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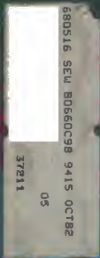
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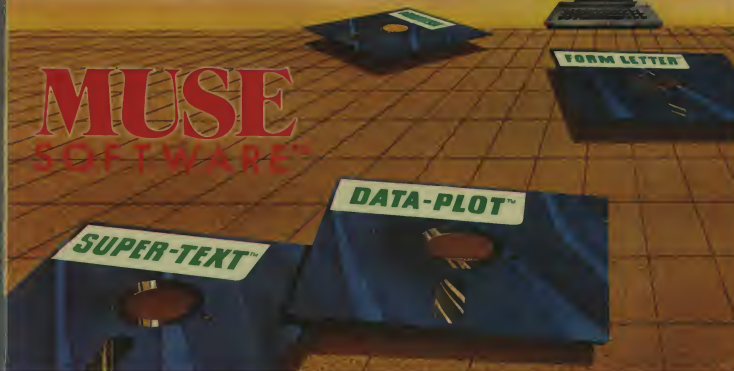
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Compute.

Compute.

Compute.

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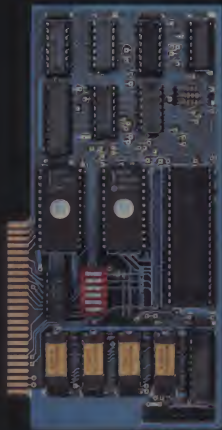
Compute.

Compute.

Compute.

Compute.

Compute.



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Print,

Print,

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Print,

Print,

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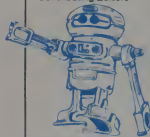
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CIRCLE 127 ON READER SERVICE CARD

Output...input/output...input

First You Line the Walls with Aluminum Foil...

Dear Editor:

I saw a letter in *Creative Computing* in which the writer complained of "random reboot" and freeze-up in the TRS-80 Model I.

Please let me tell you what I have done to cure my system of freeze-ups and random reboots.

First, to eliminate the freeze-ups, you must eliminate static electricity. My Model I is so sensitive that it would freeze up if I even came near it and did not touch it. I use a stainless steel automobile radiator clamp, snug on my wrist, with a long wire attached to ground. Since I started to use it I have had no freeze-ups at all. I have a simple connector on the wire so I can get unhooked in a hurry to go to the next room or whatever, and I make sure I re-connect before I touch the equipment.

Second, I have installed gold-plated edge connectors. They

have totally eliminated the re-boot problem: no more oxidized connectors. They are called Goldplug-80 and are sold by the EAPCo., Box 14, Keller, TX. You must dismantle your keyboard and interface to solder them on, but it is a simple job and takes about an hour.

This may sound drastic, but it beats replacing your equipment to solve a frustrating problem. As an alternative, you could try to brush-plate your contacts, but you would still have to take everything apart, and risk corrosion and/or electrical damage as well.

Richard A. Press, M.D.
493 American Drive
Yardley, PA 19067

Spraying for Keeps

Dear Editor:

Robin Ault's letter in *Input/Output* concerning reinking printer ribbons is the reason for this letter. If you don't want to go to the hassle of making up a reinking device you can just apply a little WD-40 (sold in most auto supply and hardware stores) to an old ribbon. The stuff gets the old ink mobile and redistributes it. Ribbons last about three times normal life with the WD-40 treatment.

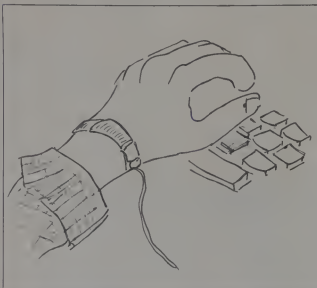
Here's the technique I use. First I get the ribbon in motion. To do this I use the program:

```
10 PRINT " ":GOTO 10
```

I then apply the WD-40 with a small paint brush or section of stamp pad. Get the ribbon wet but not soaking wet. OK, now let it dry for about half an hour.

Mr. Ault's system is much better than the WD-40 system but requires more time and effort. By the way, WD-40 also works on typewriter ribbons. Just give the ribbon spools a good shot of the stuff. The ribbon I'm using is in its third life now and is getting ready for its fourth. I suspect that any penetrating oil would work as well as WD-40.

George Trepal
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Input...input/output...input

Bar Sinister

Dear Editor:

Undoubtedly the editorial staff of *Creative Computing* has considered the following question, but many of us readers would appreciate your response to, "Could *Creative Computing* print its programs in bar code as well as typed form?"

The obvious reason for my question is my poor typing speed and accuracy. (I don't think that I'm your only reader with this problem!) Bar code readers that would pick up bar code and transmit it to one's micro are now available for about \$150. Programs in code would not only save typing hours—and searching-for-typing-errors hours—but also make it possible for more of us to attempt those long programs that now just look plain discouraging: not because the programs aren't tantalizing but because typing hundreds of error-free lines is so tedious. We could be up and running them in minutes instead of many hours if we had bar coded programs.

If some of the problems associated with this suggestion involve cost to you in terms of capital equipment and personnel as well as more pages per magazine issue, perhaps this added expense could be handled as some scientific journals do it. They charge an extra fee for pages of lengthy data and you have to pay for each article you want. Alternately, an outside

repository or "clearing house" has the data and you send a check to them for the data pages. *Creative Computing* bar coded programs could be handled the same way as an extra cost feature by you or a "translation clearing house."

Frank L. Lambert

As a technology, bar code is suitable only for small discrete units of information, such as the universal product code on the cover of this magazine, or short programs for a programmable calculator. It takes up too much space to justify its use as a medium for publishing programs. The major element in software publishing is not direct media cost (15 cents each for a few hundred bar code listings, 50 cents for a cassette, \$2 for a diskette). At least half of the cost of any published piece of software is the marketing cost, finding a customer. Usually about one third of the cost pays for creating the product and preparing it for publication. Publishing on bar code would decrease the media cost, but increase the marketing cost significantly, as few people have bar code readers, and most are eager to have the convenience of other media. Should we save \$1.85 putting a program on paper instead of a diskette so that a customer can use a \$150 device to put it on a diskette that probably cost him \$5?—GB

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CIRCLE 160 ON READER SERVICE CARD



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CP/M
Z-80



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CIRCLE 177 ON READER SERVICE CARD

Input...input/output...input

Where's Ralph Nader When We Need Him?

Dear Editor:

Isn't it time that our industry grew up? I just resisted purchasing an expensive piece of computer software for which the warranty reads in part:

"All...computer programs are distributed on an "as is" basis without warranty of any kind. The entire risk as to the quality and performance of such programs is with the purchaser. Should the programs prove defective...the purchaser and not the manufacturer...assumes the entire cost of all necessary servicing or repair. (The company) shall have no liability or responsibility to a purchaser...."

This is not mere legal jargon. It's the embodiment of a business philosophy which seriously harms all of us. It encourages sloppy work and inadequate testing; it even increases the potential for dishonesty. Whatever justification there might have been in our infancy of freely exchanged software, it certainly does not apply to today's expensive copy-protected or ROMed software, for which the source code is generally unavailable. It is any wonder that so many businessmen are "turned off" by computers?

To software companies I say: Accept responsibility for your products. Get the bugs out *before* you sell them. Don't try to sell a program debugged by your customers as a "revised" or "improved" product at additional cost.

To software consumers I say: If possible, avoid products for which there is no warranty. Don't buy on faith. Complain loudly to software companies which provide no warranty.

Of *Creative Computing* I ask: Speak out on the importance of hardware and software warranties. Help your readers by reporting on the warranty provided in all product reviews. Praise the responsible firms that produce quality products and help to expose the ones with a reputation for bugs.

John Navas II
490 Mariners Island Blvd., #108
San Mateo, CA 94404

Unfortunately, the better a product is, the more likely it is to have a warranty disclaimer. The reason is that the companies which can afford to do a thorough job of preparing software for market are large enough to have found that legal assistance is essential to survival in a world of constant litigation. Very few companies can afford to guarantee programs against consequential damages. If IBM were to go broke because they were foolish enough to use a floppy disk based microcomputer for corporate accounting, it is not the fault of a programmer who designed an accounting system for a lemonade stand. (They probably should, however, sue the salesman who told them it was just what they needed.) The lawyer is not interested in the customer; he is paid to protect the company. While warranties do tell you what you can expect in court, there is often a significant difference between what a company guarantees and their actual service. I am annoyed by disclaimers myself, but generally try to discover whether the company stands behind the product or hides behind the disclaimer before I make up my mind. —GB

Don't Log It In

Dear Editor:

In the February 1982 I/O column Robert Lehrburger posed a problem he was having in testing a floating point number for equality.

Most computers, including the Apple, will perform exact arithmetic for small integers and simple arithmetic functions. However, when squaring a number, Mr. Lehrburger used the exponent function. Exponentiation is performed by taking the log of the number, multiplying it by the exponent, and taking the antilog of the answer.

Because of the computation error in the log function the answer will generally not be an integer even if the original number and the exponent were integers.

I suggest that if Line 67, $P=Q^2$, is replaced by $P=Q^*Q$, the program will give the expected result.

Herb Hope
19804 Ridge Manor Way
Yorba Linda, CA 92686

Catalog Command

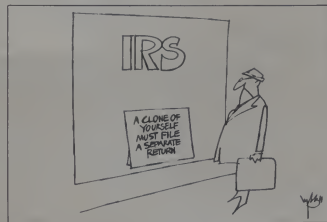
Dear Editor:

I was shocked at your article "IBM + Sears Doesn't Compute" in the February 1982 issue. I recently purchased a new IBM Personal Computer from the Preston Court Sears Business Systems Center in Dallas, TX.

I walked in Saturday afternoon, filled out a credit request form and picked up my system about a week later. Some of this time was due to the unusual weather that had things shut down. The people at the center were most helpful and checked out the system fully before delivery.

R. Diddle
5930 Arapaho #1138
Dallas, TX 75248

We're glad your experience was better than ours. Our system finally did arrive, and has been working very nicely. —EBS



tices... notices... notic

Software Prize for Best Question

Starting in July, *Creative Computing* will run a series of in-depth articles covering hi-res graphics and animation on the Apple II Plus computer.

The series will begin with elementary concepts such as Applesoft graphics commands, but will also cover a full range of machine-language techniques including integration of animation with sound and methods for developing complete programs.

To insure that the articles meet your needs we are interested in receiving ques-

tions on *any* area of graphics. Whether your question is on basic concepts or advanced areas, please let us hear from you.

While we can't respond to each individual letter, as many questions as possible will be answered in the articles.

As an added incentive, the person who sends in the best question covered in each month's article will receive a copy of *Shape Master* from Creative Computing Software.

Address all letters to The Graph Paper, Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. Please specify whether or not you wish to have your name appear in print with your question.

NECC-82

The 1982 National Educational Computing Conference (NECC-82) will be held in Kansas City, MO, June 28-30, 1982. The purpose of the conference is to provide a forum for discussion among individuals interested in educational computing.

For additional information, please contact: E. Michael Staman, NECC-82 General Chairman, Campus Computing Services, University of Missouri-Columbia, 305 Jesse Hall, Columbia, MO 65211.

Summer Computer Simulation Conference

The 1982 Summer Computer Simulation Conference will be held July 19-21, 1982 at the Marriott City Center Hotel in Denver, Colorado.

The SCSC covers all aspects of simulation methodology and applications. Technical Sessions include presentations on mathematical methods, model design, simulation languages, validation techniques and the use of a variety of equipment and processor configurations.

For more information, contact: Lawrence Sashkin, The Aerospace Corporation, P.O. Box 92957, Los Angeles, CA 90009.

Corrections

The following line was omitted from the program for "Player/Missile Design Aid." (February 1982, page 168.)

1070 POSITION K27,K10: ? C5;A5:;
POSITION K27,11: ? C5;LS:;POSITION
K27,K12: ? C5;"Column";LX=0:LY=0:
X=0:Y=0

Due to a production error, the Book Reviews Section of our April 1982 issue (page 252) omitted the name of the book to which Glenn Kleiman gave such an excellent review. For the curious, that book is *The Electronic Cottage* by Joseph Deken. It is available from William Morrow and Company, Inc., of New York for \$14.95.

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CIRCLE 233 ON READER SERVICE CARD

An Embarrassment of Riches

Few people would consider it a problem, but the *Creative Computing* editorial staff is about to sink beneath an ocean of new software and peripherals.

You see, manufacturers know that *Creative Computing* publishes fair, in-depth evaluations of new products. They know that we want to be first with reviews of state-of-the-art hardware and software. So they send us games, educational packages, investment programs, computers, printers, terminals, music synthesizers, electronic toys—every kind of computer-related product you can think of.

Of course, we appreciate their enthusiasm, and we want to keep you up-to-date on the newest products, but we can't do it all in-house. We need your help.

If you have a computer system, writing ability, an open mind, and few spare hours, you could become a reviewer for *Creative Computing*. You won't make a fortune (we pay about \$50 per printed page), but you may make a name for yourself.

If you would like to share in our riches, please write and answer the following questions (If you have more than one computer, list the information for each one separately.):

1. What type of computer do you have and how much memory does it have?
2. Do you have a disk drive? (Most software sent for review is on disk.)
3. Do you have a printer? What kind?
4. What other peripherals do you have?
5. What peripherals would you like to have?
6. Do you use any kind of network (The Source, CompuServe, Prestel, etc.)?
7. What do you use your computer for (business, education, word processing, adventure games, recipe conversion, etc.)?

8. Do you have any other areas of interest in the personal computing field?

9. Would you prefer to evaluate hardware or software?

10. What else should we know about you and/or your computer?

Please don't forget to include your name and address and a telephone number at which we can contact you during the day.

We have quite a few new products on hand at the moment and will begin to distribute them to appropriate reviewers as soon as we find out who you are. In general, products must be returned to us or to the manufacturer, however, when possible, we will let you keep the item.

Write to: Editor, *Creative Computing*, 39 E. Hanover Ave., Morris Plains, NJ 07950. ☐

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CIRCLE 117 ON READER SERVICE CARD

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Introducing the Sinclair ZX81

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The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only \$149.95* completely assembled.

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Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual

- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only \$39.95, plus shipping and handling—complete with new keyboard overlay and the ZX81 manual.

So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

Order at no risk**

We'll give you 10 days to try out the ZX81. If you're not completely satisfied, just return it to Sinclair Research and we'll give you a full refund.

And if you have a problem with your ZX81, send it to Sinclair Research within 90 days and we'll repair or replace it at no charge.

**Does not apply to ZX81 kits



NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



ZX PRINTER: The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than \$100.



16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is \$99.95, plus shipping and handling.



ZX81 MANUAL: The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A \$10.95 value. It's yours free with the ZX81.

The \$99⁹⁵ personal computer.

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These numbers are for orders only. For information, you must write to Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

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CIRCLE 147 ON READER SERVICE CARD

The TRS-80 as Smart Terminal

creative computing SOFTWARE PROFILE

Name: Omniterm

Type: Communications

System: 32K TRS-80, Disk Drive

Format: Disk

Language: Machine

Summary: Turns the TRS-80 into a smart terminal.

Price: \$95

Manufacturer:

Lindbergh Systems
41 Fairhill Road
Holden, MA 01520

Omniterm is a program that converts Model I and III TRS-80 computers into "smart" terminals; or to be more precise, into "super smart" terminals. Requiring only 32K of RAM and one disk drive, *Omniterm* gives the personal computer user many of the advantages and features available on giant mainframe computers.

Just as a start, consider this. You have a TRS-80 and your friend has a Zenith/Heathkit H89. Your chances of swapping programs other than by typing in a listing are nil. Yet with *Omniterm* and a modem at each computer, you can swap programs over the telephone line, actually feeding the electrical signals of one computer into the other.

Herb Friedman, Tridac Electronics Corp., 588 Hewlett Street, Franklin Square, NY 11010.

Herb Friedman

What's that? You say there are differences in Basic that prevent a direct swap? Not so. *Omniterm* has an in/out editor, and a translator that straightens out standard ASCII, which really isn't all that standard. In fact, only one location needs *Omniterm* because *Omniterm* can make the translations both ways. You can use the editor on incoming and outgoing signals to ensure

A smart terminal allows you to use your computer as a computer even when it is working as a terminal.

that they match the computer(s).

For those of you completely lost in all these new terms and phrases, let's go back to the beginning and explain "smart" and "dumb" terminals.

The common form of terminal with which most computer users are familiar is the TTY (teletypewriter) arrangement consisting of a keyboard—called the "trans-

mitter" or "sender,"—and a display—the receiver—that provides either a hard copy printout or a CRT display. The keyboard and display are two separate entities. They are rarely connected in normal use although some form of interconnect is provided to check out the complete terminal.

Typing on the keyboard produces a local display. Normally, the terminal connects to a local computer or to a remote computer via a modem and telephone line. The remote can be a time-share or a personal computer.

The information typed on the keyboard is fed to the computer. What is seen on the display is actually an echo provided by the computer, which is fed back to the display so the user can check the information he has entered on the keyboard.

Smart and Dumb Terminals

All the terminal can do is send and receive characters. It's not very bright; so it's called a "dumb" terminal.

When you purchase the Radio Shack serial interface you also get a program that allows your TRS-80—complete with all its memory and disk drives—to function as a dumb terminal. You can use it to converse with other terminals over the telephone lines (through modems), or even to talk to a time sharing system or community bulletin board. But that's all it can do. Your personal computer remains a dumb terminal, with all its memory and data storage going to waste. All you can do is read what is sent out from the other end.

OmniTerm, continued...

On the other hand, a *smart terminal* allows you to use your computer as a computer even when it is working as a terminal. It will store information coming down the line, can transmit directly from memory, and it should be able to do some of the things your computer normally can do in conjunction with the terminal mode. At its best it should also throw in every feature you think you might ever need, and a few you haven't even thought of.

Most of the smart terminal software available for the TRS-80 falls in the first category—you get a few computer functions. Then there is *OmniTerm*, which doesn't just make your computer smart, it makes it a *genius*—an expanded computer terminal system capable of just about anything.

OmniTerm is a package consisting of 15

disk programs including Basic, standard Backup (for single drive systems) and the TRSDOS 2.3 operating system. In addition to *OmniTerm* itself, there are special operating modes for MicroNet and The Source, ASCII to binary conversion (and vice versa) and translation, which we'll get to later.

Using the Program

When *OmniTerm* is loaded, it converts the TRS-80 into a smart terminal. A complete menu is displayed when the "@" key is pressed twice. The menu shows all the operating modes, the terminal conditions, total available buffer RAM and the amount used. Pressing a key directly enters the command without a Return. It is also easy to change the terminal conditions as shown in Figures 1-3.

Figure 1.

OMNITERM Command Mode - Hit <BREAK> to quit			
P	PRINTER	is: OFF	X SYSTEM COMMANDS
R	SCREEN REFORMATING	is: 54	T CHANGE/EXAMINE TABLES
C	CR SUPPRESSION	is: OFF	U CHANGE UART SETTINGS
L	LF SUPPRESSION	is: ON	A SEND CONTROL-A & QUIT
D	DUPLEX	is: FULL	0 SEND "AT" SYMBOL & QUIT
E	ECHO	is: OFF	B SCROLL BACK DISPLAY
G	CR/LF GROUPING	is: OFF	Z ZERO REAL TIME CLOCK
I	INPUT TO BUFFER	is: OFF	F FILL BUFFER FROM DISK
O	OUTPUT FROM BUFFER	is: OFF	S SAVE BUFFER TO DISK
Baud Rate = 300		Parity Errors: 0	
Data Bits = 7		Framing Errors: 0	
Stop Bits = 1		Overrun Errors: 0	
Parity = EVEN		Buffer: 0 of 9358 used	

Figure 2.

OMNITERM Command Mode - Hit <BREAK> to quit			
P	PRINTER	is: OFF	X SYSTEM COMMANDS
R	SCREEN REFORMATING	is: 54	T CHANGE/EXAMINE TABLES
C	CR SUPPRESSION	is: OFF	U CHANGE UART SETTINGS
L	LF SUPPRESSION	is: ON	A SEND CONTROL-A & QUIT
D	DUPLEX	is: FULL	0 SEND "AT" SYMBOL & QUIT
E	ECHO	is: OFF	B SCROLL BACK DISPLAY
G	CR/LF GROUPING	is: OFF	Z ZERO REAL TIME CLOCK
I	INPUT TO BUFFER	is: OFF	F FILL BUFFER FROM DISK
O	OUTPUT FROM BUFFER	is: OFF	S SAVE BUFFER TO DISK
Baud Rate = 300		Baud Rate = 110	
Data Bits = 7		Data Bits =	
Stop Bits = 1		Stop Bits = 2	
Parity = EVEN		Parity (E,O,N) = 0+	

Figure 3.

OMNITERM Command Mode - Hit <BREAK> to quit			
P	PRINTER	is: OFF	X SYSTEM COMMANDS
R	SCREEN REFORMATING	is: 54	T CHANGE/EXAMINE TABLES
C	CR SUPPRESSION	is: OFF	U CHANGE UART SETTINGS
L	LF SUPPRESSION	is: ON	A SEND CONTROL-A & QUIT
D	DUPLEX	is: FULL	0 SEND "AT" SYMBOL & QUIT
E	ECHO	is: OFF	B SCROLL BACK DISPLAY
G	CR/LF GROUPING	is: OFF	Z ZERO REAL TIME CLOCK
I	INPUT TO BUFFER	is: OFF	F FILL BUFFER FROM DISK
O	OUTPUT FROM BUFFER	is: OFF	S SAVE BUFFER TO DISK
Baud Rate = 110		Parity Errors: 0	
Data Bits = 7		Framing Errors: 0	
Stop Bits = 2		Overrun Errors: 0	
Parity = NONE		Buffer: 0 of 9358 used	

You can edit your programs into the Basic (or protocols) of the receiving computer before they are transmitted.

The command functions are virtually self-explanatory. CR SUPPRESSION, CR/LF GROUPING, etc., simply turn the auto line feeds and carriage returns on and off to accommodate different printers and operating modes.

For example, Radio Shack printers don't use a linefeed: it's automatically provided by the printer. Try to use a different printer, however and everything will overwrite on the same line. The LF and CR commands simply straighten out the mess Radio Shack has designed into their system.

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CIRCLE 230 ON READER SERVICE CARD

feed a program to another computer. You load a disk file into the buffer through the input mode using command "F" (FILL BUFFER FROM DISK). Then you set the buffer for output. The instant you press the O key, the buffer is transmitted from the terminal. If you want to receive a program, you set the buffer for input, which loads whatever is received. Then you use the S (SAVE BUFFER TO DISK) command, which will ask for a standard TRS-DOS filespec and then save to disk.

If you are connected to another TRS-80 computer you can exchange programs using the direct binary information from the TRS-80 disk or memory. But if the computer at the other end isn't a TRS-80 it will not be able to read data. In this case, the data or information exchange must be in ASCII. *Omniterm* provides the conversion programs—from ASCII to binary and vice versa—in the software package.

A built-in editor, TEXTED/BAS, allows you to edit input and output data. Assume you are swapping programs with a Zenith computer. Your Basics are similar, but not exactly the same. A wrong command here or there can cause the program to bomb. With *Omniterm* you can receive the Zenith program, edit it to remove or change unfamiliar Basic statements or commands, and then save a usable version.

Similarly, you can edit your programs into the Basic (or protocols) of the receiving computer before they are transmitted. (We have even connected a Zenith/Heathkit H89 computer directly to our TRS-80 in order to swap programs, which normally can't be done because, among other things, the disks are not compatible.)

Omniterm's translation feature is really what makes the terminal "super intelligent." One of the problems in using terminals is there is really no such thing as standard ASCII.

Worse, still, are the unmodified IBM terminal/printers which use IBM EBCDIC code rather than ASCII, which causes the IBM printer to create garbage from straight ASCII input.

Omniterm solves this problem by providing user programmable translation tables for every individual operating mode. For example, you can translate only the printer output to convert ASCII to EBCDIC for an IBM printer.

In Conclusion

We have only touched the highlights of *Omniterm*. Suffice it to say that we consider *Omniterm* among the very finest, if not the finest smart terminal program for the TRS-80.

Lindbergh Systems, 41 Fairhill Rd., Holden, MA 01520.

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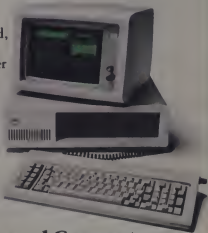
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Neil Shapiro, Popular Mechanics

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Terminal Communications for the Apple

Ken R. Hancock

As this issue went to press, we received word that Personal Software Inc., "as part of a series of marketing actions to increase its corporate visibility" has changed its name to VisiCorp. VisiCorp was chosen as the new name "because it clearly identified the company with its VisiCalc program."

In future articles we shall call them by their new name. In this one we'll rely on you to substitute VisiCorp for each mention of Personal Software. —EBS

VisiTerm is a terminal communications program that was written by Tom Keith of Personal Software. It is a member of a popular series of Apple programs which includes VisiCalc, as well as VisiDex, VisiTrend/VisiPlot, Desk Top Plan and CCA Data Base Management.

All of these programs can save their data in a standardized form which Personal Software calls the Data Interchange Format. Thus, data developed using one program can be shared by the others. This feature greatly increases the usefulness of the series.

Documentation

The documentation consists of three separate pieces: the manual, the VisiTerm Pocket Reference card and the Personal Software User Assurance Plan card.

The manual is a professionally prepared document which comes in a three-ring binder. It is written by Jeffrey Emmet Levinger.

The manual, which is 100 pages long and features numerous photographs and drawings, is divided into the following parts: Table of contents, Preface, Introduction, VisiTerm Tutorial (three separate lessons), Reference, Appendices (eight in total), Glossary, and Index.

Most of the manual is written for the first time user and as a result may seem too

wordy for the seasoned communications veteran. However, this is preferable to a manual that is lacking in critical explanation.

The VisiTerm Pocket Reference card is, when folded out, about four square feet of tables, photographs and abbreviated definitions of the numerous VisiTerm commands. It is divided into the four separate modes of VisiTerm operation: terminal mode, macro definition mode, options mode and file transfer mode. If you are considering the purchase of this program I would recommend that you take a look at the card first, it certainly is the best capsule of VisiTerm information.

changes to the programs on the disk without causing abnormal behavior.

Screen Display

Figure 1 shows an actual screen dump of a VisiTerm display. I created all the text on this screen with the exception of the bottom line. This line is reserved by VisiTerm as a status line.

The "COL- 1" is a column counter indicating that the next character will be typed into column one. The "HALF DUPL" indicator tells us whether we are in half or full duplex communications.

The "SET A" informs us that character set A is in use. This line also indicates when an escape key has been pressed and when the CAPS LOCK is activated.

The screen display of VisiTerm dynamically proportions characters as they are written to the screen, courtesy of high-resolution graphics. In this way, a larger number of characters can be displayed on a single line. The actual number depends upon the number of upper and lower case characters, but, given typical lines of text, 75 columns or more can usually be displayed. All of this is accomplished using only the VisiTerm software. No 80-column card or lower case adapter is required.

This display technique has several advantages as well as disadvantages. First, it permits several different character sets to be supported. Second, it allows smooth scrolling, which is much better than the line by line scroll of a typical Apple screen. Third, this technique also permits the spacing between lines to be altered by the user. Invoking or changing any of these features can be done while on-line.

While, on one hand, it is best to have the maximum number of characters on one line; on the other, there are times when rigidly fixed columns are desired, such as when you are displaying a column of numbers. With VisiTerm, if you want to display such a column of numbers a different character set must be loaded.

This character set is not much different from the standard Apple set and, therefore, does not allow a great number

creative computing

SOFTWARE PROFILE

Name: VisiTerm
Type: Communications
System: Apple II or II+, 8K Memory,
1 Disk Drive
Format: Disk
Language: Applesoft
Summary: Superb
Price: \$100
Manufacturers:
VisiCorp
2895 Zanker Rd.
San Jose, CA 95134

The Personal Software User Assurance Plan is a card containing the warranty registration, backup diskette order card and a replacement disk order card. VisiTerm is a copy-protected disk and only one copy of the program is supplied with the package. The backup disk costs \$30.

Although VisiTerm is copy-protected, the method of protection is not as restrictive as some of the techniques used in the industry. A VisiTerm diskette will CATALOG normally and display each file like a standard 3.3 disk. It will also allow

VISITERM

This is a standard line of text exactly as it would appear on an APPLE screen
This is a standard line of text exactly as it would appear on an APPLE screen
This is a standard line of text exactly as it would appear on an APPLE screen
The line above took a total of 80 columns to display. It required no special hardware whatsoever. No 80 column card, no lower case adapter!

Additional character sets are provided including APL:

```
? w e p ~ ^ ↑ ↓ ↖ ↗ *
α Γ L - ∇ Δ + ' 0 [
      C D O U I T | , , /
```

Smooth scroll is also provided. You can even change the width of the cursor and the spacing between lines!

VISITERM

COL - 1 HALF DUPL SET A

Figure 1.

of characters on a line (70, MONO-SPACE). But, it is still true, that for most text transmissions VisiTerm is as good as an 80-column card.

File Handling

VisiTerm itself will work with only two types of files: a 16-sector binary configuration file or a text file format used to store data transmissions.

Figure 2 shows a CATALOG of a VisiTerm disk. All the files shown are supplied with every VisiTerm package.

Six of the first file type, the 16-sector binary file, are supplied with VisiTerm. These are the files that are followed by "<VT-CONFIG>." They not only save the character sets but all the current VisiTerm settings as well. They could be likened to a snapshot of the VisiTerm operating mode.

Of the second file type, only one short example is supplied. This is the text file called SAMPLE. It is a short Applesoft Basic program that has been converted to a text file.

Thus, VisiTerm will transmit only text files. But, it supplies four conversion programs that allow you to send and receive the four file types—Applesoft, Integer, binary and text. To transmit an Applesoft Basic program, for example, you would run the Applesoft program called FP TO TEXT, which would then prompt you for the program you wish to convert.

You may have noticed that two conversion steps seem to be missing. It appears that Personal Software neglected to supply a TEXT TO FP or TEXT TO INT

program. In fact, neither of these programs is necessary. This is because any standard Apple will automatically convert from text to Basic by means of the EXEC command.

That is, if you have just received a text file that you wish to convert to Basic, simply type "EXEC filename" and the text file will be converted to a Basic program residing in memory. Remember to type NEW prior to executing this command or you will end up with an unfortunate merge of two programs.

The BIN TO TEXT program works in an unexpected way: it converts all binary characters to their equivalent hexadecimal representation. Thus, a control-m character, equivalent to a carriage return, would be transmitted as an ASCII "O" followed by an ASCII "D." A conversion like this is necessary because of the difficulties involved in transmitting an unaltered binary file.

For example, suppose we had a short binary program in memory that we wished to transmit. Also suppose that this short program contained an absolute ORA instruction. Well, as it happens, the hex code for an absolute ORA is OD, which is a carriage return, as previously mentioned. As you can see, there would be no way to discriminate between carriage return and an absolute ORA instruction.

This conversion method has the unfortunate drawback of creating a text file that is about twice the length of its binary counterpart. This characteristic degrades the capacity of VisiTerm in certain cases. Since the maximum number of characters

DISK VOLUME 254

A 000 SERIAL-NUMBER:0266740362

```
A1000
A 016 BY TOM KEITH
A 000 COPYRIGHT 1981

A 002 INIT
A 002 APPLESOFT
A 067 VISITERM
B 016 MONO-SPACE <VT-CONFIG>
B 016 CURSIVE & SHORT <VT-CONFIG>
B 016 UPPER CASE <VT-CONFIG>
B 016 VISIBLE CTRL <VT-CONFIG>
B 016 REG & BOLD <VT-CONFIG>
B 016 DEFAULT <VT-CONFIG>
A 004 FP TO TEXT
A 004 INT TO TEXT
B 002 CRUNCHER
A 005 BIN TO TEXT
A 004 TEXT TO BIN
A 011 CHECKSUM
A 045 PRINT
T 002 SAMPLE
T 002 DEFAULT.PRINTER
```

Figure 2. Typical VisiTerm 'catalog.'

that VisiTerm can receive in one block is 18,384, the maximum length of a binary reception is only about 9000 characters. Also, this conversion method does not allow binary files that are being used as text files to be properly transmitted. The conversion will not work with an Apple-writer file for instance.

File Transfer mode allows data to be transmitted or received in a block. This is the mode that would be used to transmit a text file.

All conventional transmission protocols are supported including EOB-ACK (End Of Block-Acknowledge) as well as STP-STR (Stop-Start). Auto acknowledge is also allowed as are combinations of the above. Further, VisiTerm gives you the ability to change the EOB or the ACK characters to any ASCII value. Similarly, both the STP and STR characters can be changed to accommodate nearly any convention.

Let me give you an example of a block data transmission to illustrate how these characters would be used. Suppose we wished to transmit a Basic program, line-by-line, into a timesharing editor such as the MTS (Michigan Timesharing System) editor. This editor prompts line-by-line with a question mark and accepts data in conventional ASCII.

First, we would convert our Basic program to a text file using the FP TO TEXT program. Then we would go to the VisiTerm Options mode (Escape shift 1 from the Terminal mode) and change our EOB character to a OD (since the ends of our Basic lines are marked with carriage

returns). We would then change the ACK character to a 3F which is the ASCII value for a question mark.

Next, we would go to the File Transfer mode by pressing F. We would then type in the name of the file we wish to transmit by typing "Escape filename." VisiTerm must now be told what communications protocol we wish, so we would select EOB-ACK by pressing either of the arrow keys. Provided the MTS editor is invoked, the file will be successfully transmitted by merely typing an "S" for "Send."

This is one way that data could be transmitted to the MTS system. A better way, which works very well using different EOB and ACK characters, is the MTS COPY *SINK* or COPY *SOURCE* commands.

Convenience Features

One of VisiTerm's most useful modes of operation is the Macro Definition mode. In this mode, a character on your keyboard can be made to represent a whole string of characters or commands including embedded carriage returns. If you are using a timesharing system such as The Source, this will greatly simplify your sign-on procedure.

All macro definitions are saved with all the other VisiTerm options in a <VT-CONFIG> file.

VisiTerm allows you to use your DC Hayes modem with your Apple at either 110 or 300 Baud. Unfortunately though, you cannot save a dial up number in a <VT-CONFIG> file and you must dial each time by typing the appropriate number on the Apple keyboard.

Whether you are using a DC Hayes, an Apple communications card or a 1200 baud CCS 7710 card, VisiTerm automatically locates the card and sets itself accord-

VisiTerm allows you to create or modify your own character sets.

ingly. However, you can change the slot number it suggests if you desire.

VisiTerm allows you to set the Data Format to almost any combination of 7 or 8 bits per character, odd, even, or no parity, as well as 1 or 2 stop bits. Further, you can change the length of a break character from 0.00 seconds to 2.50 seconds in hundredths of a second increments.

VisiTerm also gives you control over such elegant things as setting the volume of

the ticks which are heard when you press a key. You can also change the column number at which VisiTerm is instructed to beep automatically—72 being the standard value. Also, you can change the length of the Tab set.

You may remember from Figure 2, the VisiTerm CATALOG, that a fairly lengthy Applesoft program called PRINT was present. This is another Basic program which allows you to print a text file that is resident on your disk. VisiTerm does not allow for simultaneous printing and terminal communications. This feature would be a welcome addition.

Certainly well beyond a convenience feature, VisiTerm also allows you to create or modify your own character sets. This feature gives VisiTerm a nearly worldwide appeal—an intelligent choice for a communications program.

Conclusion

I am impressed. Personal Software received, and still receives, a shower of compliments and commendations for its VisiCalc program. VisiTerm follows in the same tradition of superb documentation and effective, stable software.

It will be no surprise to see a flurry of VisiTerm related products following in its wake. VisiTerm, like VisiCalc, will be with us for many years. □

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CIRCLE 139 ON READER SERVICE CARD

128K Memory System for Atari

David Small



A while ago a group of employees left Atari and formed Axlon Co. to manufacture add-on products for the Atari computer. They produce a 32K RAMCram card, and a 256K RAM system, complete with expansion interface.

So when ads began to appear for their RAMDisk, I was intrigued. I couldn't resist calling them for more details.

They turned out to be most friendly and mailed me a loaner RAMDisk for evaluation. This review is based on my use of the product for a month.

The RAMDisk arrives in a 9" x 11" x 1" blue box which contains a manual, a diskette, and a memory cartridge. The manual is housed in an attractive notebook with the diskette in a side pocket.

The memory board looks like an Atari 16K cartridge except that it has no top or sides. (It does have front and back covers, though.) This is probably to help the RAMDisk get rid of heat.

The manual is well written, and very, very clear. I decided to trust it immediately, and began following the setup directions.

Getting Started

First, one boots up the system with a normal Atari 2.05 DOS disk. The Axlon disk is fast formatted and uses Atari directory formats and such, but does not contain DOS.SYS or DUP.SYS, so you can't boot up with it. Next, I ran a Basic program called CREATE to create a boot disk (a disk used whenever the system is

powered up or re-booted). Following the instructions, I put in the Axlon disk, then a blank disk, and created a boot disk. No problem—very easy to do.

Next, I turned the computer off, removed my middle 16K board, and put in the RAMDisk. Two memory boards are required, for some reason, on either side of the RAMDisk. Perhaps they keep it from getting the electrical equivalent of lonely.

Then, I booted up using the new boot disk. A most foreboding message flashed onscreen for about five seconds, just long enough for a speed reader to comprehend it. It pointed out that the Axlon MMS (Memory Management System) was an end-user initiated change to Atari DOS and that Axlon doesn't condone making copies and distributing them.

Here is my first complaint with the MMS, Axlon's DOS 2.05: you have to sit through this silly legal message every time you boot up with the MMS disk. The first time, it's fun, and even witty. The second time, half witty, and after that, not funny at all. I was ready to disassemble the boot file and "short out" the message after a month of seeing it.

Once you're through the message, you get to Basic or whatever you're running. The RAMDisk hardware operates just like a normal 16K cartridge unless you specifically tell it not to. There's just about the same amount of free memory as before. So I typed DOS.

Next surprise. No click, whirr of the disk. The DOS menu popped up right away, just like the old DOS 1, but apparently without the memory sacrifice, according to FRE(0). And my, how the DOS menu has changed.

The Menu

First, the top line is not Atari 2.05 anymore. It is the Axlon RAMDisk MMS System V1.0. Most of the options look the same, but two are disabled: writing DOS files and creating MEM.SAV.

Second complaint. I don't care about MEM.SAV; I never use it. But I want to be able to write the DOS files after formatting a disk. The DOS and DUP files are on nearly every disk I have, making for few bootup problems. But Axlon doesn't want complaints about folks copying DOS, so they disabled it. Aside from these two changes the menu is a duplicate of the Atari 2.05 menu.

How do you use the RAMDisk? The RAMDisk contains 128K bytes of memory. A diskette contains around 90K. So the Axlon MMS makes "disk #4" the RAMDisk memory area. You literally use the 90K of the memory board as disk number 4.

You can copy to it, open files on it, close them, NOTE/POINT them, and so forth. You can copy an entire disk to RAM. You can run directories, lock files—everything you can do to a normal disk—to the RAMDisk (disk 4). In short, the RAMDisk replaces disk 4.

Here's an example. Let's say I have one disk drive and I need to duplicate a disk. I load the Axlon MMS, go to DOS, and J (duplicate disk) from I to 4. This copies the whole diskette into RAM. Next, I put in my destination disk, and copy from 4 to 1. All done. (No more swapping diskettes back and forth.) This is very nice and very easy. It is also fast. I could load 220-sector binary files in less than a second from the RAMDisk. This compares to more than 30 seconds for a disk drive.

Software houses should take note here. The RAMDisk is a very good thing for

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Polly, Put The Kettle On

Richard A. Zatarga

I have owned a BSR X-10 control system for several years and have been intrigued with the possibility of somehow controlling the modules with my TRS-80 Model I computer. Recently, several hardware interfaces have been introduced to perform this function. These interfaces range in price from less than \$40 to over \$200.

The cheaper units usually provide a sonic link from the computer to the BSR Command Console. The more expensive units operate without the console, i.e., they send the signal directly from the interface, through the house wiring, and on to the control modules. Some controllers come complete with the necessary software for them to function. Others offer software as an optional extra.

In my search for the right computer-to-X-10 controller, I made a list of attributes I felt the unit should possess. It had to be relatively inexpensive. It had to be compact. (I don't have too much room left on my desk.) I didn't want a sonic link type controller. My command console is centrally located in my house, and quite some distance from the computer. I had no desire to move the console every time I wanted the computer to control the modules.

It also had to be permanently installed without affecting the operation of other peripherals; I didn't want to remove and attach cables to use the controller. Lastly, it had to be easy to use and program so other members of the family could readily operate it.

My quest came to an end when I received a TRS-80 Plug 'n Power Controller. The price is only \$39.95. It is only 4.5" x 4.25" x 1.5" in size, and the command console is not required—no sonic link. It attaches to the cassette DIN jack on the TRS-80 and the cassette recorder plugs into the controller.

A single rocker switch on top of the unit selects either cassette or controller operation. Finally, the Plug 'n Power Controller came complete with the software to satisfy all computer configurations for which the unit was designed—TRS-80 Models I and II, and the Color computer.

Documentation

The TRS-80 Plug 'n Power Controller comes with two cassette tapes and an instruction booklet. The 36-page instruction booklet exceeds Radio Shack's high standards for documentation. It is clear, concise, and complete concerning the installation, operation, and programming of the controller.

Set-Up

It only takes five minutes to attach the controller to the computer permanently. You simply unplug the cassette cable from the computer and plug in the cable from the controller. Plug the cassette cable into the DIN jack on the controller and the line cord of the controller into an AC outlet.

In order for the computer to activate the X-10 modules through the Plug 'n Power Controller, a software link or operating program must be loaded into memory. This is a machine language program for the Level II machines and a Basic program for the Color and Level I computers. To load a Level II version of the operating program, you set the rocker switch on the controller to CASette and enter the following:

SYSTEM ENTER
*?L ENTER

Set the rocker switch to conTRoL and enter a slash (/) after the second question mark (?) to execute the program.

Operation

The controller may be operated in either a direct command or a programming mode. I really can't see any purpose for the direct command mode. It is faster and easier to

turn a single appliance or lamp on and off directly than it is to power up the computer, load the operating program, enter the time, and finally, issue a command to a module via the computer keyboard.

In the programming mode, however, the Plug 'n Power Controller is a very useful tool. In this mode you can program a sequence of commands to turn lights and appliances on and off at different times over a period of hours, days or even weeks. Your only limitation is a maximum program length of 45 lines, i.e., 45 separate commands.

Once a program sequence is entered and executed, it will continue to function even after the last line of the program has been executed. The sequence of commands will repeat again and again, starting with the first program line. For example, if you program a three-day sequence of commands and are away for five days, the first day's command sequence will begin to repeat on the fourth day. In fact, the whole three-day sequence will repeat indefinitely, unless there is a loss of power and the operating program is lost.

Both operating modes use the following six control commands:

ON: Turns on the selected module.

OFF: Turns off the selected module.

CLR: Turns off *all* modules for a selected house code.

ALL: Turns on *all* modules for a selected house code.

The following two commands only work with the lamp and wall control modules. They will not work with the appliance modules.

DIM1-DIM9: Decreases or dims the level of light intensity for a selected module. The number after the command determines the level of intensity.

BRI-BR9: Increases or brightens the level of intensity for a selected module.

Programming mode commands allow you to (I)nsert, (R)eplace, (E)dit, (D)elete and (L)ist program lines. One command,

controlling one module, is allowed per program line. However, up to eighteen commands can be executed at the same time by using the same execution time in two or more program lines.

A program line must contain the following five items of information:

- A line or sequence number.
- The time the command will execute.
- The house code of the module being commanded. (A thru P)
- The unit code of the module being commanded. (1 thru 16)
- The command (on, off, etc.)

Line numbers are automatically displayed by the operating program and do not have to be entered. The other items are keyed into the program line individually, with each item followed by a carriage return (Enter). After the four items have been keyed into a program line, the next line number is displayed, ready for a new command. Table 1 shows an example of a two day sequence of commands to give you an idea of the format.

Conclusion

I have nothing but praise for the unit. It has performed flawlessly since the day I hooked it up. Its only limitation is the 45 program line maximum of the operating program. This limit precludes a multi-week

program of commands that contains any degree of time and sequence sophistication. However, I considered this to be a minor flaw in the design of the controller. Since it is the software that is at fault, a little programming and experimentation should overcome the flaw completely.

So, if you want to foil burglars by giving your home that lived-in appearance while you are away, or just want the luxury of having your coffee ready when you get out of bed in the morning, you can't go wrong with this cost effective remote control computer interface from Radio Shack. □

Line Number	Time	House Code	Unit Code	Command
01	07:00	A	03	OFF
02	07:00	B	14	ON
03	07:25	B	14	OFF
04	19:30	A	03	ON
05	07:00	A	03	OFF
06	09:30	B	14	ON
07	09:55	B	14	OFF
08	19:30	A	03	ON

A scenario for the above commands might be:

Day 1

- 01 7:00 a.m. — Turn off outside security light.
- 02 7:00 a.m. — Turn on coffee pot.
- 03 7:25 a.m. — Turn off coffee pot.
- 04 7:30 p.m. — Turn on outside security light.

Day 2

- 05 7:00 a.m. — Turn off outside security light.
- 06 9:30 a.m. — Turn on coffee pot. (Must be Sunday)
- 07 9:55 a.m. — Turn off coffee pot.
- 08 7:30 p.m. — Turn on outside security light.

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I don't even pretend to understand why there are so many renditions of dank clammy caverns to be played on these glossy little machines of ours, but there are. It sometimes seems we're caught between the pit and the place without atmosphere.

Imagine it is simply because the majority of these games are interesting. Who wants to sit and stare at the boob tube when he can be involved in derring-do, battling dragons, orcs and other slithy toves? Let the "booboisie" of H.L. Mencken stare, we'll interact.

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Ultima

One of the most recent entries in the parade of adventures is *Ultima*. I was familiar with this company's *Akalabeth*, having played it some time back. *Akalabeth* wasn't an overly impressive game, although it had some good features.

Ultima far surpasses that earlier effort. The major author of *Ultima*, recently revealed in *Softalk* as Richard Garriott of Austin, TX, works under the *nom de chip* of Lord British, with the help of several other people.

This game is like an onion; it has layer after layer after layer of intrigue. I have been told that there are over 16,000 squares of land—4096 per continent on four continents. You will use two disks, one for the program, the other for your character (and the towns, castles, and continents).

There are roughly eight dungeons and eight towns per continent and two castles. All told, there are four kinds of kings. Each of the kings will enlist you in a different

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- **PRINT USING** - Easily formats output in columns, with automatic rounding, floating dollar sign, asterisk fill, preceding or trailing sign, and more features than any other similar system.
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and CALL statements for easy programming.

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The Extender comes on a 3.2 diskette and is fully compatible with both DOS versions 3.2 and 3.3. The Extender requires an Apple II or Apple II Plus with at least 32K, Applesoft in ROM or Language System, and a minimum of one disk drive.

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type of quest, and as you succeed at each, will give you a gift on your return to his castle.

By the way, why couldn't the program have one queen in place of a king? This insistence on mild sexism is one of the worst oversights in the program, and for that matter the whole genre. Must adventure game publishers always picture women as either "tavern wench-with-no-clothes" or "warrior maiden-with-no-clothes"?

In the instruction books, the men are usually shown dressed as if they're ready for a day in the gladiatorial mines, while the women are portrayed mini-skirted and sleeveless, albeit carrying a sword. The only two women in this scenario are an imprisoned princess and a tavern wench.

But, to continue: *Ultima* has various levels of adventure, whether you tour the ten-level dungeons, travel around the land or ocean, or go into outer space.

As you create your character, you are allotted 90 points to assign to strength, agility, stamina, charisma, wisdom, and intelligence. None can be above 20 to begin, or 99 with further play. You can become human, elf, hobbit, or dwarf, and a fighter, thief, cleric, or wizard.

You receive 100 hit points, 99 days of food, two daggers and leather armor. That isn't a whole lot on this planet.

First you must ready your armor and weapons (and later any spells you want to cast). As you travel, you run into assorted enemies, such as necromancers, thieves and evil knights. You can either flee or attack with your readied weapon. Each time you overcome an adversary, you receive his gold and experience points.

If you should decide to enter a dungeon, the scene changes. From the hi-res graphic above ground, you plummet into a simple three-dimensional line drawing of the dungeon. This changes as you walk along, controlling movement with the return-right arrow-left arrow and slash keys. Return moves you forward, slash turns you around, and the arrow keys send you in the matching direction.

These are tough dungeons, but fair: they don't change each time you enter them, so they're mappable. You can go back to the surface to resupply or purchase better arms. The graphics (a transfer from *Akalabeth*) are very simple, but they work. You can inspect for secret doors and pits.

You can be surprised, however; your attacker or attackers can be swinging at you while you are trying to decide where they are. You must face a monster before you can hit it.

With a distance weapon such as a bow and arrow (or, later in the game, a blaster), you can attack a distant monster. If you have purchased magic spells, you can cast one you have readied, such as a magic missile (good one square in front of you).

As you travel, you run into assorted enemies, such as necromancers, thieves, and evil knights.

You have to ready the weapon or spell, then wait until the next turn to use it. (Turns can be adjusted for lag-times of 0-9.)

There is a constant annoying flicker on the screen as you walk through the dungeon. This may be because this part of the program was written in Applesoft. I wish the sound of battle could be turned off: the "boink-zap" is very tiring after a few repetitions. If the attacker is a thief, he can steal from you, but even if you defeat him, you can't retrieve the lost items.

Return to the surface, and you will have this points added to your remaining ones. This is how you build hit points, although you can also buy them from the kings.

Enter the town, and the graphic changes. There are stores selling food, arms, armor, transportation and magic, and a pub. Among the townsfolk are large guards and a bard. The bard is one of two moving characters (the bar wench is the other) on the screen. If the bard touches you, he may rob you. Kill him, and you'll be sorry.

Among the types of transportation you can purchase are a horse, a frigate, and later an aircar and a space shuttle. The aircar can go over water or land; the space shuttle takes you into space. Once in space, you can take on enemy ships.

There are still some bugs in the program the company hasn't been able to exterminate. Normally, you can save your character at different points. However,

when you reboot, you may have lost your transportation. So don't quit the game if you are on an island. Also, when my wife's character was killed, she was reincarnated in the middle of the ocean. So save the game regularly.

Garriot is working on the sequel to *Ultima* now. California Pacific promises it will be even better. That will be awfully hard to accomplish, because this is an adventure of truly epic proportion.

Wizardry

David Lubar reviewed an early copy of *Wizardry* in the May, 1981 issue of *Creative*, and I decided to look at it.

The program was written by Andrew Greenberg, Inc. and Robert Woodhead, Inc. The two Inc.s have wrought wondrously well.

This multi-player or solitary game has to be ranked at the top for playability. It is an entrancer.

There are some 14,000 lines of code in this program in run-time Pascal. Since it is so long, and because of the language, your disk drive must be set exactly right. I discovered mine was quite fast: I could load any Basic, machine or assembly language program—but not this one.

My wife is a fanatic about this game. Since we first received an early copy, she has uncovered many of the bugs by virtue of raising some of her characters to sixteenth level and acquiring 1.3 million experience points. (I said she was a fanatic.) The program, by the way, is fairly nonexistent.

Unlike *Ultima*, there is only one quest here: to recover a valuable item stolen from the mad overlord Trebor by the evil mage Werdna. It has been hidden in the depths of the overlord's dungeon, perhaps the tenth level down. However, when a priest tried to find the body of a missing warrior, the spell told the party the body was on the eleventh level. To date, no one has lived long enough on the tenth level to discover any deeper ones!

The player can have as many as 20 named characters in training at any one time, and you can see how they all have unique personalities. The difference in point distributions—strength, IQ, piety, vitality, agility, luck—makes a great deal of difference in handling them.

In a melee you would have the most effective fighter go after the magic user in the opposing party for example. There can be as many as four different types of attackers in a melee.

Each of your characters can be directed at a specific attacking group.

This nurturing and development of the characters is one of the most entertaining and engrossing aspects of *Wizardry*. You can learn their qualities, and their abilities. You can mix experienced hands with beginners.

Creative Computing SOFTWARE PROFILE

Name: Wizardry

Type: Magic adventure

System: 48K Apple II or II+ 3.5 Disk Drive

Format: Disk

Language: Run-time Pascal

Summary: A sure winner

Price: \$49.95

Manufacturer:

Sir-Tech Software, Inc.
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□ PM EDITOR: by Dennis Zander (Atari, 16K)

Create your own last action graphics game for the Atari 400 or 800 using only player model graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (POV's-SHIPS). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in **ARTWORK RINGS OF THE EMPIRE** and **ENCOUNTER AT QUESTAR IV**. **PRICE \$29.95 cassette \$35.95 diskette**

□ ROCKET RAIDERS by Richard Petersen (Atari, 24K)

Defend your asteroid base against pulsar bombs, rock jets, lasers, and the dreaded "stealth saucer" as alien attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures. **PRICE \$19.95 cassette \$29.95 diskette**

□ INTRUDER ALERT! by Dennis Zander (Atari, 16K)

This is a fast paced action game in which you must escape from the "Dreadstar" with the tech aliens. The droods are after you and you must find and enter your ship in order to escape. If you fail the rebellion is doomed. **PRICE \$16.95 cassette \$20.95 diskette**

□ THE RINGS OF THE EMPIRE by Dennis Zander (Atari, 16K)

The Empire has developed a series of battle stations protected by one of the more rings of energy. You must destroy these weapons by attacking them in your wing fighter armed with Zander's ordnance. Each time you blast through the rings and destroy the station the Empire develops a new station with more protective rings. **PRICE \$16.95 cassette \$20.95 diskette**

□ FOREST FIRE by Richard Petersen (Atari, 24K)

Using scanner color graphics, your Atari is turned in to a fire scanner to help you direct operations to contain a forest fire. You must compensate for changes in wind, weather and terrain. Not protecting valuable property can result in startling penalties. Life like variables make **FOREST FIRE** a very suspenseful and challenging simulation. **PRICE \$16.95 cassette \$20.95 diskette**

□ GIGA TREK by John Shevard (Atari, 24K) Apple, North Star and CP/M (BASIC)

Giga Trek has features not found in other "Star Trek" games including movement and a trigonometric coordinate system for navigation. It is your task during play to destroy the combined fleet of Klingons and Romulans that are menacing the Federation throughout the galaxy. **PRICE \$19.95 cassette \$29.95 diskette**

□ KALEIDOSCOPE by Clinton Parker (Atari, 16K)

Turn your computer into a color kaleidoscope of ever changing patterns. This assembly level program will generate sequences of patterns which will not repeat for days. A graphic spectacular! **PRICE \$14.95 cassette \$19.95 diskette**

□ GIANT SLALOM by Dennis Zander (Atari, 16K)

Bring the Winter Olympics to your computer anytime of the year! Use the joystick to guide your hero down a giant slalom course consisting of open and closed gates. Choose from three levels of difficulty. Use practice runs or compete against from two to eight additional skiers. **PRICE \$15.95 cassette \$19.95 diskette**

□ HODGE PODGE by Marsha Meredith (Apple, 48K, Applesoft or Integer BASIC)

This captivating program is a marvelous learning device for children from 18 months to 6 years. **HODGE PODGE** consists of many cartoons, animations and songs which appear when any key on the computer is depressed. A must for any family containing young children and an educational gem. **PRICE \$19.95 cassette \$29.95 diskette**

□ THE PRECICOITOR by Thomas Barker (Apple Atari, North Star and CP/M (BASIC))

This is a complete package that covers least squares fitting of parameters for two or more variables. **THE PRECICOITOR** can be used for curve fitting and process behavior, trend analysis, model building and many other uses calling for multivariate techniques. Each option in the program is prompted with simple "Y/N" commands making it very easy to use. **PRICE \$29.95 cassette \$39.95 diskette**

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ARTWORK is offering the fantastic **TYPE-N-TALK*** from **Vidral**. This easy to use connects to your computer's serial port. Text is automatically translated into electronic speech enabling the **TYPE-N-TALK*** hobbyist to use and enjoy it immediately. **PRICE \$39.00**

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BRIDGE 2.0 (Atari, 24K, North Star) **\$19.95 / \$29.95**

NOMINOES JIGSAW (Atari, 24K) **\$17.95 / \$21.95**

Please specify "TNT" version when ordering programs.

□ **CRANSTON MANOR ADVENTURE** by Larry Ledden (Atari, North Star and CP/M)

You must enter mysterious Cranston Manor and attempt to collect its many treasures. This extremely challenging program will provide you with many hours (days?) of adventure. The program may be interrupted at will and your status saved onto the diskette. **PRICE \$24.95 diskette**

□ **PILOT** by Michael Piro (Atari, 16K)

Pilot your small airplane to a successful landing using both joystick to control throttle and attack angle. **PILOT** produces a true perspective rendition of the runway which is constantly changing. Select from two levels of difficulty. **PRICE \$16.95 cassette \$20.95 diskette**

□ **TEACHER'S PET** by Arthur Walsh (Atari, Apple II, North Star and CP/M (BASIC))

This is an introduction to computers as well as a learning tool for the young computerist (ages 7-7). The program provides counting practice, letter word recognition and three levels of math skills. **PRICE \$14.95 cassette \$18.95 diskette**

□ **FORM LETTER SYSTEM** (Atari, North Star and Apple II)

This is the ideal program for creating personalized form letters! It is employs a simple to use text editor for producing fully justified letters. Addresses are stored in a separate file and are automatically inserted into your form letter along with a personalized salutation. Both letter files and address files are compatible with **ARTWORK MAIL LIST 3.0** and **TEXT EDITOR** programs. **PRICE \$19.95 cassette \$29.95 diskette**

□ **TEXT EDITOR** (Atari and North Star)

This program is a very friendly, yet employs all essential features needed for serious text editing. Very minimal memory requirements. Features include common sense operation, two different justification techniques, automatic line centering, and straightforward text merging and manipulation. **TEXT EDITOR** files are compatible with **ARTWORK FORM LETTER SYSTEM**. **PRICE \$39.95 cassette \$49.95 diskette**

□ MAIL LIST 3.0: (Atari, Apple and North Star)

The very popular **MAIL LIST 2.2** has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. **MAIL LIST** is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3 up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and **MAIL LIST** will even find and delete duplicate entries! The address files created with **MAIL LIST** are completely compatible with **ARTWORK FORM LETTER SYSTEM**. **PRICE \$49.95 cassette \$59.95 diskette**

□ **THE VAULTS OF ZURICH** by Felix and Greg Herlihy (Atari, 24K, PET)

Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to under take the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: **THE OREC OIL OREOS**. **PRICE \$21.95 cassette \$25.95 diskette**

□ **BRIDGE 2.0** by Arthur Walsh (Atari, 24K, Apple II, North Star and CP/M (BASIC))

Rated #1 by Creative Computing, **BRIDGE 2.0** is the only program that allows you to both bid for the contract and play the hand (both defense and offense). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available. **PRICE \$17.95 cassette \$21.95 diskette**

□ **ENCOUNTER AT QUESTAR IV** by Douglas McFarland (Atari, 24K)

As helmsman of Rikar starship, you must defend **Questar Sector IV** from the dreaded Zenitars. Using your plasma beam, hyperspace engines and wits to avoid Zenitars mines and death phasers, you struggle to stay alive. This **BASIC** Assembly level program has super sound, full player movie graphics, and real time action. **PRICE \$21.95 cassette \$25.95 diskette**

□ **THE NOMINOES JIGSAW PUZZLE** by Minn/B. Brownlee (Atari, 24K, TRS-80, Apple II)

We salute a brain-teaser supreme... the concept of **NOMINOES JIGSAW** is brilliant. This video igaw game is so clever and completely original that only the most hardheaded puzzle hater could fail to be charmed... **ELECTRONIC GAMES MAGAZINE**. **PRICE \$19.95 cassette \$24.95 diskette** (Apple II, North Star and Apple II compatible for TRS 80 color computer) **\$21.95 diskette**

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The nurturing and development of the characters is one of the most entertaining and engrossing aspects of Wizardry.

