cabrillo Highway, Half Moon Bay, CA 94019 (415)726-0280. They retail for $99 each ($299 for the enhanced versions).

Explore Computer Speech Generation

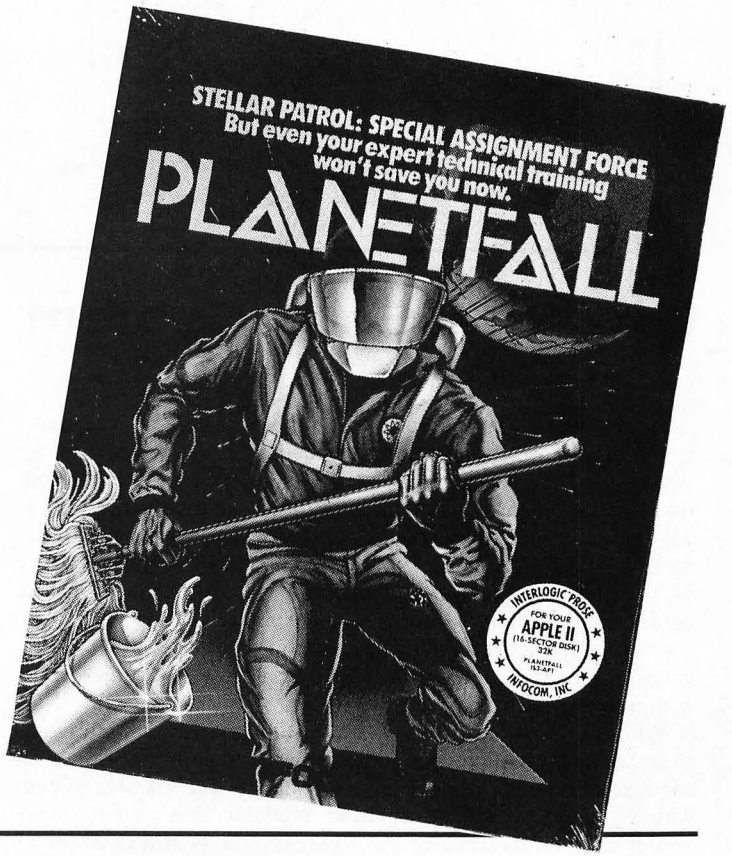


Electronically Speaking: Computer Speech Generation, by John Cater, covers the basics of generating synthetic speech with your microcomputer. Even if you have only a minimal background in electronics, this book will teach you techniques for making your computer talk to you in *any* language, with either a masculine or feminine voice. In addition, the book features flowcharts and other aids to help you write your own speech programs in BASIC, and offers advice on what to do about problem areas you might encounter. There is also a section on choosing the right hardware for your particular application, with an overview of many of the most popular speech synthesizers on the market today.

Electronically Speaking: Computer Speech Generation is published by Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, IN 46268 and carries a suggested retail price of $14.95.

Fun With Floyd

... a colorful and exciting journey to the far reaches of the galaxy



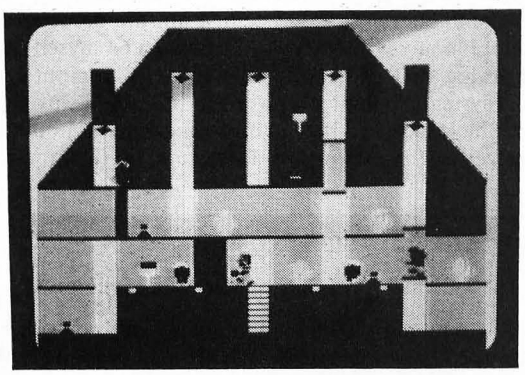
Infocom's latest entry into the interactive prose adventure field spices your colorful and exciting journey into the far reaches of the galaxy with a touch of humor. In *Planetfall*, your hum-drum life as an ensign in the Stellar Patrol suddenly takes on new meaning when you're spacewrecked on a doomed planet. Your challenge — to save this corner of the universe while maintaining a straight face. Your companion and helpmate on your adventure is a charming and mischievous robot named Floyd, whose impish personality will charm you and make you laugh.

Planetfall features Infocom's usual unique packaging concept and a 600 page vocabulary, the most complete in the marketplace. It is available, at a store near you, from Infocom, Inc., 55 Wheeler Street, Cambridge, MA 02138, for a retail price of $49.95.

Another Hit For Herrera

... theme music for each character from Tchaikovsky's "Nutcracker Suite"

Bristles™, by Fernando Herrera from First Star Software, is a four-player game in which you can choose from one of eight characters (four boys and four girls), or any combination of one-four players. The player(s) have been commissioned to paint eight different dwellings. Each player begins in the basement supply room, where he/she picks up his/her brushes and goes upstairs to begin the task at hand. As the painter/player runs around frantically, he/she encounters a variety of challenging obstacles, including the building superintendant's daughter, who occasionally puts her handprint in the wet paint.



Bristles features 48 levels, and theme music for each character, which Herrera has blended into a lively symphony using Tchaikovsky's "Nutcracker Suite."

Bristles is marketed by First Star Software, 22 East 41st Street, New York, NY 10017. It is available, both on disk and cassette, for a retail price of $29.95. A cartridge version is also available for $39.95 (Atari®), and $34.95 (Commodore®).

Low Cost Entry System

by Tim Knight

If the apparent high cost of plugging into The World Connection is keeping you from enjoying its benefits, take heart. You *can* make it affordable. Naturally, you can go the deluxe route, but don't make the mistake of thinking that's the only way to do it. Like automobiles, the higher priced equipment generally offers better performance, more features and greater convenience to the user. But less expensive, less elaborate, and simpler to operate equipment has many advantages — particularly when it gains access to the immense amount of information and services waiting for you. Smaller can be better if you don't have space near your computer for a stack of telecommunications devices.

You can spend over $5,000 for a fully-loaded personal computer, a 1200 baud modem with a timer, and subscriptions to all the networks. This is great if you want a top-of-the-line system with access to all the information available, but many people simply want an inexpensive way to access The World Connection and still enjoy the experience. You already have the computer (and if not, several for under $100 are available and will do the job nicely), so all you really need is a modem, and a number of modems for under $100 are available.

Cost-Effective Communications

You can get involved with computer communications without spending a bundle. First of all, instead of buying a completely separate device called a "modem," look at some of the smaller attachments which serve the same purpose. These are still modems, but are not quite so elaborate and separate from the computer as the modems you have probably seen. Some of them are devices which attach within your computer (such as the Micromodem for the Apple II or the Vicmodem for the Commodore 64 and Vic-20 computers). Instead of spending $300, $400 or $500 on a modem, you can spend as little as $60 for a device which performs the same task, though in a less "flashy" manner. That is, a $60 Vicmodem won't have the lights, speaker or intelligence of a Hayes Smartmodem 1200, but it still performs the same basic task of transferring information to and from a computer through the phone line.

An interesting low-cost modem made by the Microperipheral Corporation receives data at 300 baud (bits of information per second) and can operate at speeds of up to 4,800 baud. In other words, a complete video game could be downloaded to your computer in about four seconds. The unusual thing about this modem is that it requires no telephone hookup. The complete system requires a radio station to broadcast the data, which the modem receives and sends to your computer. The problem with this device is that it only receives signals, and cannot send them. However, a receive-only modem can provide access to an enormous amount of data, including news, weather or stock reports, and software. To date, a functioning system is not in operation, but Microperipheral expects to have one running in about six months. The modem only costs $69.88, and further information about this product is available from Microperipheral Corp. at 2565 152nd Avenue N.E., Redmond, WA 98052, (206) 881-7544.

Free Information Services

Another way to reduce the costs of computer communications is to avoid the expensive networks. These services, such as The Source® and Dow Jones, are excellent media for obtaining up-to-the-minute information on nearly any topic. Still, if you don't need this information, don't use the system, because a bill from one of these networks can mount up to over $500 a month. Several less pricey networks are coming on-line, and though less comprehensive, may offer just what you need. Free Bulletin Board Services and even a few free networks offer a good deal of information, personal contacts and interesting system operators, without the high costs. Try to call the free services within your local telephone calling area, since long distance calls can be expensive.

If you are new to computers or computer communications, or even if you want a computer exclusively for The World Connection, you can put together a completely independent system, capable of sending and receiving information, and acting as a computer, for only $200. This may seem like an incredibly low price for a full-fledged computer capable of communications, but it does exist, thanks to the plummeting prices of computers and peripherals. A good example of what you can do on a budget is the Commodore Vic-20 system. I am not associated with Commodore in any way (except that I own a 64 myself), and I am not suggesting that this is the only low-cost computer communications system available. However, it is a good way to see that you don't have to take a second mortgage on your house simply to get involved in the exciting world of computer communications.

Suggested Budget System

The system I have put together is as follows:

- A Commodore Vic-20 computer. This computer comes with sound, color graphics, BASIC, 4K memory, and is the first computer to sell over one million units. In addition, a large amount of software is available for it. Discounted price: $90.

● A Commodore tape recorder, used to load in the program which allows you to communicate. If you already own a cassette player, you can shave another $50 off the system price, making the whole package only $150. Discounted price: $50.

● Vicmodem, the little black box which attaches to the back of the Vic-20 and hooks up to the telephone to permit computer communications. Although it's a simple device which runs only at 300 baud, it works and comes with its own terminal program. Discounted price: $60.

The term "discounted price" is my way of saying "reasonable price," since prices vary from store to store. The "suggested retail prices" of these three items are $200, $75 and $100 respectively. However, the prices I mentioned are typical over the counter retail prices.

Commodore's Modem

For anyone who owns a Vic-20 or a Commodore 64, remember that you can buy a Vicmodem and start communicating with other computers whenever you desire. In addition to the Vicmodem and the terminal program, though, you also get a free hour on the CompuServe Information Service, as well as a free hour on the Dow Jones Information Retrieval Service. This represents quite a bargain, and is an excellent way to see some of the networks (as well as get "hooked" on them, I'm afraid).

Operating the Vicmodem is not a complicated matter. Simply call up another computer (such as a BBS or a network), wait for the signal, then plug the handset cable into the Vicmodem, connected on the back of your Commodore computer. At that point, a red light should appear, indicating the transfer of data. To send and receive the data, some kind of terminal program should be in memory, such as the Victerm I included with the package.

Working with Victerm I itself is simple. Although you can't transfer programs with Victerm (other communications packages will allow you to do this), you can perform basic receive/send data operations for things such as bulletin board services and information networks. Victerm I has several convenient features, such as:

● <CONTROL> <F3> Changes the screen background color;

● <CONTROL> <English Pound> Changes the screen border color;

● <CONTROL> <F5> Alters the character color;

● <CONTROL> <F1> Changes the color of the characters that are being sent to you by another computer. This helps to distinguish between the information being sent and the information being received.

● <CONTROL> <F4> Goes to the special options menu to change technical information the computer sometimes requires.

Using this system is easy and just as efficient as any expensive computer terminal. Of course, if you have more money, you may want to invest it in a modem with a faster baud rate, more "intelligence" or automatic operation, and a speaker so you can listen to your computer "talk" with another machine.

What Price The World Connection?

Here we have found an economical way to get involved with computer communications. In my closing columns, *I'll look* at the real price of this network revolution, along with its many benefits. Until then, keep enjoying your computer, and I hope to chat with you on the networks.

The Futurephone: A Broader View, Part IV

To recapitulate briefly, three columns back I presented the idea of the futurephone, with the caveat that, this time, I would do more than just give a pro-technologist's view of the wonderful possibilities. I then proceeded to explore those possibilities, primarily on a technological level. Two columns back I took a broader view, again a highly optimistic one, and painted a rosy picture of some of the possible benefits to our society, should a futurephone such as I had envisioned actually come into being. After a hint of near Utopia, I reminded you that another side exists, that any developing technology has implicit problems, which are overlooked all too frequently by optimistic writers.

Last time I began to explore those problems, some of them trivial, some not. Some were problems of acceptance or implementation; others concerned a possible deleterious impact on portions of our economy. This time the list of problems continues. It is not complete. Again, they range in scope and significance. The picture ultimately painted is black. But then, both positive and negative are only the two sides of the coin. What we want is the whole coin itself.

The modern telephone can cost as little as eight dollars, but the sophisticated phone equipment we've been discussing could never cost that little. Of course, given sufficient time, even the most sophisticated devices, by today's standards, become cheap. The pocket calculator is an example. One which cost $300 not too many years ago costs less than $10 today. But even so, our complete futurephone will cost much more than a handset comparable to contemporary models.

Costs of the New System

Unless you buy your own phone set, the phone company owns all the equipment. To provide the futurephone to every household would entail a huge investment. Thus, we are not likely to see a full scale home computer-phone in every house. At first, only those who could afford to buy one, or afford the higher rental rates, would be able to have such a device. That means that the universal access we've envisioned would not take place all at once, if ever.

The switching equipment in phone company offices necessary to handle the complexity of the signals, which a full implementation of our hypothetical phone would require, would be more sophisticated and complex, hence also more expensive, and hence also would raise our rates. Even today, with de-regulation, some people speculate that phone rates may triple for some users. With a full futurephone, would the rates triple again? Would anyone be willing to pay $250 to $300 a month just for phone service, not counting toll calls?

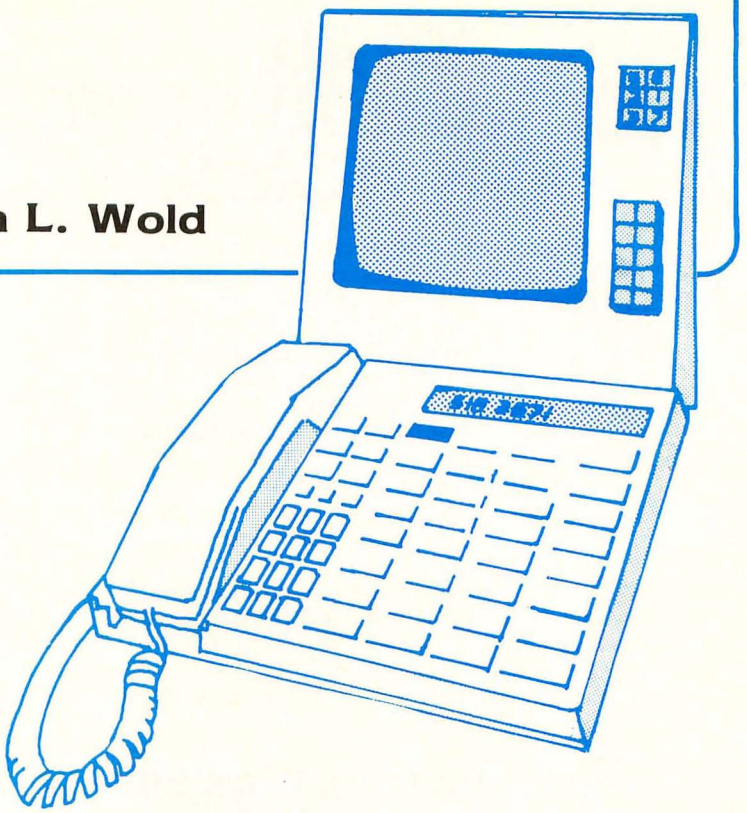
The entire copper-wire network would have to be replaced by fiber optics. The sheer size of the task of making the change would make it very expensive.

The entire copper-wire network would have to be replaced by fiber optics. While fibers are cheaper and take less room than copper wire, the existing system is vast. The sheer size of the task of making the change would make it very expensive. Also, today's telephones are easy to install and service. The new phones should plug in almost as easily, but if anything goes wrong, they would be much more difficult to repair.

Thus the cost of the investment will hinder the universal application of our new phones. It can be done, of course. The old system got installed, the new one can too. But the old one was done over the course of decades. People today are unhappy with the unspeedy installation of cable TV systems. Imagine how unhappy you'd be if you were the last one in the county to get the new phone — especially if that meant you had to continue using outmoded and expensive modes of business, commuting, and so on.

Current phones are easy to use. Five minutes will teach you how. Children pick it up without trying. Then all you need is a phone book. But the futurephone will be much more complex, if we want it to have all the facilities I've been talking about. True,

by Allen L. Wold



most people could get along with just knowing how to dial, but then they wouldn't need, or might not want, to pay for the complete futurephone. That would result in a lower over-all production and a higher price, making it less likely to be adopted universally.

Even if the futurephone is installed in every home, if the users don't know how to call information services, or do their banking and shopping, they will be unable to take advantage of these services, or will have to be taught. It would be more like learning how to drive a car — or to operate a computer (not to program one, however). People have a natural tendency to resist things that are difficult to use. That's why we see ads for one-handed electric flour sifters (no kidding). People resist new-fangled devices (except those of us who adopt them without question). Most people don't like complicated or tricky devices, if any effort is necessary to learn how to use them.

Of course, in time, such things will seem second nature. Today, the person who doesn't or can't drive a car, at least in this country, is an anomaly, someone to be pitied. In time, people will adapt to the new phones too — provided economic resistance to their speedy installation isn't too great. But that will take a while. We should not underestimate the general public's resistance to change. In the meantime, if only the rich have the futurephone, its price will remain high, keeping it out of the reach of the average consumer. That results in a slow-down in familiarity, hence resistance to adoption. That will keep the prices high, and so on in a vicious circle. France and Canada are now experimenting with installing computer terminals in place of phones in some places. To see how that turns out will be interesting.

How about people who don't know how to read? Today, the phone presents them with no problems (it does to the deaf, but our phone system largely ignores them). Illiterates, of course, need not take advantage of the whole range of the futurephone's possibilities, but they definitely would be left out. Should a futurephone system in this country require literacy to operate it? That's a difficult social question. What then do you do for residents and visitors who do not speak English? Would a system of international symbols, such as used on the highways, help? The system might have to be designed so that literacy was not required.

Accommodating users without literacy, however, leads to other compromises. How do we serve the illiterate phone shopper, especially if, in the future, all shopping is done by phone? Will that require the store to have sophisticated voice recognition software and hardware? Will banks have to do their business by voice, instead of by printing numbers and words? If we accommodate the illiterate, we cripple the system. If we don't, we disenfranchise them. You choose which is better. Teaching the illiterate would be the best solution, but we haven't solved that problem yet.

Futurephones for the Masses

Suppose that, in spite of all these obstacles and problems, some form of the futurephone does in fact come into existence. Taking a purely negative view, what might our society be like? Remember, this is only one speculation, one possibility among many, though painted deliberately dark, for the sake of contrast with the near-Utopia two columns ago.

What we find, in one possible worst case, is a highly stratified society. The futurephone is compact, semi-portable, full-featured — and very expensive. Those who can afford them reap all the benefits. Those who cannot, reap none. The Haves are better educated and better informed, which enables them to become even richer. The Have-Nots cannot qualify for high-paying jobs and positions, due to their lack of adequate education. The poor become poorer. Society becomes split, with all wealth and power going to a relative few, and nothing to the majority.

In the process of achieving this, the sense of natural superiority/inferiority, now a relatively minor facet of our society, becomes strengthened. Those who have more will wish to keep it, and shut out the less fortunate. The Have-Nots will not accept this gracefully. Strikes, riots and demands for equality will upset society unless the Haves, in the name of Law and Order, can shut them out completely — or shut themselves away in secure strongholds. It has happened before.

And the Haves will not be without guilt. Knowing, as many of them must, that they have been favored by mere chance, not inherent ability, they must either go with the rest of the Haves or seek reform. In the former case, the mental and emotional stability and well being of the Haves will be jeopardized. Concentrating purely on maintaining the status quo, and shutting out thoughts of guilt, the society will stagnate and decay.

In the latter case, the society of the Haves will be split by philosophical and political differences, as has happened so many times in the past. Revolution, unaided by the Have-Nots, is almost inevitable. Ultimately, the society as a whole will collapse.

↪

Critics of a good idea can impede its implementation by pointing out omissions, and hence calling the whole idea into question, perhaps wrongly.

The Dark Side of the Phone

It's an extreme view, of course, but no more so than the Utopia of two columns ago, though more compelling, because of its drama. Neither Utopia nor Dark Age, of course, are really likely, but something between certainly is. I haven't provided answers for the problems implied by the futurephone (as I have not provided implementations for its possible benefits). Partly this is because to try to do so would more than double the length of this series. Indeed, two whole novels, or more, could be written, one from each point of view. Also, none of my answers to the above problems would be free of error — that is, each would itself imply further problems, requiring further answers.

The answers to the darker side of this question will have to be provided by the people developing the system. It probably will not be developed in the way I envisioned it, partly because of those very problems and the compromises they will require, as well as because of technological advances I have not anticipated or included. Some of these problems will evaporate with developing technology: They just won't be there when we get to them. Some problems will require answers, hard or easy, and compromises. Others may have no solutions, thereby preventing some feature from developing at all. And as technology develops and society grows, new problems will come along. Readers may see other problems which I have missed completely.

I don't mean to imply that wonderful ideas won't come about because of problems like these. They will, and the public will demand them. But any speculation on the future of technology must take into account more than the technology itself. It must also consider public response, social inertia, economic interests, and the effects of technology on related or competing industries and systems. Failure to do so will paint only a false picture, and possibly make any problems that exist worse. No matter what the potential of any technological development, it does not exist in a vacuum. Promotion of technological advance is not served by half-blind optimism. Critics of a good idea can impede its implementation by pointing out omissions, and hence calling the whole idea into question, perhaps wrongly.

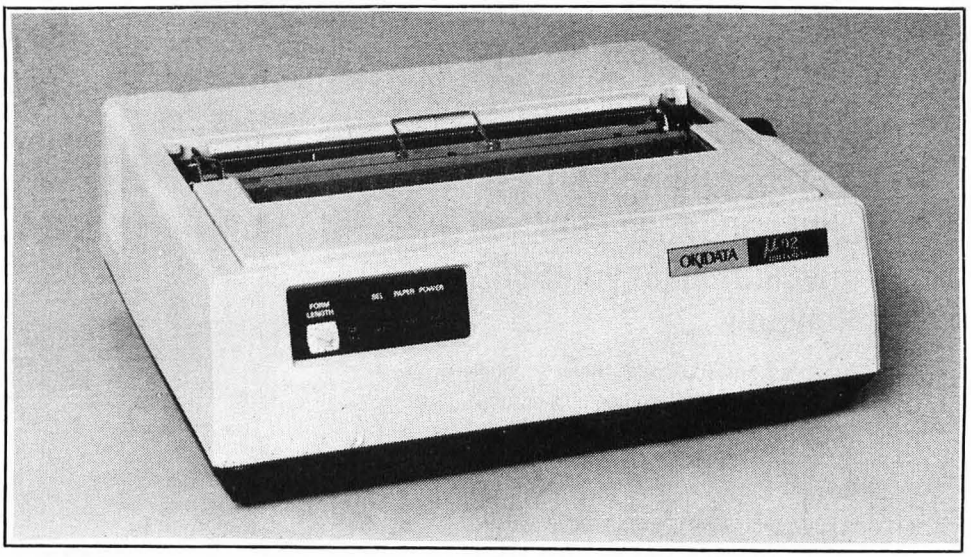
Neither is the possibly just criticism of such advances helped by half-blind pessimism. Proponents can force through adoption of faulty ideas by failing to consider the inherent problems. An open-minded analysis might prove the idea invalid, or help solve the problems in a flawed but otherwise sound idea.

The futurephone is only one such idea. But the principles of "future studies" remain the same, whether it is that, or computerized traffic control and automobiles, computerization of the home, telecommunications on another level, military modeling, home security systems, educational procedures, or whatever. A narrow perspective, positive or negative, can only give a false picture. The only true way to evaluate developments in technology, politics, or anything else, is to take the broader view.

Hard Facts on Hard Copy

OKIDATA

Microline 92



We've seen plenty of printers pass through our warehouse, but few of them are as deserving of praise as the **Microline 92** (80 columns) or the **Microline 93** (136 columns). This assesment comes in part from our own experience, but it's based largely on the experience of customers, who've used the **Microline 92** and **93** for word processing, business and scientific programs. They endorsed the printer the best way possible: by telling their friends and associates about it. This "word-of-mouth" advertising proved more powerful than any ad we've produced, and it made the **Microline 92** our Number One Best Seller in 1983.

Technically, the **Microline 92** and **93** are quite up-to-date. They print at 160 characters per second at 10 characters/inch (pica/draft mode), with bi-directional and short-line seeking head action to optimize mechanical motion. They also have 12 characters/inch (elite) and 17 characters/inch (condensed), and all fonts have a corresponding double width (for example, 10 characters/inch doubles down to 5 characters/inch, 12 cpi to 6 cpi, and 17 cpi to 8.5 cpi). You can double-strike all the fonts for extra dark copy, or boldface them (a double-strike shifted 1/120") through software.

There's also a correspondence-quality font that has earned great praise. This font is distinctly different from the others with the characters designed to resemble typewriter or daisy-wheel type characters (see the example below). The "near letter-quality" font can be used for all but the most demanding

DRAFT MODE

CORRESPONDENCE MODE

sort of correspondence: purchase orders, invoices, packing lists, bills, letters, reports and inter-office notes for example.

Dot-addressable graphics (also called bit-mapped graphics) are also standard on the **Microline 92** and **93**. The 60 horizontal by 72 vertical dots per inch (120 by 144 double-strike mode) produces sharp graphic output for logos, charts, graphs, drawings or your own personal doodles.

Paper handling is easy and convenient. Both printers have a bottom feed slot as well as a rear paper path. The **Microline 92** has both friction and pin feed. It can take single sheets or standard 9½" pin-fed paper. Optional paper handling accessories for the **Microline 92** include an adjustable tractor feed and a roll paper holder. The **Microline 93** comes standard with both friction feed and an adjustable tractor (sorry, no roll holder option is available) that accepts up to 14⅞" data processing paper. Both units accept up to 4-part forms (the original plus three copies).

The **Microline 92** or **93** comes standard with an 8-bit Centronics compatible parallel interface. A standard 2K printing buffer can also be used for downloading special or customized character sets. An optional RS-232C interface (serial) with 2K is also available. It accepts 7 or 8 bit data from 110 to 9600 baud, with odd, even or no parity. Protocols include Okidata SIMPLE BUSY and SIMPLE ACKNOWLEDGE, Centronics RS-232, Centronics UNBLOCKED, DEC Duplex and Local TEST.

On top of all this, there is yet another option: **PC Plug-n-Play ROMs**. These ROMs will turn your **Microline 92** or **93** into an IBM-PC printer with graphics. You can install the **92** or **93** on ***any*** program that has an IBM-PC printer with dot and block graphics...meaning every PC program made. This option expands the compatability of the **Microline 92** and **93**, yet it's simple to switch back to Okidata dot graphics by replacing the original ROMs. Easy.

Warranty repairs are even easier. Now you don't have to worry about "who fixes it." Okidata has contracted with Xerox to provide national warranty service on all Okidata printers. You can find a Xerox Service Center in nearly every major U.S. city (as well as some minor U.S. cities). Call **(603) 881-9855** for the name and number of the Xerox Service Center nearest you. All warranty work can be handled by your Xerox Service Representative, and you can also arrange service contracts for after-warranty work. Or, if you like, take advantage of our own ***Extended Warranty Plan***: we cover all parts and labor after the manufacturer's standard 90 day warranty for an additional 275 days, giving you a full year of coverage. It costs only $39.88 extra for the **Microline 92** and $49.88 for **Microline 93**.

Call **800-343-0726** for prices on all items mentioned in this ad. If you need more technical details, call **(603) 881-9855** and ask for Technical Sales.

Clean up the computer clutter.

For less than $250 you can make your investment in yourself pay off!

Chances are you have spent a couple thousand dollars on setting up a computer system that gets a lot of your work done. But sometimes it gets to be work to work at it.

I know that when I have to move two program manuals and a pencil holder to boot up the disk drive, it is work. When there is an unlabeled floppy (that I am going to identify some day) on top of the monitor and the business checkbook is on top of the printer . . . *and I will* remember (I hope) before the next "report" comes through . . . that is work.

MICRO-OFFICE WORK CENTER

I found the annoyance of my own "computer clutter" was even worse than the extra work the disorder created. And that is when I started looking for some practical furniture for my computer set up. Since I had already spent a lot of money on the system itself, I was really dismayed when I found out how much it would cost to get a *decent-looking* desk or even a data table for my equipment. $400 . . . $500 . . . even more for a sleasy unit that looked like junk! In fact, it was junk! And it took a long time for me to find something that was really worth the money . . . and more.

A lot of my working day is spent with my computer, and I will bet a lot of your time is too. So I figure a "home" for my system—a housing that is good looking as well as efficient to work at—will pay off two ways:

1. Less work: an efficient and orderly layout will save me time and energy.
2. Personal satisfaction: good quality furnishings look better; they just plain feel better to work at too.

So imagine how good I felt to find the "Micro-Office" Work Center! These are fine pieces of computer system furniture that make my office-at-home as pleasant a place to work as it ought to be. And the biggest and best surprise is the low, low price for such good quality.

Here is what you get—all for only $249.50 plus shipping.

- Mar-resistant work surface. Your choice of oak or walnut grained. Work surface height is adjustable to your keyboard, your chair, your height.
- Two shelves plus work surface extender. Both shelves tilt to lock in position so that monitor faces you—in a position that does away with screen glare squinting and neck craning forever. Retainer bar keeps equipment from sliding off shelf. Snap-in bookends hold reference manuals and programs.
- Strong, sturdy and steady. All-steel welded frame construction is concealed by top-quality wood grain surfaces with finished trim. Adjustable floor levelers included. The work center is really a piece of fine furniture.
- There is no risk in buying from us either. We will make a full refund of purchase price **plus shipping** charges if you return the **workcenter within 30 days for any reason whatsoever. In addition,** the product is warrantied for any defects in materials or construction for a full year from date of purchase. This is a no-risk investment in your own productivity and work efficiency that will pay off for years to come—even if you do not yet have a microcomputer of your own.
- Take your choice for your own work center decor:

Order 48-inch unit in walnut, #2KP0-945, or in oak, #2KP0-947. Only $249.50 for each unit plus $20.00 shipping charge. On orders for two or more units at the same time, shipping charge applies to only the first unit ordered. Shipment made UPS, so we cannot ship to post office box. Illinois residents please add $15 per unit sales tax. Please allow 10 extra days for personal checks to clear. Sorry—at these special offer prices we cannot ship c.o.d. or bill direct.

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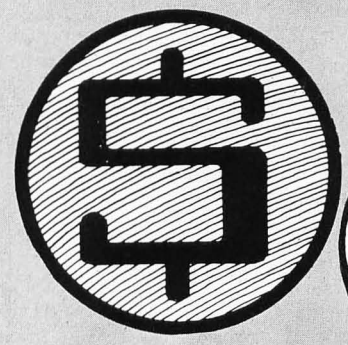
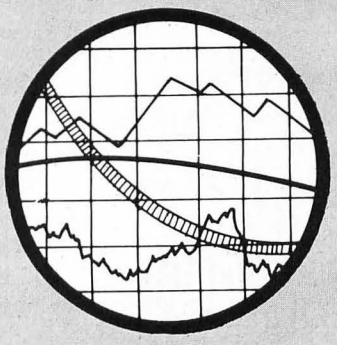
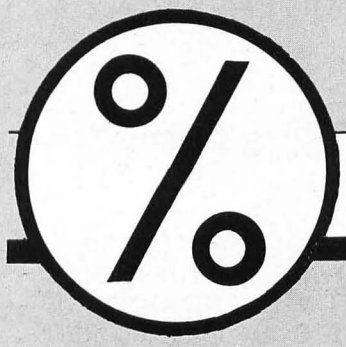


CALC SIDE



by David Peters



The VisiCalc® Spreadsheet Comes Home

Forecasting Future Earnings...

