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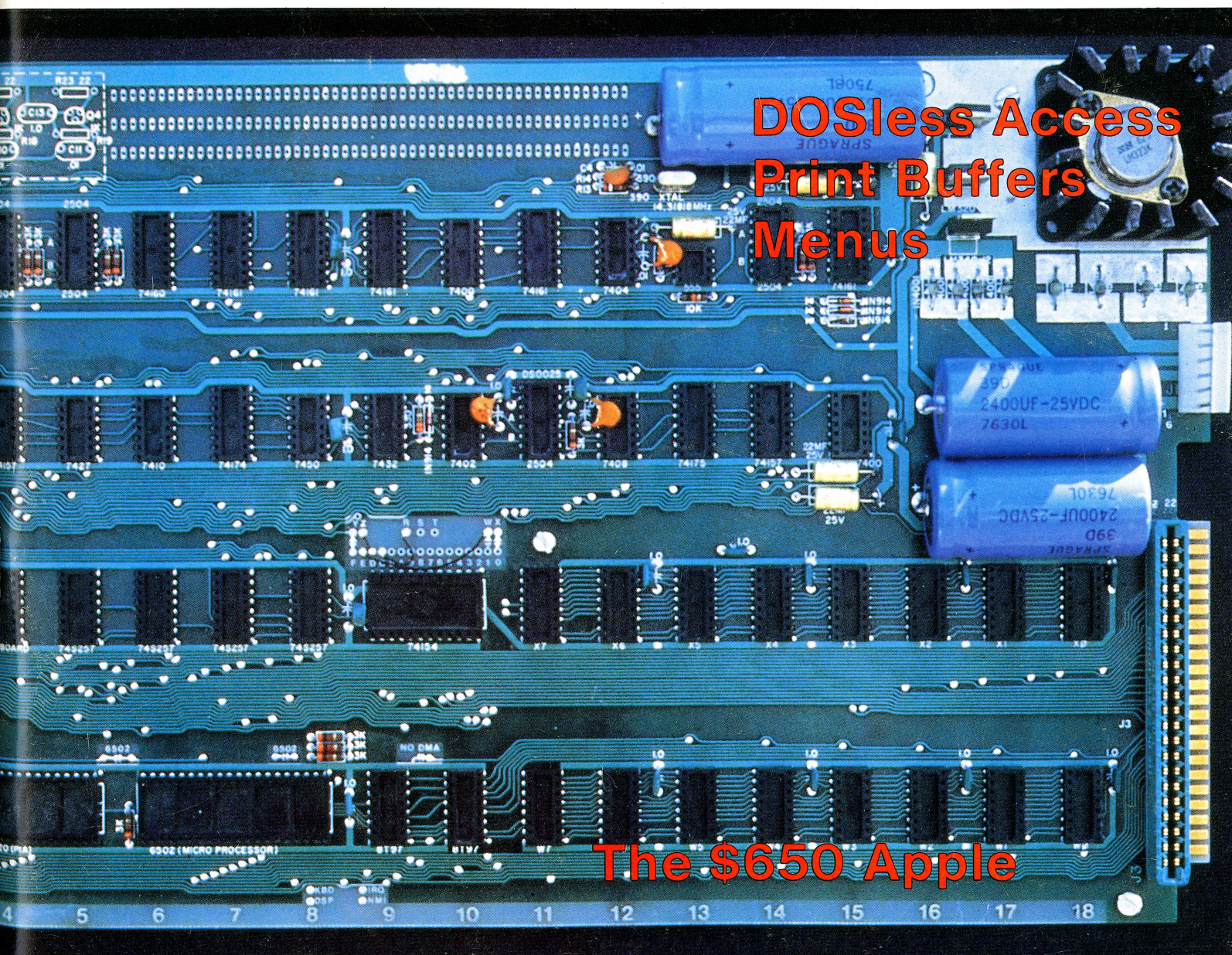
Apple Orchard

The Premier Magazine for Apple Computer Users ™

VOLUME 4 NUMBER 3 APRIL 1983 $3.25



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PROWRITER: Dot matrix correspondence quality, with incremental printing capability standard.

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PROWRITER: Both tractor and friction feed standard.

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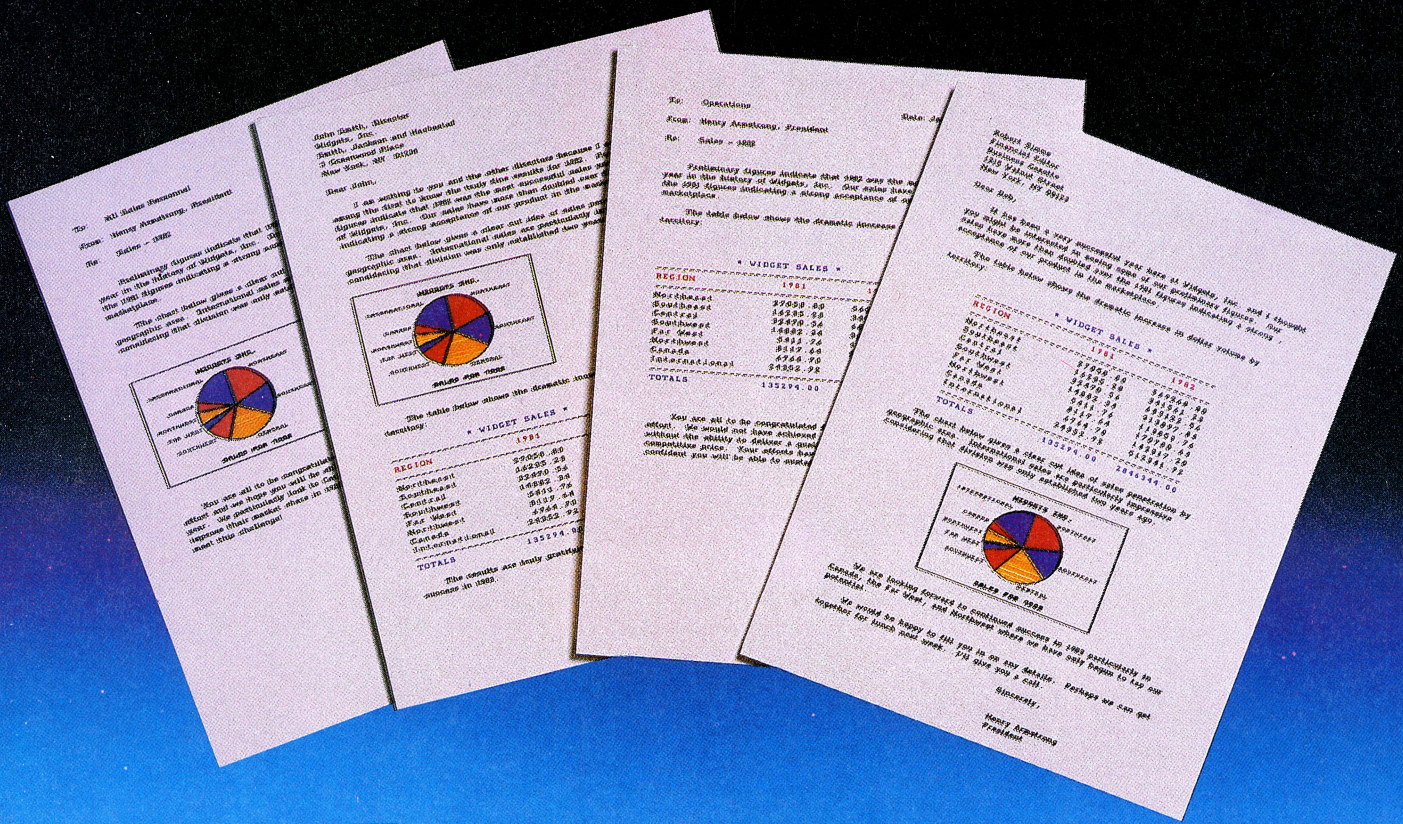

YES!

Introducing . . .
The IS PipeLine™ Random Access Printing Buffer.

Insert pictures, graphics or spread-sheet data into reports. Duplicate form letters—automatically changing addresses on each. Now, all your programs can work together to produce printed output.

For the first time ever, here is a buffer that not only frees your fast computer from your slow printer but also allows you to rearrange, compose and copy your data on its way to the printer.

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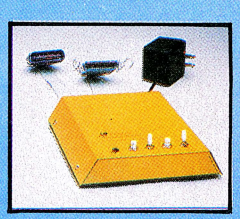

The IS PipeLine is Universal—it works with any parallel (Centronics*—style) computer/printer combination. A special version is available for PKASO™ Printer Interfaces.