The display gives you all information at a glance. If you see a group of monsters, you know you are being attacked: you don't need a message from the computer intruding on your consciousness. The view of the dungeon is three-dimensional, so you can map it.

Having a group to draw on during dungeon forays allows a matchup of talents between fighters and magic users. For instance, priests have healing and hurting abilities, while mages have only hurting ones. A few types of characters have both fighting and magic-using capabilities.

You assemble your group of six in the tavern, arm them at Boltac's if necessary, then head for the edge of town and the maze. Once down, you line them up in the order you want (since the dungeons only allow three abreast, put fighters in front).

In addition to the three types of characters mentioned already, there are evil ninjas, good lords, thieves, bishops and samurai.

With the wittily-illustrated instruction book and the utilities to change names, or transfer characters from adventure to adventure (Woodhead reports he is working on a two-disk adventure that includes outdoor travel), this is a great program.

My wife, by the way, refuses to complete the quest until she is sure there is another adventure for her to move on to.

Acheron and Upper Apshai

For those of you who liked *Apshai*, the *Upper Reaches* may be enjoyable. It adds 150 new rooms, treasures, traps and hazards to the list of fun things for *Apshai* owners. That is, you must have *Temple of Apshai* to play this expansion unit, and *Hellfire Warrior* to play *Keys of Acheron*.

(For newcomers: your character will have strength, constitution, dexterity, intelligence, intuition, and ego. You can buy weapons, armor, magic items and more to visit the levels. You will see your character onscreen, and can control motion by typing R or L plus a number to signal the distance of the move. There are many fine details to these exciting games.)

Upper Reaches is about the adventures of those who arrived in *Apshai* too late to

**Creative Computing
SOFTWARE PROFILE**

Name:

The Keys of Acheron (Expansion kit for *Hellfire Warrior*) and The Upper Reaches of Apshai (Expansion kit for *Temple of Apshai*)

Type: Graphic adventure

System: 48K Apple II with Applesoft in ROM, or II+ 3.2 Disk Drive; also available for TRS-80 Level II on cassette, 32K Level III on disk

Format: Disk and cassette

Language: Basic

Summary: Son (or daughter) of *Hellfire* meets the Temple chickens.

Price: \$19.95

Manufacturer:

Automated Simulations
P.O. Box 4247
Mountain View, CA 94040

mine the mother lode. It offers the innkeeper's backyard, the magician Merlis's cottage, the dwarf Olias's cellar, and Benedic the priest's monastery.

While cleaning up the backyard, you are attacked by dogs, giant tomatoes, a farmer's wife, lots of mice, chickens, and other domestic critters.

Merlis has a covey of cats to deal with, bees, spiders, and other beasties.

Olias is often troubled by bats in his cellar, but that is where he stores the loot taken from the adventurers who died in the Temple. Arrows, armor, swords, elixir... all are here to be found.

The monastery offers the most challenge: the dead are walking here, and a vampire prowls the night.

These Automated Simulations games are very popular, and I note that the expansion kits are numbered "1." Apparently others are on the way.

I found an error on the loading instructions to *Keys of Acheron* for the Apple. After booting the DOS 3.2 *Hellfire* disk, you must enter your character's attributes, arms and armor, etc. When it asks what level you wish to enter, insert the *Acheron* disk and hit the level choice. BREAK IN 20050 will appear at this point, so type RUN DM.

This is a much deeper game than *Upper Reaches*, and much more dangerous for your character. No chickens or geese here; you are faced with four levels of everything from dragons to astral skulls.

Your quest is to find the four gems—emerald, amethyst, ruby and sapphire—known as the Keys of Acheron. Each gem is protected by dire beings, led by the demon lord Kronus.

You will be transported to the different

While cleaning up the backyard, you are attacked by dogs, giant tomatoes, a farmer's wife, lots of mice, chickens, and other domestic critters.

levels by the wizard Abosandrus, but you must find the portals to make your way back.

First is the Abode of the Dragon, which you must face after obtaining an enchanted necklace from a unicorn. Next you visit the Temple in the Jungle, a primeval place populated by beasts and reptiles from before time. In the temple of the reptile Sserpa, protected by the Sserpa shaman, is the second key.

The Crystal Caves, in the heart of a dead volcano, contain the third key. You will meet piranhas, giant scorpions, and other strange cavern beings. Finally you reach the Shadowland of Kronus, a world shrouded in perpetual darkness. Here, in his citadel, you will find the last key...if you survive the kraken, wraiths, automatons, traps and hazards of this strange land, not the least hazardous of which is the unkillable Kronus himself.

These are some of the most popular adventure games around, and the expansion kits will add to their play value for quite some time to come. They are topnotch in concept and execution.



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SOFTWARE PROFILE

Name: Dragon's Eye

Type: Graphic adventure

System: 48K Apple II with Applesoft in ROM, or II+, 3.2 Disk Drive

Format: Disk

Language: Basic

Summary: Fairly interesting quest, and good melee graphics, but too many elements of chance.

Price: \$24.95

Manufacturer:

Automated Simulations

P.O. Box 4247

Mountain View, CA 94040

Dragon's Eye

Dragon's Eye is another game Automated Simulations has picked up from an outside company, as they did *Tuesday Morning Quarterback*. This one is from Southern Software, and was written by Robert Leyland.

The challenge is to find a magic amulet used by the Evil Necromancer to control time. Your character has 21 days in which to do so. (Weather varies the number of periods in a day. Superb weather gives dawn, morning, noon, afternoon, dusk and evening. Fine weather doesn't have evening. If it should be storming, you have just morning and afternoon. So, depending upon the weather, 21 days may not be very many moves.)

You begin by selecting a name and a shield (which becomes your character's body during melees). You can select among four swords, from great sword to scimitar.

You are given several spells to use during your search. These should be cast when the time is auspicious, i.e., when the magical wind is right. A Necromantic spell, for example shouldn't be cast when times are right for Divining.

You open on a map of the Seven Provinces, with your location at Fel City, right in the middle. Relying on your intuition (or the Locate Eye spell, if conditions are correct), you move up to one of the provinces.

Along the way, you will run across monsters from ghosts to skeletons, golems to arachnids, sabretooth tigers to dragons. These melees are the most interesting part of the game, I feel.

The screen shifts to show your character and the monster. If you are at a distance from it, you can use either a magic bolt or an arrow. You can see your character fire these—missed arrows even stick in the ground. Once you get close enough, sword ready, you can chop horizontally, smash

**You will run across
monsters from ghosts to
skeletons, golems to
arachnids, sabretooth
tigers to dragons.**

downward, thrust, parry, or duck. You can leap toward and away from your adversary while you battle.

You must watch your character's strength and health while you fight. The more exhausting strokes will diminish your strength. And if you stop to take a vial of healthful fluid, you may get hurt.

When you are in a location (shown by number) you can examine, rest, or move cautiously, boldly, or normally. (The bold attract trouble, but are a little faster; the cautious avoid the monsters unless they choose to do otherwise.)

This is one of the few adventures I have come across that gives the player a score. It is based on monsters killed, treasures found (including the Dragon's Eye), and arrows, magic bolts, etc., retained.

The major problem with the game is the lack of continuity. Other games in the genre give you a continuing adventure. With this one, it's out and back in a certain number of moves.

Swordthrust

Oh, I wish Donald Brown had found some way to include graphics in these games of his. These are excellent solitaire text adventures, with some highly imaginative techniques. The master diskette, *The King's Testing Ground*, even asks what sex you are, so that it can react correctly. Bravo.

All are very well thought out games, although the master instruction book is a bit thick at times for the person who doesn't really care about the mathematics of battle.

Your character has hardness, agility, charisma, left hand rating, and fatigue. As you continue, your parrying ability, armor and weapons expertise all increase.

In the Main Hall of the Free Rogues, you can buy weapons, learn magic spells, bank money, examine your characteristics

**The King's Testing
Ground even asks what
sex you are.**

creative computing

SOFTWARE PROFILE

Name:

Sword Thrust: Master Diskette "The King's Testing Grounds," "The Vampire Caves," "The Kidnapper's Cove," and "The Case of the Sultan's Pearl."

Type: Text adventure

System: 48K Apple II with Applesoft in ROM, or II+ 3.2 Disk Drive

Format: Disk

Language: Basic

Summary: The first text adventure I've seen where characters can change and learn, get fatigued, etc. If only it had some graphics!

Price: \$29.95 for Master Diskette. (required for others at \$24.95)

Manufacturer:

CE Software

801 73rd St.

Des Moines, IA 50312

and acquisitions, buy drinks, train to increase expertise, go on an adventure, or quit the game.

Shields and armor that you purchase lose hardness after several battles, and may just fall off without warning.

As in regular text adventures, you are told what is happening. You see text descriptions of the rooms you are in, objects there, and the various ghoulies on location. You type in your instructions, such as GET, DROP, LOOK, READY, ATTACK, and FLEE.

At times, you will run across a being who will be friendly, or can be bribed into being friendly. The being will join you on your adventure. Remain aware, however, that its fondness for you can change, often under the most embarrassing and deadly of circumstances.

Your character can be encumbered (carrying treasure, for example), fatigued, or hurt. He can fumble and drop or break a weapon—even, in some cases, hit himself.

After a short introductory game on the Testing Ground, your character can't return to that particular scenario. Instead, you must advance to one of the other three adventures, which, naturally, are much tougher.

The Vampire Caves is a case of love at first bite. The adventurer is bitten by the vampire, and turns into a vampire adventurer. To become human again, he must travel through the caves and find the secret doors. Don't go outside; you know what sunshine does to a vampire.

Kidnapper's Cove is your chance to rescue the ailing son of a rich Count. You must

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CIRCLE 152 ON READER SERVICE CARD

deliver the ransom and a vial of the drug that will save the youngster's life.

The Case of the Sultan's Pearl pits you against the murderer of one of the sultan's guards, as you attempt to recover the pearl that is the symbol of Allah's favor. Whoever holds the pearl at the hour chosen is granted the power of the sultan. That fateful hour, needless to say, is rapidly approaching.

Creative computing SOFTWARE PROFILE

Name: Oo-topos
Type: Text adventure
System: 48K Apple II with Applesoft in ROM, or II+ 3.3 Disk Drive
Format: Disk
Language: Basic
Summary: A text adventure written by a science fiction writer
Price: \$32.95
Manufacturer:
Sentient Software
P.O. Box 4929
Aspen, CO 81612

Oo-Topos

Oo-Topos is another text adventure. It was written by Michael Berlyn who has published two science fiction books, *Crystal Phoenix* and *The Integrated Man*, both from Bantam.

The scenario is as follows: you were selected to petition the Galactic Council for a plague antidote, necessary to save the population of Earth. Your petition was granted, and you were asked to also deliver a shipment of valuables.

In your relief, you went out and parted until dawn, then shut off all automatic warning devices while you took a nap once the ship was aloft. This was the time the aliens chose to lock onto you with a tractor beam. They forced you to their planet, cracked open your ship, and locked you in a cell.

So, you must escape the cell, find your way out of the prison building, collect all your cargo, rebuild your ship, and soar back to Earth's space station.

If text adventures are your bag, you will probably enjoy this one. It is relatively straightforward, but Berlyn's imagination does add a few nice touches, and the descriptions are good.

Fantasyland 2041 AD

Fantasyland 2041 AD has some of the makings of an epic adventure *a la Ultima*, but it isn't my cup of chowder. It lacks

Fantasyland has much more than the average text adventure.

variety, the graphics are simple, and you do not assume the role of the character. That is, you don't arm yourself, or engage in battle. You are simply the mastermind who decides in which direction your party should go, how to solve puzzles, etc. How can you identify with your character?

The challenge is to travel through jungle, desert, medieval Europe, a sea voyage across the Mediterranean, a submarine dip, and a visit to the Underworld to rescue either Lancelot or Guinevere (your choice). You will travel over 100 different terrains, and find a myriad of objects to help you.

Some of these objects will be useful in all terrains: food, for example. Other items will only be useful in one place. You won't need a plank or a shovel in a submarine, for example. At least, I don't think so. I haven't gotten that far.

You begin the adventure in the Hall of Heroes, with 5000 pieces of gold. There are various exhibits where you can buy items you will need for your expedition.

In the African exhibit, among other things, you can buy Zulu warriors' services, spears and blowguns. The Arabian exhibit has horses and samurai warriors in brass armor. The Medieval has knights, squires, archers and even peasant bearers. The Magic exhibit has such things as dragons, demons and zombies. The Nautical offers sailors, divers and harpooners, as well as a boat.

Once you have your group selected, you can begin your expedition. Your food will last a certain time depending upon the size of the party. If you have too many members, some will die. As you have problems and lose members, the others will have to carry the weapons and armor of the departed; at times you will be forced to drop some either temporarily or permanently.

As you travel, you will meet a variety of beings. These range from piranhas and apes to giant squid and dragons. There are numerous traps and pitfalls as well.

Every time you traverse a land successfully, you will be able to trade for new supplies. At least, you will until you reach the last two scenarios! Captain Nemo's underwater adventure, and Dante's Inferno.

I found one problem: When you are prompted to drop something temporarily, you are forced to drop it in front of you. At times a strategically-placed treasure may trap you and you must drop items permanently.

You can never go back through the gate once you have started your travels. Although you supposedly can save the game at any time, it seems that if you are killed at any point in the game, you are forced to start all over again.

I don't know what happens here, since with this particular copy of *Fantasyland*, I can't save a game. Every time I do, then ask to play an old game, it tells me to boot disk III, King Arthur. My figure ends up on the wrong side of a table in Merlin's lair.

Creative computing SOFTWARE PROFILE

Name: Fantasyland 2041 A.D.
Type: Graphic exploration
System: 48K Apple II with Applesoft in ROM, or II+, Disk Drive, 40K Atari 800, Basic cartridge, Disk
Format: Disk
Language: Basic and machine language
Summary: A set of six sides on three disks designed as a true epic outdoor/indoor adventure. I felt it was a fair game; others may go crazy over it.

Price: \$59.95

Manufacturer:

Crystal Computer
17429 Bluejay Dr.
Morgan Hill, CA 95071

I also think they should use double-sided disks. These look like regular single-sided disks with a notch in them.

The Apple version of the game has 420 hires screens, plus some special ones. The Atari version has joystick control on land and in the ocean. Divers must be supplied with air and diving suits. They and the submarine are controlled by joystick.

It is indeed a supergame, with so many disks. For some people, it would be a fascinating way to spend a month or two.

The scenario and information-packed instruction book admits that this is a very difficult game. It isn't for the casual player. Instead, it is for the most dedicated player who enjoys the planning and thought that go into a text adventure with extra dimensions graphics can give. *Fantasyland* has much more than the average text adventure. □

**Be sure to vote for
your favorite software
packages. See page 216.**

ENTERTAINING SOFTWARE

Softlights

By Fred Huntington

Time for our latest new program for Apple's **Computer Almanac**. Written by David Carman, an honest-to-goodness weatherman, **Computer Almanac** is a diverse collection of well thought-out programs. It contains sunrise and sunset times, weather forecasts for any year, a wind chill chart, lightning safety rules, a super-duper extra easy to use loan amortization program that will print out in 80 columns, health chapter (including a nifty calorie counter), a vacation planner, a bionymh chapter (needs printer) and more.

We're very proud of this program and think that at **\$24.95**, it's one of the best bargains in the software market today. Also, don't forget our other new program for the Apple's, **Understand Yourself**, also **\$24.95**. Dealer inquiries welcome.

Speaking of good programs, we'd like to recommend for either home or school use **Crossword Magic** by L&S Computerware. A super outstanding program with nothing else even close, we thought the original price of **\$79.95** was a little steep. So we were able to convince them to lower it to **\$49.95**, which is still a little steep for a crossword program, no matter how fantastic. So, to prove a point, we've set the price at **\$39.95**. Now it's a bargain.

It will work with most graphic printers, including the Epson with, with or without the Grappler.

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Corcoran, CA 93212

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CIRCLE 144 ON READER SERVICE CARD

From Shovels to Lasers

Owen Linzmayer

If variety is the spice of life, then these reviews are full of it, *spice* that is. There is a review of *Apple Panic* for the Apple II, *Star Fighter* for the TRS-80 Models I and III, *Galactic Chase* for the Atari 400/800 and *Color Space Invaders* for the TRS-80 Color Computer. These are a few of the excellent software packages I have had the pleasure to evaluate recently. I hope you find something that strikes your fancy. I sure did—four of them. Have fun and good luck in the video wars.

creative computing SOFTWARE PROFILE

Name: Apple Panic
Type: Arcade game
System: 48K Apple II, II+
Format: Disk
Language: Machine
Summary: Excellent arcade game
Price: \$29.95
Manufacturer:
Broderbund Software
2 Vista Wood Way
San Rafael, CA 94901

Take Me To Your Ladder

Climbing seems to be the rage in currently popular arcade games such as *Crazy Climber*, *Donkey Kong* and *Space Panic*. *Apple Panic*, from Broderbund Software, is an Apple adaption of *Space Panic*. Although the game appears to be simple, it is very challenging, not to mention nerve-racking.

In *Apple Panic* the player controls a human equipped with only a shovel for defense. The man starts off on the bottom level of a six-platform maze interconnected by ladders of various lengths. The object

is to kill the apple-monsters by digging holes in the brick ledges for them to fall into. To score, the player must wait for a monster to get stuck in a hole then smash it over the head with his shovel before it



Apple Panic.

crawls out. Finishing off a screen quickly is rewarded with bonus points, while slow thinking and hesitation bring death as the monster clamps onto the human's head and sucks its brains out—yuck! Sounds simple enough, but as the game progresses the monsters grow in number, speed and strength.

At the lower levels of the game only red apple-monsters infest the maze; at advanced levels green butterflies and Masks of Death appear. These must be bashed through two and three levels, respectively, to be killed. The trick here is to dig holes directly under one another. Luckily, the player may glide down levels unharmed by jumping in a hole. Normal physics don't apply here; instead of plummeting to his death like the evil monsters he is bent on destroying, he floats gently down to the next level.

Apple Panic is a well written program which uses hi-res color graphics and sound effects in a delightful combination to create a highly playable game. The only fault I could find with it is that when a monster is caught in a hole, some of the color "bleeds" onto the surrounding bricks.

This doesn't affect the game itself, it just looks a bit messy. Other than that, I can find only good things to say about *Apple Panic*.

David Lubar, our resident Game Guru, assures me, in no way bragging, that the program doesn't crash after 220,560 points are achieved. *Apple Panic* has an intangible addictive quality that will keep young and old alike lined up at the keyboard waiting for their chance to "bash those little suckers."

creative computing SOFTWARE PROFILE

Name: Star Fighter
Type: Arcade/simulation
System: 16K cassette 32K disk TRS-80 Model I & II
Format: Cassette/Disk
Language: Machine
Summary: The best Star Trek/arcadeish game I've seen
Price: \$24.95 cassette \$29.95 disk
Manufacturer:
Adventure International
Box 3435
Longwood, FL 32750

Star Trek Ver. 2198.36

"The world doesn't need another version of *Star Trek*." Well, maybe one more—*Star Fighter*. *Star Fighter* is much more than just another souped-up version of *Star Trek* for the TRS-80. It lies somewhere between Atari's *Star Raiders* and a high action arcade game. Quick thinking and nimble fingers are helpful in this game but one needs to act intelligently and responsibly if he intends to advance upwards in rank toward the coveted title of Star Lord.

Star Fighter is written in machine language by Sparky Starks and is sold by

THE creative computing software

ARCADE



Super Invasion

Apple II (requires paddles)
licensed from Atari International
48K Diskette DOS 3.3 CS-4505 \$19.95
16K Cassette CS-4008 \$19.95
Sorcerer 16K Cassette CS-5011 \$19.95
by Matt Hickey

This is the original arcade game, with superb high resolution graphics, high speed action, nail biting tension, and hilarious antics by the moon creatures. Fifty five aliens whiz across the screen, quickening their descent, challenging you to come out from behind your blockades and pick them off with your lasers before they bomb you, destroy your shields, or drop down right on top of you.

Super Invasion by John Varela
32K TRS-80 Model I Diskette CS-3520 \$19.95

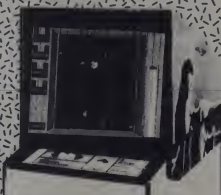
16K TRS-80 Cassette CS-3020 \$19.95
A low resolution, high speed arcade game similar to our Apple and Sorcerer versions. The aliens move back and forth across the screen, dropping ever lower to attack you as you attempt to destroy them with your lasers.



Blisterball and Mad Bomber

By Rodney McCauley
Apple II 48K Diskette DOS 3.3 (requires paddles) CS-4511 \$24.95

A frantic, fast paced romp that can be played for hours. **Blisterball** is the first truly original arcade-type game for a home computer. As the bouncing balls drop from above, the player moves his laser base and tries to shoot them. It's easy at first—with just one ball. Then come two, then three. It's getting harder. Four balls come, and finally five. Surviving them, the player gets to shoot at inelastic bonus balls. If he makes it this far, the second round starts. The balls bounce lower, the walls close in. Shades of Poe and Newton! Making Superb use of Apple graphics and sound, **Blisterball** can be played by one or two people. **Mad Bomber**, included on the same disk, is another fast paced arcade game. Racks of bombs fill up above you. Whenever four bombs are in any rack, they start to fall. You can shoot them either in the rack or while they are falling, but since there are racks all across the top of the screen, you need to stay ahead of them to survive.



Tsunami

by Rodney McCauley
Apple II 48K Diskette DOS 3.3 (requires paddles) CS-4526 \$29.95

Wave after wave of alien attackers attempt to overwhelm your defenses. Each wave comes in a different formation and uses different attack and defense strategies. You get dozens of superior arcade games combined into one program. If you ever master the first set of games on the diskette, where the attackers are without shields, then you are ready for the second set. This time the attackers are sheltered by shields. They can drop bombs right through the shields, but you cannot shoot through them. Successive waves use different strategies. Some move from shield to shield, allowing you to shoot while they are in between. Others just come out briefly to attack, and you must have fast reflexes to get them. Bonus points are awarded for beating the clock, with a countdown timer displayed on screen. This may be our finest arcade game ever!



Torax

by Erol Pekoz
Apple II 48K Diskette DOS 3.3 (requires paddles) CS-4520 \$24.95

Defend your home planet against the invading Torids! Try to protect your nuclear fuel tanks, which the aliens are intent on stealing. The Torids drop down, steal a fuel tank and rise up to escape. They are also armed, and will not hesitate to shoot at you. While you whiz by the surface of your planet at incredible speed, you must avoid enemy fire, maneuver your ship, and try to shoot down the Torids without hitting the fuel tanks!



ICBM

Audio visual licensed from Atari, Inc.
32K TRS-80 Model I Diskette CS-3521 \$19.95

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TRS-80 version of the popular arcade game where you must destroy incoming missiles with your own anti-ballistic missiles before they destroy your cities with nuclear warheads.

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TRS-80   

Sorcerer  **Apple II**

Four Games, continued...

Adventure International. There are three parts to this package, a training simulator program for beginners, a main mission program and an extremely detailed and somewhat awkward 33-page instruction booklet. The game itself is great—nothing less than excellent. The player starts out as a new recruit fighting for the Solar Galactic Authority against the Petro Resources Conglomerate. He flies, or rather hyper-drives through space in search of honor and wealth by destroying enemy PRC craft. He must be careful though; of the eleven different types of ships he could encounter, only six are valid targets. The others are friendly and will bring demotion if destroyed.



Star Fighter.

The realistic restrictions put on the pilot and the tense moments before battle are just two factors which make *Star Fighter* a program that outclasses anything in its field. Options available to the pilot are: send, request or kill beacon, enable wave or beam weapon, attempt to identify target, use peripheral vision, lock onto target, request tow, engage in combat or navigational mode, use extended scan, and hyper-drive to any of the infinite sectors of space or to one of the eight landbases. While at certain landbases the fighter may: receive an overhaul, refuel, buy tow tickets, collect bounty for ships destroyed, purchase hyper-recharge or have his performance reviewed for possible promotion.

It is variety—of options, restrictions, random encounters, space craft and high-speed graphics—that make *Star Fighter* a classic. It has been advertised as "The Penultimate Space War Game". I hope that is because one more expanded deluxe version is in the works. Anyone who doesn't mind wading through the fine-printed documentation will find *Star Fighter* more than worth the asking price in terms of hours upon hours spent battling the forces of evil in the cosmos. Every game player should own this one; it is definitely a winner.

Creative Computing

SOFTWARE PROFILE

Name: Galactic Chase
Type: Arcade game
System: 16K Atari 400/800
Format: Cassette/Disk
Language: Machine
Summary: Fine Atari version of Galaxian
Price: \$24.95 cassette \$29.95 disk
Manufacturer:
 Spectrum Computers
 26618 Southfield
 Southfield, MI 48076

Chasin' The Blues Away

From Spectrum Computers comes proof positive that Atari isn't the only source of quality arcade games for their 400/800 computer systems. *Galactic Chase* is an Atari home computer version of the immensely popular arcade game, Galaxian. It is Space Invaders with a twist; kamikaze aliens break out of formation from the convoy above and swoop down, following wild parabolic paths as they drop lethal bombs, intent on the player's destruction.

Galactic Chase is a colorful, fast-paced, shoot 'em up game written by Tony Weber. One or two players can compete, controlling their ships via the joysticks. This program has everything that the arcade game has; four different enemy ships, a high score function (doesn't save to disk), bonus starships, hi-res color graphics, beautiful sound effects, progressively harder levels of play and even aliens that do "U-turns in space."



Galactic Chase.

One feature that *Galactic Chase* has added to the game is a *magnetic repeller* situated on the nose-cone of the ship. As a last resort it sometimes becomes necessary

to collide directly with an alien in the hopes that the repellers will destroy it. This comes in handy, but I wouldn't use it as an offensive weapon. I prefer the comfort of a warm laser cannon and a little more distance between the attackers and me.

Galactic Chase is a wonderful piece of machine language programming—in only 16K. The speed and action of the graphics make it a very compelling game. I highly recommend it to all Galaxian freaks, it is easily worth the price if you enjoy the challenge of an addicting arcade game.

Creative Computing

SOFTWARE PROFILE

Name: Color Space Invaders
Type: Arcade
System: 16K Extended Color Basic, TRS-80 Color Computer
Format: Cassette
Language: Machine
Summary: Very well done Space Invaders
Price: \$21.95
Manufacturer:
 Spectral Associates
 141 Harvard Ave
 Tacoma, WA 98466

Annie, Get Your Laser

Color Space Invaders is just that, a Space Invaders program written for the TRS-80 Color Computer. Rather than regurgitate what Space Invaders is and how it is played, let's just say it is the grand-daddy of the arcade games.

The Spectral Associates version offers something not even the original Midway game has, multi-color graphics (PMODE 3). The sound effects are nice and the action is intense with sixteen different levels of play. The higher the level, the larger the laser base and the faster the aliens move. An attacking wave consists of 48 aliens in an eight-by-six arrangement that rains bombs down on the defender. Another novel item invented by Spectral Associates is a movable, indestructible shield that hovers above the blockades and absorbs enemy shots but allows friendly fire to pass onward and upward. The player can move and shoot at the same time, all with very smooth graphics.

Color Space Invaders is a very interesting Color Computer rendition of the original arcade game. The fast moving hi-res color graphics really demonstrate what the Color Computer can do. I look forward to seeing new action games from Spectral Associates. They seem to know what they are doing and if you do, you'll buy Color Space Invaders. It's a bargain at only \$21.95. □



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Videotex for Learning?

Henry and Elizabeth Urrows

Question: Why does the U.S. lag in teaching via videotex?

Answer: Via what?

Videotex (no final t, please) is old stuff in England, a hot topic in Canada, government policy in France and Japan. In America it is still in the "please explain" stage.

Part of the confusion is all those names: videotex, teletext, viewdata, Ceefax, Oracle, Prestel, Antiope, Intematique, Captain, Viewtron, Gateway, Vista, among many others. The system is a lot simpler than its taxonomy.

Step one: Videotex is the catch-all name.

Step two: One-way videotex has the generic term teletext. Its brand names include Ceefax, Oracle, and Antiope. Ceefax was developed by the BBC in the early 1970s and since 1975 has continued as a full public service over broadcast channels BBC-1 and BBC-2. Oracle (Optional Reception of Announcements by Coded Line Electronics) began about the same time and is a regular service of the British Commercial Independent Broadcasting Authority. Antiope (Acquisition Numerique et Televisualisation d'Images Organisees en Pages d'Ecriture) has operated in France since the Paris Bourse (stock exchange) went on the air over the

national TV network and is the teletext service in Paris and Lyon.

How one-way teletext works: a bit stream of digital data encodes alphanumeric and/or graphic images at a transmission rate the particular TV system can handle. The data are inserted or multiplexed on unused lines in the vertical blanking interval when scanning of the TV picture begins. These lines are at the top of the TV screen on part of the tube the cabinet hides and are not seen by viewers of regular programs. A decoder in or attached to the TV set accepts the data, stores one or more pages in buffer memory, and displays pages on the screen as summoned by the viewer on his keypad.

Step three: Two-way videotex has the generic term viewdata. Among brand names are British Telecom's Prestel, the French Titan which is compatible with Antiope, the Canadian Telidon which also comes in one-way teletext mode, Japan's Captain, the West German Bildschirmtex, Finnish Telset, and Dutch Viditel. The last three have built on, and are compatible with, the British Prestel.

How two-way viewdata works: Unlike broadcast teletext's continuous transmission of magazines that comprise up to 200 pages or frames, the viewdata terminal has a modem that converts an analog telephone (or other common carrier) signal into digital form for display.

Instead of pressing a keypad to get one or more of the pages that are continually rebroadcast, the viewdata retrieval device can be either a keypad or typewriter-like keyboard. It can summon from a computer-stored database of hundreds of thousands, or conceivably millions, of pages.

The computer software permits virtually instant access and screen display, rather than having to wait the 12 seconds customary on teletext. The software automatically tallies and bills users, and credits the electronic publishers who create and maintain pages in the central computer database.

If you think the teletext decoder has a microprocessor chip congruent with one that is in a low-cost small computer linked to a TV set, you can be right. If you infer that the program content offered on videotex has much in common with The Source and CompuServe, you are accurate. But those readers who remember Tracy R. Licklider's article "Calling Information: Telecomputing with Personal Computers" reprinted in the April, 1981 issue from *The Boston Computer Update* may have already decided that videotex is a lot easier to use. Videotex does not require the customer to learn computer language of any kind.

Step four: What has any of this to do with learning? Briefly, there is a hierarchy of information obtainable through com-

munications media. At the simplest that has the spectrum is actual information that has its limited uses in coping with ordinary needs: flight schedules, weather predictions, price of goods and services, news headlines. One step up is business information that enables an organization to function; when this information should not be available to viewers outside the enterprise or institution, it should be shared within a Closed User Group.

Then there is social information that specifies what particular government departments or offices, and specific agencies, do to serve specific needs.

Last is structured learning associated with schools, colleges, and distance or extension courses. This has defined objectives and should provide for feedback so the learner can find out what he has acquired in the way of skills, knowledge, and some understanding of what the content is about.

Let's regard the first two kinds of learning as the sort that people get through newspapers, magazines, directories, newsletters, professional and trade periodicals. They can also get this information via videotex more promptly than through print, more easily than by phone, and without needing to know Basic, Cobol or other special languages. The second two kinds of learning are those that government, educational institutions, and nonprofit organizations are in business to furnish. To show how videotex is being used for these varieties of learning, we give this quick comparative international report.

England

The BBC's Ceefax and ITA's Oracle are one-way teletext systems. In 1979 their "19 schools project" transmitted pages before and after the showings of such TV programs as "Exploring Science." These provided notes for teachers and reminded stu-

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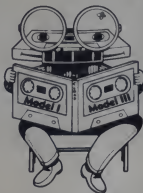
This program conducts an experiment concerning the explanation of temperature in terms of the distribution of quanta of energy in an Einstein model of a solid.
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Start retrieval at key 1 for Index requestor 2325,1912 47

Hard copy made of Prestel introductory frame explaining a telesoftware program in physics and directing user to begin retrieving unless he wishes the Index to select another program. A code in the upper left identifies the service provider. In the center of the top line is the number of the frame accessed. The upper right corner has price—in this instance nothing.

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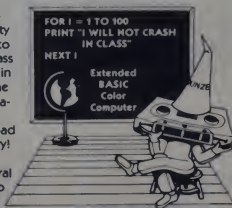
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Videotex, continued...

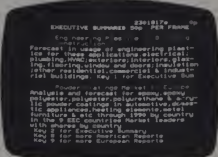
dents of the main points of what they had seen or missed. One observer noted that "The experiments appear to have been successful, if unremarkable; one of the benefits being increased classroom discussion."

The U.K. Department of Industry furnished 32 schools with computer terminals and adapters to TV sets for a broader investigation of teaching and learning uses of British Telecom's two-way Prestel system.

A bank of programs is being made available so that Ceefax, Oracle, and Prestel can download materials which owners of small computers store to use when and as often as they wish. W. J. G. Overington coined the word *telesoftware* in 1977. Its original meaning was the broadcasting of computer programs over television to intelligent teletext terminals. Later it came to describe software transmission over the air and by cable and telephone lines in real-time from a computer system source to a computer which would execute the software. According to Mike Brown of the CET Prestel Educational Umbrella Service, because Prestel equipment and usage costs are too high for many schools, designers decided to create software that emulates a Prestel terminal on the Research Machines 380Z microcomputer that many schools and colleges in England have bought and are buying.

Microcomputers have nearly all the hardware needed in a Prestel terminal: a video display, keyboard, and communications interface. A modem or acoustic coupler is also needed to connect to the telephone line.

Software now in use takes three forms: cassette Prestel telesoftware for cassette-based computers furnish Prestel reception,



Prestel International went into regular service on July 1, 1981 in seven countries after one year of experimental development. This page gives a precis of Frost and Sullivan American and European reports. At 50p British currency (or about \$1 U.S.) per frame, the information falls into the second category of learning in this article, and amounts to a small fraction of what Frost and Sullivan normally charges corporations for their research reports.

frame printouts, and retrieval of computer programs on cassettes; disc Prestel telesoftware for disc micros able to retrieve Prestel sub-trees and computer programs for which copyright clearance is obtained; and the integrated Viewdata system for disc-based micros with these features plus an editing terminal that creates and maintains local databases which absorb Prestel frames within their programs. The CET is designing identical software for other makes of micros and has expressed hope that Prestel will develop modem cards to decrease rental costs.

The CET estimates that the capital cost of this telesoftware system is about 13% of the price of a conventional Prestel terminal and that running costs are 17%, substantially reduced because of quick retrieval at lowest telephone and Prestel rates and because of successive re-uses at no cost at all.

A Political Task

The establishment of a national telesoftware service on Prestel is a political as well as technical task because it often involves conflicting interests of service providers, computer manufacturers, software producers, Prestel users, and Prestel itself. Apparently Gordian knots have been cut. Richard Hooper, Director of Prestel, assured us that current telesoftware programs on Prestel will increase in the near future.

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CIRCLE 159 ON READER SERVICE CARD

For cynics who say videotex is a solution in search of a problem, proponents cite Britain's Open University, which had real problems that the new medium is helping meet. The OU began in late 1969. Its 45,000 graduates are one-twelfth of all U.K. university alumni and have fully accredited world-recognized degrees. Most of its 65,000 undergraduate students are working adults who study in their spare time and take six to ten years to complete a degree course.

The curriculum includes TV and radio programs that leaven specially written texts, limited face to face contact with instructors at 255 study centers, and week-long summer schools for the more "practical" courses. TV is popular with students, but when the number of course options exceeded 130 in 1980 so did the number of programs aired without repeats and put on at inconvenient hours.

Cyclops

In 1977 a research team from OU's Math and Technology faculties worked with its educational technology division to develop Cyclops, first as a low-cost A-V teaching system using ordinary TV sets for both display and audio outputs. It enabled students to store and replay A-V programs from standard audio cassettes, with pictures coded as a sequence of audio tones. Audio cassettes are cheaper than videocas-

settes, which are too big to fit in most British mail boxes, and audio cassette recorders are cheaper and in wider use than VCRs.

The group devised a remote blackboard which has modems connecting two tape replay units by telephone. It allows teacher and student to communicate orally while drawing on their TV screens with a light-pen.

Cyclops also uses a keypad to access frames stored by the OU in the Prestel database. Because the original Prestel display format was designed for science and technology education, having few mathematical symbols and no Greek characters along with effective resolution of 72 x 80 for graphics, the Cyclops terminal was developed, and is now comparable to Level 2 of the British teletext standard. The Cyclops terminal has graphic resolution of 240 x 320 and a repertoire of symbols which totals 256 characters.

Since mid-1979 the OU has collaborated with Aregon International on research and development. A medium resolution alphanumeric coding model which can display at the same time advanced alphamosaic and alphaphotographic graphics has been designed and put into use. There is also an inexpensive microcomputer-based studio system for creating, changing and recording picture data which has made production runs of the inexpensive color

graphics Cyclops terminal based on the Motorola 6800.

The replay device has a 16K byte input buffer. It permits storage of a complex or slow-to-display picture sequence in advance of its commentary. Cyclops is also capable of executing telesoftware loaded down-line from cassette, micro or main frame computer, viewdata system or over the telephone network.

Social Information

In Britain on Prestel the Association of Special Libraries and Information Bureau has conducted an experiment in social information, supplying answers to questions on welfare, employment, leisure interests, and where to find counseling for particular needs. The British Library supplies reference, loan, catalog, and online retrieval services. The national government Central Office of Information, Central Statistical Office, Lord Chancellor's Office, the Meteorological Office, Ministry of Agriculture, Fisheries and Food, departments of the Environment, Industry, and Trade, Overseas Trade Board and Parliament all use Prestel to answer questions on consumer rights, current prices, and their particular functions. These can save time otherwise spent travelling to the offices and save toll charges from locations throughout the U.K. and northern Ireland.



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Videotex, continued...

Local government bodies—Brighton and Bournemouth for their tourist attractions; the Essex County and Glasgow District councils, and the London boroughs of

In mid-1981 only two countries, Britain and Finland, had full public videotex services in operation.

Bromley, Hounslow, Richmond Upon Thames, and Waltham Forest to tell about their community services, clubs, societies and organizations—disseminate public information. Because small district councils felt they could not spare money from their budgets to pay for Prestel charges, in Hertfordshire ten of them joined together to form one service providership, rented out pages to local businesses, and cleared enough to pay for the community service they wanted.

In mid-1981 only two countries, Britain and Finland, had full public videotex services in operation. All the others are testing. The U.K. has 150,000 terminals in use for which customers pay. Once a resident has a decoder, Cefax and Oracle come free. In April 1981 there were 10,000 subscribers to Prestel, with a ratio of eight business users to each residence. They paid not only for their TV sets and adapters, but also for the local phone calls and for those pages on which there are access charges.

Canada

In April 1979 the Canadian federal government Department of Communications began its four-year \$10 million development of Telidon. This videotex system has been tooling up ever since, and started its first trials in May 1981.

Starting in October 1980 TV Ontario piggybacked Telidon teletext on the television programs it sent by ANIK-B 12/14 GHz satellite transponder to the isolated town of Quetico near the Manitoba border. Since then it has transmitted a Telidon magazine to Quetico by way of the same satellite along with regularly scheduled TV programs. This project, run by the Ontario Educational Communications Authority (OECA), has been sending teletext to 55 terminals throughout Ontario by broadcast and telephone transmission.

John H. Syrett, the Telidon and Education project manager for TV Ontario, has written a chapter for the "Technology and Teaching" volume in the *New Directions for Teaching and Learning* series

being published by Jossey-Bass. In it he asks us to consider a scenario in which Mary Future, age 18, works at an assembly plant in a small town. She left school at 17 for the sake of a steady income, but is "confident that she did not have to give up her further education . . . Her confidence arose from the certain knowledge that part of every day could be devoted to completing those undergraduate courses she had not completed in school, or to proceeding with a choice of post-graduate courses. Her employer makes available to her a videotex terminal for eight hours a week, and encourages the taking of applied arts courses that have a bearing on Mary's growth as a skilled employee."

Syrett describes the terminal that plugs into a TV set and says that "With the flick of a switch, Mary can send messages to similar terminals in other offices or retrieve information originating with her tutor at a college 80 miles distant. At home, Mary has access to a similar terminal . . . If Mary has some research to do, she can do a free text search of any one of several databases. If she wishes to assess her progress in a particular course unit, she can instruct the data base at the school to display an objective test. When her responses are complete, she is presented with her score and some recommendations for further study to correct deficiencies revealed in the process."

Peter G. Bowers, general manager of OECA operations, and Dr. Maria L. Cioni gave a paper on Telidon and Education in Canada. Their agency's distinction, they said, is that it "is one of very few agencies undertaking to develop educational applications for videotex in a major way . . . we are the only agency to our knowledge that is attempting to develop both interactive and broadcast modes in an integrated way."

They termed the OECA field trial a "composite experiment" that consists of four parts: (a) broadcast, (b) interactive, with participation in (c) the Bell Vista and (d) cable Telidon trials. They said 55 terminals operating in both interactive and broadcast modes will be deployed in schools, colleges, universities, libraries, science museums, and homes.

"The initial aim will be to expose educational information providers to the system," Bowers and Cioni explained, "and encourage them to create educational content." OECA considers, they wrote, Telidon "to be an educational medium in its own right" because of several characteristics:

"Hypothetically, at least, Telidon could be as ubiquitous as television sets or telephones. It has, therefore, the potential of delivering educational experiences to anyone, regardless of location or time." Its interactive capability allows each learner to proceed at his own pace with pe-

riodic feedback on progress. (How is this different from what small computers offer? Presumably the eventual universality.) Its graphics make possible music scores, charts and graphs, symbols, equations, cartoons, and maps.

They project using Telidon (in ascending order of complexity) as a complement to educational TV; as an alternative to conventional print (on which the OECA now spends \$500,000 a year ("with the price of newsprint going up, postal rates going up and distribution times getting longer, electronic publishing becomes more interesting"); for dissemination of educational information (particularly when Ontario weather closes schools and stops school buses), and less crucial but still useful facts on curriculum, registrations, job openings, and for tests which they translate into pedagogical jargon as "appraisal instruments."

Telidon could be as ubiquitous as television sets or telephones.

Climbing to more complex uses they foresee videotex retrieving information from data banks and interactive learning programs. These involve individually paced correspondence courses with keyed-in responses to tests, computer assisted learning, computer managed learning using ETV to present materials, educational quizzes and games, and (finally) course content, exams, answers, results, and diploma.

Grouped among applications "that appear to be within the capability of the technology but that are not developed" are Telidon with audio, teleconference, full channel transmission, alphabetic keyboards, hard copy printers and addressable terminals, and what is called "common video space." They say audio would enhance the medium, that "with voice synthesizers we could even dispense with the visual display of text. However, we are not advocating this. Obviously work would have to be done on the trade-offs between information capacity devoted to audio and that devoted to data . . ."

T. Ronald Ide, chairman of the Canadian government's Communications Research Advisory Board (CRAB) who was CEO of the Ontario Educational Communications Authority from 1970 to 1979 and is given credit for the growth and success of TV Ontario, gave his view of what the future should bring in a paper distributed at Videotex '81.

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Videotex, continued...

"Literacy," he said ought to include the ability to think critically, not only about what is in print but also what is heard, what is seen on television or displayed on a computer." (BBC has begun to telecast its series designed to encourage computer literacy.)

Ide continued, "It is particularly important to know where organized knowledge is stored and how to access it and evaluate its worth. If educational systems of the future fail to provide for these requirements then we will inevitably become the victims rather than the beneficiaries of the emerging technologies. Both the content of the curriculum and the form of the educational system will have to be re-examined in the light of the new developments in science and technology."

His conclusion has vision, identifying videotex and other participatory media as having an important potential. "Interactive devices offer unheard of opportunities for life-long learning," he wrote. "The contents of millions of books and journals will be almost instantly accessible at the press of a button. The great teachers will be there, even though electronically, to provoke and stimulate, and everyone ought to be able to afford them. Equal opportunity to learn is no longer only an unrealistic ideal."

The possibility of economic barriers is implicit in his statement that everyone ought to be able to afford the great teaching. And it will be a while before it is on-line; from what we could learn, the Canadians have not yet put their Telidon videotex system to work on reportable educational applications.

Interactive devices offer unheard of opportunities for life-long learning.

Telidon's technical distinction is primarily in innovative graphics that use alphabetic coding with Picture Description Instructions that program certain point, line, arc, rectangle, and polygon geometric primitives and their location, dimensional, and color characteristics.

At Videotex '81 in Toronto on May 20, 1981 the Canadians were very enthusiastic when AT&T announced its videotex standard, termed Program Level Protocol, and stated that it was compatible with Telidon.

Little of this concerns using videotex for learning. But Canada was discussing it, and Canadian educators were voicing their misgivings lest Telidon turn out to be a

mixed bag in terms of broad public interest and concern.

France

In "Videotex: The Race to Plug In" written for a special March 1981 supplement to *ComputerWorld*, Elizabeth M. Ferrarini told how in 1976 French President Valéry Giscard d'Estaing authorized Inspector General Simon Nora of the Ministry of Finance to report on the impacts of computer technology on French society. The resulting January 1978 report to d'Estaing, published in the book *Computerization of Society*, became the basis of the grandiose French plan to integrate into one system teletext, videodata, and telephone directory assistance terminals. France has set out aggressively to export 30% of its telecommunications equipment by the end of 1982, and plans to invest \$27 billion during the next five years to become the "Charlemagne of the wired nations."

The high point of the French national telephone system plan is the distribution of an electronic telephone directory assistance terminal to every telephone user in the country. Instead of looking up a number in a printed directory, the French will use a video display terminal with a typewriter keyboard to access phone numbers. In May 1981 the national phone company ordered 300,000 black-and-white terminals from four manufacturers.

As Ferrarini puts it, "the French believe that 30 million terminals distributed within the next 10 years will be cheaper than printing and distributing both the white and yellow pages of the telephone directory for that period. At present it costs about \$230 million a year to print telephone books. Although the proposed directory assistance terminals will cost less than \$100 apiece users will have to pay a tariff on the calls they make." About 20% of the French population has telephones now, and the goal is 80% by 1990.

Education seems virtually absent as a factor, except in one respect: the national Ministry of Education plans to make using a keyboard compulsory for all French school pupils. The trial in 2500 households in five communities southwest of Paris does not plan to place any Teletel (the name for the national videodata service based on Antiope, France's videotex system) terminals in schools.

Japan

The first experimental service of Captain (Character and Pattern Telephone Access Information Network) ran in Tokyo with 199 information providers and 976 terminals from December 1979 to March 1981. A second trial begins in August.

Unlike all other videodata systems about which we have been able to learn thus far, from the start Captain contained lessons

aimed at kindergarten through junior high users. With a database capacity of 100,000 frames, it began with 14,081 out of 98,944 frames classified as "education and culture," renewing 12,996 of them in the course of the first trial. Up through March 15, 10.36% of the 9,836,000 frame accesses were education and culture.

The second pre-market trial service will have 200,000 frames and 2000 terminals in Tokyo. It has alphabetic coding which displays as many as 4000 different characters in Kanji (Chinese), the Katakana syllabary, the cursive Hiragana, Roman alphanumeric and special symbols. The Ministry of Posts and Telecommunications recently announced that full commercial service will begin in 1983.

The French will use a video display terminal with a typewriter keyboard to access phone numbers.

In their report at Toronto, Susumu Harashima and Tadashi Kitamura of the NTT Engineering Bureau stated that NTT continues investigation and development of hybrid code and pattern transmission, connection to digital transmission display of a more finely detailed picture and "new services, such as telesoftware."

Venezuela

Hector Martinez, head of the Venezuelan government's office of Statistics and Information, told Videotex '81 that it has put into operation 22 Telidon terminals in ten orientation and information centers and five libraries in Caracas, primarily to let illiterate and barely literate citizens know what government services are available.

He explained that "there is no intention of mechanizing the process of questions and answers to the public; on the contrary, the intention is to establish a link between the public in need of information and individuals specially trained to determine exactly the need of the person who comes to put the question. . . Videotex is a tool to support the orienter, but it is also a source of attraction to the public, with its colorful display."

The government is the information provider and all data are free. It has cost less than \$1 million for start-up. A dozen people work three four-hour shifts at six editing terminals creating 150 pages per day. Priorities are emergency social services involving hospital and medical care services, financial and employment needs,

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The first frame of the Academic American encyclopedia article on particle accelerators, taken by Polaroid from the face of a CRT screen at Arete Publishing Co.

followed by education on careers, school and university admissions, the cultural area, and tourist information.

By the end of 1982 there should be 70 information centers with videotex terminals to furnish staff with updated facts for citizens in various parts of Venezuela and service should be extensive in Caracas when the Pan American games are held there in 1983. The fourth stage, a commercial service run by the telephone company, is planned for 1984.

The U.S.

In April 1981 Thomas D. Harnish reported on the viewdata test the Online Computer Library Center conducted during the last three months of 1980 in 200 Columbus, OH homes by attaching decoders to ordinary TV sets.

The test used library catalog and encyclopedia databases created automatically (by using special OCLC software) from machine-readable records provided by the Columbus and Franklin County Public Library and the Arete Publishing Company in Princeton, NJ. Users searching the library catalog by author, title, or subject had access to 300,000 records corresponding to books and other materials held by the main library and its branches. Arete's *Academic American Encyclopedia* was accessed by its 200,000 keyword index, 32,000 article titles, or classified menu according to discipline or subdiscipline. Articles varied in length from a single frame to over 300 TV screen "pages." Illustrations and graphics had to be omitted.

The Ohio State University College of Education developed two educational services tested during the project. "Math That Counts" provided exercises for teaching children basic mathematics, with problem sets grouped by grade level from kindergarten through sixth grade. "Early Reader," designed to help parents teach preschool children to read and recognize word relationships, had 14 single-screen rhymes and instructions to parents on their use.

These six frames show the tree structure of the Arete Academic American encyclopedia whose 32,000 article database was on-line during the October-December 1980 OCLC Channel 2000 trial in Dayton, OH. Our April 1981 issue reprinted Bill Streeter's article from the November 1980 ABA Bankind Journal which illustrated rudimentary electronic banking demonstrated during the experiment with 200 households. It told how one-third of the encyclopedia articles are updated annually. About one-tenth of the nine million words (about 82 million characters stored on nine-track magnetic tape) is revised in any one month.

1 *VIDEPEDIA
VIEWTEL
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OF THE ARETE ACADEMIC AMERICAN
ENCYCLOPEDIA.
CHOOSE THE INDEX YOU WANT
TO USE:
1ARTICLE HEADING
2SUBJECT
3ENCYCLOPEDIA

1. Welcome to new users, offers title, subject, or index.

2 *VIDEPEDIA
VIEWTEL
SUBJECT INDEX
TECHNOLOGY
1AGRICULTURE
2ELECTRONICS
3ENERGY
4ENGINEERING
5FOOD
6INDUSTRY
7MILITARY AND SPACE
8ORGANIZATIONS
9TOOLS
10TRANSPORTATION

3. The result of pressing 11 on screen 2.

7 *VIDEPEDIA
VIEWTEL
1COMMUNICATION
2COMPLEX
3COMPUTER
4COMPUTER LANGUAGE
5COMPUTER MEMORY
6COMPUTER REGISTER
7COMPUTER TERMINAL

5. The result of choosing 7 on screen 4.

11 *VIDEPEDIA
VIEWTEL
VIDEO ENCYCLOPEDIA
SUBJECT INDEX
1ANCROLOGY AND ANTHROPOLOGY
2AMERICAN CULTURE
3ART
4EARTH SCIENCES
5GEOGRAPHY
6HISTORY
7LIFE SCIENCES
8PHYSICAL SCIENCES
9SPORTS
10SOCIAL SCIENCES
11TECHNOLOGY
12POLITICS

2. Menu page of Subject files.

7 *VIDEPEDIA
VIEWTEL
1ADDING - ANALOG
2ANTENNA - AUTOMATA
3ARTIST - BIT
4BLACK - CABLE
5CALCULATOR - CARDS
6CENTRAL - COLLOTYPE
7COMMUNICATION - COMPUTER

4. Alphabetical headings of articles by title.

FWD *VIDEPEDIA 1/3
VIEWTEL
COMPUTER TERMINAL
A COMPUTER TERMINAL (ALSO
CALLED A DATA TERMINAL OR DATA
COMMUNICATION TERMINAL) IS A
DEVICE THAT ALLOWS A USER TO
INTERACT WITH A DIGITAL
COMPUTER. TERMINALS, WHICH ARE
GENERALLY CONNECTED TO THE
CENTRAL PROCESSING UNIT BY
DIRECT WIRING OR TELEPHONE
LINES, ARE THE MOST COMMONLY
SEEN COMPONENTS OF A COMPUTER
SYSTEM. THE TYPEWRITER-LIKE

6. The first of several frames telling what a computer terminal does.

In the evaluation of the project, users found the videotex services enabling them to look up their checking account balances, pay bills, and consult the encyclopedia easiest to use, and the two instructional offerings most difficult.

When asked to rank the services according to the likelihood they would pay money to have them in their homes, users ranked the encyclopedia and library catalog first and second, and the instructional courses last.

Harnish found that more than a few users were bothered by the absence of the audio signal to which they are accustomed when watching a TV screen. The New York Times Information Service now makes available Arete's *Academic American* database on CRT display and paper printouts to subscribers. In England the *New Caxton Encyclopedia* has 10,000 condensed articles on Prestel, with "entries particularly suitable for children's homework and projects."



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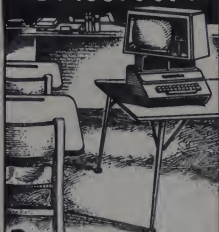


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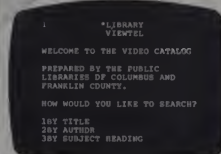
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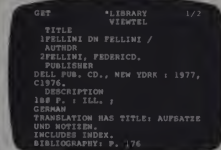
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This could lead to future joint projects

Videotex, continued...



7. Welcome frame of the electronic library catalog OCLC offered in its Columbus, OH Channel 2000 trial.



8. The title frame of a book, with cross reference to different title of its German translation.

Perspective

Richard Hooper, director of Prestel, told the Videotex '81 banquet audience that videotex with Gateway facilities to third party databases moves the goal posts and changes the rules of the game. "Gateway will be seen by future historians as an inspired response by videotex systems to the attack from on-line computer systems moving downmarket. Gateway permits large numbers of people to look at large numbers of pages. Videotex can now aspire to being encyclopaedic."

Videotex Update

Prestel was officially launched as a commercial service in the U.S. on January 19, 1982 from its Boston-based computer center.

"The Boston computer center allows U.S. users and information providers to access Prestel's 210,000 page database via a local telephone call over Teletex, as well as giving U.S. corporations the opportunity to become operators of their own videotex service on proven systems at very low cost," said William Shrimpton, president of BVT, the marketing organization for British Videotex and Teletext technology.

For the Boston launch, terminals made by Zenith and decoders made by Wolf-

Gateway was developed by the West German developers of *Bildschirmtext*, with the help of British consultants. It enables a user to access host databases directly without having to be confined by the storage limitations of a central computer. Now Prestel is licensing it back from the German Deutsche Post and planned to put Gateway into service in early 1982, with 120 companies queued up for its use. At Toronto the Germans announced that *Bildschirmtext* will go into full public service in 1983.

Even though AT&T has issued what it says will be a North American standard which will not be compatible with European databases unless the latter transcode, as far as the free flow of scholarly as well as all other kinds of data go it will be desirable for a worldwide standard to emerge, taking into account the creative ferment represented by British, German, French, Canadian, Japanese and all other contributions to the state-of-the-art. From what we can see, use of videotex for education has been largely talked about rather than demonstrated, except for the landfalls cited earlier.

Conclusion

Education tends to get the crumbs from the table where business goes out after paying mass and special markets. KCET, a PBS station in Los Angeles, has an interesting trial applying CBS-modified French Antelope teletext. The able investigators, at last report, were out hunting for the \$500,000 still needed for their trial.

While conglomerates and multinational corporations, and entire national PTTs backed by their governments, invest heavily, the educators must do what they can by stretching meager resources. Perhaps it was always thus, but can we continue to have learning given low priority now? □

data and Radofin were used. Floppy disk software converting an Apple II to Prestel was also on display. This hardware is available to U.S. users, ranging in price from \$85 for the Apple disk to \$1,250 for the Zenith terminal.

More than 15,000 users worldwide are currently connected to the Prestel service, most of them business users. Some 900 information providers, including American Express, Holiday Inn Hotels, Frost & Sullivan, Merrill Lynch, Newsweek and the Official Airlines Guide are using Prestel as an electronic publishing and message transmission medium. Prestel also allows users to order goods and services from their terminals, and is being tested as a direct-marketing tool for information providers.

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CIRCLE 130 ON READER SERVICE CARD

What's New for '82



A fish's eye view of the 1982 Winter Consumer Electronics Show.

Betsy Staples

At every Consumer Electronics Show there seems to be, if not a stated theme, at least a common denominator that reappears in booths all over the show floor.

At the most recent CES in Las Vegas it was arcade games. Some manufacturers, like Commodore and Coleco, had full size games in their booths to promote hand held or computer versions. Others—Atari, Mattel and Activision—had their own versions running on their own machines. All of them drew crowds.

In fact, it seems that these manufacturers have finally found something to rival the pornographic video tapes that have been the crowd pleasers for the past several years. And what better way to get a person hooked than to offer him a few free rounds of whatever game it is you are selling?

COMPUTERS AND PERIPHERALS

CES has never really caught on with most of the computer companies—the ones that do exhibit are there because they have other consumer electronics products to show. We were the only personal computing magazine with a booth, and many people stopped to ask "Where are all the computers?"

There were, however, several introductions of significant new products of interest to personal computing enthusiasts.

Commodore

Commodore introduced new machines at both ends of its home computer line. The Commodore Ultimax and the Commo-

dore-64, both promised for delivery in "spring 1982," bracket the VIC 20 in price and capability. Carrying a suggested retail price of \$149.95, the Ultimax is a programmable color computer designed to compete with the Atari VCS, Mattel Intellivision and Magnavox Odyssey. It features a flat membrane keyboard, can be programmed in Basic, and uses both cartridges and cassettes for games, pro-

gramming and music synthesis.

The Commodore-64, which will be introduced with a suggested retail price of \$595, will be marketed as a competitor for the Atari 800 and Apple II Plus. It features a CP/M option, 64K of memory, a 66-key full-stroke keyboard with upper and lower case capability, function keys, graphic characters, a game cartridge slot and game controllers. Audio capabilities include sound



The Commodore VIC 20 with an array of peripherals, including the VIC modem, floppy disk drive, printer and cassette recorder.

Systems With Spice....

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Spice up your S-100 or Apple II™ with system enhancements from ASAP. From motherboards and mainframe cabinets to I/O boards and RAMs, we have the California Computer System product that will give you the added capability you need.

FOR S-100 USERS

16K Static RAM Board — 200 nS RAMs, compatible with Alpha Micro, Cromemco and others. 16K memory divided into 4K blocks. Assembled and tested.

Part Number 2116C Price: \$290.00

32K Static RAM Board — 200 nS RAMs, compatible with Alpha Micro, Cromemco and others. 32K memory divided into 8K blocks. Fully static 2114 RAMs. Assembled and tested.

Part Number 2032C Price: \$610.00

64K Dynamic RAM Board — For 8080 and 280 based S-100 systems. Provides processor-transparent refresh, 200 nS, Micromos. Supports IMSA-type front panels. Expandable. Assembled and tested.

Part Number 2085C Price: \$550.00

Z80A CPU Board — 2 or 4MHz, switch selectable. 158 instructions, including 8080's 78 instructions for total 8080 software compatibility. 2K monitor ROM and RS-232-C port on-board. Assembled and tested.