One nice thing about January is that it is much harder for well-meaning people to tell you to "get away from that machine and get some fresh air." If the people that surround you are heckling for your presence somewhere else for other reasons, however, here's a good activity for this particular month — a model that can forecast your earnings for the year, and provide you with an outlook against which to plan expenditures.

It is particularly useful if you have several different sources of income, or if your income fluctuates from month to month. Regulating expenditures to prevent becoming over-extended can be difficult.

The first step is to create a forecast. Your particular situation dictates on just what it will be based. It could be past years' patterns, commission records, or whatever type of data applies to your situation.

If you have other income such as dividends from stocks or bonds, interest income (like savings accounts), rents, any income in addition to your main sources, these should all be listed with the amount estimated each month.

In the model, the sources of income are listed in vertical columns by month. The actual amounts are then entered in the next column as payments are received, a monthly task.

Our Family's Forecast

Take a look at our illustration. This family has several different forms of income. The husband has a basic salary from a full-time job. He also writes articles for magazines, and reckons to be paid for at least two a month. His wife, Mary, works part-time and irregularly. They have a cabin in the country that they sometimes rent, and they get some miscellaneous dividend income. All their expectations are entered for the full year, and the model set up to receive the monthly tracking on the actual receipts.

As you can see (Fig. 1), it is completed through the end of May. Since it is maintained in the first week of each month, it is possible for a late receipt to throw the figures off — but late checks do that anyway, right?

They did not rent the cabin in January, so the CUME goes negative, and you can see it takes a bit of time to make that up! There was an unexpected salary increase in May, and, of course, the June outlook figure was up-dated right away.

How the Model Manages It

The model manages the forecasting quite simply. The columns for ESTIMATED and ACTUAL are totalled and then compared on the line called SUMMARY. The results of the month appear as a simple subtraction. CUMM SUMM (cumulative summary) carry forward the comparison from month-to-month.

The running totals for Estimate and Actual amounts are kept in CUMM TOTAL. The previous month's CUME is added to the Estimated for the current month. Finally, and perhaps most useful, are the monthly and yearly indices. These will show how far off your estimates are from the monthly and year-to-date totals.

Those of us not yet acquainted with the more advanced features of spreadsheet programs will appreciate the fact that there are no difficult formulas used in this model. The primary function required is @SUM!

Figure 1:

INCOME FLOW FORECASTER 1984

JANUARY

SOURCE	ESTIMATED	ACTUAL
SALARY	1500.00	1500.00
MAGAZINE 1	250.00	250.00
MAGAZINE 2	300.00	300.00
MARY INCOM	995.00	1095.00
CABIN RENT	400.00	0.00
DIVIDEND	100.00	55.00
TOTAL	3545.00	3200.00
SUMMARY		-345.00
CUMM SUMM		-345.00
CUMM TOTAL	3545.00	3200.00
INDEX/MO		0.90
INDEX YTD		0.90

FEBRUARY

SOURCE	ESTIMATED	ACTUAL
SALARY	1500.00	1500.00
MAGAZINE 1	250.00	350.00
MAGAZINE 2	300.00	350.00
MARY INCOM	995.00	1095.00
CABIN RENT	400.00	400.00
DIVIDEND	100.00	100.00
TOTAL	3545.00	3795.00
SUMMARY		250.00
CUMM SUMM		-95.00
CUMM TOTAL	7090.00	6995.00
INDEX/MO		1.07
INDEX YTD		0.99

MARCH

SOURCE	ESTIMATED	ACTUAL
SALARY	1500.00	1500.00
MAGAZINE 1	250.00	250.00
MAGAZINE 2	300.00	300.00
MARY INCOM	995.00	1012.00
CABIN RENT	400.00	200.00
DIVIDEND	100.00	100.00
TOTAL	3545.00	3362.00
SUMMARY		-183.00
CUMM SUMM		-278.00
CUMM TOTAL	10635.00	10357.00
INDEX/MO		0.95
INDEX YTD		0.97

APRIL

SOURCE	ESTIMATED	ACTUAL
SALARY	1500.00	1500.00
MAGAZINE 1	250.00	0.00
MAGAZINE 2	300.00	600.00
MARY INCOM	995.00	995.00
CABIN RENT	400.00	800.00
DIVIDEND	100.00	150.00
TOTAL	3545.00	4045.00
SUMMARY		500.00
CUMM SUMM		222.00
CUMM TOTAL	14180.00	14402.00
INDEX/MO		1.14
INDEX YTD		1.02

MAY

SOURCE	ESTIMATED	ACTUAL
SALARY	1500.00	1750.00
MAGAZINE 1	250.00	250.00
MAGAZINE 2	300.00	300.00
MARY INCOM	995.00	995.00
CABIN RENT	400.00	400.00
DIVIDEND	100.00	100.00
TOTAL	3545.00	3795.00
SUMMARY		250.00
CUMM SUMM		472.00
CUMM TOTAL	17725.00	18197.00
INDEX/MO		1.07
INDEX YTD		1.03

JUNE

SOURCE	ESTIMATED	ACTUAL
SALARY	1750.00	0.00
MAGAZINE 1	250.00	0.00
MAGAZINE 2	300.00	0.00
MARY INCOM	995.00	0.00
CABIN RENT	400.00	0.00
DIVIDEND	100.00	0.00
TOTAL	3795.00	0.00
SUMMARY		-3795.00
CUMM SUMM		-3323.00
CUMM TOTAL	21520.00	18197.00
INDEX/MO		0.00
INDEX YTD		0.85

---CONTINUED DOWN TO DECEMBER.

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Setting The Model Up

First set the column width to /GC10 and all locations to dollars with /GF$. The total for each month is a simple @SUM; but, in order to provide for the negative amounts in the SUMMARY (if the Actual Total is less than the Estimated Total), the formula in must be expressed as "minus ESTIMATED plus ACTUAL".

The INDEX(MO) and (YTD) are useful for trend indications without having to plot the date. They are derived by dividing the actual totals each month by the estimated totals. Thus a figure of less than 1.00 tells you at a glance that actual receipts are less than estimate. Use TOTAL amounts for INDEX(MO) and CUMM TOT amounts for INDEX(YTD).

The at-first-sight distressing negatives in June in our illustration are, of course, the result of having no actuals yet. If they are too distressing, then an @IF statement could have been used in this location in each month to enter a zero if there were no actuals yet filled in. The formula would be:

IF(TOTAL=0,0,TOTAL)

The months can be set up in a two across by six down format to facilitate printing. Set the order of recalculation to ROWS to avoid a mandatory Recalc.

The real utility of this model is the facility for analysis and control that comes from consolidating the various incomes. Also, the ability to look ahead at your expectations can give valuable guidance at tax time. If a major expenditure is planned, then, at a glance, you can see when you might be able to afford it.

Another Entry For Your Utility Disk

Last month, we talked about the usefulness of having a utilities disk, and gave you a couple of useful models to include on it. ...with another very useful tip, especially for those who do a lot of financial forecasting work. Ellen Javitz writes: "I have to make a variety of models but they all need the same thing at the outset: the months across the top and a Total column. I have set up several different column width models with a variety of headers. I have four character wide columns with just the initial of the months (J,F,M,A,M, etc.). I have a three letter format (Jan, Feb, Mar, etc.). I have, of course, the full names, too; and, in addition, I have them *all* set up as DIF files, so that if I am to bring them into a model anywhere other than the top I can do so."

Thanks, Ellen, and any of you who have other interesting ideas or tips, just drop me a line care of ***SoftSide.***

SoftTakes

Financial Operating System

by J. M. Keynes

The $10,000,000 Formula

The news of Henry's death engendered mixed emotions for me. I knew him for ten years. He was a tight-fisted, old curmudgeon whose only apparent joy in life was making money, and, he made it all between 8 am and Noon (E.S.T.) trading commodities. I had heard his fortune estimated at ten to 20 megabucks. I had no interest in his money, but I was fascinated by his uncanny ability to predict the daily high and low of several commodities *before the market opened!* He succeeded at something that many have tried but few have conquered: *Day Trading.*

Day trading is simply doing your buying and selling during the same day. On a given day the difference between the high and low of active markets like Silver, Gold, T-Bills, Soybeans and Swiss Francs may be as much as several thousand dollars. Look at the commodity futures quotes and think of the fun you could have if you could predict the daily market high and low with an accuracy of .01 percent. Furthermore, you would never be subject to being on the wrong side of a market when there was a "Limit" move against you. Most commodity futures have a maximum amount of price change that can occur in one trading day. (e.g., Soybeans can rise or fall in price a maximum of thirty cents/bushel each day.) A contract is 5000 bushels and a thirty cent move translates into $1,500. There are some times when one is trapped and can't get out. Let's say you bought one contract of Beans at $6/bushel. If some very bearish news came out after the market closed, the following day the "Longs" (those who had bought), would all be trying to get out. If no one wanted to buy at $5.70, there would

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Figure 1. Sample worksheets covering up to three month's trading in 1982.

C	DATE	P/L1	COMMENTS	OPEN	HI1	LO1	CL1	S2	S1	B1	B2
BEANS	05/04/82	45	BUY 2	677.00	678.75	672.75	676.25	685.75	682.00	676.00	673.75
SEPT.	05/07/82	-80	SELL 1	667.00	670.50	666.75	669.75	672.50	669.00	663.50	661.50
	05/10/82	145	BUY 2	668.00	669.00	663.75	668.75	672.75	671.25	667.50	665.25
	05/11/82	-340	SELL 1	672.00	678.50	670.50	678.25	672.42	670.58	665.33	661.92
	05/13/82	-250	BUY 1	675.00	676.00	670.00	670.25	682.08	679.92	674.67	671.58
	05/14/82	-280	SELL 2	673.00	682.00	672.50	677.75	678.08	674.17	668.17	666.08
	05/17/82	260	SELL 1	678.00	685.00	675.00	676.50	686.92	682.33	672.83	667.92
	05/19/82	-30	SELL 2	681.00	684.00	678.75	682.25	683.75	681.50	675.50	671.75
	05/21/82	155	BUY 2	679.00	684.50	677.00	681.25	685.25	683.25	680.00	678.75
	05/24/82	-200	BUY 1	678.00	679.25	673.25	674.74	687.88	684.57	677.87	674.48
	05/25/82	-240	BUY 1	674.00	676.75	668.00	668.54	681.75	678.24	672.24	669.75
	05/27/82	180	BUY & SELL 1	669.00	670.50	662.25	666.25	674.58	670.42	662.17	658.08
	06/01/82	660	BUY 2	643.00	643.00	630.75	633.75	661.25	653.50	641.50	637.25
	06/04/82	230	BUY 1	633.50	642.00	628.25	635.50	647.17	640.33	629.83	626.17
	06/07/82	-290	SELL 1	637.00	648.00	631.50	647.25	649.00	642.25	628.50	621.50
	06/08/82	230	SELL 1	644.00	653.00	643.50	647.75	658.75	653.00	636.50	625.75
	06/14/82	-480	BUY 1	651.50	652.00	641.00	642.75	665.83	662.67	653.67	647.83
	06/15/82	285	BUY 1	642.50	645.50	637.25	645.00	656.25	649.50	638.50	634.25
	06/21/82	1,020	BUY 2	630.50	642.50	621.50	640.50	637.33	635.17	630.67	628.33
	06/23/82	310	BUY & SELL 1	645.00	648.50	638.50	647.50	650.50	647.50	640.50	636.50
	06/25/82	-90	BUY 1	641.50	645.00	639.50	640.50	652.25	648.00	641.50	639.25
	06/28/82	-265	BUY 1	638.00	638.50	632.25	633.50	647.17	643.83	638.33	636.17
	06/29/82	70	SELL 1	633.50	638.00	631.50	635.00	641.00	637.25	631.00	628.50
	06/30/82	-240	BUY 1	629.00	632.00	622.50	624.50	641.33	638.17	631.67	628.33
	07/06/82	-190	BUY 1	616.00	617.00	609.50	610.50	631.83	624.67	613.67	609.83
	07/07/82	10	BUY & SELL 1	609.00	615.25	605.50	608.50	619.83	615.17	607.67	604.83
	07/08/82	-290	SELL 2	613.00	620.00	610.50	619.00	619.50	614.00	604.25	600.00
	07/09/82	220	SELL 2	622.00	628.00	620.25	621.75	626.00	622.50	613.00	607.00
	07/12/82	250	SELL 1	624.00	627.75	619.50	620.75	631.08	626.42	618.67	615.58
	07/13/82	480	BUY 1	620.00	632.00	617.50	630.00	630.58	625.67	617.67	614.58
	07/15/82	-15	BUY 1	625.00	630.00	620.25	622.75	635.42	630.33	622.33	619.42
	07/21/82	-40	BUY 1	622.50	629.00	619.00	622.50	624.67	621.83	614.33	609.67
	07/22/82	85	BUY 1	620.00	623.50	617.00	620.50	633.50	628.00	618.00	613.50
	07/23/82	-15	SELL 1	624.00	626.00	620.50	623.50	626.83	623.67	617.17	613.83
	07/26/82	-80	BUY 1	619.00	619.50	615.00	618.25	628.83	626.17	620.67	617.83
	07/27/82	145	SELL 1	617.00	620.50	616.50	617.50	622.08	620.17	615.67	613.08
	07/28/82	345	OPENED TOO LO	614.00	614.50	606.00	606.50	622.17	619.83	615.83	614.17
	07/29/82	170	BUY 1	602.00	611.00	599.50	607.75	617.50	612.00	603.50	600.50
	08/04/82	50	BUY 1	608.50	613.75	606.25	610.25	616.17	613.33	608.83	607.17
	08/05/82	-240	BUY 1	603.00	604.50	600.00	600.75	617.58	613.92	606.42	602.58
	08/09/82	-80	BUY 1	584.00	588.00	580.50	583.25	599.92	594.83	586.83	583.92
	08/16/82	760	BUY & SELL 1	569.00	570.00	553.25	554.00	573.08	569.67	563.67	561.08
	08/18/82	330	OPENED TOO HI	570.00	572.00	566.00	570.25	566.83	563.67	554.67	548.83
	08/19/82	10	BUY 1	565.00	569.00	563.00	564.50	575.42	572.83	566.83	563.42
	08/20/82	-15	BUY 1	569.00	571.00	565.00	568.50	571.50	568.00	562.00	559.50
	08/23/82	-255	SELL 2	567.50	577.00	565.75	574.50	574.17	571.33	565.33	562.17
	08/24/82	-305	SELL 1	577.00	581.00	577.00	578.75	583.67	579.08	567.83	561.17

sum	815	Total new P/L after commission.	BEANS	Range
minimum	-660		Low.....	554.00
maximum	1,020		High.....	682.25
mean	17.340426	Ave P/L per trade after commission.		

Somewhere out there is a computer/ arithmetic master-mind who can crack that code.

FOS, ***continued***

be no trading, and you might be obliged to wait another day ($1500 or so) to get out. Henry never worried about limit moves as he never went home with any position. He was content to "Scalp" the markets for what he termed "Lunch Money." There are those who would consider $10 million fancy lunch money. I should mention that it took him 40 years to do it. Most of you reading this don't have 40 years left, but I'd guess you would settle for somewhat less than ten million!

Several years ago I did Henry a great favor. He promised to give me his formula . . . after he died. He loved to brag, and one day he showed me his work sheet which covered about three months trading in 1982. "Here is a Xerox copy . . .," he teased, "Read it and weep!" Fig. 1 is a reproduction of it. The only clue he gave was that his calculations were solely derived from the previous day's trading data, all of which is contained in the Wall St. Journal every day. The only possible variables must be *Open, High, Low,* and *Close.*

I scratched my old gray head for a few days, but was unable to discover the formula. Linear regressions and standard deviations are over my head. Besides, Henry was 79 years old and he couldn't last forever — and he didn't! His wife told me Henry dropped dead one afternoon while totaling up his profits for the day. His death was unfortunate . . . the fact that the old gent failed to leave the formula to me, as he promised, was tragic. His wife said he never would disclose it to his family.

He disclosed the strategy, but not the formula for computing B1, B2, S1, S2, (see Fig. 1). I can tell you the strategy which, of course, is worthless without the formula.

- If the market opens between B1 and S1, they become your action points to buy or sell. If the market moves to B2 or S2 you add another position and place an order to liquidate at a point which would cause a loss of $1000 or at the market on the close.
- If the market opens between B1-B2 or S1-S2 you buy or sell only one contract and

SILVER DEC,	05/04/82	970	BUY 1	740.00	750.00	739.00	747.80	758.90	753.80	743.80	738.90
	05/07/82	-1,080	BUY 2	744.00	744.00	723.00	734.50	749.67	745.33	737.33	733.67
	05/10/82	-290	BUY 1	726.00	729.00	715.50	718.50	754.83	744.67	723.67	712.83
	05/12/82	5	BUY 2	721.00	723.00	719.50	721.50	726.83	725.17	721.67	719.83
	05/13/82	-390	BUY 2	721.00	722.00	713.50	715.50	724.83	723.17	719.67	717.83
	05/14/82	-780	SELL 2	718.00	732.50	717.50	730.30	725.50	720.50	712.00	708.50
	05/17/82	-230	BUY 1	731.00	731.00	716.00	717.20	741.77	736.03	721.03	711.77
	05/19/82	330	SELL 1	727.00	728.00	720.50	721.60	731.07	727.13	717.13	711.07
	05/21/82	35	BUY 1	720.00	722.50	718.00	721.50	730.93	728.37	721.87	717.93
	05/25/82	140	BUY 2	700.00	705.00	698.00	701.20	707.37	704.73	700.23	698.37
	05/26/82	780	SELL 1	703.00	706.00	681.00	688.20	708.40	704.80	697.80	694.40
	05/31/82	-880	BUY 2	680.00	681.00	667.00	667.50	692.37	687.73	678.23	673.37
	06/02/82	160	SELL 1	643.00	653.50	643.00	649.30	661.37	653.23	638.73	632.37
	06/03/82	-1,080	BUY 2	649.00	649.00	625.00	632.20	659.10	654.20	643.70	638.10
	06/07/82	-540	SELL 1	638.00	668.00	632.00	660.50	644.50	636.50	622.00	615.50
	06/10/82	1,010	BUY 1	623.00	643.00	621.00	642.80	649.83	639.67	622.67	615.83
	06/15/82	20	BUY 1	588.00	599.00	576.00	581.10	635.93	613.87	579.87	567.93
	06/18/82	330	BUY 1	555.00	556.50	539.05	547.70	571.13	560.27	540.27	531.13
	06/22/82	620	SELL 2	538.00	555.00	535.00	539.60	550.33	541.67	517.67	502.33
	06/24/82	585	SELL 1	565.00	567.00	546.00	552.50	571.50	565.00	547.00	535.50
	06/28/82	1,350	BUY 2	548.00	577.00	542.00	572.00	562.37	557.73	547.73	542.37
	06/30/82	160	SELL 1	644.00	650.00	619.00	640.60	657.67	639.33	585.33	549.67
	07/01/82	310	BUY 1	620.00	632.00	608.00	627.00	667.53	654.07	623.07	605.53
	07/07/82	960	BUY 1	589.00	610.00	580.00	605.80	641.40	619.80	585.80	573.40
	07/08/82	860	OPENED TOO HI	640.00	648.00	623.00	646.80	628.60	617.20	587.20	568.60
	07/09/82	550	OPENED TOO HI	681.00	685.00	658.00	675.80	664.27	655.53	630.53	614.27
	07/13/82	-1,080	SELL 2	675.00	693.00	670.00	690.60	688.93	673.87	648.87	638.93
	07/15/82	-240	BUY 1	690.00	692.00	664.00	668.60	707.87	694.73	672.73	663.87
	07/20/82	4,400	BUY 2	683.00	728.00	679.00	726.70	703.13	697.27	685.27	679.13
	07/21/82	1,650	SELL 1	738.00	759.00	700.00	719.70	760.23	743.47	694.47	662.23
	07/26/82	1,810	BUY 1	735.00	772.00	730.00	768.60	777.67	767.33	744.33	731.67
	07/28/82	-560	BUY 1	740.00	744.50	704.80	704.80	776.93	765.87	745.87	736.93
	07/29/82	-1,080	BUY 2	710.00	712.50	660.00	682.50	757.73	731.27	691.57	678.33
	08/02/82	-115	SELL 1	718.00	739.50	718.00	738.50	736.97	709.73	658.03	633.57
	08/03/82	-680	BUY 2	730.00	741.50	712.00	717.50	752.97	745.73	725.03	711.57
	08/05/82	-170	BUY 1	714.00	718.50	699.00	711.40	755.50	745.00	715.50	696.50
	08/10/82	-215	BUY 1	670.00	674.00	642.00	645.00	689.33	673.67	648.67	639.33
	08/11/82	490	BUY 1	640.00	648.00	632.00	642.50	685.67	665.33	633.33	621.67
	08/16/82	-1,080	SELL 2	657.00	690.00	655.00	662.40	674.00	659.00	634.00	624.00
	08/19/82	3,300	BUY 2	725.00	758.20	707.00	749.20	735.67	730.93	716.73	707.27
	08/20/82	360	OPENED TOO HI	797.00	797.20	774.00	797.00	789.33	769.27	718.07	686.93
	08/23/82	-640	SELL 1	810.00	833.00	786.00	822.00	810.33	803.67	783.67	770.33
	08/24/82	2,345	SELL 1	834.00	852.00	785.00	795.00	860.67	841.33	794.33	766.67

sum	12,400	Total new P/L after commission.	SILVER Range
minimum	-1,080		Low..... 539.60
maximum	4,400		High..... 822.00
mean	288.37209	Ave P/L per trade after commission.	

GOLD DEC	05/04/82	120	BUY 1	369.50	371.00	366.50	370.10	379.93	376.27	368.47	364.33
	05/07/82	360	BUY 1	359.80	360.50	352.00	357.90	364.93	360.87	353.87	350.93
	05/10/82	-70	BUY 1	353.00	353.80	350.60	352.70	365.30	361.60	353.10	348.30
	05/11/82	-200	SELL 1	356.00	358.50	354.00	357.60	355.57	354.13	350.93	349.17
	05/13/82	50	BUY 2	355.00	356.30	353.80	355.40	358.93	357.87	355.37	353.93
	05/14/82	30	SELL 1	355.40	363.00	355.20	361.90	369.67	362.53	351.03	346.67
	05/18/82	-280	SELL 1	359.00	364.50	359.00	364.10	365.10	361.70	356.20	354.10
	05/19/82	150	SELL 1	367.00	367.50	364.70	365.10	368.03	366.07	360.57	357.03
	05/20/82	240	BUY & SELL 1	366.00	367.00	363.80	366.30	368.57	366.83	364.03	362.97
	05/21/82	-560	BUY 2	365.00	365.00	357.00	358.90	368.90	367.60	364.40	362.50
	05/25/82	230	BUY & SELL 1	348.00	352.50	348.00	351.00	353.37	351.73	348.23	346.37
	05/26/82	670	BUY & SELL 1	352.00	353.00	345.00	345.90	355.00	353.00	348.50	346.00
	05/31/82	-230	BUY 2	345.80	347.00	342.00	343.00	350.50	349.00	345.00	342.50
	06/01/82	-330	BUY 2	340.50	340.50	336.70	338.10	349.00	346.00	341.00	339.00
	06/02/82	480	SELL 2	339.50	342.40	337.50	341.00	342.23	340.17	336.37	334.63
	06/03/82	-80	BUY 1	343.00	343.00	335.00	337.90	345.20	343.10	338.20	335.40
	06/10/82	90	BUY 1	348.00	349.00	344.80	347.80	352.33	350.37	346.57	344.73
	06/11/82	310	BUY 1	344.50	349.00	344.10	348.10	351.40	349.60	345.40	343.00
	06/15/82	-290	OPENED TOO LO	332.00	336.50	332.00	335.90	343.20	340.30	335.50	333.60
	06/21/82	-30	OPENED TOO LO	316.00	321.00	311.50	319.70	329.80	326.60	321.60	319.80
	06/22/82	1,660	SELL 2	321.00	327.50	315.50	316.40	326.90	323.30	313.80	307.90
	06/24/82	650	SELL 1	328.50	331.00	322.00	322.60	333.03	329.57	319.57	313.03
	06/28/82	700	BUY & SELL 1	321.70	330.00	320.60	329.30	329.83	327.67	322.67	319.83
	06/29/82	-120	SELL 1	328.50	335.50	325.00	333.40	336.03	332.67	323.27	317.23
	06/30/82	400	SELL 1	335.00	338.50	331.00	333.20	341.80	337.60	327.10	320.80
	07/01/82	220	BUY 1	329.00	331.90	327.60	331.60	341.73	337.47	329.97	326.73
	07/05/82	80	BUY 1	333.00	333.00	328.50	330.00	334.67	333.13	328.83	326.07
	07/07/82	380	BUY 1	324.50	328.50	322.50	328.10	332.40	329.20	323.90	321.80
	07/08/82	-1,080	SELL 2	330.00	341.50	329.00	339.50	332.37	330.23	324.23	320.37
	07/09/82	-1,080	SELL 2	341.50	364.50	341.50	363.30	349.17	344.33	331.83	324.17
	07/13/82	-1,080	SELL 2	362.00	378.00	360.00	375.70	367.93	363.37	354.87	350.93
	07/14/82	50	BUY 1	373.00	375.50	364.00	365.30	389.23	382.47	364.47	353.23
	07/15/82	10	BUY 1	368.50	372.00	358.00	361.50	379.77	372.53	361.03	356.77
	07/21/82	1,070	SELL 1	381.00	385.30	369.00	371.50	389.57	382.63	365.13	354.57
	07/23/82	380	SELL 1	381.00	383.00	371.00	376.00	380.17	377.33	369.33	364.17
	07/26/82	70	BUY 1	369.00	371.00	363.00	370.10	388.67	382.33	370.33	364.67
	07/27/82	120	BUY 1	365.00	369.90	362.50	366.70	376.03	373.07	365.07	360.03
	07/28/82	-600	BUY 1	360.00	362.00	351.50	353.40	373.77	370.23	362.83	358.97
	07/29/82	200	BUY 1	355.50	356.80	347.00	351.70	366.13	359.77	349.27	345.13
	08/04/82	-50	SELL 1	356.80	364.40	356.20	363.10	368.00	363.00	355.00	352.00
	08/05/82	-170	BUY 1	359.00	359.50	354.00	356.80	369.43	366.27	358.07	353.03

	08/06/82	410	SELL 1	356.50	359.80	354.80	355.50	362.27	359.57	354.07	351.27
	08/16/82	370	SELL 2	348.00	357.50	347.20	348.40	352.03	348.47	342.87	340.43
	08/19/82	1,950	BUY 1	366.00	386.00	365.00	384.50	375.97	372.47	364.97	360.97
	08/20/82	310	BUY 1	396.00	401.00	388.00	396.00	399.50	392.00	371.00	357.50
	08/23/82	-720	SELL 2	403.00	411.50	397.00	408.70	408.60	402.90	389.00	382.00
	08/24/82	660	SELL 1	418.00	422.00	408.00	413.20	420.27	414.47	399.87	391.23

sum		5,450	Total new P/L after commission.		GOLD	Range				
minimum		-1,080			Low.....	316.40				
maximum		1,950			High.....	413.20				
mean		115.95745	Ave P/L per trade after commission.							
TBILL	05/04/82	485	BUY & SELL 1	87.17	87.27	87.11	87.22	87.51	87.26	87.13	87.05
DEC	05/07/82	135	SELL 1	87.97	88.06	87.87	87.95	88.13	88.02	87.71	87.51
	05/11/82	335	BUY 2	87.75	87.91	87.71	87.86	88.04	87.99	87.84	87.74
	05/12/82	660	SELL 1	87.89	87.96	87.66	87.68	88.04	87.96	87.76	87.64
	05/13/82	-15	BUY 1	87.62	87.73	87.55	87.58	88.07	87.87	87.57	87.47
	05/14/82	-180	SELL 2	87.65	87.85	87.62	87.77	87.80	87.69	87.51	87.44
	05/18/82	560	BUY & SELL 1	87.50	87.77	87.49	87.74	87.90	87.74	87.50	87.42
	05/20/82	635	OPENED TOD HI	87.92	88.24	87.87	88.16	87.89	87.82	87.67	87.59
	05/26/82	645	BUY & SELL 2	88.10	88.14	87.83	87.84	88.11	88.05	87.95	87.91
	05/31/82	-230	SELL 2	87.95	88.09	87.86	88.02	88.04	87.96	87.81	87.74
	06/01/82	-1,080	BUY 2	87.92	87.93	87.46	87.49	88.22	88.12	87.89	87.76
	06/03/82	435	BUY & SELL 1	87.47	87.57	87.26	87.33	87.63	87.52	87.32	87.23
	06/04/82	-215	BUY 1	87.33	87.33	87.10	87.13	87.70	87.51	87.20	87.08
	06/07/82	-215	SELL 1	87.17	87.37	87.13	87.34	87.42	87.27	87.04	86.96
	06/11/82	260	SELL 1	87.39	87.47	87.33	87.33	87.45	87.32	87.12	87.05
	06/16/82	260	BUY 1	86.71	86.95	86.69	86.83	87.04	86.95	86.78	86.70
	06/17/82	15	BUY 1	86.60	86.69	86.57	86.63	87.08	86.96	86.70	86.56
	06/18/82	360	SELL 1	86.65	86.69	86.51	86.53	86.75	86.69	86.57	86.51
	06/21/82	370	SELL 2	86.50	86.76	86.50	86.61	86.76	86.64	86.46	86.40
	06/22/82	-115	BUY 1	86.67	86.73	86.43	86.46	86.88	86.75	86.49	86.36
	06/23/82	60	SELL 1	86.42	86.65	86.39	86.61	86.84	86.65	86.35	86.24
	06/24/82	760	BUY & SELL 1	86.60	86.72	86.37	86.39	86.81	86.71	86.45	86.29
	06/29/82	-215	SELL 1	86.62	86.75	86.52	86.72	86.65	86.59	86.40	86.27
	06/30/82	-265	BUY 1	87.02	87.02	86.70	86.80	86.89	86.80	86.58	86.45
	07/01/82	935	BUY & SELL 1	86.65	87.05	86.65	87.04	87.16	86.98	86.66	86.52
	07/06/82	-290	BUY 1	87.11	87.13	86.86	86.92	87.02	86.94	86.81	86.76
	07/07/82	860	BUY 1	86.80	87.18	86.79	87.17	87.24	87.08	86.81	86.70
	07/08/82	-390	SELL 1	87.43	87.63	87.41	87.58	87.44	87.30	86.91	86.66
	07/09/82	160	SELL 1	87.75	87.81	87.61	87.68	87.76	87.67	87.45	87.22
	07/12/82	970	SELL 2	87.75	88.02	87.62	87.64	87.90	87.79	87.59	87.50
	07/13/82	-130	BUY 2	87.49	87.62	87.35	87.41	88.17	87.90	87.49	87.35
	07/15/82	-280	SELL 2	87.53	87.77	87.53	87.64	87.65	87.54	87.32	87.21
	07/21/82	860	BUY & SELL 1	88.34	88.38	87.97	87.98	88.42	88.34	88.14	88.02
	07/27/82	-365	SELL 1	87.81	86.11	87.76	88.01	88.22	86.11	87.94	87.88
	07/28/82	-240	BUY 1	87.82	87.95	87.70	87.73	88.31	88.16	87.91	87.81
	07/29/82	35	SELL 1	87.80	88.02	87.70	87.86	88.04	87.86	87.64	87.54
	08/03/82	-565	BUY 1	88.44	88.48	88.22	88.27	88.64	88.58	88.45	88.38
	08/06/82	-240	BUY 1	88.25	88.32	88.16	88.21	88.58	88.50	88.29	88.16
	08/09/82	585	BUY 1	88.05	88.46	88.05	88.47	88.39	88.50	88.14	88.07
	08/17/82	-180	SELL 2	89.19	89.68	89.16	89.49	89.58	89.36	89.95	89.76
	08/18/82	1,310	SELL 1	89.97	90.00	89.43	89.67	89.96	89.73	89.21	88.92
	08/19/82	135	SELL 1	89.85	89.97	89.42	89.90	90.27	89.97	89.40	89.13
	08/20/82	885	SELL 1	90.32	90.40	89.90	89.96	90.71	90.11	89.52	89.21
	08/23/82	-290	BUY 1	89.85	89.88	89.65	89.67	90.59	90.27	89.77	89.59
	08/24/82	760	BUY 1	89.65	89.97	89.55	89.91	89.96	89.82	89.59	89.50