The IS PipeLine is a self-contained unit with operating manual, cables and power supply included.

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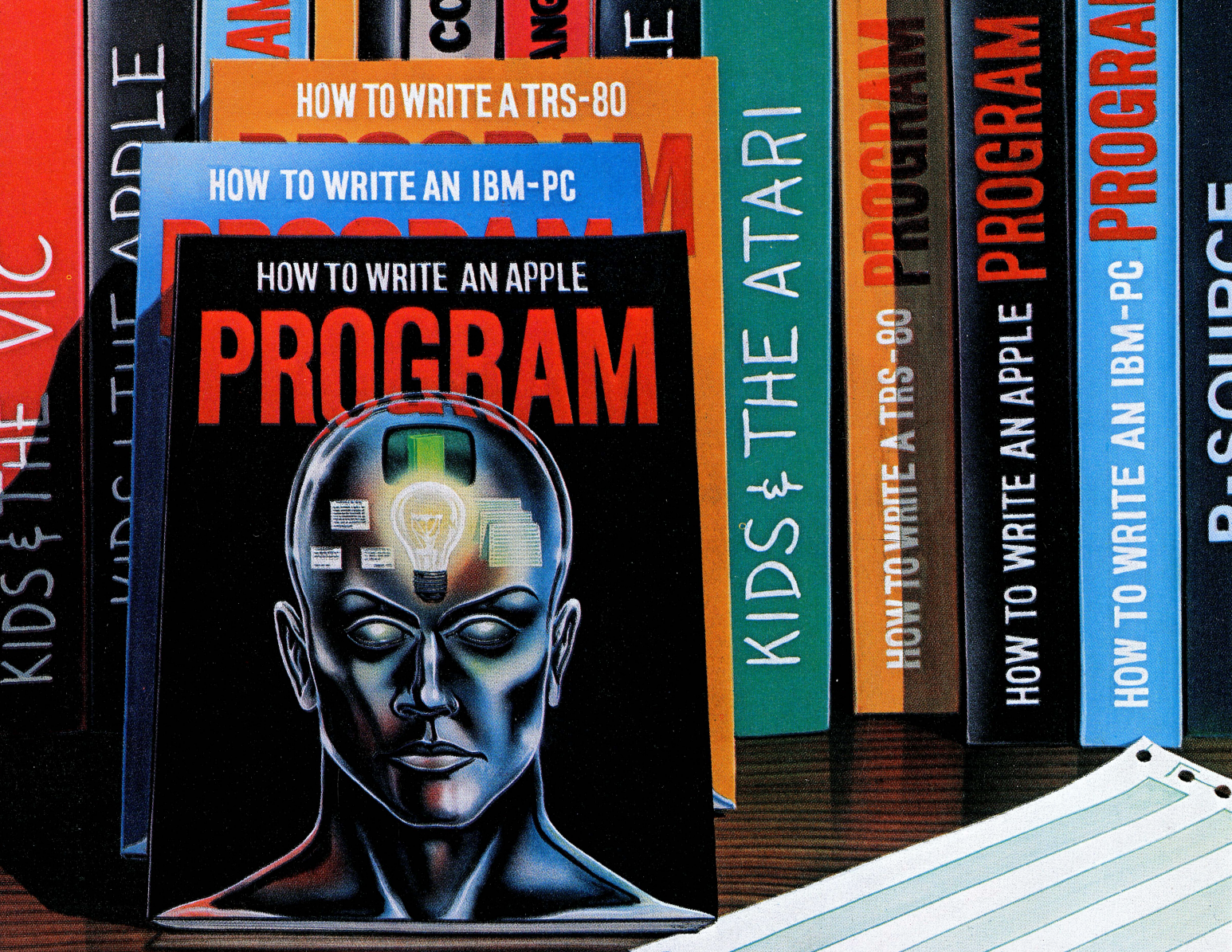
The IS Pipeline™ Random Access Printing Buffer is patent pending.



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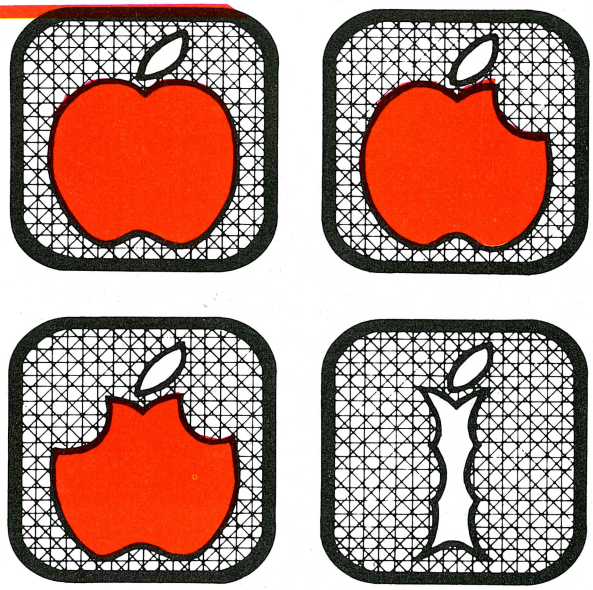

Take a bite...

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IMAGINE IT...

CAPTURE IT.

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The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler + with *Dual Hi-Res Graphics* adds flexibility with a side-by-side graphics printout of page 1 and page 2.

The Grappler + can now be used with the Apple® Dot Matrix, the Okidata 84, and is Apple III compatible*. In addition, the IDS Grappler + is currently available with color capability, including color graphics screen dumps.

UP TO 64K BUFFER OPTION

An optional Bufferboard can now be added to all existing Grappler and Grappler + interfaces. See your Apple Dealer for details.

*Requires additional software driver.
**Requires graphics upgrade.

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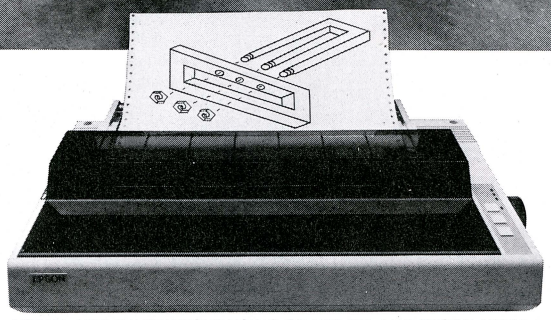
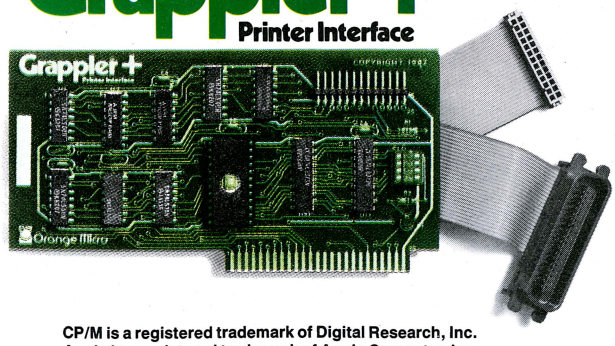


ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100.