Part Number 2810A Price: \$265.00

Floppy Disk Controller — Controls up to four 5 1/4" and 8" drives in any combination. Double-sided and side-select signals for double-sided drives. Compatible with IBM 3740 and System 34 standards.

Part Number 2422A Price: \$365.00
CP/M™ Version 2.2 Free With Purchase

S-100 Mainframe — 12-slot motherboard. Active termination on all bus lines. Built-in power supply, fan and circuit breaker. "Double path" trace pattern. Solder plated circuit area. Assembled and tested.

Part Number 2200A Price: \$475.00
2201A (220VAC) \$475.00

S-100 Motherboard — 12-slot capacity using standard S-100 connectors. Capable of supporting CPU's at 4MHz and above. "Double path" trace pattern. On-board voltage regulator, with termination.

Part Number 2501A Price: \$150.00

4-Port Serial I/O Interface — 4 individually-controlled asynchronous ports. Fully buffered inputs and outputs. Includes ROM circuitry for 2716 2K EPROM (user supplied). Ports meet RS-232-C interface specs. 3 control and 3 status registers per port.

Part Number 2710A Price: \$275.00

2-Serial, 2-Parallel I/O Board — Fully buffered inputs and outputs. Includes ROM circuitry for 2716 2K EPROM (user supplied). Parallel ports have full four-line-per-port handshaking and 8-bit data transfer. Serial ports meet RS-232-C interface specs. Port A transmits and receives in asynchronous mode. Port B in either synchronous or asynchronous.

Part Number 2719A Price: \$275.00

4-Port Parallel I/O Board — 3 I/O ports and one output port. Seven bit status register. Fully buffered inputs and outputs. ROM circuitry for 2716 2K EPROM (user supplied). Ports provide 8-bit parallel data transfer; TTL-compatible.

Part Number 2720A Price: \$195.00

FOR APPLE II™ USERS

Synchronous Serial Interface

Compatible with RS-232-C (configurations A thru E, 1978). Supports full or half duplex. DTC type interface.

Part Number 7712A Price: \$149.00

Programmable Timer — Time events in continuous, single shot, frequency comparison and pulse width comparison modes. Interface patch area for custom interface applications.

Part Number 7440A Price: \$ 95.00

Asynchronous Serial Interface — RS-232-C compatible (configurations A thru E, 1978). DCE type interface; supports half or full duplex operation.

Part Number 7710A Price: \$139.00

Calendar/Clock Module — Accurate, real-time counting. Software programmable for 12- or 24-hour format. Each decimal digit of data is separately addressed for freedom of data format.

Part Number 7424 Price: \$ 99.00

3% Digit BCD A-to-D Converter — Converts DC voltages to BCD numbers for monitoring and analysis. 400 mSec per conversion. -3.999 to +3.999 VDC full scale. ±5% non-linearity.

Part Number 7470A Price: \$ 95.00

12K ROM/PROM Module — Capable of accepting operating systems, system patches or firmware in 2K increments of mixed ROM or PROM. Addressable 12K in any of 4 16K blocks. 2316E ROM and 2716 PROM compatible.

Part Number 7114A Price: \$ 85.00

Parallel Interface — Two bidirectional 8-bit buses for interface to peripherals. Two programmable control registers. Four individually controlled interrupt input lines, two usable as peripheral control outputs.

Part Number 7720A Price: \$125.00

Arithmetic Processor — Add, subtract, multiply and divide; trig and inverse trig functions; square roots, logarithms and exponentiation. Fixed point 16 and 32-bit operation.

Part Number 7811A Price: \$349.00

Centronics Printer Interface — Interfaces high-speed Centronics-type parallel printers to Apple II™ computers. Features 8-bit parallel data output bus, 4-bit status input, Data Strobe and Acknowledge handshake signals and printer reset signal.

Part Number 7728A Price: \$125.00

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CIRCLE 100 ON READER SERVICE CARD

C.E.S., continued...

generation, polyphonic tones, music synthesis and hi fi output.

Along with the 16K SuperVIC, an expanded memory version of the VIC 20, Commodore announced seven new cartridge games for the VIC: *Jupiter Lander*, *VIC Avenger*, *Superslot*, *Draw Poker*, *Super Alien*, *Midnight Drive* and *Magic Mouse* retail for \$29.95 each.

In addition to the cartridge games, Commodore released the *Home Calculation Program Pack*, a series of six programs on cassette.

Other additions to the VIC line are memory expanders and a modem. The VIC-1110, which sells for \$59.95, plugs into the memory expansion port of the VIC 20 to increase program capacity and add 8192 bytes of memory. The VIC-1210 is a 3K memory expander available for \$39.95.

Introduced as the "lowest-priced modem in the personal computing industry," the VIC Modem is a plug-in cartridge which connects to the user port of the VIC 20 and may be used with any modular style telephone. It operates at 300 baud with originate/answer and half/full duplex capabilities and retails for \$109.95.

Commodore Business Machines, Inc., Computer Services Division, 681 Moore Rd., King of Prussia, PA 19406. (215)377-7100.

Texas Instruments

Don Bynum, manager of the home computer division of TI, keeps his TI 99/4 in an old piano. A while ago he told TI designers that the way to job security was to ensure that all new peripherals would fit in that piano. Space inside the piano is now at a premium, but the designers are said to be still employed. The reason is a peripheral expansion system slated for release in the second quarter of this year.

The unit, which measures 14" x 15" x 20" has eight slots for peripheral, board-type modules and room for one disk drive within the enclosure. Up to two additional drives can be added externally. The expansion system has a suggested retail price of \$249.95.

The peripheral modules to be released are a memory expansion module which adds 32K of RAM to the computer (\$249.95); a p-code module, which is used for writing Pascal programs (\$249.95); a disk controller module, which will be able to handle double-sided 5 1/4" disks (\$249.95); and an RS-232 interface module, which provides a parallel port for interfacing with printers (\$174.95).

A UCSD p-system peripheral, which is identical to the p-code module, allows users of the 99/4 and 99/4A to run UCSD Pascal Version IV.0. Price for the system is \$399.95.

Also shown for the first time at CES was a "mini-RAM" for the TI home computer.

It plugs into the cartridge slot to provide 4K of non-volatile CPU RAM. It offers ROM support and allows the user to write to or read from Basic and to call assembly language routines from Basic. The cartridge comes with a cassette containing a line-by-line assembler.

Of course, without software, hardware—whether it fits into a piano or not—might as well be a boat anchor, so TI introduced about 30 new software packages. New systems software includes a Pascal compiler; an editor, filer and utilities package for screen editing and file management; and an assembler/linker package for developing TMS 9900 assembly language programs, all for use with the p-System peripheral.



Bill Cosby poses with the TI99/4A and new peripheral expansion unit.

An *Editor/Assembler* package, priced at \$99.95, allows users to program on the machine level via TMS 9900 assembly language. Programs can be run as stand-alone programs or linked into TI Basic programs as subroutines.

Among the applications software released are ten games: *Tombstone City*; *21st Century*; *TI Invaders*; *Car Wars*; *Adventure*; *Pirate Adventure*; *Munch Man*; *Draw Poker*; *Yahtzee*; *Blasto*; and *Hustle*.

New educational packages include *Speak & Spell*, *Speak & Math*, *Spell Writer*, *Addition/Subtraction I*, *Addition/Subtraction II*, *Multiplication I*, and *Teach Yourself Extended Basic*. Additions to the Business Aids Library are *Inventory Management*, *Invoice Management* and *Cash Management*. Other new packages include *Terminal Emulator II*, *Basketball Statistician*, *Bridge Bidding II*, *Bridge Bidding III*, *Structural Engineering Library* and *Electrical Engineering Library*. Prices range from \$24.95 to \$69.95.

Texas Instruments Incorporated, P.O. Box 53, Lubbock, TX 79408.

CIRCLE 299 ON READER SERVICE CARD

Astrovision

Astrovision introduced the ZGrass-32 personal computer add-on to the Astro Professional Arcade (formerly the Bally Professional Arcade). It is Z-80 based and features a full-stroke keyboard and 32K ROM. The ZGrass language, combined with a Votrax chip and Astro Arcade chips, allows users to create 256-color animation,



The ZGrass-32 personal computer from Astrovision.

sound effects, three-voice music, and speech. The ZGrass-32 is expandable to run CP/M and has interfaces for light pen, graphics tablet, disk drives, and joysticks, and includes two RS-232 ports for communication. The add-on, which carries a retail price of \$600, should be available in April.

The *Music Maker* cartridge for the Astro Arcade was scheduled for release in March. It allows users to adjust pitch, vibrato, tempo, noise, volume, attack and decay to create synthesized music or sound effects. Multi-colored pictures can be created with the *Coloring Book* with *Light Pen* package.



The Wizard, a new game for the Astrovision Arcade.

New to the game repertoire of the Arcade are *Munchie*, *The Wizard*, *Cosmic Raiders*, *Solar Conqueror*, *Space Fortress*, *Quest for the Orb* and *Pirate's Chase*. The cartridges will be priced at \$24.95 to \$35.95.

Astrovision, Inc., 6460 Busch Blvd., Suite 215, Columbus, OH 43229. (614)855-0130.
CIRCLE 300 ON READER SERVICE CARD

From the Orient

Toshiba America previewed its first personal computer, the Model T-100. The

basic unit includes a Z-80A microprocessor; a 90-key keyboard with programmable keys; a numeric keypad and cursor controls; and expansion ports. Up to 32K of RAM and 32K of ROM is available in cassette-like packs that plug into the computer. The addition of a floppy disk system offers up to 560K of storage.



The Toshiba T-100 personal computer with flat-panel LCD display.

The display for the T-100 is a separate unit for which Toshiba offers five options, the most interesting of which is a flat-panel LCD which displays eight lines of 40 characters. Other options include a 12", 25 x 80 green phosphor display; a 14", 24 x 36 color display; a 14", 80 x 25 color display; and an RF modulator adapter for use with a color TV set.

Prices will be set upon official introduction of the system at the National Computer Conference in June.

Toshiba America, Inc., Information Processing Systems Division, 2441 Michelle Dr., Tustin, CA 92680, (714)730-5000.

CIRCLE 301 ON READER SERVICE CARD

Sharp

We were very impressed with the Sharp PC-1500 Hand Held Personal Computer and its tiny color graphics printer. It has 16K of ROM and 3.5K of RAM which can be expanded to 7.5K by adding the optional 4K memory module for \$75.



The Sharp PC-1500 Hand Held Personal Computer.

May 1982 • Creative Computing

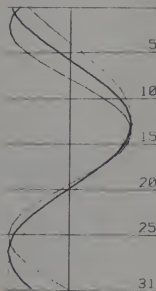
The machine features six programmable keys and added Basic language terms to provide variables that can be defined using one or two characters, variables in two-dimensional arrays, strings, and commands for the 7 x 156 dot mini-graphic display. Suggested retail price for the computer is \$300.

The little add-on printer is truly amazing. It prints in four colors (red, blue, green and black) in four directions (up, down, right and left) in nine character sizes. Not only did it do a tidy job plotting my biorhythm for the month, but it was correct—notice the triple valley during the week of the 25th.

Date 1982, 1
Name BETSY

- Body
- Emotion
- Intelligence

(-) (+)



Printout of the editor's biorhythm as calculated by the PC-1500. The curves are printed in contrasting colors.

Print speed is 11 characters per second on 29/32"-wide paper. The suggested retail price for the printer/cassette interface is \$250.

Sharp Electronics Corporation, 10 Sharp Plaza, Paramus, NJ 07652, (201)265-5600.

CIRCLE 302 ON READER SERVICE CARD

Panasonic

Another small, if not quite pocket size, computer is the Panasonic JR-100 personal computer. It has what we sometimes describe as a "Chiclet-style" keyboard

similar to that of the TRS-80 Color Computer. Each key is a small square of plastic which can be pressed, but it is not a full-stroke keyboard.

When it is released, it will have joystick controllers, a printer, I/O expansion units (each of which will add 16K up to a maximum of 48K), a music adapter and an RS-232 serial interface.



The Panasonic JR-100 Personal Computer.

The projected price for the basic 16K unit to drive a black and white TV set is \$200. The basic unit with a color driver is \$300.

The Basic language is entered by means of keywords, but the Panasonic spokeswoman did not know whether it was Microsoft Basic. The machine appears to have an extensive graphics character set as well as the standard alpha/numerics.

Panasonic, One Panasonic Way, Secaucus, NJ 07094.

CIRCLE 303 ON READER SERVICE CARD

Casio

The Casio FX-9000P is available for immediate delivery at a retail price of \$1199. The display and 67-key keyboard are built into the compact unit which is equipped with a fully applicable RAM file control function and uses the RAM package as a program and data file medium.

A unique feature is the 4K slot-in CMOS RAMs on which programs can be stored

CAR



Graphics produced by the Casio FX-9000P.



The Casio FX-9000P.

for up to three years. The computer can be expanded to include up to 32K bytes of RAM. A graphics printer is optional.

Casio, Inc., 15 Gardner Rd., Fairfield, NJ 07006, (201)575-7400.
CIRCLE 304 ON READER SERVICE CARD

NEC

NEC was featuring the PC-8000 Series Application Software for business and professional use. The NEC General Accounting System consists of several independent programs which can be used either on a stand-alone basis or integrated to allow the tracking of up to 1000 general ledger accounts.

The Accounts Receivable System allows tracking of up to 600 customers per disk.



The NEC PC-8000 personal computer with color monitor, printer and disk drives.

and provides the user with the ability to analyze his customer base in several ways. The system will also print mailing labels and past due notices.

The Payroll System tracks an unlimited number of employees with each disk maintaining complete data for up to 100. The system handles the requirements for all states, plus Puerto Rico and the District of Columbia. It prints paychecks and W-2 forms and provides an audit trail.

The NEC Job Cost System helps the user prepare an original bid or estimate on a particular job, and then tracks and reports on the costs as they accrue. Up to 100 cost accounts may be created.

Up to 1000 items can be tracked on a single disk using the Inventory Control System. The system prints invoices, packing lists, coded price labels, and purchase order forms.

Report Manager is a CP/M-based calculating instrument and electronic spread

sheet. Features include editing commands, a field which can be up to 255 cells wide, 255 cells long and 255 cells deep, the ability to copy cells, lists, two-dimensional and three-dimensional matrices from one region to another, and the ability to create four independent viewing sections.

The CP/M-based Word Processing System includes a self-teaching instruction disk and spelling checker containing 9700 words along with provision for an additional 2000 words chosen by the user.

The "Answer" Information Organizer is a data base management system which uses an information storage technique called threading which allows any record in the file to be attached to any other record.

The Creative Programming Series consists of six hands-on, interactive guides to the basics of computer programming for the first time user of any age.

NEC Home Electronics USA, Personal Computer Division, 1401 Estes Ave., Elk Grove Village, IL 60007, (312)228-5900.
CIRCLE 305 ON READER SERVICE CARD

Tatung

The Tatung Computer uses a Z80A microprocessor running at 4 MHz, and a floppy disk drive with one megabyte of storage capacity. The system can run either CP/M or MP/M and has 16K built into the terminal while the computer unit itself has 64K built in. The terminals are separate from the computer unit.

The computer unit contains one or two 8" disk drives and the CP/U in memory. The basic unit has both serial I/O and



The Tatung computer with disk drive.

parallel for a Centronics printer. The Model UT 1820 has a full keyboard with full-stroke keys as well as two rows of 16 special function keys. Availability is scheduled for April or May and retail pricing should be in the \$2-3000 range.

Tatung Co. of America Inc., 2850 El Presidio St., Long Beach, CA 90810.

CIRCLE 306 ON READER SERVICE CARD

From Germany

Olympia has added two new letter quality printers to its line. The ESW 102 uses the Olympia Whisperdisk print wheel, and features changeable typesizes, proportional spacing, four pitches, bi-directional printing and a print speed of 17.5 characters per second. It is priced at \$1590, about



The Olympia ESW 103 letter quality printer.

one-half the cost of other daisy-wheel printers.

The ESW 103 incorporates all the features of the ESW 102 and may be used as an electronic typewriter as well. It retails for \$1990.

Olympia USA Inc., Box 22, Somerville, NJ 08876, (201)722-7000.

CIRCLE 307 ON READER SERVICE CARD

VIDEO GAMES

Atari

Two large, furry Pac-Man characters, a yellow mouth and a red energy dot, heralded the introduction of the new advanced game system unveiled by Atari at a reception the night before CES opened.

The clarity and color of the graphics and the wide range of sounds—from music notes to explosions—produced by the new game system lead us to suspect that a close inspection of its innards might reveal at least a close cousin of an Atari 400 home computer.

A universal controller (which was snatched from our hands when we tried to inspect it) is said to combine the operation of the joystick, paddle and keyboard in a single hand-held unit that looks and operates like a pocket calculator. The control stick moves incrementally in eight directions and controls the speed of game characters.

The streamlined console has a single electrical cord and built-in storage areas for controllers as well as a built-in switchbox that automatically switches from television programming to game play.

Delivery of the unit is scheduled for the second half of 1982, in time for the Christmas season. The suggested retail price is \$349.95.

The Home Computer Division of Atari Inc. introduced three new games, a book-keeping package and a home filing system.

Pac-Man will be available in cartridge form for both the Atari 400 and 800 during the second quarter of 1982. It will sell for \$44.95.

In Centipede, also a home version of a coin-op game, the player uses a bug blaster to defeat attacking spiders, fleas, scorpions, centipedes and poisonous mushrooms. Also available in cartridge form for the Atari 400 and 800, it is priced at \$44.95 and will be available during the second quarter of 1982.

2 FROM HORIZON



Time: June, 1943
Place: North Atlantic
German Wolf Packs have been driven from their hunting grounds by Allied escort vessels and massive air attacks. But unknown to the Allies is a Nazi super sub completed well ahead of schedule: The Mark XXI. Der Führer has demanded total destruction of enemy merchant shipping — a vital link for continued success of the Allied war effort. Will you, as one of the Kriegsmarine's remaining ace skippers, enter history and save the Third Reich from defeat?

Der Führer will not be disappointed!
FATHOMS 40: \$39.95 ppd. Foreign, FPO and APO add 10% for shipping. Please specify Apple or Atari when ordering.

In the 1930's dramas were slowly unfolding in capital cities throughout the world. From army to high seas to high sophistication, intelligence. Headquarters, men and women were playing a game of cat and mouse for scraps of information essential to the security of their country. In OAK & DAGGER pits men against computer, or other players, as head of a mysterious Agency trying desperately to stay one step ahead of evil forces. Moving against time, against a capital forming nuclear arm, and offering bribes and fundamental facts of each player's turn and your survival.



CLOAK & DAGGER: \$39.95 ppd. Foreign, FPO and APO add 10% for shipping. Please specify Apple or Atari when ordering.

Look Apple II, IBM, or Atari II or later system with disk drive. Buy stocks required. Contact your local dealer for full details. Visa & MasterCard accepted. Dealer inquiries: We serve. 7561 after ask Highway White Fly 503) 826-4640

HORIZON SIMULATIONS
7561 after ask Highway White Fly
503) 826-4640

C.E.S., continued...

In *Caverns of Mars*, the player must penetrate several layers of defenses to reach the aliens' stronghold. Floating mines, enemy ships and laser fire are among the hazards to be overcome. The \$39.95 game is available on disk for Atari 400 and 800 computers.



The Atari Advanced Video Computer System and controllers.

The *Bookkeeper* is an accounting system designed for those who do business from their homes and for those who maintain their personal finances in a business-like fashion. It will handle 1000 transactions a month and up to 350 general ledger accounts, vendors and customers.

The program comes on four disks and requires an Atari 480 with Basic language cartridge and 48K of RAM, disk drive, 80-column printer and interface module.

The *Home Filing Manager* allows the user to create, store, edit, retrieve and print information on electronic index cards. The user can search in alphabetical or reverse alphabetical order or locate an entry by its title or a phrase it contains. The program consists of two program disks and one formatted data disk. It can be used on an Atari 400 or 800 with disk drive.

Atari Incorporated, Consumer Electronics Division, 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086.

Activision

Activision chose a more spectacular, if somewhat chillier, way to announce its *Barnstorming* cartridge. Activision employees and a few hardy members of the press gathered at 6:00 a.m. in sub-freezing temperatures to travel by bus to a landing strip near the Las Vegas Airport. At the strip we met a small, open-cockpit bi-plane, turned around and followed as it taxied through the streets of Las Vegas to the convention center.

Be sure to vote for your favorite software packages. See page 216.

Activision chose a spectacular, if somewhat chilly, way to announce its Barnstorming cartridge.



In *Barnstorming*, the player uses a joystick to guide his bi-plane over windmills, through barns and around flocks of geese. Points are amassed as these hurdles are cleared, and speed counts.



Grand Prix features brightly-colored formula racing cars speeding down an asphalt road, dodging oil slicks, crossing bridges and avoiding collisions on the tree-lined roadway. The player uses a joystick as throttle, brake and steering device to race his car around one of four courses.

Both games are designed for use with the Atari Video Computer System and the Sears Tele-Game Video Arcade. They retail for \$31.95 each and were scheduled for delivery in March.

Activision, Inc., 3255-2 Scott Blvd., Santa Clara, CA 95051. (408)727-7770.

CIRCLE 308 ON READER SERVICE CARD

Imagic

Imagic, the newest producer of cartridges for the Atari VCS and Intellivision, made its debut with three game cartridges for the Atari system.

In *Star Voyager*, the player navigates a space ship past flashing stars and galaxies. Enemy ships fire and meteors crash into the ship. With each hit, the energy in the ship drops and the player must search for refueling stations. Essentially, this is a scaled down version of *Star Raiders*.

Demon Attack pits the player against invasions of flying monsters. The attackers appear in waves, each of which employs a different attack strategy.



Trick Shot from Imagic.

Trick Shot is a billiard game which combines three balls and a cue ball into 14 different game variations. It is a game that requires either a great deal of practice or considerably more information than we had when we tried it.

Prices for Imagic games range from \$25 to \$35.

Imagic Corporation, 20665 Fourth St., Saratoga, CA 95070.

CIRCLE 309 ON READER SERVICE CARD

Mattel

Mattel Electronics introduced its new products at an interminable press conference. They also announced that the Intellivision keyboard unit is being test marketed in New Orleans and Seattle—an announcement that has an all-too-familiar ring to it.



B-17 Bomber, a new voice cartridge for the Intellivision.

COLLEGE BOARD SAT* PREP SERIES

TRS-80, APPLE, PET, OSI, ATARI, CP/M, PDP-11

Each program confronts the user with a virtually limitless series of questions and answers. Each is based on past exams and presents material on the same level of difficulty and in the same form used in the S.A.T. Scoring is provided in accordance with the formula used by College Boards.

S.A.T., P.S.A.T., N.M.S.Q.T. — Educator Edition set includes 25 programs covering Vocabulary, Word Relationships, Reading Comprehension, Sentence Completion, and Mathematics. **Independent tests of S.A.T. series performance show a mean total increase of 70 points in students' scores.**

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COMPETENCY PROFICIENCY EXAM PREP SERIES

This comprehensive set of programs consists of simulated exam modules, a thorough diagnostic package, and a complete set of instructional programs. It is designed to teach concepts and operations, provide drill and practice and assess achievement levels through pre and post testing. The Competency Exam Preparation Series provides a structured, sequential, curriculum encompassing mathematical, reading and writing instruction.

This program is designed for individual student use or use in a classroom setting. Programs provide optional printer capability covering worksheet generation and performance monitoring. C.E.P.S. are available in three software formats.

Special editions available for California Proficiency Assessment Test and New York Regents Competency Tests. Call for Prices.

Krell's M.I.T. Logo for Apple* \$179.95

Complete 4 disk set includes Library Disk, 20 program Tutorial Disk, *Alice In Logoland* and 2 COPIES OF M.I.T. LOGO FOR APPLE*

Odyssey in Time

This spectacular adventure game adds a new dimension of excitement and complexity to *Time Traveler*.

Odyssey in Time includes all the challenges of *Time Traveler* plus 10 additional eras. Each game is different and may be interrupted and saved at any point for later play.

\$39.95

Time Traveler

The best of the adventure games. Confronts the player with complex decision situations and the demand for real time action. Using the Time Machine, players face a challenging series of historical environments. To succeed you must build alliances and struggle with the ruling power. Each game is unique.

\$24.95



Isaac Newton +

Perhaps the most fascinating and valuable educational game ever devised - **ISAAC NEWTON** challenges the players (1-4) to assemble evidence and discern the underlying "Laws of Nature" that have produced this evidence. **ISAAC NEWTON** is an inductive game that allows players to intervene actively by proposing experiments to determine if new data conform to the "Laws of Nature." In question, Players may set the level of difficulty from simple to fiendishly complex.

F.G. Newton

Full Graphics Newton. This version of Isaac Newton presents all data in graphic form. Because data is graphic rather than symbolic, this game is suitable for very young children. Players may select difficulty levels challenging to the most skilled adults.

\$49.95

★ NEW ★

★MICRO-DEUTSCH★

Micro-Deutsch set includes 24 grammar lessons, covering all material of an Introductory German course. Four test units also included. Grammar lessons use substitution transformation drills, item ordering, translations and verb drills. Drill vocabulary based on frequency lists. Suitable for use with any high school or college textbook. Extensively field tested at SUNY Stony Brook. Available for Apple II and PET/CBM. (PET version includes a special foreign language character chip.) Also available soon: MICRO-FRANCAIS, MICRO-ESPANOL, MICRO-IVRIT, MICRO-YIDISH, MICRO-CHINESE, MICRO-JAPANESE.

\$179.95

★ NEW ★

★Pythagoras and The Dragon★

Mathematics in a fantasy game context. Based on *The Sword of Zedek*, **Pythagoras and The Dragon** introduces Pythagoras as a mentor to the player. When called on for aid, Pythagoras poses math questions, and depending on the speed and accuracy of the player response, confers secret information. With Pythagoras as an ally, the quest to overthrow Ra, The Master of Evil, assumes a new dimension of complexity. Depending on the level chosen, problems range from arithmetic through plane geometry.

32K

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CIRCLE 219 ON READER SERVICE CARD

While you are waiting for the keyboard unit to be test marketed in your area, you can jazz up your Intellivision with the Intellivoice Voice Synthesis Module. Synthesized voices of excellent quality introduce the games, cheer winners, warn of danger and offer strategic assistance.

Game cartridges which will make use of the synthesized voices are *Space Spartans*, *B-17 Bomber* and *Bomb Squad*.

In *Space Spartans*, warlike enemies attack the player's spaceship, and he must hold off the alien warriors as long as possible.

In *B-17 Bomber*, the player must fly the plane to a selected site, bomb the target and return safely to his take-off point. *Bomb Squad* requires the player to break a numerical code, which has been programmed by terrorists, and defuse a time bomb.

Other new game cartridges for the Intellivision include *Star Strike*, *Space Hawks*, *Advanced Dungeons and Dragons*, *Utopia*, *Reversi*, *Night Stalker*, *Sub Hunt*, and *Frog Bog*. One cartridge which has yet to be named plays a selection of favorite card games, another is a video pinball game and two others are based on a concept from the new Disney movie "Tron."

Mattel also announced a hand held diet computer, the Diet Trac Personal Computer System which stores information and tracks nutritional intake from the six basic food categories as well as five nutritional groups. Dieters may follow the built-in "food exchange" diet plan or design individual programs.



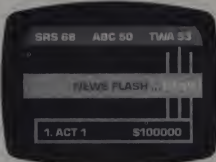
Synsonics Drums from Mattel Electronics.

Another new Mattel product should find itself high on the shopping lists of parents whose children reside with an ex-spouse. Synsonics Drums features four drum pads (snare, tom 1, tom 2, and cymbal) with bass, accent and tempo control. Settings include automatic drum roll at varying speeds, record and playback, and pitch control. The microprocessor controlled unit connects to a home stereo or instrument amplifier, and can be used to compose music, practice drum skills or "entertain friends."

Mattel Electronics, 5150 Rosecrans Ave., Hawthorne, CA 90250. (213)978-5150.
CIRCLE 310 ON READER SERVICE CARD

Magnavox

Magnavox dramatized their slogan, "You can feel like a million bucks playing *The Great Wall Street Fortune Hunt*," with a heavily-guarded display of one million dollars in silver dollars and poker chips. The latest in the Master Strategy Series for the Odyssey2 video game challenges players to anticipate market fluctuations in order to take full advantage of the buying and selling opportunities offered in the game.



The Great Wall Street Fortune Hunt, a new game for the Odyssey2.

The *Great Wall Street Fortune Hunt* can be played as a solitaire game, by two people playing against each other, or by teams of two or more people representing investment syndicates. The game, which features four levels of play, is priced at \$49.95.

Keyboard Creations, also for the Odyssey2, uses the Odyssey 49-character keyboard to turn TV screens into message centers or bulletin boards, and can be used as a character generator for titling home VCR tapes. Another mode creates word and number games. Suggested retail price for the cartridge is \$22.95.

N.A.P. Consumer Electronics, Interstate 40 and Straw Plains Pike, Knoxville, TN 37914.
CIRCLE 311 ON READER SERVICE CARD

Video Technology Ltd.

Creativision from Video Technology Ltd., another new entry in the video game market, features rectangular game controllers with built-in joysticks and membrane keyboard panels. The two controllers fit end-to-end in a track on the console to create a full qwerty keyboard. The console sells for about \$200.

Twelve game cartridges, including versions of most of the current favorites, are listed as being available, but no price was given.

The Creativision Home Computer System is apparently an expanded version of the game unit. It features a 6502 microprocessor, 16K of dynamic RAM expandable to 64K, Video Tech Basic in a ROM cartridge and cassette interface. Again, no price was available.

Video Technology Ltd., 4th Floor, Flat F.G.H Freder Centre, 68 Sung Wong Toi Rd., Tokwawan, Kowloon, Hong Kong.

HANDHELD GAMES AND MISCELLANEOUS

General Consumer Electronics Corporation
Combining electronic fun and function, General Consumer Electronics Corporation introduced four additions to its line of game calculators and watches.

The quartz wristwatches tell the time and date, but also offer an LCD field on which to play four different games. Arcade Time features football, basketball and soccer.

Space-N-Counter with Phaser Fight, Meteorox and Star Sweep, and Chase-N-Counter with Treasure Quest, Eat-N-Run and Double Cross are full function calculators with built-in game fields. Both have memory, floating point decimal, percent key and a continuous time readout. All four products carry suggested retail prices under \$40.



Chase-N-Counter game calculator from General Consumer Electronics Products.

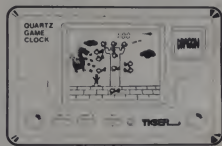
General Consumer Electronics Corp., 233 Wilshire Blvd., Santa Monica, CA 90401. (213)394-9667.

CIRCLE 312 ON READER SERVICE CARD

Tiger Electronics

Variations on the same theme are the LCD Watch Games from Tiger Electronics. These, however, are pocket watches, each of which offers two variations on a single game: Dragon, Caveman, King Kong or Space Fight.

Tiger has also announced four new modules of their K-2-8 children's computer. These include Talking Clock, Introduction



Dragon LCD watch game from Tiger Electronics.

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CIRCLE 138 ON READER SERVICE CARD

C.E.S., continued...

to Computer Programming, Beginning Algebra and Grammar I.

For pre-school children, five new Picture Book Module Packs have been added to the Talking Picture Book for two- to six-year old children.

Tiger Electronic Toys, Inc., 909 Orchard, Mundelein, IL 60060, (312)949-8100.

CIRCLE 313 ON READER SERVICE CARD

Western Publishing

Also aimed at pre-school children is Connectron from Western Publishing. The device, designed for three- to eight-year olds, consists of a series of word and picture books and a wand connected to a micro-processor.



The Connectron bar code reader/story book from Western Publishing.

The words in the books are underlined with bar codes, and when the wand is passed over the codes, a voice repeats the word. Approximately 1000 words are stored in five ROMs.

The unit is scheduled for delivery during the second half of 1982, and will carry a retail price in the \$60 to \$80 range.

Western Publishing Company, Inc., Racine, WI.

CIRCLE 314 ON READER SERVICE CARD

SciSys

SciSys Computer introduced Travel Sensor Chess, which measures 7.25" x 4.5" x 1.4". It features an Integral Sensorboard with red LEDs running parallel to the chessboard. The sensorboard automatically enters all moves as the pieces are advanced, and the LEDs indicate the coordinates of the computer's next move.



Travel Sensor Chess from SciSys.

The game offers eight levels of play and sells for under \$50.

SciSys Computer Inc., One World Trade Center, Suite 86097, New York, NY 10048.

CIRCLE 315 ON READER SERVICE CARD

Coleco

While other companies flirt with the copyright/licensing problems associated with arcade game copies with sound-alike names and slightly modified screen displays, Coleco has taken the direct approach and formed alliances with some of the arcade game manufacturers.

Hand held versions of *Frogger*, *Donkey Kong*, *Berzerk*, *Pac-Man* and *Galaxian* are approximately 8" x 8" x 6" and feature hooded displays like those of their big brothers and sisters. All play three games, have joystick controls and record a best score. All but *Galaxian* have two skill levels. *Pac-Man* and *Galaxian* were scheduled for delivery in the first quarter of 1982; the others will be available during the third quarter.

Coleco also announced a new line of cartridges of the Atari VCS and Intellivision. These, too, are licensed versions of the popular arcade games, and will be delivered during the third quarter of 1982.

Coleco Industries, Inc., 945 Asylum Ave., Hartford, CT 06105, (203)278-0280.

CIRCLE 316 ON READER SERVICE CARD

Sony

Sony Consumer Products Company introduced the SL-2500, a compact Betamax videocassette recorder which measures 17" x 13 3/8" x 3 1/8". It features front loading, high-speed picture search, multi-speed bi-directional playback, electronic indexing for random access to as many as nine selectable positions, and a two-week timer. Suggested retail price is \$1500.



The compact Sony SL-2500 Betamax video cassette recorder.

Sony also announced the portable PCM-F1 digital audio processor, a device that enables a video cassette recorder to record and play digital audio cassettes. It works with any NTSC-standard videocassette recorder—U-Matic, Beta or VHS—but was designed specifically for use with the Sony SL-2000 BetaPak. The PCM-F1 will be available in the spring of 1982 at a suggested retail price of \$1900.



The Sony portable PCM-F1 digital audio processor.

Sony Consumer Products Company, 9 West 57th St., New York, NY 10019, (212)371-5800.

CIRCLE 317 ON READER SERVICE CARD

Toshiba

A prototype of the Toshiba XR-81 digital audio disc player was on display for the first time in the U.S. The device uses a laser beam to "read" audio signals off the surface of a 4 1/2" disc. The detected signal is then processed through a converter to recover the information and transform it into music.



The Toshiba XR-81 digital audio disc player.

Toshiba America Inc., Consumer Electronics Division, 82 Totowa Rd., Wayne, NJ 07470.

CIRCLE 318 ON READER SERVICE CARD

Right to Tape

One group which has a problem rather than a product as its *raison d'être* was the Right to Tape Committee. It is their position that "the Ninth Circuit Court of Appeals decision of October 19, 1981, with regard to the use of private video tape recorders for recording TV programs off-the-air, not only threatens serious harm to an important growing industry, but also represents an unjustified invasion of privacy never envisioned in the Copyright Act on which the Court decision is based."

Their primary argument is that people who tape TV programs do so not to make a permanent library copy of the program, but to make a temporary copy that can be viewed at a more convenient time and then erased. They claim that this practice leads to larger audiences for programs, which enables copyright holders to "strike a better financial deal" for their artistic and creative product.

For more information contact Gary Shapiro, 1201 Pennsylvania Ave., 4th Fl., Washington, D.C. 20004, (202)626-6721.

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CIRCLE 137 ON READER SERVICE CARD

Through the Fog

David H. Ahl

Upon embarking from a jammed TWA flight, Betsy and I were greeted by a British Rail strike. This made getting to Birmingham a less-than-wonderful experience. A week of fog and drizzle did nothing for our outlook or health, but we had come to see computers, not the countryside.

Which Computer? That was the name of the show that we were attending at the National Exposition Centre. Principally a trade show, it most closely resembled the Comdex show here in the States. Although the main focus was business applications of small computers with exhibitors such as DEC and Data General, it had much of interest to personal computer enthusiasts.

The Japanese manufacturers frequently use Britain as a test market for new products before introducing them in the United States. Although some of these machines never reach our shores, it is still interesting and informative to see what the Japanese have in store for the English-speaking world.

Also, Britain is considerably ahead of the United States in implementing systems for broadcasting material from computerized data banks. Viewdata and Prestel have been in widespread operation for some time and now many manufacturers are marketing low-cost terminals for utilizing these data banks.

Furthermore, Britain has made a strong commitment to extend computer literacy to every person in the country. They feel, rightly so, that computers are the wave of the future and that every citizen ought to be able to take advantage of their potential. Thus, the government is supporting educational computer programs in schools by picking up 50 percent of the cost of the hardware as well as sponsoring a twice-weekly program on BBC television.

The BBC Microcomputer System

The BBC system consists of two models, both of which can use a standard TV set or monitor as a display, a Teletext receiver, a Prestel option, and optional disk system and peripherals.

The standard model is based on a 2MHz 6505 mpu with 16K of RAM and 32K of ROM; the ROM includes a 16K Basic and 15K operating system. The system has eight different display modes including a text mode, 40 x 25 characters mode and a 320 x 256 high resolution graphics mode. It can display up to eight colors.

The system has interfaces for cassette, TV set and video monitor. Disk and communications interfaces are optional.

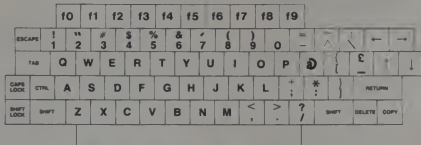
The enhanced model has an enhanced display mode giving 80 x 25 characters and 640 x 256 high resolution graphics, 32K RAM, A-D interfaces, Centronics printer interface, and RS423 interface.

The BBC Basic specification is fairly standard, i.e., close to Microsoft. Extensions include long variable names, integer variable

types and extensive string operations (largely using Microsoft syntax). Attention has been paid to the emphasis on program structure (a la Pascal), and BBC Basic supports IF...THEN...ELSE, REPEAT...UNTIL, and multi-line named functions and procedures with local variable declarations. Assembly language routines can be written into a Basic program and high resolution color graphics are well supported.

It is rumored that once Acorn irons out a few manufacturing wrinkles, they plan to offer the machine in the United States. Don't look for this any time soon since demand is exceptionally strong in Britain and production has not yet caught up. It is also rumored that other British manufacturers, notably Sinclair, will be bringing out their own versions of the BBC machine but for now these are just rumors.

There are currently ten half-hour courses in the television series which started airing in January 1982. In addition, the National Extension College is providing a 30-hour introductory course in Basic programming for home use.



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Apple Owners A Chance
To Become Musicians—
And Musicians A Reason
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Your Apple Can Be the Heart of a Sophisticated Sound Studio

Would you like real music and total control? The Soundchaser Computer Music System coupled with an Apple computer produces dazzling results. While a studio synthesizer can cost as much as a small house, Soundchaser gives you a polyphonic synthesizer and multibank sequencer, with features found on most professional systems, for about the same cost as twenty hours of studio time. The system represents a new generation in music, combining computer and synthesizer hardware under the control of sophisticated software. Add a human at the keyboard and you've got a dynamite package.

The keyboard is exceptional. It is a professional, four-octave, 49-note unit housed in a handsome wood cabinet. It looks as good as it sounds. Just as important, it feels right. Installation is simple: the keyboard interface plugs into peripheral slot seven in the Apple. No special wiring or chip changes are required. As soon as you insert the card, the keyboard is ready to talk to the Apple. Add a synthesizer, and you can play live, lay down a sequence, or play over a recorded sequence.

Outstanding Synthesizer Hardware

The Soundchaser Voice Card is a computer controlled, full-feature, dynamic synthesizer. Each card provides three voices. A two-card system with a total of six voices is recommended, but we don't lock you into one product line. Soundchaser can sing just as well with other synthesizers, most notably the Mountain Music System. This board is highly regarded by Passport Designs and by pairing the sixteen channels, they allow the Soundchaser system to produce eight full-bodied voices.

The Software Side of the Story

A system that's hard to use is less than worthless. You want to concentrate on music, not programming. Soundchaser helps you out with intelligent and flexible menu-driven software. A highlight of the software is the Editor. With the aid of graphically displayed envelopes, slides, and switches, you can create a wide range of instrument sounds. Envelopes and oscillator waveforms are drawn right on the screen. There is no better aid for experimentation than this.

Once you create an instrument sound, it's onto the Sequencer. Here, you can record a sequence of notes, storing them in memory. Later, the sequence can be played back, using a new instrument sound if desired. You can sit back and listen, or play live over the sequence. Instruments and sequences can easily be saved to disk and retrieved, all under program control.

Added Support

Passport Designs has already produced a full series of support software to augment Soundchaser. The Notewriter displays your music in standard notation on the hi-res screen, right as you play. It lets you easily write your own lead sheets and fake books. There is no simpler way to produce sheet music, and you can obtain hard copy using virtually any graphics printer. With the Notewriter, you can compose, arrange, and transcribe without having the drudge work get in the way of your creativity.

The Music tutor transforms Soundchaser into a challenging educational tool. The software includes programmed courses in ear training, music theory, and harmony. It can be used both by teachers and by individuals who want to sharpen their musical skills (curriculum outline is available upon request).

The software will continue to grow, so Soundchaser will never grow obsolete. For those with the interest and desire, the manual includes instructions for accessing the keyboard from user programs.

Soundchaser Packages

Soundchaser with Dual 3-Voice Synthesizer Boards	
(Six Voices)	\$1350.00
Soundchaser with Mountain Music System Boards	
(Eight Voices)	\$1045.00
Notewriter (1 Disk)	\$50.00
Music tutor (4 Disks)	\$150.00

Soundchaser Keyboard and Interface without Synthesizers \$650.00

System Requirements

Apple II or Apple II Plus, 48K, Disk Drive, Paddies, Monitor or Television with RF Modulator (black and white or color), and printer (only required for making hard copy from Notewriter).

Write for free brochure. Dealer inquiries invited. To order your system send payment and shipping charged indicated to Creative Computing, Dept. C025A, One Park Avenue, New York, N.Y. 10016. Orders may also be charged to your Visa, MasterCard or American Express account—by mail include credit card name, number and expiration date, or if you prefer, use our 24 hour toll-free number, 800-631-8112. In NJ only 201-540-0445.

Your system is fully backed by a 90-day manufacturer warranty and a complete money back guarantee of satisfaction from Peripherals Plus (trial period is 30 days).

Package #1 or 2	\$10.00
Software (independently)	\$2.00
Soundchaser (independently)	\$2.00

*N.J. residents add 5% sales tax.

Peripherals Plus

Through Fog, continued...

NewBrain by Grundy Business Systems

The NewBrain is an amazingly compact computer measuring just 7 x 10 x 2 inches. It is based on a Z80A mpu and has 24K of ROM and 32K of RAM. It has a calculator-type keyboard, i.e., short movement keys, but in a standard QWERTY layout. It drives a standard TV set or monitor and provides a display of 24 lines of either 40 or 80 characters. Text may be mixed with high resolution graphics of up to 240 x 256 or 240 x 512 pixels.



A 1200 baud cassette interface is built in along with a serial printer interface and communications interface. Other interfaces are available as options.

NewBrain software includes a screen editor, Basic compiler, high-speed floating point math package and, of course, an operating system. An extension of ANSI standard Basic, it includes unlimited length string handling, program chaining, external call capability, and DMA handling.

First availability is April 1982. Prices start at about \$400 although the unit is not expected to be immediately available in the U.S. For more information, contact Grundy Business Systems Ltd., Science Park, Milton Road, Cambridge CB4 4BH, England.

Sharp Electronics

We continue to be surprised that Sharp has not introduced the MZ80K computer in the United States. Sharp recently announced production of the 100,000th unit and it is one of the most popular computers in Britain.



The latest member of the MZ family is the MZ80B, a high-end system with 64K RAM, 2K video RAM to store a switchable 40- or 80-character x 25-line text display, two 8K graphics RAMs which independently map the screen using 320 x 200 pixels.

The unit has provision to install twin double density, double-sided floppy disk drives with 560K bytes per unit. Also, Sharpsoft Ltd., the British distributor, is offering two Winchester disk systems offering 6M bytes and 12M bytes respectively. The disk is configured as a CP/M device to enhance compatibility with existing software.

A MZ80B system with 64K RAM, single disk drive and printer costs about \$4600.

NEC PC8000B Series

The PC8000B Series is an update of the PC8001 (*Creative Computing*, Sept. 1981, pp 65-66). The computer is based on the NEC equivalent to the Z80A mpu and comes with 32K of RAM and 24K ROM containing N-Basic and a screen editor. The full-size keyboard has a numeric pad and four programmable function keys. Eight-color graphics are available in 160 x 100 pixel resolution.



N-Basic is based on Microsoft Basic but it incorporates many additional graphics commands. A very nice feature while in text mode is the ability to define a scroll area less than the full screen as well as four character per line specs (36, 40, 72 and 80).

Integrax CX80 Color Matrix Printer

At last! A low-cost, 7-color, easy-to-use printer for small computers. Actually, seven colors isn't quite accurate. The CX80 ribbon has three lengthwise color stripes which can be combined into the seven print colors by overstriking. A microprocessor built into the CX80 translates the color specifications from the computer into the correct combinations for the printer.

The character ROM contains 96 ASCII (5 x 7 format) and 64 PET graphics characters (6 x 7 format); 15 characters are user programmable. All characters may be printed double width (elongated) and/or reversed (white character, color background).



The printer uses a standard Centronics-type interface. However, Apple owners will be delighted to note that an Apple dump card is available which will transfer the color screen directly to the printer with no further programming.

We are trying to track down pricing and U.S. availability information. Keep tuned.



VIC 20 Expansion Unit from Arlon Micro

The VIC 20 Expansion Unit is an aluminum shell into which the Commodore VIC 20 fits. It replaces the VIC power supply with a heavy-duty unit and provides a motherboard with seven peripheral slots. The cover of the unit provides a base for a TV set.

For people who have purchased 3K memory packs for their VICs and wonder how they can add anything else, this unit may be just the thing.

Arlon also offers add-on memory packs and a speech synthesis unit for the VIC. For more information, contact Arlon Micro, Cibly Industrial Estate, Caernarfon, Gwynedd, Wales.

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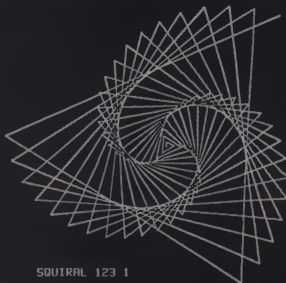


MOUSTACHE APPAREIL

Every Englishman, man, and woman who knows that a beautiful moustache is the chief charm of a man's face. It gives permanent fashionable appearance and is NO cosmetic. This valuable treatment costs \$20. References: Chicago Banks, 301 N. Dearborn Ave., Chicago, Ill. 194 Park Avenue, Chicago, Ill.

The Logo Language is Here It's the Learning Language

```
TO SQUIRAL :ANGLE :DISTANCE
  IF :DISTANCE > 200 THEN STOP
  FORWARD :DISTANCE
  RIGHT :ANGLE
  SQUIRAL :ANGLE :DISTANCE + 3
END
```



SQUIRAL 123 1

Terrapin, the Turtle Company, brings you the Terrapin Logo Language for the Apple II with Turtle Graphics, now ready for immediate delivery.

The Terrapin Logo language is for students and teachers at every level. It was carefully designed by professional educators and artificial intelligence researchers to promote structured, logical thinking. It encourages exploration and experimentation, helping students to take an active role in the learning process. The language is so easy to use that it quickly overcomes fear of the computer. Simple graphics commands make using the computer fun and exciting for young children.

But it doesn't stop there. Children won't outgrow the Terrapin Logo language. It grows with them. The Logo language includes many features common to unusual (and) powerful research languages, permitting programs of great power to be written quickly and easily. Writing nontrivial programs in other languages is usually much more difficult and time consuming.

The Terrapin Logo language was developed by the Artificial Intelligence Lab at the Massachusetts Institute of Technology. Terrapin is now authorized by MIT to distribute the results of its 12 years of research to you. To provide quality support for the language,

Terrapin has assembled a team that includes two of the three authors who developed the Logo language for the Apple II at MIT.

Dr. Wally Florman, the architect of the Logo language, Dr. Sylvia Weiss, Mr. Nancy Roberts, and Mr. Paul Goldenberg, who have been involved with the Logo project for many years, think the Terrapin Logo language is so good that they have just joined Terrapin's Board of Educational Directors.

Every copy of the Terrapin Logo language comes with complete documentation. To run the language, a 48K Apple II with 16K RAM card, or a language card, and one disk drive is required.

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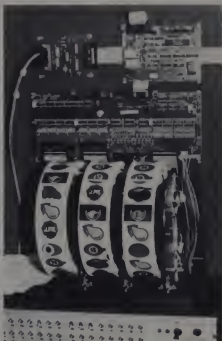
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Through Fog, continued...

Arcade and Amusement Games Show

We were fortunate that the National Exposition Centre which housed the Which Computer? Show also was hosting the Amusement Games Show the same week. Hence, we were able to get a firsthand look at the new coin-op games that will be coming out in 1982.

One of the hits of the show was Dribbling, a two-player soccer game from Model Racing, an Italian design firm. Model Racing also introduced Thunderbird, a variation of Falcons, and Scramble, a Defenders-type game with many extensions and variations.



MicroCasino is an electronic betting machine which can be set up to play five different card games.

to the predatory insects chasing the ladybug. Both of these games use spectacular color graphics and sound to good advantage.

Other big news at the show was the proliferation of cartridge-type coin-op machines. The front panel generally has a joystick and two or four buttons. Each game cartridge comes with overlays for the controls and sign panels for the machine so it can be changed in a matter of minutes to a completely new game. Rip-offs of all the popular coin-op games are available in cartridge form at a fraction of the cost of a new game.

We're in the process of editing a book, *The Creative Computing Guide to Video Arcade Games*, to be published by Pocket Books in a month or so. Look for it on your favorite paperback rack. □

New slot machines are electronically operated. This one demonstrated how different payoffs can be set by the operator.

Konami, a Japanese company, introduced three new games with rather different concepts of play. Guttang Götting is a game in which you guide a train around a maze of track trying to reverse the color pattern as well as get the Crazy Trains to crash into one another. Amidar calls for good logic as you try to surround blocks on an uneven grid while avoiding the mean little Amidars. Tutankham is a treasure hunt game.

Universal introduced two new games which we predict will be big winners: Snap Jack and Ladybug. In Snap Jack the player uses a joystick to control a car on stilts travelling from left to right. The car must eat fuel dots while avoiding various hazards such as rockets, birds, open bridges, wolves, etc. Ladybug is a Pac-Man variation with a major change: in particular, portions of the maze rotate and can be used as barriers



Electronic slot machines have no pull levers but rather have an array of buttons which allegedly allow the player to "nudge the wheels."

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Logo Ideas

Robert Lawler

Make It Your Own

A six year old was introduced to the INSPI procedure below. When she saw it executed with these variable values, [INSPI 100 1], she declared that it looked like a "seahorse" and asked if she could have a seahorse procedure of her own. (I coded for her the equivalent SEAHORSE procedure.) Her "SEAHORSE" procedure was one she explored with considerable interest and satisfaction for several days, delighting in the pretty designs she discovered:

```
TO INSPI :DISTANCE :ANGLE :CHANGE
1: FORWARD :DISTANCE
2: RIGHT :ANGLE
3: MAKE "ANGLE (:ANGLE + :CHANGE)
4: GO "1
```

Seahorse 7

Seahorse 1

```
TO SEAHORSE :CHANGE
1: MAKE "ANGLE 0
2: FORWARD 10
3: RIGHT :ANGLE
4: MAKE "ANGLE (:ANGLE + :CHANGE)
5: GO "2
```

It was important to this child to make the procedure her own because it put limits on how much complexity she had to cope with. She didn't have to worry about other people's procedures or how they related to hers. She created her own little world where she was free to explore and develop her own ideas.

Making things your own limits the problems you face at one time. It also serves to make you more independent. You can use your own procedure whatever way you want. You can become as certain as you need to be about how your procedure behaves. You can change your procedure without doing something unexpected to anybody else. But greater independence has its problems. You may get frustrated when your procedure doesn't work the way you think it should; you may have a harder time explaining your own procedure to somebody when you ask them for help. Even if you begin Logo by copying others' procedures and changing them to be exactly what you want them to be, you will soon go from changing other people's procedures to making your own procedures from scratch.

Robert Lawler, Ph.D., Associate Director, Logo, P.O. Box 1551, Ansonia Station, New York, NY 10023.

Can I Make Logo Commands?

Any procedure you write is a new Logo command. In this first sense, the answer is "yes" and obviously so. On the other hand, if you write a procedure whose only function is to print "FOO", that would clearly be of a different stature from the Logo primitives, such as RIGHT and FORWARD, mainly because it won't do much for you. Do you need more "Logo commands"? Do you have enough experience to know what you need? Hardly anybody can answer "yes" very positively to such difficult questions as these. The way to find out if you need more Logo commands is to look at what you do and the procedures you've coded. Ask yourself: are there sequences of repeated instructions in procedure after procedure? Are there tests of data conditions applied time after time? There probably are. Here is an example of a command you might find a valuable addition to Logo:

PURPOSE: when programming with lists, most frequently iteration is terminated by testing a data condition; for example, the list is empty so no more processing can be performed on its members. It would be useful to have a predicate which directly reports whether a list is empty or not. Such a one could be encoded this way:

```
TO EMPTY? :LIST
IF :LIST = [] OUTPUT "TRUE
OUTPUT "FALSE
END
```

PURPOSE: when programming with lists, very often you want to know if a specific item is a member of a list. The MEMBER? predicate will answer that question.

```
TO MEMBER? :ITEM :LIST
IF EMPTY? :LIST OUTPUT "FALSE
IF :ITEM = FIRST :LIST OUTPUT "TRUE
OUTPUT MEMBER? :ITEM BUTFIRST :LIST
```

The gain in your programming from using such a new command may appear a small one, and so it is. But small gains add up to significant advances. Easy extensibility is a key feature of the Logo language. Using that feature to simplify your own coding will enable you to code more complex procedures and understand them better. □



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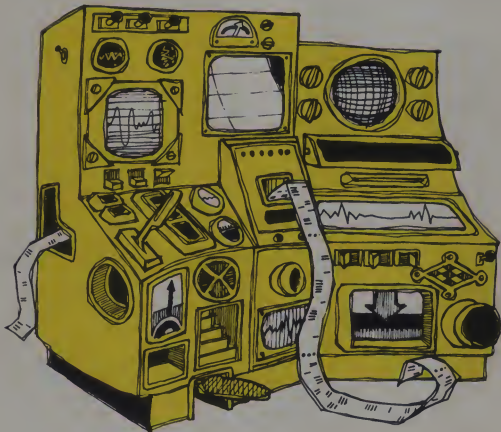
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A Brief History of The Front Panel

Philip Hooper



Everyone knows that without programs computers are useless, except perhaps as sculpture or paperweights. Computers need programs! Early computers used programs that were stored outside of memory; instructions were brought in, one at a time, and executed. Fetching an instruction might require more time than processing it—much more time. However, once programmed the computer itself needed no additional priming before it was ready for work. It was like a hardwired interpreter, patiently waiting for a line of source code to process, and reprogramming was a very tedious chore.

When John von Neumann* envisioned a scheme with programs stored internally, along with and virtually indistinguishable

**Historical Note:* While von Neumann generally gets the credit for the idea of the stored program, veterans of the original ENIAC project, and particularly Dr. John Mauchly himself, have firmly stated that Von Neumann got the ideas from them—Ed.

Philip Hooper, Box 62, Northfield, VT 05663.

At any given time the signals presented at the pins constitute only a small fraction of the interesting signals throbbing within the chip.

from the data, a revolution was sparked. The program, formerly embodied as a paper-snake-tape gradually being devoured by the mill, or as a plugboard crawling with patchcords—truly a tray of worms—became obsolete in that flash of genius which spawned the stored program computer. Suddenly it was even possible to create programs which could modify themselves, a capability which opened the door to undreamt of elegance, deviousness and agony, in addition to inspiring some rather imaginative fiction about self-programming

computers "taking over." At the same time, the question "how do we get the program in there in the first place?" assumed critical importance.

Enter the front panel, to become as essential for proper computer function as a massive air conditioner and three-digit-ampere power supply. This front panel provided the cartoonists with an image that guaranteed instant recognition. Oh, yes, the whirling tape drives were important, but far more arresting were those rows of twinkling lights and little switches, the very devices which let a person "talk" with the machine and listen/look to/at it.

Indeed, beyond the hard line of brute soldering iron and on-off-reset switch, this array of tiny red eyes and noses was the main line of communication between the two species: the one aging, biological, transforming resources into garbage; the other emerging, electronic, transforming information into garbage. The lights showed us what was in there, and the switches let us change it. But it was tedious business, toggling in data one bit at a time, and

would never be suitable for loading any program large enough to be useful.

Ooops! That is not quite true, for there was one program, or rather class of programs, small and yet very useful indeed, for once they had been loaded they proceeded to load in the large programs. These programs, the bootstrap loaders, provided the essential link through which man could use an agonizingly slow input procedure to load (eventually) a very large program, quickly and with very little human effort. Numerous analogies come to mind—a photomultiplier tube, a kick-starter, an avalanche, a fission reaction, a seed. Together, the front panel and bootstrap combined to provide an effective way of utilizing the conceptual breakthrough of the stored program computer—they got the program inside where it could be stored.

The front panel had other functions besides helping us load and activate the "strap." It gave us a way to examine things, important things like the contents of the CPU registers. Since these registers were composed of discrete components, their individual bits were directly available on wires, and through the switch settings an assortment of these bits could be selected for representation on the lights. (This is not easy to do with a microprocessor chip (MPU), since at any given time the signals presented at the pins constitute only a small fraction of the interesting signals throbbing within the chip.) Moreover, the front panel could use hard-wired interrupts to provide a single-step feature, allowing the behavior of a program to be examined in great detail, within a human time-frame. Address and instruction traps could also be provided, to let the operator/programmer run his program until his own specific conditions were met, a capability of great value during debugging.

Enter the ROM. Suddenly we had a way to mass produce a program cheaply, on a tiny chip, and store it in a computer memory by simply plugging it in. Surely that was the way to implement the bootstrap loader, whatever device it was loaded from. Load the "strap" just once, in the infancy of the computer, and use it for all program loading from then on.

We no longer even needed a front panel, since the reset button could be wired to activate the ROM bootstrap, letting us load our programs automatically. Besides, with the entire CPU now cased in a plastic dominoid quadrate instead of spread over a few yards of discrete circuitry, we couldn't even get at some of the signals that used to be so handy and useful. If we wanted to inspect, say, the low nibble of some register, we would now have to convince the MPU to bring it out on pins, where we could access and display it. But the instructions causing the MPU to do this would almost certainly change the

very register to be examined, a fact forcing us to store all of the register information outside the MPU first, and then restore it to the MPU registers after our examination was over.

The black-box boundary of the black chip design sets limits to what we may know about the inner workings of the chip. For the convenience of tidy, swift, integrated packages we trade the ability to investigate the infrastructure, just as the convenience of an automatic transmission costs us the freedom to select, when appropriate, some specific gear ratio. We cannot bring out an index register for examination without also changing the accumulator and status register and bringing about frantic activity on the address lines. We cannot open up the chip to make minor alterations in its behavior or to resolder a troublesome connection any more than we can, in Basic, use a data value as a program address. Indeed, is the convenience, the simplification, worth it?

The black-box boundary of the black chip design sets limits to what we may know about the inner workings of the chip.

Well, if we no longer need the front panel for loading programs (we don't), and if the hardware cost of bringing extra signals out of the MPU are not justified (they are not), then why have a front panel at all? Let the cartoonists find another recognition archetype, and build instead a sleek box with one switch, one push-button, and one line cord.