sum		7,970	Total new P/L after commission.		TBILL	Range				
minimum		-1,080			Low.....	86.39				
maximum		1,310			High.....	89.96				
mean		177.11111	Ave P/L per trade after commission.							
SFRANC	05/04/82	50	BUY 1	53.15	53.23	52.98	53.23	53.70	53.49	53.16	53.04
SEPT	05/07/82	-615	SELL 1	54.80	55.25	54.64	55.22	55.01	54.76	54.04	52.57
	05/10/82	-190	BUY 1	54.60	54.70	54.22	54.21	55.65	55.42	54.82	54.43
	05/12/82	-580	BUY 2	54.27	54.34	53.88	53.91	54.62	54.50	54.20	54.02
	05/13/82	630	OPENED TOD LO	53.52	53.58	53.02	53.03	54.50	54.21	53.75	53.58
	05/14/82	400	SELL 1	53.25	53.45	53.00	53.05	53.76	53.40	52.85	52.66
	05/17/82	1,685	SELL 1	53.32	53.34	51.92	51.95	53.62	53.33	52.88	52.72
	05/21/82	335	SELL 1	52.73	52.89	52.35	52.52	53.03	52.82	52.23	51.85
	05/24/82	185	SELL 1	52.70	52.98	52.54	52.64	53.13	52.82	52.28	52.05
	05/25/82	210	BUY 1	52.30	52.60	52.20	52.48	53.16	52.90	52.46	52.28
	05/27/82	-1,080	BUY 2	52.02	52.17	51.43	51.68	52.78	52.49	52.02	51.84
	06/02/82	520	BUY 1	50.60	51.20	50.57	51.06	51.22	50.98	50.61	50.48
	06/04/82	420	BUY & SELL 1	50.90	50.93	50.44	50.55	51.17	50.92	50.52	50.37
	06/08/82	-415	BUY 1	50.48	50.53	49.95	50.01	50.91	50.77	50.42	50.21
	06/09/82	110	BUY 1	49.94	50.12	49.71	49.86	50.74	50.38	49.80	49.58
	06/10/82	-140	BUY 1	49.87	49.92	49.55	49.63	50.31	50.08	49.67	49.49
	06/11/82	550	OPENED TOD HI	50.17	50.53	49.97	50.51	50.07	49.85	49.48	49.33
	06/14/82	275	OPENED TOD LO	49.73	49.78	49.37	49.52	50.90	50.70	50.14	49.78
	06/15/82	10	BUY 1	49.36	49.67	49.23	49.38	49.97	49.75	49.34	49.15
	06/21/82	585	BUY 1	47.86	48.43	47.76	48.31	48.65	48.39	47.97	47.81
	06/22/82	70	SELL 2	48.66	49.22	48.45	48.62	48.84	48.57	47.90	47.50
	06/23/82	1,055	BUY & SELL 1	48.34	49.25	48.19	49.17	49.54	49.08	48.31	48.00
	06/25/82	-330	BUY 2	48.20	48.35	47.87	47.98	49.30	48.86	48.19	47.96
	06/29/82	-1,080	BUY 2	48.27	48.84	48.06	48.76	48.43	48.29	47.90	47.65
	06/30/82	540	SELL 1	48.55	49.09	48.46	48.66	49.33	49.05	48.27	47.77
	07/01/82	-50	SELL 1	48.73	49.03	48.42	48.98	49.25	48.97	48.34	48.09
	07/02/82	-600	BUY 1	48.75	48.84	48.10	48.15	49.41	49.20	48.60	48.21
	07/07/82	-55	BUY 1	47.61	47.66	47.32	47.60	48.57	48.22	47.66	47.45
	07/08/82	610	BUY 1	47.68	47.95	47.38	47.91	47.87	47.73	47.39	47.19
	07/09/82	210	SELL 2	47.92	48.39	47.92	48.10	48.32	48.11	47.54	47.18
	07/12/82	470	SELL 1	48.60	48.69	48.15	48.20	48.61	48.35	47.88	47.67
	07/13/82	245	BUY 2	48.20	48.23	47.66	48.03	48.89	48.54	48.00	47.81
	07/14/82	85	BUY 1	47.86	48.08	47.69	47.82	48.54	48.29	47.72	47.40
	07/20/82	-540	SELL 1	48.39	48.84	48.36	48.77	48.91	48.61	48.08	47.85
	07/21/82	60	SELL 1	49.12	49.46	48.96	49.06	49.14	48.95	48.47	48.18
	07/26/82	-190	BUY 1	49.84	50.05	49.69	49.79	50.55	50.36	49.91	49.65
	07/27/82	-550	OPENED TOD LO	49.44	49.65	49.25	49.49	50.20	50.00	49.64	49.48
	07/28/82	1,050	OPENED TOD LO	48.90	49.07	48.17	48.19	49.86	49.68	49.28	49.06
	07/29/82	50	BUY 1	48.45	48.64	47.62	47.95	49.38	48.78	47.88	47.58
	08/03/82	275	SELL 1	48.95	48.98	48.43	48.50	49.19	48.84	48.29	48.09
	08/04/82	185	OPENED TOD LO	47.90	48.12	47.63	47.81	49.19	48.84	48.29	48.09
	08/05/82	-30	BUY 2	47.87	47.87	47.26	47.50	48.34	48.08	47.59	47.36
	08/06/82	-185	BUY 1	47.16	47.40	46.87	46.89	48.09	47.79	47.28	47.07
	08/09/82	510	BUY 1	46.60	47.27	46.60	47.04	47.58	47.24	46.71	46.52
	08/10/82	470	BUY 1	47.44	47.48	46.94	47.03	47.64	47.34	46.87	46.30
	08/11/82	-300	SELL 1	46.60	46.93	46.54	46.82	47.69	47.36	46.82	46.61
	08/17/82	650	BUY 1	46.65	47.09	46.45	47.01	47.11	46.85	46.46	46.25
	08/18/82	120	OPENED TOD HI	47.88	48.05	47.45	47.62	47.49	47.25	46.81	46.21
	08/19/82	-205	SELL 1	47.46	48.30	47.41	48.09	48.31	47.96	47.36	47.11
	08/20/82	-780	SELL 1	48.28	48.77	48.28	48.73	48.82	48.46	47.57	47.04
	08/23/82	170	BUY & SELL 1	48.44	48.85	48.35	48.59	49.08	48.91	48.42	48.10
	08/24/82	-230	SELL 1	48.99	49.34	48.84	49.25	49.10	48.84	48.24	48.10

sum		5,045	Total new P/L after commission.		SFRANC	Range				
minimum		-1,080			Low.....	46.82				
maximum		1,685			High.....	55.22				
mean		97.019231	Ave P/L per trade after commission.							
sum		31,680	Total new P/L after commission.		~~SFRANC~~	~~Range~~				
minimum		-1,080	ALL The Above		~~Low.....~~	~~46.82~~				
maximum		4,400			~~High.....~~	~~822.00~~				
mean		135.38462	Ave P/L per trade after commission.							

place an order to liquidate at a loss of $500 or at the market on the close.

- If the market opens above S2 or below B2, you only take a position if the market retraces to B2 or S2, and then you do the opposite. (e.g., S2 is 400 in gold. Market opens at 405. Now if the market falls to 400 you *Buy* not *Sell* and place liquidation orders as per #2.)
- In all of the above you take no new position after noon, E.S.T. — no matter what. Henry always left the floor after noon.

Check out Fig. 1 and you will see how well it worked. In less than 90 days he made over $30,000 per contract traded. The margin required was about $12,000. You probably think I will now try to sell the magic formula to you for $1,000, which would be a bargin . . . but, I don't know what it is. This is where you come in.

Somewhere out there is a computer/arithmatic mastermind who can crack the code. There are only *four* possible variables which can be used to compute B1, B2, S1 and S2. Fig. 1 shows only the days of trades.

The fact that the old gent failed to leave the formula to me, as he promised, was tragic. His wife said he never would disclose it to his family.

No Action days are shown. Look at the Open, HI1, LO1, and CL1 one day and then look at S2, S1, B1 and B2 for the following day. Find a formula which takes the previous day's Open, High, Low and Close and gives you S2, S1, B1 and B2 for the following day, and you have it. If you decipher the problem and provide a formula which provides the correct B1, B2, S1 and S2, I will make it worth your while. Let's say . . . a new IBM PC, or $3,000 in cash to the first one with the answer. Is this formula really worth three kilobucks??? It's worth at least 30K, but I shall begin with only 3K. If this doesn't get results, I shall double the ante. If you intend to give it a try and have any questions, call me person-to-person collect at 305-747-2088, between 8am and 10am EST, Monday-Friday.

If you have the solution, send it to me at Box 3332, Tequesta, FL 33458. Give me your phone number and I will let you know if you win. If someone solves the problem before you, we will give you a one-year subscription to ***SoftSide.*** Who knows, it may be easier than I think. Stay tuned, I'll keep you posted.

Computers and Musical Expression:

A Conversation with Paul Lansky and Steve Birchall

Last spring, I attended a series of lectures and concerts by computer music composers at MIT. Among the guests was Paul Lansky, from Princeton. His music impressed me with its warmly emotional and human content. Here is a composer who has mastered the computer as an expressive tool, I thought, so I asked him to share his thoughts with us in this issue on music.

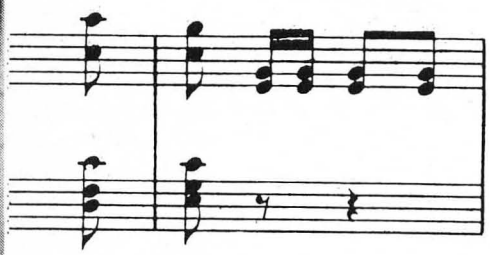
Steve Birchall: Why are composers attracted to computers as a medium for artistic expression?

Paul Lansky: For me the real attractions are the increased responsibilities the composer gains, and the ability to contemplate and realize new modes of expression and musical thought. The first thing Godfrey Winham said, in the course I took with him in 1966, was that the computer can synthesize any sound you can describe. The catch is learning to describe sounds in ways the computer can understand. This may require gaining not only programming expertise, but also some mathematical and acoustical sophistication. For a composer, gaining these skills is analogous to learning to play another instrument, and having done so — what an instrument it is! Composers frequently have sought to consolidate a wide variety of sound-producing potentials within easy reach. The organ is perhaps the best historical model for this.

The potential of the computer, however, dwarfs all previous efforts and makes it seem unlikely that a more powerful method could be devised. A composer who has learned how to play the computer is, to a composer who writes for performers, something like a film maker is to a playwright. He becomes, in effect, a performer himself, and assumes responsibility for all aspects of the finished product, from the trivial — such as making sure his equipment has no ground loops, to the profound — contemplating the nature of musical expression. The playwright and the traditional composer, on the other hand, write scripts for performers to follow and interpret. For many, this is a fundamental and exciting aspect of their craft. Because the computer composer relegates these responsibilities to himself, he moves into a new position with respect to his work. For me, having the chance to perfect a piece in every intimate detail, and then to disseminate it with reasonable confidence that my ideas will be represented accurately on other people's hi-fi systems, is much more rewarding and satisfying than leaving a score to the mercy of multiple interpretation, and insufficient rehearsal time.

SB: What new sonic resources does the computer medium present to a composer?

PL: The computer can function as a music-making machine in several ways. The simplest and most widely used is to construct, or synthesize sounds. For this application, we now have a growing number of clever sound-producing algorithms for additive and subtractive synthesis, frequency modulation and wave shaping. Another application, which interests me very much, however, is to use the computer to re-process real world sound. I've always considered the issue of "new sounds" as one concerning new ways of expressing a musical thought rather than creating wave forms new to the universe. And, in this sense, I've found a lot to



do in manipulating one of the oldest musical sounds: the human voice. What I try to make emerge from these manipulations is a retuning of my ears (and I hope those of my listeners), to the inner expressiveness — the music — of spoken language. With the computer I'm able to distill and isolate aspects of speech which are beyond the reach of any other device. In a very real way I think of myself as a kind of "sound photographer" rather than "inventor." This approach owes a great deal to the concept of "musique concrete," of course.

SB: What possibilities does the computer exclude?

PL: What digital synthesis specifically excludes, as I practice it at least, is subsequent interpretation by performers. On the other hand, many people, including Max Matthews of the Bell Labs, and several at IRCAM in Paris, are working on intelligent musical instruments. These could be played in real time, and involve complex intelligent interactions between musician and machine. As computing speeds increase, this promises to be an extremely interesting approach.

SB: Does the computer replace present instrumental resources, or does it take its place in the repertoire of tools available?

About Paul Lansky

Paul Lansky has been active as a composer, performer, teacher and musical journalist. He played French horn in the Dorian Wind Quintet, and has taught at the Mannes College of Music, and Swarthmore College. Since 1969, he has been on the faculty of Princeton University, where he received his Ph.D. in 1973. He was co-editor of the *Proceedings of the American Society of University Composers*, and is presently Associate Editor of *Perspectives of New Music*. Many of his compositions have been recorded, including:

Modal Fantasy (piano, 1970), Robert Helps, piano, CRI SD-342 (1975).

String Quartet #2 (1971, rev. 1977), Pro-Arte String Quartet, CRI SD-402 (1979).

mild und leise (computer-synthesized tape, 1973-4), Columbia-Odyssey Y34149 (1976).

Crossworks (chamber ensemble, 1974-5), Boston Musica Viva, Nonesuch H-71351 (1978).

Six Fantasies on a Poem by Thomas Campion (computer-synthesized tape, 1978-9), CRI SD-456 (1982).

PL: As far as I can tell, the only thing it replaces is the old analog tape studio. In every other respect it is a healthy addition to our repertoire of possibilities.

SB: Are its capabilities more attuned to expressing twentieth century experience than oboes and violins (or lutes and recorders)?

PL: To answer this question well is difficult. The sensibilities of an era are, of course, partly defined by the products of its culture. The only way I can imagine computer synthesis being relevant to our times is that it represents current technology. On the other hand, in many applications of computers to music (including those which interest me), the computer often is relatively transparent in every respect except for the ease with which it manipulates material. A good example of this transparency is the new digital recording technology — clean sound and remarkably precise editing give the music a much more life-like sound. Similarly, original music synthesized or re-processed by computer need not ring "outer space" or "high-tech" bells. The computer's influence may be, instead, to allow the composer to develop a new musical context for familiar sounds.

SB: The linear prediction technique has played an important role in your musical expression. How does it work, and what does it do?

The computer often is relatively transparent in every respect except for the ease with which it manipulates material

PL: Basically, linear prediction involves the analysis of a signal by means of a series of filters. During the synthesis process these filters are inverted and something closely resembling the original signal is recreated by passing a pulse-like signal through them. The main virtue of this process is that you are able to separate and individually control the pitch, rhythm and timbre of the signal during its reconstruction, and consequently, the creative possibilities are stunning. A "snapshot" of a single cello note enables you to generate the cello's entire pitch range. But you can do other things, such as change the timbre to an oboe, but with the bowed articulations of the cello. From that point on, the transformational possibilities become enormous.

Unfortunately, all-pole linear prediction, the most simple and straightforward application, works much better on some sounds than others. As far as I know, more complicated approaches involving pole-zero analysis/synthesis, for example, are too computationally expensive for my applications, in which a great deal of synthesis is done from a single analysis. The Texas Instruments Speak and Spell uses linear prediction implemented by means of a lattice filter.

While the filter program is fairly straightforward, the analysis process is more complicated and cumbersome. A great deal may depend on the qualities of the signal being analyzed, as well as the sonic quality of the recording of that signal. We're now using 16-bit A/D conversion, though 12-bit has seemed fine in the past (especially since the signal is recorded on analog tape with only a 12-bit dynamic range). I've done all this work on large IBM mainframes, using double precision for the analysis and 32-bit single precision for the synthesis. I know of some music done on minicomputers such as the more powerful PDP 11s. I haven't heard of anyone doing linear prediction on personal computers — though I'm sure the time will come, if it hasn't already. It's a number crunching problem.

A great deal of the analysis process is not automated, at least as I have used it. Different parts of the analysis may have to be redone with different initial conditions; the pitch analysis usually has to be touched up some; the amplitudes may have to be normalized; and the voiced/unvoiced decision is far from simple. Until a better method comes along it is a very powerful way to capture and dissect real world sounds. It gives you a complicated package of time-varying spectra right from the start. To attempt to synthesize such complex sounds from scratch is quite difficult.

SB: What is your background as a musician?

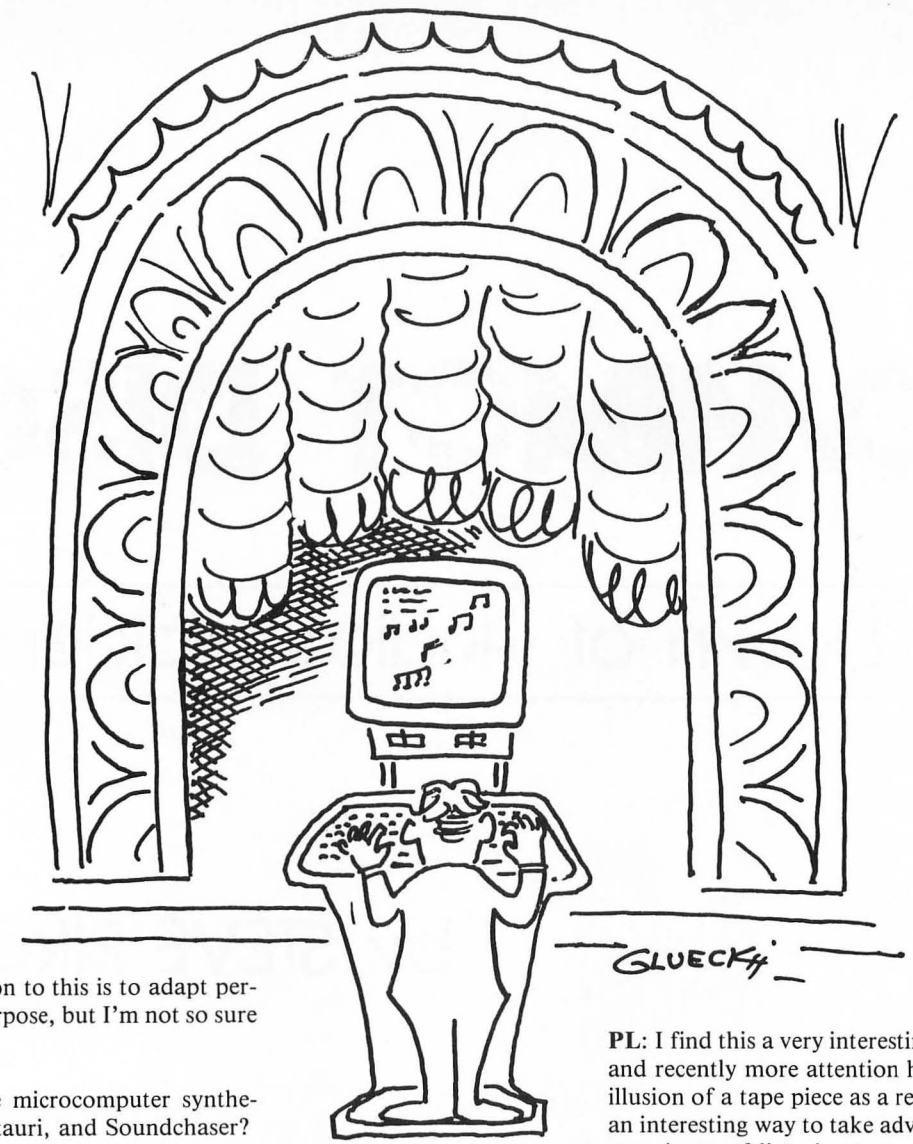
PL: My background is primarily as a performer. I made the transition to composition during my teens. I suspect the attraction of electronic music for me is that it allows the composer to be a performer. Now that I think of it, when I was performing, I always found real-time-performance (traditional concerts) less interesting than rehearsals. And now I find software-based systems more interesting than real-time music machines.

SB: The composing software always seems to be composer-specific. How do you avoid this problem? Is it desirable to make software more generally applicable?

PL: This is a very interesting problem and unfortunately devolves to a great extent upon the available hardware. For me, the real beauty of computer synthesis lies in its generality. The lower the level of your program the more your imagination can roam at will. In this sense it is a real instrument of the imagination. You need only some time, a pencil and paper, rather than a hammer and chisel, to design the sound-makers of your musical world. I have found that the generality of the computer as a musical instrument usually is proportional to the amount you know, and are willing to go through, in order to use it.

Several good high level music synthesis packages are available which make it easy for a composer to walk in off the street and get sound out rather quickly. These programs have many brilliant aspects, but I find their structure is too limiting, and many aspects of their design are too musically suggestive. They push the composer into certain styles or modes of thought, thus defeating the kind of generality I'm looking for. I've ended up writing my own synthesis program called MIX, for use on Princeton's IBM mainframes. If and when we switch to a smaller computer, much of it may have to be redone, but the essential logic will remain the same — very simple, and low level constructions, in which what is happening is always exactly clear to the user, and in which implementing new ideas is not difficult.

I think any composer serious about using the computer should regard it as analogous to learning to play an instrument and devote some serious time to learning some programming, along with the fundamentals of musical acoustics and synthesis. Then he needs to putter around for a while — poking the computer in different ways to see how it squeaks. Unfortunately, this is often difficult since most of the powerful installations are at universities where composers visit or pass through on a tour of duty of one



sort or another. The solution to this is to adapt personal computers for this purpose, but I'm not so sure this is a simple task.

SB: How do you view the microcomputer synthesizers such as the alphaSyntauri, and Soundchaser?

PL: These are very good and powerful machines. I have had a little experience with them but really am not qualified to be critical since I have not written any music with any of them. I'm quite impressed with how sturdy and easy to use they are. The trade-off between this kind of accessibility and the kind of low level generality I'm interested in seems to be too high a price for me. I'd prefer to play the piano. I have no doubt that people can write good pieces on these machines. A good composer can make music on anything, and the best music systems in the world won't help a bad composer. Peculiarly enough, however, the feature which makes these machines popular, the use of a piano-like keyboard as an input device, is what I find particularly limiting. It is so suggestive of piano-like musical gestures that a composer must work hard to imagine musical concepts which have other bases than equal divisions of the octave, for example. To create compositions which are not pitch-oriented at all is virtually impossible — and many composers prefer to organize their music with other parameters, leaving pitch structures deep in the background. Loudness and softness, directionality, rhythmic patterns, or tone colors can be as powerful as keys, scales and chords in expressing thoughts and providing organization to a piece. I would like to spend some time with one of these systems, but for the present, I have no particular use for them.

SB: Creating a convincing illusion of an acoustic ambience is a difficult problem in electronic and computer music. What have you done to solve these problems, and what remains to be done in this area?

PL: I find this a very interesting issue, as have others, and recently more attention has been paid to it. The illusion of a tape piece as a recording of something is an interesting way to take advantage of our collective experience of listening to recordings. Basically, this means considering reverberation and room acoustics in processing synthesized signals. My own efforts have been far more primitive than those of some others, but even these have convinced me that the environmental quality of a sound is an important characteristic, which we have often taken for granted.

An interesting angle on this is that, after having derived methods of simulating reasonable room acoustics, you can twist a few software knobs and create unreasonable and fantastic room acoustics. I've experimented with this to a certain extent, creating odd-shaped rooms and non-real reverberation characteristics, (such as sound which grows louder after the note stops, instead of dying away), but my methods are quite primitive and I hope to take advantage of more recent research.

SB: What do you think is likely to happen in the future in computer music?

PL: It looks quite healthy to me at this point. The amount of activity is growing, and a lot of young people are becoming involved. Most important is the fact that a reasonable number of good pieces are being produced. The main problem with it right now is that it is quite expensive and beyond the reach of many interested and capable people. To take full advantage of a generalized software approach you need a lot of machine cycles. Fortunately, these are becoming less expensive all the time, and digital to analog converters are dropping in price. I hope to see personal computers become powerful enough to take over in this area, but I think this may be a few years away. When it does happen, however, it will be a whole new ball game.

COMPACT DISCS:

The Dawn of Audio's Golden Age

by STEVE BIRCHALL

The Compact Disc is the audio equivalent of the video disc. With a diameter of about five inches, a sampling rate of 44.1kHz and 16-bit analog-to-digital conversion, it can play for an hour, deliver frequency response beyond the range of human hearing and produce a dynamic range of over 90dB. Moreover, it can do all this with less than 0.005 percent distortion (THD), and (in the case of the Philips/Magnavox player) with phase linearity within 0.5% over the entire frequency range. Wow and flutter are nearly unmeasurable. No analog equipment can approach that level of performance.

The discs are small (reducing storage space) and virtually indestructible. No stylus traces the groove. A laser scans the tracks (which contain up to three billion pit/no-pit areas), so the groove can't wear out. Finger prints and minor scratches do not affect playability or sound quality. By using microprocessor control, many intriguing new possibilities, similar to those of the interactive video disc, are also available.

Sound of Silence

The sound quality of the CD is nothing less than astonishing. The total absence of background noise, and an expanded dynamic range are its most immediately noticeable attributes. On an analog record, the best signal-to-noise ratio on a state of the art pressing is about 62dB, but on a CD, the figure jumps to over 90dB — close to the 110dB or so a full orchestra can produce. The music on a digital disc rises out of complete silence. No hiss, ticks and pops or other clues tip you off that the record has started. When the music begins, it surprises you the first few times. Better still, extremely quiet passages are not obscured by the record's surface noise, nor is the signal modulated and muddied by the ever-present hiss on conventional recordings.

What amazes me about digital recording is that now, for the first time, I can hear details like bow hair scraping on the strings, and the slight differences in bowing speed and pressure among players in a violin section — just as in a live performance. No longer is a recording just a blur of highs that sounds like one large violin. Now it sounds like a violin *section*. Having played in orchestras, I like the idea of a recording technology which can resolve that much detail. I suspect that more than a few audiophiles have been puzzled to hear such data coming out of their systems and thought it was distortion instead of reality.

Wow and flutter, which are the enemies of clarity on even the most expensive analog turntables and tape decks, do not affect the sound. Even small amounts can smear the sound and add irritating inharmonic distortion components — but not on a CD. Wow and flutter are insignificant because the data are stored in a buffer and the decoder retrieves them with quartz clock accuracy. The clarity, the ability to resolve extremely small details, and the crystal clear transparency of the sound are impressive.

Be forewarned that if the original program material contained tape hiss or distortion, the CD will reproduce them perfectly. Some labels are re-issuing old analog tapes on CD (frequently without saying so on the jacket), and the resulting discs sound less than amazing. This practice makes as much sense as re-issuing old 78s on LPs and capitalizing on the wonderful "new technology."

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Illusions of Reality

One component of recorded sound which has fascinated audiophiles endlessly is imaging. Most consumers are not accustomed to expecting their systems to deliver a convincing acoustic image with depth, breadth and height. As long as sound comes out of both speakers, it's "stereo" to them. The problem is that you need fairly expensive equipment to re-capture the subtle phase relationships which the ear needs to reconstruct an image with three-dimensionality. That phase information is weak (thus weak on an analog recording) and difficult to reproduce — if it survived as far as the final pressing. On a CD, everyone can hear a convincing stereo image, because the phase information is reproduced precisely. Suddenly new listening experiences are available to the majority of consumers. Even on a "cheap and ugly" system, enough spatial information comes through to give some impression of depth. That's quite a technological achievement.

If you have some audiophile friends, many of them have no doubt jumped on the anti-digital bandwagon, proclaiming that analog is the one, true technology. That point of view is quite popular in the "underground" audio press. Most of the objections I have heard have no rational basis, but are emotional reactions from people who suddenly have lost their position as "experts" on high performance audio. These are mostly the same people who have been marching bravely forward into 1952, extolling the virtues of tubes over solid state circuits, which they claim are "unmusical."

The usual objections to digital recording seem to be:

- Distortion or edginess in the highs;
- Coloration of low-level sounds;
- Phase shift produced by the anti-aliasing filter;
- Incompatibility of formats.

To answer the objection that the highs are distorted, we turn to the sampling process and the Nyquist Theorem, which states that the sampling rate must be at least twice the highest frequency you wish to sample. This satisfies the mathematical criteria necessary to reconstruct a sine wave. Generally, the highest frequency we can hear is about 20kHz, although in practice, most people can't hear that high. In FM radio, 15kHz is the upper limit, and most people don't notice the "missing" half octave. The CD's sampling rate is 44.1kHz, so its upper frequency response limit is 22.05kHz — well above the range of human hearing.

Precisely what causes the harshness reported by many listeners is harder to pin down. Perhaps they are not accustomed to hearing recorded highs reproduced with that degree of accuracy and intensity. Also, various components in the reproducing system (particularly speakers) may not be able to pass that information without distortion. Beyond that, research on such things as sampling rates and alternatives to the widely-accepted Pulse Code Modulation system might be worthwhile. The dbx 700, which uses Companded Predictive Delta Modulation and samples at 700kHz, may provide some clues. Most people who have compared the dbx 700 with PCM units report a slightly cleaner, more relaxed high end. Why this is so needs to be determined. At the least, we need to know what sampling rate will reproduce all the phase information we require for realistic reproduction.

Pianissimo Distortion

Digital technology has distortion at extremely low levels, rather than at extremely high levels, as is the case with analog recording. We all tend to expect a recording to distort when it gets loud. But the PCM system distorts when the signal is very quiet. So we frequently hear this criticism levelled at CDs as if it were a significant, audible defect. The truth is that the defect is nearly inaudible, simply because it is at the lowest threshold of audibility for the system.

At a recent meeting of the Boston chapter of the Audio Engineering Society, Brad Meyer and Peter Mitchell made a convincing demonstration of this point. They played a test tone recorded at a low level, and turned up the volume so we could hear the coloration. No question, it was audible — but only at that extremely amplified playback level. If you tried to play the disc at that volume, you would blow the fuses in your system, or destroy your eardrums. This distortion occurs 80 to 90dB *below* the loudest sounds on the record, and thus is safely below the level of audibility.

The engineering solution to this problem is called dithering (adding a small amount of noise to the signal). It deceives the encoding/decoding circuits and prevents even that tiny amount of distortion. Some brands of digital recorders do not use dithering, but, as Meyer and Mitchell — along with many other experienced recording engineers in the room — observed, the residual noise of microphone preamps and mixers is sufficient to serve the purpose. In other words, dithering happens naturally, and the so-called defect is non-existent.