With The Grappler™ + Printer Interface



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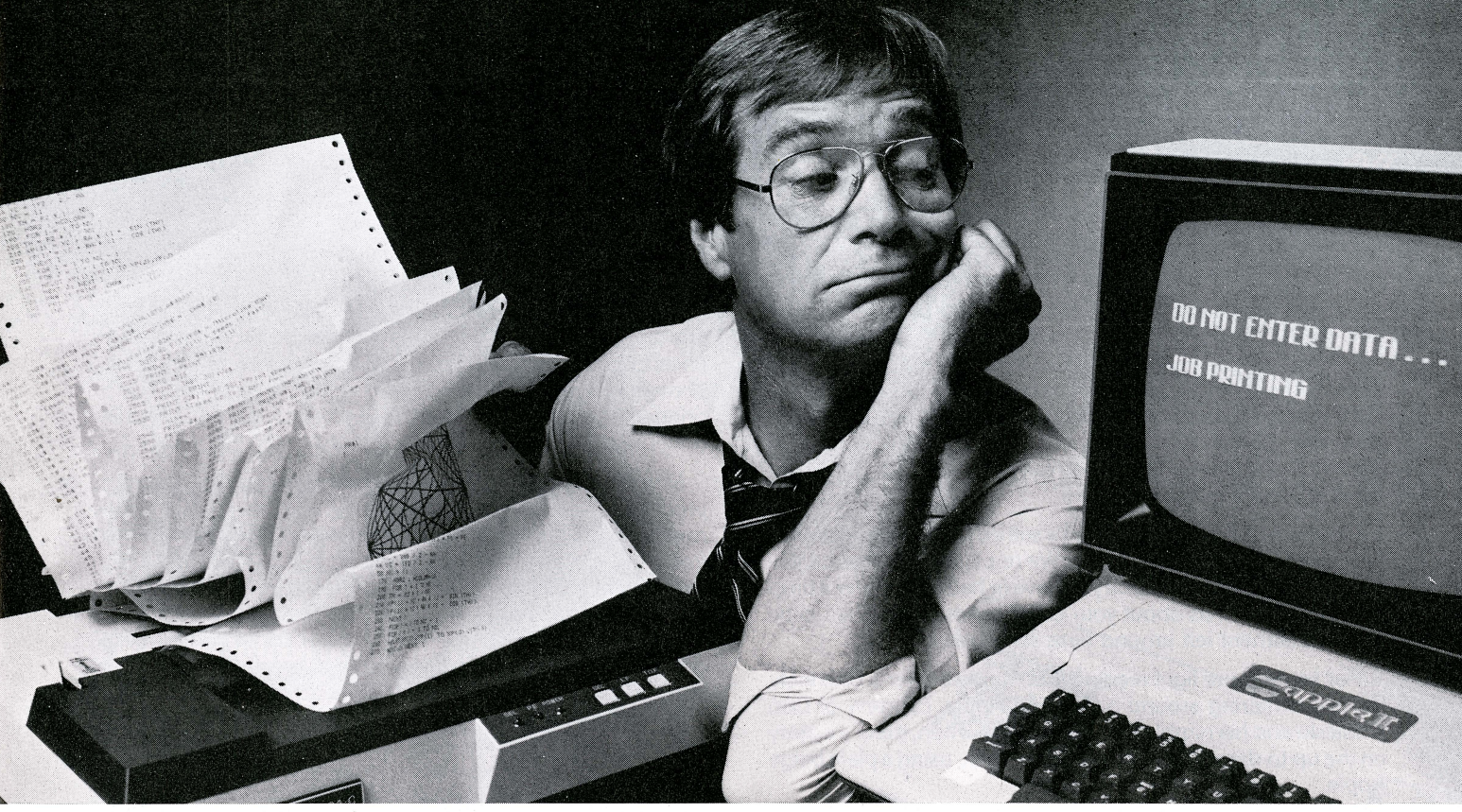
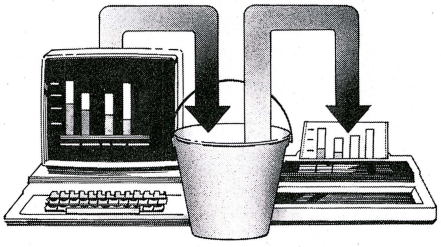


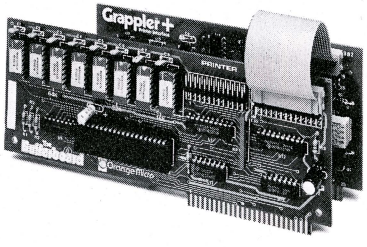
If your printer uses your Apple® more than you do, you need The Bufferboard™.

If your Apple is locked into the "PRINT" mode so much that you've taken up solitaire to kill the boredom, you need a buffer. And if your computer is the Apple II or III, the only buffer for you is The Bufferboard. Expandable to 64K of storage, The Bufferboard stores an instantaneous **bucketful** of print data from your computer. Then it feeds the data to your printer at its own printing rate. Your Apple is set free from driving your printer and is ready for more data from you.



Take your existing interface—and buffer it!

Only The Bufferboard has a simple Interface-Docking System. No bulky boxes or expensive power supplies are needed because The Bufferboard fits right into your Apple—and **docks** onto your existing printer interface. The result is convenient



and economical buffering of most popular printer interfaces, including the Grappler + ™ interface, Epson interface, and Apple printer interface. Thirty seconds and a single hook-up are all you need to end the printer waiting game forever.

Up to 20 letter-size pages stored at a time.

The Bufferboard comes standard with 16K, and is expandable to 32K or 64K of buffering capacity with the addition of memory chips. This "bucket" will hold up to 20 pages of a print job, allowing you freedom to use your Apple.

The Bufferboard—designed exclusively for the Apple Computer.

Specifications:

• Versions for Grappler + interface, Epson interface, Apple interface, and other popular printer interfaces • 16K buffer standard • Upgradeable to 32K or 64K • Automatic memory configuration • Automatic self test • Includes interface docking cable.

The Bufferboard is made by Orange Micro, Inc.; the same people who brought you the popular Grappler + printer interface. Both the Grappler + and The Bufferboard are now available at your local Apple dealer.

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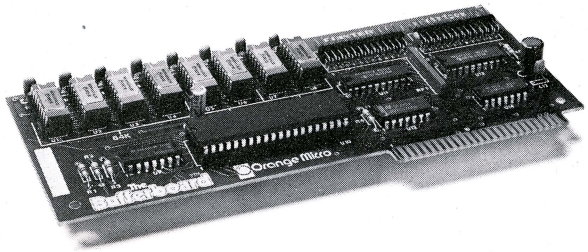

The Bufferboard™
For Apples and Printers

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TEXTFILE

Ah, yes. What's the story behind the "$650 Apple"? Well, we just couldn't resist that one, considering the month of this issue. With regret, we must add that the model depicted on our cover is no longer available—it's the Apple I, and that was its price range. Of course, you had to add a few little things, like a keyboard, power supply, case, stuff like that. But you got a whole 8K of memory. Steve Wozniak has one on his office wall, labelled "Our Founder".

Believe it or not, some Apple I's still exist out there, and they have become collectors' items. We're planning a "retrospective review" of this product. If you have or had one, why not drop us a line and tell us about your experiences? There has to be some sentiment left around here someplace.

For some more light reading this April, we offer a Sherlockian tale centering around a Magenta Apple, courtesy of Dan Wasleski and his nimble word processor. Then, there's a story on the up-to-date music of Herbie Hancock, using a plain beige Apple.

On a more serious note, John Uhley takes us into the realm of direct disk access, and Apple Computer, Inc. President Mike Markkula takes time from his busy schedule to answer a question about the release of information about the inner workings of Apples. (Now, what gremlin put those two articles back to back, I wonder?) Neil Lipson brings us up to date on printers and buffering, the process whereby a printer can be printing without tying up your computer for what can seem like hours. Check out Neil's analysis of the CPS Myth too.

In upcoming issues, we'll be looking at hard disks, structured programming, EXEC, new products, your own EPROMS, and much more. One more thing: we have received some letters from folks who have had difficulty in reaching or gaining satisfaction from some firms mentioned in Forbidden Fruit. As the *Users'* magazine, we'd like to check these out more thoroughly. We'd also like to hear from you if you have had difficulties . . . or if something turned out *better* than you thought it would.

We did get some nice notes from individual subscribers about the plastic bags in which this magazine is mailed; one Californian said it was the only thing that survived the winter rains. Yes, it costs us a bit more, but that made it all worth while. And please note that there will not be a May issue of Apple Orchard; the next issue will carry the cover date of June 1983.

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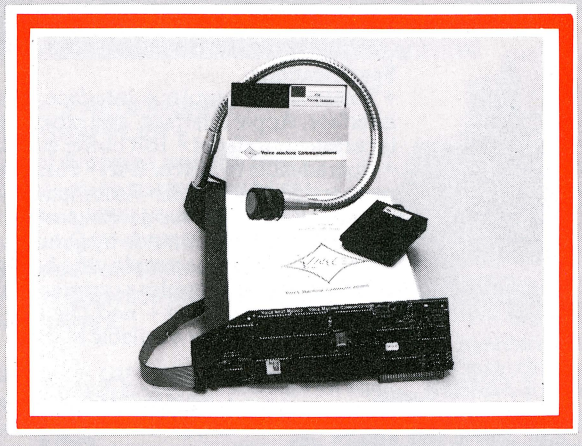