Compared with something which "looks like a computer," this streamlined box would be far less threatening to small businessmen, large businessmen, majority groups, history majors, and sundry technophobes. Only pinball addicts would sense a loss. Is it not somewhat surprising that the typewriter ever "took hold," considering how much more complicated and technological it looks than, say, an ink pad and box of hand type. And, by the way, was the increase in speed worth it?

In fact, the front panel has faded into history, after emerging to provide vital support for Von Neumann's inspiration and serving well as a flipping, blinking coupler between man and machine during those critical years in which the increasing complexity of machines outstripped the ability of their creators to use them well or understand them fully. Now that these new creatures, computers, have helped us learn how to provide them with ever-

present, everready internal programs, the job of the front panel is essentially over. As Ludwig Wittgenstein, at the end of his *Tractatus*, remarked about the proper use for his own philosophy: having climbed the ladder, one throws it away. Although slow, the front panel did contribute greatly to the development of the modern computer, only to be sacrificed, when expedient, to the God of Speed.

It is unfortunate that the availability of better (ROM) loaders has cost us the other front panel features as well, but it is impossible to justify the expense of supporting this register-level control and debugging capacity, except in a few very expensive installations for program development. However, there is an alternative approach—one which offers a reasonable compromise between function and cost by using software to simulate the MPU and then operating on the resulting model, using it to execute a target program interpretively. This approach can avoid any additional hardware cost and complication by using the capabilities of existing I/O devices. It can model the front panel lights on an existing CRT (no doubt providing a richer alphabet than binary blink) and can interpret the switch closures of an existing keyboard as if it were sensing front panel switches.

Execution under the resulting system will be slower than direct execution, but will be brought completely under the control of the user, whether in single-step mode or running subject to halt/trap conditions. Moreover, while the model of the MPU is being manipulated by software running the actual MPU, every bit of every register of the machine model is immediately accessible for examination and alteration.

Through this model approach, the internal logic of the MPU chip is spread out in some region of R/W memory where each "wire" may be accessed conveniently and independently. The tidiness and speed of the blackbox chip are gone, traded for a cumbersome but transparent room that is crammed full of useful, interesting junk. Control over program execution is returned to the programmer. Direct communication with the MPU registers is possible once again. Though the hardware front panel is gone, a "front panel" in software is able to take its place. The front panel returns. □

A software system to implement this scheme has been written for the OSI C4P computer. Called Soft Front Panel, it is available through Technical Products Co., Box 12983, Gainesville, FL 32604. If enough interest is evidenced, it may be modified for other 6502-based systems as well.



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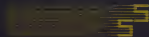
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Summer Computer Programs

Barbara Garris

Last summer saw the blossoming of the "Computer Camp" phenomenon. We've put together a listing of residential and day summer programs for children and adults. If you know of any programs that are not listed here, please let us know.

East Coast

Computers for Kids Day Program, Creative Computing Education Center, 39 East Hanover Ave., Morris Plains, NJ 07950.

This non-residential day summer program teaches young people aged 10 to 17 micro-computer concepts and Basic programming, beginners to advanced level. Two-week courses run from June 28 through August 20. Contact Barbara Garris, manager, Creative Computing Education Center, 201-540-0445, for registration information.

Computer Camps International, 310 Hartford Turnpike, Vernon, CT 06066.

Computer Camp East, renamed Computer Camps International, is offering two new two-week residential programs in Denton, TX and Whitewater, WI, as well as their original East Haddam, CT program.

Day programs are also planned. For more information, call Mr. Michaels, director, at 203-871-9227.

National Computer Camp, Box 624, Orange, CT.

The original residential/recreational computer camp concept of Michael Zabinski is alive and well in one- and two-week sessions at Westminster Preparatory School, Simsbury, CT and Woodward Academy, Atlanta, GA. For more information, call Michael Zabinski at 203-795-3049.

Wesleyan Summer Computer Institute, 92 St. Botolph St., Suite 3, Boston, MA 02116.

This two-week or seven-week residential program mainly for adults at Wesleyan University, Middletown, CT, also provides low-cost campus housing. Credits toward a Master's degree can be earned if the course is successfully completed. For starting dates and registration information, call Russ Walter, director, at 617-266-8128.

Midwest

CompuCamp, 7101 York Avenue South, Edina, MN 55435.

Held at Bethel College as well as other midwest campuses, this residential computer/sports/recreation program takes young people from 10 to 17. One-week and two-week courses are available starting

June 16 through August 6. For more information call Kathryn Thomas, director, at 612-835-0064.

Lake Forest Computer Camp, Sheridan and College Roads, Lake Forest, IL 60045.

One-week intensive courses in Basic will be offered on the campus of Lake Forest College, 30 miles north of Chicago. The 1982 season runs from June 20 to August 6, and is open to children between the ages of 12 and 18. Contact Lowell Carmony at (312)234-3100.

West Coast

Computers for Kids, Inc. and Computers for Grownups, 8 Benton Ct., #4, Tiburon, CA 94920.

Weekend residential computer and recreational programs for adults and children are offered periodically in the central California area through winter and spring. A summer computer/recreation/sports program for young people is planned. For more details, call Robin Samuel, director, at 415-435-1310.

Computer Camp, Inc., Suite G, 1235 Coast Village Rd., Santa Barbara, CA 93108.

This Southern California residential/recreation/sports camp for young people 10 to 18 runs two-week cycles starting June 11 through August 20. Call Garry White, director, at 805-969-7871 for more information. □

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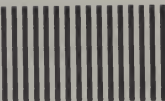
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WH Smith Brings ZX-81s to the High Street

Tim Hartnell

AFTER RELYING on mail order for 18 months, Sinclair Research has ventured into the retail field — via the giant newsagency chain, W H Smith. In 112 stores, Computer Know-How centres feature displays based around an operating ZX-81 which is backed up by computer magazines and books.

The agreement, which began in September, is for a trial period of 12 months. "Both parties view the agreement as an experiment", says Clive Sinclair, inventor of the ZX-81. "We accepted Smith's approach because they've clearly researched the subject carefully, and take the new operation very seriously".

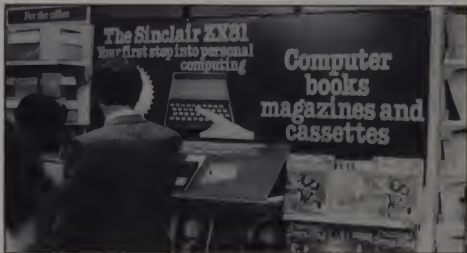
Under the sales contract, W H Smith has established the computer departments in its stores, and although the company is selling a wide range of computer books and magazines, it is staying away from hardware — except for the ZX-81.

W H Smith has made the move into the computer field after its success with computer books and magazines. For several years, the only place you could find computer books was in specialist computer shops. Then, the retail chains discovered the appeal of computers and began to stock the magazines. Now, few of the specialist stores bother to stock the British monthlies, relying instead on issues of U.S. magazines and books. The same is unlikely to happen with computers, because both W H Smith and Sinclair Research believe they will be tapping a whole new market — one which would not consider buying by mail order.

John Rowland, W H Smith market-development manager, said the company had decided to approach Clive Sinclair for the rights to sell the ZX-81, because Sinclair Research was the only company with "both a proven product available in the right quantities, and a proven sales record."

"Last year we started a small experiment with computer books and magazines", says

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Rowland, "and it worked well. So what we've done now is bring the computer-orientated publications together with an actual computer, to create the Computer Know-How section of the store".

Growing Market

The first test market for computer products was the W H Smith store in the Brent Cross Shopping Centre. "We sold a good deal of books there", Rowland recalls. "We thought that we were at the beginning of something important, and that with suitable hardware, we'd have a combination which would prove successful".

Rowland says that the traditional strengths of W H Smith in selling books and magazines had increased in recent years with the development of the record and toy departments, the camera and film sections, and the small office and home products such as typewriters and calculators. Computers seemed the next logical step.

"We sell about 500,000 computer magazines a year", says Rowland. "CB is the latest boom, with a new magazine in the field just about every month, but computer magazines are very strong, and we expect this area to keep growing".

W H Smith started in the computer magazine field by importing magazines from the United States: "We had many American magazines", says Rowland, "and they sold very well". He says he found that the home-bred magazines quickly improved out of sight, and the need to import U.S. publications diminished.

As well as the ZX-81 and computer books and magazines, the Computer Know-How section of the W H Smith's stores sell blank cassettes at 50p as well as the Sinclair-produced software.

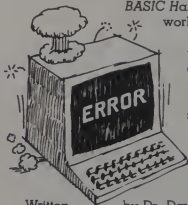
"We'll look at how the ZX-81 goes, and then decide if we want to carry other machines", says Rowland.

He is aware of the problems some people had had with early 16K memory packs, but says he has been assured by Sinclair Research that the problems associated with the RAMs had been ironed out.

"We'll be providing our own service on the computers, and related hardware", says Rowland. "The machines will be covered by our normal audio guarantee. We normally repair cassette recorders and the like within 24 hours, and we imagine we'll be able to do the same with the ZX-81. Of course, we've had no experience here — time will tell".

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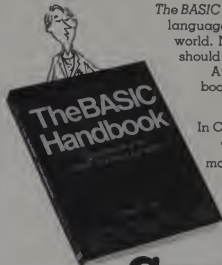
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ZX-81, continued...

W H Smith has decided that if the ZX-81 experiment works, it could well become a major part of the company's marketing policy in the 1980s. The company believes that its strength in the book and magazine markets places it in a good position to attract potential purchasers of the machine.

W H Smith is aiming to sell as many machines during the five months' retail agreement as Sinclair Research sell in one month by mail order — about 10,000 computers a month.

Bewildering Selection

W H Smith sees the back-to-school and Christmas trading periods as very important for ZX-81 sales. The company expects sales to grow slowly as people gradually became aware that it is selling the computer. Then, when Christmas gift-buying time arrives, W H Smith hopes people will automatically turn to their local branch as the source for the ZX-81.

About 300 W H Smith staff have been trained in the rudiments of the ZX-81. They have been shown how to plug in the machine, attach the 16K pack and the printer, and know the memory requirements of the five cassette software packs on sale. A number of magazines have been moved from the general magazine section to the Computer Know-How departments. These include *Your Computer*, and its sister publication *Practical Computing*.

A number of books — none of which has any particular relevance to the ZX-81 — are also on sale in the special computer areas. Some, such as *Illustrating Basic* and *Introduction to microprocessing* are likely to prove bewildering and worse than useless for first-time computer buyers.

If you are having problems with your mail-order ZX-81, do not try taking it into your nearest W H Smith claiming you bought it from there, and expecting to have it repaired. ZX-81s sold by W H Smith have a WH serial number. Staff have been told not to accept any ZX-81s without this serial number. □



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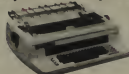
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Using Field Specifiers on the TRS-80

John Adams

The first "big" program that I wrote for my TRS-80 had to do with household budget and expenditures, and it came close to being my last. I had not done much programming and I was still working in Level I. The program slowly and painfully worked out to my satisfaction, except for the printouts. To give you an example of what I was getting RUN the following lines.

Listing 1.

```
1 REM * MONEY PRINTING
  ROUTINE
10 FOR X = 1 TO 5:READ P(X):NEXT
20 DATA 254.13,1041.19,42.90,6.00,.79
30 CLS:PRINT"SALES SLIP #",
  "AMOUNT"
40 FOR X = 18255 TO 18259:PRINT X,
  "$";P(X-18254):NEXT
```

All of the information is there, but that number column looks downright seedy. I spent a couple of days and almost went berserk trying to line up those miserable figures. Level II, however, offers us some solutions to this problem. It includes a group of "field specifiers" which take a lot of the misery out of generating reports.

As applied to computers, the word "field" has several meanings. If we are creating reports, "field" means an area into which a specific category of data is to be printed. Look at Table 1.

This report has five fields; for the month, one for food, one for rent, one for

SALES SLIP #	AMOUNT
18255	\$ 254.13
18256	\$ 1041.19
18257	\$ 42.9
18258	\$ 6
18259	\$.79

Printout of Listing 1.

utilities and one for the total. The specifiers under discussion allow us to design a pattern or "format" for each of these fields. These formats are stored in memory locations and are called into use by the PRINT USING instruction. An example follows:

```
10 AS="####":B=456
20 PRINT USING AS;B
```

Line 10 sets up the format in AS and loads a value into B. All formats are loaded into string locations. Line 20 is actually a routine which takes the value stored in B and prints it out in accordance with the specified pattern. A semicolon is used to separate the format string name from the data which follows. Notice that the format loaded into AS is enclosed in quotes. Such patterns may also be loaded by the READ-DATA method (10 READ AS:DATA ###) in which case the quotes are not needed. Formats are composed of various symbols found on the keyboard.

Since much formatting is done with numbers we should perhaps start there.

The number or pound sign (#) is used in the format to specify the number of digit spaces needed in the field. Look back at line 10 and you will see that "####" was put into AS. This sets the field length at three. To get a look at what this does, enter and RUN the following lines.

```
10 AS="####"
20 FOR X = 1 TO 5:READ
  P(X):NEXT
30 DATA 123,4567.8,-90.7,5
40 FOR X = 1 TO 5:PRINT-
  TAB(20)P(X);TAB(40)USING
  AS;P(X):NEXT
```

The left-hand column is printed without the format, the right with the format. Several differences are immediately apparent. On the left all numbers are lined up from the leftmost digit. Actually the positive numbers all begin at tab 21 as a space is left for the "+" sign which is not needed. On the right the numbers (with the exception of the second) are lined up from the rightmost digit. Unless there is some reason not to, this is the way tables of numbers are usually printed.

So why is the second number not lined up properly? And where did the percent sign come from? It is an indication that the field size is too small. Line 10 specified three spaces but the number has four digits. The percent sign tells you so, then goes ahead and prints the entire number anyway. It is out of line because the field cannot contain it. It is therefore prudent to include enough number signs in your format to hold the largest number that you will be using. As we go along you will see that adding other symbols to the format increases the field size. Change line 10 to read AS="#####". The percent sign, and the lineup problem, disappear.

Table 1. Breakdown of Expenses.

MONTH	FOOD	RENT	UTILITIES	TOTAL
JANUARY	\$221.50	\$425.00	\$145.89	\$792.39
FEBRUARY	\$199.58	\$425.00	\$155.35	\$779.93
MARCH	\$240.04	\$425.00	\$139.20	\$804.24

There is also a difference in the last item, which was changed from 7.5 to 8. The format used did not specify that decimals were wanted, so none were furnished, and the 7.5 was rounded up to 8. Regular 5/4 rounding was used here; 7.4 would round down to 7 and 7.5 up to 8. This feature can be used to advantage. When working with decimal numbers we can use a format to round to whole numbers (or any number of decimal places) and this can eliminate one program line.

Decimals may be requested by inserting a period in the format, and its position will indicate the number of places to be returned. Change line 10 to read `AS="####.#"`. The 7.5 is now printed properly, and a bonus is picked up in the "trailing" zeroes following the numbers. More about that in a minute. Changing line 10 to read `AS="####.###"` will cause the numbers to be printed with two decimal places. You can, by adding number signs to the right of the decimal, get up to 16 decimal places. Be careful with precision, however, as decimal digits may be incorrect after the sixth place unless you have declared double precision. If you are unsure about precision see "Variable Types" on page 1/3 and DEFINT, DEFSNG and DEFDBL in Chapter 4 of your manual.

The bonus that was mentioned has to do with printing money figures. The TRS-80 has a built-in function to suppress trailing zeroes. Enter `PRINT 5.0000` and the monitor will return 5. Since the two numbers represent equal amounts the zeroes are not needed. Entering `PRINT 5.0001`, on the other hand, will return 5.0001. The zeroes are now "significant" as the two numbers are different amounts. In the original money-printing routine, the third and fourth items of data were 42.90 and 6.00 and if you recall these were printed as \$ 42.9 and \$6. Using a format will guarantee that money columns will have two, and only two, decimal places.

We might also want dollar signs in our money columns. Adding two dollar signs (\$\$) to the beginning of the format will act as a floating dollar sign which will print immediately to the left of the first digit.

The comma is useful in printing large numbers. It is easier to read 12,345,678.90 than 12345678.90, as we are accustomed to seeing large numbers divided into periods of three. Inserting a comma any place after

```
1 REM * REVISED MONEY PRINTING ROUTINE
5 AS="$$.###.###"
10 FOR X=1 TO 5:READ P(X):NEXT
20 DATA 254.13,1041.19,42.90,6.00,.79
30 CLS:PRINT"SALES SLIP #", " AMOUNT"
40 FOR X=18255 TO 18259:PRINT X,USING AS;(P(X)-18254):NEXT
```

Listing 2.

the first number sign and before the decimal will do this for us. Only one comma is needed; the computer will then put commas in front of each group of three digits.

Using these four symbols (number sign, period, dollar sign and comma) we can polish up that first routine. The revised version is shown in Listing 2.

Note the differences from the original version in lines 5, 30 and 40. The addition of the four spaces before the word AMOUNT in line 30 is to adjust the column heading. There is a better way to do this which will be discussed later.

If the computer is used to print checks or other numbers that could be altered, using a pair of asterisks in the format will fill in any unused spaces in the field with stars. The following lines illustrate:

```
10 AS="#####.###";B$="
   "#####.###";A=1234
20 PRINT USING AS;A
30 PRINT USING B$;A
```

The asterisks and the dollar sign can be used in conjunction. Change line 10 so that B\$ reads "***\$###.###". For this format only one dollar sign is used (**\$). You should be aware that adding asterisks, dollar signs, periods, etc., increase the field size. There are now eleven characters in the B\$ format, so that field could contain a dollar sign, eight digits and two commas. Again, be careful with precision.

Just as the TRS-80 suppresses trailing zeroes, it also omits the "+" sign in front of positive numbers. Should you need such signs they can be incorporated into the format. An example is shown in Listing 3. RUN this and notice that the leading signs are positive and negative as the occasion demands. Putting the plus or minus sign at the end of the format will cause them to be printed as trailing signs. See page A/7 of the manual.

The last of the number formatting signs

is the "up" arrow, normally used for indicating exponentiation. Including four such arrows at the end of the format will cause printout in exponential or "scientific" notation. Such notation is used with very large or very small numbers and expresses them more compactly as small groups of significant numbers times powers of ten. If you have need for such numbers you probably know what they are and how they work. For more information consult any math reference book.

Up to this point we have been dealing with formatting numbers, but there are two symbols that can assist in formatting strings. Remember that strings can contain any mixture of letters, numbers and symbols. The first of these signs is the exclamation point and it is used to excerpt the first character of any given string. RUNNING the following will return the letter A.

```
10 AS="ABCDE"
20 PRINT USING "1";AS
```

Just such a format will be used frequently it can be stored in a variable location and called when needed as in the following.

```
10 AS="ABCDE";Z$="1"
20 PRINT USING Z$;AS
```

Two or more exclamation points may be used in combination and spaces can be included before, in between and following the points to establish the string field. RUN the following example.

```
10 AS="ABCDE";B$="
   "12345";Z$=" ! ! "
20 PRINT USING Z$;AS,B$
```

This creates a string field in Z\$ which contains two spaces, the first letter of the first listed string, two more spaces, the first letter of the second listed string, and then two more spaces. The printout therefore reads space-space-A-space-space-1-space-space. This is handy for creating acronyms from titles, such as CBS from Columbia Broadcasting System.

The second of the symbols is the percent sign (%). Using a pair of these will establish a string field size of 2 plus the number of spaces included in between the signs. This allows us to lift any number of characters from a given string, starting from the first character. Try the lines in Listing 4.

Listing 3.

```
10 AS="+###.##"
20 CLS:PRINT"TEMPERATURE DEVIATION FOR MAY 1 TO MAY
   10":PRINT
30 PRINT"DATE", "AVERAGE", "TEMPERATURE", "DEVIATION"
40 FOR X=1 TO 10:B(X)=RND(10)+80:C=C+B(X):NEXT:D=C/10
50 FOR X=1 TO 10:PRINT" MAY",X,D,B(X),
60 PRINT USING AS;B(X)-D:NEXT
```

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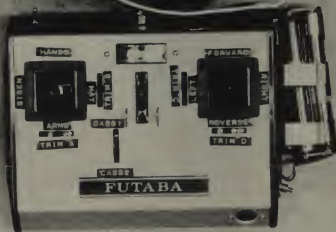
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Norton



Norton's radio control unit, concealed in a shoulder bag, directs his movements.



Norton the robot.



If you have ever attended a computer show, you have undoubtedly met one of the cheeky little mechanical fellows who ply the aisles attracting attention for their renters products.

"Obviously," you have said to yourself, "it can't be a 'real' robot. But how does it work?"

Here is a closer look that should answer the question.—EBS

Norton is a radio-controlled robot operated by Laser Systems Development Corporation of Colorado Springs, as a promotional gimmick for their laser and light shows.

Powered by a motorcycle battery, the robot rolls with motorized wheels, moves his arms and claws, flashes lights in his opaque dome, raises and lowers his hat mounted on an antenna, and plays music through a cassette deck.

Norton is remotely controlled with a modified model airplane control box, which is concealed in a leather shoulder bag.

Peter Shriner, 5262 Reed St., Arvada, CO 80002.

← **CIRCLE 186 ON READER SERVICE CARD**

the Robot



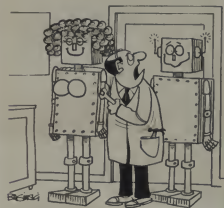
Unnoticed by curious spectators, Jim Wiley (left) and Ron Webster (right) maneuver Norton.

The operator(s) also make him speak with a radio microphone.

Norton has an effective operating range of 30 feet, enabling the operator to control him in a crowd without being noticed. An operator can make the robot approach any individual in a crowd and carry on a conversation, much to the amazement of spectators. □

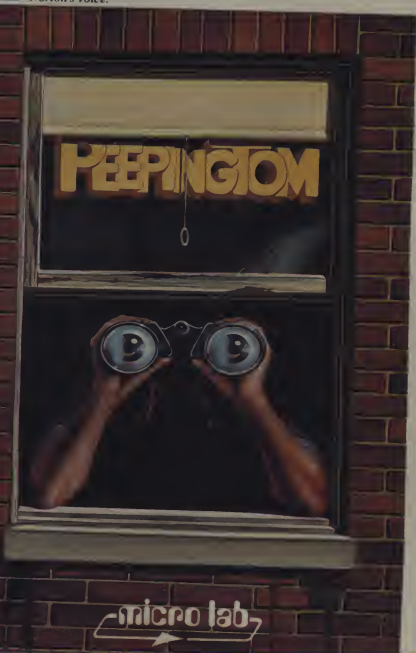


A tiny radio microphone hidden in the operator's palm is Norton's voice.



"I am hurrying!"

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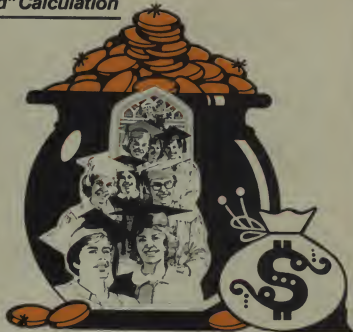
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CIRCLE 217 ON READER SERVICE CARD

Financial Aid



John B. Fisher

As a college financial aid officer, I am frequently asked by students and their parents about eligibility for student aid. Often, parents will tell me their income and ask if their child is eligible. I must then explain that the answer depends on many factors in addition to income and that the calculation is too complex to carry out on the spot.

The best way to find out if one is eligible is simply to apply, using all the forms required at a particular college, and wait for an official answer. The problem is that this wait is usually at least two months. At a time when a student may need to make college decisions quickly, it would be helpful to get some idea of student aid eligibility right away.

What You Can Learn

The program presented here will tell a student a good deal, although not everything, about eligibility for student financial aid during the 1982-83 academic year.

Specifically, it will calculate the amount the family will be expected to contribute to the student's education, according to the "uniform methodology," the most widely used measure of ability to pay for college.

Most financial aid is limited by need, which is defined as the cost of education minus the expected family contribution. Since most colleges calculate family contribution with a formula identical or very similar to the one in this program, the figure the program provides should be a good approximation of what any college will expect.

The cost of education, however, varies widely from college to college. The figure

includes tuition, fees, dorm charges for resident students and an estimate of the amount required for books, transportation and personal expenses. The amount can be as little as under \$1,000 per year at a two-year community college to well over \$10,000 per year at a four-year independent college.

The best way to find out the cost of education is to contact the financial aid office at the college in which the student is interested.

Subtracting the family contribution calculated by this program from the cost of education at a particular college will indicate the student's "need" at that college. Most grants, National Direct Student Loans (loans made directly by the college) and jobs in the Federal College Work-Study Program are limited by the amount of need.

A student's financial aid cannot exceed this demonstrated need. There is no guarantee that a college will always be able to meet 100% of this need, but students who do demonstrate need are likely to get at least some help.

Knowing the amount of need is also useful for another purpose. In the past, all students could get federally subsidized Guaranteed Student Loans (the student loans obtained from banks) regardless of need. At the present time, however, students whose families have incomes of \$30,000 or more can get these loans only if they have demonstrated need.

There have been proposals to limit loans

to the amount of demonstrated need no matter what family income is, and this may well be in effect by September, 1982. Knowing one's "need" is, therefore, an important piece of information for anyone who may be interested in a Guaranteed Student Loan next year.

This program, by the way, will not tell a student anything about eligibility for Pell Grants, the federal program which makes awards directly to students. Eligibility for Pell Grants is determined by a different formula established by the Department of Education. At press time, the formula for the 1982-83 school year had not been determined.

Program Notes

The structure of this Applesoft Basic program is contained in the control section. Program flow consists of successive calls to major subroutines. Table 1 outlines the function of each routine. The calculation of family contribution requires reference to several tables. They are included here as DOS textfiles (Table 2) but they could just as well be DATA within the program.

Looking over the program (Listing 1) one will notice that text and slots in the input matrix are provided for questions not used by the program. I have done this to allow for easy expansion of the program to determine Pell Grant eligibility, once that formula is published by the U.S. Department of Education.

After entering the program and getting it to run, it is important to make sure that all numerical data and calculations are correct. In addition to careful proofreading, I have provided three sample dependent student cases (Table 3) and two sample independent student cases (Table 4) to test against. □

John B. Fisher, Director of Financial Aid, Bloomfield College, Bloomfield, NJ 07003.

Lines	Function
10 — 500	Program Set-Up
4000 — 4999	Strings for input questions
5000 — 5999	Control Section
6000 — 6999	Set-up for new student
7000 — 19999	Input
20000 — 24999	Calculation for dependent student
25000 — 29999	Calculation for independent student
30000 — 39999	Report
40000 — 49999	Miscellaneous Subroutines
50000	END

Table 1.

Table 3.

Input	Case 1	Case 2	Case 3
State	NJ	CA	MS
Parent Age	50	60	48
Marital Status	M	S	M
College Year	1	3	1
Family Size	4	3	5
Number in College	1	2	3
Adjusted Gross	\$20,000	\$15,000	\$30,000
US Tax	2,000	1,200	4,500
Father's Income	12,000	0	30,000
Mother's Income	8,000	12,000	0
Social Security	0	4,000	0
AFDC	0	0	0
Other Income	0	0	0
Medical/Dental	500	1,000	800
Student Assets	300	0	0
Cash and Savings	2,000	200	1,000
Home Value	50,000	0	70,000
Mortgage	35,000	0	40,000
Investments	0	10,000	0
Debt on Investment	0	0	0
Business Value	0	0	100,000
Business Debt	0	0	60,000
Social Security/Month	0	100	0
Number of Months	0	9	0
V.A. Benefits	0	0	40
Number of Months	0	0	12
Other Income	0	0	500

Results**Parent Contribution**

From Income	514	570	983
From Assets	-168	-90	4
Total Parent Contribution	347	480	988

Student Contribution

Summer Savings	700	900	700
Social Security	0	900	0
V.A. Benefits	0	0	480
Other Benefits	0	0	500
From Assets	104	0	0
Total Student Contribution	804	1,800	1,680

Total Family Contribution	\$1,151	\$2,280	\$2,668
---------------------------	---------	---------	---------

Table 2.

AK 57.2	6,574	5760	8	8
9	5970	7500	8310	8
7	10730	9540	8390	7160
8	12650	11470	10280	3090
9	14810	13620	12430	11240
9	C(26,2)			
7	24600	13600		
8	25300	20200		
4	26000	20700		
8	26700	21200		
12	27400	21600		
10	28100	22200		
9	28900	22700		
4	29700	23000		
11	30700	23300		
7	31500	24500		
6	32600	25100		
8	33500	25700		
4	34700	26600		
10	35800	27200		
9	37000	28100		
7	38300	28600		
8	39600	29700		
5	41200	30400		
5	42500	31300		
13	44200	32200		
12	45600	33300		
10	47400	34300		
10	49200	35300		
10	51100	36400		
12	53400	37700		
7	55400	38600		
8	D(15,2)			
9	1600	1300		
8	3300	2600		
9	4900	4000		
8	6600	5300		
10	8200	6600		
15	9600	7900		
6	11500	9200		
7	13100	10600		
10	14800	11900		
7	16400	13200		
9	18000	14500		
4	19700	15800		
1	21300	17200		
7	23000	18500		
5	24600	19800		
4	E(6,2)			
4	5120	5260		
3	6870	9560		
9	9060	11840		
4	10620	14620		
1	13740	17250		
7	16230	20180		
13	F(30,2)			
5	2100	294.16		
	4200	630.18		
	8500	1404.21		
	12600	2265.24		
	16800	3273.28		
	21200	4559.32		
	25500	6201.37		
	31800	8162.43		
	42400	12720.49		
	56600	19679.54		
	7100	234.15		
	4200	730.18		
	6400	1026.22		
	9500	1708.24		
	12700	2476.26		
	15900	3308.31		
	21200	4351.36		
	26500	6059.42		
	31000	9005.46		
	42400	13961.54		
	1100	154.16		
	2100	314.18		
	4200	632.19		
	6200	1072.21		
	8500	1555.24		
	10600	2059.26		
	12700	2605.3		
	15900	3365.34		
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	EXCEL 12 CRT Terminal	\$185	\$185	\$185
	EXCEL 12 CRT Terminal	\$185	\$185	\$185
TIMEPLEX	EXCEL 12 CRT Terminal	\$185	\$185	\$185
	EXCEL 12 CRT Terminal	\$185	\$185	\$185
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	EXCEL 12 CRT Terminal	\$185	\$185	\$185
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CIRCLE 181 ON READER SERVICE CARD

Graphics

are no
mystery
when
you
hold...



...The Winning Card

Computer Station™
presents

Station Master™
for the Apple II® or Apple II Plus®

Computer Station has long been known for its graphic developments for the Apple Computer. The Dithertizer II™ is a video digitizer board which loads the hi-res screen with a video camera. Combined Enhanced Graphics Software (CEGS) dumps the contents of the hi-res screen onto paper for a large variety of printers by means of low-cost software package.

We now introduce the Station Master™. The Station Master is a universal parallel card with the added capability of being able to put the hi-res screen on paper with simple keyboard commands. The Station Master may be used with ANY one of FOUR different printer types. (See model selection below.)

As with our CEGS, there are options for dumping page one or page two normal or expanded size, picture or plot, and horizontal positioning.

The Station Master card is supplied with printer cable so you just plug in and go. We also include a diskette with practice pictures and plots as well as drivers for use with Visplot™.

The Station Master offers compatibility with BASIC, Pascal 1.1, CP/M and application software. The documentation includes helpful information for first-time users about hi-res graphics and how to use the board with programs such as Appewriter™, Apple Plot™, Visical™ and Visplot™.

The Station Master including cable **\$175.00**

Model #7017 accommodates ANY of the printers listed below

- Epson MX-80 with graphics option
- Epson MX-100
- Anadex 9501/9500
- Data South DS 180
- Centronics 739
- NEC PC8023

Computer Station



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St. Louis, Missouri 63141
(314) 432-7019



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CIRCLE 122 ON READER SERVICE CARD

Table 4.

Input	Case 1	Case 2
State	ME	WA
Student Age	25	35
Marital Status	S	S
Family Size	1	2
College Year	1	1
Cash and Savings	\$2,000	\$5,000
Home Value	0	45,000
Mortgage	0	30,000
Investment	0	0
Debt on Investment	0	0
Business Value	0	0
Business Debt	0	0
Summer Earnings	3,000	3,000
1982-83 Earnings	5,000	9,000
Social Security/Month	200	0
Number of Months	12	0
V.A. Benefits	0	150
Number of Months	0	9
Other Income	0	

Parent Contribution

From Income	0	0
From Assets	0	0
Total Parent Contribution	0	0

From Earnings	8,769	11,293
Social Security	2,406	0
V.A. Benefits	0	1,350
Other Benefits	0	0
From Assets	2,000	3,606
Total Student Contribution	13,169	16,243

Total Family Contribution	\$13,169	\$16,243
---------------------------	----------	----------

Listung 1.

[illegible]

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At SS1, we apply state-of-the-art gaming techniques to the design of our simulations in the past. As proof, we offer just one of our games for the Apple® computer*, **PURSUIT OF THE GRAF SPEE** and **THE ROAD TO GETTYSBURG**.

PURSUIT OF THE GRAF SPEE™

transports you back to the South Atlantic of 1939 so you can command the deadly German pocket battleship to sink enemy merchant vessels while eluding British and French warships. Or you can direct the Allied fleet to locate and destroy the scourge of your shipping lanes.

If you're familiar with **Computer Bismarck** — which has become something of a phenomenon in gaming circles — you owe it to yourself to try this game. Like its older brother, **PURSUIT OF THE GRAF SPEE** has all the thrill of the chase, heightened by the complexity and richness of detail such as complete ship ratings for speed and strength, fuel restrictions, refueling capabilities, and realistic rules governing sighting and visibility.

However, we've also added a remarkable tactical combat system that accounts for gunfire accuracy, torpedoes and smoke screens. When it comes to calculating ship damage and battle results, you simply leave all the work to the computer, which does everything instantly and unerringly.

And **THE ROAD TO GETTYSBURG** gives you even more to think about. Using miniature figures, the simulation takes you back to the strategic game you played for hours in the strategic game.

THE ROAD TO GETTYSBURG simulates two scenarios, all played on a 19-by-19 square-grid map of the South Atlantic displayed in colorful Hi-Res graphics. The first recounts the entire 25-day historic chase, where shadowing, pursuit and elusive maneuvers are your primary concerns. The second simulates the Battle of the River Plate, where the Graf Spee — already located — must deal with three British ships.

Finally, the solitaire scenario lets you match wits against the computer as it directs the Graf Spee. We wish you luck.

THE ROAD TO GETTYSBURG™ takes you even further back in time, to that fateful battle of 1863. This board-assisted computer simulation is designed to let you experience the actual feel of a Civil War command. Like a real Union or Confederate general, you must deal with the slow and frustrating dispatch system — your only means of communication with your troops. Knowledge of troop positions and estimates of enemy strength are only as good as your reconnaissance patrols.

The computer plays the individual corps commanders who implement your orders.

And in **THE ROAD TO GETTYSBURG**, leadership decisions may be misinterpreted or even disobey your directives.

Before you move a corps, you must consider the effects of weather, terrain, corps morale, fatigue, and even straggling on your troops.

THE ROAD TO GETTYSBURG simulates the entire week-long campaign. Depending on your strategies, the town of Gettysburg may not be involved at all.

For those who want to dispense with long-range planning, we've provided a scenario that just simulates the three-day Battle of Gettysburg. There is also a solitaire scenario so you can play anytime against a tough computer opponent.

Again, you can use miniatures to resolve all battles if you so desire.

This game is made for all you avid strategists out there. After you're done playing it, you'll really know the pleasure and pain of being a Robert E. Lee!

If you're interested in what the future has in store for the past, visit your local computer/game store and get these SS1 games today. At \$59.95 each, they must surely be the best bargain in time travel!

To order with your VISA or MC, call toll free 800-227-1617, ext. 335 (800-772-3545, ext. 335 in California). To order by mail, send your check to Strategic Simulations Inc., 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. All our games carry a 14-day money back guarantee.

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CIRCLE 254 ON READER SERVICE CARD

MAGIC?



You Bet.

MAGIC WINDOW™ transforms your Apple Computer into a sophisticated word processor unlike any other.

Streamlined to meet all professional needs, it's easy to understand and operate. **MAGIC WINDOW** can be used by anyone in minutes.

Simulating a standard typewriter, everyone has immediate rapport with the system as no special training is required. All complexities of operation are eliminated by explicit instructions and a unique menu system that simplifies the powerful functions available.

MAGIC WINDOW solves the Apple's display problem without expensive hardware additions. Using your vid. screen as a "window" you view what you type from any position selected with a single keystroke. Centering, justifying and correcting can all be done on the screen before printing. Eliminating your problems with **MAGIC WINDOW** is the finest word processor designed for the Apple.

MAGIC WORDS™ uses the same positive features of **MAGIC WINDOW**—menu selection of options, simplicity of use, accuracy and speed.

Discovering errors after it is too late is not only embarrassing and unprofessional but costly. Don't you wish you could avoid mistakes altogether?

You can. With **MAGIC WORDS**, an entire page is proofread for spelling errors and typos in seconds. When found, you see the words in context on the screen or print out, and are given clues of how to handle each.

MAGIC WORDS main dictionary is more than ample with 14,000 words (twice as many as the average person). You can also add more words, specialized terms, or clients' names to the vocabulary of the "user" dictionary, editing them with **MAGIC WINDOW**.

If perfection is what you're striving for, let **MAGIC WORDS** correct documents composed on **MAGIC WINDOW** before printing.

MAGIC MAILER™ is a mailing list merge system intended to be used with **MAGIC WINDOW**.

With both systems you can print as many personalized letters, invoices, labels as you elect with minimal keystrokes.

Create your mailing list for **MAGIC MAILER** merge it with the documents filed in **MAGIC WINDOW** and instantaneously print customized documents with individual data inserted where you've specified it.

These three programs used together form the most complete and professional word processing system on the market today.

This system is so simple and straightforward to learn it is being used by universities to teach electronic word processing.

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CIRCLE 103 ON READER SERVICE CARD

Aid, continued...

```

5100 GOSUB 6000
5200 GOSUB 7000
5210 IF I(1) = 1 THEN GOSUB 20000
5215 IF I(1) = 0 THEN GOSUB 25000
5230 GOSUB 30000
5700 HOME
5705 UTAB 3
5710 PRINT "TO DETERMINE YOUR 'NEED', SUBTRACT"
5715
5720 PRINT "THIS TOTAL FAMILY CONTRIBUTION OF"
5725
5730 PRINT "H" FROM THE COST OF EDUCATION AT A"
5735
5740 PRINT "PARTICULAR SCHOOL."
5750
5760 IF H = 0 THEN 5800
5770 PRINT "CONTRIBUTIONS LESS THAN 0 ARE" PRINT
5780 PRINT "SOMETIMES USED FOR RAISING PURPOSES"; PRINT
5790 PRINT "BUT 'NEED' IS NEVER GREATER THAN"; PRINT
5795 PRINT "THE COST OF EDUCATION"; PRINT
5800 PRINT "PRESS 'N' FOR A NEW STUDENT"; PRINT
5810 INPUT "OR ANY OTHER KEY TO END"; Z$
5820 IF Z$ = "N" THEN 5000
5830 END
5840 REM SET UP FOR NEW STUDENT
5910 A$ =
5930 FOR N = 1 TO 30
6040 I(N) = 1
6050 NEXT N
6060 RESTORE
6070 C$ = 0
6080 T1 = 3: T2 = 75: T3 = 39
6090 RETURN
6100 REM INPUT
7100 HOME
7102
7104 PRINT
7110 PRINT "THIS PROGRAM WILL HELP YOU FIND OUT"
7120 PRINT "YOUR ELIGIBILITY FOR STUDENT FINANCIAL"
7130 PRINT "AID AS A COLLEGE STUDENT DURING THE"
7140 PRINT "1982-83 ACADEMIC YEAR"
7150
7160 PRINT "STUDENT AID IS LIMITED TO YOUR"
7170 PRINT "'NEED', THE DEFINITION OF 'NEED' IS"
7180 PRINT "THE COST OF EDUCATION MINUS THE AMOUNT"
7190 PRINT "YOUR FAMILY IS EXPECTED TO CONTRIBUTE"
7200
7210 PRINT "THIS PROGRAM WILL HELP YOU ESTIMATE"
7220 PRINT "YOUR EXPECTED FAMILY CONTRIBUTION."
7230 PRINT "THE COST OF EDUCATION DIFFERS WIDELY"
7240 PRINT "AND YOU WILL HAVE TO GET PARTICULAR"
7250 PRINT "AMOUNTS FROM INDIVIDUAL COLLEGES."
7260 PRINT "SUBTRACTING THE CONTRIBUTION ESTIMATED"
7270 PRINT "BY THIS PROGRAM WILL SHOW YOUR 'NEED'."
7280
7290 INPUT "PRESS (RETURN) TO CONTINUE "A$
7292 HOME
7300 PRINT "FIRST IT IS NECESSARY TO DETERMINE"
7310 PRINT "IF YOU WILL BE CONSIDERED DEPENDENT"
7320 PRINT "OR SELF-SUPPORTING. THREE QUESTIONS"
7330 PRINT "MUST BE CONSIDERED:"
7340 PRINT
7350 PRINT "1. DID (HILL) YOU LIVE WITH YOUR"
7360 PRINT "PARENTS IN 1981 OR 1982?"
7370 PRINT "2. DID (HILL) THEY CLAIM YOU AS A"
7380 PRINT "TAX EXEMPTION EITHER YEAR?"
7390 PRINT "3. DID (HILL) THEY GIVE YOU MORE THAN"
7400 PRINT "75% OF SUPPORT EITHER YEAR?"
7410 PRINT
7420 PRINT "IF THE ANSWER TO ANY PART OF THESE"
7430 PRINT "THREE QUESTIONS IS YES THEN YOU ARE"
7440 PRINT "CONSIDERED DEPENDENT. IF THE ANSWER"
7450 PRINT "TO ALL PARTS IS 'NO' THEN YOU ARE"
7460 PRINT "CONSIDERED 'SELF-SUPPORTING.'"
7470 PRINT
7480 PRINT "BASED ON THIS DESCRIPTION, ANSWER"
7490 PRINT "D' OR I' BELOW:"
7510 GOSUB 40045
7512 GOTO 7530
7530 GOSUB 40060
7550 IF I$ = "I" THEN I(1) = 0
7562 IF I$ = "I" THEN GOSUB 40300
7564 IF I$ = "I" THEN GOSUB 40350
7566 IF I$ = "D" OR I$ = "I" THEN 7600
7570 GOSUB 40030
7580 PRINT "PLEASE ANSWER 'D' OR 'I'"
7590 GOTO 7530
7600 GOSUB 40040
7620 GOSUB 40045
7625 REM
7630 GOSUB 40060

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7640 IF I$ = "D" THEN 8500
7650 GOSUB 40070: INVERSE: PRINT I$,
7660 NORMAL: PRINT "IS NOT LISTED. TRY AGAIN"
7670 GOSUB 40060
7680 GOTO 7525
7690 IF I(3) = 0 THEN READ 0$
7700 IF I(3) = 0 THEN 5000
7710 GOSUB 40040
7720 N = 3
7730 GOSUB 40200
7740 IF I(4) = 0 THEN READ 0$
7750 IF I(4) = 0 THEN 9500
7760 GOSUB 40040
7770 N = 4
7780 GOSUB 40200
7790 IF I(5) = 0 THEN READ 0$
7800 IF I(5) = 0 THEN 10000
7810 HOME
7820 GOSUB 40700
7830 GOSUB 40045
7840 IF I$ = "S" THEN I(5) = 0
7850 IF I$ = "S" THEN I(5) = 0
7860 IF I$ = "H" OR I$ = "S" THEN 10000
7870 GOSUB 40030
7880 PRINT "PLEASE ANSWER 'H' OR 'S'"
7890 GOSUB 40060
7900 GOTO 9540
10000 IF I(6) = 0 THEN READ 0$
10010 IF I(6) = 0 THEN 10000
10020 HOME
10030 GOSUB 40700
10040 GOSUB 40045
10050 IF I$ = "S" THEN I(6) = 0
10060 IF I(6) = 0 THEN I(31) = 0
10070 IF I(6) = 0 THEN I(32) = 0
10080 IF I(6) = 0 AND I(1) = 0 THEN I(14) = 0
10090 IF I$ = "S" OR I$ = "H" THEN 10000
10100 GOSUB 40030
10110 PRINT "PLEASE ANSWER 'H' OR 'S'"
10120 GOSUB 40060
10130 GOTO 10030
10140 FOR N = 7 TO 37
10150 HOME
10160 IF I(N) = 0 THEN READ 0$
10170 IF I(N) = 0 THEN 10000
10180 GOSUB 40100
10190 IF N = 7 THEN GOSUB 41000
10200 IF N = 8 THEN GOSUB 41100
10210 IF N = 10 THEN GOSUB 41200
10220 IF N = 11 THEN GOSUB 41300
10230 IF N = 15 THEN GOSUB 41400
10240 IF N = 22 THEN GOSUB 41500
10250 IF N = 33 THEN GOSUB 41600
10260 IF N = 9 THEN GOSUB 41800
10270 IF N = 23 OR N = 31 THEN GOSUB 41900
10280 IF N = 30 OR N = 32 THEN GOSUB 41950
10290 IF N = 13 THEN GOSUB 42000
10300 IF N = 14 THEN GOSUB 42000
10310 GOSUB 40045
10320 GOSUB 40200
10330 IF I(23) = 0 THEN I(24) = 0
10340 IF I(25) = 0 THEN I(26) = 0
10350 IF I(27) = 0 THEN I(28) = 0
10360 IF I(33) = 0 THEN I(34) = 0
10370 IF I(35) = 0 THEN I(36) = 0
10380 NEXT N
10390 HOME
10400 UTAB 11: HTAB 12
10410 FLASH: PRINT "CALCULATING"
10420 FOR N = 1 TO 39
10430 IF I(N) = 0 THEN I(N) = 0
10440 I(N) = INT(I(N))
10450 NEXT N
10460 IF I(6) = 1 THEN I(8) = 1
10470 RETURN
20000 REM DEPENDENT PC
20010 A1 = I(10) + I(15) + I(16) + I(17)
20020 A2 = I(13) + 0.065
20030 IF A2 > 1975 THEN A2 = 1975
20040 A3 = I(14) + 0.065
20050 IF A3 > 1975 THEN A3 = 1975
20060 A3 = A3 + A2
20070 IF I(1) = 0 THEN RETURN
20080 A4 = A1/2.1
20090 IF A1 > 15000 THEN A4 = A4 - 1
20100 A4 = (A4 + .01) * A1
20110 A5 = I(18) - A1 * .63
20120 IF A5 > 0 THEN A5 = 0
20130 IF I(13) > I(14) THEN A6 = I(13)
20140 IF I(14) > I(13) THEN A6 = I(14)
20150 A6 = A6 + .3
20160 IF A6 > 1800 THEN A6 = 1800

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20150 IF I(5) = 0 THEN 20190
20160 IF I(13) = 1(13) THEN A6 = I(13)
20170 IF I(14) = 1(13) THEN A6 = I(14)
20175 A6 = A6 + 3
20180 IF A6 > 1600 THEN A6 = 1600
20190 A7 = I(8) * A6 = I(9)
20200 IF A7 = 6 THEN A7 = 6
20210 IF A7 = 2 THEN A7 = 2
20220 IF A7 = 1 THEN A7 = 1
20230 IF A7 = 4 THEN A7 = 4
20240 A9 = B * A7 = 1 * A8
20242 IF I(1) = 1(1) THEN A9 = A9 + ((I(8) - A7) * 1670)
20250 B1 = 1(11) * A3 + A4 + A5 + A6 + A8
20260 B2 = A1 - B1
20265 B5 = I(27) * 1(28)
20270 B4 = 130000 * (B5 - 250000)
20275 IF B5 = 250000 THEN B4 = 70000 + ((B5 - 150000) * .6)
20280 IF B5 = 150001 THEN B4 = 20000 + ((B5 - 50000) * .5)
20290 IF B5 = 50001 THEN B4 = E5 * .5
20300 IF B5 = 1 THEN B4 = 0
20310 B6 = 1(13) * 1(23) - 1(24) + 1(25) - 1(26) + B4
20315 B7 = 1(7)
20320 IF I(3) = 40 THEN B7 = 40
20330 IF I(3) = 65 THEN B7 = 65
20340 B9 = C * B7 - 39(2) - 1(5)
20350 B9 = B6 - B9
20360 C1 = 0
20370 IF B2 = 12500 THEN C1 = ((12500 - B2) * 12500) * .06
20380 IF B2 = 0 THEN C1 = .06
20390 IF B9 = 0 THEN C1 = .12
20400 C2 = B9 - C1
20410 C3 = B2 - C2
20420 C4 = 74(2) * (C3 - 12600) * .47
20430 IF C3 = 12600 THEN C4 = 2772 + ((C3 - 11000) * .4)
20440 IF C3 = 11001 THEN C4 = 2220 + ((C3 - 9400) * .34)
20450 IF C3 = 9401 THEN C4 = 1364 + ((C3 - 6200) * .25)
20460 IF C3 = 6201 THEN C4 = C3 - .22
20470 IF C3 = 3405 THEN C4 = -.750
20480 IF C4 = 1 THEN RETURN
20490 C5 = 1 * A2 = C4
20500 C3 = B2(7) - 1
20510 GOSUB 20420
20520 C8 = 1 * A3 = C4

```

```

20530 C9 = C5 - C6
20540 D1 = 700
20550 IF I(7) > 1 THEN D1 = 900
20560 RETURN
20570 REM IND CALC
20580 A1 = I(29) + I(30) + I(31) + I(32) + I(33) + I(34)
+ I(35) + I(36) + I(37)
20590 F1 = 2300 * IF I(6) = 1 THEN F1 = 3400
20600 F2 = I(129) * I(30) + I(31) + I(32) - (F1 *
+ I(8) * 1000)
20610 IF F2 < 0 THEN F2 = 0
20620 I(11) = F2 * .14 * F3 = 1
20630 IF I(6) = 0 AND I(8) = 1 THEN F3 = 11
20640 IF I(6) = 0 AND I(8) < 1 THEN F3 = 21
20650 FOR N = F3 TO F3 + 9
20660 IF F2 > (F(11) * N) THEN I(11) = INT(F(11) * N) + ((F2 -
+ F(11) * N) * (F(11) * N) - INT(F(11) * N))
20670 NEXT N
20680 I(11) = INT(I(11))
20690 I(13) = I(29) + I(30) + I(31) + I(32)
20700 GOSUB 20620
20710 A4 = A4 + A1
20720 A4 = A4 * .01
20730 A4 = A4 + A1
20740 B4 = A4 + C1
20750 B5 = I(22) + I(23) - 1(24) + 1(25) - 1(26)
+ I(27) - 1(28)
20760 F4 = I(4)
20770 IF I(4) > 26 THEN F4 = 26
20780 IF I(4) > 40 THEN F4 = 40
20790 B9 = D(4) - 25(1)
20800 IF I(9) > 2 THEN B9 = D(4) - 25(1)
20810 IF I(4) > 26 THEN B9 = 0
20820 I(21) = B6 - B9
20830 IF I(21) < 0 AND I(21) = 0
20840 RETURN
20850 REM REPORT
20860 HOME
20870 NORMAL
20880 PRINT
20890 PRINT "PARENT CONTRIBUTION:"
20900 PRINT
20910 HTAB T1: PRINT "FROM INCOME:"
20920 H = INT(C8) : IF I(1) = 0 THEN H = 0: GOSUB 40900
20930 HTAB T2: PRINT H
20940 PRINT
20950 HTAB T1: PRINT "FROM ASSETS:"
20960 H = INT(C9) : IF I(1) = 0 THEN H = 0: GOSUB 40900
20970 HTAB T2: PRINT H
20980 PRINT
20990 HTAB T1: PRINT "TOTAL PARENT CONTRIBUTION:"
21000 H = INT(C5) : IF I(1) = 0 THEN H = 0: GOSUB 40950
21010 INVERSE : HTAB T3: PRINT H: NORMAL
21020 PRINT
21030 PRINT "STUDENT CONTRIBUTION:"
21040 PRINT
21050 IF I(1) = 0 THEN GOSUB 41700
21060 IF I(1) = 0 THEN 30210
21070 HTAB T1: PRINT "SUMMER SAVINGS:"
21080 H = INT(D1) : GOSUB 40900
21090 HTAB T2: PRINT H
21100 D2 = H
21110 PRINT
21120 HTAB T1: PRINT "SOCIAL SECURITY:"
21130 H = INT(I(33) * I(34)) : GOSUB 40900
21140 HTAB T2: PRINT H: D2 = H
21150 PRINT
21160 HTAB T1: PRINT "VA BENEFITS:"
21170 H = INT(I(35) * I(36)) : GOSUB 40900
21180 HTAB T2: PRINT H
21190 D2 = D2 + H
21200 PRINT
21210 HTAB T1: PRINT "OTHER BENEFITS:"
21220 H = INT(I(37)) : GOSUB 40900
21230 HTAB T2: PRINT H
21240 D2 = D2 + H
21250 PRINT
21260 HTAB T1: PRINT "FROM ASSETS:"
21270 H = INT(I(21) * .75) : IF I(1) = 0 THEN H =
+ I(21) : GOSUB 40900
21280 HTAB T2: PRINT H: D2 = D2 + H
21290 PRINT : HTAB T1: PRINT "TOTAL STUDENT CONTRIBUTION:"
21300 H = D2 : GOSUB 40950
21310 INVERSE : HTAB T3: PRINT H: NORMAL
21320 PRINT
21330 PRINT "TOTAL FAMILY CONTRIBUTION:"
21340 H = INT(C5 + D2) : GOSUB 40950
21350 INVERSE : HTAB T3: PRINT H: NORMAL
21360 GET A$

```

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CIRCLE 142 ON READER SERVICE CARD



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Aid, continued...

```

34999 RETURN
35000 REH IND REPORT
35010 PRINT INDRPT OR T
35020 RETURN
40000 REM SUBROUTINES
40010 UTAB 22: HTAB 1
40015 RETURN
40020 UTAB 22: HTAB 30
40025 RETURN
40030 UTAB 23: HTAB 1
40035 RETURN
40040 HOME
40045 READ 08:08 = AF + 08
40050 GOSUB 40010: PRINT G4
40060 GOSUB 40020: PRINT "
40070 GOSUB 40020
40080 INPUT "":J1$
40090 RETURN
40100 AF = "
40110 IF I(1) = 0 AND N = 13 THEN AF = "STUDENT'S "
40120 IF I(1) = 0 AND N = 14 THEN AF = "SPOUSE'S "
40130 IF I(1) = 1 AND N = 13 THEN AF = "FATHER'S "
40140 IF I(1) = 1 AND N = 14 THEN AF = "MOTHER'S "
40150 RETURN
40200 IF LEN (I$) = 0 THEN I(N) = 0
40210 IF LEN (I$) = 0 THEN 40350
40220 H$ = "
40225 G4 = "
40226 H$ = ""
40230 FOR H = 1 TO LEN (I$)
40240 G4 = MID$(I$,H,1)
40250 Z$ = ASC (G4)
40260 IF NOT (<29 > 47 AND Z$ < 50) OR Z$ = 46) THEN 40280
40270 H$ = H$ + G4
40280 NEXT H
40310 I$ = "
40320 I$ = H$
40340 I(N) = VAL (I$)
40350 RETURN
40400 HOME
40410 UTAB 5
40420 PRINT "PROVIDE THE TWO LETTER ABBREVIATION"
40430 PRINT "FOR THE STATE IN WHICH YOU LIVE."
40440 PRINT
40450 PRINT "OFFICIAL ABBREVIATIONS ARE AS FOLLOWS:"
40460 PRINT
40470 FOR N = 1 TO 113 STEP 2
40480 PRINT MID$(S$,N,2)
40490 PRINT " "
40500 IF N = 21 OR N = 43 OR N = 65 OR N = 87
OR N = 109 THEN PRINT " "
40510 NEXT N
40520 RETURN
40530 IF LEN (I$) = 0 THEN I$ = "RETURN"
40540 P = 1
40550 FOR N = 1 TO 113 STEP 2
40560 G4 = MID$(S$,N,2)
40570 IF I$ = G4 THEN I(2) = P
40580 IF I$ = G4 THEN 40650
40590 G4 = "
40630 P = P + 1
40640 NEXT N
40650 RETURN
40700 UTAB 8
40710 PRINT "PLEASE ANSWER 'H' FOR MARRIED"
40715 PRINT
40720 PRINT "OR 'S' FOR SINGLE (INCLUDING)"
40730 PRINT : PRINT "SEPARATED, DIVORCED, OR WIDOWED."
40740 RETURN
40800 I(3) = 0:I(5) = 0:I(7) = 0
40810 I(12) = 0:I(20) = 0:I(21) = 0
40815 I(19) = 0:I(10) = 0:I(11) = 0:I(12) = 0
40816 I(13) = 0:I(14) = 0:I(15) = 0:I(16) = 0
40817 I(17) = 0:I(18) = 0:I(19) = 0
40820 RETURN
40850 I(4) = 0:I(12) = 0
40855 I(19) = 0:I(29) = 0:I(30) = 0
40855 I(31) = 0:I(32) = 0
40857 I(20) = 0:I(6) = 0
40860 RETURN
40900 T2 = 35:H1 = 0: FOR N = 1 TO 8
40910 H1 = (H1 + 1) + 10: T2 = 1
40920 IF ABS (H1) > 11 THEN T2 = T2 - 1
40930 NEXT N
40935 IF H1 < 0 THEN T2 = T2 - 1
40940 RETURN
40950 T3 = 39:H1 = 0: FOR N = 1 TO 8
40960 H1 = (H1 + 1) + 10: T3 = 1
40970 IF ABS (H1) > 11 THEN T3 = T3 - 1
40980 RETURN
40990 IF H1 < 0 THEN T3 = T3 - 1
40995 RETURN
41000 PRINT "WHICH YEAR IN SCHOOL WILL 82-83 BE?"
41010 PRINT
41020 PRINT "FRESHMAN = 1"
41030 PRINT "SOPHOMORE = 2"
41040 PRINT "JUNIOR = 3"
41050 PRINT "SENIOR OR FIFTH YEAR = 4"
41060 PRINT
41070 PRINT "ENTER NUMBER (1-4) BELOW:"
41080 RETURN
41100 UTAB 5
41110 PRINT "INCLUDE IN THE NUMBER BELOW, THE"
41120 PRINT
41130 PRINT "PARENTS AND ALL DEPENDENTS IN THE"
41140 PRINT
41150 PRINT "FAMILY, INCLUDING THE STUDENT."
41160 RETURN
41200 UTAB 5
41210 PRINT "THE AMOUNT BELOW SHOULD BE TAKEN"
41220 PRINT
41230 PRINT "FROM THE PARENTS IRS FORM 1040 LINE 31"
41240 PRINT
41250 PRINT "OR IRS FORM 1040A LINE 10"
41255 PRINT : PRINT
41260 PRINT "ALL OF THE FOLLOWING INCOME AND"
41265 PRINT
41270 PRINT "EXPENSE QUESTIONS REFER TO THE YEAR"
41275 PRINT
41280 PRINT "1981 UNLESS OTHERWISE NOTED"
41285 RETURN
41300 UTAB 5
41310 PRINT "THE ANSWER BELOW SHOULD BE FROM"
41320 PRINT
41330 PRINT "THE PARENTS IRS FORM 1040 LINE 47"
41340 PRINT
41350 PRINT "OR IRS FORM 1040A LINE 15A"
41360 RETURN
41400 UTAB 5
41410 PRINT "INCLUDE BELOW SOCIAL SECURITY"
41420 PRINT
41430 PRINT "BENEFITS RECEIVED BY ALL MEMBERS OF"
41440 PRINT
41450 PRINT "FAMILY EXCEPT STUDENT"
41460 RETURN
41500 UTAB 5
41510 PRINT "THE FOLLOWING QUESTIONS ON ASSETS"
41520 PRINT
41530 PRINT "REFER TO ASSETS HELD BY THE "
41535 PRINT
41540 PRINT "STUDENT'S PARENTS"
41550 IF I(1) = 0 THEN PRINT "STUDENT (AND SPOUSE)"
41560 RETURN
41600 UTAB 5
41610 PRINT "THE FOLLOWING QUESTIONS ON SOCIAL"
41620 PRINT
41630 PRINT "SECURITY, VA BENEFITS AND OTHER"
41640 PRINT
41650 PRINT "NON-TAXABLE INCOME REFERS TO"
41660 PRINT
41670 PRINT "BENEFITS RECEIVED BY THE STUDENT"
41680 PRINT
41690 PRINT "DURING THE PERIOD 7-1-82 TO 6-30-83"
41700 RETURN
41710 HTAB 11: PRINT "FROM EARNINGS"
41720 D1 = 0: RETURN
41800 UTAB 5
41810 PRINT "OF THE 'J(8)' PEOPLE IN THE"
41820 PRINT
41830 PRINT "THE HOUSEHOLD, HOW MANY WILL"
41840 PRINT
41850 PRINT "ATTEND COLLEGE IN 82-83"
41860 RETURN
41900 UTAB 5
41910 PRINT "SUMMER 82 REFERS TO JUNE, JULY"
41920 PRINT : PRINT "AND AUGUST OF 1982."
41930 RETURN
41950 UTAB 5
41960 PRINT "82-83 REFERS TO THE NINE MONTH PERIOD"
41970 PRINT : PRINT "FROM SEPTEMBER THROUGH JUNE OF 82-83"
41980 RETURN
42000 UTAB 5
42010 PRINT "ENTER BELOW THE PART OF FAMILY INCOME"
42020 PRINT : PRINT "WHICH COMES FROM THE 'J(8)"
42030 PRINT : PRINT "INCOME FROM WORK"
42040 RETURN
42050 END

```

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AUTOHEX PEEK/POKE

A Program to Convert Machine Language Programs into Basic DATA Statements

David M. Conley

AUTOHEX PEEK/POKE is a program written for the Commodore PET, that will convert a machine language program in the PET into Basic DATA statements, or will read a program from DATA statements and put them into memory.