The Real Problems of CD

What the audiophiles should be concerned about, and what the manufacturers of CD players are competing over, is the phase shift caused by the anti-aliasing filter. This filter has an extremely sharp rolloff so that it passes all the audio frequencies, but blocks out higher frequencies (which are "alien" mirror images of the main signal) to prevent them from distorting the music. However, such filters are expensive, have distortion, and cause a significant amount of phase shift, which destroys the imaging. Many different filter designs are in use, but Philips has found the best solution. They *delete* the unwanted frequencies while the information is still in numerical form, thus avoiding the distortion and image-flattening of analog filters.

Another problem is the incompatibility of the various digital recording systems. Ideally, once the signal has been converted to numerical form, it should stay that way until final playback. Dumping the numbers directly from the master tape onto the CD should be possible. But as things stand now, the taped signal is converted to analog form, then re-converted to digital using the CD parameters for encoding. Obviously, something is lost in the translation. Peter Swanson, an engineer at WGBH, has commented on the scrambled phase relationships (especially in the highs) which this creates. For the time being, no one cares, because the results are so obviously superior to anything else. But as time goes by, we will become more critical and complain of the losses. Eventually, we will need standardized formats, or perhaps translation circuits which can make conversions directly in numerical form, with no loss of data. At least one company, dbx, Inc., is working on a transcoder to convert its CPDM signal to the CD's PCM format. They also are making the dbx 700 technology available to manufacturers who wish to build digital tape recorders based on their CPDM system.

Interactive CDs

Could we have an interactive CD? Obviously, that would be no problem. The question is why, and what would you do with it? When I asked Peter Mitchell, who is one of the most knowledgeable people in the field, if he knew of any interactive CDs, he was truly surprised by the question. Nonetheless, at the AES meeting, one of the disks they demonstrated had indications on the jacket to tell you where the first and second themes are, where the development section begins, and where the recapitulation starts. Punch in the numbers, and the player searches for those places so you can hear, and compare them. You can learn

the themes before you listen to the entire composition. The disc becomes interactive through the simple act of placing the right information on the jacket — and the user learns about musical structure.

Quite a number of possibilities are begging to be used. Suppose the disc contained a piece of music, but had a particular passage repeated five times with five different interpretations. By giving the CD player the appropriate instructions, you could hear the piece played five different ways, with the passage under study in its proper context, instead of isolated from the piece. Since the CD has up to an hour of playing time, every phrase in a short piece could be presented in such a format. Students could study approaches to interpretation at length, without burning up valuable time in private lessons.

What an excellent way for music schools to teach such things as the fine points of musical interpretation, or Baroque ornamentation. What an excellent way for listeners at home to understand how different artists approach the same piece of music. Interactive CD's would make this level of understanding available to everyone. Would you buy an interactiver CD with Rudolph Serkin and Glenn Gould demonstrating how each of them interprets the same piano concerto? Or would you prefer Carlos Santana or Ralph Towner demonstrating their improvisational techniques?

In both popular and classical music, interactive compositions could become a dominant style. Branching choices could involve purely musical concepts, or story and plot ideas, or some combination. The programming could be quite complex with a microcomputer to do all the work of asking you the questions, and then driving the CD player for you. I can imagine a rather neo-classsical composition consisting of dozens of modular sections with different characteristics. I could construct a different piece every time I played it, by making different choices, depending on my mood. During one playback, I might emphasize all the quiet sections, or all the sections featuring the trombone. I could alternate sections using dotted rhythms with sections using bitonal harmony. In this way, ordinary listeners can become *involved* with some of the decisions a composer makes and will have a more profound understanding of music than they can acquire through passive listening to records.

For a composition with a strong textual or dramatic content, I can imagine something like an adventure, or role-playing game set to music. The outcome of the story, and thus the musical and expressive content would depend on choices made at critical points in the plot. One playback might be violent and stormy, another might be quiet, but tense and ambiguous. Who will write the first video or audio disc-based interactive opera? One of the major labels should commission a composer to exploit and popularize this new medium. What a group like Yes, Oregon, or the Moody Blues might have done with an interactive CD is not too difficult to imagine.

If you are thinking that this kind of speculation about interactive CDs is too fantastic, I should point out some interesting precedents. Mozart wrote a minuet with interchangeable phrases. The performer throws dice to determine the order in which he will play them. This is extremely easy to realize on a CD. Earlier in this century, several composers wrote interactive operas. Hindemith's *Let's Build a City* is a children's opera in which the class decides at various points what direction to take. Much of Carl Orff's musical pedagogy involves group decisions about what events are to occur in the class' cooperative composition. The Belgian composer, Henri Pousseur, in the Sixties wrote an opera called *Votre Faust (Your Faust).* Here, the action stops at several points, and the audience has a "town meeting" to discuss the action and character development so far, and vote upon what they would like to happen next. The interactive CD is a medium perfectly suited to this kind of listener involvement. In fact, it not only permits it, but *demands* it.

Consider *The Mystery Disc* reviewed in ***SoftSide*** Issue #46. If presented as a "radio drama" on a CD, it could be as much fun as the video version — perhaps even more involving, because, like radio drama, it could evoke powerful images in the listener's imagination.

Peter Mitchell mentioned one fascinating CD application which actually is under development. If used for computer data storage, it could hold an enormous amount of information. You could have an entire city library on a handful of discs at home. Picture a college book store selling one of these discs containing not only the text book, but the research materials, and even lab work for an entire course. Making raw information that cheap and accessible will put a premium on how a student works with ideas and reasons with them, rather than whether he simply can dig up facts.

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Second Generation Players

The differences among CD players fall into three categories, according to Peter Mitchell:

- Human engineering;
- Digital to analog conversion;
- Error correction.

The most obvious differences are in the area of human interface. If you make the rounds of dealers, you will discover that some units are much easier to operate than others. One machine permits you to cue up a track precisely on the nose and pause until you are ready to play it. Another may be frustratingly inconvenient to use in this way. One player may allow you to hear the tracks as it skips across in fast forward mode (like a video disc or tape player, and garbled in a similar way) — but another mutes the sound until you go into play. Some people prefer to hear an approximation of the music so they can search for a particular place in the music, while others prefer silence. Some players give a precise readout in minutes and seconds, showing exactly where you are on the disc, but others show only a bar graph of approximate position. For the moment, manufacturers don't know what consumers want, and they are offering a variety of ergonomic approaches to find out what sells. Shop carefully and evaluate the control functions in terms of how convenient they are for *your* purposes.

The digital to analog conversion process is crucial to the ultimate sound quality of the player, and each manufacturer has his own circuits for this purpose. The competition here is about the same as in conventional audio equipment. The designer must

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take care to preserve the subtleties of the signal once it returns to analog form. Cheap and dirty circuits at the final output stage, while saving production costs, can ruin much of the sought-for clarity. For this reason, you must listen, and compare CD players as if they were speakers. Just because they are "digital" doesn't make them all the same or all perfect.

Recovering Lost Data

The second generation of CD players, which should reach dealers' shelves in the first quarter of 1984, makes use of newer and bigger VLSI chips, and more sophisticated error correction codes. With fewer chips, they run cooler and are cheaper to make. The error correction codes are truly miraculous. A piece of opaque material over the data tracks as wide as 3mm does not cause any audible problems on a second generation player. On a first generation player, a 1mm data gap causes momentary muting or clicks, but nothing like the ticks and pops of a scratched analog record.

How the error correction codes work is complicated in the end, but basically it's a simple parity bit scheme. Suppose you have a four-bit word such as 0101 or 1101. If the number of ones is even, you attach a zero; if odd, attach a one. With this technique, you can determine whether the word contains an error. By using more parity bits, you can narrow it down to which bit is wrong (in binary arithmetic, correcting an incorrect bit is simple). You can apply the parity bit concept to groups of words for longer-term errors, which is important, because any scratch or speck of dust is big enough to obliterate more than one byte.

Future Prospects

Putting the signal in digital form presents mind-boggling possibilities for future applications. One of the biggest problems is that manufacturing CDs is a difficult and expensive process. That tends to limit the range of titles to those with a fairly wide appeal. Alternative, less expensive methods of distribution could make more titles available to smaller, more specialized audiences. One way to do this might be to send the digitally-encoded signal through a cable TV system. For all practical purposes, we could do this right now. In fact, the Boston Symphony broadcasts have been sent from Symphony Hall to the radio station using a digital encoder (both a Sony PCM-F1 and a dbx 700 have been tried) at each end of the microwave link. No technical barriers prevent feeding that signal into a cable TV system. Anyone with a PCM-F1 or dbx 700 could decode the signal and listen through his audio system. And through the wonders of subscription cable billing, the BSO musicians and any living composers would receive their fair share of the broadcast fees. All the barriers are in the legal, financial and lethargical areas.

Peter Swanson points out that on a cable, the signal — thus the decoder — could be simpler since it would not need all the videotape formatting information. Also some cables now have a premium-quality music service, with a special decoder box. No practical reason exists to prevent that from becoming a *digital* music service. Other places to slip in a digital audio signal are the blanking interval between frames on broadcast TV (unless the videotex or closed-caption people stake their claim first), and on the FM subcarrier channel presently used for things like Muzak and paging systems.

The CD itself can carry limited amounts of text and graphic information, and such discs are currently on the market in Japan. Words to a song, a translation of an opera libretto, still pictures of the musicians — all kinds of applications are possible and will make the CD far more interesting than the LP.

Remember Quad? It died for all the wrong reasons. However, a CD can have as many channels as you want — no need to stop at two or even four. Precise localization of sounds, movement of sound-objects in the room, and accurate reproduction of room acoustics are production concepts you will hear with increasing regularity as the CD matures. These are exciting listening experiences which consumers will demand to hear once they get a taste of how well the medium can reproduce them. Already, complaints about poor ambience characteristics on CD's are being heard — because the sound is so clear, everyone notices when its not done well. What was once buried in the mud on analog records is now plainly audible to all.

Precise localization of sounds, movement of sound-objects in the room, and accurate reproduction of room acoustics are production concepts you will hear with increasing regularity as the CD matures.

Editing and Signal Processing

One of the most practical benefits of digital recording, at least as far as the record companies are concerned, is digital editing. Soundstream, which was one of the first companies with a digital recorder, has a computerized editing facility at its headquarters in Salt Lake City. Using musician-friendly software, and a bank of hard disks, they can edit tapes with a precision previously unobtainable — and without cutting into irreplaceable master tapes. The electronic splices have finer resolution than the width of the traditional razor blade. Also, the edits can be auditioned and redone until they are completely satisfactory, without harm to the tape. For classical music, producers now commonly mark the score, indicating the "takes" they want spliced together, and wait for a "proof" copy to come back. They don't need to be present for the actual editing.

Some fascinating possibilities are in store when electronic designers start thinking about purely numerical signal processing devices. Already, digital delay and reverberation simulators are in use, and digital equivalents of limiters, equalizers and other common studio equipment are certain to appear — all with performance parameters beyond what is possible with analog circuits. Peter Swanson suggested a limiter which would operate on different parts of the frequency spectrum at different times of the day, so *All Things Considered* would have a good strong, but highly compressed signal for people listening on car radios, while *Morning Pro Musica* would have as wide a dynamic range as possible.

But I think the real action will be in the area of the new numerical signal processors which will start to appear, offering special effects never heard before, and with no undesirable side effects. Some of the new generation of synthesizers, such as the Fairlight, the Synclavier, and the DMX-1000 have shown some of the fantastic transformations of acoustic sounds which are possible. When producers and musicians begin working with specialized numerical signal processors, we'll hear a revolution in music equivalent to what groups such as the Beatles and the Moody Blues did with the rapidly expanding recording technology of the Sixties.

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COMPUTERS, LASERS, MUSIC and THEATRE: A Composer's View

A Conversation with Paul Earls and Steve Birchall

We are sitting in the studio of composer Paul Earls at MIT's Center for Advanced Visual Studies in late August, as he describes his creative work and his plans for the upcoming concert season. Surrounding us are the "tools of the trade" — tape recorders, computers, synthesizers, mixers, circuit boards (some still under construction), amplifiers and speakers. Through a window we look out into the laser projection studio, where Dr. Earls is showing us examples from his new opera *Icarus*. During the interview, we are interrupted frequently by phone calls from people involved with concerts he will give soon in Munich and Paris. As we speak, music from *Icarus* plays softly, activating the laser displays.

Paul Earls: The production in Munich is an opera...the American premiere of *Icarus* will be next May.

Steve Birchall: Will we have a chance to see it in Cambridge?

PE: Yes — we will give an indoor production in MIT's Kresge Auditorium. The best part of the story of Icarus is the mating of the bull with the queen. That bull then becomes the Minotaur. After that, Icarus and his father are put into the Labyrinth, from which no escape is possible, unless you can learn to fly.

SB: Tell me more about *Icarus*. What kind of a piece is it; how is it put together?

PE: It's a multi-media opera, and we have two performance versions, one of which we call the Sky Opera because it can be — and often is — done outside. We're presenting it as part of an international horticultural exhibition in a large park in Munich, with a large amphitheatre. We're giving four performances of *Icarus* as an outdoor production with inflatable sculptures by Otto Piene. These give us lots of images and activity up in the sky and the air. In addition, we'll have two soloists who actually are opera singers — David Holloway and Diane Curry. Both have sung with the Met. We did it in Austria last September as an indoor stage production. This time in Munich we're doing it on a larger scale.

All this is about the guy who learns to fly. So we have the two singers, the Boston Musica Viva, with Richard Pittman conducting, and a children's choir, which really represents the personality of the Icarus character — prepubescent. It's about an hour long, non-stop. We have presented it various ways — with laser projections, and with video projections. We'll probably do it here with both video and laser projections, since the production at MIT will be indoors (Kresge Auditorium), and with Otto Piene's large inflatables. I don't know if you're familiar with these, but they are 40 or 50 foot tall balloons representing characters or people. They give a large scale to the performance.

SB: Do you project laser images...

PE: We've done that. This photo shows part of a production in Linz. You can see a woman singing up there, to give you an idea of the scale. The inflatables are back behind and reflected light is bouncing all around the stage.

SB: How do you derive the laser images? Are they controlled by the music at all?

PE: Yes, they are. To begin, the images actually are drawn with an Apple on a bit pad. These are all Otto Piene's drawings. And then, once the drawing is on the monitor, you can alter it with music. Let me see if I can find something...I've been out of the studio for awhile so I doubt that anything is hooked up...Here is a tape of some old electronic music I can use to demonstrate.

SB: Do you plan to use the alphaSyntauri in *Icarus?*

PE: It's one of the instruments...

SB: ...And it just takes its place alongside the other instruments.

PE: Yes, the pianist plays it.

(As we talk, music fills the studio and the laser image begins to dance in the projection area.)

PE: See what the music does to the static image?

SB: What musical parameter causes the image to move?

PE: The controller is just a color filter — like a color organ. The lower frequencies control the up and down movement. If you take the music influence off entirely, you just have that (a static image). If you put the music on it — you've got that....

SB: Very nice!

PE: So, in this case, the music controls the size of the image on the two axes independently, as well as the polarity. I can make it turn over. Every time the music gets loud enough, it changes the polarity on the horizontal axis. That's a control parameter. Let's do another image. It's an automatic process controlled by the music's characteristics. Electronic music works extremely well for installations that deal with music and lasers.

You can do certain kinds of simple animations with these things. The images are being drawn by two mirrors which move rapidly, tracing the image stored in the computer. This image is stored on tape, and the tape deck is simply playing back the images we're using. However, first you must create the image on the computer. Then, with FM encoding, you store it on tape for exactly the time length you need. During the performance, you play it back and the computer translates it back to an image. Our new system uses an Apple on-line as a driving system, which gives a more stable image. Here, you can see some wobbling, and the imagery itself actually is shaking a little bit. That's just tape flutter. Size is not a problem as you can see.

(Suddenly the image expands to a size larger than the room.)

SB: How about color?

PE: Color is a function of the laser. The other laser I have in that room has color capabilities, but at the moment it's connected to the video system because we can project video imagery with lasers, too.

SB: Changing color must be difficult, then.

PE: Well, actually it's not. Certain lasers have single lines throughout the rainbow of blue, purple, green, yellow and red. This one is an argon laser, so it only has blues, greens and purples. And the mixtures look like this....

Two years ago I used another laser, called a dye laser, in an exhibition at MIT that ran for a month. You run an argon laser beam through another system which contains dye. By changing the dye and tilting the prism, you can get very close gradations of shades in almost any color you want. That's really a double laser — the beam from the first excites the dye in the second one, making it lase. It uses the same fluorescent dyes they use in clothing and dye markers. Each of those dyes has its own resonant color frequency.

This kind of technology and the laser projection systems are so much like our music technology that I got involved easily because it becomes an extension of it.

If I want to move the image up and around, I can put it almost anywhere. What you see now is just the set of stored points needed to create that image. The laser beam is running very slowly around the stored points now. When you run it very fast, it doesn't stay long at each point, and it appears to smooth out. All of those rough edges become curved lines.

This kind of technology and the laser projection systems are so much like our musical technology that I got involved easily because it becomes an extension of it.

SB: Do you do most of your musical work with the alphaSyntauri?

PE: I do a lot of it with the Syntauri, and they've been very good to me. They have let me use this one for the past three years, and I've given four or five performances of music I wrote especially for it. I use the Syntauri in *Icarus*, and I used it in an installation exhibition as a real-time responding instrument. No one was playing it, but we had a triggering system (like a Doppler effect burglar alarm system) set up so that every time a certain amount of movement occurred in the room, it would trigger, throwing a signal into the synthesizer. We had an endless file of music sitting in the Apple so it would go to the next "album" or it would change instruments or change timbre in various ways. The kinds of decisions a person might make at the keyboard — punching up this instrument or that instrument, or playing this particular piece in a long album — actually were being made by the activity in the room. So the listener got a sense of constant change, and that perception was tied into the laser projections because the triggering activities were modulating them too. We had this kind of circular thing in the environment — the viewers were inducing changes as they moved about to observe the work. I've used it a lot in applications like that. We'll also use the Syntauri in the Paris show called Electra, which is a major retrospective of electronic art of the past ten years. We're also talking about doing a piece, or a part of a program, for NEWCOMP in the winter. I'm thinking of using four Syntauris — a kind of real-time quartet. (See page 48 for more on NEWCOMP).

SB: I want to hear that!

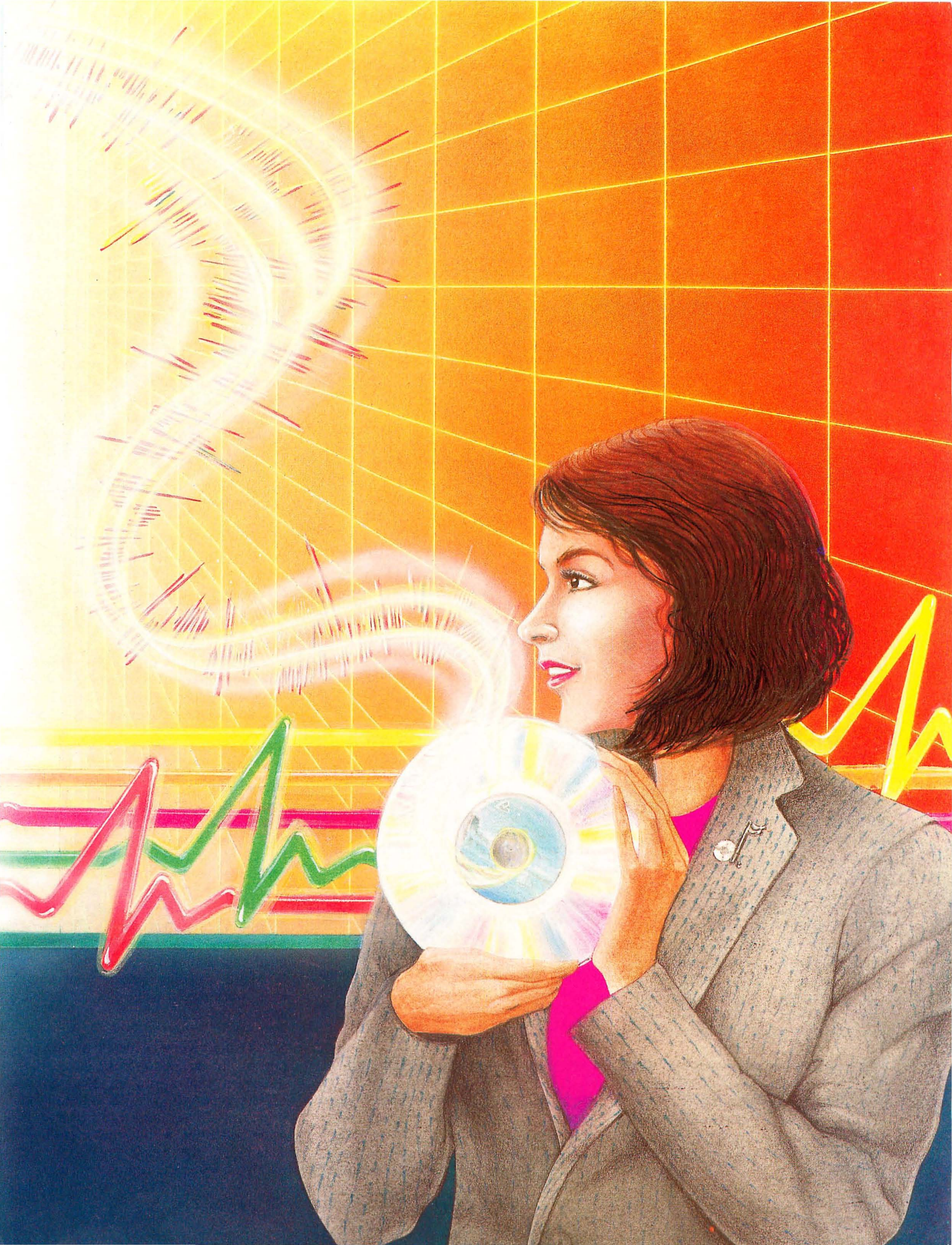
PE: I also may do something with the Digital Music Systems DMX-1000 downtown — a larger computer, a "real" computer, instead of microprocessors (chuckles). That's coming up.

SB: All the composers I've been talking with work on mainframes and minis. You're the only one I know of who uses a Syntauri or anything like it. And here you are, right in the middle of MIT and all its high-powered computer technology.

PE: I guess that's one of the reasons why Syntauri was interested in my having an opportunity to use it. The Center for Advanced Visual Studies gets involved in fairly interesting projects in interesting places so the equipment gets some attention too. It's used in unusual ways.

SB: What drew you to the Syntauri?

PE: They came to me. I got a call from Ellen Latham, the president, quite a few years ago. I had been asked to do a piece for Paolo Soleri's Arcosanti project in Arizona. She is a great sup-



porter and champion of Soleri, so when she heard about my project (she didn't know me at all), she just called and said, "Let's do something together." One thing led to another and she came to MIT to talk about the possibilities, so I said, "Sure, let's do it," and she loaned me an instrument. I had two or three projects including an *Icarus* production in Austria (part of a large electronic music festival called *Ars Electronica*), and I asked if we could use it there. She agreed, and Syntauri had a presence there that was beneficial to them. Also, we are becoming a test site for the Syntauri in the sense that we use it in unconventional ways — more than the normal composer or performer would use it. We really do a lot of software development.

SB: What kinds of unconventional things do you do?

PE: A real-time instrument that responds to an environment was something they never envisioned at all, but we did it and it worked. Also, as a composer, I want to do some things with the system that most people wouldn't. For instance, I think one of the weaknesses of the software is that Syntauri designed it so that you must enter everything through the keyboard. No matter what kind of piece you want to create, regardless of the style or musical materials, you are forced to enter the data through the keyboard, and thus are forced to think in keyboard terms.

SB: Exactly — that's the same criticism I made in my review a year ago.

PE: And I don't agree personally with the point of view about fingers being that important — communicating all your musical ideas entirely with your fingers. So Walter Zingerle developed a little program that actually allows you to type in values, edit them and push them around as numbers. With it, you can be much more accurate in terms of timings.

SB: That's more to the point for a serious composer. And, of course sliding tones are impossible with their software.

PE: Syntauri has their own bias about what they want to do and what they don't want to do. We however try to do all the "funny" things with it. This bias is influenced by the fact that most of their market is popular music performers.

SB: All they want is twelve tone equal temperament.

PE: And they are not interested in crawling inside the machine. They just want to turn it on, do things quickly, and know that it's reliable. It seems to work quite well for that purpose. I have no problem with that.

SB: I felt very frustrated with not being able to get the effect of turning knobs.

PE: You can do that, but you really have to crawl inside the software. In many long conversations with them, they've given information generously about how to take apart their programs. If we want to do something unusual, they suggest how to go about doing it and sometimes do it for us. I've never had any problem with help on modifying their software. The system has limitations, because it is on an Apple computer. I think they've taken it about as far as they can go in terms of the capabilities with the present Mountain Computer synthesizer boards — which are not all that great. I think they are, at the moment, limited with those boards — the finite number of voices, the DMA, and so on. The structure of those boards prevents them from milking much more out of them. I think they are at a deciding point themselves about whether to go into hardware or not.

SB: What kinds of possibilities does the Syntauri open up to you that wouldn't be available with normal instruments?

PE: I've been playing with electronic music for quite a long time, so it fits into that realm quite easily. MIT has a large system in the Experimental Music Studio across the street, which is available to me. At the moment, I'm really working on three levels of systems. I do some work across the street on the big one, although at the moment it's actually being torn down because they are updating it. But also, I've been working recently on the Digital Music Systems DMX-1000, which is downtown.

SB: I don't know that system at all.

PE: Dean Wollrath is the owner of the company. The machine is an array processor set on top of a PDP-11, and it does a scaled down version of the big music programs such as those we use at the EMS. But the reason I find it interesting is that, first of all, by stretching his budget a bit, an individual composer could afford to buy one. The advantage a free-lance artist has is that he is not dependent upon a large institution and its facilities. If the managers at the EMS decide they want to tear down a system and change the configuration, it's their machine and they do it. If I had a project scheduled for six months from now that would be delayed or inconvenienced by the modifications, that's just too bad. It's their machine, and they are going to do what they want with it. Whenever you are a user of a large system, unless it's your system and unless you're the kaiser on top of it, you're subject to that kind of problem. I like the idea that you can own your own system, that you can adapt and modify it yourself. Also, the portability of these things is a great benefit.

SB: Definitely! Virtually the equivalent of an orchestra in a suitcase.

PE: And the ubiquity of the Apple helps too. For instance, for the Munich performance, as I did in Linz, I'm not taking my Apple. I'll just take the Syntauri, and the card we've made to control the lasers, but I'm borrowing Apples from local companies. I did a project in Florida in January of this year. I didn't take the Apple — I went to a computer store and talked to them. Generally, I can borrow the equipment for nothing. Sometimes I'll do a laser demo in their store or give them a demo of the Syntauri. I don't want to carry a computer around with me.

If your system isn't working and it's the only one of its kind in the world, you won't be able to give your performance. I used to do that — two other microprocessor-based laser systems are sitting in here. I used to carry them around with me. But that approach really is nerve-racking, because occasionally something goes wrong. You can't find a replacement chip and you're in a remote area. What are you going to do? If your Apple isn't working, usually you can find another one.

SB: That's characteristic of microcomputers in general. Businesses have discovered that if you are doing bookkeeping or word processing on one, and it breaks, all you need to do is shove it aside and bring in one that's working. That way, the whole company isn't paralyzed when the computer breaks.

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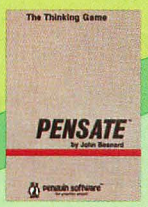

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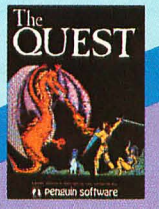

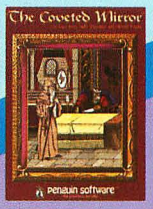

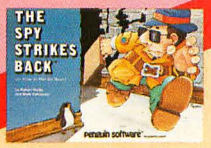

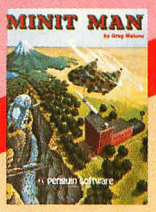

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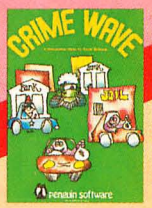

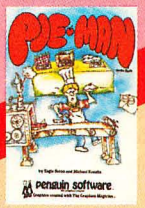

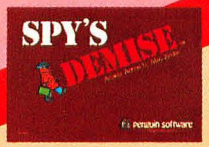

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PE: Exactly. I think the same thing would be true with the DMX-1000 system, because it uses a PDP-11 with an RT-11 operating system, which are in fairly common use all over the world. Although it costs over $20,000, a professional musician, doing income-producing work on it, could afford it. A violinist has to pay that for his violin. It's not like the system across the street which ends up costing a quarter of a million dollars and needs a full-time team of people to keep it going.

SB: What equipment currently is in use at the Experimental Music Studio?

PE: This is one of the largest computer music facilities in the country. It runs on a VAX now with a lot of hard disks. They use UNIX, MULTIX, and so on. It's a multi-user arrangement — ten or fifteen people can work simultaneously. It's almost real-time — you have to wait a bit, but it is fairly fast. "Commercial" is the wrong word, but it really is a kind of commercial facility. When you're the only person using it, it's nice, but it also requires maintenance and really heavyweight programming. Even the DMX-1000 requires a pretty decent program, but you could do that as an individual. In six months of your life you could probably learn enough to do the programming you need to operate the big system. It will do synthesized voices and you can put together the parameters to synthesize real instruments, as well as more classically configured computer generated instruments.

SB: Do you work directly in Machine Language?

PE: No. They have their own code, Digital's version of C. You *can* get into machine code. I've never done it on that facility. We do work with machine code, and we have to with the Apple. I like the idea of the composer as an individual being able to control the equipment. The Apple/Syntauri is on a very good scale for an individual, but it has real limitations.

SB: The principle is not too different from writing chamber music. Your resources are limited, but still you can do a lot of interesting things.

PE: Yes, exactly. I think you can deal with the scale of the project as you will. I'm quite interested in the future of the Syntauri, because it seems to lie between two schools of thought. It responds best to somebody who has some real familiarity with how a computer works and how to do your own programming, although their software is fine. However, if you get impatient with it, you really need to have some kind of information beyond that — and experience. Most musicians don't have it, and are not particularly interested in acquiring it. On the other hand, the computer people sometimes don't have the musical sophistication to *know* what they want, so they can push the capabilities further.

SB: That has been a problem — we keep getting electric pianos instead of computer instruments.

PE: The Syntauri is somewhere between two things. And I think they are aware of the problem of where do you sell the thing? How do you market it?

SB: The market for rock groups is much larger than the market for *avant-garde* composers.

PE: Sure — they have the money to spend.

SB: Tell me about the kind of music you write and the styles you work with. I've heard some of your pieces and...

PE: ...a little bit of everything. I really don't think that I belong in any particular camp, except probably essentially conservative. I have a fairly traditional musical background and came up through all of that. I have, though, been influenced by my work with the visual arts and by the kinds of performing artists — interesting people — who specialize in conceptual art and environmental art. I like the idea of putting art, including music, in unconventional situations — outdoors, in a hallway, or in the sky....

SB: Wonderful ideas!