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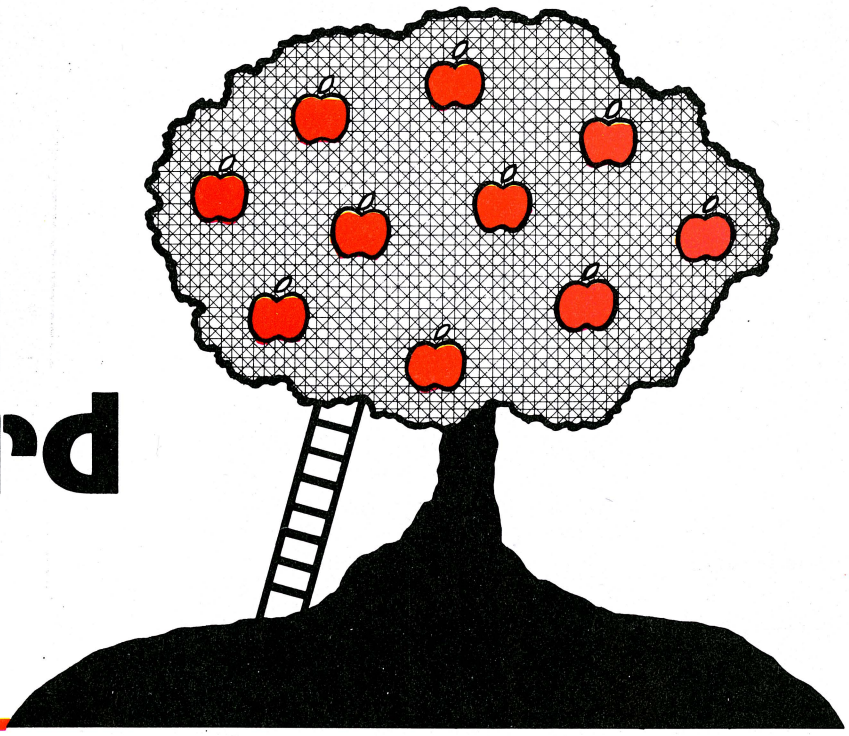

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CREATE PROFESSIONAL PRESENTATIONS of intermixed hi-res, lo-res and text frames. Easy-to-use and FAST— hi-res images load in 2½-seconds! Paddles or Keyboard-advance frames in forward or reverse.

UNATTENDED SHOWS are possible with each frame individually pre-programmed to appear on the screen from 1 to 99 seconds.

TEXT SCREEN EDITOR lets you create your own b/w text "slides". Add type "live" from the keyboard during presentations if you want.

DISPLAY MODULE: Send entire presentations-on-disk to your friends and associates.

FRAME-UP: $29.50
(Includes Peeks/Pokes Chart)

Apple Mechanic

SHAPE-WRITER/BYTE-ZAP DISK
BY BERT KERSEY

SHAPE EDITOR: Keyboard-draw shapes for hi-res animation in your programs. Design proportionally-spaced typefaces with special characters. 6 fonts on the disk. Listable demos show how to use shape tables to animate games, graphics and professional Charts & Graphs.

BYTE-ZAP: Rewrite any byte on a disk for repair or alteration. Load entire sectors on the screen for inspection. Hex/Dec/Ascii displays and input. Complete instructions for making trick file names, restoring deleted files, etc.

MORE: Useful music, text and hi-res tricks for your programs. Educational documentation.

APPLE MECHANIC: $29.50
(Includes Peeks/Pokes Chart & Tip Book#5)

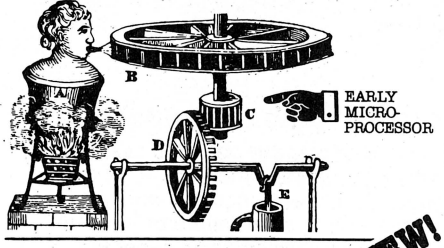
NEW! Typefaces

FOR APPLE MECHANIC

26 NEW FONTS for Apple Mechanic's Xtyper and Hi-Writer programs. Most are full 96-character fonts, large & small, of fully-editable characters. (Apple Mechanic required)

BEAGLE MENU: Use with your disks. Display only the filenames you want (e.g. only Applesoft files or only Locked files) for one-key cursor selection/execution. Space-on-disk, catalog scan, optional sector-number elimination.

TYPEFACES for Apple Mechanic: $20.00
(Includes Peeks/Pokes Chart & Beagle Menu Utility)



Beagle Bag NEW!

12-GAMES-PLUS ON ONE DISK
BY BERT KERSEY

TWELVE GREAT GAMES from the classic Beagle Bros collection— TextTrain, Slippery Digits, Wowzo, Magic Pack, Buzzword... Almost all of our "Game Pack" games, updated and re-released on one jam-packed, entertaining, unprotected disk.

COMPARE BEAGLE BAG with any one-game locked-up game disk on the market today. All 12 games are a blast, the price is right, the instructions are crystal clear, AND the disk is copyable. You can even change the programs or list them to LEARN, and see what makes them tick.

BEAGLE MENU TOO: See "Typefaces" above.

BEAGLE BAG: $29.50
(Includes Peeks/Pokes Chart & Beagle Menu Utility)

NEW! Flex Text

70-COLUMN TEXT UTILITY
BY MARK SIMONSEN

PRINT VARIABLE-WIDTH TEXT on the hi-res screens with normal Applesoft commands (including Htab 1-70). Normal, expanded & compressed text on same screen— no hardware!

ADD GRAPHICS TO TEXT or vice-versa. Run existing programs under Flex Text control. Easy to use and compatible with PLE© and GPLE.©

DOS TOOL KIT© FONT compatibility, or use Flex Text fonts. Select up to 9 fonts with ctrl-key commands. Print/List/Catalog in any style! Custom TEXT CHARACTER EDITOR included.

FLEX TEXT: $29.50
(Includes Peeks/Pokes Chart; requires monitor)

Utility City

81 UTILITIES ON ONE DISK
BY BERT KERSEY

LIST FORMATTER prints each program statement on a new line. Loops indented with printer page breaks. A great de-bugger! Also...

MULTI-COLUMN catalogs for printouts, auto-post Run-number & Date in programs, put invisible commands in programs, create INVISIBLE file names, alphabetize/store info on disk, convert decimal to hex or INT to FP, renumber to 65535, append programs, dump text-screen to printer...

MORE TOO: 21 Programs Total, a best-seller!

UTILITY CITY: $29.50
(Includes Peeks/Pokes Chart & Tip Book#3)

```
10  FOR A = 1 TO 22: PRINT CHR$(ASC (MID$(
    "IJ—!IPX(T!ZPVS!TJTUFS@", A, 1))—A/A);
20  FOR B = 1 TO 4: C = PEEK(49200): NEXT B, A
```

DOS Boss

DISK COMMAND EDITOR
BY BERT KERSEY & JACK CASSIDY

RENAME COMMANDS & ERROR MESSAGES: "Catalog" can be "C"; "Syntax Error" can be "Oops" or anything you want. Protect your programs; unauthorized save-attempt can produce "Not Copyable" message. Also LIST-prevention and one-key program-run from catalog.

CUSTOMIZE DOS: Change Disk Volume heading to your message. Omit/alter catalog file codes. Fascinating documentation and tips; hours of juicy reading and Apple experiments.

ANYONE USING YOUR DISKS (booted or not) will be formatting DOS the way you designed it.

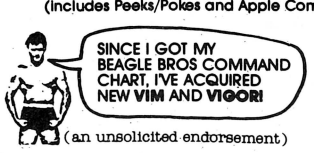
DOS BOSS: $24.00
(Includes Peeks/Pokes Chart & Tip Book#2)

Tip Disk#1

100 TIP BOOK TIPS ON DISK
BY BERT KERSEY

100 LISTABLE PROGRAMS from Beagle Bros Tip Books 1-4. Make your Apple do things its never done! All programs changeable for experimentation. Includes our Apple Command Chart: ALL Applesoft, Integer & DOS Commands!

TIP DISK#1: $20.00
(Includes Peeks/Pokes and Apple Command Charts)



(an unsolicited endorsement)

"APPLE" is a registered trade mark of You-Know-Who.

NEW! ProntoDOS

HIGH-SPEED DISK UTILITY
BY TOM WEISHAAR

HIGH-SPEED DOS! Take a look—

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
BSAVE HI-RES IMAGE	12 sec.	6 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD	13 sec.	4 sec.
TEXT FILES		(no change)

BOOT PRONTO-DOS or any updated normal-3.3 disk. Create new ProntoDos disks with the normal INIT command. ProntoDos is compatible with ALL DOS COMMANDS and performs normally with almost ALL programs, including CopyA.

MORE DISK SPACE: ProntoDos frees-up 15-extra-sectors per disk, almost one full track!

PRONTO-DOS: $29.50
(Includes Peeks/Pokes Chart)

Alpha Plot

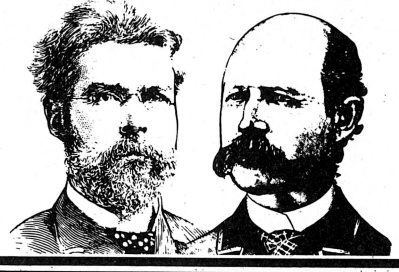
HI-RES GRAPHICS/TEXT UTILITY
BY BERT KERSEY & JACK CASSIDY

DRAW IN HI-RES, on 2 pages, using keyboard or paddles/joystick. See lines before plotting. Mixed-colors and reverse (background opposite). Fast circles, boxes and ellipses; filled or outlined.