All addresses and data are in hex, not in decimal, so no conversion is required. Using hex also saves memory. A 32K PET will hold approximately 8.6K of machine language in Basic form, with the program in the form shown here. However, it can be shortened by leaving out the REMs, blank lines, spaces, etc.

The "fixes" for the various ROMs are given in the listing.

This program will check for bad input addresses (for example, it won't go from \$A100 to \$A000, or start at A0000), and when POKing a program into memory, it will only put it into RAM.

The old PETs had their ROM code protected, which meant that you couldn't PEEK into it. This program uses a short machine language program that can look into that forbidden area, although why you would want to do that is a mystery to me. For the new PETs, you don't need this subroutine.

The heart of this program is the series of POKes in lines 340 and 350. The first POKe tells the PET that there are three keystrokes in the keyboard buffer. The second is a "Cursor Home" command. The third and fourth POKes are carriage returns.

This routine can be used for many other kinds of self-modifying programs. The buffer can store a total of ten keystrokes.

As the program runs, it becomes obvious how it works. The first line printed on the screen is the machine code that the PET PEEKed and converted to hex. The second line contains the end address, the next address to PEEK, the line number of the last DATA statement, and a GOTO command.

This program is not particularly fast. However, it is all Basic, and makes it easy

to copy, write, and change machine language programs. If you are just starting out in machine code, and are not comfortable with the PET Monitor, this is for you!

It can also be modified to work on other computers that have rollover (keyboard memory/buffer), if you know the addresses and codes needed. □

```
10 REM**AUTOMATIC DATA READER-POKER
20
30 REM**THIS CONVERTS PEEKS INTO HEX DATA STATEMENTS..EVEN LEVEL 1'S ROM CODE!
40
50 REM**TO LOAD A MACHINE LANGUAGE PROGRAM (IN HEX), RUN 450
60
70 REM**IF ENTERING A HEX LISTING BY HAND, MAKE THE LAST DATA STATEMENT A "*"
80 REM**YOU CAN DOCUMENT YOUR LISTING BY USING A "*" LIKE THIS
90 REM**      1000 DATA "033A", "A9.00.1" LDA #00
100
110 REM**ALL DATA STARTING WITH A "*" WILL BE IGNORED.
120
130 POKE 634,173 POKE 637,141 POKE 630,129 POKE 639,2 POKE 640,96
140
150 DIM DF(16)
160 PRINT "[CLR]([3 DOWN]READ MEMORY INTO HEX DATA STATEMENTS [4 DOWN]"GOSUB 650
170 INPUT "STARTING ADDRESS (HEX) [3 SPACES] [SHIFTED ?] [3 LEFT]".XF
180 IF XF="(SHIFTED ?)" THEN PRINT "[2 UP]" GOTO 170
190 E=0 GOSUB 670 X=X# IF E=1 GOTO 170
200 INPUT "LAST ADDRESS (HEX) [3 SPACES] [SHIFTED ?] [3 LEFT]".XF
210 IF XF="(SHIFTED ?)" THEN PRINT "[3 UP]" GOTO 200
220 E=0 GOSUB 670 Y=Y# IF E=1 GOTO 200
230 IF Y# THEN PRINT "[2 DOWN] [VS] HOLD 17! [OFF] YOUR ENDING ADDRESS IS LESS
240 IF Y# THEN PRINT "THAN YOUR STARTING ADDRESS. TRY AGAIN.[2 DOWN]" GOTO 170
250 L=L+1000
260 PRINT "[CLR]". GOSUB 650 PRINT L; "DATA "
270 GOSUB 670
280 PRINT E; X# IF Y# THEN PRINT " &" GOTO 340
290 IF X#<22 THEN L=L+10 GOTO 320
300 PRINT " " X#>X+1 A#>A+1 GOTO 270
310
320 PRINT E; Y# IF X#>X+1 L=L+10 GOTO 260
330
340 POKE 525,3 POKE 527,19 POKE 528,13 POKE 529,13 END FOR 1.0 & 2.0 ROM PETS
350 REM**POKE 158,3 POKE 623,19 POKE 624,13 POKE 625,13 END FOR 3.0 & 4.0 PETS
360
370 X12=X/256 X22=X-X/256 POKE 636-X/12 POKE 635-X/22 SVS 634
380 A=PEEK(641) B=INT(A/16) C=INT(A-(B*16)) E=B+1 C=C+1
```

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CIRCLE 143 ON READER SERVICE CARD

Adding Machine Language Routines to Basic

Max Vrugt

For reasons of his own, the author was unable to tell us in this article what computer his spells work on. Readers must guess.

While writing a Basic program for a board game, it occurred to me that it would be nice if a player could point at his move, instead of specifying a numerical input. I wanted a routine that would produce a cursor that could be moved over the entire screen, using the four "arrow" keys on the keyboard. These keys should have a typomatic action, that is, continue their function while depressed. Hitting the enter key should return the current cursor position to my main program. Such a routine would also be useful for menu selection, screen drawings, and word processing applications.

Cursor Movement in Basic

So I wrote a cursor routine in Basic that did what I wanted. However, the cursor moved too slowly because of the Basic overhead (see Figure 1). The program in this example centers on the contents of location 4830H (14400) which contains the status of the enter and arrow keys on the keyboard. If one of these keys is pressed, the corresponding bit of byte 4830H is 1; otherwise it is zero. To detect which key is pressed, I use a series of logical expressions in statement 300 of this routine. In Basic, the true value for a logical expression is -1. This explains the reversed signs in statement 300. Using byte 4830H instead of the INKEY\$ function allows for easier programming and faster response time.

Figure 1. Cursor routine in Basic, used in menu selection. Point the cursor at the "*" in front of desired item and hit enter key. The program indicated by this item will be given control.

```

100 *****
110 *          EXAMPLE OF A MENU SELECTION
120 *          *****
130 CLS
140 PRINT@270,"MAKE A SELECTION OF REQUIRED FUNCTION";
150 P1=428: P2=492: P3=556: P4=620
160 PRINT@P1,"* FILE DATASET":      '* PRINT MENU ON SCREEN
170 PRINT@P2,"* DELETE DATASET":
180 PRINT@P3,"* COPY DATASET":
190 PRINT@P4,"* RETRIEVE DATASET":
200 CU=364
210 GOSUB 260:                        '* START CURSOR AT POS 364
220 ON 1-(CU=P1)*1-(CU=P2)*2-(CU=P3)*3-(CU=P4)*4
      GOSUB 210,500,600,700,800      '* CURSOR ROUTINE CALL
      '* SPECIFIED IN THE MENU
230 *****
240 *          CURSOR MOVEMENT ROUTINE
250 *          *****
260 SV=PEEK(15360+CU)
270 POKE 15360+CU,95
280 CO=CU
290 KE=PEEK(14400)
300 CU=CO+((KE=8)-(KE=16))*64+(KE=32)-(KE=64) '* WHICH WAY ?
310 CU=CU+((CU>1022)-(CU<0))*1023          '* CURSOR WRAP AROUND
320 POKE 15360+CU,SV
330 IF KE=1 THEN RETURN
340 GOTO 260:                              '* RESTORE SCREEN POS.
350 *****                              '* ENTER KEY WAS HIT
                                         '* REPEAT

```

Figure 2. Same cursor routine as in Figure 1. This routine has an MLR stored in DATA statements.

```

100 *****
110 *          EXAMPLE OF MENU WITH USER ROUTINE IN DATA STMTS
120 *          *****
130 CLS: CLEAR 1000
140 RESTORE '* THE DATA STATEMENTS WILL CONTAIN THE USR RTN.
150 DATA 205,127,010,245,197,213,124,198,060,103,001,255,020
160 DATA 197,030,095,086,115,193,013,032,253,005,032,250,001
170 DATA 255,020,024,003,001,253,192,058,064,056,183,040,247
180 DATA 197,001,000,000,254,001,040,046,254,008,032,003,001
190 DATA 192,255,254,016,032,003,001,064,000,254,032,032,003
200 DATA 001,255,255,254,064,032,003,001,001,000,114,009,124
210 DATA 254,064,056,002,214,004,254,060,048,002,198,004,103
220 DATA 024,179,114,124,214,060,103,193,209,193,241,195,154
230 DATA 010
240 PS=""                               '* LOAD USR RTN IN STRING
250 FOR I=1 TO 105
260 READ X
270 PS=PS+CHR$(X)
280 NEXT I
290 CU=364
300 PRINT@270,"MAKE A SELECTION OF REQUIRED FUNCTION";
310 P1=428: P2=492: P3=556: P4=620
320 PRINT@P1,"* FILE DATASET":
330 PRINT@P2,"* DELETE DATASET":
340 PRINT@P3,"* COPY DATASET":
350 PRINT@P4,"* RETRIEVE DATASET":
360 POKE 16526,PEEK(VARPTR(PS)+1)      '* INITIATE USR ADDR
370 POKE 16527,PEEK(VARPTR(PS)+2)
380 CU=USR(CU)                          '* CALL CURSOR RTN.
390 ON 1-(CU=P1)*1-(CU=P2)*2-(CU=P3)*3-(CU=P4)*4
      GOSUB 360,400,410,420,430      '* EXECUTE FUNCTION

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Machine-Language, continued...

Written in assembly language, this function produced a cursor with a rather high speed (see Figure 2). This routine also uses the contents of byte 4830H. Because of the much higher speed of the cursor, I had to add a delay. There is a long delay, the first time a key is hit, and a short one for the continued movement while the key remains pressed.

This routine saves and restores all used registers with PUSH and POP instructions. I consider this a safer method than using an EXX instruction, because I do not know what the Basic interpreter has been doing before. The CALL 0A7FH at the beginning of the program enters the initial cursor position, passed from the Basic program, into register HL. The JP 0A9AH at the end of the routine, passes the contents of register HL back to the function, making the last location of the cursor available to the main program.

However, to run an application with this machine-language routine (MLR) was rather clumsy. First I had to remember to specify memory size, then SYSTEM load the MLR, hit break, and CLOAD my application. Usually, these two programs are stored together on one tape, leaving the rest of the tape unavailable for other programs and making it impossible to copy without a disk.

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```

00100 ;CURSOR MOVE ROUTINE
00110 ;AT ENTRY, REG HL POINTS AT CURSOR START POSITION
00120 ;AT EXIT, REG HL POINTS AT NEW CURSOR POSITION
00130 ORG 7000H
00135 CURSOR DEFW PGMLLEN ;2 BYTES PROGRAM LENGTH
00140 CALL 0A7FH ;PASS PARAMETER TO HL
00150 PUSH AF ;SAVE REGS
00160 PUSH BC
00170 PUSH DE
00180 PUSH BC
00190 A,H ;CONVERT REL. SCREEN POS.
00200 ADD A,3CH ;HL POINTS TO REAL ADDR
00210 LD H,A ;SET INITIAL DELAY
00220 LD BC,14FFH
00230 PUSH BC
00240 LD E,95
00250 LD D,(HL) ;CURSOR DISPLAY CHAR.
00260 LD (HL),E ;SAVE CONTENT OF LOC.
00270 POP BC ;DISPLAY CURSOR
00280 DELAY C ;USE BC FOR DELAY
00290 JR NZ,DELAY ;DELAY
00300 DEC B
00310 JR NZ,DELAY
00320 LD BC,14FFH ;SET SHORT DELAY
00330 JR CONT
00340 LD BC,0C0FFH ;SET LONG DELAY
00350 AGN LD A,(3840H) ;KB CONTR KEYS
00360 OR A ;KEYS DEPRESSED ?
00370 JR Z,AGN ;NO, TRY AGAIN
00380 PUSH BC ;SAVE DELAY
00390 LD BC,0 ;WHICH KEY ?
00400 CP 1
00410 JR Z,RET ;EXIT ROUTINE
00420 CP 8 ;UP ?
00430 JR NZ,NOUP
00440 LD BC,-64 ;DOWN ?
00450 CP 16
00460 JR NZ,NODWN ;WITHIN SCREEN LIMIT ?
00470 LD BC,64 ;LEFT ?
00480 CP 32
00490 JR NZ,NOLFT ;RIGHT ?
00500 LD BC,-1
00510 NOLFT CP 64
00520 JR NZ,NORIGHT
00530 LD BC,1
00540 NORIGHT LD (HL),D ;RESTORE CONTENT OLD LOC
00550 ADD HL,BC ;NEW CURSOR POSITION
00560 LD A,H ;WITHIN SCREEN LIMIT ?
00570 CP 40H ;OFFSCREEN TO RIGHT ?
00580 JR C,NORT ;NO
00590 SUB 04H ;BRING CURSOR BACK
00600 CP 3CH ;OFFSCREEN TO LEFT ?
00610 JR NC,NOLF ;NO
00620 ADD A,04H ;BRING CURSOR BACK
00630 LD H,A ;HL CONTAINS NEW POS.
00640 JR MOVE ;MORE CURSOR MOVES ?
00650 RET LD (HL),D ;RESTORE SCREEN
00660 LD A,H ;CONVERT ADDR TO
00670 SUB 3CH ;REL. SCREEN POS.
00680 LD H,A
00690 POP BC ;REMOVE DELAY
00700 POP DE ;AND RESTORE REGS
00710 POP BC
00720 POP AF
00730 0A9AH ;RETURN TO MAIN
00740 EQU $-CURSOR ;PROGRAM LENGHT
00750 END

00000 TOTAL ERRORS

AGN 7020 00340 00370
CONT 7023 00350 00330
CURSOR 7000 00135 00135
DELAY 7015 00280 00290 00310
MOVE 7012 00250 00640
NODWN 7032 00480 00460
NOLF 7050 00630 00610
NOLFT 7046 00510 00490
NORIGHT 7040 00540 00520
NORT 7056 00600 00580
NUP 7038 00450 00430
PGMLLEN 006B 00735 00135
RET 705F 00650 00410

```

Figure 2a. Assembler listing of MLR used in Figure 2.



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Machine-Language, continued...

Machine Language Routines in Basic

Why not include the MLR in my Basic program? This avoids all the problems I mentioned earlier. A clean way to include such code in a Basic program is to put it into a string. The start of this string, (the start of the MLR), can be found with the VARPTR function, which returns the address of the string pointer. The string pointer in turn has the address of the string stored in the second and third byte. Passing this address in the usual way to the system (POKE it into location 16526 and 16527) initializes the USR function and we are in business.

But a string with hex values cannot be used in a Basic program. Not every hex value between OOH and FFH has an ASCII character representation, and even if these values could be put into a string, the correct operation of the Basic interpreter would be disrupted. Some hex values are used as interpreter controls. For example, the value OOH is used by the Basic interpreter as an end of line marker.

This means that we have to create the string at execution time. At that time, strings are created in the string space outside the Basic program and their content cannot disturb the interpreter. But it is necessary to store the data and initialize the string somewhere inside the program. The decimal values of the bytes of the MLR can be stored in DATA statements. During execution these values are READ, converted to hex with the CHR\$ function and concatenated to the string.

Translating the hexadecimal codes and typing the DATA statements causes errors and is a boring effort. The computer should take care of this task; so I wrote a copy program (listed in Figure 3) to do this job.

The program first CLOADs the user's Basic program into storage, consecutive to itself. Then the MLR is translated and DATA statements, created at the end of the Basic program, contain the decimal

Figure 3. Copy program. This program concatenates Basic programs in storage, converts MLR hex codes to decimal and generates DATA statements.

```

10 *****
11 ' PROGRAM TO MOVE USR RTN INTO BASIC PROGRAM
20 *****
30 DEFINT A-Z
40 PRINT "FIRST 2 BYTES OF OBJECT USR RTN MUST CONTAIN LENGHT 1"
50 CLS: INPUT "DID YOU LOAD THE OBJECT RTN --- Y/N":Y$
60 IF Y$=LEFT$("NO",LEN(Y$)) THEN PRINT "PLEASE CORRECT":END
70 'PREPARE FOR MERGE WITH USER APPLICATION PROGRAM
80 'MOVE PROGRAM END ADDR (16633,16634)
90 'INTO PROGRAM START ADDR (16548,16549)
100 PRINT @640,"";
110 PRINT "CLOAD YOUR PROGRAM "
120 PRINT "WHEN READY KEY IN FOLLOWING STATEMENTS"
130 PRINT " POKE 16548,233"
140 PRINT " POKE 16549,66"
150 PRINT "THEN GIVE THE COMMAND "
160 PRINT " RUN 200"
170 EP=PEEK(16633)+256*PEEK(16634) 'GET END OF PROGR ADDR
180 VR=EP-2: AD=16548: GOSUB 920: 'AND PUT IN PGM START PTR
190 END
200 *****
210 '**** USER PROGRAM IS NOW LOADED BEHIND THIS PROGRAM ****
220 'THIS PROGRAM USES FOLLOWING VARIABLES:
230 ' US : USR START ADDR UL : USR LENGTH
240 ' UE : USR END ADDR PE : BASIC PGM END ADDR
250 ' NE : BASIC PGM NEW END ADDR NP : NEXT LINE PTR
260 ' LP : LINE NUMBER PTR TP : TEXT PTR
270 ' EL : END OF LINE MARKER ADDR EF : END OF FILE MARKER
280 ' LN : LINE NUMBER
290 DEFINT A-Z
300 INPUT "USR ROUTINE START ADDRESS, PLEASE ";US
310 UL=PEEK(US)+256*PEEK(US+1) 'USR RTN LENGHT
320 PE=PEEK(16633)+256*PEEK(16634) 'BASIC PGM END
330 DL=INT(UL/13)*56
340 DU=UL-INT(UL/13)*56
350 IF DU>0 THEN DL=DL+DU*4
360 NE=PE+DL
370 'THE NEW PROGRAM END INCLUDES THE NECESSARY DATA STMTS
380 'SAVE US,UL,PE,NE AND CHANGE END OF PROGRAM ADDR TO NEW
390 VR=US: AD=32766: GOSUB 920: 'SAVE US
400 VR=UL: AD=32764: GOSUB 920: 'SAVE UL
410 VR=PE: AD=32762: GOSUB 920: 'SAVE PE
420 VR=NE: AD=32760: GOSUB 920: 'SAVE NE
430 POKE 16634,PEEK(32761) 'CHANGE END OF BASIC PGM
440 POKE 16633,PEEK(32760):RUN 450 'PTR, CONTINUE EXECUTION
450 DEFINT A-Z
460 US=PEEK(32766)+256*PEEK(32767) 'RESTORE US
470 UL=PEEK(32764)+256*PEEK(32765) 'RESTORE UL
480 PE=PEEK(32762)+256*PEEK(32763) 'RESTORE PE

```

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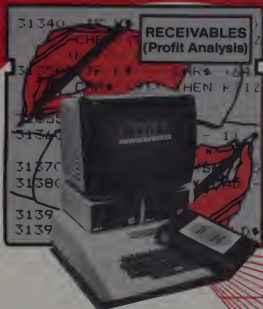
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Machine-Language, continued...

values of the bytes of the MLR. Upon successful completion the copy program deletes itself, leaving behind the user's Basic program, including the newly-created DATA statements. This Basic program may be saved for later use or executed immediately and saved after debugging. It is not necessary to CLOAD a user program. If you bypass this part of the program (start with RUN 200), only the DATA statements are created.

The copy program needs the location of the start of the MLR. The length of the MLR is expected in the first two bytes of the MLR. An easy way to provide this information in a MLR is as follows.

```

ORG load address
LENGTH DEFW ENDPGM-BEGPGM ;first MLR instruction
BEGPGM (MLR first instruction)
|
| (MLR program instructions)
|
ENDPGM EQU $ ;last MLR instruction

```

Figure 3, continued.

```

490 'FIND START OF LAST STMTN TO PICK UP LINE NUMBER
500 FOR EL=PE-4 TO PE-260 STEP -1 'SEARCH BACKWARDS
510 IF PEEK(EL)=0 THEN GOTO 550: 'END OF LINE MARKER FOUND
520 NEXT EL
530 PRINT "END OF LINE MARKER NOT FOUND"
540 STOP
550 LN=PEEK(EL+3)+256*PEEK(EL+4) 'GET LAST LINE NUMBER
560 NP=PE-2 'INITIAL NEXT LINE PTR
570 US=US-1 'ADJUST START
580 FOR K=1 TO UL STEP 13 'ADJUST START
590 KE=K-12*(K+12<UL)-(UL-K)*(K+12>UL) 'LAST BYTE TO MOVE
600 'INTO A DATA STMTN
610 'BUILD A COMPLETE DATA STATEMENT
620 LN=LN+1 'NEW LINE NUMBER
630 LP=NP+2 'LINE NUMBER PTR
640 VR=LN: AD=LP: GOSUB 920: 'PUT NEW LINE NUMBER
650 TP=LP+2 'TEXT PTR
660 POKE TP,136 'PUT CODE FOR DATA STMTN
670 POKE TP+1,32 'FOLLOWED BY SPACE IN TXT
680 TP=TP+2 'POINT AT NEXT AVAIL BYTE
690 'MOVE 13 BYTES (OR LESS) FROM USR TO DATA STMTN
700 FOR I=K TO KE
710 X=PEEK(US+I): D=1000 'GET NEXT BYTE FROM USR
720 FOR L=1 TO 3 'CONVERT BYTE TO DEC
730 D=D/10: X1=INT(X/D)
740 POKE TP,X1+48 'STORE DEC IN DATA STMTN
750 TP=TP+1
760 X=X-X1*D
770 NEXT L
780 POKE TP,ASC(",") 'PLACE COMMA
790 TP=TP+1 'UPDATE TEXT PTR
800 PRINT CHR$(132); 'I AM STILL ALIVE
810 NEXT I
820 PRINT "BYTES";K;" TO";KE;" HAVE BEEN MOVED"
830 EL=TP-1 'OVERWRITE LAST COMMA WITH
840 POKE EL,00 'AN END OF LINE MARKER
850 VR=EL+1: AD=NP: GOSUB 920: 'UPDATE NEXT LINE POINTER
860 VR=VR
870 NEXT K
880 VR=00: AD=NP: GOSUB 920: 'END OF PROGRAM MARKER
890 PRINT "USER ROUTINE SUCCESSFUL COPYED"
900 DELETE 10-970 'DELETE PROGRAM
910 END
920 'SUBROUTINE TO POKE A WORD FROM VARIABLE VR INTO ADDRESS AD
930 HI=INT(VR/256)
940 POKE AD+1,HI
950 LO=VR-INT(VR/256)*256
960 POKE AD,LO
970 RETURN

```

The last assembler pseudo-instruction assigns the address of the end of the MLR program to variable ENDPGM. The definition at the beginning of the program loads the difference between the program start and end address into the first two bytes labelled LENGTH. This length is also stored in the first two entries of the first DATA statement and can be used to control the loop variable of the READ loop in the Basic program. The length of the program can include the two length bytes or not according to your needs. You can easily change this if you want.

Concatenating Basic Programs

To load a Basic program after a program is already in storage, reset the

Basic program start address pointer and do the following:

- 1) First load the current Basic program end address (minus 2) into this pointer.
- 2) Next CLOAD the next Basic program, starting at the address in the program start address pointer (the last program's end address).
- 3) When the CLOAD is complete, restore the Basic program start address pointer to its original value. In this case there is no need to renumber the programs because only the first program is executed and this program deletes itself when it completes execution. Thus there is no conflict in line numbering.

Creating Space

Before the copy part of the program starts to execute, you must make room for the new DATA statements. This changes the end-of-program address. Because the end of the program is also the start of the simple variable space, we are in trouble. Changing the end of the program destroys already-defined variables and pointers and makes them unusable. To move these already-defined variables behind the newly-defined end of the program is not possible because the process involves using variables.

Rather than doing a lot of housekeeping that the system can do, let's take an easy way out. Before changing the end-of-program pointer, save the necessary variables in high core, using POKES. Assume that these locations are not used, otherwise redefine these addresses for your own configuration. Next change the end-of-program pointer, with POKES without variables (using PEEKs from high storage). Now the copy program needs to be reinitialized, because the interpreter has lost track of its allocated variables.

Execution of the RUN 450 statement resets all parameters and variables and starts to execute line 450. Thus you restore the variables saved earlier into redefined variables and you are ready to start the creation of DATA statements.

Generating Data Statements

To understand the part of the program that creates the DATA statements, you need to understand the structure of a Basic program line as stored in memory. The structure of such a line is:

Two bytes containing a pointer to the next Basic line.

Two bytes containing the line number. The actual line contents.

One byte containing an end-of-line marker (OOH).

Two bytes containing OOH follow the last line of the Basic program and indicate the end-of-program (EOP) marker. Remember that you changed the end-of-program pointer to make space for the DATA statements, but the EOP marker is still there and indicates the original program end.

Copying MLR to Data Statements

The copy program starts searching for the first end of line (EOL) marker to the left of the last EOL marker. Three bytes to the right of this EOL marker is the number of the last line used in the user's Basic program. The DATA statement line numbers are based on the last line number of the Basic program with an increment of one. Now you can create the first DATA statement and write it over the EOP marker. Continue this process until all the bytes of the MLR are copied. Each DATA statement contains 13 elements (or less, if it is the last one).

There are two restrictions in this process.

Due to a Basic interpreter restriction, you cannot create a string longer than 255 characters.

Because an MLR is moved around in storage, it should not contain code which is dependent on its location in storage.

The first restriction limits you to MLRs with a length of 255 bytes or less. Because of the nature of the MLRs used in a Basic program, I do not view this as a limitation. MLRs are usually rather short programs. However, if you do have longer programs, there are two solutions:

Split your MLR into two or more 255-byte MLRs and store them in several strings that you call successively from your Basic program.

Store your MLR in successive defined strings, thus forming one large area in storage. You must realize that string space is defined from high memory down. To explain this, let's look at an example.

```
100 PS="1": FOR I=1 TO 3:
    PS=PS+"*":NEXT I
200 QS="2": FOR I=1 TO 3:
    QS=QS+"Q":NEXT I
```

This routine eventually creates the following sequence in storage:

2QQQ2QQ2Q1PPPIPPPI starting
at 32750, ending at 32767. The pointers

point at 32750 for QS and 32759 for PS. Eventually the garbage between these strings will be collected, but the strings are still in the wrong order. Thus, after creating PS and QS, it is necessary to issue the statement 300 PS=PS, immediately after creating string QS. Now PS and QS are in the right order and concatenated in storage. Changing any of the two strings in your program from this point on destroys the concatenation again! A safe practice is to redefine your strings in opposite order of creation and not to touch them anymore. In this example write

```
300 QS=QS
400 PS=PS
```

Changing any of the two strings in your program from this point on destroys the concatenation again!

Collection of garbage at certain times, due to a need for string space, moves strings around but does not destroy their order of sequence. This means that before every USR call you must POKE the MLR start address, because it may have been changed.

The second restriction requires self-relocating MLRs. A self-relocating program can be loaded into any area of available storage, and contains an initialization routine to adjust its address constants so that it can be executed at that location.

There are several ways to write a self-relocating program.

If you do not use address constants in your program, it will always be self-relocating. In that case you do not need an initialization routine. You can write a program without address constants if you do not use DEFs and JPs (absolute jumps). All data must be handled and stored (stacked) through registers. The system makes 16 bytes available in the system stack, (usually sufficient space). All jumps must be relative (JR). Relative jumps have a range from -126 to 129. This is sufficient for most routines. If you use CALLs then the called routine must be at an absolute address.

The indexed addressing mode of the Z-80 provides another means of self-relocating. Use registers IX and IY as your base registers. Each address constant is formed of a combination of a base value and a displacement. Changing the base value relocates your program.

The third way is to have an initialization routine. This routine detects the difference between assembled and loaded start address. Then all address constants are changed by this delta, which may be positive or negative.

It is also possible to write your own relocating loader, independent of any particular application. However, the way that the Z-80 has implemented its opcodes makes it rather complicated to write such a program efficiently.

The cursor routine and the resulting copy program can be used for many other applications. Currently, I am using slightly modified versions of these programs to design and save complex screen layouts. The modified cursor routine allows me to make any drawing on the screen. The copy program saves the layout in DATA statements. These DATA statements can be used in another program to build a screen. It is also possible in this way to define protected screen areas and areas to be used for input. □

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Chas Andres

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Structured Design with Basic?

An example and an answer

Phil Hughes

We all seem to be willing to waste a lot of time in small increments to save having to drop everything and get what we need to do a job right. I am no exception. For months, I have been looking at listings to see if two files were the same or if one had been updated. Finally, this morning, I decided to write a file-compare utility.

I had just finished reading David Higgins' book entitled *Program Design and Construction*. Thus, his ideas for structured design using Warnier-Orr charts were fresh in my mind. For the past couple of years I have tried to be structured in my approach to design and programming but the structure always gets lost along the way. I was impressed with the book so I decided to play it by the rules and see what would happen.

Being skeptical, I decided to keep track of the time I would spend writing and debugging the compare program. My estimate was eight hours, although I felt I could kluge it out in around four. I figured it was worth the other four hours just to see if structured design really works.

Armed with a copy of *Program Design and Construction*, I sat down to do the design. The program requirements were simple: it should read two specified files, compare each record, print all records that differ between the files and when done, print both record and error counts. The program should also handle all input/output (I/O) errors.

Fifty minutes later I had produced Charts 1 through 7. They seemed to follow the rules outlined in the book and I could understand what they said. For only fifty minutes work, I was impressed.

Phil Hughes, Specialized Systems Consultants, P.O. Box 2847, Olympia, WA 98507.

Chart 1.

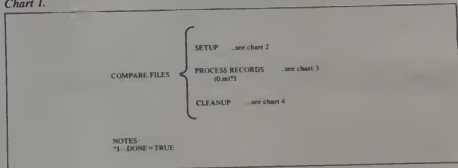


Chart 2.

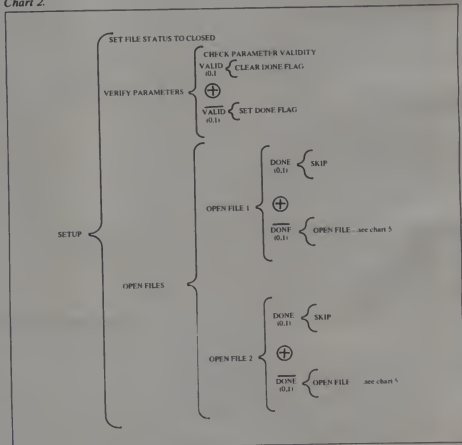


Chart 3.

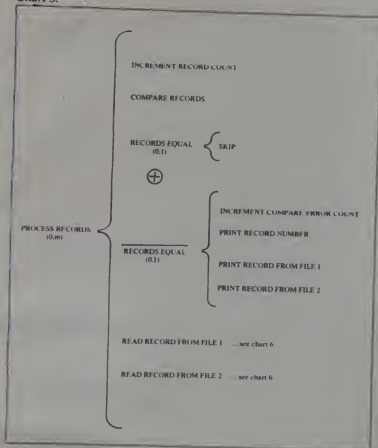


Chart 4.

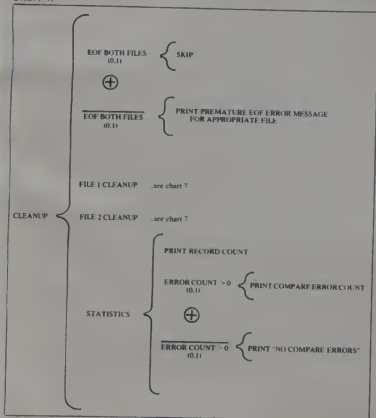


Chart 5.

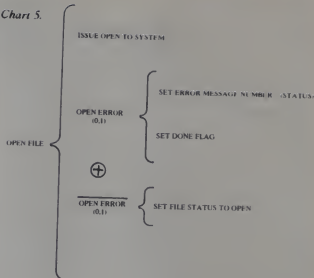


Chart 6.

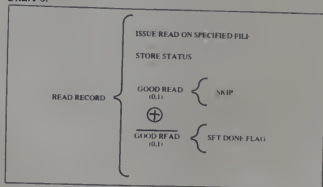
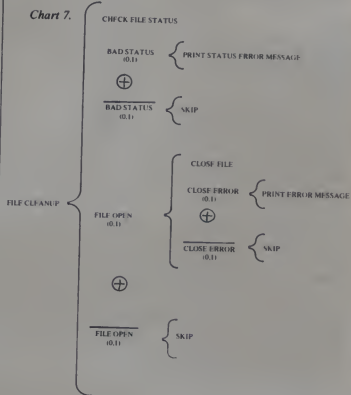


Chart 7.



The next decision was to select the programming language I would use to code the file compare. I had considered Pascal and assembler earlier. Pascal seemed like the logical choice; a structured language for a structured design. In the book Mr. Higgins had shown that the techniques he presented could be implemented in Basic. In fact, Basic was the only language used, and his design techniques had worked so well I decided to give Basic a try.

I checked the time and started writing code. As per his suggestions, I had all kinds of little subprograms and lots of GOSUB statements. Fifty-two minutes later I met my next surprise. I was all out of subprograms to code. I quickly compared the code to the chart. I found the way that seemed correct instead of following the chart. Recording to correct my error took another five minutes.

Next, I started typing. Typing took about 35 minutes including time to correct my obvious typographical errors. Listing 1 shows the program that I had produced.

Listing 1. Listing of program CMP-1.

```

1 REM FILE COMPARE 1-24-80
2 REM VARIABLE USAGE
3 REM F=Current file number
4 REM S(1),S(2)=File status
5 REM B(1),B(2)=Record buffers
6 REM F(1),F(2)=File names
7 REM D=Done flag (1=TRUE)
8 REM R=Record number
9 REM E=Number of record compare errors
10 REM *****
11 REM IF B IREN EOF Status
12 REM *****
100 REM MAIN PROGRAM
110 GOSUB 500 : REM Setup
120 REM Process records (orn)
130 IF D=1 THEN GOSUB 1000 ELSE 150
140 GOTO 120
150 GOSUB 1500 : REM Cleanup
160 END
170 REM *****
180 REM SETUP
190 S(1)=1
200 S(2)=1
210 GOSUB 2100:REM Get parameters
220 GOSUB 2200 : REM Open file 1
230 GOSUB 2300 : REM Open file 2
240 IF DONE=0 THEN GOSUB 2400 : REM Read first records
250 RETURN
260 REM *****

```

```

1000 REM PROCESS RECORDS
1010 R=R+1
1015 REM Compare
1020 IF B(1)<>B(2) THEN GOSUB 2000
1030 REM Read next records
1040 F=1
1050 GOSUB 7000
1060 F=2
1070 GOSUB 7000
1080 RETURN
1090 REM *****
1100 REM CLEANUP
1110 IF NOT((S(1)=EF)AND(S(2)=EF)) THEN GOSUB 3000
1120 F=1:GOSUB 3200
1130 F=2:GOSUB 3200
1140 GOSUB 3500 : REM Statistics
1150 RETURN
1160 REM *****
1170 REM RECORDS NOT EQUAL
1180 E=E+1
1190 PRINT:PRINT "RECORD "R"
1200 PRINT B(1)
1210 PRINT B(2)
1220 RETURN
1230 REM *****
1240 REM GET PARAMETERS
1250 INPUT "ENTER FIRST FILE NAME",F(1)
1260 INPUT "ENTER SECOND FILE NAME",F(2)
1270 D=0
1280 RETURN
1290 REM *****
1300 REM OPEN FILE 1
1310 IF DONE=0 THEN 2220 ELSE 2240
1320 F=1
1330 GOSUB 7200
1340 RETURN
1350 REM *****
1360 REM OPEN FILE 2
1370 IF DONE=0 THEN 2320 ELSE 2340
1380 F=2
1390 GOSUB 7200
1400 RETURN
1410 REM *****
1420 REM PREMAJURE EOF ERROR
1430 PRINT "PREMAJURE EOF ON FILE"
1440 IF S(1)=EF THEN PRINT F(2) ELSE PRINT F(1)
1450 RETURN
1460 REM *****
1470 REM FILE CLEANUP
1480 IF (S(1)=0)AND(S(2)=EF) THEN 3220 ELSE 3230
1490 PRINT "STATUS ERROR"IS(F)"ON FILE"IF(S)
1500 IF S(F)=0 THEN 3240 ELSE 3270
1510 ON ERROR GOTO 3300
1520 CLOSE F
1530 ON ERROR GOTO 0
1540 RETURN
1550 REM error handler
1560 PRINT "CLOSE ERROR ON"IF(S)
1570 RESUME 3260
1580 REM *****
1590 REM STATISTICS
1600 PRINT "RECORDS PROCESSED"
1610 IF E=0 THEN PRINT "COMPARISON ERRORS"
1620 IF E=0 THEN PRINT "NO COMPARISON ERRORS"
1630 RETURN
1640 REM *****
1650 REM READ RECORD FROM FILE F
1660 ON ERROR GOTO 7100
1670 INPUT OF,B(F)
1680 ON ERROR GOTO 0
1690 RETURN
1700 REM error handler
1710 IF(S)=ERR
1720 RESUME 7030
1730 REM *****
1740 REM OPEN FILE F
1750 ON ERROR GOTO 7300
1760 OPEN OLD F(F) AS F
1770 ON ERROR GOTO 0
1780 IF S(F)=0 THEN D=1
1790 RETURN
1800 REM error handler
1810 RESUME 7230
1820 REM *****

```

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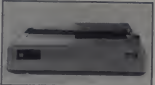
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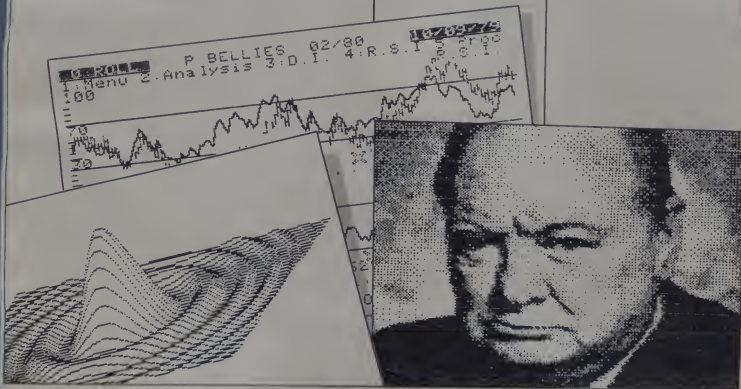
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CIRCLE 214 ON READER SERVICE CARD

Listing 2. Run of CMP-1.

```

RUN

ERROR 078 AT LINE 510

READY

```

I entered RUN and was immediately greeted by an error message (Listing 2). This was caused by an undimensioned variable. I added a DIM statement for all the variables described as arrays in the REM statements at the start of the program. At this time I also noticed that I had failed to enter the READ FIRST RECORDS subroutine (lines 2400-2460). I entered these lines.

My second attempt at execution is shown in Listing 3. I entered two file names in response to the prompts and was greeted this time by an error message from the program rather than Basic. There appeared to be a couple of problems, one relating to getting an EOF (end of file) before I should and another indicating that I only got an EOF on one of the files. I decided to do a little proofreading and found the following.

I had entered DONE for the variable name of the done flag in lines 560, 2210 and 2310. Although DONE was clearly an invalid variable name, Basic had failed to produce an error message. I fixed these lines, changing DONE to D, and took a look at the test for premature EOF at line 1510. It did what was described in the blocks EOF BOTH FILES and EOF BOTH FILES in the Warnier chart, but it didn't look right. That's because I had charted it wrong. The condition I wanted was EOF ON ONE FILE ONLY. Chart 8 shows the updates to Chart 4 to implement this correction. This was translated into lines 1510 and 1515 in the code.

Listing 4 shows my next attempt to run the program. This time it seemed to read from disk for a while, then it stopped. I finally hit the break key. The line it stopped on (1020) was the compare of the two record buffers. I printed their contents to see how far it had run. The final records of the files were in the buffers. Printing the record counter (R) and the done flag (D) revealed that the program thought it was on record 249 and still not done.

There were nowhere near 249 records in the file so it looked like the done flag was not being set when an EOF occurred. Looking at the Warnier chart showed that the done flag should be set in the READ RECORD subroutine. Scanning the listing (lines 7000-7130) showed that I had left out this important statement. At line 7115 I added a D=1 and was off to try again.

Listing 3. Run of CMP-2.

```

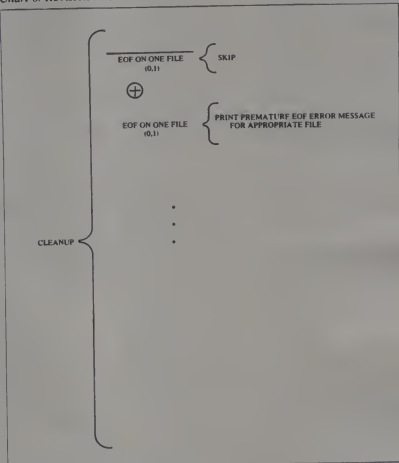
RUN

ENTER FIRST FILE NAME? 1.CMP-1.BAS
ENTER SECOND FILE NAME? 1.CMP-1.BAS
PREMATURE EOF ON FILE1.CMP-1.BAS
0 RECORDS PROCESSED
NO COMPARE ERRORS

READY

```

Chart 8. Revision to Chart 4.



Listing 4. Run of CMP-3.

```

RUN

ENTER FIRST FILE NAME? 1.CMP-1.BAS
ENTER SECOND FILE NAME? 1.CMP-1.BAS

BREAK AT LINE 1020

READY

PRINT B$(1),B$(2)
7320 REM ***** 7320 REM *****

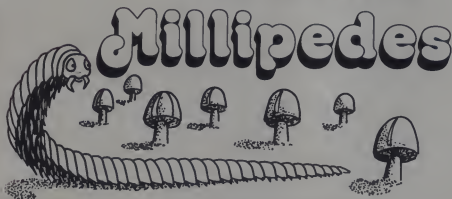
READY

PRINT R;D
249 0

READY

```

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This time the program seemed to work. Amazing! I cleaned up a few of my typos so the spacing would be correct in the error messages and ran some more tests. Listing 5 shows the results. First I compared a file to itself. I got a valid record count and no errors. Next I compared the current version of the program to the previous version. The first three compare errors show the changes I made to correct spacing in the error messages. The fourth error (record 112) is a result of adding the D=1 statement at line 7115. At this point all records show compare errors because of the added line in one file. Finally, the error messages came out correctly.

Listing 5. Run of CMP-4.

RUN

```
ENTER FIRST FILE NAME? 1.CMP-1.BAS
ENTER SECOND FILE NAME? 1.CMP-1.BAS
113 RECORDS PROCESSED
NO COMPARE ERRORS
```

READY

RUN

```
ENTER FIRST FILE NAME? 1.CMP-3.BAS
ENTER SECOND FILE NAME? 1.CMP-4.BAS
```

```
RECORD # 83
3010 PRINT 'PREMATURE EOF ON FILE 'I
3010 PRINT 'PREMATURE EOF ON FILE 'I
```

```
RECORD # 89
3220 PRINT 'STATUS ERROR 'I$(F)' ON FILE 'I$(F)
3220 PRINT 'STATUS ERROR 'I$(F)' ON FILE 'I$(F)
```

```
RECORD # 96
3310 PRINT 'CLOSE ERROR ON 'I$(F)
3310 PRINT 'CLOSE ERROR ON 'I$(F)
```

```
RECORD # 112
7120 RESUME 7030
7115 D=1
```

```
RECORD # 113
7130 REM *****
7120 RESUME 7030
```

```
RECORD # 114
7200 REM OPEN FILE F
7130 REM *****
```

```
RECORD # 115
7210 ON ERROR GOTO 7300
7200 REM OPEN FILE F
```

```
RECORD # 116
7220 OPEN OLD F$(F) AS F
7210 ON ERROR GOTO 7300
```

```
RECORD # 117
7230 ON ERROR GOTO 0
7220 OPEN OLD F$(F) AS F
```

```
RECORD # 118
7240 IF S$(F)>0 THEN D=1
7230 ON ERROR GOTO 0
```

```
RECORD # 119
7250 RETURN
7240 IF S$(F)>0 THEN D=1
```

```
RECORD # 120
7300 REM error handler
7250 RETURN
```

```
RECORD # 121
7310 RESUME 7230
7300 REM error handler
```

```
RECORD # 122
7320 REM *****
7310 RESUME 7230
PREMATURE EOF ON FILE 1.CMP-3.BAS
122 RECORDS PROCESSED
14 COMPARE ERRORS
```

READY

RUN

```
ENTER FIRST FILE NAME? 1.CMP-3.BAS
ENTER SECOND FILE NAME? WRONG
STATUS ERROR 4 ON FILE WRONG
0 RECORDS PROCESSED
NO COMPARE ERRORS
```

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From this enormous outpouring I selected the 90 best games and added 11 that I had written myself for a total of 101. I edited these into a book called 101 Basic Computer Games which was published by DEC. It still is.

When I left DEC in 1974 I asked for the rights to print the book independently. They agreed as long as the name was changed.

Contents of Basic Computer Games (right) and More Basic Computer Games (below).

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Word Search Puzzle
Wumpus 1
Wumpus 2

Introduction
The Basic Language
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Math Dice
Mugwump
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Train
Trips
23 Matches
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Converted to Microsoft Basic

The games in the original book were in many different dialects of Basic. So Steve North and I converted all the games to standard Microsoft Basic, expanded the descriptions and published the book under the new name Basic Computer Games.

Over the next three years, people sent in improved versions of many of the games along with scores of new ones. So in 1979, we totally revised and corrected Basic Computer Games and published a completely new companion volume of 84 additional games called More Basic Computer Games. This edition is available in both Microsoft Basic and TRS-80 Basic for owners of the TRS-80 computer.

Today Basic Computer Games is in its fifth printing and More Basic Computer Games is in its second. Combined sales are over one half million copies making them the best selling pair of books in recreational computing by a wide margin. There are many imitators, but all offer a fraction of the number of games and cost far more.

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The final test was with a wrong file name. The error message produced was correct, error 4 is the FLEX error number for FILE NOT FOUND. Listing 6 shows the final version of the program. There are very few changes from the original. Of course you can't make a lot of changes in less than one hour of debugging.

I have very favorable conclusions. First, the time I spent developing the working program was much less than my estimate and, in fact, less than my estimate for doing it the "quick and dirty" way. The resulting program is very readable, and I have some accurate documentation on its operation. In other words, structured design for Basic programs works great! □

Listing 6. Listing of CMP-4.

```

1 REM FILE COMPARE 1-24-80
2 REM VARIABLE USAGE
10 REM F=Current file number
20 REM S(1),S(2)=File status
30 REM B(1),B(2)=Record buffers
40 REM F(1),F(2)=File names
50 REM D=Done flag (1=TRUE)
60 REM R=Record number
70 REM E=Number of record compare errors
80 REM *****
85 DIM S(2),B(2),F(2)
90 EF=0 :REM EOF Status
95 REM *****
100 REM MAIN PROGRAM
110 GOSUB 500 : REM Setup
120 REM Process records (O:n)
130 IF D=0 THEN GOSUB 1000 ELSE 150
140 GOTO 120
150 GOSUB 1500 : REM Cleanup
160 END
170 REM *****
500 REM SETUP
510 S(1)=1
520 S(2)=1
530 GOSUB 2100:REM Get parameters
540 GOSUB 2200 : REM Open file 1
550 GOSUB 2300 : REM Open file 2
560 IF D=0 THEN GOSUB 2400 : REM Read first records
570 RETURN
580 REM *****
1000 REM PROCESS RECORDS
1010 R=R+1
1015 REM Compare
1020 IF B(1) < B(2) THEN GOSUB 2000
1030 REM Read next records
1040 F=1
1050 GOSUB 7000
1060 F=2

```

```

1070 GOSUB 7000
1080 RETURN
1090 REM *****
1500 REM CLEANUP
1510 IF (S(1)=EF) AND (S(2) < EF) THEN GOSUB 3000
1515 IF (S(2)=EF) AND (S(1) < EF) THEN GOSUB 3000
1520 F=1:GOSUB 3200
1530 F=2:GOSUB 3200
1540 GOSUB 3500 : REM Statistics
1550 RETURN
1560 REM *****
2000 REM RECORDS NOT EQUAL
2010 E=E+1
2020 PRINT:PRINT "RECORD #":R
2030 PRINT B(1)
2040 PRINT B(2)
2050 RETURN
2060 REM *****
2100 REM GET PARAMETERS
2110 INPUT "ENTER FIRST FILE NAME":F(1)
2120 INPUT "ENTER SECOND FILE NAME":F(2)
2130 D=0
2140 RETURN
2150 REM *****
2200 REM OPEN FILE 1
2210 IF D=0 THEN 2220 ELSE 2240
2220 F=1
2230 GOSUB 7200
2240 RETURN
2250 REM *****
2300 REM OPEN FILE 2
2310 IF D=0 THEN 2320 ELSE 2340
2320 F=2
2330 GOSUB 7200
2340 RETURN
2350 REM *****
2400 REM READ FIRST RECORDS
2410 F=1
2420 GOSUB 7000
2430 F=2
2440 GOSUB 7000
2450 RETURN
2460 REM *****
3000 REM PREMATURE EOF ERROR
3010 PRINT "PREMATURE EOF ON FILE "
3020 IF S(1)=EF THEN PRINT F(2) ELSE PRINT F(1)
3030 RETURN
3040 REM *****
3200 REM FILE CLEANUP
3210 IF (S(F)>0) AND (S(F) < EF) THEN 3220 ELSE 3230
3220 PRINT "STATUS ERROR 'IS(F)'" ON FILE "F(F)"
3230 IF S(F)=0 THEN 3240 ELSE 3270
3240 ON ERROR GOTO 3300
3250 CLOSE F
3260 ON ERROR GOTO 0
3270 RETURN
3300 REM error handler
3310 PRINT "CLOSE ERROR ON "F(F)
3320 RESUME 3240
3330 REM *****
3500 REM STATISTICS
3510 PRINT R:"RECORDS PROCESSED"
3520 IF E>0 THEN PRINT E:"COMPARE ERRORS"
3530 IF E=0 THEN PRINT "NO COMPARE ERRORS"
3540 RETURN
3550 REM *****
7000 REM READ RECORD FROM FILE F
7010 ON ERROR GOTO 7100
7020 INPUT #F,B(F)
7030 ON ERROR GOTO 0
7040 RETURN
7100 REM error handler
7110 S(F)=ERR
7115 D=1
7120 RESUME 7030
7130 REM *****
7200 REM OPEN FILE F
7210 ON ERROR GOTO 7300
7220 OPEN OLD F(F) AS F
7230 ON ERROR GOTO 0
7240 IF S(F)>0 THEN D=1
7250 RETURN
7300 REM error handler
7310 RESUME 7230
7320 REM *****

```

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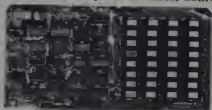
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Listing/Copying Apple Text Files

Jack P. Ott

One of the minor annoyances in using text files on the Apple II with DOS 3.2 is the inability to get a printout of the file as easily as one can by loading and listing a Basic program.

Another nuisance is the fact that there is no simple command sequence to load and save duplicates of the text file on different drives or under different names on the same drive. The only way to accomplish this is to write a complete program to do these tasks.

In practice, most well-designed programs that use text files should incorporate these features as options somewhere in the program. However, the results are generally specific to the files created by the original program and must match the format used (type and number of variables per record, etc.) and/or be included on a possible menu of available files. This does not help the user who is writing a program and needs the listing and copying options, to help detect and debug errors. Most text editors can help here, but not everyone, especially those just learning about Apple text files, can justify their expense.

With these difficulties in mind, this article presents a program that permits the listing and copying of any text file, and allows simple editing of whole records. You can delete or insert a complete record, or change a record by retyping the new entry.

If you wish, a backup file can be made before any editing is done. This program

is not as versatile as a true text editor since it is not screen-oriented and you cannot change just one letter or word. However, it is much simpler to use.

While not necessarily efficient, this program does have the ability to create a new text file. The REM statements in the program give details on how to do this.

Programming Style

The program was written with clarity as its first objective, not efficiency. It squanders memory space recklessly by using many REM statements and avoiding subroutines. No POKES, PEEKs or CALLs were used if an equivalent Applesoft line would do. Despite a goal of comprehensibility, the listing wanders around a bit as Basic programs tend to do. This is

not excessive, and with the REM statements most programmers should be able to follow it.

The program is well documented. The REM statements should be read because they explain all the details of how the code works, the potential problems that might be encountered and the limitations that exist.

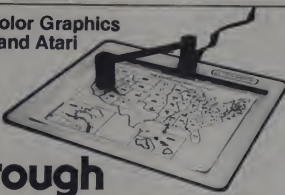
Some readers, after reading the listing here, might prefer to omit the REM statements. The only problem is that nine of the GOTO statements are keyed to REM line numbers. I prefer it this way since it helps people who are trying to follow the code. For me it does not slow execution discernibly, and my Apple has enough memory. The changes are listed in Table I. □

Table I. Listing/Copying Apple II Text Files.

Program Line Number	Calls for GOTO	Change To
2500	3370	3620
2670	6370	6440
2680	2720	3030
3280	3310	3350 (3345 if printer used)
3800	3890	3950
4240	5290	5340
4270	4350	4470
6060	6320	6360
6550	6580	6575 (only if printer used)
6670	6930	6970

High-Resolution Color Graphics for the Apple and Atari

Graphics Breakthrough



How many programs have you written that would benefit from animated high-resolution graphics? Probably several. It is this kind of dramatic graphics that distinguish outstanding programs from ordinary ones. But if you've ever agonized for hours or days just to get one image perfected, you're probably not anxious to do it again. Now there's a better way.

New Graphics Entry System

Today there is a new graphics system available that is not only amazingly user-oriented but surprisingly economical. Called VersaWriter, it starts with an ingeniously simple entry board consisting of a 14" X 12" high impact plastic bed with a tough clear plastic overlay sheet. The original drawing or diagram is fastened with masking tape to the plastic bed and then covered with the clear sheet. Instead of using a light pen or complicated electronic X-Y head, the VersaWriter uses a double jointed arm attached to the top of the entry board at one end and a magnifying lens with crosshairs at the other end. The VersaWriter resembles a draftsman's pantograph on a smaller scale.

At each joint in the arm of the VersaWriter is a potentiometer. A cable from these potentiometers connects to the paddle input of the computer. No special interface electronics or board is needed. Since the arm of the VersaWriter bends only in one direction, each point on the plotting head corresponds to a unique set of resistances on the potentiometers. All that's needed now is software to translate these resistances into usable screen coordinates.

Exceptionally powerful software

It is in the software where VersaWriter really stands out. VersaWriter comes with two full disks of user-oriented software. First it has sets of "low level" commands for entering, creating and copying drawings and diagrams. Secondly, it has extensive sets of application routines for moving, enlarging, rotating, coloring or animating drawings that the user has created.

Of course the basic commands let you enter a drawing freehand or by tracing it. Want a wider brush stroke? Six widths are available. Drawings can be independently scaled in both the vertical and horizontal directions. An enclosed shape may be filled in with any of 106 colors. No, that is not a misprint—By the same technique that a printing press can create hundreds of colors from the three primary ones, so can VersaWriter.



Here a shape (the letter A) is being scanned. After putting it in a shape table it may be used in other programs.



From the shape table, a shape (the letter A) may be enlarged, rotated, colored or moved about the screen.

Create Animation for Other Programs

The shapes you create with VersaWriter can be used and manipulated with ease in other programs. Up to 255 shapes can be entered into a shape table. These shapes may then be placed on the screen in any position or may be overlaid on a full or partial screen image. Animation is produced easily by moving about a portion of the image created by VersaWriter. For example, by alternating between two images of an airplane propeller it will appear to be spinning.

Other VersaWriter software includes text-writer with which text can be added to graphics. Upper and lower case, choice of color, text size, direction and starting point all may be specified.

The Area/Distance program lets you calculate distances (or perimeters) by entering a scale and tracing a shape or map route with the drawing arm. Areas of figures, open and irregular, can be similarly calculated.

The software also includes sets of electronic and computer logic shapes. In addition, an entire disk of dramatic demonstration graphics is included. These twelve full-screen graphics run the gamut from a fully labeled cross section of a human skull to colored maps to animated cartoons to an electronics schematic.

Software Updates

You may have read a review of VersaWriter that indicated that the color fill routine was slow. It was. But not any more. Several routines and improvements were added to the VersaWriter software since its introduction. An added feature, the Expansion Pac, is also now available. This third disk of software contains an area distance program, a microscope feature, and will save your graphics in the exact colors you prefer. It also includes shape tables for architecture, plumbing, electrical, circuit boards, landscape, chemistry, games, and more; 350 predefined shapes in all.

At Peripherals Plus, we evaluated every graphics device. We wanted to handle the best one regardless of price. VersaWriter has the best performance bar none. Surprisingly, it also has the lowest price. Just \$299.00 for the Apple version. It requires an Apple II Applesoft in Rom (or an Apple II Plus), disk, and 48K memory. VersaWriter comes complete with two disks of software, a comprehensive instruction manual, and a 90-day limited warranty. The additional Expansion Pac is available for \$39.95.

The Atari version, which varies slightly from the Apple version in number and types of functions performed, is available for \$299.00. As new updates are developed for the Atari, Peripherals Plus will furnish them free to all customers—just send us the disk and we'll supply the updated material. We make this unique offer because it is in our best interest to have you make the best use of your computer. We're also convinced that if other people see your VersaWriter in use they'll want one too.

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To order, specify Apple or Atari version. Send payment* indicated plus \$3.00 postage and handling to Creative Computing, Dept. C0523, One Park Avenue, New York, N.Y. 10016. Orders may also be charged to your Visa, MasterCard or American Express account—by mail include credit card name, number and expiration date, or if you prefer, use our 24 hour toll-free number, 800-631-8112. In NJ only 201-540-0445.

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All programs are menu-driven and allow add/change/delete. Also, all files and statements can be listed to screen or printer, and saved to cassette or diskette. The cost of THE COLOR ACCOUNTANT is \$75 for cassette and \$80 for diskette. This package requires 16K for the TRS-80 COLOR, Model I, III, and Apple II+. However the ATARI 400/800 requires 24K for cassette and 32K for diskette. THE COLOR ACCOUNTANT also comes with 40 pages of documentation.