PE: Yes, but that's not the kind of thinking that you get in the conventional musical world, so I guess some of that has affected what I do. I'm really interested in dramatic work. I don't think you can be doctrinaire about dramatic work. I don't think you can be purist musically and say, "Only a certain kind of music is appropriate for what I want to do," because dramatic work by nature is dirty and sloppy. If you need a cannon to make a point, you bring in a cannon and fire it. And if a violin can do it, you do it with that. In other words, I think you become a little less philosophically clean about the whole thing. In theatrical music, you must make your point in the most effective way — you're trying to give an impression or convey a dramatic idea. That's why I write pieces for chain saws, or bottles, or pianos, or whatever is appropriate. I think they are all part of the available resources.

SB: The piece with the electric chain saw, drill and sander ("Power Movement" from *The Building of the Universe*) is marvelous.

PE: (Chuckles) I'm glad you liked it. It was interesting how well the audience stayed with it and how well Dean Anderson kept the piece together.

SB: All the theatricalism — the formal white work gloves, white hard hat, white tie and tails — gave it a wonderfully satirical quality. ↪

PE: That's something that you get when you're working in the visual arts. Dean Anderson was terrific — he picked that up right away.

SB: How did you organize the sounds for that piece?

PE: It's a fairly conventional piece. I had one of these intellectual brainstorms that I put together, but the notation is quite conventional. I gave him the score, which like most percussion music, says this staff line means play the chain saw, this means drill, this means saber saw, this means circular saw. In certain places he had to keep going until he went through the board. I used real note values and indicated dynamic levels and pauses. Sometimes he had to play two instruments simultaneously. Once I had decided on the format, the actual realization of it, and the way in which it was rehearsed and notated, was very conventional. Even the musical gesture was quite conventional. After you accept the fact of the unconventional instruments and sounds, the inherent musical expressivity of the gestures is easy to understand. The same is true of the movement with the bottles ("Site Walkaround"), which is one of my favorite things. I really enjoyed what he did with it. That's a visual piece as well as a sound piece.

SB: Yes, it had a lot of energy.

PE: That piece was partly aleatoric (dependent on choices made during performance). I gave him little blocks of rhythms to play on various instruments. I told him to repeat each one a certain number of times but, for every repetition, to change the particular instrument within the category. Of course, the choice was his to make at the moment he played it. Part of his responsibility was to select the various bottles and pieces of metal to use and arrange them on the rack, so it left a lot of things for him to do.

SB: So every performer's version would have a distinctly personal sound.

PE: Yes, and if he did it two or three times, it would be different, too.

SB: The Isabella Gardner piece had a very interesting way of handling the spoken voice on tape — that offstage presence.

PE: That was an experiment. It's really part of the next big piece I want to do — a long-term project on the creation of the universe. We'll do part of it for Paris, and I have a couple more plans still in my head. Everything I get asked to do, I'll probably twist into this project in some way just because it's a theme I find big enough to chew on.

SB: Yes, you could keep adding on to that forever. It's a wonderful concept.

PE: When you read all the different stories of the creation, you keep going from one to another. *Icarus* has taken about four or five years in its various stages and forms to come to where it is now. I'm just about finished with it.

SB: What instrument do you play?

PE: I grew up playing the piano, violin and clarinet. But I don't really play them anymore. From time to time I have to play the Syntauri, but that's just about it. When I do perform, I generally like to run the laser projections and control their relationships to the music. Playing the lasers is enjoyable because it gives me a chance to improvise on all the ideas I put into the piece. Because the music and the images are already written and committed to tape, I have a certain feel for, and experience with, the relationships among the visual and the musical elements, and all the dramatic qualities they can have. For me, performing is a double role.

SB: You really can be interactive with the performance!

PE: *(Demonstrating music and lasers as he talks)* What you're seeing is the singer for the full moon piece. It's really fun when you strobe the image. I can turn it over, start upside down, and when the music gets active, kick it back. We could do it the other way too. What you're hearing now is part of the piece I did for the MIT graduation.

For a composer to make a living *as a composer* in today's society is almost impossible. The conventional way in America is to teach. I've done that for a dozen years. Teaching is not a platform for your own individual work. Your work as a composer is independent of your teaching, and you have to find another avenue, which usually is an extended academic world. However, I do like the dramatic world. I like creating for opera, and for the professional theatre — outlets generally not available in the academic world. So this actually is some kind of interim solution. I use the visual arts as a way to support myself. A lot of people want laser work, so that creates opportunities for me to work as a composer. Those sources of income might not be available if I were just sitting in a room writing music or pushing notes on a Syntauri.

SB: The benefit was that you were able to experiment with more daring musical thoughts, because you had to find ways to suit those dramatic situations.

PE: You have to find solutions all the time. American society is not interested in new music in general. The orchestras, the established organizations are just that: museums which are never really interested in new works. Therefore, every composer has to make his own solution, for both professional and monetary survival. I don't say what I have done is a model by any means, but for me it's been a solution.

SB: That's tremendous, because few composers today can find so many opportunities for performance.

PE: And I have found a lot — some of which we make here. The opera they're interested in because all this spectacle in *Icarus* is unusual. But opera, of course, always has been a spectacle — not the way it's often done nowadays, but at least in the days when it really was a vital art form, it was quite a spectacle.

SB: It seems to be the point of opera.

PE: I think so. Unfortunately, it has become something else — something you're supposed to get bored by. It's not supposed to be relevant to anything and it's supposed to be ridiculous or absurd. But opera used to be like the movies are today — a medium for experimentation and a forum for popular controversy. I don't say we should return to that, but

when things are going right in an opera production, I don't know of any other art form that hits me with that kind of power. When everything goes right, it is a very remarkable experience. The concert music repertoire has lots of really fine masterpieces, but we don't have many operatic masterpieces. It's a harder field to work in than any other I know of. It's like plays and novels. There are very few really great plays, but lots of great novels. I think it's a much more challenging medium.

SB: It requires more people, too — many inputs from different kinds of creative people...

PE: ...and attention to some hard-to-understand variables that float around the production's edges. Some things work, but others don't. Why is this idea boring, and why is this one not ridiculous? We can theorize about some of these things, but ultimately they have to work on the spot, and the theory doesn't help you if the idea isn't working.

SB: *(Turning to look at another laser projection)* That's beautiful. Every time I turn around I see another incredible image.

PE: We won a competition, Joan Brigham and I. She works with steam and water systems. This project was a water sculpture for the Louisiana World's Fair, using music-modulated laser projections on streams of water — images of fish on water — things like that. It won the competition, but they didn't have the money to build it, so now they're looking for sponsors. If I did that work again, I'd use the Syntauri. We did the actual presentation as a videotape, because you can't describe this in words.

SB: What performances do you have planned for this season?

PE: *Icarus* will be done in Munich at the end of September. And we have the Paris performance in December. We are planning an MIT concert sometime this winter, but the date has not been set. I want to do a piece for Syntauri quartet, and maybe a real-time DMX performance. Most important is the American premiere of *Icarus* on May 30. We'll have lasers, Otto Piene's inflatable sculptures, electronic music — the full regalia for contemporary opera. I want to make a good recording when we do it. I have a good tape of the production in Linz, because that was sponsored by the Austrian radio.

SB: Do you plan to make a video recording as well?

PE: Yes, although that's considerably more expensive. You really need to do a separate production for video, because all the lighting levels are different from what you do for a stage presentation. I don't really like these things you see from the Met — just a camera sitting in the balcony. To me it's static, and boring. You have to do a different production for video, after the people have learned the music and feel comfortable with the opera.

SB: I'm really looking forward to seeing *Icarus* in May. From what I've seen and heard today, it's going to be an unusually exciting event!

THE DIGITAL SOUND:
Making Music with Soundchaser

Reviewed by Andy Muson

Computer technology has been used in the recording studio for quite some time now. In fact, we take many things for granted that are just beginning to delight consumers, businesspeople and other children within a wide age span. Digital recording, computerized mixdown, mix merging with instructions flashing on a monitor, synthesisers, harmonisers, emulators and digitisers of all kinds are now commonplace in the studio. But, for use at home, this new technology has only recently become accessible as well as affordable.

I had been intending to buy a synthesiser, primarily so that I could learn to write in that medium, and be able to communicate to the players, in some intelligible way, the sounds that I hoped to hear. It was at just about this time that I was asked to write many minutes of music for *Aerobicise,* an aerobics workout seen on cable TV, and recently on national TV, now called *The Twenty Minute Workout.* The producer requested that the music for these segments be generally "new wave" and very "moderne."

The timing was great. I was about to do the obvious thing. Any one of the well known synthesisers would have sufficed as a vehicle to get me through the gig, and I would probably own one of them today, had it not been for my eight-year-old son.

We Take the Plunge

We (I) had recently (reluctantly), bought a home computer, after many months of pleading by my son, David. Since I wasn't about to let him sit in front of the tube all day and just shoot 'em up, I got a machine that had some programming capabilities. As we drove home from the computer store loaded with arcade games and other programs that I felt had given this purchase some redeeming educational value, I cautioned him that he had better spend equal time "playing" math, spelling and history, etc. Two days later I had a numb spot on my thumb, very bloodshot eyes, and an angry eight-year-old on my hands. I had beaten all of his high scores.

I realize that every computer salesman and many parents have heard that one before, but it was from such mundane beginnings that I entered the computer age and soon found the synthesiser that I was "really" looking for.

You see, I got hooked. I learned some BASIC programming, read all the magazines, and began checking out local stores for the latest in software. It was during one of these little forays that I noticed someone leaving a computer showroom with what looked like a piano keyboard. "Hmmmmm . . . what was that?

Steve Kessedjian, of Micro Business World in Woodland Hills, CA. had just sold a Soundchaser to a customer. He told me that he was into keyboards, and that this machine was really something, and would I like a demonstration? *Bingo. Deja vu* in the computer store.

It really was something special. I could hardly sleep until I owned one. (I slept even less for the first few days after it arrived.) Now all I had to do to fulfill my quest for the perfect machine was to explain carefully to my wife that I needed an Apple® computer to run this fantastic instrument. Within a few short weeks, we became a two-computer family.

I learned, during that short demo, that this machine wasn't just another keyboard synthesiser, but rather a complete music recording, transcribing, editing, printing and sound creation system, with lots of extra little tricks thrown in.

Tuning Up

Everything in the system is digital. Sound generation is by two banks of eight

System requirements: Apple IIe with monitor, one disk drive, game paddles, audio system (amplifier and speakers).

Andy Muson composing on the Soundchaser/Apple II system.

oscillators. The keyboard itself is eight-voice polyphonic. A possible sixteen voices may be recorded over sixteen tracks (digitally) *a la* sel-sync. When I get to this stage, I usually send the whole thing to my tape deck. This is very simple to do since the output of the system is fed into the AUX input of a stereo system. All of the recorded music can be synced to one of the many drum machines available so that a completed track can be produced in very little time.

I used the four track mode and the sequencer extensively while working on the *Twenty Minute Workout* project, but most recently have been using the sixteen track *Turbo Tracks* software. The ability to change the sounds on a track during playback was a fantastic tool to have at my disposal. Not only could I mold and change the basic sound by changing the attack, decay, sustain, release, pitch, vibrato, LFO modulation, octave and volume, (as on other synthesisers), but, I could change the actual preset or even change to another "master." (A master contains up to sixteen presets that can be used during playing and recording.) Masters are provided with the original software but the fun begins when you start to search for and create original sounds.

Making Music

There are several ways to go about creating sounds. Any of the sound waves that comprise a preset may be displayed on the monitor screen. Many oscillators (up to sixteen) and different wave forms may be combined to create a sound for each preset. These waves may be edited or altered by several other procedures.

A light pen is provided with the original hardware, but game paddles are the most effective when it comes to editing waves. For creating from scratch, a graph of the harmonic system appears on the screen, and the amplitude for each harmonic overtone is entered. When this is completed the wave can be displayed on the screen, edited and tweaked some more. Move the waves, load them into presets, load the presets into a master of your favorite sounds and so on. With this kind of versatility, the range of sound is almost limitless, including all sorts of etherial sounds and space age effects. All of this is accomplished with amazing speed and a minimum of hassle.

I want to stress that I still don't know very much about computers. All of this "programming" is accomplished by simple menu prompting on the screen, and by using the clear and concise manual provided by the Soundchaser people. It took a very short time to learn to operate the system, and lucky for me, because I had to use it "now."

One particular function of this computerized instrument really saved me a lot of grief. With all of its marvelous features, I still had to play everything I wanted to hear on a piano keyboard.

My instrument is the bass. I play just enough piano to check my voicings and rhythm figures, and play melodies (if they are not too fast.) Well, I must admit that I took full advantage of the tempo change functions. Play it slow, press the button and hear it back, up to the tempo of your choice, *in the same key!* Now that's what I call progress through computing. I probably would have bought the system for that feature alone. It all works, and there is more.

With the addition of a printer and the PolyWriter program, musical notation can be displayed on the monitor screen, as it is played on the keyboard in real time. The program features polyphonic print out of chords, separate lines for orchestral scoring, treble and bass lines with chords for lead sheets. Enter key signature, time signature and the tempo, (a click track is also provided), play the melody, send it to the printer, and you have an instant lead sheet, or trombone part, or whatever. Naturally, many edit options, including transposition and proofreading for rythmic correctness are incorporated into the program.

I realize that this may be an awful lot to swallow at first, but, at the same time, I feel that these computerized tools that I have been describing, are just the tip of the iceberg as far as musical applications are concerned. The techniques of programming, and the large musical computers have been dissected and studied in universities for a long time. I for one, am really happy that the availability of these tools has become such, that we use them on a daily basis. For me, the computer programable synthesiser has been an invaluable tool, not only as a time saver, but also as a kind of audio (and visual) "drawing board," adding impetus to the creative process.

In my own case this impetus resulted in creativity well outside my usual field of endeavor. My journey into the world of computing was about to take a new and totally unexpected turn.

From Musician to Entrepreneur

Once the immediacy of the music projects had passed (temporarily), I took some time to sit down and actually explore the machine that was at the heart of my new-found digital musicality. Remember, I was pressed for time, and although I had a cursory knowledge of BASIC, (all puns intended), and even wrote a few six line programs for click track/metronome conversions, number of bars in minutes at *x* tempo etc., I hadn't really explored the Apple or the Soundchaser past what my needs were for a particular assignment.

Well, it seemed that every peek into these machines (next to last pun) magnified my enthusiasm for them. It wasn't long before my entire life was on a disk, or so it seemed. I discovered data bases for all sorts of filing and record keeping, word processing not just for letters and that sort of thing, but also for lyric sheets, demo and reel labels, games, of course, and so on.

The Soundchaser became the producer and filer of pop songs, arrangements, random licks and musical ideas. To say that I had a large number of data disks would be an understatement. In fact, I had over two hundred disks within the space of about four and a half months. They were stored in every manner of device available. None were really satisfactory. There was nothing that could hold a lot of disks efficiently, in terms of desk space, ease of access and filing. Needless to say, there is one now!

It was one year ago this past October that I ventured (possible pun) up to the Apple Fest in San Francisco to seek out what was new and exciting. I was truly inspired by the wealth of new ideas — software, hardware and accessories. I was so inspired, that when I couldn't find the disk storage device I thought would surely be at this show, I determined to design one of my own.

While driving from San Francisco to L.A. that Sunday after the show closed, the cineramic blackness of the windshield became a drawing board where all manner of design came to my mind's eye. By the time I reached home I had formulated many of the ideas that have come to fruition as product and are now available to all computer users in need of "better mouse traps."

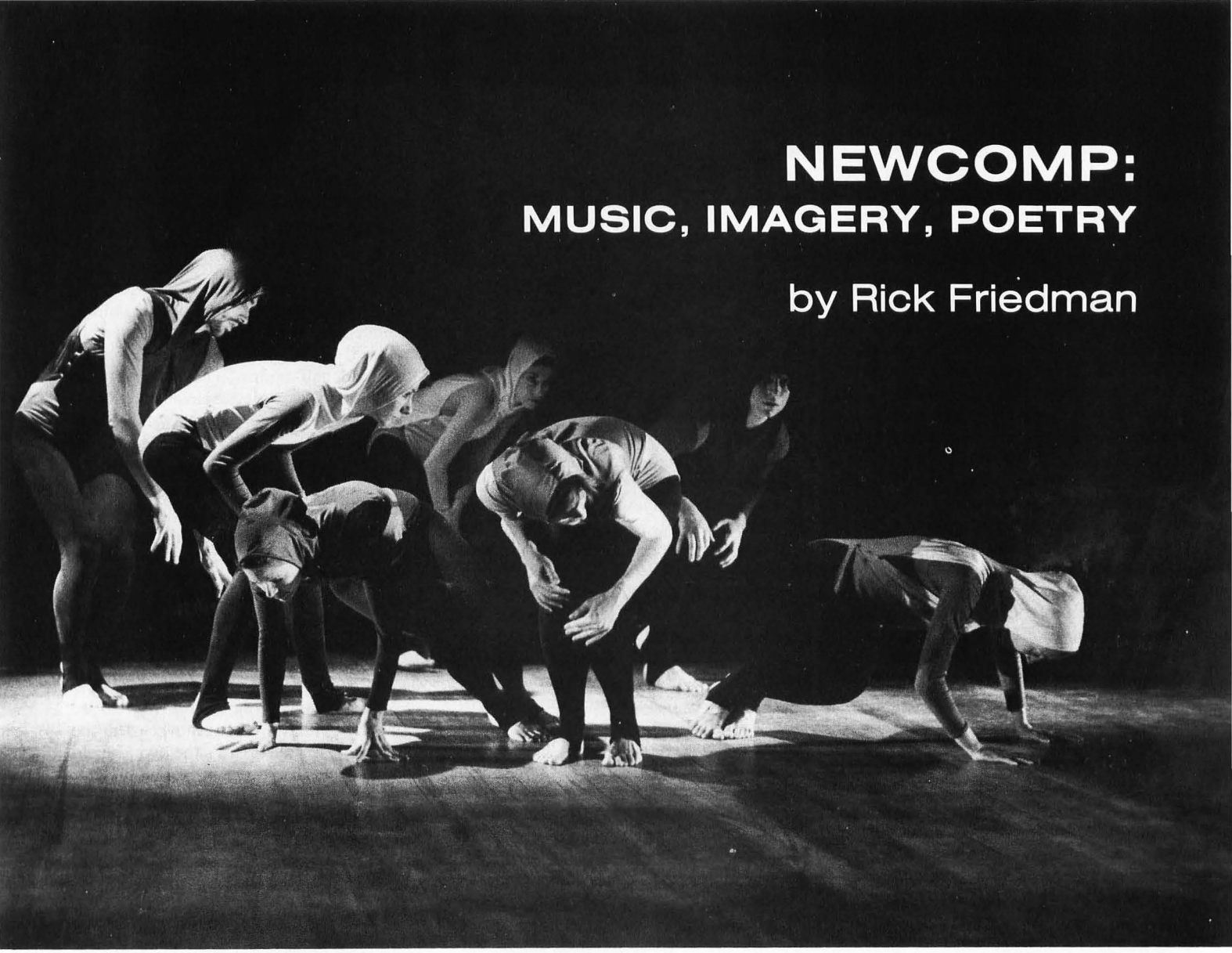
Within three months of the 1982 Apple Fest in San Francisco, I started *Diskus Products.* Our first product, the *Diskfile 125* was introduced at the West Coast Computer Faire last March. Since then we have expanded our product line to include the *Diskus Jr., Diskfile 8,* and a full line of innovative desk top computer accessories including the *Tilter,* an angled printer stand, document holders, and the *Poco Stand,* a desk top stand for brief case type portable computers.

So, it has been a hectic year and shows no sign of letting up. I have been sharing my time between *Diskus Products* and a musical career that now includes being musical director of the newly reborn Ralph Edwards' *This Is Your Life* show.

As I become more knowledgeable in the areas of computers and digital music, I realize that we are still only seeing the tip of a gigantic technological iceberg. On the horizon are many advances and improvements, innovations and discoveries. New products will be forthcoming from *Diskus Products,* while yours truly contemplates musical entry into the growing digital home entertainment industry. Watch for "*Dr. Diskus,*" appearing soon in your home.

NEWCOMP:
MUSIC, IMAGERY, POETRY

by Rick Friedman



The Massachusetts Dance Ensemble of Cambridge performing at a NEWCOMP "Computer Music and Dance" Concert.

It is a mild, late Autumn evening at the Boston Film and Video Foundation, on Bolyston Street. An audience of some 100 people sit in a pitch-black theatre, listening attentively to a musical poem. The poem is being read by a human voice whose pitch and speed has been programmed into music by software inside a computer.

It is a cold winter evening at the Village Street Theatre in Somerville, MA, an old and battered city a few miles west of Boston. In what was once a bronzing factory, where great bushy ferns now hang from hoists, some 85 people listen to deep, slowly-overlapping organ tones and wind chimes producing, with the help of a computer, a mournful elegy to the dark recesses of night.

In both instances, *NEWCOMP* has brought together an audience from both the high tech and the arts worlds to explore the infinite creative possibilities of RAM and rhythm, megabytes and melody, hardware and harmony.

NEWCOMP is an association of composers, performers and listeners interested, according to its two co-founders, "in the application of intelligent machinery to music and related arts." The co-founders and artistic directors, Otto Laske and Curt Roads, add that *NEWCOMP* is "dedicated to making the practice, research, education and performance of computer music an integral part of the New England musical scene."

In recent months, *NEWCOMP* has presented concerts entitled, "Computer Music and Dance," "Computer Music and Imagery" and "Computer Music and Poetry." Laske stresses that in these and all other concerts, *NEWCOMP* has presented over the past four years in the United States and Europe, "the computer is used as a composing tool in the dance, imagery and poetry. He says, "The computer is a creative medium. We're trying to break down the phobia the artist has about using the computer — to demystify it for him or her."

Roads adds, "At the same time, we want to bring the technical community into the creative process. In doing this, we can create a new audience coming from both directions."

Laske defines computer music as "any kind of music, including music performed live, whose production has been aided by computer programs. It can be used as a tool to create sound, or as tools by computers to assist in creating sounds; but, its relation to music is nothing more than a tool that can create good or bad music, depending on the talent of the composer."

Neil B. Relnick plays a Synclavier II keyboard at the NEWCOMP computer music concert. Since its introduction almost three years ago, the Synclavier II digital music system is being used at universities and by musicians to aid in research and implementation of their ideas.

Musicians Discover Microchips

Laske and Roads are both composers and both have their feet firmly planted in the world of microchips.

Laske, 44, has a Doctorate in Philosophy and a Master's Degree in Music. For many years, he taught musical composition and theory at such prestigious universities as McGill in Montreal, Utrecht in Holland, Pittsburgh and Illinois. "In 1978, I *dropped out* of the university scene," he says, to become a systems engineer; he now works on programming mainframes for Intermetrics in Cambridge, MA. Laske has been composing instrumental, vocal and tape computer music since 1970.

Roads, 32, studied music composition at the California Institute of the Arts and the University of California at San Diego. Since 1978 he has been the fulltime editor of the *Computer Music Journal*, published by MIT Press. He has been composing computer music since the early 1970's.

Both men claim that more and more composers are taking full- and part-time jobs in the computer field to provide themselves both financial security and a new outlet for their creative talents. Mark Lutton, President of *NEWCOMP* is an example, Roads says. He is a software engineer and a pianist. "It's a way for the artist to survive in today's marketplace," Laske claims, "and gets the artist away from the hothouse of academia."

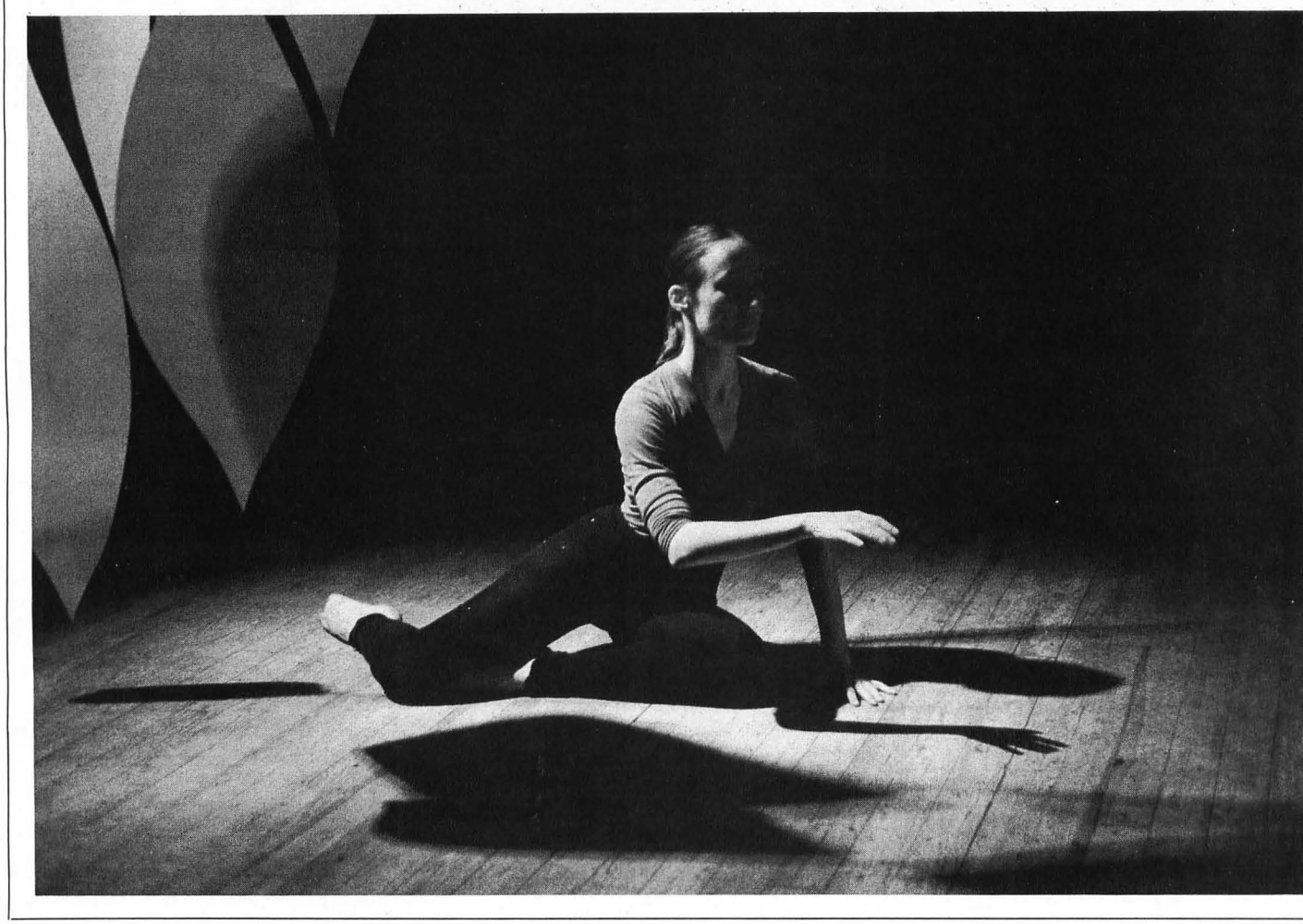
NEWCOMP concerts, Roads says, "present the best works that emerge from international sources," and *NEWCOMP* frequently brings the international computer scene to Boston. A February, 1984, concert on "International Computer Music and Imagery" will feature computer graphics artists Darcey Gerbarg of New York City, Japanese visual artist Masao Komura, Japanese music composers Kazuo Uehara and I Mizutani, as well as film by German composer, Josef Riedl, and slides of computer graphics by Henry Lieberman of M.I.T.

Laske and Roads claim that computer music gets a better reaction in Europe than it does in the United States. "Critics in this country aren't used to reviewing multimedia concerts," Laske says. Their expertise may be in dance, music or imagery, but not in all three. We never get the media coverage here that we get in Europe. Critics in the United States don't understand what we're doing." Roads sees this problem as an educational one.

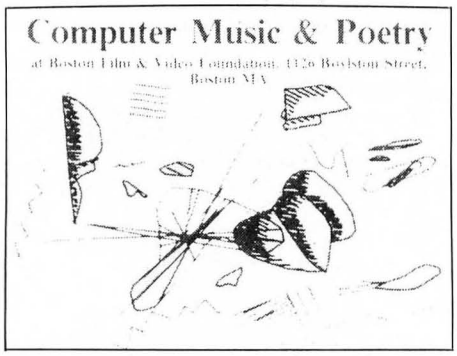
Going in the other direction, *NEWCOMP* is establishing its reputation in Europe, where it gives concerts and lectures. In 1982, *NEWCOMP* organized a successful concert tour through Italy and gave lectures and concerts at the Darmastadt Summer Courses for New Music, Darmstadt, West Germany.

NEWCOMP organized two concerts of music in Warsaw, Poland, in 1983 and early 1984. In the Spring of 1983, the concert was devoted to taped computer music and featured works by Laske and Roads.

Warsaw was also the site of the second concert in January, 1984, and featured instruments and tapes by six international composers, Laske and Roads among them. Both concerts were co-sponsored by the Polish section of the International Society of Contemporary Music (ISCM).



Lauren Naslund, of the Massachusetts Dance Ensemble of Cambridge, performing at a NEWCOMP "Computer Music and Dance" concert.



Poster Illustration by Harold Cohen, who designs computer art by creating images through programs that are self-directed and driven by a set of rules and decisions that emulate the human process of art-making.

Regular membership in NEWCOMP *is $16, couples $24, students $8, retaining membership $32, life membership $1024. For more information, Laske can be contacted at* NEWCOMP, *926 Greendale Avenue, Needham, MA 02192, telephone (617) 449-0781.*

NEWCOMP, ***continued***

NEWCOMP also has been asked to assist in the selection of works for a concert of computer music, as part of the May, 1984, Bonn, West Germany, New Music Days (Tage der Neuen Musik).

Outreach

In 1983, *NEWCOMP* held a successful summer course in the Boston area. Charging $35 for the entire week, it provided seminars on computer improvisation of jazz, artificial intelligence and music, planning structure in automated composition programs, the history of computer music, interactive orchestration, music printing by computer, and music manuscripting software.

Part of *NEWCOMP's* support comes from grants by way of agencies and foundations such as the Massachusetts Council on The Arts and Humanities, Meet the Composer/New England Foundation for the Arts, and National Endowment for the Arts.

NEWCOMP is looking into the possibility of setting up a public access computer music studio where people can walk in off the street to use the computer as part of their creative endeavors.

Laske and Roads envision the day when musical sound manipulation by computer will be an integral part of the home entertainment center. "The linkage between art, science and technology inherent in computer music generates enormous creative potential," Laske says. "We hope to make this potential known and accessible through concerts, lectures and workshops. Since we experience computers as an extension of creative abilities, we want to make computer technology better understood and valued, thereby removing the fear that it might be inimical to human originality and intuition."

Roads adds, "Making computer music is, we believe, a way of learning how to handle technological responsibility. We are interested in making computers into more congenial environments for musicians and artists generally. For this reason, we are interested in artificial intelligence applications to the arts."