COMPRESS HI-RES PIX to 1/3 Disk-Space. Superimpose pages or re-locate any rectangular image area anywhere on either hi-res page.

HI-RES TEXT: Proportional spacing, adjustable character size and color, upper/lower case, no tab limits, sideways typing for graphs.

ALPHA PLOT: $39.50
(Includes Peeks/Pokes Chart & Tip Book#4)



Beagle Bros™ MICRO SOFTWARE

Where to Buy Beagle Bros Disks:

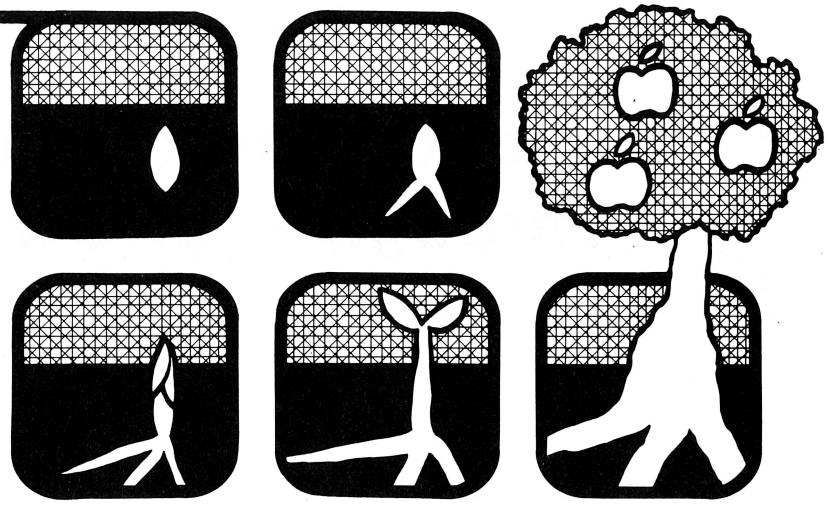
MOST APPLE DEALERS carry Beagle Bros software. If yours doesn't, get on his case. Or order directly from us for IMMEDIATE SHIPMENT—

Visa/MasterCard/COD, call TOLL FREE:
Nationwide: 1-800-854-2003 ext. 827
California: 1-800-522-1500 ext. 827
Alaska/Hawaii: 1-800-854-2622 ext. 827

OR mail U.S.check, money-order or Visa/MC #'s to BEAGLE BROS, Dept. A
4315 SIERRA VISTA / SAN DIEGO, CA 92103

Please add $1.50 First Class shipping, any size order. Overseas add $4.00. COD add $3.00. California add 6% ALL ORDERS SHIPPED IMMEDIATELY.

Planting a seed...



The Changing Climate

A recent estimate places the number of companies making microcomputers at about 150. Some of them are making machines which are "compatible" with the Apple II. Some others are "IBM PC lookalikes". And still others are CP/M-based Z80-family machines, not necessarily compatible with either of the two large firms' products, and not necessarily desiring to be so.

With the anticipated 1983 market for such computers estimated at more than $6 billion (yes, *b*illion), it's not suprising that many firms (and, presumably, some more in the planning and formation stages) would be seeking a share of that market. Just design a technically superior machine, and the market awaits.

Well, no. That may have been true three or four years ago, but not today. One stark fact will help to clarify this: one "small" firm will invest more than $6 million over two years to market its already-developed small computer. We are now light-years beyond the "garage startup" stage, where two guys could rub a couple of chips together and make some money.

When you get down to it, only one computer company has made the transition from startup to Fortune 500 size: Apple Computer. And some giant companies who attempted to enter the market have stubbed their toes quite badly. The name of the game today is marketing; big-buck, sophisticated marketing, if you're selling computers. This is no longer a friendly, grass-roots, "hobbyist" market, and it will be even more competitive in years to come.

Indulge me in an analogy if you will. Remember the auto industry? In its pioneering days, more than 300 companies at one time or another produced one or more automobiles in places as diverse as Oakland, CA, Indianapolis, IN and Pottstown, PA. The survivors were not necessarily the best technologically, or the most dedicated. The survivors were the best organized, the best financed, and the best marketers. Many knowledgeable insiders ascribe General Motors' domestic pre-eminence to their having built up an outstanding independent dealer network (no mail order), beginning in the 1930s. Read *My Years With General Motors*, by Alfred Sloan for some related insights on development and refinement of a new technology, and its exploitation in the marketplace.

That process will continue to occur in the microcomputer market, because it is part of human nature that it occur. By 1990, maybe by 1985, a few large firms will dominate. The process will take less time than it did in autoland, because all things are accelerating. Even the force ambiguously known as the Japanese Problem is happening faster in computers than in automobiles.

It's almost impossible to believe that Apple Computer will not be one of those U.S. large companies. To the chagrin of many hobbyists, that company's focus has turned toward the mass market, and away from the technological high. The consolation is that those who have purchased and will purchase Apples have reason to feel good that their machines will not become orphans.

Use of the Disk II Interface Card Through Your Own Software

by John Uhley

This is the first of a series of three articles which will discuss several techniques used in accessing the Disk II Interface Card. The routines discussed in these articles will enable a programmer to access the Disk II without the use of Apple DOS or Apple RWTS. This article will introduce the programmer to one method of accessing the Disk II Interface card and develop several routines to position the disk drive's magnetic head across the surface of the diskette.

Each of the eight slots in back of the Apple computer is allocated 16 memory locations for I/O control. Some of these memory locations act as softswitches (software switches) and perform a predefined hardware task when addressed by a software routine. Other I/O memory locations are used as wormholes through which data can enter or exit the computer.

Most of the Apple's I/O is done on page $C0 of memory. The following table illustrates the range of memory reserved for each slot's softswitches.

SLOT	LOCATIONS
0	$C080 - $C08F
1	$C090 - $C09F
2	$C0A0 - $C0AF
3	$C0B0 - $C0BF
4	$C0C0 - $C0CF
5	$C0D0 - $C0DF
6	$C0E0 - $C0EF
7	$C0F0 - $C0FF

One common method of accessing softswitches through software is to use the Apple's indexed addressing mode. By adding various values to the address of a slot zero softswitch it is possible to change the addressed slot by altering the index register alone. For example, if a program wanted to access the softswitches of the card in Slot 3 the following method could be used:

```
        LDX   #$30      ; (select slot 3)

TURNON  LDA   $C089,X   ; turn on disk drive in slot 3
        RTS             ; and return
```

Using this technique the same routine can access any slot's softswitches by changing the value in the X-register:

```
        LDX   #$60      ; (select slot 6)
        JMP   TURNON    ; turn on disk drive in slot 6
                        ; using the same routine
```

In the table below 'S' represents one of the 16 softswitches of the specified slot.

SLOT	SOFTSWITCH	X-REG	COMMAND
0	S	$00	LDA $C08S,X
1	S	$10	LDA $C08S,X
2	S	$20	LDA $C08S,X
3	S	$30	LDA $C08S,X
4	S	$40	LDA $C08S,X
5	S	$50	LDA $C08S,X
6	S	$60	LDA $C08S,X
7	S	$70	LDA $C08S,X

Depending on the actual card placed in a given slot the 16 softswitches will perform a different function. This article will only discuss the effect of these 16 softswitches on the Disk II Interface Card. The table below illustrates the functions of each of the softswitches.

MEMORY LOCATION	FUNCTION
$C080 + SLOT	Phase 0 off (positioning)
$C081 + SLOT	Phase 0 on (positioning)
$C082 + SLOT	Phase 1 off (positioning)
$C083 + SLOT	Phase 1 on (positioning)
$C084 + SLOT	Phase 2 off (positioning)
$C085 + SLOT	Phase 2 on (positioning)
$C086 + SLOT	Phase 3 off (positioning)
$C087 − SLOT	Phase 3 on (positioning)
$C088 + SLOT	Power Down (drive off)
$C089 - SLOT	Power Up (drive on)
$C08A + SLOT	Select 1 (select drive 1)
$C08B + SLOT	Select 2 (select drive 2)
$C08C + SLOT	Readswitch (I/O wormhole)
$C08D + SLOT	Writeswitch (I/O wormhole)
$C08E + SLOT	Clearswitch (I/O wormhole)
$C08F + SLOT	Shiftswitch (I/O wormhole)

(SLOT refers to the index value needed to access the softswitches of a given slot. As shown earlier, this value is equal to that slot number times 16.)