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*All software available on cassette for ATARI 400/800, APPLE II + MODEL I, III, COLOR. On Diskette for the APPLE II +, MODEL III ATARI 400/800.

```

0001 REM
0002 REM THIS PROGRAM IS WRITTEN IN APPLESOFT USING DOS 3.2
0003 REM IT CAN FIT INTO A 24K MACHINE IF MANY OF THE REMS
0004 REM ARE DELETED SINCE HCR IS NOT USED SO THAT
0005 SECTION IF HPMKY CAN BE OVERWRITTEN
0006 REM
0007 REM AUTHOR: JACK P. OTT
0008 REM
0009 REM WEST HEMPSTEAD HIGH SCHOOL
0010 REM
0011 REM THIS VERSION OF THE PROGRAM IS FORMATTED SO THAT
0012 REM THE ALIGNMENT IS APPROPRIATE FOR LISTING ON A PRINTER
0013 REM
0014 REM THIS PROGRAM READS A TEXT FILE AND PRINTS OUT
0015 REM THE CONTENTS ON THE CRT
0016 REM
0017 REM IF YOU WISH THE FILE LISTINGS TO BE DONE ON YOUR PRINTER
0018 REM YOU WOULD HAVE TO ADD THE LINES GIVEN AT THE END OF
0019 REM THE PROGRAM, THEY ASSUME YOU ARE USING A CARD IN SLOT 1
0020 REM TO INTERFACE YOUR PRINTER TO THE APPLE
0021 REM
0022 REM IT THEN PERMITS SIMPLE EDITING ON THIS FILE
0023 REM YOU CAN EITHER INSERT, DELETE OR CHANGE WHOLE RECORDS
0024 REM YOU MUST REMEMBER THE POSITION OF THE RECORD THAT
0025 REM YOU WANT TO CHANGE
0026 REM
0027 REM YOU CAN USE CONTROL S TO STOP PRINTING
0028 REM WHILE YOU CHECK RECORDS
0029 REM OR NOTE POSITION NUMBERS AND CHANGES YOU WANT TO MAKE
0030 REM
0031 REM IT ALSO ALLOWS YOU TO SAVE A COPY OF THE TEXT FILE
0032 REM ON EITHER DISK DRIVE
0033 REM
0034 REM A DEFAULT MODE IS AVAILABLE IN THIS COPYING ROUTINE
0035 REM TO USE IT JUST HIT RETURN WHEN ASKED FOR THE COPY'S FILE
0036 REM THE DEFAULT MODE USES THE SAME FILE NAME
0037 REM AND OPPOSITE DRIVE NUMBER
0038 REM
0039 REM WHEN YOU BEGIN USING THE PROGRAM
0040 REM YOU MUST SPECIFY THE FILE NAME, THE TYPE, I.E.,
0041 REM (SEQUENTIAL OR RANDOM)
0042 REM THE LENGTH IF RANDOM, AND THE DRIVE NUMBER
0043 REM
0044 REM : PKINT : PRINT
0045 REM
0046 REM THE ONERR TRAP IS USED TO PREVENT PREMATURE TERMINATION
0047 REM OF THE PROGRAM WHEN SPECIFIC ERRORS OCCUR
0048 REM DETAILS ARE GIVEN IN THAT PART OF THE PROGRAM
0049 REM
0050 ONERR GOTO 3370
0051 REM
0052 REM A$(J) HOLDS THE TEXT FILE AS IT IS READ
0053 REM
0054 REM A$(J) IS DIMENSIONED AS 200
0055 REM BUT COULD BE CHANGED FOR A LONG TEXT FILE
0056 REM JUST CHANGE THE VALUE OF MAXLN TO DO THIS
0057 REM
0058 LET MAXLN = 200
0059 DIM A$(MAXLN)
0060 REM
0061 REM CHR$(13) IS A CARRIAGE RETURN
0062 REM
0063 LET R$ = CHR$(13)
0064 LET D$ = CHR$(4)
0065 PRINT D$;"RANDOM OR SEQUENTIAL- TYPE R OR S :";IT$
0066 INPUT RANDOM OR SEQUENTIAL- TYPE R OR S :IT$
0067 IF IT$ = "S" THEN PRINT : GOTO 6370
0068 IF IT$ = "R" THEN PRINT : GOTO 2720
0069 PRINT : FLASH : PRINT "JUST R OR S, PLEASE"
0070 FOR HH = 1 TO 2000: NEXT HH
0071 NUMML : HOME : PRINT : PRINT : GOTO 2660
0072 REM
0073 REM IF YOU NAME AN EXISTING FILE AND ITS CORRECT LENGTH
0074 REM THE PROGRAM WORKS WELL
0075 REM
0076 REM IF YOU GIVE A NON-EXISTING FILE NAME, THE PROGRAM
0077 REM CREATES AN EMPTY FILE WITH THAT NAME
0078 REM THIS FEATURE CAN BE USED TO CREATE TEXT FILES
0079 REM
0080 REM TO HAVE THIS PROGRAM CREATE FILES
0081 REM JUST NAME YOUR FILE AND USE THE INSERT MODE TO ENTER IT
0082 REM YOU MUST BEGIN WITH RECORD 0 AND PROCEED CONSECUTIVELY
0083 REM
0084 REM A WRONG LENGTH GIVES UNRELIABLE AND/OR WFRD RESULTS

```

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Text Files, continued...

```

2850 REM
2860 REM IF YOU DON'T KNOW THE RANDOM TEXT FILE'S LENGTH,
2870 REM YOU HAVE TO TRY DIFFERENT VALUES
2880 REM UNTIL THE RESULTS LOOK RIGHT
2890 REM
2900 REM IF THE RANDOM TEXT FILE HAS UNUSED RECORDS THE OUT OF DATA
2910 REM ERROR WILL OCCUR AND YOU WILL ONLY SEE THE PART OF THE
2920 REM FILE THAT PRECEDES THIS CAP
2930 REM THIS IS A REAL PROBLEM IF RECORD 0 IS UNUSED
2940 REM DOCTORING THE VALUE OF R IN LINE 3250 CAN HELP COMPENSATE
2950 REM FOR THIS BUT THIS CAUSES OTHER PROBLEMS IF EDITING OR COPYING
2960 REM IS DONE BECAUSE AN UNUSED RECORD AND A BLANK RECORD
2970 REM CONTAINING JUST A CARRIAGE RETURN ARE NOT THE SAME
2980 REM
2990 REM THE PROGRAM LINES NECESSARY TO HANDLE THIS KIND OF
3000 REM RANDOM TEXT FILE ARE GIVEN IN REM STATEMENTS
3010 REM AT THE END OF THE PROGRAM LISTING
3020 REM
3030 PRINT "WHAT IS THE NAME OF THE TEXT FILE YOU"
3040 INPUT "WISH TO LOOK AT ? " : IN$
3050 PRINT
3060 INPUT "LENGTH OF RECORD ? " : IL
3070 PRINT
3080 INPUT "DISK DRIVE ? " : ID
3090 PRINT D$ : OPEN "N" : IL " " : D$ "D"
3100 REM
3110 REM USING A GET STATEMENT THE APPLE READS
3120 REM A CHARACTER AT A TIME UNTIL IT HITS
3130 REM A CARRIAGE RETURN
3140 REM
3150 REM IT CONCATENATES EACH ENTRY UNTIL THE CR IS ENCOUNTERED
3160 REM
3170 REM THIS IS CONSIDERED A RECORD AND IS PRINTED
3180 REM
3190 REM THIS IS BASICALLY THE SCHEME DESCRIBED
3200 REM IN THE DOS MANUAL
3210 REM
3220 HOME : PRINT : PRINT : PRINT
3230 PRINT "FILE CONTENTS ARE:" : PRINT : PRINT
3240 FOR J = 0 TO MAXLNG
3250 PRINT D$ : READ N$ : R$ : J
3260 LET A$(J) = ""
3270 GET B$
3280 IF B$ = RS THEN GOTO 3310
3290 LET A$(J) = A$(J) + B$
3300 GOTO 3270
3310 REM
3320 REM SINCE THE FIRST CHARACTER AFTER A DOS GET IS NOT
3330 REM PRINTED, CHR$(6) IS USED AS A THROWAWAY PRINT ELEMENT
3340 REM
3350 PRINT CHR$(6) : J$ : HTAB 6 : PRINT A$(J)
3360 NEXT J
3370 REM
3380 REM THE ONERR TRAP IS USED TO SCREEN OUT SEVERAL PROBLEMS
3390 REM WHEN AN ERROR OCCURS THE CODE IS STORED IN CELL 222
3400 REM BY CHECKING FOR SPECIFIC ERRORS AND PROVIDING APPROPRIATE
3410 REM ACTIONS IN EACH CASE, WE PREVENT PREMATURE TERMINATION
3420 REM
3430 REM AN ERROR CODE OF 5 MEANS THE FILE RAN OUT OF DATA
3440 REM WHICH OCCURS BECAUSE NO LENGTH IS SPECIFIED AT THE BEGINNING
3450 REM THE FILE IS CLOSED AND THE PROGRAM GOES TO THE EDITING PHASE
3460 REM
3470 REM SINCE THE MACHINE TRIED TO READ BEYOND THE END
3480 REM OF A FILE GETTING OUT OF DATA IN THE 'J' LOOP
3490 REM THE LENGTH OF THE FILE IS FROM 0 TO J-1
3500 REM
3510 REM A CODE OF 6 MEANS YOU TRIED TO DELETE A FILE THAT DID NOT
3520 REM EXIST DURING THE COPYING PHASE OF THE PROGRAM
3530 REM THE MACHINE SIMPLY GOES BACK TO THE NEXT STEP
3540 REM
3550 REM A CODE OF 254 MEANS YOU MISTYPED THE INPUT
3560 REM FOR EXAMPLE, 'YES' WHEN A NUMBER IS REQUIRED
3570 REM AFTER A MESSAGE YOU SIMPLY GO BACK TO THE SAME SPOT
3580 REM
3590 REM FOR OTHER, UNANTICIPATED, ERRORS THE CODE IS PRINTED
3600 REM AND EXECUTION HALTED
3610 REM
3620 LET Y = PEEK (222)
3630 IF Y = 5 THEN PRINT D$ : CLOSE N$
3640 IF Y = 5 THEN GOTO 3710
3650 IF Y = 6 AND T$ = "R" THEN GOTO 4250
3660 IF Y = 6 AND T$ = "S" THEN GOTO 4860
3670 IF Y = 254 THEN PRINT "INPUT IN INCORRECT FORM"
3680 IF Y = 254 THEN RESUME
3690 PRINT "ONERR CODE IS " : Y

```



```

6320 REM
6330 REM THIS IS THE AREA WHERE THE NEXT OPTION
6340 REM FOR RANDOM TEXT FILES SHOULD BE WRITTEN
6350 REM
6360 STOP
6370 REM
6380 REM THIS SECTION FUNCTIONS EXACTLY THE SAME AS
6390 REM THE RANDOM FILE SECTION
6400 REM
6410 REM READ THE REMARKS THERE FOR A DESCRIPTION
6420 REM OF HOW THE PROGRAM WORKS
6430 REM
6440 PRINT "WHAT IS THE NAME OF THE TEXT FILE YOU"
6450 INPUT "WISH TO LOOK AT ? " : $N$
6460 PRINT
6470 INPUT "DISK DRIVE # ? " : I$
6480 PRINT $I$;"OPEN" ; $N$ ; $I$
6490 HOME : PRINT : PRINT : PRINT
6500 PRINT "FILE CONTENTS ARE:" : PRINT : PRINT
6510 FOR J = 0 TO MAXLNG
6520 PRINT $I$;"READ" ; $N$
6530 LET A$(J) = ""
6540 GET B$
6550 IF B$ = $ THEN GOTO 6580
6560 LET A$(J) = A$(J) + B$
6570 GOTO 6540
6580 PRINT CHR$(63) ; " " ; " : HTAB 61 : PRINT A$(J)
6590 NEXT J
6600 REM
6610 REM REMEMBER IT WILL BREAK OUT OF THIS LOOP
6620 REM BECAUSE OF THE ONERR COMMAND
6630 REM
6640 PRINT : PRINT : PRINT
6650 INPUT "DO YOU WANT THIS FILE COPIED ? " : $H$
6660 IF $H$ = "YES" THEN GOTO 6750
6670 IF $H$ = "NO" THEN GOTO 6930
6680 PRINT : FLASH : PRINT "JUST YES OR NO, PLEASE"
6690 FOR HH = 1 TO 2000 : NEXT HH
6700 NORMAL : CALL - 998 : PRINT " "
6710 CALL - 998 : CALL - 998 : CALL - 998
6720 PRINT " "
6730 CALL - 998 : FOR HH = 1 TO 200 : NEXT HH
6740 GOTO 6650
6750 PRINT
6760 PRINT "WHAT NAME SHOULD THE COPY HAVE"
6770 INPUT $N$
6780 IF $N$ < " " THEN GOTO 6830
6790 LET $N$ = $N$
6800 IF D = 1 THEN LET DR = 2
6810 IF D = 2 THEN LET DR = 1
6820 GOTO 6850
6830 PRINT
6840 INPUT "WHAT DRIVE IS THE COPY TO GO ON ? " : I$
6850 PRINT $I$;"DELETE" ; $N$ ; $I$
6860 PRINT $I$;"OPEN" ; $N$ ; $I$
6870 FOR JC = 0 TO J - 1
6880 PRINT $I$;"WRITE" ; $N$
6890 PRINT $I$ ; JC
6900 NEXT JC
6910 PRINT $I$;"CLOSE" ; $N$
6920 PRINT : PRINT : PRINT "THE FILE HAS BEEN COPIED"
6930 REM
6940 REM THIS IS THE AREA WHERE THE NEXT OPTION
6950 REM FOR SEQUENTIAL TEXT FILES SHOULD BE WRITTEN
6960 REM
6970 STOP
6980 REM
6990 REM ADDING THE STEPS SHOWN BELOW WILL ALLOW YOU TO READ
7000 REM RANDOM TEXT FILES WITH UNUSED RECORDS MIXED BETWEEN
7010 REM THE WRITTEN ONES
7020 REM HOWEVER IT WILL NOT PERMIT COPYING OR EDITING AS THE ROUTINE
7030 REM ENDS WITH AN ERROR AFTER THE LAST WRITTEN RECORD OF
7040 REM THE RANDOM FILE IS PRINTED
7050 REM
7060 REM TO INCLUDE THESE LAST FEATURES WOULD INVOLVE A MORE
7070 REM SOPHISTICATED PROGRAM INVOLVING THE TRACK/SECTOR MAP
7080 REM OF THE RANDOM TEXT FILE
7090 REM
7100 REM INSERT THESE STEPS INTO THE PROGRAM
7110 REM
7120 REM 3235 LET TEMP = 0
7130 REM 3240 FOR J = TEMP TO MAXLNG
7140 REM 3622 IF Y = 5 AND T$ = "R" THEN PRINT $I$;"OPEN" ; $N$ ; "L" ; $I$ ; $I$
7150 REM 3625 IF Y = 5 AND T$ = "R" THEN TEMP = J + 1 : GOTO 3240
7160 REM
7170 REM
7180 REM
7190 REM ADDING THE LINES SHOWN BELOW WILL CAUSE LISTING

```

An introductory five-day seminar for musicians and visual artists will be held on the campus of the University of California, Santa Barbara from July 12-16, 1982.

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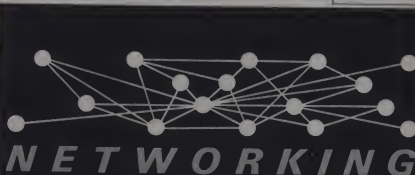
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Text Files, continued...

```
7200 REM OF THE TEXT FILES TO BE DONE BY THE PRINTER
7210 REM INSTEAD OF THE CRT
7220 REM
7230 REM THEY ARE ROUTINE EXCEPT ONE MUST BE CAREFUL
7240 REM TO BE SURE A CARRIAGE RETURN IS ALWAYS
7250 REM PRINTED IMMEDIATELY BEFORE A DOS COMMAND IS
7260 REM GIVEN
7270 REM 3215 PRINT : PRINT D$;"PR#1"
7280 REM 3235 PRINT D$;"PR#0" : PRINT
7290 REM 3345 PRINT 1 PRINT D$;"PR#1"
7300 REM 3355 PRINT D$;"PR#0" : PRINT
7310 REM
7320 REM 5240 PRINT : PRINT D$;"PR#1"
7330 REM 5245 PRINT "FILE CONTENTS ARE:" : PRINT
7340 REM 5275 PRINT D$;"PR#0"
7350 REM
7360 REM 6485 PRINT : PRINT D$;"PR#1"
7370 REM 6505 PRINT D$;"PR#0" : PRINT
7380 REM 6550 IF B$ = R$ THEN GOTO 6575
7390 REM 6575 PRINT "PR#1"
7400 REM 6585 PRINT D$;"PR#1"
7410 REM 6585 PRINT D$;"PR#0" : PRINT
```

Sample Run.

RANDOM OR SEQUENTIAL-TYPE K OR S IK

WHAT IS THE NAME OF THE TEXT FILE YOU
WISH TO LOOK AT ? INVENTORY

LENGTH OF RECORD ? 38

DISK DRIVE ? 1

FILE CONTENTS ARE:

```
0) 6 ITEMS
1) GUITAR STRAP-GS-62,10,3
2) ACOUSTICAL GUITAR-AG-34,5,2
3) ELECTRIC BASS-EB-71,5,1
4) AMPLIFIER-AM-56,2,0
5) ELU ALBUM-EL-156,10,-1
```

DO YOU WISH TO MAKE ANY CHANGES IN
THIS FILE (YES, NO, LIST) ? YES

DO YOU WANT A BACK-UP FILE CREATED
BEFORE YOU START ANY EDITING ? YES

DO YOU WISH TO:

```
C) CHANGE A RECORD
D) DELETE A RECORD
I) INSERT A RECORD
```

WHICH (C, D OR I) ? I

WHICH POSITION SHOULD THIS NEW
RECORD OCCUPY ? 6

TYPE OUT THE RECORD EXACTLY AS YOU
WISH IT TO APPEAR. REMEMBER TO ENCLOSE
THE WHOLE ITEM IN QUOTES IF IT
INCLUDES COMMAS OR SEMICOLONS

NEW RECORD: "PICKS-P-12,100,20"

DO YOU WISH TO SEE ALL, SOME OR NONE
OF THE UPDATED FILE ?

WHICH (A, S OR N) ? A
FILE CONTENTS ARE:

```
0) 6 ITEMS
1) GUITAR STRAP-GS-62,10,3
2) ACOUSTICAL GUITAR-AG-34,5,2
3) ELECTRIC BASS-EB-71,5,1
4) AMPLIFIER-AM-56,2,0
5) ELU ALBUM-EL-156,10,-1
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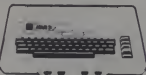
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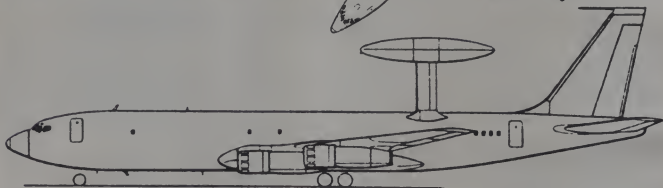
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AWACS



John Hitchcock

"Mommy, why is the smoke coming out of Daddy's ears?"

"I don't know, Marla. It's something about that new computer game he's been working on. Why don't you ask him?"

"Daddy, why are you writing all those ones and zeros on that paper?"

"Well, it's like this; I wrote a whole character set into the Apple hi-resolution screen using a 3 by 5 block for each character. When I tried running the program on the TV set rather than a monitor, I realized the resolution wasn't clear enough, so I'm now doing the whole set over in 5 by 7 blocks."

"Oh, Mom, can we watch 'Little House' tonight?"

So whoever expected eight-year-olds and non-programmers to understand, anyway? That "special feeling" that occurs when you grudgingly admit that a few hours of work must be repeated can't be explained, only experienced.

Anyway, it all started several weeks ago....

My job as a high school physics teacher involves quite a bit of computer programming, mainly in the area of laboratory

The plane is a flying command post from which the events of a battle can be monitored and commanded.

routines or CAI modules. I also teach one class in introductory Basic, so this also involves quite a bit of activity with programming. This "routine" programming is rather interesting, but every so often I get the urge to do some "creative computing" on a major project of my own design.

Recently, I'd been getting anxious to start on another project, but was having difficulty deciding what to work on. Some-

times the hardest part of being creative is getting started, and let's face it, re-inventing the wheel is fun for only the first few times. Finally that elusive idea began to take shape.

AWACS—that's what I'd write! A program to simulate the radar screen of an AWACS aircraft. If you've followed some of the Middle East politics recently, you'll remember that AWACS is the "super radar" plane that we've used in that area of the world. The letters stand for Aircraft Warning And Control System, and the plane is a flying command post from which the events of a battle can be monitored and commanded.

The simulation I envisioned would display a radar screen on which both enemy and friendly aircraft would be displayed. The enemy planes would be en route to destroy friendly bases. The user would be able to control his own aircraft and attempt to destroy the enemy planes before his bases were attacked. Not only should the program be reasonably fast paced, but it should also require a certain degree of concentration and mental alertness.

John Hitchcock, 2255 E. River Rd., Cortland, NY 13045.

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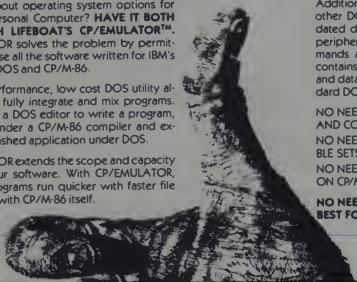
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PMATE: Editor-in-Chief

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1

CIRCLE 162 ON READER SERVICE CARD

AWACS, continued...

The idea was conceived; now the question became how to develop it and give birth to the finished program. My initial reaction was to use a popular "3-D Game Tool" to create the map display and the aircraft indicators. Then I'd get Andy, our school's resident expert in machine language, to write some routines for controlling the aircraft on the screen.

But wait! Suddenly, it's no longer my program! I've simply become an assembler and organizer of other people's skills. So scratch that method.

Then another philosophy began to emerge. Why not use the writing of this program to upgrade my own skills in some of these weak areas. I never had done much using shape tables of any sort, and my ability to use graphics was certainly limited. Perhaps the excitement of working on this project would provide me with the discipline needed to increase my proficiency in these areas.

A few more days of contemplation resulted in several objectives which were to be accomplished in the project:

1) The radar map should use hi-res graphics and would be redrawn periodically as the passage of aircraft erased lines on the screen. The display should also appear quickly on the screen.

2) Aircraft would be indicated by symbols or numbers defined using the Applesoft "shape tables."

3) The user should be able to control which of his planes are airborne, the firing

of weapons from his planes, the speed and direction of his aircraft, and refueling of his planes.

4) It should not be necessary to use the Return key during the playing of the game.

5) Though "real-time" isn't achieved, a sense of fluidity and motion should exist.

What ultimately evolved for AWACS is indicated in the flowchart and the program listing. Those programming purists among the readers will cringe at some of the inefficiencies and cumbersome parts of the program, but perhaps a brief commentary about certain sections will show some of the rationale and philosophy which

led to this particular style of programming.

The program was initially written as one unit rather than separate parts for instructions and the main program. The reason for the switch is that as the program grew in size, it began to infringe on page 1 of the hi-res graphics screen and cause inglorious things to happen to the display.

This little dilemma caused me to explore the memory mapping of the Apple and make the appropriate adjustments. The problem was solved by separating the instructions from the main body of the program.

```

1 REM .....
2 REM .... THIS SECTION CONTAINS....
3 REM .... THE INTRODUCTION AND ....
4 REM .... INSTRUCTIONS FOR THE ....
5 REM .... PROGRAM A.W.A.C.S. ....
6 REM .....
10 DF = CHR$(4)
20 HOME 1: VTAB 12: HTAB 9: PRINT "...A.W.A.C.S..."
30 VTAB 22: THRU "DO YOU NEED INSTRUCTIONS (Y OR N)? " : IF
50 IF AF = "Y" THEN 500
60 IF AF = "N" THEN 110
70 GOTO 20
110 PRINT D$:"RUN AWACS"
500 REM ... BEGIN INSTRUCTIONS
510 HOME
520 PRINT " GREETINGS, COMMANDER. WELCOME TO THE CONTROL BRIDGE OF
A.W.A.C.S."
530 PRINT 1: PRINT "YOU ARE COMMANDING A FLEET OF SIX FIGHTER PLANES
AND ONE REFUELING TANKER. YOU MUST DEFEND YOUR TWO BASES FR
N AN ATTACK BY AN UNDETERMINED NUMBER OF ENEMY FIGHTER BOMBERS."
540 PRINT 1: PRINT "YOU CAN CONTROL THE FOLLOWING ITEMS:"
550 PRINT " 1. WHICH PLANES ARE IN THE AIR
560 PRINT " 2. THE SPEED OF YOUR AIRCRAFT
570 PRINT " 3. THE HEADING OF EACH PLANE
580 PRINT " 4. REFUELING OF EACH PLANE
590 PRINT " 5. FIRING OF 'PROXIMITY DEVICES'
600 PRINT " 6. AN 'IDENTIFY' COMMAND
610 PRINT 1: PRINT "YOU MUST CAUSE YOUR PLANES TO APPROACH WITHIN A CERTA
IN DISTANCE OF THE ENEMY IN ORDER TO DESTROY THEM.
620 GOSUB 900
630 :
640 PRINT "A 'BEEP' SIGNALS THAT ONE OF YOUR AIRCRAFT IS LOW ON FUE
L. YOU MUST USE THE IDENTIFY COMMAND TO FIND WHICH ONE.
650 PRINT 1: PRINT "SINCE WE ARE IN THE MIST OF BATTLE, NOT ALL OF OUR
EQUIPMENT IS WORKING. STRANGE EVENTS MAY OCCUR IF YOU DO NOT RES
POND TO COMMAND REQUESTS IN THE APPROPRIATE TIME
660 PRINT 1: PRINT : GOSUB 900
670 PRINT "TO GIVE A COMMAND, YOU MUST TYPE THE LETTER OF THE COMMAND.
WHEN ASKED, YOU MUST TYPE THE NUMBER OF THE PLANE TO
680 PRINT "THE COMMAND IS DIRECTED.
690 PRINT 1: PRINT "THEN YOU MUST TYPE THE APPROPRIATE NUMBER FOR THE
INFORMATION REQUESTED BY THE COMMAND.
700 PRINT 1: PRINT "IF YOU DO NOT RESPOND TO THE COMMAND REQUEST IN THE
PROPER AMOUNT OF TIME STRANGE EVENTS MAY OCCUR!
710 GOSUB 900
720 PRINT "FOLLOWING IS A LIST OF THE COMMANDS AVAILABLE TO YOU:"
730 PRINT 1: PRINT "S 'SCRAMBLE' AN AIRCRAFT (1-7)
740 PRINT 1: PRINT "V CHANGE THE VELOCITY (1-3)
750 PRINT 1: PRINT "H CHANGE THE HEADING (1-8)
760 PRINT "
770 PRINT " 1
780 PRINT " 2
790 PRINT " 3
800 PRINT " 4
810 PRINT 1: PRINT "F FIRE A WEAPON FROM PLANE(1-6)
820 PRINT 1: PRINT "R REFUEL PLANE (1-6)
830 PRINT 1: PRINT "I IDENTIFY STATUS OF PLANES(1-7)
840 GOSUB 900
850 HOME : VTAB 12: HTAB 9: PRINT "CAPTAIN, ARE YOU READY? (Y OR N) " : GET AF
860 IF AF < "Y" THEN 850
870 VTAB 12: HTAB 9: PRINT "RADAR UNIT INITIALIZING"
880 PRINT CHR$(13)
890 PRINT D$:"RUN AWACS"
900 PRINT 1: PRINT "TYPE ANY KEY FOR MORE DATA " : GET AF : POKE -16368,0
: HOME : RETURN

```

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Adjustments to the main program consisted of setting LOMEM to decimal 24576 to keep the string storage from entering the hi-res screen storage. This was done in line 10 of the main program. The main program was also written with many commands on one line to conserve memory space.

Perhaps the excitement of working on this project would provide me with the discipline needed to improve my programming skills.

Most of the actual program can be followed by reading the REM statements in the listing. In order to assure proper operation, those lines with REM statements should be removed prior to running.

One difficulty does exist for which I have not yet found an answer. To control the aircraft, I wanted the user to type in a certain command (for instance, "S" to scramble one of his planes), and then immediately be able to type a number to indicate which plane was to become airborne.

```

1 REM .....
2 REM .....A. M. A. C. S.....
3 REM .....BY JOHN HITCHCOCK.....
4 REM .....CORTLAND, NEW YORK.....
5 REM .....SET LOWEN TO PREVENT PROGRAM FROM ENTERING HI-RES SCREEN
6
7
8 LOWEN= 24576
9
10
11
12
13 REM ...SET VARIABLES TO READ KEYBOARD AND RESET STROBE...POKES INDICAT
14 E WHERE SHAPES ARE STORED
15
16
17
18
19 D% = CHR$(4):RS = - 16368:RK = - 16384
20 DIM D%(15,10): POKE 232,0: POKE 233,64
21 HGR 1: TEXT
22 HOME : VTAB 12: HTAB 11: PRINT "RADAR UNIT INITIALIZING"
23 POKE D%:"BLORD AWAC SHAPES"
24
25
26 REM ...ESTABLISH INITIAL STATUS OF ALL AIRCRAFT
27
28
29 FOR R = 1 TO 15
30 IF R = 10 THEN D%(R,0) = 1
31 D%(R,1) = 1
32 IF (R = 12) OR (R = 13) THEN D%(R,1) = 2
33 IF R > 13 THEN D%(R,5) = 250:D%(R,6) = 10:D%(14,1) = 5:D%(15,1) = 7
34 D%(R,2) = 1:D%(R,4) = - 1
35 IF R > 13 THEN D%(R,4) = 0
36 IF R < 8 THEN D%(R,5) = 250:D%(R,6) = 130
37 IF R > 7 AND R < 14 THEN D%(R,5) = 40:D%(R,6) = 100
38 IF R < 8 THEN D%(R,7) = R
39 IF R > 7 THEN D%(R,7) = 8
40 IF R < 7 THEN D%(R,8) = 1:D%(R,9) = 75:D%(R,10) = 3
41 IF R > 7 THEN D%(R,8) = 210:D%(R,9) = 1500:D%(R,10) = 1
42 IF R > 7 THEN D%(R,8) = 410:D%(R,9) = 1000:D%(R,10) = 0
43 NEXT
44
45
46
47
48 GOSUB 1880
49 ROT= 0: SCALE = 1
50
51
52
53 REM ...LINES 240-270 DETERMINE WHICH PLANES ARE IN THE AIR; THEIR FLI
54 GHT STATUS, CALCULATE THEIR NEW POSITION AND DRAWS NEW POSITION
55
56
57
58 FOR R = 1 TO 15
59 IF D%(R,0) = 0 THEN 470
60 IF D%(R,0) = - 1 THEN 470
61 HCOLOR=0: DRAW D%(R,7) AT D%(R,5),D%(R,6): HCOLOR= 3
62 IF D%(R,1) = 1 THEN D%(R,5) = 0:D%(R,6) = - 1
63 IF D%(R,1) = 2 THEN D%(R,5) = 110:D%(R,6) = - 1
64 IF D%(R,1) = 3 THEN D%(R,5) = 110:D%(R,6) = 0
65 IF D%(R,1) = 4 THEN D%(R,5) = 110:D%(R,6) = 1
66 IF D%(R,1) = 5 THEN D%(R,5) = 0:D%(R,6) = 1
67 IF D%(R,1) = 6 THEN D%(R,5) = - 110:D%(R,6) = 1
68 IF D%(R,1) = 7 THEN D%(R,5) = - 110:D%(R,6) = 0
69 IF D%(R,1) = 8 THEN D%(R,5) = - 110:D%(R,6) = - 1
70 IF D%(R,2) = 1 THEN D%(R,9) = D%(R,9) - 1
71 IF D%(R,2) > 1 THEN D%(R,9) = D%(R,9) - 2
72 IF D%(R,9) < = 0 THEN D%(R,0) = - 1
73 IF D%(R,9) < 15 THEN PRINT CHR$(7)
74 DX = D%(R,2) * D%(R,3)
75 DY = D%(R,2) * D%(R,4)
76 D%(R,5) = D%(R,5) + DX
77 D%(R,6) = D%(R,6) + DY
78 IF D%(R,5) < 5 OR D%(R,5) > 276 THEN D%(R,5) = 0:D%(R,6) = - 1
79 IF D%(R,6) < 3 OR D%(R,6) > 156 THEN D%(R,6) = 0:D%(R,0) = - 1
80 DRAW D%(R,7) AT D%(R,5),D%(R,6)
81 NEXT R
82
83
84
85 REM ...LINES 480 AND 490 CHECK TO SEE IF A COMMAND KEY HAS BEEN PRESS
86 ED. IF SO, THEN JUMP TO 770
87
88
89
90
91 X = PEEK (RK): POKE RS,0
92 IF X > 127 THEN 770
93
94
95
96 REM ...LINES 510-750 DETERMINE FLIGHT PATTERN OF ENEMY PLANES AND DET
97 ERMINE IF A BASE IS ATTACKED
98
99
100

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AWACS, continued...

This is initially done is line 480 where X becomes the value of location -16384. POKEing the value of RS (-16368) resets the strobe so another value can be read in. If a key has been pressed, then the program branches from line 490 to 770. Lines 770-820 check to see if the key pressed is one of the valid command moves. If not, the program returns to line 500 to continue the flight of the planes.

If the key pressed is a valid command, then the program branches to the appropriate sub-routine to handle the rest of the command sequence. And that's where the trouble begins. To illustrate the problem, suppose the user wants to change the heading of one of his planes. He presses the letter "H" (ASCII 200) which is first detected at lines 480 and 490. Line 780 identifies the key pressed as an "H" and then routes the program to line 890.

I originally wanted the program to look something like the following:

```
900 FOR K = 1 TO 250
910 X = PEEK (RK): POKE RS,0
920 IF (X>48) AND (X<58) THEN
P=X:X=0:GOTO940
930 NEXT K:GOTO500
```

At line 940 a similar sequence would occur in which the user was asked for the value of the heading to be entered. The difficulty was that the second loop was never executed properly, and the value

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```
510 FC = FC + 1
520 IF FC = 2 THEN D%(8,0) = 1:D%(9,0) = 1:D%(10,0) = 1:D%(10,1) = 3: GOTO 740
530 IF FC = 20 THEN D%(11,0) = 1:D%(12,0) = 1:D%(13,0) = 1: GOTO 740
540 IF FC = 52 THEN D%(8,1) = 2:D%(9,1) = 4:D%(11,1) = 3: GOTO 740
550 IF FC = 70 THEN D%(12,1) = 1: GOTO 740
560 IF FC = 80 THEN D%(13,1) = 4:D%(13,2) = 3: GOTO 740
570 IF FC = 87 THEN D%(8,1) = 3:D%(8,2) = 3: GOTO 740
580 IF FC = 100 THEN D%(14,0) = 1:D%(15,0) = 1:D%(14,2) = 5:D%(15,2) = 3: GOTO 740
590 IF FC = 102 THEN D%(9,1) = 2:D%(10,1) = 4:D%(10,2) = 3:D%(12,1) = 3: GOTO 740
600 IF FC = 115 THEN D%(10,1) = 3:D%(13,1) = 3: GOTO 740
610 IF FC = 120 AND D%(8,0) > 0 THEN GOSUB 1830
620 IF FC = 125 AND D%(15,0) > 0 THEN GOSUB 1830
630 IF FC = 126 AND D%(14,0) > 0 THEN GOSUB 1840
640 IF FC = 130 THEN D%(13,1) = 4
650 IF FC = 135 THEN D%(11,1) = 1:D%(11,2) = 3:D%(12,2) = 3: GOTO 740
660 IF FC = 138 AND D%(10,0) > 0 THEN GOSUB 1840
670 IF FC = 140 AND D%(13,0) > 0 THEN GOSUB 1840
680 IF FC = 142 THEN D%(9,2) = 3: GOTO 740
690 IF FC = 155 AND D%(12,0) > 0 THEN GOSUB 1830
700 IF FC = 156 AND D%(11,0) > 0 THEN GOSUB 1830
710 IF FC = 157 AND D%(9,0) > 0 THEN GOSUB 1830
720 IF TB = 1 AND FB = 1 THEN 1850
730 IF FC = 157 THEN 1860
740 VTAB 21:WTAB 1:CALL - 958:PRINT "COMMAND = "FC
750 GOSUB 1880
760 GOTO 240
761 :
762 :
765 REM ...CHECK TO SEE WHICH COMMAND KEY HAS BEEN PRESSED
766 :
767 :
770 IF X = 211 THEN X = 0: GOTO 840
780 IF X = 200 THEN X = 0: GOTO 890
790 IF X = 198 THEN X = 0: GOTO 1250
800 IF X = 214 THEN X = 0: GOTO 1090
810 IF X = 210 THEN X = 0: GOTO 1550
820 IF X = 201 THEN X = 0: GOTO 1700
830 GOTO 510
832 :
833 :
835 REM ... 'SCRAMBLE' YOUR AIRCRAFT
836 :
837 :
840 VTAB 21:CALL - 958:PRINT "SCRAMBLE WHICH PLANE (1-7)?"
850 FOR K = 1 TO 250
860 X = PEEK (RK): POKE RS,0
870 IF (X > 48) AND (X < 58) THEN X = X - 48:D%(X,0) = 1: GOTO 500
880 NEXT X: GOTO 500
882 :
883 :
885 REM ...CHANGE HEADING OF YOUR AIRCRAFT
886 :
887 :
890 VTAB 21:CALL - 958:PRINT "WHICH PLANE (1-9)?"
900 FOR K = 1 TO 250
910 X = PEEK (RK): POKE RS,0
920 IF (X > 48) AND (X < 58) THEN P# = CHR$(X):P = VAL (P#):X = 0:PRINT P: GOTO 940
930 X = 0: NEXT X: GOTO 500
940 VTAB 23:CALL - 958:PRINT "WHAT HEADING (1-8)?"
950 FOR K = 1 TO 250
960 X = PEEK (RK): POKE RS,0
970 NEXT X
980 IF (X > 48) AND (X < 57) THEN H# = CHR$(X):P# = VAL (H#):X = 0: GOTO 1000
990 GOTO 500
1000 D%(P,1) = H
1010 IF H = 1 THEN D%(P,3) = 0:D%(P,4) = - 1: GOTO 500
1020 IF H = 2 THEN D%(P,3) = 1:D%(P,4) = - 1: GOTO 500
1030 IF H = 3 THEN D%(P,3) = 1:D%(P,4) = 0: GOTO 500
1040 IF H = 4 THEN D%(P,3) = 1:D%(P,4) = 1: GOTO 500
1050 IF H = 5 THEN D%(P,3) = 0:D%(P,4) = 1: GOTO 500
1060 IF H = 6 THEN D%(P,3) = - 1:D%(P,4) = 1: GOTO 500
1070 IF H = 7 THEN D%(P,3) = - 1:D%(P,4) = 0: GOTO 500
1080 IF H = 8 THEN D%(P,3) = - 1:D%(P,4) = - 1: GOTO 500
1090 C = 0:X = 0
1092 :
1093 :
1095 REM ...CHANGE VELOCITY OF AIRCRAFT
1096 :
1097 :
1100 VTAB 21:CALL - 958:PRINT "CHANGE VEL. WHICH PLANE (1-9)?"
1110 X = PEEK (RK): POKE RS,0
1120 IF (X > 48) AND (X < 58) THEN PRINT X - 48: GOTO 1160
1130 C = C + 1
1140 IF C < 250 THEN 1110
1150 GOTO 500
1160 VTAB 23:CALL - 958:PRINT "NEW VELOCITY (1-3)?"
```



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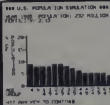
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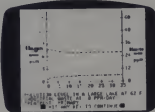
Limits is a microcomputer version of the well known Limits to Growth project done by the Club of Rome. It contains a model of a world that is built of five subsystems (population, pollution, food supply, industrial output, and resource usage) linked together by six variables: birth rate, death rate, pollution generation, resource usage rate, industrial output growth rate, and food production rate. Markets allows two or more people to play the roles of companies who are competing for the market for a particular product. Each player makes marketing decisions quarterly including the production level, advertising budget, and the unit price of the product for his company. USPOP allows the user to study many aspects of the United States human demography (population change) including population growth, age and sex distribution. USPOP makes population projections and investigates the consequences of many different demographic changes. Requires 48K AppleSoft or Apple II Plus. \$24.95 (Also available for PET/IBM and TRS-80.)



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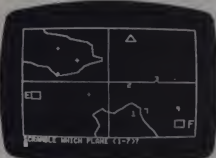
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AWACS, continued...

of the heading always turned out to be the value of the plane which was to be controlled. The method which I use in the program uses a loop like 950-970 to take some time and reset the keyboard strobe with certainty. Now I know that there is a much better way to accomplish this task, but for the life of me, I have been unable to find it. Perhaps you have the answer.



Well, that's a semi-failure. But how about one of the successes of the project. The subroutine at 1870 is used to draw the map portion of the radar screen. The original version of the program simply had lines 1920-2130 incorporated into the early portion of the program. As planes crossed portions of the map display, they would erase part of the map. This was originally corrected by putting the map

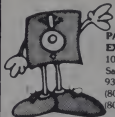
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```

1170 FOR K = 1 TO 400: POKE RS,0: NEXT K
1180 P = X - 48: C = 0: X = 0
1190 X = PEEK (RK): POKE RS,0
1200 IF (X > 48) AND (X < 52) THEN PRINT X - 48: GOTO 1240
1210 C = C + 1
1220 IF C < 250 THEN 1190
1230 GOTO 500
1240 D%(P,2) = X - 48: GOTO 500
1242 :
1243 :
1245 REM ...FIRE 'PROXIMITY MISSILE' FROM YOUR AIRCRAFT
1246 :
1247 :
1250 VTAB 21: CALL - 958: PRINT "FIRE WHICH PLANE (1-6)?":
1260 X = 0
1270 FOR K = 1 TO 250
1280 X = PEEK (PK): POKE RS,0
1290 IF (X > 48) AND (X < 52) THEN PRINT X - 48: P = X - 48: GOTO 1310
1300 NEXT K: GOTO 500
1310 FOR K = 1 TO 200: NEXT
1320 IF D%(P,0) < 1 THEN VTAB 21: PRINT "AIRCRAFT NOT FLIGHT STATUS": FOR
Z = 1 TO 1000: NEXT Z: GOTO 500
1330 IF D%(P,10) < 0 THEN 1470
1340 D%(P,10) = D%(P,10) - 1
1350 VTAB 21: CALL - 958: PRINT "PROXIMITY DEVICE LAUNCHED"
1360 FOR K = 1 TO 50: X = PEEK (- 16336): NEXT
1370 FOR K = 8 TO 15
1380 IF (ABS (D%(K,5) - D%(P,5)) < 6) AND (ABS (D%(K,6) - D%(P,6)) < 6)
THEN D%(P,0) = - 1: GOTO 1500
1390 IF (ABS (D%(K,5) - D%(P,5)) < 11) AND (ABS (D%(K,6) - D%(P,6)) < 1
1) THEN HC = HC + 1: D%(K,0) = - 1
1400 NEXT K
1410 FOR K = 1 TO 200: NEXT
1420 VTAB 23: CALL - 958: PRINT "YOU SCORED 'HITS' HITS .... ":
1430 IF HC > 0 THEN PRINT "GOOD JOB"
1440 IF HC < 0 THEN PRINT "KLUTZ"
1450 FOR Z = 1 TO 1000: NEXT Z
1460 HC = 0: GOTO 500
1470 VTAB 23: CALL - 958: PRINT "WEAPONS DEPLETED"
1480 FOR Z = 1 TO 1000: NEXT Z
1490 GOTO 500
1500 VTAB 21: CALL - 958
1510 FOR K = 1 TO 5: PRINT CHR$(7): NEXT
1520 PRINT "WHAT A DUNDEHEAD...YOU WERE TOO CLOSE BEFORE YOU FIRED AND
WERE SHOT DOWN.
1530 FOR Z = 1 TO 1000: NEXT Z: GOTO 500
1538 :
1539 :
1540 REM ...REFUEL
1541 :
1542 :
1550 VTAB 21: CALL - 958: PRINT "REFUEL WHICH PLANE(1-6)?":
1560 FOR K = 1 TO 250
1570 X = PEEK (PK): POKE RS,0
1580 IF (X > 48) AND (X < 52) THEN 1600
1590 X = 0: NEXT K: GOTO 500
1600 REM ...CHECK REFUEL
1610 P = X - 48
1620 IF (ABS (D%(P,5) - D%(7,5)) > 5) OR (ABS (D%(P,6) - D%(7,6)) > 5) THEN
1670
1630 D%(P,9) = 75
1640 VTAB 23: CALL - 958: PRINT "NOW REFUELED...RESUME MISSION"
1650 FOR K = 1 TO 500: NEXT K
1660 GOTO 500
1670 VTAB 23: CALL - 958: PRINT "CAPTAIN, YOU ARE OUT OF RANGE"
1680 FOR K = 1 TO 500: NEXT K: GOTO 500
1688 :
1689 :
1690 REM ...IDENTIFY ROUTINE
1691 :
1692 :
1700 VTAB 21: CALL - 958: PRINT "IDENTIFY WHICH PLANE(1-7)?":
1710 FOR K = 1 TO 250
1720 X = PEEK (RK): POKE RS,0
1730 IF (X > 48) AND (X < 56) THEN P = X - 48: GOTO 1750
1740 X = 0: NEXT K: GOTO 500
1750 REM ...IDENT
1760 IF D%(P,8) = 1 THEN T$ = "FIGHTER"
1770 IF D%(P,8) = 2 THEN T$ = "TANKER"
1780 VTAB 21: CALL - 958: PRINT "TYPE..": T$
1790 PRINT "FUEL..": D%(P,9)
1800 PRINT "WEAPONS..": D%(P,10)
1810 FOR K = 1 TO 1000: NEXT K
1820 GOTO 500
1822 :
1823 :
1825 REM ...YOUR BASES ATTACKED
1826 :
1827 :
1830 VTAB 21: CALL - 958: PRINT "TRIANGLE BASE ATTACKED": FOR Z = 1 TO 1
000: NEXT Z: TB = 1: RETURN

```

into a GOSUB that periodically re-draw directly on the visible screen and took a few seconds to complete. Spending an hour or so with the screen switches (page 12, 13 of the Apple II Reference Manual) resulted in lines 1880 and 2160 which draw the map in memory before displaying it all at once on the screen.

Suggested Improvements

I've yet to write a program which doesn't have a great deal of room for improvement or revision, and this one is no exception. Some changes or additions could be:

- 1) Add ships or submarines to the seas.
- 2) Make "aimed" missiles and show their paths as they travel. They should be fast, but able to be evaded with fast reactions.
- 3) Include neutral aircraft which, if accidentally shot down, would precipitate a massive attack from "the North."
- 4) Giant explosions should occur when your bases are attacked.
- 5) The user should have a bomber which can attack the enemy air base.

I certainly can't say this program has any "redeeming social value," nor does the programming technique provide subtle insights into the intricacies of Basic. What if I did for me, however, was to provide the thrill and satisfaction of getting a reasonably sophisticated idea to work acceptably on the screen. I realized that my own programming had reached an inevitable plateau, and this project provided the impetus to get off that plateau and onto a higher one.

Most of us amateur programmers could benefit greatly if we periodically searched for a project idea that would take us beyond our present skill level. □

THE FOLLOWING LISTING GIVES THE MACHINE LANGUAGE CODE FOR THE SHAPE TABLE USED IN THE PROGRAM A.M.A.C.B.S.

TYPE CALL=151 TO ENTER THE MONITOR AND THEN ENTER THE FOLLOWING LISTING.

REMEMBER TO CHANGE EACH DASH IN THE LISTING BELDOW TO A COLON.

AFTER YOU HAVE ENTERED THIS SECTION PRESS THE "RESET" KEY TO RE-ENTER BASIC. NOW TYPE BSAVE AHAC SHAPES,A\$4000,L\$7F TO SAVE THE SHAPES ON THE DISK.

3CALL=151

*4000,407F

```
4000- 08 00 12 00 10 00 2C 00
4008- 39 00 46 00 55 00 64 00
4016- 6F 00 24 2F 36 36 36 2D
4024- 1D 3F 3F 05 0D 2D 3C 3F
4032- 3F 2F 2D 35 36 3F 3F 36
4040- 2E 2D 3D 00 2D 24 3C 3F
4048- 2F 2D 35 36 36 3F 3F 3F
4056- 00 3F 24 34 36 2D 2D 27
4064- 24 36 36 36 04 00 3F 24
4072- 2C 2D 3D 3F 37 36 2D 2D
4080- 36 3E 3F 2F 00 3F 24 2C
4088- 2D 3D 3F 37 36 3E 2D
4096- 25 24 3F 00 09 24 3C 3F
4104- 2F 2D 35 36 36 2D 24
4112- 36 2D 3F 37 36 2D 04 00
4120- 07 05 05 06 06 04 00 00
```

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```
1640 VTAB 21: CALL = 958: PRINT "FIGHTER BASE ATTACKED!! FOR Z = 1 TO 920:
00: NEXT Z:IFB = 1: RETURN
1650 FOR K = 1 TO 7: HCOLOR= K: HPLOT 0,0: CALL 62454: FOR Z = 1 TO 250: NEXT
Z: NEXT K: VTAB 21: HTAB 11: CALL = 958: PRINT "URGENT MESSAGE...ALL
BASES DESTROYED...SUGGEST YOU SURRENDER IMMEDIATELY...": END
1660 VTAB 21: CALL = 958: PRINT "GREAT JOB, CAPTAIN..YOU HAVE DESTROYED
ALL THE ENEMY BOMBERS AND WIN THE WAR!!": END
1668 :
1669 :
1670 REM ...MAP DRAW
1671 :
1672 :
1680 POKE 49239,0: POKE 49236,0
1690 :
1691 :
1692 HCOLOR= 3
1693 HPLOT 0,0 TO 279,0 TO 279,159 TO 0,159 TO 0,0
1694 HPLOT 140,0 TO 140,159
1695 HPLOT 0,80 TO 279,80
1696 HPLOT 175,10 TO 183,20 TO 167,20 TO 175,10
1697 HPLOT 15,95 TO 30,95 TO 30,105 TO 15,105 TO 15,95
1698 HPLOT 12,96 TO 5,96 TO 5,104 TO 12,104: HPLOT 5,100 TO 10,100
1699 HPLOT 245,135 TO 260,135 TO 260,145 TO 245,145 TO 245,135
2000 HPLOT 275,136 TO 268,136 TO 268,146: HPLOT 268,140 TO 273,140
2010 X = 35:Y = 0
2020 FOR K = 1 TO 39
2030 REPEAT A,B
2040 HPLOT X,Y TO A,B
2050 X = A:Y = B
2060 IF K = 19 THEN X = 120:Y = 159
2070 NEXT K
2080 DATA 37,6,41,8,56,10,73,13,79,17,106,22,114,27,117,43
2090 DATA 130,46,130,50,110,55,102,58,91,67,75,70,58,72
2100 DATA 42,58,25,56,15,52,0,50
2110 DATA 118,154,125,143,124,140,120,132,115,127
2120 DATA 122,122,130,118,135,122,148,125,155,120,162,117,170,112
2130 DATA 175,110,183,114,190,118,190,125,195,135,203,143,212,150,219,159
2140 :
2150 :
2160 POKE 49235,0: POKE 49232,0
2170 RESTORE
2180 RETURN
```

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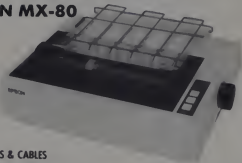
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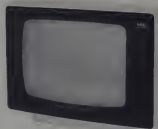
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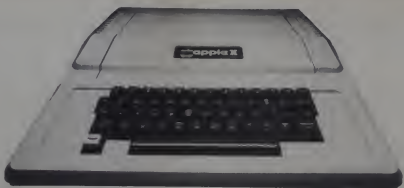
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Chuck Carpenter

As promised, a review of *Program Line Editor* (PLE) is included this month. A tutorial on converting hex to decimal and back is, too. Other items include one-liners and answers to questions from readers. The review of PLE was written by Barry Bayer. Some of you may recognize his name from articles and columns he has written in this and other magazines.

Barry wrote me a letter some time ago and asked me why I was still telling people to use POKE 33,33 to help with their editing, especially since this great PLE program was available. I have PLE but I have never gotten around to using it. When Barry was asked to help, he graciously consented. Here, only slightly edited, is a review of *Program Line Editor* by Barry Bayer.

Program Line Editor

One of the most irritating features of the Apple II is the clearly inadequate editor when entering or modifying Integer Basic or Applesoft floating point Basic programs. Try to insert a letter or two into an Applesoft program, particularly with the old, non-autostart monitor ROM, and by the time you're finished with a complicated sequence of CTRL-As, CTRL-Bs, and all sorts of other controls, you can get a little disgusted with the whole thing.

When a line is listed, the editor automatically includes spaces between keywords, and at the end and beginning of each 34 column line, to make the whole thing more readable. Unfortunately, the only way to make a change in a line is to list it, copy it using the Right Arrow key until the point of change, and continue to copy it to the end.

Unless one carefully advances the cursor with a CTRL A, (ESC K with the autostart monitor ROM) strings tend to be broken up and look terrible. By the time you get to the end, the editor decides that all of those spaces that it put in (that you didn't want to begin with) make the line too long, and issues a *** SYNTAX ERROR message, and ignores the entire modification.

Some problems (squaring the circle, the Middle-East situation) may never be solved. But there are two generally used methods to solve the Apple II editor problems. The first (as has previously been discussed in this column) is to narrow the text window to 34 characters, which eliminates the "prettyprinting" function of the editor (POKE 33,33 does it); the second is to use Neil Konzen's *Program Line Editor*, or PLE, as it is affectionately known.

PLE is a strange type of program that almost everyone has and uses, but nobody ever talks about. For the benefit of new Apple owners, and for you old timers who may not have heard of it, let me describe a program that is really indispensable.

PLE comes well documented, on a DOS 3.2 disk, and is both copyable and Muffinable (to DOS 3.3). It is available commercially through Synergistic Software, and would be well worth its suggested retail price of \$40 if all it did was to solve the "line editing" problems outlined above.

When you run PLE, it lowers HIMEM and the DOS buffers (about 1500 bytes), changes the DOS pointers, and installs itself immediately below DOS and above the DOS buffers and new HIMEM. And there it stays, unaffected by FPs, INTs or even hard RESETs, always ready to do its stuff.

Load a program, in either Integer Basic

or Applesoft. Find a line that you wish to edit, and key in CTRL-E and the line number. Thus far, you have done the equivalent of a LIST line number. But now starts the fun.

The sequence of CTRL-F and any keyboard letter or number key, will find the next occurrence of the character in the line. Press the same key again, and the cursor goes to the next occurrence of that character. Press any other key to get out of the sequence. CTRL-N puts the cursor at the end of the line, and CTRL-B puts it at the beginning. CTRL-Z will ZAP from the current cursor position up to, but not including the character pressed after the CTRL-Z. (A CTRL-Z ":" sequence is an excellent way to eliminate a single statement in a multiple statement line. A second ":" will eliminate a second statement, and so forth.)

A CTRL-P will pack the line and remove all the spaces between tokenized words (just in case the line may be getting too long because of all of those extra spaces inserted by the Basic editor.) But the best thing about all of this is that, once the change is made, a Return is sufficient to enter the new line. *You don't have to re-copy the whole thing.* (Note that a tokenized word is a reserved keyword like PRINT. The interpreter assigns a token of only one byte to each reserved word to conserve memory. See page 121 in the Applesoft Reference Manual. - CC.)

But there is more. Move to the place in the line where you wish to insert characters, press CTRL-I, and start typing. PLE moves everything over to the right to make room for your insertion, be it a character, a word, or a full statement or two. And of course, a CTRL-D will delete characters. CTRL-A performs a case change trans-

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formation, enabling the programmer to insert lower case within strings. (Lower case could also be placed into a program proper, but such characters will either be changed into upper case, or rejected by the Basic editor.) Of course your monitor screen will not show lower case unless you have modified your Apple by adding a lower case character generator of some sort. But, the feature can be used for text intended to be printed on a printer with lower case.

ESC-T is the equivalent of typing in TEXT and Return, ESC-L does a LIST, and ESC-W does a relatively complicated set of PEEKs and calculations and then PRINTs the address and length (in decimal) of the last BLOADED program, and ESC — jumps eight columns to the right. RUN, PRINT, CALL-151, or just about anything else you can think of can be programmed into this Escape Create feature. All are transparent to the user. All are easily modifiable by the user.

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But maybe I was too rash in my opening. *Program Line Editor* is not indispensable. It is possible in the Apple Basics without it. But just like central heating, electric

refrigerators, and indoor plumbing, I would rather not be without it. And I am sure that after you try it, you won't want to get along without it, either. (Thanks Barry—CC.)

Converting from one number base to another is a frequent requirement for programming applications. When you use PEEKs and POKEs you need to convert from hex (base 16) to decimal (base 10). Programs to POKE machine language into memory and to dump the contents of memory are examples of practical applications. We will discuss a useful POKE program later, but first, let's consider the techniques for making the conversions.

To convert from one system to another, it is first necessary to understand the nature of the systems. In the Apple, all the characters on the keyboard (and more that aren't available) are assigned codes. The code is known as ASCII—pronounced AS-KEY—which stands for American Standard Code for Information Interchange. There are other codes around, and IBM uses one of their own called EBCDIC. But for anything we do within the Apple, the ASCII code is the only one with which we need to be concerned.

Get your Applesoft II Basic Programming Reference Manual and turn to page 138. Find the numbers 0 and 9 and observe that, in the DEC column, the value assigned is from 48 to 57. On the next page, find the letters A to F. The values assigned here are 65 to 70. Note that there are seven characters between the numbers and letters. Numbers 48 and 7 will be used in the conversions from one base to the other. These numbers are the differences between the code values, the positional values in the table, and the value of the characters we want to convert. Now, let's examine a program that uses these relationships.

Listing 1 is a short program to convert hex numbers to decimal. The program accepts a four-digit hex number, manipulates the digits, then sums the digits in the equivalent decimal number. Input is accepted in line 1000. There is no error checking included, so you will get funny results if you don't use correct characters. Then, a FOR...NEXT loop is set-up in lines 1010 to 1025. This loop steps through each of the four input characters and assigns the decimal value to the digit. First, the digit is converted to its ASCII value by subtracting the ASCII value of hex 0. Next, the digit is a number 0 to 48 is subtracted to put it into the range 0 to 9. If the digit is one of the letters A to F, an additional 10 is subtracted to put the value in the 10 to 15 range. Now we have the values stored in variables D(1) to D(4). Variable 1 is the most significant digit (MSD) and so on.

```

0000 INPUT "ENTER A 4-DIGIT HEX
      NUMBER = ";H$
1010 FOR I = 1 TO 4
      48: IF D(I) > 9 THEN D(I)
           = D(I) - 7
1025 NEXT I
1030 D(1) = D(1) * 4096:D(2) = D(
      2) * 256
1040 D(3) = D(3) * 16:I = D(1) +
      D(2) + D(3) + D(4)
1050 PRINT : PRINT I
]
]
RUN
ENTER A 4-DIGIT HEX NUMBER = FFFF
56535
]
]
RUN
ENTER A 4-DIGIT HEX NUMBER = 9999
39321

```

In line 1030, each of the four variables is converted to its base 16 value. Position 1, the MSD, is 16 to the third power or 4096. Position 2 is 16 squared or 256. Position 3 is 16 to the first power or 16, and position 4 is the 1's position (16 to the 0 power). So each position is multiplied by its positional value and summed in line 1040. Line 1050 prints the results of all the manipulation. The output will be a five-digit number. Using the loop to break down (parse) the hex string makes this a compact conversion routine. Listing 3 is an example of how to do the same conversion without the use of FOR...NEXT loops.

Listing 3. Another way to convert hex to decimal requiring more coding than the example in Listing 1.