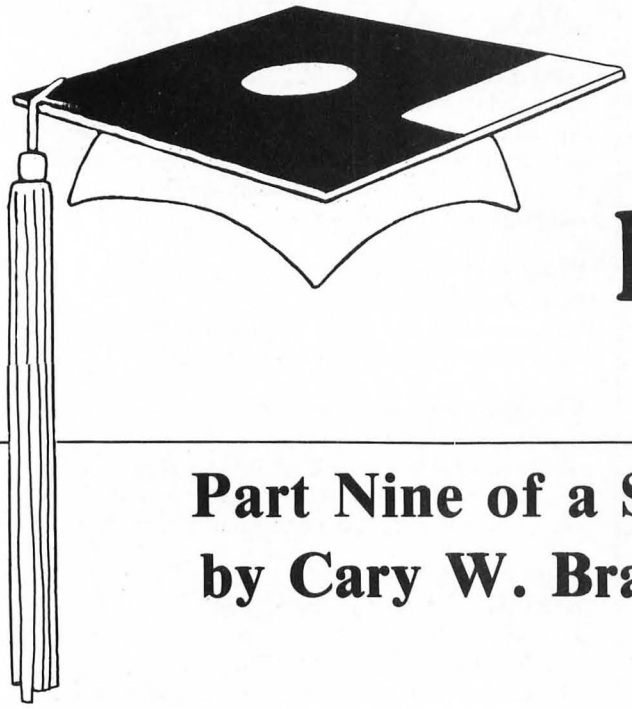
Sides Of SoftSide

APPLE® /SIDE

PC/SIDE

ATARI® /SIDE

COMMODORE® /SIDE



APPLE DISKOURSE

Random Access Files

Part Nine of a Series

by Cary W. Bradley

Our discussion of disk file programming in Apple DOS has been restricted, until now, to the use of sequential files. While this type of file is useful in a large number of applications, your programmer's tool box isn't really full until you've mastered the use of random access files. It's impossible to tell you everything you will ever need to know about the powerful data-handling features of random access files in one short article, but I can try to point you in the right direction for making this valuable addition to your programming repertory.

Random access files are useful for storing data in which individual items need to be retrieved or changed without disturbing other items in the file. Probably the most common example is a mailing list, in which a particular person's address may be looked up or changed. If you were to use a sequential file for the list, you would have to read every name in the list until you got to the one you were looking for — an inefficient way to use your (and your computer's) time. With a random access file, you only need a method for locating the particular record where the name in question resides, and DOS can read or write information there directly.

The price you pay for this convenience is a possible waste of disk space, since every record in a random access file occupies a predefined, fixed number of bytes — "Jon Doe" uses as much disk space as "Ellsworth Frothingslosh." It is often worth the tradeoff, however.

Finding Your Way Around

I will assume that you have read enough about random access files in the DOS manual to be at least vaguely familiar with their use. After you work through a couple of examples, you will get a feel for what they're all about, but you still need to learn more before you can appreciate their full power.

This month's programs are designed to demonstrate how easily a particular record in a random access file can be located, even if the file is fairly large. The technique is well known to programmers; it's called a binary search. It is absolutely essential knowledge if you are to master disk file programming.

The binary search, as presented here, requires that the file be arranged so that some piece of data that appears in each record is in either ascending or descending order. This item is called the "key." In our small example, the key is the only item in the file, but your applications can easily expand upon this example to use the technique. Getting the file in that order may require that it be sorted. (Sorting is a broad topic in itself, but you should master at least one or two simple sorting techniques if you plan to do much programming.) We'll get around the problem of sorting in this example by creating a file that is already sorted. This is accomplished by the program RA CREATE.

RA CREATE creates a random access file of numbers, arranged in descending order. The objective will be to locate the record in which a specific number can be found, or to determine that the number is not in the file. The program that does the searching, BINSEARCH, shows us exactly how the searching is done.

Creating the File

To keep the exercise from becoming trivial, RA CREATE uses BASIC's RND function to determine both the number of records in the file and the specific numbers that are placed in the records. (To avoid any possible confusion, please note that the term *random-access* has absolutely nothing to do with our use of the random number function to generate data values for the file for this example.) To keep it manageable, the file size for the example is restricted to the range of 1000-2000 records. After determining the number of records the file will have, a random number above 6000 is chosen as the first record in the file. Then, as each record is written, the contents of the next record are found by randomly subtracting 1, 2 or 3 from the

previous record. RA CREATE shows you the numbers as they are placed into the file by using the DOS "MON" command.

The sample file created, "SAMPFILE", has a record length of ten, although five would have been sufficient. To use the INPUT command, a carriage return must be written on the disk after each of the numbers. If you like to experiment, try explaining what happens when you don't leave enough room in the record for the carriage return, by changing the file's record length to four in both programs.

In Apple DOS, a random access file actually contains one more record than the number of the highest-numbered record, because numbering starts at zero. This fact can be used to our advantage. BINSEARCH's task is made a little easier by storing the number of records in record zero, and using records one through NREC for the actual data.

Searching for Your Favorite Number

After the file has been created, you can run the program BINSEARCH. Its purpose is to show you exactly how a binary search is done. You will be shown how many numbers are in the file, and what the largest and smallest numbers are. (Remember that the number of actual data items in the file is one less than the true number of records — don't forget record zero). You type in a number for the program to attempt to locate, and it attempts to locate the number while showing you how the search is progressing at each step along the way. As it is written, BINSEARCH serves no purpose other than instruction (a worthwhile purpose in itself), but it can easily be modified for use in your application programs. You would, of course, want to eliminate the statements that show what records are being searched, although they may be helpful for debugging purposes.

The principle of the binary search is fairly simple. It is a process of elimination. It begins by setting an upper and lower limit for records in which we might find the number we're looking for. As our lower limit we use zero, and add one to the total number of data records in the file to arrive at the initial upper limit. This is the purpose of writing the number of records in record zero when RA CREATE was run. For example, if the file contains 1916 records, we know for certain that the record number of a given data item must be greater than zero and less than 1917, if it is in the file.

Since the file is arranged from largest to smallest, it is easy to cut the number of records where the number might be in half. We just read the record halfway between the upper and lower limits (record 958) and compare its contents to the number we're looking for. Suppose, for example, that we are searching the 1916-record file for a record that contains the number 4216. If it turns out that record 958 contains a number that is smaller than 4216, we immediately know that the number cannot be in records 958-1916. So we adjust the limits of our search to 0 and 958 and again read the record in the middle of our new range (number 479).

The process is repeated until one of two things happens: Either the number is found, or the upper and lower limits collapse upon each other, in which case we may conclude that the number is not in the file. If reading the description of the search is confusing, run the program a couple of times and follow the computer's process of elimination. You'll soon see how straighforward the method is.

Since the range of the search is cut in half with each trial, our file of 1000-2000 records should never require more than eleven "reads" to locate a specific record. (Dividing by two eleven times yields a result less than one.) Even a fairly large file can be searched efficiently with this technique.

As with all basic programming techniques, improvements have been made on the binary search technique. If you ever find yourself in a programming environment where you are handling massive amounts of data and search time is critical, you may wish to investigate some of the more advanced techniques. But the simple version presented here should fill the bill for any situation you are likely to encounter in programming your Apple.

Parting Shots

This will be the final article in the Apple Diskourse series. I hope you've enjoyed reading and learning from the utilities and tutorials as much as I've enjoyed bringing them to you. Although the series has come to an end, I look forward to speaking to you through these pages on other topics in the future.

PROGRAM VARIABLES

RA CREATE:

D$: DOS command prefix, CHR$(4).
J: FOR-NEXT loop index.
NREC: Number of records in the file.
S(: Random number function. This function uses a "random" seed for the RND function.
V: The value being written in a record.
X: Dummy variable. Does nothing but hold the parentheses apart.

BINSEARCH:

A$: User input to yes/no question.
D$: DOS command prefix, CHR$(4).
MN: Smallest number in the file.
MX: Largest number in the file.
NREC: Number of records in the file.
NS: Counts the number of records read during the search.
RC: Number of the record being read.
TH: "Too high;" program has determined that the number being sought is not in any record numbered TH or higher.
TL: 'Too low;" program has determined that the number being sought is not in any record numbered TL or lower.
V: Value being searched for.
X: Value read from the file.

```
$$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$
$$                           $$
$$      Applesoft BASIC      $$
$$        'RA CREATE'        $$
$$    Author: Cary Bradley   $$
$$     Copyright (c) 1983    $$
$$ SoftSide Publications, Inc $$
$$                           $$
$$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$
```

Initialization and titles.

```
100 D$ =  CHR$ (4): DEF  FN S(X) =
     RND ( PEEK (79) +  PEEK (79
    ) * 256)
110  TEXT : HOME : VTAB 6: HTAB 6
    : INVERSE : PRINT " RANDOM-A
    CCESS FILE EXERCISE ": NORMAL
120  PRINT : PRINT  TAB( 7)"CREAT
    ING SAMPLE R-A FILE."
```

Apple Diskourse, *continued*

Force the number of records in the file to be between 1000 and 2000.

```
130  NREC =  INT (1000 *  RND ( FN
     S(X)))
140  IF NREC < 1000 THEN NREC = N
     REC + 1000
150  IF NREC > 2000 THEN NREC = N
     REC - 1000: GOTO 150
160  PRINT  TAB( 7)"FILE WILL HAV
     E "NREC" RECORDS."
```

Write the file to the disk.

```
170  PRINT : PRINT : HTAB 12: FLASH
     : PRINT " WRITING FILE: ": NORMAL
180 V = 6000 +  INT (1000 *  RND
     ( FN S(X)))
190  POKE 34,13: POKE 33,20: POKE
     32,9: HOME : PRINT D$"MONI,C
     ,0"
200  PRINT D$"OPENSAMPFILE,L10"
210  FOR J = 1 TO NREC
220  PRINT D$"WRITESAMPFILE,R"J
230  PRINT V:V = V -  INT (3 *  RND
     ( FN S(X)) + 1)
240  NEXT J
250  PRINT D$"WRITESAMPFILE,R0"
260  PRINT NREC
270  PRINT D$"CLOSESAMPFILE"
280  HOME : TEXT : VTAB 12: HTAB
     12: PRINT D$"NOMONI,C,0"
290  VTAB 12: PRINT  TAB( 8)"FILE
     CREATION COMPLETED."
```

For RA CREATE:

LINES	STOMP CODE	LENGTH
100- 210	WW	366
220- 290	DP	166

```
  SS SS SS SS SS SS SS SS SS SS SS
  SS                           SS
  SS      Applesoft BASIC      SS
  SS        'BINSEARCH'        SS
  SS    Author: Cary Bradley   SS
  SS     Copyright (c) 1983    SS
  SS SoftSide Publications, Inc SS
  SS                           SS
  SS SS SS SS SS SS SS SS SS SS SS
```

Find the size of the file and the range of values it contains.

```
100 D$ =  CHR$ (4)
110  PRINT D$"OPENSAMPFILE,L10"
120  PRINT D$"READSAMPFILE,R0"
130  INPUT NREC
140  PRINT D$"READSAMPFILE,R1"
150  INPUT MX
160  PRINT D$"READSAMPFILE,R"NREC

170  INPUT MN
180  PRINT D$"CLOSE"
190 TH = NREC + 1:TL = 0
```

Print screen titles.

```
200  TEXT : HOME : HTAB 8: INVERSE
     : PRINT " BINARY SEARCH EXAM
     PLE ": NORMAL
210  PRINT : PRINT  TAB( 7)"FILE
     CONTAINS "NREC" RECORDS."
220  PRINT  TAB( 7)"(VALUES FROM
     "MX" TO "MN")"
230  PRINT : PRINT "-------------
     ---------------------------"

240  POKE 34,6
250  INPUT "ENTER VALUE TO SEARCH
      FOR: ";V
260  IF V < MN OR V > MX THEN  PRINT
     "OUT OF RANGE. TRY AGAIN." CHR$
     (7): GOTO 250
```

The search begins here.

```
270  PRINT D$"OPENSAMPFILE,L10"
280  VTAB 5: HTAB 4: INVERSE : PRINT
     " SEARCHING FILE FOR VALUE:
     "V" ": NORMAL : HOME
290 NS = 0
300 RC =  INT ((TL + TH) / 2)
310 NS = NS + 1: PRINT NS"." TAB(
     5)"LOW="TL; TAB( 15)"HIGH="T
     H; TAB( 25)" READING:"RC
320  PRINT D$"READSAMPFILE,R"RC
330  INPUT X
```

If the number read from the file does not match the number you're looking for, adjust the upper or lower limit of the search range accordingly.

```
340  IF X > V THEN TL = RC: GOTO
     420
350  IF X < V THEN TH = RC: GOTO
     420
```

If you get here, the number you're looking for has been found.

```
360  PRINT : PRINT  TAB( 6);: INVERSE
     : PRINT " VALUE FOUND IN REC
     ORD "RC; TAB( 34)
370  PRINT : HTAB 6: PRINT " "NS"
      RECORDS READ IN SEARCH." TAB(
     34): PRINT : NORMAL
380  PRINT D$"CLOSE"
390  PRINT : INPUT "ANOTHER SEARC
     H? (Y/N): ";A$
400  IF  LEFT$ (A$,1) = "Y" THEN
     190
410  TEXT : END
```

Check to see whether the upper and lower limits of the search range have converged. If so, the number is not in the file.

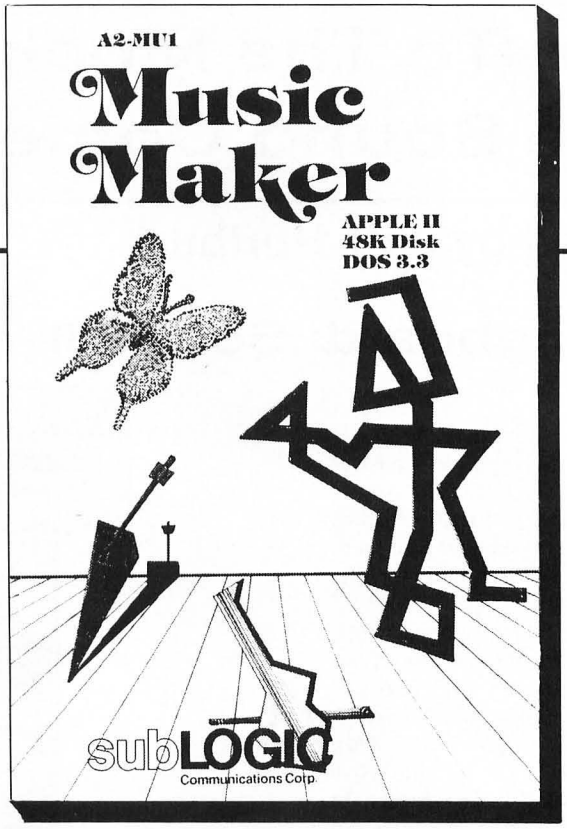
```
420  IF TH - TL > 1 THEN 300
430  PRINT : INVERSE : HTAB 6: PRINT
      SPC( 7)V" NOT FOUND. "; TAB(
     34): GOTO 370
```

For BINSEARCH:

LINES	STOMP CODE	LENGTH
100- 210	HC	224
220- 330	RZ	351
340- 430	WR	246

Music Maker

Reviewed by Jim Thompson



The potential for elaborate performance is there, and the sound emanating from that tiny Apple speaker will amaze you.

Surprise, surprise! Documentation written in the English language and understandable to most English-speaking people! That describes the introduction to *Music Maker,* a sound and music utility program with almost infinite potential — if the user has patience and fair-to-good music reading skills. The sound is pleasant — almost celeste-like — in the middle registers, flattens out a bit near the top, and sort of rasps at the bottom. The range is from F, an octave and a half below middle C, to F sharp, two and one half octaves above middle C. This is a full four octaves, sufficient for many serious applications, and more than enough for elaborate sound effects.

You enter notes sequentially by octave, name and type (whole, quarter, eighth, etc.); and they may be legato, regular or stacatto. You may alter the tempo of single notes or entire passages to suit musical tastes. You may enter one thousand notes in a single program, and you may link these thousand-note songs together to form a larger module. Editing, deleting and inserting are easy to understand and perform.

Chords, Too!

Music Maker's most remarkable feature (for the musician, at least) is its chord-making potential. You form chords by entering short grace notes (for example C-E-G) and then repeating the sequence over and over so rapidly that a vibrating C major chord is heard. Remarkable! But, oh, the patience needed to make such chords! Nevertheless, the potential for elaborate performance is there, and the sound emanating from that tiny Apple speaker will amaze you.

The instructions to integrate your music modules with Apple BASIC programs are easy to understand and actually work. With *Music Maker,* I had a Bach C-Major Prelude up and running within an Applesoft program in a few hours.

A Few Sour Notes

There are a few little annoyances, however, that tried my patience. For example: Jim Baldridge, you programming wizard, why do you keep asking me if I'm sure I want to do that? Of course, I'm sure. And why, in the Play Mode, is the repetition of the melody played backwards? It's irritating to have to hit ESC to hear repeats of the melody going in the right direction. Also, as long as you went to the trouble of making 256th grace notes, why didn't you make ties? Two tied quarter notes are not the same as two legato quarter notes. And one final gripe: If there's a way to access the Main Menu from the Insert Mode without going through the hassle of quitting, I never found it.

A Winner

Understand, now, that *Music Maker* is not a synthesizer. It is a self-contained piece of software with everything needed to make music on the disk. Naturally, you are stuck with the Apple's sound-generating capacity which Jim Baldridge has pushed to its limits. Still, *Music Maker,* for the price, is an outstanding value. No, that's not strong enough: As a former musician and now-struggling Apple programmer, I congratulate Jim Baldridge and Sublogic on a superior product, and recommend it to musicians and sound-makers everywhere. At last — your money's worth!

By Jim Baldridge (Sublogic Communications Corp., 713 Edgewood Drive, Champaign, IL 61820). System requirements: Apple II+ with 48K RAM, one disk drive, DOS 3.3. Suggested retail price: $29.95.

Listen To The Mockingboard: Apple Sound Comes Of Age

Reviewed by Jeff Hurlburt

Mockingboard: Sound II

What sings like a bird, zaps like a laser, and lives in an Apple? The answer is *Mockingboard II.* Officially *Mockingboard: Sound II,* this single-card peripheral may just become the de facto sound effects/music standard for the Apple computer.

Certainly the list of programs which incorporate *Mockingboard* routines has lengthened considerably over the last few months. Sometimes, as in *Thunderbombs* (reviewed in ***SoftSide #46***), *Mockingboard* yields a more impressive version of optional standard effects. In other cases, the board is employed to add another dimension, otherwise unavailable (the background music in *Ultima III*, for example). Finally, there is at least one major new release, a music-writing utility called the *Music Construction Set*, which has been designed expressly around *Mockingboard II.* More about this utility later.

Mockingboard: Sound II is supplied with a user's manual, a demo disk, and the Sound Editor 3.0 disk plus documentation. It and two smaller (i.e. fewer sound channels) versions, *Sound I* and *Sound/Speech I*, are Apple II+ and IIe compatible.

Zapping Like A Laser

Once you have placed the *Mockingboard* safely in a peripheral slot (normally slot four) you can connect the output cables. Each of the two on-card IC amplifiers can drive an eight ohm speaker to a respectable volume; but, for really *big*, low-distortion sound you will need the boost of an external system (i.e. you must plug into the "Aux" inputs of a stereo amplifier or receiver). If your system includes taping facilities, all the better.

Admittedly, the demo effects and tunes supplied by the manufacturer do not push *Mockingboard II* to its limits. They will, however, whet your appetite and provide a glimpse of the new dimension of expression at your disposal. Among the effects, a series of laser blasts, complete with hi-res display, is an especially dramatic illustration of sound dubbing over fast-action graphics. A brief text introduction and rapid logo scrolling, all to musical accompaniment, drive home the point: You can do anything you ever did with your Apple, but now you can do it with spectacular sound effects and/or music!

Mockingboard: Sound II from Sweet Micro Systems, 150 Chestnut Street, Providence, RI 02903. System requirements: Apple II+ or IIe. Suggested retail price: $124.95. Available now at a special discount price of $99.95.

Sound Editor 3.0

An excellent aid for getting acquainted with *Mockingboard II* is the Sound Editor 3.0 program included in the package. Employing one of the two available channels (i.e. three sound sources plus white noise), this utility makes it easy to create and save your own sound effects. You can also load-in and experiment with a variety of demo effects. (The latter approach, incidentally, proved to be the quickest way of getting a feel for the board.) Loading "Sonar," for example, you can manipulate the pitch, duration, rate, etc. of pings, or even mold an entirely new effect. Since you can modify frequency, amplitude, noise content, and envelope parameters from the keyboard (even while sound is being produced), it's not difficult to see what changes produce which effects.

Many "real world" sounds, of course, are too complex to achieve faithful reproduction with a single setting of *Mockingboard II's* parameters. Not to worry! Under editor control, you can string together several stored effects, fixing the duration of each element in the sequence. Thus, an extraordinary variety of effects, ranging from elementary tones to sound-noise blends and musical instruments, may be synthesized. Sound Editor encodes each simple sound (i.e. a single parameter setting) as a sixteen-byte table, so even intricate, multiple-sound effects are reasonably compact.

Among *Mockingboard II's* major assets is the ease of adding vivid sound effects to a program. Sound Editor makes things even simpler. Just BLOAD a set of brief routines (copied from the editor disk), and you're ready to play back any sounds whose tables are in memory. A few BASIC commands is all it takes!

In case you decide to "roll your own" access routines (or possibly develop a special-purpose editor, etc.), the *Mockingboard* people supply a good deal of relevant information, hints, and even a sound chip register reference card. The documentation could, nonetheless, stand a little fleshing-out, particularly when it comes to using the on-card timers and interrupts. In fairness to the publishers, however, the software documentation included with the board did have an "in-process" look, indicating that more comprehensive materials are forthcoming.

Singing Like A Bird

Virtual transparency of sound production to other Apple activities makes it a simple matter to incorporate elaborate musical backdrops into your programs. Now heroes can march to stirring airs, and colorful tunes can reward successful completion of educational tasks. (Even business software might become more interesting!) For the hard-to-convince, a sampling of the "Scherzo" (on the *Music Construction Set* disk) or of the delightful score accompanying *Ultima III* will resolve all doubts. The latter's introduction is a sound-graphics masterpiece, the computer game equivalent to the opening of *Star Wars.*

Music Construction Set

Sound Editor 3.0, alas, is not a tool for writing music. It emphasizes rather specialized, compact encoding, ease of note selection, and standard notation display. Fortunately, a new software publisher, Electronic Arts, has just introduced a music-writing utility encompassing all of the above functions and more.

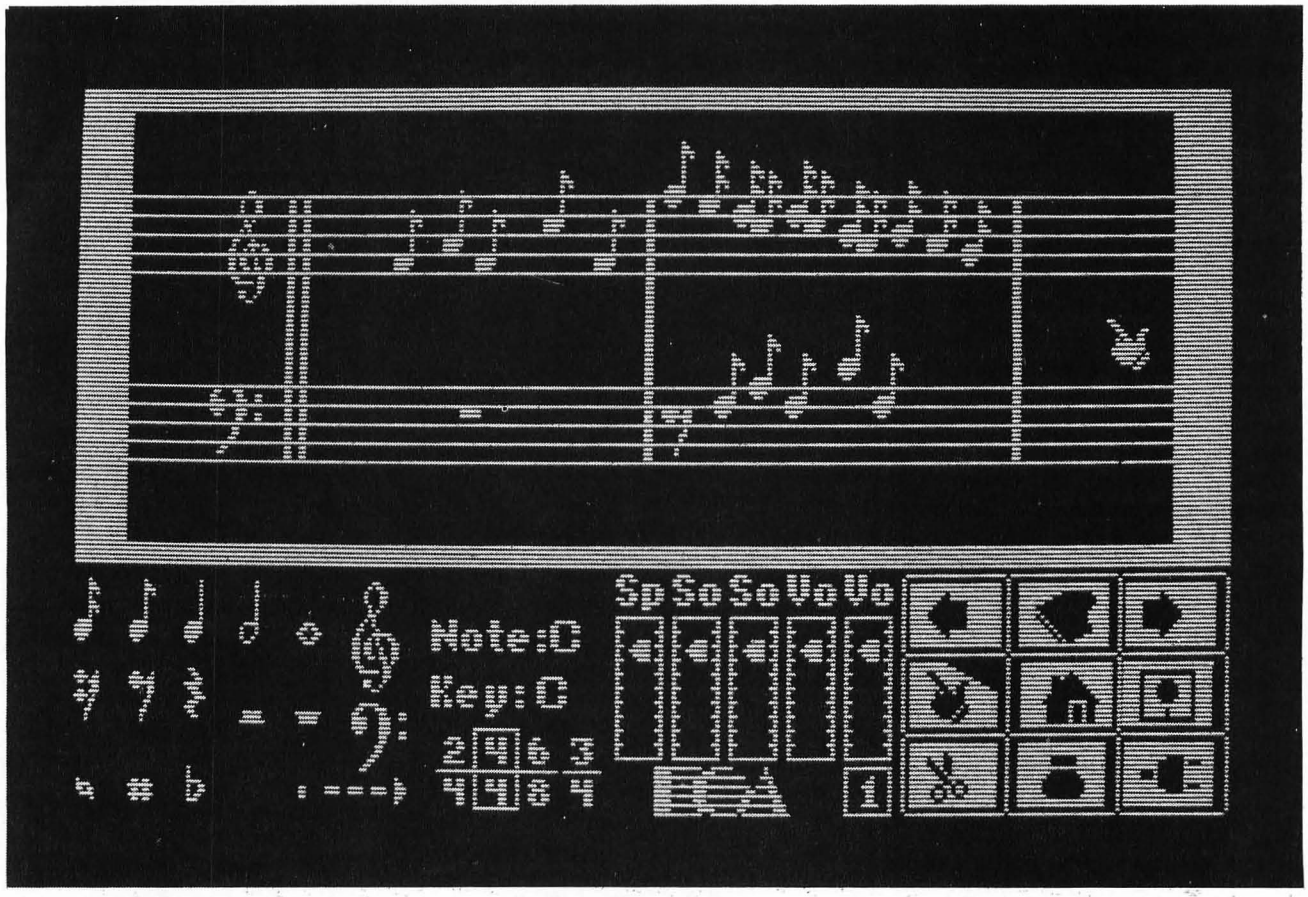
With the *Music Construction Set (MCS)* you can employ the single-channel *Mockingboards* (and even produce basic tunes with no peripheral at all); but you can utilize its full power only with the *Mockingboard II.* Featuring up to six simultaneous voices with a 700 note/staff capacity, *MCS* brings professional quality write-and-play musical composition to the Apple.

Whether you are a musical genius or not, you will master the Koala-style inputs quickly. Using a joystick, you move a pointing finger to pick up and place notes, rests, clefs, etc. on a standard, two-staff sheet music display. Other controls adjust playback speed, quality and volume level for each channel.

With "cut and paste" editing, it's no trouble to insert, delete and duplicate measures. For tricky passages, you can stop and restart play, scroll forward and back, check a timing error indicator, and change notes at will. (*MCS* even identifies and sounds each note as it's placed!) Finally, if your printer does graphics, you may obtain a hardcopy of the score (to pore over when you're away from the computer).

Naturally the icon-cued, fetch-and-place method of entry is an advantage

Music Construction Set by Will Harvey from Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. System requirements: the Apple II family. Also available for the Commodore 64. Suggested retail price: $40.



Music Construction Set, ***continued***

when getting started with *MCS*. Unfortunately, it is also dreadfully cumbersome, especially since you must often place the pointing finger precisely. For practical work, the *MCS* keyboard option (you type in notation with single keystrokes) is much better.

What You See Is What You Hear

Generally, what you see on the *MCS* display is what you will hear; and you may enter music as it appears, or would appear, on sheet music. Otherwise (for instance, playing triplets), the *MCS* manual outlines acceptable alternatives for entry. The sole significant exceptions involve speed and volume. There is currently no *MCS* notation to permit changing either during play.

Like the sound editor, *MCS* permits effortless recording and retrieval of selections from disk. These selections, however, have entertainment value in themselves. Your Apple, you will discover, has suddenly been transformed into a musical instrument. (This time they won't laugh when you sit down to play!) *MCS* makes integrating music into a program almost as simple. A short playback routine and the compact music code are BLOADED, and you're ready to go. The *MCS* manual locates key control bytes to facilitate a variety of special manipulations. You can even deallocate unused voices so that sound effects may accompany music.

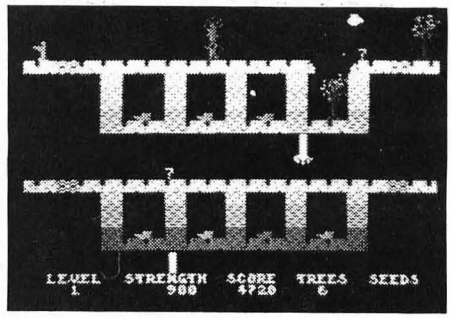
As might be anticipated in a prerelease working copy of such a complicated program, a few bugs emerged in testing. These were reported to the publisher and should be absent from the finished product. In fact, *MCS* is an attractive, well-documented music-writing package, and an essential *Mockingboard* support utility. Apart from its value to the software designer, *MCS* will appeal to music lovers of every stripe.

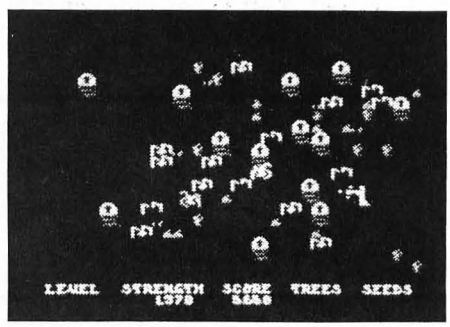
A New Standard

A powerful sound effects/music peripheral, *Mockingboard II*, has won remarkably wide acceptance in a relatively brief time span. With the release of *Music Construction Set*, the board boasts comprehensive utility support of a quality sure to make sound a la *Mockingboard* still more attractive to software designers and vendors (i.e. your *Mockingboard* will not gather dust back there in slot four). The era of the virtually mute, meeping, beeping personal computer is drawing to a close. There is a new standard, and the Age of Sound is upon us!

Necromancer

Reviewed by Richard E. Herring





Tetragorn is the *Necromancer**. "With his armies of halfling sprites, hammerfists, and dreaded legions of the arachnid," he rules supreme over all the world. His is the force of darkness and you, Illuminar, are the force of light. You are the last of the ancient Celtic priesthood which practiced magic — the last druid. Rallying the forces of nature to your aid, for the forces of men are far too frail, you descend into Tetragorn's lair to do battle with the necromancer.

There are three acts in *Necromancer.* Each has five progressively more difficult levels or screens (non-scrolling), and its own set of hazards. When you boot the game from disk, dreary sounding chamber music plays. The title screen lists the last score, high score since the game was booted, and program author, Bill Williams. There are no player options in *Necromancer.* When you press start, and between acts, the title screen splits in the middle and slowly opens to the next screen — a nice effect.

How Does Your Garden Grow?

In Act I, your druid magically materializes in the center of the screen where he remains through the act. He starts with a magic wisp (primarily a weapon), and ten seeds. Using the wisp, he deposits the seeds around the screen, and they grow into an army of trees with spectacular sparkling, shimmering leaves. Ogres, clubs slung over their shoulders, run back and forth across the screen as the trees grow, trampling young trees and stealing seeds. You protect the trees by sucking up the ogres with your wisp. Since it is magic, you only have to move the wisp near an ogre and it jumps out and destroys him.

Once the trees are grown, the ogres cannot harm them. However, there is a spider bouncing around who likes to poison trees. You can kill the spider, like the ogres, with the wisp; but you have to be fast. If you move the wisp over a tree immediately after it is poisoned, you can save it. Otherwise, a face appears on the tree, and screaming in pain, it turns into a stump. Periodically, a blue eye pod hops across the screen. Capture it with your wisp and you get one to eight new seeds to plant.