The following routines demonstrate some of the techniques used to activate or deactivate a disk drive. Each time a new disk

drive is activated it is necessary to wait for the drive's motor to reach operational speed. One suitable delay loop is illustrated by the "MWAIT" subroutine.

The first eight softswitches are used to position the disk drive's magnetic head above the physical tracks of a diskette. These softswitches are used to rotate a motor which moves the magnetic head back and forth along the surface of a diskette.

By rotating the motor in a clockwise direction the magnetic head is moved towards higher numbered tracks. Conversely, counterclockwise rotation forces the magnetic head towards lower numbered tracks. Figures A and B illustrate the concepts discussed in these paragraphs using simplified models.

Figure C shows a magnetized needle surrounded by four electromagnetic poles. By magnetizing one of the four poles the needle is forced to 'point' towards that pole. By magnetizing and demagnetizing the poles in a given order the needle can be made to spin in a clockwise or counterclockwise direction (see figure D).

By replacing the needle with a motor and the poles with software controlled electromagnets (numbered 0,1,2,and 3) a model of the disk drive's positioning motor can be visualized (see figure E).

```
                        1     ********************************
                        2     *                              *
                        3     * ROUTINE TO TURN ON DRIVE 1   *
                        4     *                              *
                        5     ********************************
                        6     SLOT     EQU   $0001
                        7     WAIT     EQU   $0002
                        8     DISKON   EQU   $C089
                        9     DRIVEA   EQU   $C08A
                        10    ********************************
                        11    *                              *
                        12    * SET SLOT EQUAL TO SLOT 6     *
                        13    *                              *
                        14    ********************************
7000:  A9 60            15            LDA   #$60
7002:  85 01            16            STA   SLOT
                        17    ********************************
                        18    *                              *
                        19    * TURN ON THE DISK DRIVE AND   *
                        20    * SELECT DRIVE A               *
                        21    *                              *
                        22    ********************************
7004:  A6 01            23            LDX   SLOT
7006:  BD 89 C0         24            LDA   DISKON,X
7009:  BD 8A C0         25            LDA   DRIVEA,X
                        26    ********************************
                        27    *                              *
                        28    * WAIT FOR DRIVE TO POWER UP   *
                        29    *                              *
                        30    ********************************
700C:  A9 EF            31    MWAIT   LDA   #$EF
700E:  85 02            32            STA   WAIT
7010:  A9 D8            33            LDA   #$D8
7012:  85 03            34            STA   WAIT+1
7014:  A0 12            35    MWAITA  LDY   #$12
7016:  88               36    MWAITB  DEY
7017:  D0 FD            37            BNE   MWAITB
7019:  E6 02            38            INC   WAIT
701B:  D0 F7            39            BNE   MWAITA
701D:  E6 03            40            INC   WAIT+1
701F:  D0 F3            41            BNE   MWAITA
7021:  60               42            RTS
```

```
                        1     ********************************
                        2     *                              *
                        3     * ROUTINE TO TURN ON DRIVE 2   *
                        4     *                              *
                        5     ********************************
                        6     SLOT     EQU   $0001
                        7     WAIT     EQU   $0002
                        8     DISKON   EQU   $C089
                        9     DRIVEB   EQU   $C08B
                        10    ********************************
                        11    *                              *
                        12    * SET SLOT EQUAL TO SLOT 6     *
                        13    *                              *
                        14    ********************************
7000:  A9 60            15            LDA   #$60
7002:  85 01            16            STA   SLOT
                        17    ********************************
                        18    *                              *
                        19    * TURN ON THE DISK DRIVE AND   *
                        20    * SELECT DRIVE B               *
                        21    *                              *
                        22    ********************************
7004:  A6 01            23            LDX   SLOT
7006:  BD 89 C0         24            LDA   DISKON,X
7009:  BD 8B C0         25            LDA   DRIVEB,X
                        26    ********************************
                        27    *                              *
                        28    * WAIT FOR DRIVE TO POWER UP   *
                        29    *                              *
                        30    ********************************
700C:  A9 EF            31    MWAIT   LDA   #$EF
700E:  85 02            32            STA   WAIT
7010:  A9 D8            33            LDA   #$D8
7012:  85 03            34            STA   WAIT+1
7014:  A0 12            35    MWAITA  LDY   #$12
7016:  88               36    MWAITB  DEY
7017:  D0 FD            37            BNE   MWAITB
7019:  E6 02            38            INC   WAIT
701B:  D0 F7            39            BNE   MWAITA
701D:  E6 03            40            INC   WAIT+1
701F:  D0 F3            41            BNE   MWAITA
7021:  60               42            RTS
```

```
                        1     ********************************
                        2     *                              *
                        3     * ROUTINE TO TURN OFF A DISK   *
                        4     *                              *
                        5     ********************************
                        6     SLOT     EQU   $0001
                        7     DISKOFF  EQU   $C088
                        8     ********************************
                        9     *                              *
                        10    * SET SLOT EQUAL TO SLOT 6     *
                        11    *                              *
                        12    ********************************
7000:  A9 60            13            LDA   #$60
7002:  85 01            14            STA   SLOT
                        15    ********************************
                        16    *                              *
                        17    * TURN OFF THE DISK DRIVE      *
                        18    * AND QUIT                     *
                        19    *                              *
                        20    ********************************
7004:  A6 01            21            LDX   SLOT
7006:  BD 88 C0         22            LDA   DISKOFF,X
7009:  60               23            RTS
```