```

90 HOME
100 INPUT "INPUT A 4 DIGIT HEX N
    UMBER = ";A$
110 LET I: PRINT
    LET H1 = ASC ( LEFT$ (A$,1)
        ) - 48
130 IF H1 > 9 THEN H1 = H1 - 7
140 LET H2 = ASC ( MID$ (A$,2,1)
        ) - 48
145 IF H2 > 9 THEN H2 = H2 - 7
150 LET H3 = ASC ( MID$ (A$,3,1)
        ) - 48
155 IF H3 > 9 THEN H3 = H3 - 7
160 LET H4 = ASC ( RIGHT$ (A$,1)
        ) - 48
165 IF H4 > 9 THEN H4 = H4 - 7
170 LET H1 = H1 * 4096
180 LET H2 = H2 * 256
190 LET H3 = H3 * 16
200 LET H = H + H1 + H2 + H3 + H
210 PRINT: PRINT "H";A$;" = "
    ;H;"  DECIMAL"

```



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```

1000 INPUT "ENTER 5 DIGIT NUMBER
      "H
1020 FOR I = 1 TO 4
1030 H1 = INT (H / 16) : D(I) = H -
      16 * H1 : H = H1
1040 NEXT I
1050 FOR T = 4 TO 1 STEP -1
1055 H5 = H5 + CHR$(D(T) * 48 +
      7 * (D(T) > 9))
1060 NEXT T
1070 PRINT "PRINT "H5"
1
1
1090
ENTER 5 DIGIT NUMBER 45603
HEX
1
1
1099
ENTER 5 DIGIT NUMBER - 00100
500A4

```

Listing 2. Sample program showing use of FOR...NEXT loops in decimal to hex conversion.

Decimal to Hex

As you might expect, converting from decimal to hex is just the reverse of hex to decimal. Listing 2 is a short program that does this. Again, FOR...NEXT loops are used to minimize coding. Line 1000 accepts input of a five-digit base-10 number. As in the other example there is no error checking. The number should have five digits between 00000 and 65535. This is consistent with the range of memory addressable by the Apple 6502 microprocessor.

Line 1020 uses a loop to break the number into four elements representing the hex values. They are stored in four variables, D(1) to D(4).

Lines 1050 to 1060 are another loop to convert the digits back to their ASCII values. This is accomplished with the CHR\$ string function. To complete the conversion, 48 is added to the value of the digit for the numbers. If it is a letter, an additional 7 is added. Note that line 1155 uses relational logic to test for the range of values. I was not able to make this work in line 1020 of Listing 1. The string H5 is built one character at a time until all four hex characters are accumulated (concatenated).

Line 1070 prints the string with the \$ symbol at the front. In 6502 convention, the \$ symbol is used to indicate a hex number.

All Together Now

Now that you understand how to make the conversions, a program is needed to put it all together. The program in Listing 4 is my example of a way to do it. Lines 1060 to 1160 set up a menu and the logic to make the selection. The hex conversion program is in lines 2000 to 2100. A couple of additional items were added.

```

1000 REM *****
1010 REM PROGRAM TO CONVERT HEX
1020 REM AND DECIMAL NUMBERS.
1030 REM BY: CHUCK CARPENTER.
1040 REM *****
1060 HOME
1070 PRINT "SELECT OPTIONS"
1080 PRINT "-----"
1090 PRINT
1100 PRINT "1. HEX TO DEC
      MAL CONVERSION"
1110 PRINT "2. DECIMAL TO
      HEX CONVERSION"
1120 PRINT "0. END THE PRO
      GRAM"
1130 PRINT
1140 PRINT "ENTER YOUR CHOICE "
      INPUT S
1145 IF S = 2 GOTO 1000
1150 IF S = 0 THEN HOME : PRINT
      "END OF PROGRAM..." : END
1160 ON S GOTO 2000,3000
1170 REM ** HEX TO DECIMAL **
1180 HOME : H5 = "" : T = 0
2010 INPUT "ENTER A 4-DIGIT HEX
      NUMBER. " : H$
2020 FOR I = 1 TO 4
2030 D(I) = ASC ( MID$(H$,I,1))
      - 48 : IF D(I) > 9 THEN D(I)
      = D(I) * 7
2040 NEXT I
2050 D(1) = D(1) * 4096 : D(2) = D(2)
      * 256
2060 D(3) = D(3) * 16 : T = D(1) +
      D(2) * 16 + D(3) * 16 + D(4)
2070 PRINT "PRINT H$ " : T : " : 0
      " : T : " : 0
2080 PRINT "MORE HEX CONVERSIONS
      Y/N " : INPUT A$
2090 IF A$ = "Y" GOTO 2000
2100 GOTO 1000
2120 REM ** DECIMAL TO HEX **
2130 REM *****
3000 HOME : H$ = "" : H1 = 0
3010 INPUT "ENTER A 5-DIGIT BASE
      10 NUMBER..." : H1N = H
3020 FOR I = 1 TO 4
3030 H1 = INT (H / 16) : D(I) = H -
      16 * H1 : H = H1
3040 NEXT I
3050 FOR T = 4 TO 1 STEP -1
3060 H5 = H5 + CHR$(D(T) * 48 +
      7 * (D(T) > 9))
3070 NEXT T
3080 PRINT "PRINT N$ " : H5 : "
      " : HEXADECIMAL"
3090 PRINT "MORE HEX CONVERSIONS
      Y/N " : INPUT A$
3100 IF A$ = "Y" GOTO 3000
3110 GOTO 1000

```

Listing 4. Menu driven program to convert hex and decimal numbers. Combines examples of Listings 1 and 2.

The variables are zeroed in line 2000, and the ability to go back and do it over is included in lines 2080 to 2100. Decimal conversion in lines 3000 to 3110 includes the same additions. Note that there is still no error checking in the program.

You could test for the number of input characters for instance. You could also test to see if they are in the correct range. As they say in the text books, I'll leave this as an exercise for the reader.

```

1 GDSUB 5000
2 CSUB 6000
3 END
5000 REM = ENABLING CLOCK
5010 FOR I = 768 TO 775: READ A$
5020 O1 = ASC ( LEFT$(A$,1)) -
      48
5030 IF D1 > 9 THEN D1 = D1 - 7
5040 D2 = ASC ( RIGHT$(A$,1)) -
      48
5050 IF D2 > 9 THEN D2 = D2 - 7
5060 D1 - D1 * 16 : D2 = D1 + D2 : POKE
      I,T
5070 T = 0 : NEXT I : RESTORE
5080 RETURN
5090 DATA A9,C4,85,39,20,00,C4,
      60
6000 REM = READING CLOCK
6005 CALL 768
6010 POKE 651,58 : POKE 648,58
6020 FOR I = 653 TO 646 STEP -
      1
6030 A$ = CHR$( PEK$(I))
6040 PRINT A$ : NEXT I
6050 PRINT : RETURN
1
1
JRUN
00:01:15

```

Listing 5. Program example to demonstrate one technique to convert hex data to decimal and POKE the result into a memory location within a program.

Making It Work

Having a program to make these conversions is kind of fun. But as a more practical matter, you can't use them at the same time you're writing another program. You would need to do the conversions first, then use them in your program as you write it. Since the most usual case is to convert hex to decimal, an example of a program using the conversion is appropriate. The Mountain Computer Clock in my computer requires machine language to initialize it and generate the clock output. Since the machine language is in hex, it is easier to let the program do the conversion to decimal for the POKE statements. Listing 5 is an example of a program that will do this. Note that in this program only two digits are to be converted. The FOR...NEXT loops used in the examples would take too much code here, so each digit is converted separately. The program is really two subroutines. Lines 1, 2 and 3 are used to call the routines to first, enable the clock and second, to read the clock output.

The machine language program is going to be POKE'd into page 3 of memory, decimal locations 768 (\$300) to 775. A READ...DATA combination is used to store and recall the hex machine language code.

Line 5010 reads each byte of the data as variable A\$. Each digit of the hex byte is converted to its ASCII value in lines 5020 to 5040.

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CIRCLE 200 ON READER SERVICE CARD

```

JLIST
100 REM      HEX TO DECIMAL
110 REM      BY: BILL VON BENKEN
120 REM
200 AS = "0123456789ABCDEF": FOR
    B = 1 TO 16: FOR A = 1 TO 16
        : FOR C = 1 TO 16: FOR I = 1
            TO 16: M% = MID$(AS,B,1):Z
            % = MID$(AS,A,1):Y% = MID$(
            (AS,C,1):X% = MID$(AS,I,1)
            : PRINT M%;Z;Y%;X%,NM = 1) +
            1: NEXT I: NEXT C: NEXT A: NEXT B

```

Listing 6. Single line program to display hex numbers and decimal equivalents.

Listing 7. One liner randomly generates colorful flower patterns.

```

JLIST
10 REM      — FLOWERS
12 REM      BY: STEVEN WONG
14 REM
20 P = 3,14: HCR2: FOR L = 1 TO
    301A = RND (1) * 219 + 308:R%
    = RND (1) * 131 + 30: HCOLOR=
    3: HFL0T A,191 TO A,B:H = INT
    ( RND (1) * 7) + 1: HCOLOR=
    H - (H = 4):S = RND (1) * 2
    0 + 101 FOR T = .5 * P TO 2,
    5 * P STEP 2 * P / SIX = A +
    SIN (T) * SIX = B - COS (T
    ) * S: HFL0T A,B TO X,Y: NEXT
    : NEXT : GOTO 20

```

Listing 8. Colorful snowflake patterns with the sound of falling snow are generated by this one liner.

```

JLIST
10 REM      — SNOWFLAKES
12 REM      BY: STEVEN WONG
14 REM
20 P = 3,14: HCR2: FOR Z = 1 TO
    99: A = RND (1) * 261 + 9: B =
    RND (1) * 173 + 9: HCOLOR=
    RND (1) * 7 + 1: C = RND (1
    ) * 5 + 4: FOR T = .5 * P TO
    2,5 * P STEP 2 * P / SIX = A
    + SIN (T) * SIX = B - COS
    (T) * C: HFL0T A,B TO X,Y:V =
    PEEK ( - 16336): NEXT : NEXT
    : GOTO 20

```

Line 5060 multiplies the digits by their weighted positional values, adds them together and POKes the result into the current memory location I. When all bytes of data are converted and POKed, the program is terminated in line 5070 and the data pointer is RESTORED.

Next, the subroutine to read the clock output is called. This routine starts by CALLing the machine language program in page 3. Next the two POKes put colons in two memory locations. This clock puts semi-colons in between the data in a loop. The data is stored in reverse order, hence the step of -1. Each character is converted to its ASCII value in line 6030 and printed in line 6040. Each character is printed in turn through the range of the loop. The memory range of the loop is at the end of page 2. This range is used by the keyboard as an input storage buffer. Since most of the space is not used by normal keyboard input, it can be used to advantage for temporary storage.

A program such as this example illustrates one possibility for conversion within the program. Another would be a memory dump program. For instance, you can enter

the starting location directly in hex. Then, the program can do the conversion to decimal for the PEEKs at memory. Next you can have the program print both the hex and decimal values of memory locations being examined. You could also add the printable characters represented by the hex data. I recently wrote a program to do these things. A program like this in Basic is slow but very useful since it can be used to examine itself as well as all other memory locations. You don't need to exit from Basic to use a memory dump utility. But that's another story.

One Liners

Programs that are complete in one line have been part of past columns. These fun little programs have been mostly clever uses of graphics. This month, Listings 6, 7 and 8 include one that is not graphics and two that are. As I have cautioned before, type them very carefully. It is very easy to make a mistake. Listing 6 is appropriate (by coincidence) this month — it shows hex numbers and their decimal equivalents. The program comes from Bill Von Benken.

The other two from Steven Wong generate attractive hi-res graphics patterns. If you have a one liner that you would like to contribute, please do. I'll include them in future columns.

Questions and Answers

About Integer Basic and Applesoft Basic: Recently, several letters have asked similar questions about the use of and the differences between the two main programming languages for the Apple. The original Apples had an Integer-only version of Basic as the only programming language available. Soon, however, the popularity of the computer demanded a language with more "power" in areas of number handling (floating point arithmetic as it is called) and the ability to handle text through string manipulation. Thus Applesoft was made available for the Apple II.

Integer Basic is quite a bit different from Applesoft in several ways. In addition to several commands and the implementation of them, the interpreter handles programs differently in memory. Integer Basic, as the name implies, uses only integers (whole numbers) in the range of plus and minus

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David Ahl, Founder and
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Text Files, continued...

32767. To use numbers outside this range, special programming techniques must be employed. In addition, the integer interpreter places the program in memory starting at high memory. Variables are stored from low memory up. The Applesoft interpreter, on the other hand, puts the program at low memory, the numerical variables at the end of the program, and the string variables from high memory down. Mainly because of the interpreter differences, you cannot run integer programs with Applesoft or the other way around.

Lately, some of the questions about these languages have included problems relative to the Language Card. There are programs on the masterdisk, which comes with the system, to load the non-resident language into the language card. For instance, if you have an Apple II, Applesoft will be loaded since Integer Basic is the ROM resident language. With the Apple II Plus, Integer Basic is loaded into the Language Card. If you have no language card, or you don't have one of the corresponding ROM cards, you can run only programs using the resident language in your machine.

Again:

- Apple II has Integer Basic resident in ROM.
- Apple II Plus has Applesoft Basic resident in ROM.

To use (or have) both languages in the same machine, you need to add hardware/firmware. Slot 0 in the expansion slots is reserved for this purpose. You add an Integer card to the Apple II Plus. You add an Applesoft card to the Apple II. I have an Apple II and originally added an Applesoft card so I could use both languages. Applesoft became the more popular language so the Apple II Plus came about.

There is an alternative. This is where the programs INTBASIC (and FPBASIC) come into use (the ones on your master disk). You can also plug a 16K (or more) ROM card into slot 0. When you do this, the language that is not resident in ROM is loaded into the RAM card. The master disk will test for the presence of a RAM card and load the appropriate language (during the boot cycle).

If you have one of the ROM language cards in slot 0, nothing happens since the alternate language is already there. Note that to get all the available utilities, you need to have the alternate ROM card or the RAM card installed. Once you do this, you can do anything that it is possible to do with your Apple II.

Remember, you cannot directly run Integer Basic programs with Applesoft or the other way around. Indirectly, you can convert one to the other. But it's not a

simple task. Several people including me (May '80) have written about making such conversions.

Next Time

Several readers have contributed short programs other than one liners (keep 'em short please). Some of them will be included next time. There will be more Questions and Answers too. Please write. I'm delighted to hear from you. And, to save time, write directly to me. ☐



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outpost: atari



This is Part 2 of the description of Atari disks begun in the April "Outpost: Atari."

Disk I/O is a very slow process for the Atari. The disk must be physically spun, which takes a while, and data must be shipped back and forth, which is even slower. The idea behind Atari's DOS is to minimize disk I/O. So we come to the concept of a "buffer."

In Atari's DOS, whenever you read or write to a file, you are reading/writing into a 128-byte reserved area in memory called a buffer. You are not writing to the disk at all. The Atari keeps the contents of one of the sectors of the disk in that buffer. So if you read/write to that buffer, the operation occurs at very high speed, which is what we want. For instance:

```
10 OPEN #1,4,0, "D1:FILE"  
20 FOR A=1 TO 10000  
30 GET #1,A  
40 NEXT A
```

merely reads, byte by byte, 10000 bytes from disk. But if you run this program, you will note that the disk isn't being accessed continually; only every once in a while will you hear a beep to indicate another read. What happens is that the Atari opens the file and pulls the first sector full of data into the memory buffer. When you do the first 125 GETs, the bytes are pulled out of that memory buffer. Then you try to read another byte, but the Atari doesn't have that one in memory yet. So it requests the disk to send it the next 128 bytes, fills the buffer with those 128 bytes, and starts reading at the beginning of the buffer again.

David Small

(If you are wondering why I said the 125th byte, it is because the Atari DOS reserves three bytes per sector for its own uses, which we will talk about later.)

Similarly, when you PUT # to a disk file, the Atari lets you PUT 125 bytes to the buffer, then dumps it to the disk, moves in another 125, and so on.

The result of all this confusion is that the Atari doesn't have to go to disk for every individual byte; rather, it stays in memory for a large number of "disk" accesses, and things run much faster.

When the Atari is LOAding or SAVeIng a program, again it uses these buffers. The process is invisible to you, but you can hear the beep as each individual sector in the program is LOAded, or a clunk as a sector is SAVEd. Remember, the Atari can only talk to the disk in terms of complete 128-byte sectors.

Understanding the buffer is important in solving some of the mysterious problems that can occur while using the disk. For instance; let's say you write something out to the buffer, and then your program bombs. You examine the disk file, and find the data never reached the disk. This is because the buffer was never written to disk. If you didn't know about the buffer, you'd be wondering why the disk didn't record what you wrote to it.

The CLOSE Statement

The CLOSE Statement is provided for this case. It makes sure that everything in the buffer gets to the disk. It also updates

the directory, where all file names are listed.

The DOS program handling all this keeps a table of free sectors on the disk, by the way, and when the buffer fills up and a place is needed to store the 128 bytes, a sector number is taken from that table. When a file is deleted, its sectors are returned to that table. (The XXX FREE SECTORS message at the end of the DOS directory is determined by this).

So much for Basic I/O. Everything done with Basic I/O is a version of the above; everything goes through the 128-byte buffer. How about DOS?

When you issue the COPY disk command from DOS, each sector of the file is sent to memory. In other words, DOS copies the contents of that file into memory, 128 bytes at a time. It then takes the file in memory and writes it out to disk, from memory, again in 128 byte chunks.

When you issue a Duplicate Disk command, DOS reads in every sector on the disk that is marked as "used" and stores it in memory. The unused sectors are ignored to save time. DOS then writes those used sectors out to the new disk, in the same position it found them on the old one, and doesn't worry about the empty sectors. Since there are 92,000 bytes on a disk, and only 48K maximum of memory, it may have to do this in smaller pieces—let's say 32K at a time. You then must physically change the disk several times on a single-drive system. If you are using a multiple disk system, you will see it do the copy in multiple stages.

Note: If you are copying disks for backups, remove any cartridge; each cartridge selects 6K of RAM and makes for more disk swaps.

David Small, 11314 Yucca Dr., Austin, TX 78750.

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*Billiards

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In order to know what sectors are used, and what files are on the disk, some tables must be kept on that disk. The DOS reserves certain sectors on the disk for these tables. One is known as the VTOC (Volume Table of Contents) and is sector number 360. In it is a table of all 720 sectors on disk, stored as bit-map; i.e., one bit per sector. The disk directory is stored in sectors 361-368; this is the actual list of the file names and the sectors they occupy. To find a file, DOS must use this directory.

By the way, these reserved sectors explain why only 707 sectors are available on a "clean" disk; the rest are used for the directory tables, etc. You will also hear, during the disk formatting process, right near the end, the clunks as DOS writes out a fresh directory to the disk, after the disk 6507 has finished formatting it.

Remember, DOS at the lowest level, past all of the directory opens, XIO's, and so forth, is only doing get sectors/put sectors. Let's learn about those calls.

Get Sector/Put Sector Calls

All get sector/put sector calls rely on a table called the Device Control Block. Data is put into this table, and a jump is made into the operating system, which in turn uses that table. Table 1 is the disk table, starting at \$300 (or 768 decimal).

One POKES values into this table, and then does a JSR to DSKINV (\$E453). DSKINV then does the requested operation and returns to you. Program 1 is a sample program that does the needed POKES and requests from you a sector number (1-720) to read.

This program POKES the DCB parameters, reserves 128 bytes in memory as a string for the buffer area, requests the sector number, then runs a very short assembly program which does a PLA, needed by Basic, then jumps off to DSKINV. DSKINV then does the operation, and returns to Basic.

There the status code placed in the table by DSKINV is printed, and the buffer area, as a string, is also printed. Sure, it will be strange, but you can examine individual bytes easily. If you read one of the directory sectors (try 361) you will see the directory entries.

If an 87 instead of an 82 were POKED into DCOMND, then a Put Sector would occur (\$57=Put Sector, \$52=Get Sector). Then the contents of that buffer would be written to disk.

The status code will be a 1 if all goes well. If there is a problem, you may find a 144 as the error code. This Device Not Done Error occurs if the disk is bad, the disk is write protected, etc.

We have just done disk access the same way DOS does it, at the sector level. Note

Table 1.

0300 DDEVIC	—Serial Bus ID. Not used by user.
0301 DUNIT	—Disk number, 1-4.
0302 DCOMND	—Command Byte. This is:
	\$21 Format Disk
	\$50 Put Sector, without verify
	\$52 Get Sector
	\$53 Get Status
	\$57 Put Sector, with verify
0303 DSTATS	—Disk Status. This is returned to you after the operation is done.
0304 0305	DBUFLO,HI. Buffer Address. This is a 16-bit address in memory that is the starting address of where to get or put 128 bytes.
0306	DTIMLO Disk Timeout Value. Leave it alone.
0308,0309	DBYTL0,HI Set by handler. Leave it alone.
030A,030B	DAUX1,DAUX2 Sector Number. Which disk sector, 1-720, to read/write.

Program 1.

```

5 REM SAMPLE PROGRAM TO DO DIRECT
6 REM DISK I/O. DAVID SHALL, 12/21/81
7 REM
10 DCB=768:REM START OF DISK DCB
20 POKE DCB+1,1:REM DISK 1
30 POKE DCB+2,82:REM $52 = GET SECTOR
35 REM *** GET 126 BYTE OPEN BUFFER
40 DIM BUFFER(125)
45 DIM CALLB(10)
50 FOR X=1 TO 128:BUFFER(X)=0: NEXT X
60 ADDR=ADDR BUFFER#
70 ADDRHI=INT(ADDR/256)
80 ADDRLO=ADDR-ADDRHI*256
90 POKE DCB+4,ADDRLO:REM BUFFER ADR LOW
100 POKE DCB+5,ADDRHI:REM BUFFER ADR HI
110 REM *** SECTOR NUMBER ***
120 PRINT "INPUT SECTOR NUMBER"
130 INPUT SECTOR
140 SECTORHI=INT(SECTOR/256)
150 SECTORLO=SECTOR-(SECTORHI*256)
160 POKE DCB+10,SECTORLO
170 POKE DCB+11,SECTORHI
200 REM *** BUILD SHORT ASSY PROGRAM
210 REM *** OF PLA, JMP DSKINV.
230 CALLB(1)=CHR$(104):REM PLA
240 CALLB(2)=CHR$(32):REM JSR
250 CALLB(3)=CHR$(83):REM #53
260 CALLB(4)=CHR$(228):REM #E4
270 CALLB(5)=CHR$(36):REM RTS
300 X=USR(ADDR:CALLB)
310 DSTATS=PEEK(DCB+3)
320 PRINT "DISK STATUS=";DSTATS; " (1=OK)"
330 PRINT "DATA:"
340 PRINT BUFFER#
360 REM *** CLEAN OUT BUFFER#
380 FOR X=1 TO 128:BUFFER(X)=0: NEXT X
400 END

```

we have not done an OPEN or an XIO; we have directly accessed the disk. This can be handy if you have a need for a disk allocation scheme free of DOS; I use it to store directly fixed-length records. It is fast and efficient, and removes the DOS overhead.

Also, it enables you to access the directory and modify it as necessary; this allows you, for instance, to un-delete files.

Because we are not using DOS, but are still accessing the disk, we are not dependent on the DOS directory or "In-Use-Table." We can read or write any sector on the disk, regardless of what DOS thinks that sector is for. You may want to take note: This is how to write a "boot record," a special disk record that enables your disk to boot by itself, as so many games do. The boot record is record 1; see the hardware manual for further details.



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Atari, continued...

Now that you can access the directory data directly, you can see all the data stored rather than just what OPENing "*,*" returns. A directory entry is 16 bytes long for each file. There are eight entries per sector in the directory, and eight directory sectors, hence 64 files maximum. See Table 2.

As an example of how the directory is used, if a file is LOCKED from DOS, all that occurs is that its flag byte has bit 5 set to 1.

When you delete a file, all that occurs is that the delete flag on the file is set. Then, next time DOS needs a place to put a new file entry, it knows it can overwrite the current entry.

Reading the Data into a File

In order to read the data in this file, one goes to the Starting Sector number found in the directory. Each sector contains information as shown in Table 3.

The "forward pointer" is where the next sector of the file can be found. It is a sector number from 1 to 720. When that next sector is read in, it in turn tells where the next sector can be found, and so on. This is called a "linked list" or chained sector scheme. This way, files don't have to be in any particular order on the disk (e.g., running continuously from sector 30 to 40). The sectors can jump around all over the disk, yet to DOS they are still linked together.

The file number is the file number in the directory. It is set to the same number as the entry number in the directory for all sectors. This is a safety measure. Let's say we are reading directory entry 6, and are going along, sector by sector. In the file number position in a given sector, we suddenly find a 13 (or whatever) instead of the 6 that should be there.

We know that the data for this sector has gotten scrambled, and the sector chain terminates there. This is an ERROR 164, which I am sure you have seen before; it is a warning that the data in this sector are likely to be bad. The sector link is also likely to be bad, so DOS normally stops an ERROR 164.

Reading in sectors one at a time, by getting the next sector number, reading, and so on, is called "sector tracing." Atari DOS does it every time it reads in a file. Atari also sells a "disk fix" program through their program exchange which uses the above information; you now know enough to use it. For instance, the forward "link" of a given sector may be modified if desired.

We can do the same sector tracing out of Basic. We will find a given directory entry, read it in starting at the sector number given by the directory and proceed through each sector, with each new sector number obtained from the data in the previous one, until we have read in the number of

sectors specified in the directory. Should anything be wrong (file number, etc.) we will know the file has gone bad.

Program 2 illustrates first how to read in the directory and interpret it, and second how to follow a sector chain for a given file. It reads in the directory, lists it to the screen, and asks which file to trace; if A is entered, all files will be traced (this takes a while). It will then trace the file through, stopping at any "broken links" or bad file numbers. It is an excellent way to check a disk which has some files going bad, and find out which ones are still readable and which aren't. After each check the program produces a directory listing showing which files are good, bad, or still unknown.

The techniques used within the program will probably prove more useful than the program; however, remember that this is an example. It can serve as the basis for custom disk inspect/modify routines if you wish to write them. Also, the program is written in MicroSoft Basic but translating it to the old Basic should be no problem at all. I highly recommend MicroSoft Basic in terms of speed and features as compared

Table 2.

Byte 1: Flag byte.

- Bit 7 = 1 if this file has been deleted
- Bit 6 = 1 if this file is in use
- Bit 5 = 1 if this file is locked
- Bit 0 = 1 if this file is OPEN.

Bytes 2,3. Sector Count; the number of sectors in the file, stored low, then high bytes.

Bytes 4,5. Starting Sector. Where the file begins (what sector number).

Bytes 6-16. File name. Last three bytes are the extension if you add one, otherwise they are blanks.

Table 3.

Byte 1 .. Data

Byte 125 ..

Byte 126 File Number (6 bits) and high two bits of "forward pointer"

Byte 127 Forward Pointer

Byte 128 Short Sector count .. indicates this sector not completely full.

to the old Basic; an in-depth review of the Atari version of MicroSoft Basic will appear in an upcoming issue.

Sadly, the software pirate community also found out about direct disk I/O, literally years ago. Back then manufacturers were copy protecting disks by fouling up the directory and sector maps so that DOS couldn't perform the copy. With the advent of direct disk I/O, all these schemes were bypassed with what is known as a "sector copier."

As a side note, a sector copier is sometimes advertised as a "nibble copier" or "byte copier." This is an Apple term, and refers to individual bytes being read off the disk. It is completely inaccurate when applied to the Atari; all Atari disk I/O is in 128-byte blocks.

A sector copier, as you have guessed, just issues a read of all the possible sectors, then writes them.

Sector Copying

The program is simple to write now that you understand about sector I/O and how to call up DSKINV. It is just a matter of reading in 720 sectors and writing out 720 sectors. As I said, about 20 lines of Basic

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Atari, continued...

code are required. And now you understand why, as I mentioned last month, selling such a program, at the prices currently being charged, is such a ripoff.

But...how can a disk be protected against this sort of thing? Fortunately, there is a good way. Several software manufacturers hit on the same idea at the same time: bad sectoring. Let's assume we have a special disk, with some sectors on it that have never been formatted, as with the FORMAT DISK command. Most of them are OK; just a few are bad, as if there were holes in the disk. Now when the disk is told to read these sectors, it can't find them, for they were never formatted. So it returns an ERROR 144, instead of a normal return (1). Then, in the software on the disk, that sector is called, and if an ERROR 144 doesn't result, the program quits.

Let's say the program is then copied to another disk by an average sector copier. The "bad" spots on the disks will not copy; they will return ERROR 144, but on the destination disk, there will still be formatting information on those sectors. This is because the average Atari user cannot create a disk with bad spots in it; the FORMAT command is handled completely inside the disk by the disk 6507 microprocessor. The program will find that where it expected a bad sector, it now finds a good sector. Hence the program knows it is not residing on the original disk, and can quit.

The only way to defeat this scheme is to disassemble code and remove the sector check, and even if the author is slightly clever, it will take so long to find the sector checking routine that the program will be outdated by the time it is finally made copyable. Besides, consider what a person's time is worth compared to the cost of a program; if it takes two weeks to break a copy protection scheme, isn't it a better idea just to buy the program?

This bad-sectoring scheme works quite well in preventing a sector copier from being useful. Sure, a copy of the disk may be made, but without the bad spots on the disk, it will never run. And your average user cannot create these bad spots, for only access to the disk controller program allows that, and only very advanced users can accomplish this.

Atari currently uses this bad sector scheme in several of their disk-based programs. *Jawbreakers* uses the same scheme (hence the disk retry, or "snaarak," sound when you first boot it up). *The Wizard and The Princess* use it also. In other words, the move is toward this sort of protection.

Software manufacturers can probably figure out a way to write some bad sectors onto a disk. For instance, what popular personal computer gives you complete control over the disk read/write process?

There are other ways, too.

Another manufacturer doesn't bother copy protecting his disks at all. However, a small module must be plugged into the front joystick port before the program will run. The module probably contains some sort of ROM-type circuit which is then read by the program through the PIA chip (joystick ports).

Well, we have covered a great deal, from piracy philosophy to sector chaining

in these two columns. I hope you have enjoyed it and have learned something about the Atari Disk, and how it really works. I also hope I have described some effective protection schemes for software manufacturers.

Direct disk I/O is a very powerful tool for Atari users; I hope you will use it to make your programs faster and more efficient. □

Program 2

```
10 REM DISK CHECKER - DAVE SMALL
20 REM
30 GOTO 250
40 REM SUBROUTINES PLACED IN FRONT
50 REM FOR SPEED, NO COMMENTING.
60 REM
70 REM DISK READ SUBROUTINE-----
80 POKE DCB+1,DFROM
90 POKE DCB+2,82
100 BH=INT(BUFF/256):BLO=BUFF-BH*256
110 POKE DCB+4,BH
120 POKE DCB+5,BH
130 SH=INT(PSECTOR/256):SLO=RSECTOR-(SH*256)
140 POKE DCB+10,SLO:POKE DCB+11,SH
150 GOSUB CALL
160 DSTATS=PEEK(DCB+3)
170 RETURN
180 REM DISK WRITE SUBROUTINE-(SAMPLE)
190 POKE DCB+1,370
200 POKE DCB+2,87
210 BH=INT(BUFF/256):BLO=BUFF-BH*256
220 POKE DCB+4,BLO
230 POKE DCB+5,BH
240 SH=INT(PSECTOR/256):SLO=RSECTOR-(SH*256)
250 POKE DCB+10,SLO:POKE DCB+11,SH
260 PRINT "ERROR":GRAPHICS 0
270 DSTATS=PEEK(DCB+3)
280 RETURN
290 REM DISK CHECKER.
300 REM DOES SECTOR TRACE OF ALL
310 REM FILES IN THE DIRECTORY.
320 REM PRODUCES LISTING WITH OK/
330 REM BAD.
340 REM ASSUMES 48K, MICROSOFT.
350 REM
360 REM GET DISK NUMBER,HELLO,---
370 GRAPHICS 0
380 CLEAR
390 PRINT "HELLO TO SMALL'S DISK CHECKER."
400 PRINT "INPUT DRIVE NUMBER:"
410 INPUT DF
420 IF DF=0 THEN DFROM=1:GOTO 440
430 DFROM=VAL(DF)
440 DTO=DFROM
450 CALL=8E453 1DSKINV ADDRESS
460 REM NOTE: MICROSOFT CAN CALL
470 REM SKINV DIRECTLY, NO PLA
480 REM NEEDED.
490 DIB=6300
500 OPTION PRESERVE 20*125
510 B=VARPTR(PRESERVE)
520 IF 2.5 THEN DIB=65536
530 REM FIRST, READ IN DIRECTORY---
540 PRINT "GETTING DIRECTORY."
550 INCR=0
560 FOR PSECTOR=360 TO 368
570 BUFF=B+(125*INCR) INPUT AREA
580 GOSUB 70 1GET SECTOR
590 IF DSTATS THEN G30
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CIRCLE 124 ON READER SERVICE CARD

Atari, continued...

Program 2, continued.

```

600 PRINT "***DISK RETRY,DIPECTORY SECTOR *J*RECTOR
610 PRINT "***STATUS="J$STAT$
620 GOTO 570
630 INCR=INCR+1
640 PRINT INCR$
650 NEXT R$ECTOR
660 PRINT
670 PRINT "WAIT -- BUILDING TABLES."
680 REM OK, NOW EXAMINE DIRECTORY.
690 REM PRODUCE LISTING FIRST OFF.
700 REM NOTE 360=VTOC, NOT DIR.
710 DIR INFO(64,6) :FILE INFO
720 DIR NIME(64) :NAME INFO
730 DIR DEAD(64) :FILE NOHED?
740 FOR Z$=1 TO 64:DEAD(Z$)=0:NEXT Z$
750 REM
760 Z$=8+128 :START OF DIR ENTRY
770 REM BUILD FLAG & INFO TABLE-----
780 FNUM=1
790 FOR LOC=2 TO Z$(64*16) STEP 16
800 REM LOC=ENTRIES* STARTING ADDR
810 FLAG=PEEK(LOC)
820 IF(FLAG AND 800)=800 THEN INFO(FNUM,3)=1
830 IF(FLAG AND 840)=840 THEN INFO(FNUM,4)=1
840 IF(FLAG AND 820)=820 THEN INFO(FNUM,5)=1
850 IF(FLAG AND 1)=1 THEN INFO(FNUM,6)=1
860 REM SECTOR INFO-----
870 INFO(FNUM,1)=PEEK(LOC+1)+256*PEEK(LOC+2)
880 INFO(FNUM,2)=PEEK(LOC+3)+256*PEEK(LOC+4)
890 REM NOW GET NAME DATA.-----
900 NIME(FNUM)=" "
910 FOR Z$=5 TO 15
920 NIME(FNUM)=NIME(FNUM)+CHR$(PEEK(LOC+Z$))
930 NEXT Z$
940 REM CHECK FOR END OF ENTRIES
950 IF PEEK(LOC+5)=0 THEN I020
960 REM
970 FNUM=FNUM+1
980 IF FNUM/5=INT(FNUM/5) THEN PRINT FNUM
990 NEXT LOC
1000 PRINT "DIR TOTALLY FULL."
1010 GOTO 1030
1020 PRINT "DIR PARTLY FULL."
1030 FNUM=FNUM-1
1040 PRINT
1050 PRINT "NUMBER OF ENTRIES="FNUM
1060 REM OUTPUT DIRECTORY
1070 REM ENTRY POINT (FROM BELOW)
1080 IF FNUM=0 THEN 1320 "EMPTY DISK
1090 PRINT
1100 PRINT "D=DELETED/U=USED/L=LOCKED/O=OPEN"
1110 PRINT "SC=SECTOR COUNTLEN"
1120 PRINT "SS=STARTING SECTOR"
1130 PRINT " * = GOOD FILE / - = BAD FILE / ? = UNKNOWN"
1140 PRINT
1150 FOR F=1 TO FNUM
1160 PRINT USING "0*F$J"
1170 IF DEAD(F)=1 THEN PRINT " * "
1180 IF DEAD(F)=1 THEN PRINT " - "
1190 IF DEAD(F)=0 THEN PRINT " ? "
1200 PRINT "I"INIME(F)J"1"
1210 IF INFO(F,3)=1 THEN PRINT "D" ELSE PRINT " "
1220 IF INFO(F,4)=1 THEN PRINT "U" ELSE PRINT " "
1230 IF INFO(F,5)=1 THEN PRINT "L" ELSE PRINT " "
1240 IF INFO(F,6)=1 THEN PRINT "O" ELSE PRINT " "
1250 PRINT "ISC:"
1260 PRINT USING "000"INFO(F,1)
1270 PRINT "ISS:"
1280 PRINT USING "000"INFO(F,2)
1290 IF F/20=INT(F/20) THEN INPUT RET$
1300 NEXT F
1310 GOTO 1390
1320 PRINT "EMPTY DISK -- NO ENTRIES"
1330 STOP
1340 PRINT
1350 REM ENTRY POINT (BELOW)
1360 PRINT "PRESS RETURN."
1370 INPUT RET$:CLS:GOTO 1420
1380 GOTO 1400
1390 PRINT "PRESS RETURN."
1400 INPUT RET$
1410 REM NEXT IS ENTRY POINT
1420 PRINT "SELECT :
1430 PRINT "1. A FILE NUMBER TO CHECK;"

```

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CIRCLE 160 ON READER SERVICE CARD

Atari, continued...

Program 2, continued.

```

1440 PRINT "2. 'A' TO CHECK ALL FILES,"
1450 PRINT "3. 'D' TO SEE DIRECTORY LIST AGAIN"
1460 PRINT "NOTE: ERRORS SHOW UP ON DIR LISTING"
1470 PRINT "AFTER THEY OCCUR IN SEARCH."
1480 INPUT N$
1490 IF N$="A" THEN FILE=125:GOTO 1690
1500 IF N$="D" THEN GRAPHICS 0:GOTO 1070
1510 ON ERROR 1540
1520 FILE=VAL(N$)
1530 GOTO 1560
1540 PRINT "ERROR. RE-ENTER."
1550 RESUME 1420
1560 REM --- PROCESS. CHECK.
1570 IF FILE=NUM OR FILE=0 OR FILE<>INT(FILE)
    THEN PRINT "ERROR." :GOTO 1420
1580 REM SINGLE ENTRY HANDLER
1590 PRINT "TRACING--'SELECT' TO ABORT."
1600 SS=INFO(FILE,2) : STARTING SECT
1610 SC=INFO(FILE,1) : SECTOR COUNT
1620 RSECTOR=SS
1630 REM GO TRACE IT...ERROR=RETURN
1640 GOSUB 1850
1650 IF ARROW=1 THEN PRINT "###BAD FILE###"
1660 IF ARROW=1 THEN DEAD(FILE)=1 ELSE DEAD(FILE)=0
1670 GOSUB 2110 : HARK FILE NAME
1680 GOTO 1350
1690 REM ALL ENTRIES HANDLER
1700 FOR FILE=1 TO FNUM
1710 CLS
1720 PRINT "TRACING FILE *";FILE
1730 IF LP=1 THEN PRINT @,"TRACING FILE *";FILE
1740 PRINT "PRESS 'SELECT' TO ABORT."
1750 SS=INFO(FILE,2) : STARTING SECT
1760 SC=INFO(FILE,1) : SECTOR COUNT
1770 RSECTOR=SS
1780 GOSUB 1850
1790 IF ARROW=1 THEN PRINT "###BAD FILE###" ""
1800 IF ARROW=1 THEN DEAD(FILE)=1 ELSE DEAD(FILE)=0
1810 GOSUB 2110
1820 NEXT FILE
1830 PRINT "COMPLETED."
1840 GOTO 1350
1850 REM TRACING SUBROUTINE
1860 ARROW=0
1870 PRINT
1880 PRINT "----SEC CNT='';SC'; READING SEC 'RSECTOR
1890 POKE &D01F,0 : CLEAR BUTTONS
1900 GOSUB 70 : READ
1910 REM CHECK BUTTONS
1920 IF PEEK(&D01F)<>? THEN RETURN
1930 IF DSTATS=1 THEN 1960
1940 PRINT "###ERROR. DSTATS='';DSTATS" ON SECTOR 'RSECTOR
1950 GOTO 1990 : RETRY
1960 IF SC=0 THEN RETURN
1970 SC=SC-1 : DECR S COUNT
1980 REM GET FORWARD POINTER + FNUM
1990 FND=PEEK(BUFF+125) AND 3 : FND*256
2000 FND=FND+PEEK(BUFF+126)
2010 FN=INT((PEEK(BUFF+125) AND &FC)/4) : HENCE,
    SHIFTED 2 BITS RIGHT
2020 FN=FN+1 : (DISK STARTS AT 0)
2030 PRINT "----DATA: FILE NUM='';FN"; FND SEC='';FND
2040 IF FN<>FILE THEN PRINT "FILE NUMBER ERROR." : ARROW=1
2050 IF FND<0 OR FND>0 THEN PRINT
    "FORWARD PTR OUT OF RANGE,ABORT." : ARROW=1:RETURN
2060 IF FND=0 THEN 2090
2070 RSECTOR=FND
2080 GOTO 1870
2090 PRINT "COMPLETED."
2100 RETURN
2110 REM HARK A FILE AS BAD IN TRACING.
2120 REM SET HIGH BIT SO IT SHOWS
2130 REM UP IN INVERSE VIDEO..
2140 IF ARROW=0 THEN RETURN
2150 Z$=NIME$(FILE)
2160 NIME$(FILE)=" "
2170 FOR Z=1 TO LEN(Z$)
2180 NIME$(FILE)=NIME$(FILE)+CHR$(ASC(MID$(Z$,2,1))
    OR &80) : SET HIGH BIT
2190 NEXT Z
2200 RETURN

```



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I have my system now, you know.

Well, what I mean to say is that I've run out of anecdotes about why I don't have a computer. It was great, like having automatic material. I guess I'll have to work at it from now on.

The topic of this column is the IBM (aka Epson) printer. I had promised a discussion of displays too, but that will have to wait until next month. There is enough, surprisingly, to say about the printer. It may seem strange to devote almost an entire IBM column to a printer which is obviously in broader distribution, but it is, after all, the "IBM" printer, the printer a great many owners of the Personal Computer are likely to have. Before we get rolling, though, there are a few administrative announcements.

I thank all of you who have gotten in touch with me. The information you have provided has been very useful and I have enjoyed your letters. Let me remind you that I cannot reply unless you supply a self-addressed, stamped envelope. With the SASE, I'll get back to you as soon as I can.

User groups are beginning to spring up for the IBM Personal Computer. I will be happy to carry an announcement of your group's formation in these pages. I would also like to ask that you include me on your mailing list for newsletters. Obviously, I can't afford to pay the dues for every group, but I'd sure like to hear about what you learn.

Reminder to vendors: I'm a black hole when it comes to announcements of new product, both hardware and software. I've been doing pretty well so far in getting such information, but your help will be appreciated. If you work for a firm that

Will Fastie

makes something for the IBM, let your marketing department know I exist.

Disks!

I really got excited the other day. An evaluation disk from VR Data Corporation arrived in the mail. I had been limping along on one disk drive, and I was really looking forward to having two drives, if only for two weeks. I'm going to buy the drive, though, because I can't bring myself to disconnect it, much less send it back. The price is only \$265, a bargain by comparison with IBM's price of \$570.

The disk arrived via UPS, and was packed rather well. It was marked on the outside as "Drive B" and had been setup by VR Data for connection to the IBM. Installation of the drive was simple, and I got it working rather quickly.

Ah, you say, why not immediately? There was one problem, which you should be alert for. There are two DIP sockets on the electronics board on the drive. One of these is used for a terminator chip, and the other is used for jumpers.

On the IBM drive in my system, the terminator (referred to by IBM as the "pluggable module") is installed, and there is a wire jumper across one pair of pin sockets in the DIP socket.

On the drive from VR Data, there was no terminator, which is correct, but the jumper DIP socket had what is known as a "DIP shunt." This is nothing more than a DIP package with fuse-like shunts connecting directly opposite pins.

The "shunts" can be broken or left in

place to create a set of jumpers in a single package. In the case of the VR Data drive, the DIP shunt was configured correctly but installed incorrectly.

Since no instructions had been delivered with the drive, I had to do a little detective work to discover this. Once I got the shunt installed so that the jumpered part of the socket matched that on my IBM drive, everything worked just fine.

I called Warren Rosenkranz (my face is red—I misspelled his name last month), the president of VR Data, to ask him about the lack of instructions and the shunt. He said that VR Data usually does pack installation instructions with drives sold to individuals, but often do not when they sell to computer stores, a large part of their business. I was put in the latter category.

As for the shunt, VR Data tests all their drives before they ship. The test equipment requires the shunt to be placed differently, and sometimes it doesn't get put back. Warren told me that they are usually very careful about everything, but that they have been deluged with orders for IBM expansions and have been very busy.

I like everything to have neat ends, but in this case I think the inconvenience was small considering the price I'm going to pay for the drive!

If you buy from VR Data, or any other supplier, make sure you specify which drive you are buying and that you expect instructions. If you already have one drive, the insert for your IBM Guide to Operations will have very good installation instructions. If you have bought only the disk adapter from IBM and are getting the drives elsewhere, you will need the instructions. The IBM Diskette Adapter includes the signal cable, and the installation procedures for it includes a picture of the cable showing which connectors go where.

W.H. Fastie, 7110 Sheffield Rd., Baltimore, MD 21212.

IBM continued...

Once the drive is installed, you must set the switches on the system board to reflect the number of drives installed. If you have an IBM drive, the IBM installation procedures will show how the switches are to be set. If you don't, the switch settings are also shown in the installation procedures for the display adapters, either the Monochrome or the Color/Graphics.

A word of warning. Although the diskette drive I got from VR Data is precisely the same Tandem drive used by IBM, it is still a foreign device in the eyes of IBM. This means they might not, and probably will not, be willing to service it. A computer store will usually be more flexible (pun intended) about service.

The IBM Printer

At first glance, it seems silly for me to write about the IBM printer. The Epson MX80 has been written about quite often, and is very much a known entity.

That's what I thought until I tried to write the program shown in Listing 1. I wanted this program primarily to print paginated listings of Basic programs, because neither Basic nor DOS provides this function. When a program is LLISTed, the printing begins wherever the paper is and continues right over page boundaries. I'm going to have quite a few listings around so I want them pretty and identifiable.

Listing 1.

```

10 REM PRINTER
20 REM Program to deal with the IBM 80 CPS Printer (Epson MX80)
30 REM Functions: Setup printer mode, print mode
40 REM Print paginated listings of text files
50 REM Issue controls to printer
60 REM Author: Will Fastie
70 REM Created: 12 Dec 1981
80 REM Edited: 26 Jan 1982 2355
90 REM Source: PRINTER.BAS
100 REM Notes: Operates on current display device, current mode
110 REM ##### Constants
120 PROG# = "PRINTER v1.01 26 Jan 1982"
130 ESC# = CHR$(27)
140 CLR#LPT# = CHR$(18) + CHR$(20) + ESC# + "F" + ESC# + "H"
150 WIDTH# = 80
160 REM ##### Initial Menu
170 KEY OFF: CLS: SCREEN 0,0,0
180 PRINT PROG#: PRINT
190 PRINT "The printer must be ONLINE to"
200 PRINT "perform these functions."
210 PRINT
220 PRINT "Functions: ";
230 PRINT TAB(13); "P - Print a text file"
240 PRINT TAB(13); "S - Setup printer"
250 PRINT TAB(13); "R - Reset printer"
260 PRINT TAB(13); "T - Advance paper to top"
270 PRINT TAB(13); "Q - Quit (return to DOS)"
280 PRINT TAB(13); "X - Exit to Basic"
290 MENSEL = CSR$IN$1
300 PLOC = MENSEL GOSUB 1270
310 INPUT "Enter function: ", X$: IF X$ = "" THEN BEEP: GOTO 300
320 GOSUB 1210
330 X = INSTR("PSRTOX", X$): IF X = 0 THEN BEEP: GOTO 300
340 ON X GOSUB 360, 770, 1080, 1120, 1150, 1180
350 GOTO 160
360 REM ##### Print paginated listing
370 CLS
380 PRINT PROG#: PRINT
390 PRINT "Adjust the paper in the printer so that"
400 PRINT "the perforation is at the paper bail."
410 PRINT "Put the printer ONLINE."
420 PRINT
430 PRINT "Files MUST be ASCII text files."
440 PRINT
450 PRINT "No filename extension is assumed."
460 PRINT "no enter the filename exactly."
470 PRINT "Depress ENTER key to return to menu."
480 PRINT "Press ESC key to abort printing."
490 PRINT
500 INPUT "File to print: ", X$
510 IF LEN(X$) = 0 THEN RETURN
520 GOSUB 1210
530 WIDTH "1pt1", WIDTH#
540 OPEN X$ FOR INPUT AS I
550 PAGENR = 0
560 LINENR = 1
570 IF EOF (I) THEN 650
580 LINE INPUT #I, L$
590 IF LINENR = 1 THEN GOSUB 690
600 LPRINT L$
610 IF LINENR = ESC# THEN 650
620 LINENR = LINENR + INT((LEN(L$)-79)/80)
630 IF LINENR > 54 THEN LINENR = 1
640 GOTO 570
650 REM Close file and return
660 CLOSE
670 GOSUB 1120
680 GOTO 500
690 REM ##### Subroutine to print page heading
700 IF PAGENR < 0 THEN LPRINT CHR$(12);
710 PAGENR = PAGENR + 1
720 LPRINT: LPRINT
730 LPRINT CHR$(14); X$; " "; CHR$(20);
740 LPRINT "-- printed on :DATE: at :TIME: -- Page: PAGENR
750 LPRINT: LPRINT
760 RETURN
770 REM ##### Setup Printer
780 CLS: PRINT PROG#
790 PRINT: PRINT "Printer enhancements are:"
800 PRINT
810 PRINT "DW - Double Width"
820 PRINT "C - Compressed Print"
830 PRINT "E - Emphasized Print"
840 PRINT "OS - Double Strike"
850 PRINT
860 PRINT "Enter enhancements separated by spaces."
870 PRINT
880 PRINT "Examples:"

```

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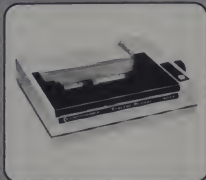
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```

890 PRINT
900 PRINT " C E - Illegal"
910 PRINT " - 10 cpi, normal"
920 PRINT " E - 10 cpi, bold"
930 PRINT " DS C - 16.5 cpi, double"
940 PRINT
950 INPUT " Enter enhancements: ",OS
960 XS=OS: GOSUB 1210: OS=XS
970 LPRINT CLRPTS:
980 IF INSTR(OS,"DM") THEN LPRINT CHR$(14):
990 IF INSTR(OS,"C") THEN LPRINT CHR$(15):
1000 IF INSTR(OS,"E") THEN LPRINT ESC;"E":
1010 IF INSTR(OS,"DS") THEN LPRINT ESC;"B":
1020 PRINT
1030 PLOC=CSRLIN
1040 GOSUB 1270
1050 INPUT "Enter desired line width: ",PWIDTH
1060 IF 1 > PWIDTH OR PWIDTH > 132 THEN 1040
1070 RETURN
1080 REM ##### Reset printer to defaults

1090 LPRINT CLRPTS:
1100 PWIDTH=80
1110 RETURN
1120 REM ##### Form feed to printer
1130 LPRINT CHR$(12):
1140 RETURN
1150 REM ##### Return to DOS
1160 CLS
1170 SYSTEM
1180 REM ##### Exit to BASIC
1190 CLS
1200 END
1210 REM ##### Subroutine to UPPERFY a string (in XS)
1220 FOR X = 1 TO LEN(XS)
1230 XC$ = MID$(XS,X,1)
1240 IF "a" <= XC$ AND XC$ <= "z" THEN MID$(XS,X,1) = CHR$(ASC(XC$)- 32)
1250 NEXT X
1260 RETURN
1270 REM ##### Subroutine to position at specified line and clear it
1280 LOCATE PLOC,1
1290 PRINT STRING$(40," ");
1300 LOCATE PLOC,1
1310 RETURN
1320 REM ##### Subroutine to wait for any keystroke
1330 PRINT "Depress any key to continue..."
1340 GOSUB 1360
1350 RETURN
1360 REM ##### Subroutine to get a keystroke into XS
1370 XS = INKEY$
1380 IF XS = "" THEN 1370
1390 RETURN

```

Table 1. IBM Printer Control Codes.

If the entry is marked with an asterisk (*), the code must be preceded by the escape code (ASCII 27). The "Char" column shows those codes which are printable characters.

Code	Char	Function
0		Terminates Tab set functions
0		Set line spacing to 1/8" (Esc A)
1		Set line spacing to 7/72" (Esc A)
2		Set line spacing to current default, or 1/6"
7		Sounds buzzer in printer
10		Line Feed
11		Vertical Tab
12		Form Feed
13		Carriage Return
14		Turn on Double Width mode
15		Turn on Compressed Character mode
17		Selects printer
18		Turn off Compressed mode
19		Deselects printer
20		Turn off Double Width mode
24		Cancels unprinted data. Resets Double Width and Compressed modes
27		Escape
*65	A	Set line feed spacing
*66	B	Set vertical tabs
*67	C	Set form length (default = 66)
*68	D	Set horizontal tabs
*69	E	Turn on Emphasized mode
*70	F	Turn off Emphasized mode
*71	G	Turn on Double Strike mode
*72	H	Turn off Double Strike mode

My problem was one of poor (yes, poor) documentation. All the facts are in various IBM documents, but not in one place, and not accurately. The Basic manual, in the LPRINT section, has an example of how to get the various styles printed, but no chart or explanation. The Guide to Operations has a chart, but it is very misleading, and if you do what it says some of the functions will not work. The Technical Reference Manual is the only one with completely accurate information, but even it is difficult to decipher and there are a few facts missing.

The problem with the chart on pages 3-15 of the Guide to Operations is obviously typographical in nature. The chart has the correct control codes, but it is annotated with either one or two asterisks(*). One asterisk is supposed to mean that the code should have 128 added to it to "make it work reliably." The only code to which this really applies is carriage return (CR), and then only in special situations. The IBM chart marks 12 codes this way. Two asterisks are supposed to mean that the code is to be preceded by the escape code, ASCII 27. None of the codes so marked in the IBM chart requires the escape.

The information you really need is embedded in the program and is also shown in Table 1. There are two rules which can generally be applied. If the ASCII control

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Listing 2a.

```

100 ' Program to demonstrate embedded print attributes
110 ESC$ = CHR$(27)
120 CR = 13
130 NORMAL$ = "Normal Print"
140 DASHES$ = "-----"
150 NLEN = LEN(NORMAL$) + LEN(DASHES$)
160 XS = "Bold Print"
170 'Print normal text, leaving space for emphasized part
180 LPRINT NORMAL$;DASHES$;SPC(LEN(XS));DASHES$;NORMAL$;
190 LPRINT CHR$(128+CR); 'command printer to print, no line advance
200 LPRINT ESC$;"E"; 'turn on emphasis
210 LPRINT SPC(NLEN);XS 'space over to hole, print text while emphasis on
220 'NOTE: TAB won't work above'
230 LPRINT ESC$;"F"; 'turn off emphasis
240 LPRINT LPRINT
250 XS = "Double Width"
260 'Double width printing is easier!
270 LPRINT NORMAL$;DASHES$;CHR$(14);XS;CHR$(20);DASHES$;NORMAL$
280 END

```

Listing 2b.

```

Normal Print -- Bold Print -- Normal Print

Normal Print -- Double Width -- Normal Print

```

code you are sending is in the range 0 to 31, then the code does not need to be preceded by the escape code. If the ASCII code is a printable character, then it must be preceded by the escape.

Another thing I tripped over was combinations of the printing attributes. I did not realize at first that certain combinations of attributes were not legal. For example, it is not possible to have compressed characters that are emphasized. If you try it, the characters will be compressed but not emphasized. It is also not possible to imbed any style within another, so you cannot print a line with normal print and emphasize a single word within the line. It is possible to imbed double width characters.

Also, the double width mode is automatically turned off at the end of each line.

I was a little angry that the printer would not handle embedded emphasized words in a simple way. It is possible to do this, but it is complicated. What you have to do is print the line, leaving blank space for the word to be emphasized. At the end of the line, print a carriage return with 128 added to it. Then turn on emphasized mode, print enough spaces to position to the blank spot, print the word, and turn off emphasized mode. The whole process is shown in the short program in Listing 2a and the result in Listing 2b.

There is one feature of the PRINTER program which requires comment. After the program prompts for the printing attributes, it asks for the width of the lines to be printed. The reason for this is twofold. First, you must specify the width depending on the type style chosen. Second, there is a problem with Basic statements that are longer than 80 characters. Microsoft Basic allows statements to "wrap" at the end of

the line and extend onto the next line.

These lines will also wrap when printed. They will wrap at a different spot, however, if the print line is longer. For example, if the line is 90 characters long it will wrap on an 80-column display or when printed with the normal type style. If the same line was printed using compressed type and a line width of 132 the line will not wrap. So far, so good.

Microsoft Basic also allows statements to be "prettyprinted" on multiple lines. For the IBM version, this is accomplished by depressing Ctrl Enter instead of just Enter at the end of the line. Additional characters can be typed and will be part of the previous line. These are referred to as logical and physical lines, the logical line being a collection of physical lines.

The IBM Basic will allow logical lines up to 255 characters long, but the spaces at the end of each physical line are included in that count, so three physical lines is the effective limit.

Now if these lines are built on an 80-column display and printed in 80-column mode, the printing will be fine. But if they are printed in 132-column mode, the prettyprinting is lost. I like the way Basic on the Radio Shack Model II works better, because the spaces at the end of the line are not included in the count and nice looking IF-THEN-ELSE statements can be built.

Friction Feed

As you might imagine, my work for this column involves a significant volume of correspondence. For this reason, it is highly desirable for me to be able to use my system as an electronic typewriter. Emphasized print delivers an acceptable, so-called "correspondence quality" font.

The problem with correspondence on the IBM printer is its inability to feed a single sheet of paper. Epson markets a version of the MX80 called the "F/T," which allows both variable width, tractor driven, continuous forms and friction driven, single sheets to be used. The F/T option is not, to the best of my knowledge, available as a later add-on option to a standard MX80. There is, however, a kit available from someone else.

The MX80/MX70 Friction Feed Kit first appeared in advertisements for the Orange Micro printer stores. As I understand it, the manufacturing rights to the device were sold to a firm named CompuCable Corporation. CompuCable is building the device and selling it on an OEM basis (i.e., to others who will resell it). Bill Lehman and Dennis Glende of CompuCable sent me one of the kits to try out.

I am very impressed with this kit. It is a very clever design and it seems well built. The kit includes very good instructions with excellent photographs and a couple of special hex wrenches that are needed to install the platen.

According to CompuCable, the kit installs in about 30 to 45 minutes, depending on your mechanical aptitude. Best of all, the kit can be removed and the printer restored to original condition in about 15 minutes, and it can be re-installed in about 15 minutes.

I am relatively apt mechanically. I had all the tools specified in the instructions, and the installation took me about an hour. Everything was very easy, especially with the photographs, but one part of the job is very difficult.