Fast And Furious Action

As you progress through each succeeding level, everything moves faster and more ogres appear. The act ends when your original 1,000 units of strength run out. You use strength by killing ogres, curing trees, getting new seeds, or being hit by the spider. You gain strength when your wisp kills the spider. At the end of the act you receive 200 units of strength for each level attained. You need as much strength, and as many adult trees as possible, to start Act II.

Act II consists of five nearly identical, but progressively faster, screens or levels. Each screen shows two rows of four vaults filled with poisonous spider eggs. Your druid and his trees can walk across the top of the vaults, but must avoid the Hands of Fate which descend from the ceiling and grab whatever they can. They drain his strength and destroy the trees. They also leave behind question marks which, if your druid runs over them, raise and lower ladders to the next row of vaults, earn points, or drain strength. Use the wisp to walk a tree over each vault.

From Synapse Software, 5221 Central Ave., Richmond, CA 94804. System requirements: 32K Atari 400/800 disk or cassette, 16K cartridge and one joystick. Also available for the Commodore 64. Suggested retail price: $34.95.

***Necromancer** n. (from the Greek "nekros", corpse + "manteia", divination) 1. Sorcerer, magician. 2. One who conjures the spirits of the dead to reveal or to influence the future magically.

↪

Necromancer, *continued*

When tree roots grow through the vault's brick top, the tree crashes down, crushing the spider eggs. You must then rescue the tree with your wisp. It is important to destroy as many eggs and spiders as possible since any which remain in Act II reappear in Act III. Once you run out of trees, you wait for spiders to hatch and fight them with your wisp. Since they move so quickly, however, it's best to descend rapidly through any remaining vaults and onto Act III. Any trees you have left give you more points.

Act III of *Necromancer* again presents the player with a series of five nearly identical screens or levels. As you progress through the levels, play becomes really furious. Almost immediately, the Necromancer materializes on a headstone. Unless you kill him with your wisp, he soon dematerializes, sending out jets of flame. At the end of each flame, a spider appears. Each screen contains thirteen graves with headstones at the start. Your druid must walk over all the graves to destroy their headstones and move onto the next level of Act III. If you can destroy all thirteen gravestones at each level of Act III, the Necromancer has no place to reincarnate and you win the game. When this happens, the power of your magic, and the strength of nature itself, cause the forest to burst into a phantasmagoria of color. The effect is super.

Spectacular Sound Effects

Necromancer makes excellent use of sound. It is not the sound's realism, but its variety that is impressive. A slow, rhythmic melody constantly plays in the background, getting faster and faster as you progress. Virtually every character and every event in the game has its own unique sound. In Act I, when the eye pods bounce across the screen, or a dying tree screams in pain, or your wisp vaporizes an ogre, you can hear it. There are at least five other distinct sounds in that Act alone, and a dozen more in Act II.

A Few Problems

The game has a few annoying inconsistencies. The druid can move in Acts II and III, but not in Act I. In Act II, you move not only the druid, but also the trees, with the joystick. It can be a bit tricky shifting control from tree to druid when you need to go after a spider with your wisp. In Act I, you lose strength for killing ogres, but gain it for killing the spider. Similarly, in Act III, you lose strength for destroying spiders but gain it for killing the Necromancer or the mother spider. In Act III, the Necromancer and the druid look enough alike that you will probably get them mixed up a time or two. The same is true of the mortal and immortal spiders. *Necromancer* features some really fine attention to detail, yet the druid, the central character of *Necromancer,* lacks the kind of detail that would give him real character.

Do I recommend this game? Not heartily, but yes. It is creatively different, and I love to watch those trees shimmer.

Pokersam

Reviewed by Carl M. Firman

Howdy Pardner — new in town aren't ya? Well, the game is Five Card Stud. The ante is real high; cost ya a buck to get in. Wanna Play? Ya do! Great, give your buck to Sam over there — he's the one with the Swedish accent — and pull up a chair.

Yessir, Sam is quite a guy. Out Hollywood way he's called the *Software Automatic Mouth.* We just call him Sam, or sometimes Swede. Oh yeah, he plays a mean hand of poker.

From Don't Ask Computer Software (marketed by Tronix, 8295 South LaCienga Boulevard, Inglewood, CA 90301). System requirements: 32K Atari 400/800. Also available for the Commodore 64. Suggested retail price: $24.95 (cassette or disk).

Sam really is quite a guy. I played poker with him the other night and won about 125 bucks in ten hands — then, in only one hand, that sonofagun won most of it back. Let me tell you some more about him. For those of you who don't already know about Sam (*S.A.M.;* see ***Softside#40,*** page 28) — he's a software speech synthesizer. *S.A.M.* will make your Atari talk better than most hardware synthesizers I have heard.

Second, you don't need to buy *S.A.M.* to play poker with him. *S.A.M.* the speech synthesizer is built into the game I'm reviewing here — *Pokersam.*

Let's Play Poker

When you load *Pokersam,* the first thing you hear is a jingly little tune and then Sam says "Let's play poker." He deals you two cards, both face up, and two cards for himself — one of them face down. Sam announces the cards as he deals them. All of the cards are visible on the screen, yours and Sam's. Sam can't see your cards, but you can see all of his except the face down card.

The player with the best cards showing bets first, and may bet up to $3. If Sam bets first, he will announce his bet and then give you a chance to Call, Fold or Raise. You press C for Call, F for Fold and R for Raise. If you Call, you

match Sam's bet and another card is dealt. If you Fold, Sam wins and collects the pot. If you opt to Raise, there is a three raise limit and the same $3 limit. You can continue to play and bet until you and Sam each have five cards — unless Sam folds.

Sam folds? Sam gives up? You bet he does; if he doesn't like his cards, or you manage to bluff him. Learning when to fold is a must for every good poker player. Bluffing is something else; you can bluff Sam (sometimes) by raising consistently. Sam will bluff too — sometimes with the most ridiculous cards. Sometimes Sam's bluff is for real, so watch out. His face down card may be an ace.

The First National Sam

Sam is really generous if you run short of cash. He'll offer to buy your watch and he also takes Visa and Master Card. Generous as he may be, he's not trusting. Sometimes he will tell you to "Keep both hands on the table," or "Look at your own cards." If things are not going well for him, you may hear him say, "I'd rather be playing Asteroids." In fact, Sam spices your whole poker game with witty comments. When Sam speaks the screen blanks, but you will adjust to this quickly.

The Graphics

Obviously, *Pokersam's* greatest plus is playing poker with an (almost) intelligent, wisecracking Sam. The game's graphics are not spectacular, but they are highly adequate. The screen is green and the cards are white. This is a high quality poker game, and you will find that spectacular graphics are not necessary.

Getting Into Debt

If you are winning, you may be accused of cheating. If you are losing and you run up a big poker debt, I really don't know how you pay it back. I wound up owing Sam about 200 bucks the other night — I expect a knock at the door any moment now, because Sam told me "I'll get you next time." Maybe he'll give me a chance to get even? This time I'll fold more often; I'll try to play a better game. After all, Sam's a good teacher, and I'm learning fast.

If you don't know how to play poker, you can learn how playing *Pokersam.* If you do play poker, I know you can improve your game. May the Aces be with you...

S.A.M.'s New Knobs

by Carl M. Firman

S.A.M. (the *Software Automatic Mouth*), from Don't Ask Software, has a new addition on the latest disks — *Knobs.* With *Knobs,* you can change *S.A.M.'s* voice from his standard Swedish accent to almost any kind of voice imaginable. *Knobs* will vary *S.A.M.'s* voice from almost human to that of a well known outer space creature with a taste for Reese's Pieces. There are so many different voices available with *Knobs* that your computer can carry on a credible simulation of a conversation among several different people.

Knobs is on the *S.A.M.* disk in three files, KNOBS.INS, KNOBS.REC and KNOBS.SAM. KNOBS.INS contains the instructions on how to use *Knobs.* You use KNOBS.REC when the RECITER program is loaded (RECITER reads English words and phrases from BASIC programs). KNOBS.SAM is for use without the RECITER (*S.A.M.* using phoneme's instead of English). You do not have to use or load *Knobs* in order for *S.A.M.* to speak.

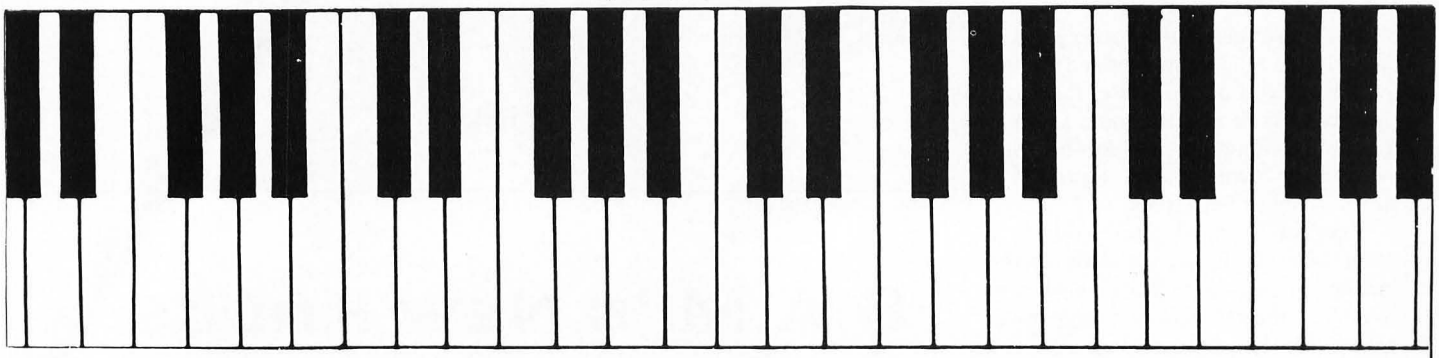
I wanted a real set of knobs to use to experiment with *S.A.M.'s Knobs,* so I wrote the following short program, Listing 1. It uses paddles zero and one to adjust the settings for knobs. Turn your paddles fully counterclockwise to hear the famous outer space creature. If you wish you can replace the "PADDLE(x)" statements with "INPUT D1,D2" and input a number from one to 255 directly from the keyboard (ET = D1=228, D2=228).

```
1 REM LOAD YOUR SAM DISK
2 REM LOAD "RECITER" AND "KNOBS.REC"
     USING THE DOS "L" OPTION
4 DIM SAM$(255):POKE 8208,100:POKE 820
9,60:GOTO 10:REM POKE 8208=SPEED AND P
OKE 8209=PITCH
5 GOSUB 2000:A=USR(8199):RETURN
10 SAM$="E  T,  PHONE HOME.":GOSUB 5:G
OTO 10
1999 REM ADJUST THE KNOBS
2000 D1=PADDLE(0):D2=PADDLE(1)
2020 POKE 24039,D1:POKE 24040,D2
2030 A=USR(23789):RETURN
```

The good people at Don't Ask Software have informed me that "POKE 8549,46" allows a graphics 3 display with players and missiles with very little change in *S.A.M.'s* speech. Poke this location with a 0 to return to the normal "screen off when *S.A.M.* talks" mode. I tried this in graphics 3, 4, 5 and 6 and it worked very well. However, it did distort speech in graphics 7 and above.

Have fun with *Knobs;* hundreds of different voices are available. If you already have an older version of *S.A.M.,* you can update it for a very reasonable $10 fee. If you don't have *S.A.M.,* you can buy the latest version, complete with *Knobs,* for the same price as the original.

Knobs is an enhancement to the S.A.M. Speech Synthesizer from Don't Ask Computer Software (marketed by Tronix, 8295 South La-Cienga Blvd., Inglewood, CA 90301). S.A.M. is available for the 32K Atari, the Apple II family and the Commodore 64.



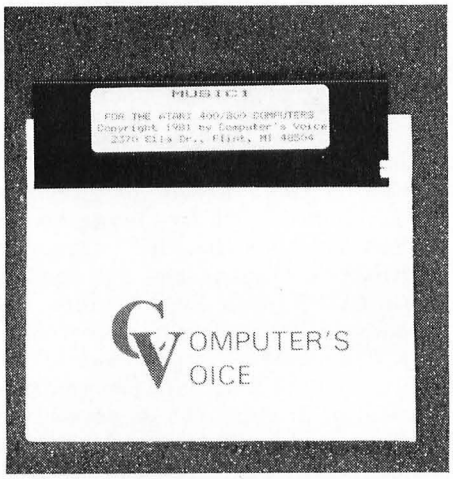
Atari Sing-Along:
A Review of Atari Music Files

by Robb Murray

If you own a music editor for your home computer, you probably enjoy playing music files created by other people. No matter which computer you own, creating your own music on it involves a lot of work, and you never have enough time to put in all the selections you'd like to hear.

Most hobbyists trade disks or swap files over the bulletin boards, but some companies are now offering music files for sale. Such "canned music" is our home computer equivalent of the old-time piano rolls. The added fun today is that the user can customize the files to fit his taste.

When it comes to music files, people seem to feel one of two ways. Either they see music editors as great computing and are so excited about music on microcomputers that sound is beside the point; or they see music editors as simply another way of creating music, and they judge the results by standards they apply to other musical forms.



Music I, Christmas Music, Set 1 and Set 2 (Computer's Voice, 2370 Ella Drive, Flint, MI 48504). System requirements: Music I — Atari 400/800 with 24K (disk) and 16K (cassette), Atari Music Composer Cartridge. Christmas Music, Sets 1 and 2 — Atari 400/800 with 16K (disk) and 8K (cassette), Atari Music Composer Cartridge. Suggested retail price: Christmas Music — $24.95 per set; Music I — $34.95.

I must confess that I fall into the second category. If you fit into the first group, stop here. You'll probably love all the files critiqued here and will enjoy playing them for your friends. Even I must admit that, though I found most of the music discussed here lacking, I had a great time playing and replaying each piece, taking it apart to figure out why it sounded as it did. I should say, too, that many friends who heard these files thought they were fine.

Perhaps I should explain the thinking underlying my perceptions on this subject. If someone offers a music file for sale, the file should have something more to offer than the garden-variety files traded around at users' groups. Above all, files for sale should *sound superb*! If possible they should showcase the editor they run on, and should be completely free of wrong notes. Collections of files should be statements in themselves, much as literary anthologies are. That is, they should have clear identities and make strong product statements.

The files under review here were handicapped from the beginning by the Atari Music Composer itself. The quality of the Composer's instrumental colorings is raucous. The editor is limited in note range to just three octaves plus one note. It can't execute triplets. Gradual increases or decreases in the tempo of its music, or graceful transitions from louder to softer, are impossible.

As Randy Kottwitz pointed out in his November, 1981 ***SoftSide*** review, the Atari Music Composer is simply not a good, programmable musical instrument. Randy estimated that it would require a "serious hunt" to find "a sheet of music capable of being input to Music Composer without serious deleterious effects."

Does this state of affairs automatically consign all music files for the Atari Music Composer to the pit? Not really.

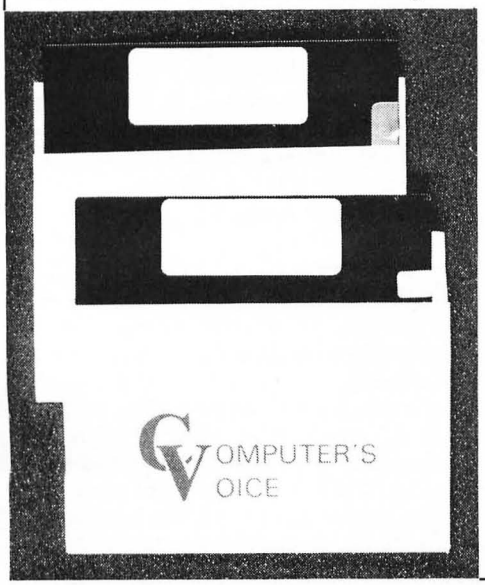
Musicians have created graceful and pleasing music on steel drums, the glass harmonica, and the tuba. As solo instruments, these contraptions all have characteristics that work against them. Music performed on them must minimize carefully anything unpleasant about their normal sounds.

People have varying degrees of luck making music on odd instruments. If you can get charming sounds from a row of shaving mugs, you are something of a genius. If you try to do so, but cannot, you should go back to making lather.

The folks at Computer's Voice had their clearest shot at success when they chose four Bach selections for their *Music 1* disk. You can play Bach on a set of cap pistols and, if your timing is perfect, you will move the very stones to song. Bach can sound angelic on all music editors, even this one. But taste decisions enter in; and, if they're mishandled or ignored, the results are suboptimal.

One of the Bach selections on this music disk is the Fifth Brandenburg Concerto — but just two voices of it. Why would anybody want to hear just two voices of a Brandenburg Concerto? Another question arises concerning Fugue 16. I haven't seen a score of this piece, but it's in B-flat (G-minor) and the bass line almost certainly goes down to a low B-flat — a B-flat that is out of range for the Atari Music Composer. I displayed the bass line and found several runs that would logically have gone to B-flat, but with rests where the B-flats belonged. Perhaps the piece could have been transposed to compensate.

But no matter; as you listen, everything's still sounding very pleasant indeed until the last chord. It gets strangled! It just flips past you, the piece thuds to the ground, and in your mind's eye you see a loose end of tape flapping on a whirling take-up reel. Regardless of what any sheet music might have shown here, was such abruptness necessary?



The *Music 1* disk also contains seven songs, with words supplied in an accompanying booklet, but the choppy, staccato sound of the music makes an uncomfortable and unlikely vocal accompaniment. (Despite its choppiness, I kind of liked "Alouette.") The Stephen Foster songs are marred by literalism in the use of rests. "Kum Ba Ya" blasts on for eight agonized verses. "Amazing Grace" is missing notes; "Shenandoah" is a travesty of bad pauses, as is "Long, Long Ago." "Amazing Grace" careens from verse to verse with narry a pause for breath, and I never could get "Oh! Suzanna" to load.

The Christmas songs (*Set 1*) are plagued by such thorns as range problems (notes drop out), inappropriate choral-style arrangements, and an occasional wrong note. "I Saw Three Ships" is pleasant, with a solo effect in alternating verses, but it's spoiled by a wrong note and an abrupt ending. "Joy to the World" ends strangely with what sounds like a descant note in the loud soprano part. In "Hark the Herald Angels," the bass part frequently drops out — even in the very last chord of the song!. "What Child Is This" has patches of unaccountably sparse lower parts. A less-familiar version of "While Shepherds Watched" is a nice choice here. But, in almost every selection, the abrupt breaks between chords give the feeling of Christmas on a pogo stick.

Christmas Set 2 is more of the same. In "Deck the Halls," "Foom, Foom, Foom," "It Came Upon A Midnight Clear" and "We Three Kings," the lower parts drop out like elves gone into hiding. The jerky motion of "Good King Wenceslas" and "The First Noel" is especially pronounced. "Away In a Manger," apparently another stylized choral arrangement, just doesn't work. Even the right notes sound wrong, and it ends on an inappropriate inversion.

Musical files are worth creating, in any stage of experimentation. Once you start seiling them, however, it's a different story. People expect, and deserve, high quality sounds. Some files really deserve wide circulation and sale, but let's face it — most of them should stay close to home, where there is more fun for the creators and less disappointment for the buyers.

Musical Computer — The Music Tutor

Reviewed by Robb Murray

There's a bit of the musician in all of us! If you've long nurtured the desire to learn to read music, *Musical Computer — The Music Tutor* can start you on your way, if you're willing to work at it. This music course for the Atari covers the basics needed for reading music one note at a time (it does not cover intervals and chords). Two main menus present titles for ten units, consisting of six content and four quiz sections.

The format of the content units is basically a "page-turning" one. Material is presented linearly. First come instructions and basic explanations, followed by animation and sound sequences. The animations appear in color, and the sounds are played through the television speaker.

You need strong motivation to succeed in this course because, while you are frequently told to memorize things, no on-the-spot drill is provided to expedite the memory work. Instead, you must take time out to learn things. Be prepared to spend some time with the course if you want to benefit from it.

The big advantage that a page turner course has over sitting down at the keyboard with a basic theory book is that the sound and animation play the musical examples for you. The program shows you how the notes sound, something no book can do. Another advantage over solitary book study is the drills offered. However, the difficulty of the questions increases rather quickly, underlining the need for motivated learning on your own. The course contains a total of ninety questions. The subject breakdown is: 20 questions on treble clef pitches, 20 questions on bass clef pitches, 20 questions on rhythms and note durations, and 30 questions on rests, tempo and dynamic markings, and accidentals.

From the Atari Program Exchange, P.O. Box 3705, Santa Clara, CA 95055. System requirements: 40K Atari 400/800 with disk drive. Retail price: $17.95.

One strong feature of the course is that it presents material in a logical order. Succeeding material dovetails nicely with preceding, and the abundant quiz questions constantly reinforce learning. The course offers the ability to freeze progress by hitting the space bar, and to resume by hitting it again. Herein lies the user's ability to tailor the pace of the course to his needs. The course occasionally presents things in a novel, refreshing way. For example, the names of the lines in the treble clef are paired with the phrase "Every good bird does fly." This is a surprisingly nonsexist mnemonic that no one used twenty-five years ago when I got my start.

Lackluster Impressions

While solid and complete, this program nonetheless presents a somewhat listless approach to computerized instruction. In the beginning, you're greeted by a rather corny blues riff, and introduced to "MC, the musical computer." A "welcome to the wonderful world of music" intro follows, hardly the motivation builder it's intended to be.

At the end of various sections, the program informs you that "you are now ready for more fun." Given the difficulty of some of the quizzes, and the rather rapid pace at which the course proceeds, one wonders if "fun" is an appropriate or convincing word.

This speaks to the whole area of production values. Screen composition in the course is hardly elegant or pretty. The writing style often seems lackluster, if not sloppy. For example, the mnemonic word "F-A-C-E" is called a "phrase."

I noticed two puzzling omissions. The term "fermata" is explained, with an example, but it is never called a "bird's eye." While "bird's eye" is considered a somewhat backward term for fermata, it is certainly a memorable and helpful association. Another puzzling omission, considering that the learner is apt to be a beginner working alone, has to do with "crescendo." The program defines the term, but never gives its unusual pronunciation.

Quizzes lack the expected motivating tweaks. The same response is returned to you for every right answer (". . . is right"). Responses to your wrong answers are no more inspired ("Wrong, the correct answer is . . .").

Questions missed do not recycle until answered correctly, and the program always presents the questions in the same order. If you want another try at a missed question, you must take the entire quiz over again. Scoring is rudimentary, showing only the number of questions remaining in the quiz, and the number you have answered correctly in the current round.

I noted a small logic flaw in one area of the course. You are asked to learn the names of notes (quarter note, half note, etc.). Following this, the course covers the general notion of time in music, with the concepts of measures and whole notes. Terms like "quarter note" would be much more meaningful if the learner knew what "quarter" referred to (a quarter of what?).

A major omission: While the time signatures 4/4 and 3/4 are used constantly, nowhere is the system of accenting discussed. Yet knowledge about strong beats and weak beats is fundamental to sight-singing and to playing instruments.

Two outright mistakes are more irritating than damaging. A grammatical error: The term "fortissimo" is defined to mean "played very loud;" and, the plural of "staff" is given as "staff" rather than "staves."

Summary

Overall, then, this program is a rudimentary and servicable course for a motivated learner. Certainly there are areas of possible improvement, perhaps to be considered in future revisions. At the moment, though, it isn't a bad program. If you are prepared to spend time with it, you can learn quite a lot about the basics of musical notation.

Blue Max

Reviewed by David Plotkin

Blue Max is a remarkably well implemented, high resolution, diagonally scrolling air/sea/ground battle. The player pilots a World War I biplane across a landscape, wreaking havoc with bullets and bombs, and dogfighting with enemy aircraft.

Blue Max uses three-quarter perspective: Rather than a view from above or the side, the view is from the upper right corner so the landscape scrolls diagonally across the screen, giving a 3-D illusion. You pilot your biplane over fields bristling with gun emplacements, enemy airfields, roads full of cars, and buildings. The object is to destroy as many of these items as possible, using your machine guns (only effective close to the ground, and ineffective against buildings), or the thirty bombs you are carrying. To fire your machine guns you press the fire button. To drop a bomb, you must press the button while descending. To complicate matters, the anti-aircraft guns throw flak into the sky, which damages your aircraft if you run into it. Enemy biplanes approach from the front or rear, guns blazing, and you must avoid them or shoot them down.

Two Stages Of Play

You play *Blue Max* in two stages. First, you fly over the countryside, creating mayhem. Periodically, targets (usually buildings or bridges) will display a target marker. If you destroy enough of the marked targets, as well as ships and cars, you proceed to stage two, where you attempt to destroy the three capital buildings in the enemy city. Successful destruction of the three buildings ends the game. Flying inside the city is impressive — your plane can actually disappear behind buildings!

In order to strafe effectively, you must fly low — 21 to 25 feet above the ground. The text window at the bottom of the screen turns brown, and your altimeter shows you when you are at the right level. Below eighteen feet the text window flashes yellow and a warning buzzer sounds — if you don't pull up immediately you'll crash into an obstacle. Since you have only one plane, this ends the game. The text window also tells you whether you are above or below an enemy aircraft. If you are at the same level as the enemy, the text window turns blue. You can then shoot down the enemy aircraft, and it can shoot you down, as well!

Enemy fire may damage your aircraft, and too much damage causes you to crash, ending the game. The text window flashes red when you are damaged, and a letter appears, signifying what type of damage you've sustained. For example, a "B" means that the bomb release mechanism is damaged, so bombs will only be released occasionally. Damage to your fuel tank ("F") causes fuel consumption to go up. Periodically, a friendly airfield will appear, and careful flying enables you to land for refueling and repair. Beware, though, that an enemy aircraft doesn't bomb you while you are on the ground!

Controlling Your Aircraft

You control your aircraft by pushing forward on your joystick (default) or pulling back on the stick. I find pushing forward a strange choice for the default mode, since aircraft are normally controlled into a climb by pulling back on the stick — but at least both options are available. You can also choose one of three levels of difficulty, and whether or not you have to deal with gravity. The game plays much differently with gravity! When the game is over, you receive a (normally posthumous!) rank based on score and time. These ranks range from "Kamikaze Trainee" (crashed on takeoff) to *Blue Max.*

Another Hit For Synapse

Blue Max is very well done, amazingly so considering that this is a first effort for author Bob Pollin, and that he wrote it in less than three months. The single line resolution players which make up the aircraft are excellent; they even have spinning props and shadows which move over the ground. The scrolling landscape is a marvel of programming. Done in high resolution graphics, it presents an ever-changing panorama to fly across. Ever-changing? Yes indeed — the landscape is calculated as it goes along, so it never repeats and there are no patterns to memorize. Touches such as wind and the fact that your bombs take longer to fall from a higher altitude contribute to the realistic feel of the game.

Once again, the Synapse powerhouse has a hit on their hands — I wonder when those guys sleep? *Blue Max* is very playable and a lot of fun. I recommend it to all you flying aces out there.

By Bob Pollin from Synapse Software, 5227 Central Ave., Richmond, CA 94804. System requirements: Atari Home computer, 32K Disk (16K Cassette). Suggested retail price: $34.95.

PC Parrot

Reviewed by Tim Knight

As expensive and powerful as the IBM PC is, its sound capabilities are not among its strong points. In fact, much less expensive computers (such as the Commodore 64) have far superior sound capabilities. Despite this, Dragon Data Systems has used the limited sound of the PC to create a voice for Baby Blue.

How The PC Parrots

The machine language routines within *PC Parrot* allow it to record and reproduce sounds through the PC speaker. When you input sound into the computer (either through a cassette recorder, a microphone or some other means), *PC Parrot* encodes these sounds into the binary language of the computer, storing the sounds in BASIC strings. This means that you can record just about any sound (music, voices or special effects) in the computer's memory and play it back at any time.

If you don't have some way of "speaking" to the computer, there are several prerecorded phrases included with the program. These phrases include common words, digits and business terms. *PC Parrot's* most important feature is that it requires absolutely no extra hardware to play back the voices. This means that you can create programs with voices and other sounds, thus enhancing your programs greatly, whether they are for your own use or for the use of others.

From Dragon Data Systems, 1068 Homer Street, Suite #110, Vancouver, British Columbia, Canada V6B 4W9. System requirements: 64K IBM PC, one disk drive and a monitor. Suggested retail price: $39.95.

Several programs are included on the *PC Parrot* disk, each for a specific function:

- DEMO.BAS: This program demonstrates the voice synthesis of *PC Parrot* by means of a BASIC program which has "voice strings" included. You may list and examine the program to see how sounds are compressed into strings and reproduced through the PC speaker.
- ECHO.EXE: This utility allows you to record your own sounds via the cassette input/output port.
- RECORD.BAS: To "pack" sounds into BASIC program strings, you should use this utility.
- SAY.TXT: To reproduce the sounds in your BASIC program, you must merge the "SAY.TXT" files with your own program.
- DIGITS.BAS: Here is another demonstration program which produces all of the digits through the PC port using the *Parrot's* voice-synthesis capabilities.
- NUMBERS.BAS: An extension of the DIGITS.BAS program, this routine allows you to type in numbers (such as 32,767 or 185) which it will reproduce properly ("thirty two thousand, seven hundred sixty seven" or "one hundred eighty five").
- VOCAB-01, VOCAB-02, VOCAB-03: These are collections of prerecorded words including digits, the alphabet, business, scientific and recreation-associated words.
- BLOCK.EXE: As a little something extra, Dragon Data Systems has included their simple *Block Buster* game on this disk, which is similar to Atari's famous *Breakout.*

Recording and playing back the sounds are very simple, which makes *PC Parrot* a program you can use almost immediately.

The Best It Can Be

PC Parrot is the type of program which is difficult to review. As a voice synthesizer, it's a pretty poor program. The voice is quiet and difficult to understand. On the other hand, the blame for this should not lie on the program's inventor, Anatoly Chumak, but on IBM itself for equipping the expensive Personal Computer with a modest sound reproduction device. In other words, *PC Parrot* is just about the best it can be, since the PC is not equipped with a voice synthesizer or high quality sound maker.

PC Parrot is easy to use, does its job, and is pretty amazing considering the limited sound capacity of the PC. If you just can't live without the addition of sound to your PC programs, and can put up with less-than-impressive quality sound reproduction, you will find the *PC Parrot* a useful addition to your software library.

Space Guardian

Reviewed by Robert C. Gray

It's the year 3913 and you're presented with a proposition you can't refuse. The Aliens have us beat two to one. The Guardian — our only functional transport — has the lastest weapons, sensors and on-board computers. Still, they seek a human commander for the mission. What do you say? How about saving the Earth from destruction this afternoon?

You sign on. Instantly, the screen presents you with your current mission: "Destroy 20 alien warships within 31 light years. You have one base module for resupplying your transport." It sounds easy enough and it is, as long as you study the intergalactic maps and stand ready to attack the aliens as they get in close range — before they attack you.

Piloting the Guardian successfully is a matter of perspective. You're equipped with short range sensors which scan your immediate quardrant, long range sensors, and eight others. You also have a galaxy region map which shows the entire galaxy with your quandrant displayed in red. If you're alert to the sensors, you can anticipate alien attack. Remembering your position is very important, as you may have to rely on your own resources when you least expect it.

You set off to blast the Aliens. At Level One, you're on the offensive; at Levels Two and Three, they're after you. A Red Alert tells you they're in close range. You attack with Phasers aimed for you by the computer, or Torpedoes that you aim yourself. You must calculate the right amount of energy or face damaging counterattack. It pays to be accurate.