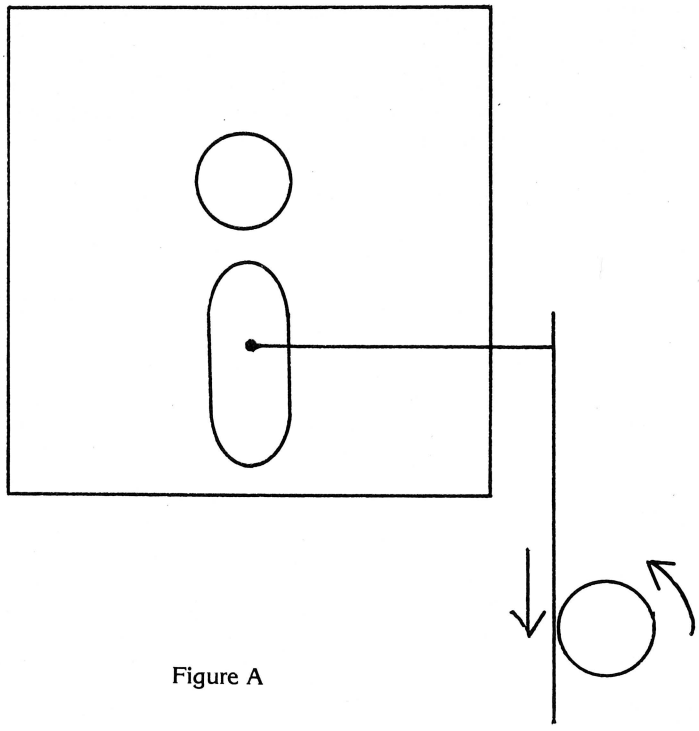


Figure A

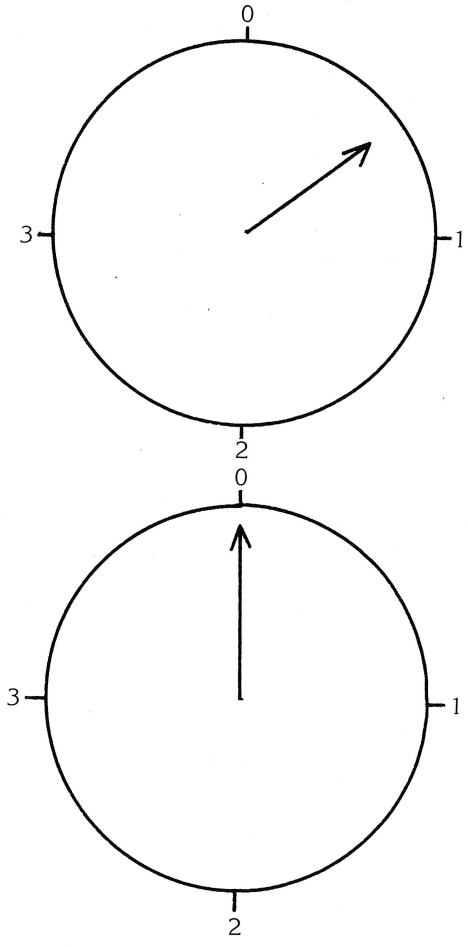


Figure C

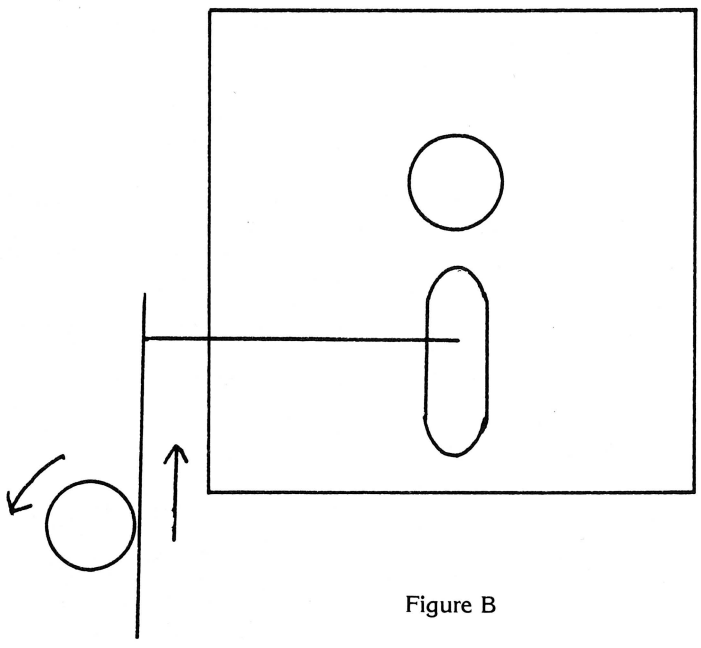


Figure B

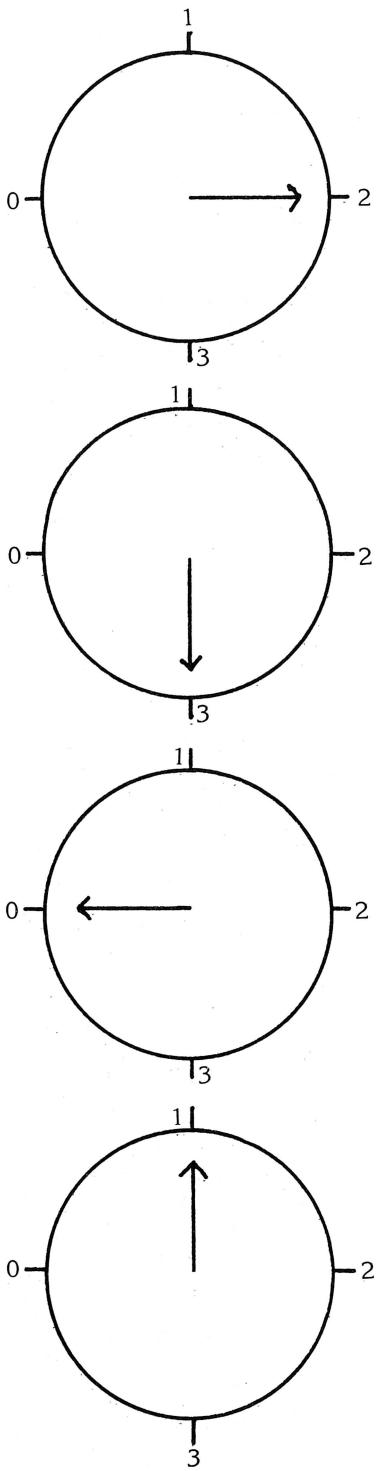


Figure D

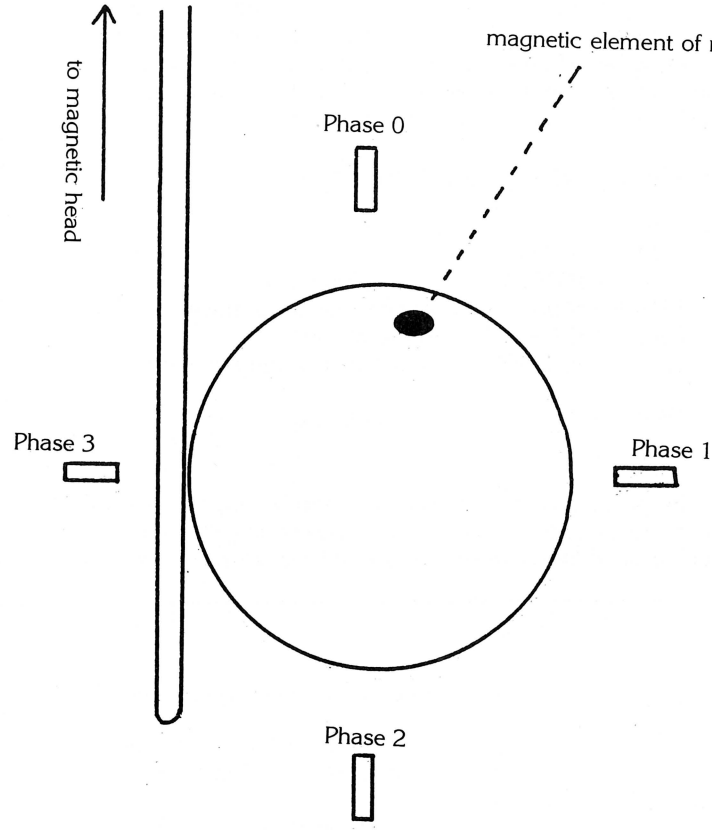


Figure E

Each of the eight softswitches used in positioning the magnetic head actually activates or deactivates a specific phase of the positioning motor. By addressing these softswitches in a specific order the motor can be rotated and the magnetic head positioned back and forth along the surface of a diskette.

The following table illustrates the function of each of the eight 'positioning' softswitches. Note that SLOT refers to the index value needed to access the softswitches of a given slot.

MEMORY LOCATION	PHASE	FUNCTION
$C080 + SLOT	0	Turn phase 0 off
$C081 + SLOT	0	Turn phase 0 on
$C082 + SLOT	1	Turn phase 1 off
$C083 + SLOT	1	Turn phase 1 on
$C084 + SLOT	2	Turn phase 2 off
$C085 + SLOT	2	Turn phase 2 on
$C086 + SLOT	3	Turn phase 3 off
$C087 + SLOT	3	Turn phase 3 on

When positioning the magnetic head via software, it is necessary to wait for the positioning motor to physically move to an activated phase before that phase is deactivated. For example, in order to 'pulse' phase 0 of the positioning motor the following routine might be executed.

```
LSX   #$60        ; (select slot 6)
:
LDA
LDA   $C081,X     ; turn on phase 0
LDA   #$56        ; wait for motor to move
JSR   $FCA8       ; to the phase
LDA   $C080,X     ; before deactivating phase 0
:
RTS               ; and returning
```

The position of the tracks recognized by Apple DOS does not correspond to the phases of the positioning motor in a 1:1 ratio. Instead, the correspondence of DOS tracks to phases is in the ratio of 1:2. All even numbered tracks are positioned "under" phase 0 and all odd numbered tracks are positioned "under" phase 2. When positioned on phases 1 or 3 the disk drive's magnetic head is positioned over a half-track (much like a car driving in two lanes). Half-tracks are not used by Apple DOS although some protected software makes use of them.

The phase to which a DOS track corresponds can be calculated by multiplying the DOS track number by two (using the ASL opcode). This value represents the number of phases that must be pulsed from phase 0 (of track zero) in order to reach the specified DOS track.