There is a pair of springs on the paper bail that is too weak to support the rollers which come with the kit and are mounted on the bail. These springs are not strong

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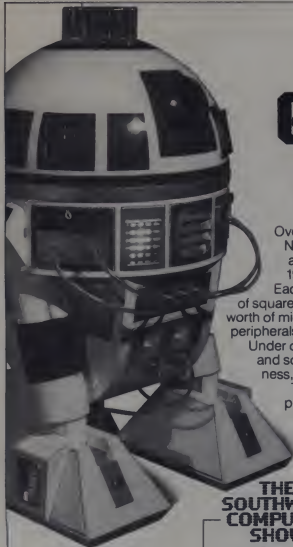
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DIRECTIONS: EUCLID AVE &
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PKWY SO. TO EXIT M5
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Boston
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11th St Exit to Third Ave

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Atlanta Civic Center

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The National Computer Shows are produced by Northeast Expositions Inc., who also produce Electronics — shows featuring home entertainment equipment and personal electronics — which are held annually in major US cities. NEI also produces the Applefest Shows. For more information about any of these events call us at 617-739-2000 or write to the above address.

IBM, continued...

enough to provide the pressure required to get a reliable friction feed. The kit includes two springs which are much, much stronger.

The installation of the kit required the removal of the weak springs (easy) and the addition of the new springs (tough). After a couple of tries I got the left spring on, but the right one, for a right-handed person, was very difficult. If the kit is ever removed, the springs can remain, and switching back and forth is simpler than the initial installation.

There is only one flaw in this kit, and that's in the instructions. Point number 1 reads "Remove the top housing cover of your printer as described in the Users Manual." Well, the IBM documentation does not tell you how to remove the top cover. I guess the Epson document does. Here are the steps you need to follow.

Disconnect the power cord and the data cable. Pull the platen knob straight off the end of the platen shaft. Remove the top cover, the ribbon, and the paper guide. Turn the printer upside down. Remove the four screws in the recessed holes at each corner.

Carefully turn the unit back over without dislodging the top housing cover. Lift the housing off by tilting it toward the front. Disconnect the cable that leads to the button and indicator panel. Put the cover aside, and you are ready to install the kit. Reverse this procedure to put the printer back together.

Once this kit is installed, single sheet paper will feed reliably with a minimum of skew. The top six or seven lines on the page cannot be printed, since they must be advanced so that the paper engages between the rollers and the platen. Continuous forms are restricted to 9 1/2" paper with standard tractor holes.

The kit is available from Orange Micro for \$75. If you've purchased the IBM printer,

or already own an Epson, and you want to use stationery or other cut sheets, I think this kit is worthwhile. Incidentally, I was told, either by CompuCable or Orange Micro, that installation of this kit is approved by Epson and will not void the warranty. I don't know what IBM's position is, but I'm in the process of finding out.

Printer Stands

One problem you're likely to have with the IBM printer is finding a way to situate it so that paper feeds and stacks smoothly and neatly. This is the main reason that a printer stand is useful. IBM offers a very attractive stand for \$55. It is nicely designed and is made of smoked plexiglass.

For less than half the price, however, you can get a practical, plexiglass stand from Programs Unlimited. Called "The Printer Solution," it sells for \$24.95, and can be ordered with an optional factory-installed second paper shelf for an additional \$9.95. I had hoped to have a photograph of the stand, but PU didn't come through.

One difference between this stand and the IBM stand is that you can see the paper in The Printer Solution. John Paysman, of Programs Unlimited, told me this was an advantage if you had more than one kind of paper because you could see what kind of paper is under the stand.

New Products

The Amdek Color-I and Color-II display monitors are being sold by the IBM Product Centers. I am astonished—I think this will be the only product carried by these stores that does not carry the IBM logo. These monitors are reasonably priced. The Color-I is an NTSC (composite video) device, while the Color-II is an RGB (direct drive) device. The Color-II is currently a seven-color monitor, but Amdek told me a 16-color version was on the way.

Quadram Corporation has announced expansion memory boards for the Personal Computer. They offer 64K, 128K, and 192K byte boards. They are unique in that they offer the 64K board with or without parity. Their prices are \$395 for 64K (with parity), \$595 for 128K, and \$795 for 192K. The smaller boards are user-expandable to 192K. These prices are the lowest I have seen so far. I'll have better technical information next month.

This isn't exactly a new product, but I got my first issues of *SATN*, the Journal for VisiCalc Users, published by Software Arts, Inc. It is terrific! If you are using VisiCalc heavily, I think you will find this publication very interesting and useful. If Vol. 2 is any measure, you will find creative VisiCalc applications that should help you learn how to build your own complex solutions. In Vol. 2, there is a tutorial on how to solve cryptarithms, like the famous SEND + MORE = MONEY problem. Who would have thought to use VisiCalc for that? It's mind-bending. Subscriptions are \$30, but worth it.

Next month: Displays. ☐

Firms Mentioned in this Column

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Quadram Corporation, 4357 Park Dr., Norcross, GA 30093, (404) 923-6666.

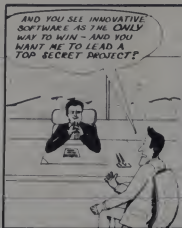
CompuCable Corporation, 1440 S. State College Blvd., Suite 3-E, Anaheim, CA 92806, (714) 635-7330.

Orange Micro, Inc., 3150 E. La Palma, Suite G, Anaheim, CA 92806, (714) 630-3322.

SATN Subscriptions, (Software Arts, Inc.), P.O. Box 815, Quincy, MA 02169, (800) 257-7850; in NJ (800) 322-8650.

Programs Unlimited, Dept. 881C, Box 265, Jericho, NY 11753, (800) 645-6038; in NY (516) 997-8668.

Bit Pit



Chas Andres

introduces you to computer concepts

Computers for Kids

Sally Greenwood Larsen

Computer for Kids is written for the elementary level child fascinated by computers but frustrated by the reading level of adult programming books. Published in three editions, TRS-80, Apple and Atari, and written expressly for the young programmer-to-be, this delightful book features large, easy-to-read text, and complete instructions for operating and programming personal computers. *Computers for Kids* covers "everything you need to know" about programming in twelve chapters: How computers work; how to run, load and save programs on the computer; how to write flow charts; and how to program in BASIC. A glossary of statements and commands is included, as well as a special section for parents and teachers that offers valuable teaching techniques and lesson ideas including solutions to common hardware problems.

Softbound, 8½ x 11 inches, illustrated. *Computers for Kids* comes in editions for TRS-80, Apple and Atari Computers and sells for \$3.95.

Creative Computing Magazine

David Ahl, ed.

From the first issue in 1974, *Creative Computing* has been valued by educators as a teaching tool in the classroom. Every issue is loaded with applications such as text editing, graphics, simulations, data base and file systems, etc. Also technology tutorials, learning activities, short programs with sample runs and problem solving pages. The September and March issues are devoted almost entirely to computer applications in education. Unbiased, straight-from-the-shoulder evaluations of hardware, software and books are presented along with light-hearted fiction and fun. Subscriptions are \$20.00 for one year, \$38.00 for two years and \$53.00 for three years. Foreign subscriptions are \$9.00 per year extra.

Computers in Mathematics: A Sourcebook of Ideas

David Ahl, ed.

This best-selling book contains scores of pragmatic, ready-to-use classroom tested ideas in dozens of areas: probability (how many packs of gum to get a complete set of baseball cards?). Problem solving ($SEND + MORE = MONEY$ — yes, a computer can solve it). Approximations (calculating π by inscribed polygons). The book contains sections on computer literacy, problem solving techniques, simulations, drill & practice, art and graphing as well as over 250 problems, puzzles and programming ideas. A section on how to select a computer complete with comparison chart is included. This mammoth 224-page softbound book costs only \$15.95.

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Katie and the Computer

Fred D'Ignazio and Stan Gilliam

Fred D'Ignazio and Stan Gilliam have created a delightful hard-cover full color picture book adventure that explains to a 4-to-10 year old child how a computer works. Katie "falls" through her daddy's home computer into the imaginary land of Cybernia, paralleling the path of a command through the stages of processing. *The School Library Journal* says: "Lively cartoon characters guide readers through the inner chamber of the computer" and *Infosystems* comments: "... the book is both entertaining and educational." *Katie and the Computer* is available for \$6.95.

Be a Computer Literate

Marion Ball & Sylvia Chapp

This first introduction to the world of computers for children aged 10-16 is used as a supplemental text in many schools. It discusses large and small computers, how they are used and their impact on our lives. Simple programming concepts are also introduced. Illustrated in full color, this 66-page book has diagrams and photos on every page. The glossary will help to familiarize readers with essential computer terminology. This large format paper-bound book is \$3.95.

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strings...trs-80 strings...trs-80

As the ball drops into the 40 slot on the TRS-80 wheel, we see five chips on the gaming table. Because it's again time to live up to the column's name, we first take a long look at using strings, in ways that may be familiar to many of you, but ending with one that probably isn't. Then on to three Radio Shack products for the Pocket Computer: the printer and the *Games II* and *Civil Engineering* packages. We end with a short musical program for the Color Computer, thus completing a triple play.

Splitting Strings

There is a way of figuring out the location of an address on a Manhattan avenue by performing a simple mathematical operation on the number. You simply "cancel the last figure of the number, divide the remainder by 2, and add or subtract the given key number," according to the instructions found on the back of some New York business card.

To locate the Chemical Bank at 2260 Broadway, you divide 226 by 2, which gives 113, and then subtract key-number 31, which gives 82. The bank is actually at the corner of Broadway and 81 St., but 82 is close enough.

How would you write a program to provide cross-street numbers for the avenues of Manhattan? For instance, find the cross-streets for:

123 Broadway
234 Amsterdam
345 Central Park West

There are 30 avenues in Manhattan with key numbers, but these three will do for examples. One involves a simple calculation; the other two are a little more complicated.

According to the Radio Shack manual, various operations can be performed on the number part of the street address. The chapter on strings shows how to use VAL in determining if a street number is odd or

Stephen B. Gray

even, which is a fairly simple operation. But is there a way to peel off the number and leave the street name to be operated on?

I called Radio Shack's Customer Service number. The woman suggested ways that would work, but only if the number part were always the same length.

But the number can vary from one to four digits, I reminded her. She consulted with someone else, and came back to say, "Well, sir, you'll just have to work around that."

Suppose you take a VAL for the number part, and try to subtract it from the string, with

```
100 READ A$  
110 B=VAL(A$)  
120 PRINT A$-B  
300 DATA 123 BROADWAY
```

which brings up

```
TM ERROR IN 120  
because you're mixing a string with a non-string which is a type mismatch.
```

Why not turn the non-string number back into a string, with STR\$, like this

```
120 C=STR$(B)  
130 PRINT C
```

However, this causes

```
TM ERROR IN 120  
because, in turning B back into a string,  
we forgot to use C$ instead of C. So we use C$
```

```
120 C$=STR$(B)  
130 PRINT C$  
and we get a printout of 123, so we add  
140 D$=A$-C$  
150 PRINT D$  
which brings up  
TM ERROR IN 140
```

not because of a type mismatch, but because, as the Model III Disk Basic manual puts it, "string values cannot be used in arithmetic expressions." The Model I, Level-II manual says, "there is only one string operation—concatenation, represented by the plus symbol+." To prove this, change the minus to a plus in line 140

```
140 D$=A$+C$  
and the printout will be, of course
```

```
123  
123 BROADWAY 123  
(Why is the first line indented?)  
If you try something like  
140 C$=-C$
```

you'll also get a TM error, because there's no such thing as a negative string (but there is a catchy rhyme).

So now what?

The Power of INSTR

The answer lies in the use of three string functions. We use them to read the length of the address string, find the location of the space in the address string, subtract the position-number of the space from the length of the string, and use the difference to read characters from the right end of the address string:

```
100 READ A$  
110 L=LEN(A$)  
120 I=INSTR(A$, " ")  
130 PRINT L,  
140 B$=RIGHT$(A$,L-I)  
150 PRINT B$  
300 DATA 123 BROADWAY
```

In line 110, LEN counts the character length of string A\$, which is 12. The INSTR in line 120 provides the location of the space in string A\$, which is the fourth character. Or in the words of the manual, INSTR searches string A\$ to see if it contains the substring that consists of a space, and if so, returns the starting position of the substring in the target string.

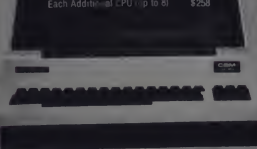
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Line 130 prints out the 12 and 4. Line 140 subtracts the 4 from the 12, and then returns the last 8 characters from the RIGHT end of string A\$. When run, this program produces

12 4
BROADWAY

But INSTR is a Disk Basic function. How do you peel the number off the address in Level-II Basic?

In the Level-II manual's chapter on strings, a paragraph starts, "Using the intrinsic string functions MID\$ and LEN\$, it's easy to create a very handy string-handling subroutine, INSTRING. This function takes two string arguments and tests to see whether one is contained in the other."

The subroutine can be simplified because we know that no address will have over four digits in it, so the space won't be past the fifth character, thus eliminating the need for LEN\$. Also, we know the space is only a single space. So the subroutine in the Level-II manual can be turned into a couple of much simpler lines, without LEN\$. (INSTRING was of course the inspiration for Disk Basic's INSTR.)

For Level-II use, replace line 120 in the Disk Basic version with lines 114-126:

```
114 Y$ = "
118 FOR I = 1 TO 5
122 IF Y$=MID$(S,I,1) 130
126 NEXT
```

Note first that line 122 does not need a THEN before the 130. The Level-II manual says, "It is optional except when it is used to specify a branch to another line number." The Model III Basic manual is more specific, "THEN is optional except when it is required to eliminate an ambiguity, as in IF A<0 100, THEN should be used in IF-THEN-ELSE statements."

In line 122, MID uses the FOR/NEXT I-loop to look for a match between one-space string Y\$ and one of the first five characters in address-string A\$. When it finds the space at position 4 in string A\$, the program branches to line 130.

The Address Routine

Let's finish up the address-finding program. First replace line 150 with

```
145 C=VAL(A$)
147 D=INT(C/20)
```

Line 145 supplies the number part of the address. Line 147 does two things: it "cancels the last figure of the number" and also "divides the remainder by 2." What is the INT for?

Now we have to write lines that will cause a branch from a particular avenue name to a routine that operates on the number preceding that name:

```
150 IF B$="BROADWAY" THEN 172
160 IF B$="AMSTERDAM" THEN 180
170 E=INT(C/10)+60: GOTO 200
```

If the avenue is neither Broadway nor Amsterdam, then it must be Central Park West, and so the program will "fall through" to line 170. For Central Park West, we do not "divide the remainder by 2," but instead "drop last figure, add 60 to remainder."

The rules for Broadway are a little more complicated. According to the instructions, "Up to 754, below East 8th Street. Above 754, deduct following key number: From 754 to 856 deduct 29. From 857 to 999 deduct 25. Above 1000 deduct 31."

```
So we take care of the first part with
172 IF C<754 THEN 210
which branches to a PRINT line we'll look
at later. As for writing a program line that
will take care of a number between 754
and 856, we could write a line starting with
IF C>=754 OR C<=856
THEN E=D-29
```

which may at first glance seem as though it would work. But on closer examination, or if you try to use it in the program, you'll find that if C is greater than (or equal to) 754, the program will never get to the OR, but skip over it to the THEN E=D-29. No matter what the Broadway address over 754 is, it will be treated as though it's between 754 and 856, and the program will go right from this line to a PRINT line, never reaching any of the lines in between.

But by simply using AND instead of OR in that line, and in lines like it, we solve the problem. The AND in line 174 means that

any address between 754 AND 856 will be taken care of by that line alone.

```
174 IF C>=754 AND C<=856
THEN E=D-29: GOTO 220
176 IF C>=857 AND C<=999
THEN E=D-25: GOTO 220
178 IF C>=1000 THEN E=D-31
179 GOTO 220
```

Amsterdam is an easy one, requiring only adding 59 to the key number for any address on that avenue:

```
180 E=D+59: GOTO 230
```

```
Now we get into the printing lines:
200 PRINT C:"C.P.W. IS AT":E:"ST."
205 GOTO 100
210 PRINT C:"BWAY IS BELOW EAST
8 ST.
```

```
215 GOTO 100
220 PRINT C:"BWAY IS AT":E:"ST."
230 PRINT C:"AMST IS AT":E:"ST."
235 GOTO 100
```

Note that line 220 takes care of all Broadway addresses except those below 754 because we used E in all three lines 174, 176 and 178. Otherwise you'd need a different PRINT line for each of the three situations.

Without the GOTO 100 after each PRINT line, you'd print out all the subsequent PRINT lines.

All that remains now is to add DATA lines to test the address-finding program, including some new ones to test the lines written for Broadway addresses:

```
300 DATA 123 BROADWAY
310 DATA 234 AMSTERDAM
320 DATA 345 CENTRAL PARK WEST
330 DATA 800 BROADWAY
340 DATA 900 BROADWAY
350 DATA 1100 BROADWAY
```

If you wanted to use this program "for real," you'd have to add lines to take care of some or all of the other 27 Manhattan avenues, nearly all of which would require adding only three lines each: one line like 160, another like line 180, and a third like line 230. Of course, many of the PRINT lines can be combined, without having to use a different one for each avenue. How would you do that?

Once you've got lines for all the avenues added to the program, then you can simply replace line 100 with

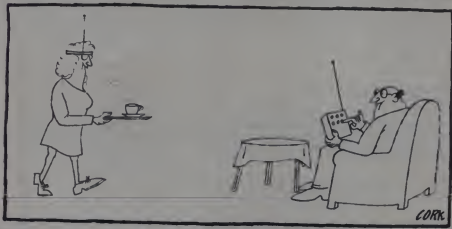
```
100 INPUT A$
eliminate lines 300-350, and you've got a program that will find the cross-street for any address on Manhattan's 30 avenues.

```

The point of all this, as you probably realized at least a page ago, is not to build an address-finder, but to look at some simple techniques involving strings. If you knew them all, please consider that many readers of this column are just getting started with strings.

Boolean For Short

Here's something you may not know: how to reduce number comparisons to a



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minimum line-count. For instance, the number-comparing parts of four lines in the address-finding program can be reduced to a single line, by using Boolean algebra.

Boolean algebra involves what the Level-II and Model III manuals call logical operators. Both manuals are pitifully deficient in discussing this important subject, and as a result many TRS-80 users have little or no idea what can be done (and in a minimum of space) with AND, OR, NOT, etc.

Replace lines 172-179 with these:

```
172 DEFFNG(C)=(C>=754)+(C>=857)+(C>=999))
174 ON FNG(C)+1 GOTO 210, 175, 176, 178
175 E=D-29: GOTO 220
176 E=D-25: GOTO 220
178 E=D-31: GOTO 220
```

The right side of the DEFFNG statement is a Boolean expression containing three terms connected by OR logical operators. If, in the first term, the Broadway address is less than 754, the expression is false, and equal to 0. If the address is greater than or equal to 754, the expression is true, and equal to -1.

If the address is below 754, all three terms are 0, and because they are ORED together, the three-term expression is equal to 0. Adding 1 to it allows the ON/GO statement to branch to line 210, for addresses below East 8 St.

If the first term is true, then the expression has a value of -1, which is made +1 by the minus sign at the beginning, and by adding a 1 in line 174, causes a branch to line 175.

If the Broadway address is 900, then the first two terms in the expression are -1 because 900 is greater than 754 and 857, and the total of -1 terms is -2. If the address is 1100, the three terms are all -1, for a total of -3. These become 2 and 3 via the minus sign, then 3 and 4 via line 174, and cause branching to lines 176 or 178.

Thus, through the use of some fairly simple Boolean algebra, we have an expression whose value is either zero or from one to three minus-ones, which are easily converted for use in an ON/GOTO statement for branching.

The Boolean lines can be made more elegant, as can the entire address-finding program; both were simplified for tutorial use. The DEFFNG statement, like INSTR, is found only in Disk Basic. To conserve memory and to make the program run faster, use integer arithmetic by adding the DEFINIT statement or the % sign.

Pocket-Computer Printer

If you're going to buy a cassette interface for your TRS-80 Pocket Computer, why not spend \$98 more and get a combination printer and cassette interface?



Figure 1. The TRS-80 Pocket Computer easily connects to the printer/cassette interface to provide a compact combination weighing only 1.25 pounds.

Not only is the tiny printer one of Radio Shack's most fascinating gadgets, but it prints out 5 x 7 dot-matrix characters on regular paper, dark and clear, one line a second, giving you highly legible hard copy of your programs or your results. Because it has a built-in rechargeable Ni-Cad battery, you can carry it along just as easily as the Pocket Computer.

You can also use it as a portable electronic memo pad, but there are only 16 characters to a line on the 1½-inch-wide paper, so you'd have to key in a lot of PRINT lines to record much of a memo.

The printer mechanism looks very much like what Sharp (which makes the PC for Radio Shack) built into their EL-7001 Memowriter, a calculator looking somewhat like the PC but with a "memo" mode for using it like a typewriter for brief messages.

The small 16-page manual is one of Radio Shack's best, covering just about all the points and using two dozen illustrations. You remove the pin-cover from the left end of the PC, and slide the PC in the printer's grooves until the pins engage. The paper, which costs only \$1.75 for six rolls (three come with the printer), is easily inserted; a Paper Advance button moves it through the mechanism. The printer ribbon comes in an easily installed cartridge; just push it into place.

A power switch turns the printer/interface on or off; a print switch activates the printer, so you print only what you need. A remote switch controls a cassette recorder when it's connected; when on, the recorder is started and stopped by the Pocket Computer; when off, by the recorder's own keys.

Also supplied are a cable for connecting the recorder to the printer/interface, and an AC adapter for recharging the built-in battery. One charge is said to be good for about 8,000 print lines.

Ordinarily, the first four columns are reserved for line numbers and the separator colon. But when PRINT items are separated by semicolons, all 16 columns are used for

printout, as they are if you write memos in quotes in PRINT lines.

```
100:INPUT A,B,C
110:D=(A*A+B*B+C*C)
    *C) (.5)
120:PRINT D
130:END
```

In the RSC-5 catalog printed in 1981, the Pocket Computer was priced at \$249; in the RSC-6 catalog (also 1981) it was listed at \$229.95, and the printer/interface at \$149.95. Both prices were lowered "for the months of November and December only," as I remember the newspaper ads, to \$169.95 for the PC and \$127.95 for the P/I. However, Radio Shack decided to continue these prices into 1982, as well as the \$29.95 price for the 26-3503 cassette interface that was originally \$49.

For \$149.95, you can get a padded vinyl case that holds the PC and P/I and extra paper, or the "recommended" Minisette-9 cassette recorder, the price of which hasn't changed from its original \$79.95.

Games II for PC

For \$149.95, you get two cassettes with eight games for the Pocket Computer that "let you test your deductive reasoning, marksmanship, and gambling abilities," according to the 24-page manual.

In *Missile Marksman* you try to hit the target by adjusting the launch angle and the amount of propellant. There are no graphics, of course, to show whether you shot short or long, so you get a readout telling how far, in miles and feet, your shot was from the target.

In *Baccarat* you are the croupier, against two experienced players, in a game similar to *Blackjack*, which is the next game (you play against the dealer), followed by *Aceyducey*; three card games in a row.

One-Armed Bandit simply displays three wheels instead of the pictures of cherries, plums, etc., displayed by slot-machines; different combinations pay different odds. *Pokerlot* is a similar game, displaying five cards that compose your hand, with five of a kind winning \$5,000, etc.

Nutmeg is similar to the Mastermind game, in which the computer gives you clues, here called direct and indirect hits, as you try to guess the hidden number. *Crap*s is the standard game of dice.

These eight games can all be fun if you don't mind a minimum display, of a few words or numbers, on a 24-digit dot-matrix LCD display. The eight have been made about as interesting as possible within the limitations of the Pocket Computer, which aren't all that great once you get right down to playing. In fact, you may get an added kick out of playing games on a computer smaller than two cassette boxes.

Civil Engineering on the PC

Described as an "on-site assistant" in the catalog, this \$24.95 package of two cassettes for the Pocket Computer consists of seven programs including Simple-Beam, Cantilever-Beam, and Fixed-Beam calculations (shear, moment, deflection), Column Characteristics (buckling, loading), Cylinders (stress) and Bolts (torque), Section Computations, and Vector Operations.

The 32-page manual provides full details on using these programs, describing all parameters, showing formulas, and giving an example of using each one.

Short Program #29: Color-Joystick Sound

George Trepal of Augusta, GA, sent "a short program to play on a TRS-80 Color Computer with a joystick:

```
10 X=JOYSTK(0)
20 Y=JOYSTK(1)
30 IF X=0 THEN X=1: IF Y=0
   THEN Y=1
40 SOUND X,Y
50 GOTO 10
```

"The a/d conversion turns out a value from 0 to 63 for the joystick. A more interesting program comes from adding the following lines:

```
15 X=INT(X*.39)
25 Y=INT(Y*.8): IF Y<1 THEN Y=1
```

"This program should be kept away from children if a non-deaf adult has to stay in the same house as the computer."

According to George's program notes, line 10 is for "horizontal left joystick," line 20 for "vertical left joystick," line 30 "gets rid of zero," and line 40 makes a sound of tone X for duration Y.

The horizontal coordinate controls the sound frequency (low at left, high at right) and the vertical controls its duration (short at top, long at bottom). You'll need a very delicate handling of the joystick to play a recognizable tune; you'll go crazy trying to play the first two solo bars of "The Flight of the Bumblebee."

The shorter program gives the sound a range of only a couple of notes, so use additional lines 15 and 25, which provide a range of over four octaves, although with very little control over the top half.

On my Color Computer, the highest, shortest note is at about 1:30 (considering the face of the joystick case as a clock dial), and the lowest, longest note is at about 7:30.

If this program doesn't work with your joystick plugged into LEFT JOYSTK, try plugging it into RIGHT JOYSTK. □



"It's a love letter from Herbert. I think he's goofing off at work again."



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CIRCLE 118 ON READER SERVICE CARD

m...software legal forum...s

The subject of this month's Software Legal Forum was prompted by a letter from Nate Salisbury. Mr. Salisbury's letter and the response are printed below. The subject is the always interesting one of copyrightable subject matter, breadth of copyright protection, and the ability to computerize a well-known game.

Dear Mr. Novick:

I have suddenly discovered that our local Community College has subscribed to *Creative Computing* for several years. I have been going through back issues (January/February 1980) and I'm fascinated by the intricacies of the copyright laws which were your topics in those issues. No matter how many times I read them, I feel that I'm trying to stuff fog into a pillow case—I just can't seem to find the "handle." Let me ask a specific question.

In the February, 1980 edition of *Creative* there is an article outlining a program to simulate "Black Box"—a well known game published (I believe) by Parker Bros. As far as I can tell, the program attempts to reproduce all aspects of the "board," concepts, rules etc. of the game as closely as possible. The article even "admits" that it is, effectively, a computerized copy of the game. Furthermore, in a boxed note accompanying the article, Mr. D. Ahl notes that he ran a contest for a computer version of "Black Box" in 1977.

Nobody seems to be writing this material from a prison. Why is this form of "copying" (apparently) not a violation of the copyright laws? The people participating are not economically "pure"; the author gets paid for the article; Mr. Ahl's magazine prospers from the great interest in games—his circulation, to some extent, increases in proportion to the number of interesting game programs he presents.

Why doesn't/can't Parker Bros. (or whoever published and copyrighted "Black Box") haul all of these people to court and "take all"? Apparently it is *not* the concept, rules, board layout etc. which has been

copyrighted *but*, if not those things, what's left?

I hope you'll find a moment to put some sort of explanation to this mystery in it.

Very truly yours,
Nate Salisbury

Dear Mr. Salisbury:

Thank you for your letter. I will try to "defog" you.

At the risk of oversimplifying matters on the one hand or confusing you more on the other, let me attempt to rephrase your question. You have basically asked: How can someone write and publish a computer program to play a well known game? As in every legal question, it is far, far easier to ask the question than to provide an answer.

I always like to answer a question first and then explain the exceptions and limitations of the answer. A game, *per se*, cannot be copyrighted. A game can, however, be patented. In fact, the game Monopoly was patented sometime around 1939 and has been in the public domain since the patent expired sometime around 1956. All a copyright can protect is a certain expression of a game or a certain description of a game. It cannot, however, protect and prevent copying of a concept of a game or the particular manner in which the game is played.

Your letter involves a particular game, "Black Box," described in the February, 1980 edition of *Creative Computing* by Mark Zimmerman. I will have to describe, briefly, the game because legal questions can only be accurately answered with respect to a particular set of facts. We lawyers, then, reason by example to determine whether the same or a different result would occur if some of the facts were changed.

The game of "Black Box" involves the use of a checker board display in which there is an 8 x 8 array of boxes. In Mark Zimmerman's computerized version, the 32 peripheral boxes are numbered sequentially in a counter clockwise direction beginning with the upper left hand box along its side face. Five balls are hidden inside the checker board in a particular box and the object of the game is to guess

the location of the five boxes by sending a probe in from a numbered edge. As in chess, the probe moves in a straight line unless it is absorbed by a ball directly in front of it, is deflected to the right or left if the probe encounters a ball in the forward left hand square or the forward right hand square, respectively; and is reflected if it would be deflected before it got onto the board or if it encounters balls in both its forward right and left hand squares. The object is to guess the location of the five balls and a penalty is assessed for each ball which is guessed incorrectly and for each probe that is made.

As the game is understood, it uses neither a patented concept nor a particular game board. Obviously, a checker board is in the public domain and cannot be copyrighted. In contrast, the game board of the game Monopoly is copyrighted and therefore cannot be copied, whether it be by a computer program "writing" the board on a video screen or by photographic techniques. Secondly, let it be assumed that the rules were simply a restatement of some generally known concepts, much in the way that I restated the rules set forth by Mr. Zimmerman in his article.

As each particular fact pattern is investigated, other subtleties can arise where the principle of copyright law would apply. For example, in some games where the particular expression of the game rules was the only way to express the concept of the rules, then even though a copyright was claimed those rules could not be protected.

For example, if the rules consisted of nothing but a series of algorithms, a mathematical principal if you will, then the rules would not constitute copyrightable subject matter. Translated, this means anybody could copy even the exact expression of those rules.

Another subtlety which is quite applicable to computerized board games is the legality of copying particular characters that appear on the board or are in the form of playing pieces. The test would be whether there was a substantial copying of the expression of the game and any particular uniqueness (translated as copyrightability) of the

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Legal Forum, continued...

character. In the case of the characters in the arcade game "Galaxian" it seems that the copying of the shapes of the particular characters was sufficient to convince most of the judges ruling in the matter that there was a "substantial copying" of the entire "game." On the other hand, if the character was in the public domain, such as a conventional chess piece, then clearly a computerized picture of the chess piece could be used by the computer programmer.

A third example, somewhere in between the other two, would be the copying of a game board in which only the outline shapes of the various spaces are depicted in the computerized version. The question then becomes, "Is copying only the shapes of the spaces without any of the other indicia or ornamentation of the board game sufficient to constitute copyright infringement?" Again, the answer would depend upon the specific facts. If the particular arrangement and shape of the spaces were unique, then copyright infringement would probably lie. On the other hand, if the arrangement were more like Monopoly, then perhaps there would not be a "substantial copying."

Returning now to the "Black Box" game, the answer to your question is that in this particular case there does not appear to be any copyright infringement because the "game board" is not copyrightable subject matter, the expression of the particular rules set up in the Parker Brothers game were not copied in sufficient particularity (this has been assumed), and the game concept is not copyrightable. Consequently, Mr. Zimmerman's article was not written from prison and, in the opinion of this writer, is not a copyright infringement.

In order to set your mind at ease, if the copyright issue were simple, there would be no need for copyright attorneys or a column such as the Software Legal Forum.



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High-quality construction

The sturdy case of the Super Joystick matches that of the Apple computer. Every component used is the very highest quality available. The Super Joystick even uses a full 16-conductor ribbon cable and you can add a second joystick (using our Select-A-Port extension unit for example) if you wish. The first Super Joystick replaces Paddles 0 and 1. You may not realize it, but the Apple has the capacity to support four paddle controls. A second Super Joystick would replace Paddles 2 and 3.

Super Joystick

Star Wars. Played with paddles, it's difficult at best and frustrating at worst. But with a joystick, it becomes an entirely new experience. It's still challenging. It's also fun. And very addictive.

Have you ever used a drawing program in which one paddle controls the horizontal movement of the "brush" and the other paddle the vertical? It's slow, tedious work. But with a joystick, drawing is an absolute joy.

Exceptional Precision

The Apple high-resolution screen is divided into a matrix of 180 by 280 pixels. To do precise work on this screen, you need a precise device. Most potentiometers used in paddle controls are not quite linear. If you rotate a paddle control at a constant speed, you'll notice that the cursor speeds up slightly at the beginning and end of the paddle rotation.

The Super Joystick has a pure resistive circuit which is absolutely linear within one tenth of one percent. In other words, it would give you precise control over an image of 1000 by 1000 pixels, were such resolution available. Thus it is suitable for high precision professional applications as well as educational and hobbyist ones.

Matched to your application

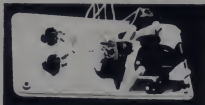
The Super Joystick also has two external trim adjustments, one for each direction. This allows you to perfectly match the unit to your application and computer. Say you want to work in a square area instead of the rectangular screen. Just reduce the horizontal size with the trim control.

How many times have you played Space Invasion and had your thumb ache for hours from the repeated button pressing? This won't happen with the Super Joystick. Its two pushbuttons are big. Moreover, they use massive contact surfaces with a life of well over 1,000,000 contacts. A few games of Super Invasion using these big buttons will justify the purchase of the Super Joystick.

The Super Joystick is self-centering in both directions. That means when you take your hand off it, the control will return to the center. However, if you want it to stay where you leave it, self-centering may be easily disabled by removing two springs.

The Super Joystick plugs right into the paddle control socket and doesn't require an I/O slot.

We invite your comparison of the Super Joystick with any other unit available. Order it and use it for 30 days. If you're not completely satisfied, return it for a prompt and courteous refund plus your return postage. You can't lose.



By removing two springs, self-centering can be defeated.

The Super Joystick consists of a self-centering linear joystick, two trim controls, and two pushbuttons mounted in an attractive case. It comes complete with schematics and a 90-day limited warranty. Cost is \$59.95.

Order Today

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ns...puzzles & problems...pu

The Cannon Ball Puzzle

The following saga concerns the meeting long ago of the Cannon Ball Express and the Bowling Ball Special. One dark night, at exactly 8:00 P.M., the Cannon Ball Express left Chicago, traveling at a speed of 60 miles an hour, and headed east for New York. At exactly the same moment the Bowling Ball Special left New York, traveling at a speed of 45 miles per hour, heading for Chicago. Both trains were non-stop to their destinations. Sometime during the night, where no one knows, the trains were switched onto the same track. The rest is history.

An interesting puzzle has been propounded concerning this event. At exactly one hour and twenty minutes before the trains crashed into one another how far apart were they? For the sake of the puzzle we will say that the distance between New York and Chicago is 800 miles.



FLY
FOR
YOUR
LIFE



I Spy

Over ninety years ago two spies met briefly on the dance floor of the Hotel Intrigue in Vienna. One of the spies whispered to the other, in code of course, "Fly for your life." The code that she used was to substitute numbers for letters. A different number is used for each letter. When the correct numbers are substituted the addition will prove to be correct. One hint I can give the puzzler is that *I* stands for 1 and *O* stands for zero. You have 15 minutes to decipher this problem.



The Juggling Fool

Zepo, the clown, a fool of renown, has a problem I'm sure that you'll like. In our picture we find him balanced on top of two barrels. The barrels are shown in outline for a reason. You must cut these two barrels into four equal pieces of the same size and shape. (You will cut each barrel into two pieces.) Now, the fun begins. You are required to rearrange these four pieces into a perfect circle.

Don't let Zeppo have the last laugh on you!



The Pig Pen Puzzle

Here's a quickie. A farmer had 16 pigs, enclosed in 8 pens, arranged in the shape of a rough square. How could the farmer add 4 more pigs to the pens so that there would still be 6 pigs along each side of the square?

2	2	2
2		2
2	2	2

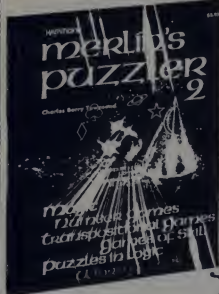


A Difficult Division



A wine merchant has in his cellar 21 casks. Seven are full of wine; seven half-full, and seven empty.

How can he divide them (without transferring any portion of the liquid from cask to cask) among his three sons—Dick, Tom, and Harry—so that each shall have not only an equal quantity of wine, but an equal number of casks?



$$\begin{array}{r}
 X7X \\
 XX)XXXXX \\
 \underline{X77} \\
 X7X \\
 \underline{X7X} \\
 XX \\
 XX
 \end{array}$$



EXTRAORDINARY," exclaimed Merlin. "Rupert, you do come up with some amazing puzzles to tax our wits. Now, let me see if I have this right. We have here a simple case of division, but you have gone and substituted X's for all of the numbers in the expression except an occasional 7 here or there, and it is our job to reason out what these numbers were and to write them back into the expression? This is an interesting problem, Rupert, now let me see, if I were to divide by . . ."



The Steel Band
In this puzzle a steel band is placed around the earth at the equator. The band is cut and 10 feet is added to it. Some magical force now holds the band an equal distance away from the earth. What is this distance? (For the sake of simplicity assume that the radius of the earth is 4000 miles. Also, use 3.14 for pi.)

This puzzle was sent to us by Mr. Gary W. Dode, of Whitehall, Michigan. Merlin is sending Mr. Dode a copy of *Merlin's Puzzler* for his contribution. Thank you!

A Problem In Addition

The following problem in addition is from *Merlin's Puzzler 3*. It's not as hard as it looks. "Take the digits 1 through 9 and arrange them in such a manner that when they are added up the total will be 99,999."

1 2 3 4 5 6 7 8 9

That's all folks. I think that Merlin has brought you an interesting mix of puzzles this month, and we both look forward to seeing you all again next month in *Creative Computing*.

Your editor,

Charles Barry Townsend

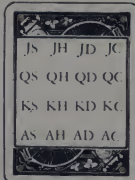
Charles Barry Townsend

No Two In The Same Row

Arrange the twelve court cards and the four aces into four rows of four cards each as shown in the drawing at the right. Now move the cards around until they are in such order that no two cards of the same suit or of the same value will be found in any row of four cards—either horizontally, vertically or diagonally. This is a famous old card puzzle and is still one of the best.

(This puzzle is from the book *Merlin's Puzzler 2*.)

This book, along with *Merlin's Puzzler 1* and *Merlin's Puzzler 3* can be purchased from Creative Computing. Each book is 128 pages long, 8 1/2" x 11" in size and filled with the best puzzles and games that have amused and delighted thinking people for the last 100 or so years. Numbers 1 and 2 are available as a set for \$7.50. Number 3 costs just \$4.50. Why wait when hundreds of puzzles and problems are waiting for you to solve them?



Where In The World?

Here we go again students. Willard Wordsworth is back with another "Scrambled Letters" geography test for you. Below is a list of ten countries that existed during the time of the Roman Empire, circa 117 A.D. Willard has very inconveniently, for you anyway, mixed the letters up in each name. It is up to you to rearrange them correctly. Seven out of ten is a must to pass this test.

- | | |
|-----------------|---------------|
| (1) DUMINAI | (6) TDAEAAMI |
| (2) SMTMEOPAAOI | (7) OIAAIN |
| (3) CTERAH | (8) GAEANMIR |
| (4) ICNSAAD | (9) YILAD |
| (5) NERAUAITAM | (10) RAHNEIBI |



Lucky Sevens

EXTRAORDINARY," exclaimed Merlin. "Rupert, you do come up with some amazing puzzles to tax our wits. Now, let me see if I have this right. We have here a simple case of division, but you have gone and substituted X's for all of the numbers in the expression except an occasional 7 here or there, and it is our job to reason out what these numbers were and to write them back into the expression? This is an interesting problem, Rupert, now let me see, if I were to divide by . . ."

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Your editor,

Charles Barry Townsend

Charles Barry Townsend

Answers on page 216.

Xerox Operator Maximus

Peter Payack

In his advanced Theory of Knowledge class at the Academy, that good ol' Professor Plato taught that for every material object on the planet (including the planet itself) there existed in a far off heaven-like realm a perfect *Idea* of that particular thing that was eternal, incorruptible, immaterial, and (I'm extrapolating here) non-carcinogenic, rust proof, and warranted for life! Furthermore, these *Ideas* are somehow more real than their manifestations on Earth, which (I'm sorry to say) are just shadowy reproductions with the quality of a xeroxed Mona Lisa!

This concept of a supreme deity being portrayed as The Great Xerox Operator, who not only runs off copies, but imperfect and faded ones at that, caused me considerable personal anguish, not to mention raising some most disturbing

Peter Payack, 64 Highland Avenue, Cambridge, MA 02139.

The Number-Cruncher's Lexicon

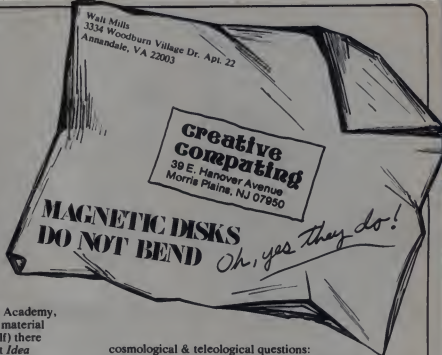
Jim Peterson

For years I've been hanging around computer people. Many of them probably think I'm some weird kind of groupie, but that isn't it at all. Actually, I've just been trying to figure out what the hell they're talking about.

My research wasn't easy at first. Whenever I located a group of them and began my approach, they would spot me as an outsider and scatter. I slowly developed better stalking techniques. I began disguising myself as one of them, carrying Fortran manuals and numerical analysis texts around. In later years I even discovered that I could lure them in by flashing a copy of *Creative Computing*.

These years of dedicated investigation have paid off, and I am now ready to share my discoveries with the world. All of you who have previously been baffled by the argot of this strange tribe need remain no longer in ignorance. I am presenting my findings in the form of a lexicon which will enable you to decode the most cryptic of statements in computer jargon.

James M. Peterson, Ph.D., 2125 Banks Ave., Superior, WI.



cosmological & teleological questions:

- Are the original *Ideas* copyrighted? And if they are, By Whom, and for what duration of time? (Eternity?)
- Who gets the royalty payments for the reproduced material? Who (or What) built the Xerox Machine-In-The-Sky?
- And by implication, was it always there *ad infinitum*, or was it built *ex nihilo*?
- Who services the machine when it breaks down?
- And by extension, who pays for these charges, or are they "taken care of"?
- Does God own the Machine outright, or does he lease it? ☐

Assembly Language: Profanities used by people who build computers from kits. (Such people are termed "cursors.")

Bug: A parasite which infests software. It is transmitted by illicit congress between people and programs.

Core: The remains of an Apple when all of the bytes are gone.

Data Processing: An arcane fortune telling method wherein one attempts to extract hidden meanings from numbers. Akin to numerology.

Down Time: Periods when a computer is acutely depressed.

Error: The act of buying a computer.

Hexadecimal: To bewitch a number.

Infinite Loop: See Input

Input: See Throughput

Keypunch: The device that puts the little round holes in the tops of keys.

Line Printer: The device that puts the thin blue streaks across your notebook paper.

Output: See Input

Peripheral: Irrelevant

Real Time: Whenever the computer isn't hallucinating.

Reboot: To repeatedly kick a faulty computer until it starts working again.

Terminal: Said of a computer that is about to die.

Throughput: See Output ☐

LNW80

COMPUTERS



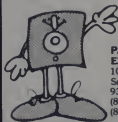
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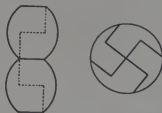
Send to: Software Ballot, Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.

puzzle answers

The Cannon Ball Puzzle: This is somewhat of a trick question. One hour and 20 minutes before the trains met the Cannon Ball Express was 80 miles away from the point of impact, and, the Bowling Ball Special was 60 miles away. Therefore, they were 140 miles apart one hour and 20 minutes before the accident.

I Spy: 598
507
8047
9152

The Juggling Fool: Cut the barrels along the dotted lines. Rearrange as shown.



The Pig Pen Puzzle:



A Difficult Division: According to the conditions of the problem, each son's share will be seven casks (irrespective of contents), and of wine, $3\frac{1}{2}$ casks. The division can be made in either of two ways; Dick and Tom each take 2 full, 2 empty, and 3 half-full casks; and Harry, 3 full, 3 empty, and 1 half-full; or Dick and Tom take 3 full, 3 empty, and 1 half-full cask; and Harry 1 full, 1 empty, and 5 half-filled casks.

No Two in The Same Row:

JS	JH	JD	JC
QS	QH	QD	QC
KS	KH	KD	KC
AS	AH	AD	AC

Where In The World?: (1) NUMIDIA (2) MESOPOTAMIA (3) THRACE (4) SCANDIA (5) MAURETANIA (6) DALMATIA (7) IONIA (8) GERMANIA (9) LYDIA (10) HIBERNIA

Lucky Sevens:

971
53 51463
477
376
371
53
53

The Steel Band:

$$C = 2\pi r_1 \quad C + 10 = 2\pi r_2$$

$$r_1 = \frac{C}{2\pi} \quad r_2 = \frac{C+10}{2\pi}$$

$$r_1 = 4,000 \quad r_2 - r_1 = \frac{C+10}{2\pi} - \frac{C}{2\pi} = \frac{10}{2\pi} = \frac{5}{\pi}$$

$$r_2 - r_1 = 1.59 \text{ FEET}$$

A Problem In Addition:

98765
+ 1234
99,999

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Stephen B. Gray, et al.

Taming Your Computer: A Guide for Business and Professional People. by Jerome Kanter. Prentice-Hall Inc., Englewood Cliffs, NJ. 254 pages, hardcover \$17.95, paperback \$8.95, 1981.

This is a revised and updated edition of *A Management Guide to Computers*, published in 1977 by Honeywell Information Systems, where the author is Director of Planning & Consulting for National Industry Operations.

The nine chapters are: Introduction to Computers, Uses and Applications of Computer Systems, Selecting and Implementing Computer Applications, Mini/Micro Mania, Understanding Software and Programming, Computer-Aided Decision Making, Management Information Systems, Computer-Based Data Processing Systems, and Future Use and Growth of Computers. A 2½-page bibliography is included.

Containing a great deal of useful material and written in a semi-informal style, this book would be much more readable and helpful to the person who has "never before been directly involved with computers" if it broke up the page-after-page masses of solid type with illustrations. The book contains only two photographs, of a small computer and a video terminal, both Honeywell products. There is one fine drawing of "How a Computer Operates." There are 36 charts and graphs in the first six chapters, six drawings of system models in the MIS chapter, and a dozen figures in the last two chapters.

If the lack of photos and figures isn't that important to you, and if you are looking for an uncomplicated, non-technical book that will give you a solid understanding of the basics of computers and computing, this is one of the better texts.

If this lack does bother you, try one of the many first-year computer-science textbooks reviewed here in the last few months.

Microcomputer Buyer's Guide. by Tony Webster. Hayden Book Co., Rochelle Park, NJ. 338 pages, paperback \$25, 1981.

This is probably the largest and most complete buyer's guide to micros yet published, with over 300 pages 8½ by 10½ inches in size, containing detailed information on microcomputers in general, several dozen software products, over 80 personal computers from 53 manufacturers, and several dozen peripherals.

Part I, on Microcomputer Theory and Applications, consists of 70 pages on micro ABCs, peripherals, software, Basic, desktop personal computers, selection guidelines, word processing, future trends, communications and networking, and education. The style is semi-formal and concise, the material highly informative.

Part II, on Independent Software Products, looks mainly at Z80 and 8080-based operating systems, high-level languages, and applications packages, plus software for the TRS-80, Apple, PET, and Motorola 68XX. Suppliers range from Microsoft to Peachtree, from Hayden to Lifeboat.

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Part III covers a wide range of machines, including the Apple II, Data General microNOVA, IBM 5120, NEC PC-8000, Radio Shack TRS-80, Sinclair ZX80, Tektronix 4050, and Wang 2200 series. Each takes up several pages, with photo, hardware and software and details, and prices.

Part IV offers less detail and no prices, but gives enough information to get a good idea of what's available in CRT displays, printers and printing terminals.

This is a valuable reference book the best I've seen of its type, with much information presented in greater detail than anywhere else, and setting a standard that will be difficult to surpass.

Although the book doesn't say a word about the author, Tony Webster is an Australian EE who publishes reports on computer hardware and software, with an updating service. He published this book himself; Hayden distributes it in the USA and Canada, and plans to publish an updated version in 1983.

The Making of the Micro: A History of the Computer. by Christopher Evans. Van Nostrand Reinhold Co., New York. 116 pages, hardcover \$14.95. 1981.

This fascinating short "history of the computer" takes half its 100 pages of actual text to lead up to the first digital computer.

Starting with the abacus, and using dozens of photographs and drawings, Evans leads us through Napier's Bones, the slide rule, Pascal's calculator, Leibniz's calculator, Babbage's engines, the Burroughs adding machine, Hollerith's tabulator, the MIT differential analyzer, etc. He explains the operations of these machines without getting bogged down in mechanical intricacies.

Evans writes as much about each inventor as about his machine, which helps make this book much more interesting than if it were merely a description of devices.

Thus we read more about how Konrad Zuse got started on his Z1 relay computer, and how WWII kept him from getting past the Z4, than about the actual computers themselves. From Zuse on, there is more emphasis on inventors and entrepreneurs, one reason being that Evans did not describe how any of these computers worked, which would have taken much more space and made the book much more complicated.

So we get mainly the superficial details of the history of IBM's Harvard Mark I, the British Colossus, ENIAC, EDVAC, and one or two other computers. After that, not one single computer is discussed; Evans goes off into 17 pages on the transistor, the computer revolution, and integrated circuits.

The book is fascinating, and one of the best of its kind, for its presentation of computers before transistors, but the reader interested in the history of computers after 1950 will have to look elsewhere.

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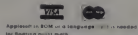
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The Captain 80 Book of Basic Adventures by Robert Liddil.
80-Northwest Publishing Inc., Tacoma, WA. 252 pages, paper.
\$19.95. 1981.

A long time in the works, *the* book for Adventure fans and programmers is finally available. Robert Liddil, author of the Adventure *Death Dreadnaught*, and a well-known figure in TRS-80 circles, has compiled a three-part (but by no means trivial) collection of treats. The first part is an introduction to the topic, with short chapters on playing, writing, and selling Adventures. The material is light but informative.

The second section contains the listing for an Adventure generator. This program, which requires a minimum of 32K and disk for the TRS-80, takes input from the user concerning rooms, objects, vocabulary, and conditional events, and produces a Basic Adventure. Liddil admits the generator is not perfect (there may be bugs or inefficient coding in the resulting program), but believes it is important enough to include in the book. Even with these flaws, it can greatly reduce the time required to write an Adventure.

The third section contains listings for eighteen Basic Adventures by authors such as Greg Hassett, Lance Micklus, and Scott Adams. The listings are clearly done in large type, and most of the programs will fit in a 16K Model I TRS-80, though Model III owners may have to do a bit of compression. There is also material about each author. While most of the programs have been published elsewhere, it is unlikely that many readers will already have listings for all eighteen of them.

Summing it up, Captain 80 has dropped a treasure. Snatch it up. Adventure fans.—David Lubar.

Using 6502 Assembly Language by Randy Hyde. Datamost Inc., Northridge, CA. \$19.95. 1981.

This book is aimed specifically at Apple users, and is written by someone who really knows what he is talking about. Randy Hyde created the LISA assembler, and a large selection of satisfied customers can testify to his credentials. The book takes the beginner all the way from basic concepts such as binary numbering to advanced areas including string handling and debugging. Filled with documented program examples and clear text, the book reads well. Mr. Hyde will never be accused of having a dry style. The strength of the book is that, beyond explaining the 6502 instructions, it presents a wealth of practical information. The sections on arithmetic are especially valuable and comprehensive. Signed and unsigned operations are explained, for both integer and multi-precision applications, along with BCD (binary coded decimal) arithmetic.

Other sections cover basic input and output, as well as I/O that is specific to the Apple, such as paddle and keyboard reading. There is even a section on Sweet-16, the rarely-documented pseudo processor available in the Integer ROM.

The only major drawback of the book is that it assumes the user owns the LISA assembler. Instructions for entering programs, and some of the special techniques described in the book, depend on LISA. While LISA is an excellent assembler, not everyone who buys the book will have it. Some may already have another assembler, in which case they may not want to make an additional purchase. Others, who have no assembler, will probably end up buying LISA. While there is nothing wrong with this, it seems to be an unfair assumption on the part of the author. Basically, the reader can still benefit from the

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book if he doesn't own LISA but will gain more if he does. Also, the only mention of the Apple mini assembler is in an appendix taken straight from an Apple manual. Readers would probably have appreciated a more thorough section, along with explanations of the single step and trace routines in the Integer ROM.

The above problems are minor compared to the overall quality of the material. Mr. Hyde has done much to unshroud the mysteries of the 6502.—DL

Apple Pascal Games by Douglas Hegert and Joseph T. Kalash. Sybex, Berkeley, CA. 371 pages, paperback, illustrated, \$14.95. 1981.

This handy volume provides users of Apple Pascal with something they haven't had until now: a collection of annotated programs to type in and study. This is not a Pascal tutorial. It is intended for the Pascal user who has learned the essentials of the language and now needs useful, entertaining hands-on practice. To this end, *Apple Pascal Games* provides a graded series of game programs, ranging from very simple to quite complex.

There are twenty-seven games all together, arranged in four sections.

The presentation of each game is divided into two parts. The first is a discussion of how the game works: game rules and instructions for running the program are given, essential algorithms are explained, and a sample run is provided.

The second part is a discussion of the program. Program logic and flow are laid out with logical diagrams. Key elements of the program are highlighted, as are the particular Pascal techniques used to program them. This part concludes with the complete program listing.

Section I consists of nine simple games. These are venerable old standbys like "Nim," "Keno," and "Guessit,"—games that have probably been programmed in every known language on every known computer.

The fifteen games of Section II are also "classics," but more complex. Each of these uses and demonstrates one of the higher functions of Pascal. Examples are the CASE statement in "Kismet," recursive procedure calls in "Telephone," and set types and set operators in "Wumpus."

Section III consists of two games. One is a skeet-shoot game and the other is a paddle-controlled sketch pad. Together, these two programs explore most of the capabilities of the TurtleGraphics Unit.

Section IV is just one game, Cribbage. This is a long program (21 pages of listing) and is written in three parts which are compiled into one program. It is something of a grand finale to the book and uses a substantial percentage of the resources of Apple Pascal. The result is an impressive program which compares favorably with "Kriegspiel Checkers" from the book *Pascal With Style*.

The overall value of this book as a learning tool stands solidly on the programs, which are uniformly well-written.

Although written specifically for Apple Pascal, this book would work just as well for users of nearly any implementation of UCSD Pascal. The programs could be easily modified for other systems. Anyone looking to sharpen his knowledge of Pascal and have fun at the same time will find it well worth the effort.—William Kubeck

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Robot Manipulators: Mathematics, Programming and Control.
by Richard P. Paul. MIT Press, Cambridge, MA. 288 pages, hardcover \$25. 1981.

The eighth in the MIT Press series on artificial intelligence, this textbook is by "the world's leading authority on the science of robot manipulation," according to the dust jacket, which adds that this is "the first book to cover all aspects of computer control of mechanical manipulators," and "presents kinematics, statics, dynamics and programming."

The book is heavy with math, of course, and "the chapter on dynamics assumes that the student is prepared to accept the Lagrangian formulation of dynamics. The chapter on control makes use of the Laplace transformation, and the final chapter on programming assumes a knowledge of Pascal," according to the preface.

For a work so complex, the chapter titles are quite short: Homogenous Transformation, Kinematic Equations, Solving Kinematic Equations, Differential Relationships, Motion Trajectories, Dynamics, Control, Static Forces, Compliance, and Programming.

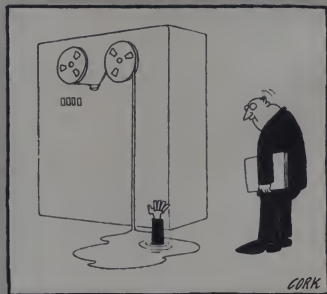
A publisher's note on the indicia page says that to shorten preparation time, the book was prepared by photographing the author's computer printout. The author notes that "The camera-ready copy was produced using Knuth's TEX system," which results in a handsome book.

Those interested in robot control from a personal-computer viewpoint will, for the most part, find the subject to be much more complicated than imagined. Very little of this book is understandable without a solid grounding in mathematics.

Software Wanted: How and Where to Sell Your Program.
edited by Eric Balkan. Battery Lane Publications, Box 30214, Bethesda, MD 20014. 105 pages, paperback \$25. 1981.

The "how" part—for people who wish to sell programs they've written—consists of five informative articles; the "where" part is 80 percent of this guide and provides details about 76 software publishers.

The introduction says you can let an established software



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publisher promote and market your software, or you can market it yourself. The article on writing software for resale says the leading markets, as of 10/81, are CP/M, Apple, TRS-80, and UNIX, offers suggestions (by George Blank) on how to pick a software publisher, and tells what a software package should include.

The article on selling software directly to users offers advice on packaging, pricing, advertising, literature, identifying the user, and piracy. The last two articles tell what to put in your manual, and how to protect your software via copyright and other methods.

The Software Publishers/Marketers Directory tells, for each company, how long it has been in business, its size, whether it sells programs retail and/or wholesale, financial arrangements with the programmer, time required to evaluate a program, documentation required, etc. Most listings take half a page; a few take over a full 8½ by 11-inch page.

All the articles are reprinted from Battery Lane's "Computer Consultant" newsletter; the book includes a coupon offering a \$15 discount on the \$48 cost of a year's twelve issues, which "provide an update service to the material in the guidebook."

The guidebook seems well worth the price to have all these facts and figures in one handy publication, written in a very straightforward style. It's sold with a money-back guarantee.

Osborne CP/M User Guide, by Thom Hogan. Osborne/McGraw-Hill, Berkeley, CA. 291 pages, paperback \$12.99, 1981.

This latest Osborne book, which is nearly the three-dozenth from the Berkeley publishing company, "introduces the novice to the microcomputer system and examines CP/M's function within that system," according to the introduction, which notes that "CP/M is an operating system which...directs the activities of your computer's components, and manages files which contain computer instructions or data."

This sets the tone for a semi-formal self-teaching manual that covers a great deal of ground, from defining "byte" to discussing the systems approach. The eight chapters include an Introduction to CP/M and Operating Systems; CP/M Built-In Commands; CP/M Transient Commands; Assembly Language Utilities; Other Transient Programs and CP/M; MP/M, CP/NET and CP/M Derivatives; Technical Aspects of CP/M; and Putting It All Together: The System Approach.

Seven very helpful appendices provide a summary of CP/M commands, ASCII character codes, comparison of three CP/M versions, CP/M prompts, diskette selection (which systems use which disks), annotated bibliography (10 pages), and a CP/M Address Book that lists sources of CP/M-compatible languages, programs, and computers.

The chapter on transient commands shows how to expand the basic set of commands by adding programs that act like commands. The chapter on assembly-language utilities, which has "limited applications for end-users who primarily use packaged programs," tells how to develop and modify programs with ASM, DDT and LOAD, and assumes an understanding of assembly-language programming.

Another valuable chapter, on Other Transient Programs and CP/M, looks at four types of programs to be used with CP/M: utilities (format, copy, SYSGEN, etc.) high-level languages (from Basic to PL/T-80), application programs, and word processors.

This is one of the very best CP/M manuals available.



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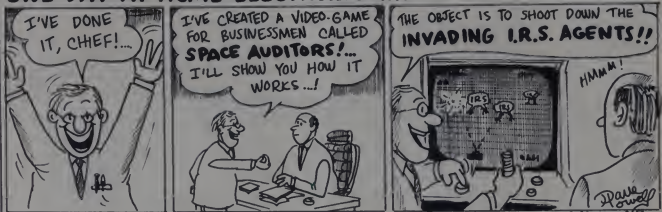
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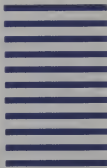
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