If damage is heavy and energy is low, you must head for the nearest Base Module. Suddenly, your computers report damage to their own navigation system. You have no guidance to locate the Base Module. Now you realize the importance of a human commander. Will your memory be good enough to replace the damaged computer's? When you used the Long Range Sensors, did you note the location of the repair station? Time is running out and the Aliens know where you are. *Space Guardian* requires judgment and wits, as well as fast reaction. When all else fails, your own mind is the winning factor. It's a game for preteens through adults.

From OMRIC Corporaton, PO Box 309, Chaplin, CT 06235. System requirements: IBM PC with 64K RAM, 80 character display, 1 disk drive, PC-DOS and BASIC A. Suggested retail price: $29.95.

Commodore's Music Cartridges

Reviewed by Sharon Zardetto Aker

Commodore 64 users who are neither musicians nor programmers, but want to get music out of their computers, finally got a break: Commodore has released *Music Machine* and *Music Composer* in convenient cartridge form.

Music Machine is the more limited of the two programs, since it is strictly for playing the computer keyboard like a piano keyboard. Although it has a great variety of sounds, it has no capacity for storing a melody or saving a composition. *Music Composer,* as its name implies, has both those capacities, although its other limitations may make it more suitable for the budding musician than for an experienced one.

Complaints

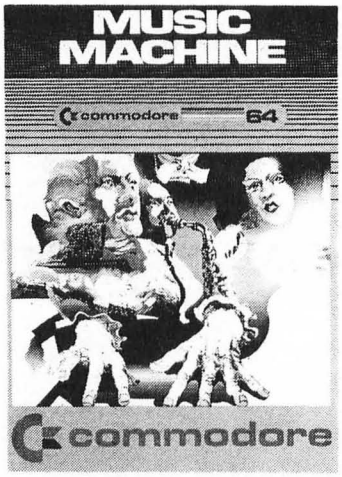
I want to get my negative comments out of the way first, because despite the fact that I was personally disappointed by both cartridges, I know, as a reviewer, that they both are pretty decent programs.

My first complaint concerns the displays for both programs. As soon as the stem of a note goes beyond the staff, the program draws a ledger line (those little lines to hold notes that are too high or too low to fit on the staff). Since the ledger line appears only in front of the note, stopping at the stem, it resembles a misplaced eighth note flag, and it clutters up the display.

There are no flatted notes, only sharps, and the sharp symbols are only drawn in the spaces of the staff, even when the note is on a line.

In addition, *Music Machine* has as one of its menu choices "rhythym." While I admit that the word trips up many people, somebody should have caught the error in a music program.

From Commodore Business Machines, Inc., 1200 Wilson Drive, West Chester, PA 19380. System requirements: Commodore 64, Datassette optional. Retail price: varies widely, but according to a Commodore spokesperson, you can purchase either cartridge for under $30.



Music Machine

Music Machine turns the computer keyboard into a piano/organ keyboard, with the top row of letters representing the white keys, and some of the numbers representing the black keys. There are easily-adjusted controls for keyboard effect (whether the notes will decay, be sustained, etc.), waveform (four choices), special effects (such as vibrato or glide), octave, and number of voices. Although there are a few restrictions as to the combinations chosen, the number of permutations is higher than I can calculate conveniently. Added to the wide range of choices for musical effects is a percussion section controlled by the function keys: You can turn seven percussive patterns on and off, and adjust their speed to suit your needs.

When you play a note, it appears at the extreme right of the screen and the entire staff moves from right to left across the display. The total effect is that of notes dancing across the screen, which doesn't sound so bad, but it does make it difficult to connect what you are playing with what you are seeing.

There is no indication that Commodore meant *Music Machine* just for kids, but I don't think older and/or more experienced users will be satisfied with its limitations. My son loves it, but he isn't even four yet; most of his neighborhood friends, ranging in age up to nine years, also enjoy it. I don't think it would be of lasting interest to anyone much older than twelve.

If you have kids who will use it, and can get it at a discounted price, you will find *Music Machine* worth the investment.

Music Composer

Music Composer is miles ahead of *Music Machine* in many ways, since you can compose, edit and save your musical compositions with it. For some reason, however, allowance was made only for users of the Datasette recorder; if you have a disk drive, you're out of luck when it comes to saving your work.

The *Music Composer* main menu allows you to choose the instrumentation (ten choices) for each voice, set special effects for each voice, edit, save or load your own composition, listen to the sample song provided, or play the keyboard like a piano.

The documentation is reasonably well done, although it neglects to point out that you need a four-digit line number at the beginning of each program line of your music. Some information about keyboard playing options on the last page of the booklet would have been better presented with the section on keyboard playing.

There are sub-menus for choosing instruments and setting filter and waveform parameters. You usually can't do these, however, without looking up further information in the booklet regarding the allowed values. Some of the necessary input seems unnecessarily complicated; for instance, you must enter the attack/decay rate by multiplying the desired attack rate by sixteen and adding it to the desired decay rate. Now,

I understand why the numbers are needed in that form, because I've programmed Commodore 64 music; and I can certainly calculate the figure, but why should I have to? Isn't that what a computer program is for?

The variety of waveform and filter settings gives a staggering range of available sounds. After working with *Music Machine* — briefly, because that's all a thorough look required — I was quite surprised at the time it took to try out all of *Music Composer's* capabilities. Actually, I'm not sure that I have; so many combinations are possible.

Notation

Programming *Music Composer* is relatively straightforward, getting more involved as the music gets more complicated. A note is programmed by name, prefixed by a letter code to indicate its duration. You set octaves by a two-character code, or just a plus or minus sign if it is only changing by one octave from the current one. You can include sharps, flats, dotted notes and repeated sections within the program, as well as indications for which of the three voices should be playing the note.

The Display

Music Composer displays your composition on the grand staff: both the treble and bass staffs. The notes are black, red or blue, depending on which voice is playing. Pressing the third function key changes the background color of the display while the music is playing. The different kinds of notes — whole, half, quarter and so on — are correctly represented; because flats are not drawn, however, a B flat shows up as an A sharp.

Not for Kids

This one's not for kids, except for older ones with the perseverence to work at programming a tune. It's not for musicians, either, except for those who can concentrate on the music and ignore the display. Commodore apparently meant it to be taken more seriously, musically speaking, than I think it deserves. There is a pitch adjustment in case you want to play along with a record or another instrument and need to tune to it. I don't think, however, that anyone with the facility to play that well will be satisfied playing on a computer keyboard.

Music Composer has a lot going for it, chiefly the capability of addressing so many of the Commodore 64's sound capabilities. It can be a valuable aid to someone who wants to do some direct Commodore 64 music programming later, because it gives a good feel for what the different filter and waveform settings accomplish. And for those who never intend to do any programming, it can be interesting, rewarding, and just plain fun.

Synthy 64

Reviewed by Sharon Zardetto Aker

After purchasing a Commodore 64 because of its musical capabilities, it was a great disappointment to discover that those capabilities were not easily accessed. My musician husband continued his forays into the vagaries of Commodore 64 music synthesis — for him, the end is worth any means — but I soon gave up, disgusted at the programming gymnastics required to play even a simple tune.

You can imagine my reaction ("ohboyohboy!") when I had a chance to review some music software. I contacted one software company and asked about their advertised Commodore 64 music program. The representative replied that it had not gone into production after all, because there was another one on the market that they felt they couldn't improve upon. Which one? *Synthy-64.*

From Abacus Software, PO Box 7211, Grand Rapids, MI 49510. System requirements: Commodore 64 Datassette or disk drive. Suggested retail price: $29.95 tape; $32.95 disk.

"Synthy" is for Synthesizer

You should be aware right away of what this program won't do: It will not teach you Commodore 64 sound programming. Neither can you transfer your *Synthy-64* compositions to another program — this is strictly for music composition, a program meant to be complete unto itself, not an adjunct to some home-brewed game.

Next, you should be aware of what it can do: just about everything else. And, it features good documentation and uses logical notation in programming the music.

Not For Musicians Only

Synthy-64 was obviously written by a musician, and while it may not have been intended just for other musicians, it is filled with details to warm the cockles of a musical heart, even down to the availability of my pet peeve, triplets, and the more rarely encountered double-dotted notes. Now, if you're not sure of what either of those terms mean, you may be thinking that this program is not for you. Not necessarily: If you have nothing but an interest and the barest working knowledge of written music (What's a staff? A note? Every Good Boy Does Fine?), *Synthy-64* is for you, and you'll love it.

Synthy 64, *continued*

Notation

The first commendable thing about *Synthy-64* is its documentation, which is thorough and clear. While the explanations of the advanced features are somewhat confusing, that has more to do with the sophistication of the features and the capabilities of the Commodore 64 than with the instruction manual.

The next outstanding feature is the simplicity and logic of the notation used in *Synthy-64* programming. The program refers to notes by their letter names, followed by a number to indicate which octave should be playing. Durations are indicated by the simple notation of a four for a quarter note, an eight for an eighth note, and so on; a dot (period) a double dot (colon) or a triplet marking (an exclamation point) can be added. "R" stands for rest, "T" sets the tempo, "V" sets the volume — a very simple system with very complicated-sounding results. Such features as key signatures and repeated phrases are easily included, and the three voices are indicated by the plus, minus, and British pound symbol — all in a row on the keyboard.

Once you tell the computer to work with a certain sound channel, it assumes everything else refers to that channel until told otherwise; similarly, once you set a note duration within a channel, it remains at that setting until you program a change. This is an extremely useful feature, because if you have twelve eighth notes in a row for one voice, you do not have to type "+" or "/8" with any but the first.

A fourteen-year-old flute player proved the ease of *Synthy's* notation to me by programming a three-part tune, translated from a piece of guitar music, after only a few minutes of instruction.

Drawbacks

There must be a catch, right? Well, not much of one. The notation, as logical as it is, seems more geared to copying in an already-written piece than to computer-keyboard composition. The notes have to be lines. From a composer's point of view, it would be easier to enter the notes for the first voice, then add the second voice, and so on. As it is, to work first with one voice and then add the others means much program editing.

I suppose I shouldn't call the second point a drawback, since *Synthy-64* purports only to be a music synthesizer, but I would have liked the opportunity to design some fancy screen displays to go with the music. Once you have *Synthy-64* in the computer, you are locked into its format and can't do anything else. It does allow you to display anything within a set of quotation marks on the screen. This opens the door, of course, to displaying lyrics and using graphics symbols, but I had sprites dancing across the screen in mind. Using the cursor controls inside the quotes will format text as usual, and the color controls are also available, but even a simple programming technique such as FOR-NEXT loops is not allowed.

```
10 E5/8 D C/4. -E4/4 */C/4 B -C5/2 +D/8 E */G3
20 G/2 -B/2 */G3/2 E4/4 -G/4 +C6/8 B
30 A/2 -F/2 */F/8 C F G A5 -F/4 +A/4 */B
40 C/2 -E/2. +G5/2. */B/4
50 A -E/2 +C6/4 B */G4 F -F/4 +A
60 G5 -C/2 */E F +A6 B -F/4 D
70 +C -E/2 */C/8 D E/4 +G5 F -D/4 */G3
80 C4 -C/2. +E/2. */C3
```

An example of Synthy 64 programming. It is the refrain, in three parts, of "The First Noel." Note: all of the */ in the program listing are British pound signs.

An Orchestra

Synthy-64 has a number of subroutines already written into the program that you can access from your program. These routines set various filter, waveform and envelope parameters so that your music will sound like a piano, trumpet, flute, banjo, or accordian. You can use these routines, or write your own to mimic other instruments.

Preserving Your Creations

Your compositions can be saved onto another tape or disk to be played at another time. You will, however, have to load the *Synthy-64* program first, and then your work of art. The *Synthy-64* program takes only about 5K of memory, which leaves you more room for your composition than you could ever expect to fill.

Extras

Synthy-64 is loaded with little extras. It allows input from the keyboard, which opens the possibility of keyboard playing and educational games of a nature limited only by the screen display. It also makes the prospect of Commodore's promised musical keyboard even more tantalizing.

Synthy-64 also has what the author calls a "trace function." You can have a display of all the parameters of your program while the music is playing — allowing you to watch what voice is playing what note, where the filters are set, etc. It is an invaluable aid to debugging your music.

As a final helpful feature, *Synthy-64* includes a "kill key" so that you can get out of the program without having to turn off your computer — an improvement many games and utility programs could stand.

Scratching the Surface

My husband and I have both worked with *Synthy-64* for a considerable amount of time now, and neither of us has come very close to utilizing all of its functions yet. It is a program with great capabilities and wide appeal, usable by the near-novice as well as the seasoned musician and/or programmer. It's a shame that the musical data can't be transferred to another program, but I suppose Abacus had to have someplace to go from here. I hope they go there soon.

MicroLog: Resources Received

ATARI®

GAMES

Computer Football Strategy from Microcomputer Games, Baltimore, MD. System requirements: Atari 400/800 with 32K, Commodore 64 with 64K, TRS-80 I/III with 32K. Price: $16.00 (cassette), $21.00 (disk).

This is a computer simulation of the Football Strategy board game in which you pit your skills against the computer, or a live opponent.

The Spy Strikes Back by R. Hardy & M. Pelczarski from Penguin Software, Geneva, IL. System requirements: Atari 400/800/1200 with 32K Disk. Price: $19.95.

A spy adventure set in the East German town of Aichenback in which you are searching for an international terrorist of particularly vile repute.

UTILITIES

The Analog Pagewriter from Alog Computing, Santa Barbara, CA. System requirements: Atari 400/800 with 32K RAM, Atari 850 Interface Box, 1 disk drive. Price: $39.95.

This program turns your Atari computer and 80-column printer into an easy-to-use electronic typewriter.

GRAPHICS

The Alog Displaymaker from Alog Computing, Santa Barbara, CA. System requirements: Atari 400/800 with 48K. Price: $39.95.

A slick color graphics program in Forth that you can use for making graphs, charts, displays or just have fun drawing pictures.

APPLICATIONS

Tiny Text by Stan Ockers from COMPUCARDS, Stone Mountain, GA. System requirements: Atari 400/800 with 48K and disk drive.

A word processing program which comes close to a full blown word processor with a few features not found in some expensive word processors.

The Alog Maillist from Alog Computing, Santa Barbara, CA. System requirements: Atari 400/800 with 32K and at least 1 disk drive. Price: $39.95.

A simple, easy to use data base program specifically designed for making and keeping mailing lists and printing out mailing labels.

COMMODORE®

APPLICATIONS

ESP Calc from New Leaf, Inc., Belleville, IL. System requirements: Commodore 64 or VIC 20 with 28K expansion memory added. Price: $43.50 (cassette), $47.50 (disk).

This program was designed for use by the average home/ business user of personal computers.

GAMES

Zeppelin Rescue from Micro Software International, Inc., Newton Upper Falls, MA. System requirements: Commodore 64. Price: $24.95 (disk), $19.95 (cassette).

With strong graphics and realistic sound effects, this game buckles you into the pilot's seat of a blimp. Your mission is to collect the stranded people of the city and safely carry them to the home base.

T.G.I.F. from Microcomputer Games, Inc., Baltimore, MD. System requirements: Commodore 64 with 64K and one joystick. Also available for the Atari. Price: $20 (cassette), $25 (disk).

T.G.I.F. is a wacky game of zany finance which makes a wonderful party game. It has colorful animated state-of-the-art graphics and sound capabilities.

IBM® PC

EDUCATION

VisiCalc Programming from Shaffer & Shaffer Applied Research & Development, Inc. from Little, Brown and Company, Boston, MA. System requirements: IBM PC with 64K RAM, 1 drive, PC DOS & 16-sector version of *VisiCalc.*

This is a unique new disk-and-manual package that transforms the *VisiCalc* electronic spreadsheet into a self-teaching tool.

APPLICATIONS

Shoebox from Techland Systems, Inc., Mt. Vernon, NY. System requirements: IBM PC. Price: $125.00.

Shoebox is a program for your computer that will help you organize and manage your time and keep track of your expenses.

Fast Facts from Innovative Software, Overland Park, KS. System requirements: IBM PC. Price: $195.00.

Fast Facts is a flexible, expandable filing system adaptable to both the office and home. It can be used to store everything from personnel records, application forms, and mailing lists, to household inventories and recipes.

Metafile from Sensor-Based Systems, Chatfield, MN. System requirements: IBM PC. Price: $995.00.

Metafile provides the multi-functional capabilities and integration required to handle a wide variety of data. Designed for users at all levels, *Metafile* reduces the effort required to manage information.

In Shape from DEG Software, Houston, TX. System requirements: IBM PC with one disk drive and 80-column monitor. Price: $95.00.

This program helps you monitor diet and exercise and lets you build a comprehensive personal fitness and nutrition profile.

RIP Real Estate Investment Package by Tom Ciulik, Marietta, GA. System requirements: IBM PC with 64K RAM, PC-DOS, 1 disk drive, an 80-column monitor, optional printer and *VisiCalc* or *Lotus 1-2-3*. Price: $29.95.

This package is a set of twelve *VisiCalc/123* templates that make the life of the small real estate investor easier.

Qwerty from HFK Software, Danbury, NH. System requirements: IBM PC with 64K, 1 disk drive, & IBM monochrome display. Price: $325.

Querty is an advanced word processor for use in the office and in the home by professional typists, authors, and business people.

PC Write from Quicksoft, Seattle, WA. System requirements: IBM PC with 128K RAM, 80-column, one disk drive, PC-DOS 1.0 or 2.0.

PC Write is a powerful, yet easy-to-use word processor for both the beginner and the professional user.

GAMES

Triple Brain Trust by Paul & Alice Shapin from Reston Software,
Reston, VA. System requirements: IBM PC with 64K and disk drive. Price: $39.95.

This game is designed around the old tic-tac-toe game. It allows play on many levels and will be enjoyed by children and adults alike.

SPOC The Chess Master by Jacques F. Middlecoff from Cypress Software, San Jose, CA. System requirements: IBM PC with 128K, DOS 1.0 or DOS 1.1. Price: $39.95.

With *SPOC*, you play an exciting, challenging chess at nine different skill levels, including a level designed for tournament play.

GRAPHICS

Graphics for the IBM PC from Kern Publications, Duxbury, MA. System requirements: IBM PC. Price: $28.50 (book), $21.50 (disk), $50.00 (book/disk package).

This book is a self teaching guide to writing graphics software on the IBM PC.

LANGUAGE

PC Logo from Harvard Associates, Inc., Somerville, MA. System requirements: IBM PC with 128K. Price: $199.95.

PC Logo is a programming language whose simplicity makes it especially appropriate for beginners of all ages, yet it is also a tool of great power and sophistication.

↪

MicroLog, *continued*

APPLE®

UTILITIES

The Bridge from Sun Microsystems, Inc., Ft. Lauderdale, FL. System requirements: Apple II family with DOS 3.3 with one or two disks. Price: $39.95.

The Bridge utility was written to bridge the gap between *PFS* and *VisiCalc®* .

GRAPHICS

The Graphics Magician by M. Pelczarski from Penguin Software, Geneva, IL. System requirements: Apple II family with 48K. Price: $59.95.

Put professional graphics into your own programs. This program contains machine language animation routines that use the same techniques as most popular computer arcade games.

GAMES

Exodus Ultima III by Lord British from Origin Systems Inc., Houston, TX. System requirements: Apple IIe. Price: $54.95.

An epic fantasy role-playing experience. Sequel to the best-selling *Ultima* and *Ultima II.*

Legacy of Llylgamyn from Sir-Tech Software, Inc., Ogdensburg, NY. System requirements: 48K Apple II with DOS 3.3 and one disk drive. Price: $39.95.

This is the third scenario in the classic Wizardry series, acknowledged to be the most popular microcomputer fantasy role-playing game in history.

Titan Empire from Muse Software, Baltimore, MD. System requirements: Apple II+/IIe 48K with disk drive.

Your mission is to defend the remaining friendly planets and win back those planets already enslaved by the Titans.

APPLICATIONS

The Eating Machine from Muse Software, Baltimore, MD. System requirements: 48K Apple II+/IIe with disk drive.

This program is a serious and factual program designed for healthful diet management and sound nutritional planning.

Family Roots from Quinsept, Inc., Lexington, MA. System requirements: Apple II/IIe with 48K or 64K and DOS 3.3. Price: $188.50.

Family Roots is a set of programs that assist you in your search for family historical information.

pfs: Write from Software Publishing Corporation, Mt. View, CA. System requirements: Apple IIe with at least 64K, printer, and one disk drive.

Write is a computer program that you can use to prepare, print, and store the documents you need in your daily work or personal life.

BOOKS

Data Base Management for the Apple by Nat Wadsworth from Hayden Book Company, Inc., Rochelle Park, NJ. System requirements: Apple II+/IIe.

This clearly written book includes Data Base, a simple, functional, and cross-referenced data base management program written in Applesoft BASIC.

Hints & Enhancements

IBM Function Key Trapping

They said it couldn't be done! According to the IBM BASIC manual, you can't trap the function keys on an IBM PC using INKEY$. Here is a short example of a method to trap the function keys using that command in a BASIC program. This will return with the ASCII value of the function key, if pressed. It ignores all regular keys on the keyboard. There are 40 different functions available by pressing the SHIFT, CONTROL and ALT keys in combination with the F1 - F10 keys.

Turn off the key display.

```
10 KEY OFF
```

Clear the BASIC keywords.

```
20 FOR I=1 TO 10
35 KEY I,""
40 NEXT
```

Jump to main program.

```
45 GOTO 100
```

Input subroutine.

```
50 KY$=INKEY$
```

Return if no key pressed.

```
70 IF LEN(KY$)=0 THEN RETURN
```

Check for function key, throw away regular keys.

```
75 IF LEN(KY$)<>2 THEN 50
```

Remove extra leading character.

```
80 KY$=RIGHT$(KY$,1)
95 RETURN
```

Jump to input routine.

```
100 GOSUB 50
```

Return to input if you really need a key.

```
102 IF KY$="" THEN 100
```

Here is where the decision statements go to decide what to do depending upon which function key was pressed.

```
105 PRINT ASC(KY$) :REM Just for test
110 GOTO 100
```

Phil Daley
SoftSide

IBM PC *Solitaire* and *Poker Squares* Modifications

Solitaire and *Poker Squares* are very enjoyable games, but some people unaccustomed to the games find black numbers on the hearts and diamonds confusing. Below are modifications that will make the numbers on the red suits appear red and the numbers on the black suits black. This should enable players to make decisions in *Poker Squares* a little bit faster, and miss fewer moves in *Solitaire* as well.

To modify *Solitaire*, type the following lines:

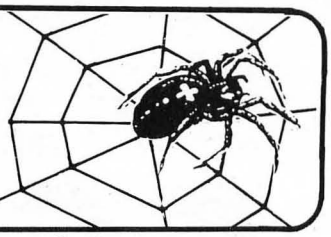
```
20 LINE (X,Y)-(X+33,Y+27),3,BF:DRAW"BM"+
STR$(X+17)+","+STR$(Y+5)+SUIT$(SU):CLR=-
(SU>2)*2:PAINT (X+15,Y+15),CLR,CLR:LOCAT
E 1,39:IF CLR=2 THEN 41 ELSE PRINT MID$(
GLADYS$,VA,1);:GET (304,0)-(311,7),A%
41 DEF SEG:POKE &H4E,1:PRINT MID$(GLADYS
$,VA,1);:GET (304,0)-(311,7),A%
42 PRINT CHR$(29)" ";:PUT (X+2,Y+1),A%:I
F VA<>10 THEN DEF SEG:POKE &H4E,3:DEF SE
G=0:RETURN
43 PRINT BS$"D";:GET (304,0)-(311,7),A%:
PRINT BS$" ";:PUT (X+7,Y+1),A%:DEF SEG:P
OKE &H4E,3:DEF SEG=0:RETURN
```

Poker Squares can be similarly modified by changing line 690 and adding lines 691 through 693:

```
670 X40=XX*40:Y40=YY*40:LINE (X40+4,Y40+
2)-(X40+37,Y40+37),3,BF:DRAW"BM"+STR$(X4
0+21)+","+STR$(Y40+11)+SUIT$(LAPEL):CLR=
-(LAPEL>1)*2:PAINT (X40+20,Y40+20),CLR,C
LR:LOCATE 1,39:IF CLR=2 THEN 691 ELSE PR
INT MID$(GLADYS$,PIP,1);:GET (304,0)-(31
1,7),A%
691 DEF SEG:POKE &H4E,1:PRINT MID$(GLADY
S$,PIP,1);:GET(304,0)-(311,7),A%
692 PRINT CHR$(29)" ";:PUT (X40+6,Y40+3)
,A%:IF PIP<>10 THEN DEF SEG:POKE &H4E,3:
DEF SEG=0:RETURN
693 PRINT BS$"D";:GET (304,0)-(311,7),A%
:PRINT BS$" ";:PUT (X40+11,Y40+3),A%:DEF
 SEG:POKE &H4E,3:DEF SEG=0:RETURN
```

Richard Apple
Hopkins, MN

Bugs, Worms, and Other Undesirables



IBM *Swat* (Swat Handout)

This program was written in BASICA on DOS 1.1. It will run in BASIC and in DOS 2.0, however the SWAT produced codes will be different from the published ones. The lengths will be the same. Running SWAT on itself a second time will also produce different codes. This occurs because of the method the IBM uses to store GOTOs and GOSUBs. When typing in the program, it stores the line numbers to jump to, but after running the program, the line numbers are replaced with the actual RAM address to jump to. While this speeds the code execution considerably, especially in loops, it means that the actual addresses depend upon the start of BASIC pointer ($30,$31), which varies depending on the particular BASIC and DOS version being used.

Apple Financial Operating System (Issue 44)

A statement was omitted inadvertently from line 790, causing the variable BE to always be set to zero. The correct line should be as follows:

```
790 IF BD < PP THEN BE = BE + 1: BD = PP: GOTO 810
```

Thanks to Roland E. Guibault for bringing this error to our attention.

Atari Sharkey (Issue 45)

All the capital 'J's in line 12050 should be underlined (i.e., typed in inverse video).

Thanks to Carl Shepard for spotting this error.

Hints and Enhancements, ***continued***

Atari STOMP Enhancement

Atari STOMP can be a great timesaver for those who key in programs from ***SoftSide***, but sometimes a long STOMP table can scroll off the screen, creating an inconvenience for those whose system doesn't include a printer. The following modification allows you to freeze the screen in the process of displaying a STOMP table:

```
In line 32020, add the statement N=0 before GOTO 32040.
In line 32210, change THEN 32230 to THEN 32222.
```

In addition, add the following lines:

```
#!(Dot Matrix Print:)
32221 GOTO 32230
32222 N=N+1:IF N<19 THEN 32230
32224 N=1:?:?;"RETURN TO CONTINUE"
32226 IF PEEK(764)=12 THEN POKE 764,255:?:GOTO 32230
32228 GOTO 32226
```

Carl Shepard
Johnstown, NY

Apple Broadway (Issue 44)

A printing error made the last character in line 3260 illegible. The line should read:

```
3260 A = A + 1: IF A=16 THEN A=1
```

Atari Financial Operating System (Issue 44)

Line 742 was missing a statement. The corrected line should read as follows:

```
742 BD=PP:BB=PP
```

TRS-80 Maze (Issue 45)

The STOMP table provided for Maze was made for the Maze program after the 16K modifications had been made. The correct STOMP table for the unmodified version is as follows:

STOMP TABLE

LINES	STOMP CODE	LENGTH
100 - 210	OR	371
220 - 320	VN	513
330 - 520	OC	501
530 - 1020	JE	417
1030 - 1140	WW	374
1150 - 1260	CC	306
1270 - 1380	KY	273
1390 - 1470	NM	525
1480 - 1590	AF	308
1600 - 1710	HM	242
1720 - 1830	LH	453
1840 - 1950	ZL	391
1960 - 2070	PM	252
2080 - 2190	DM	286
2200 - 2310	NB	280
2320 - 2430	EW	280
2440 - 2550	XP	311
2560 - 2670	PS	284
2680 - 2790	YT	356
2800 - 2910	WE	295
2920 - 3030	NQ	362
3040 - 5090	KK	417
5100 - 5180	LS	623
5190 - 5260	EQ	294

Apple High School Adventure (Issue 43 DV)

If one types 'GET' without a following noun, the program will crash. To remedy this problem, enter the following lines into the program:

```
830 IF I=L THEN R$=LEFT$(R$,I-1) : GOTO 820
835 V$=LEFT$(R$,I-1) : N$=RIGHT$(R$,L-I)
```

Market Side

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MACHINE HEAD

BY SPYDER

Presenting The Best of SoftSide™

For the past four years **SoftSide** Magazine has been bringing you the finest in microcomputer software. Now **SoftSide** has gathered the best Games, Adventures, Simulations, Utility Programs, and other software together into **The Best of SoftSide.**

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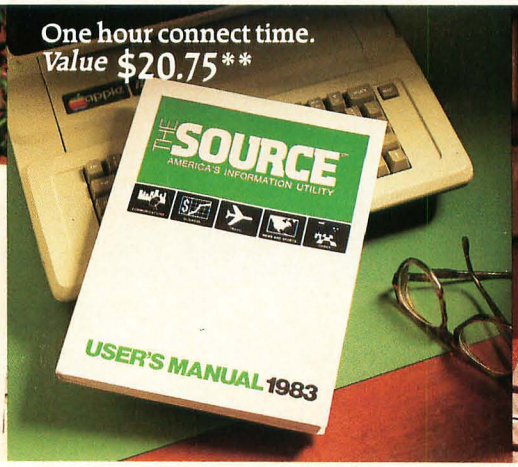

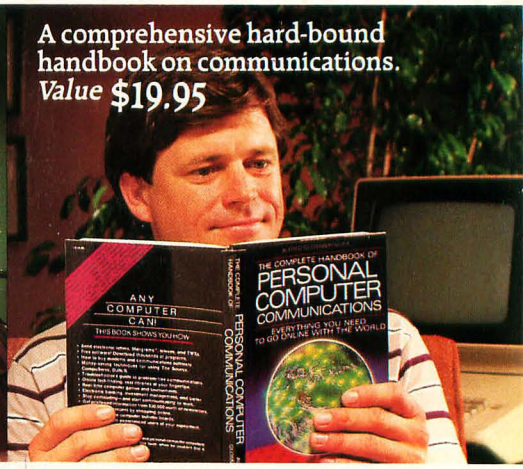

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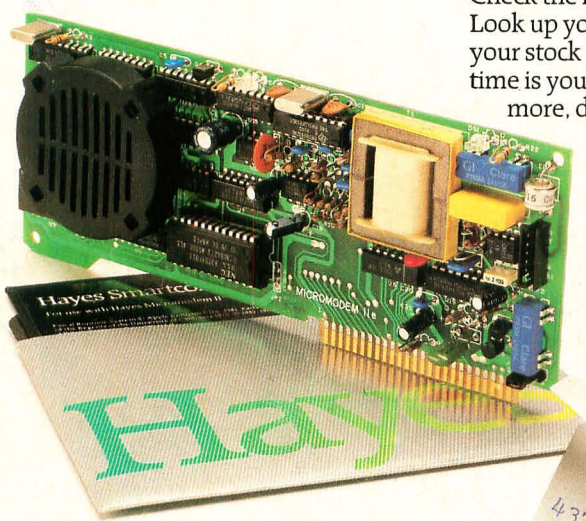

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