The following routine can be used to position the disk drive's magnetic head over any physical track of a diskette. All DOS track numbers must be multiplied by two to account for the unused phases (half-tracks). Access to half tracks can be accomplished by setting the least significant bit of the multiplied track number to 1. If you don't know the current track number you must recalibrate the magnetic head to track zero using the "RECAL" routine provided.

```
                        1     ********************************
                        2     *                              *
                        3     * ROUTINE TO POSITION FROM     *
                        4     * ANY TRACK TO TRACK ZERO      *
                        5     *                              *
                        6     * RECALIBRATION ROUTINE        *
                        7     *                              *
                        8     ********************************
                        9     CURTRK   EQU   $0004
                        10    DESTRK   EQU   $0005
                        11    POSITION EQU   $0800
                        12    ********************************
                        13    *                              *
                        14    * SET UP "CURTRK" & "DESTRK"   *
                        15    * FOR THE RECALIBRATION        *
                        16    *                              *
                        17    ********************************
7000:  A9 80            18    RECAL    LDA   #$80
7002:  85 04            19             STA   CURTRK
7004:  A9 00            20             LDA   #$00
7006:  85 05            21             STA   DESTRK
                        22    ********************************
                        23    *                              *
                        24    * CALL POSITION TO DO THE      *
                        25    * DIRTY WORK...                *
                        26    *                              *
                        27    * NOTE: THE POSITION ROUTINE   *
                        28    *       IS ASSUMED TO BE       *
                        29    *       ORG'ED AND OBJ'D AT    *
                        30    *       MEMORY LOCATION $800   *
                        31    *                              *
                        32    ********************************
7008:  4C 00 08         33             JMP   POSITION

--- END ASSEMBLY ---

TOTAL ERRORS: 00

11 BYTES OF OBJECT CODE
WERE GENERATED THIS ASSEMBLY.

]
```

```
                        1     ********************************
                        2     *                              *
                        3     * ROUTINE TO POSITION FROM     *
                        4     * "CURTRK" TO "DESTRK"         *
                        5     *                              *
                        6     *                              *
                        7     * REMEMBER!!! CURTRK AND      *
                        8     *              DESTRK REFER    *
                        9     *              TO PHASES...    *
                        10    *              ACTUAL DOS      *
                        11    *              TRACKS MUST     *
                        12    *              BE MULTIPLIED   *
                        13    *              BY TWO BEFORE   *
                        14    *              USE IN THIS     *
                        15    *              ROUTINE         *
                        16    *                              *
                        17    ********************************
                        18    SLOT     EQU   $0001
                        19    WAIT     EQU   $0002
                        20    CURTRK   EQU   $0004
                        21    DESTRK   EQU   $0005
                        22    PHSOFF   EQU   $C080
                        23    PHSON    EQU   $C081
                        24    DISKON   EQU   $C089
                        25    DISKOFF  EQU   $C088
                        26    DRIVEA   EQU   $C08A
                        27    MONWAIT  EQU   $FCA8
                        28    ********************************
                        29    *                              *
                        30    * SET SLOT EQUAL TO SLOT 6     *
                        31    *                              *
                        32    ********************************
7000:  A9 60            33    POSITION LDA   #$60
7002:  85 01            34             STA   SLOT
                        35    ********************************
                        36    *                              *
                        37    * TURN ON DRIVE A AND WAIT     *
                        38    *                              *
                        39    ********************************
```

```
7004:  A6 01     40            LDX   SLOT
7006:  BD 89 C0  41            LDA   DISKON,X
7009:  BD 8A C0  42            LDA   DRIVEA,X
700C:  A9 EF     43            LDA   #$EF
700E:  85 02     44            STA   WAIT
7010:  A9 D8     45            LDA   #$D8
7012:  85 03     46            STA   WAIT+1
7014:  A0 12     47  MWAITA    LDY   #$12
7016:  88        48  MWAITB    DEY
7017:  D0 FD     49            BNE   MWAITB
7019:  E6 02     50            INC   WAIT
701B:  D0 F7     51            BNE   MWAITA
701D:  E6 03     52            INC   WAIT+1
701F:  D0 F3     53            BNE   MWAITA
                 54  ********************************
                 55  *                              *
                 56  * CHECK & BRANCH ON CURTRK-     *
                 57  * DESTRK RELATIONSHIP           *
                 58  *                              *
                 59  ********************************
7021:  A5 04     60  MAINLOOP LDA   CURTRK
7023:  C5 05     61            CMP   DESTRK
7025:  F0 21     62            BEQ   ALLDONE
7027:  90 07     63            BCC   MOVEUP
7029:  B0 00     64            BCS   MOVEDOWN
                 65  ********************************
                 66  *                              *
                 67  * MOVE DOWN TO LAST PHASE       *
                 68  *                              *
                 69  ********************************
702B:  C6 04     70  MOVEDOWN DEC   CURTRK
702D:  4C 32 70  71            JMP   DOWORK
                 72  ********************************
                 73  *                              *
                 74  * MOVE UP TO NEXT PHASE         *
                 75  *                              *
                 76  ********************************
7030:  E6 04     77  MOVEUP   INC   CURTRK
                 78  ********************************
                 79  *                              *
                 80  * COMPUTE PHASE NUMBER          *
                 81  * FROM THE "NEW" CURTRK         *
                 82  *                              *
                 83  ********************************
7032:  A5 04     84  DOWORK   LDA   CURTRK
7034:  29 03     85            AND   #$03 ;0-3 PHS
7036:  0A        86            ASL   ;$0-$7
                 87  ********************************
                 88  *                              *
                 89  * GET INDEXING FOR CUR SLOT#    *
                 90  *                              *
                 91  ********************************
7037:  05 01     92            ORA   SLOT
7039:  A8        93            TAY
                 94  ********************************
                 95  *                              *
                 96  * TURN ON PHASE TO MOVE &       *
                 97  * WAIT FOR PHYSICAL ACTION      *
                 98  *                              *
                 99  ********************************
703A:  B9 81 C0  100           LDA   PHSON,Y
703D:  A9 56     101           LDA   #$56
703F:  20 A8 FC  102           JSR   MONWAIT
                 103 ********************************
                 104 *                              *
                 105 * TURN OFF PHASE (ALWAYS) &     *
                 106 * LOOP BACK TO CHECK ON NEW     *
                 107 * CURTRK-DESTRK RELATIONSHIP    *
                 108 *                              *
                 109 ********************************
7042:  B9 80 C0  110           LDA   PHSOFF,Y
7045:  4C 21 70  111           JMP   MAINLOOP
                 112 ********************************
                 113 *                              *
                 114 * ALL DONE... QUIT             *
                 115 *                              *
                 116 ********************************
7048:  A6 01     117 ALLDONE   LDX   SLOT
704A:  BD 88 C0  118           LDA   DISKOFF,X
704D:  60        119           RTS

--- END ASSEMBLY ---

TOTAL ERRORS: 00

78 BYTES OF OBJECT CODE
WERE GENERATED THIS ASSEMBLY.

]
```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An Extra 3746 Bytes in Apple Pascal

by Allen Munro and Mark C. Johnson

The Apple Pascal system makes efficient use of the limited memory available to it in a 64K microcomputer system. System features such as Segment Procedures, which swap in program portions from disk when they are required, permit large programs to be written and executed on small machines. When an application requires a great deal of memory, there are several standard system features that the programmer can apply to squeeze the maximum storage space from the system. Such features include packing, which optimizes memory allocation for data representation. In addition, Pascal Version 1.1 provides a "system swapping" option which frees up an additional 2234 bytes of memory for user programs.

There are times, however, when the programmer would like to be able to find even more memory. This is particularly likely to happen to the Apple Pascal user when writing a program that makes use of the Turtlegraphics program library unit. Turtlegraphics is the package of data type declarations, procedures, and functions that gives Pascal programs control of Apple's Hi-Res graphics features.

Unfortunately, as the programs in Listings 1A and 1B show, using Turtlegraphics consumes almost half of the available user memory in the 64K Apple Pascal system. Listing 1A simply writes to CONSOLE the number of words (16 bit) of memory available to the user when this minimal program and the core of the operating system are all that is in memory. If available memory has been maximized by turning System Swapping on before running this program, the available memory is 20408 words. The program in Listing 1B is identical to 1A, except that the Turtlegraphics library unit is used. Executing this program, again with System Swapping on, reveals that only 10621 words of memory are now available.

In recognition of the problems this memory usage imposes on the authors of large Pascal programs that use graphics, Apple Computer has released a new version of Turtlegraphics, called Shortgraphics. Apple Pascal Technical Note Number 15 describes the features, limitations, and techniques for use of Shortgraphics. This unit, which is licensed to commercial software developers for a nominal fee, does not provide all of the standard procedures of Turtlegraphics, and thereby saves 2472 bytes. A feature of the Shortgraphics implementation permits further memory savings. When Turtlegraphics is used, it protects Apple Hi-Res Page 1 by moving the top of the heap to the top of the Hi-Res Page (16383). At this point, 3746 bytes below the Hi-Res page are wasted, since they are not accessible to the program. Apple permits the Shortgraphics unit user to use this space, by not moving the top of the heap to the top of Hi-Res Page 1. This places a burden on the programmer to police the use of the heap, and to move the top of the heap to 16384 as soon as it approaches the bottom of the Hi-Res Page, 8192.

The Shortgraphics unit will be a significant aid to many Pascal programmers, but it is not a universal panacea. For example, some applications require the Turtlegraphics features that are absent from Shortgraphics. Furthermore, some large Pascal applications don't use dynamic memory allocation, and therefore cannot benefit from a larger heap. For these users, the approach shown in Listing 2 may help solve the problem. In this approach, program data is converted into dynamically allocatable storage. The 3746 bytes of wasted space which we covet are accessed as a second Pascal heap, hidden below Hi-Res Page 1. In Listing 2, this small heap is referred to as LOWHEAP, and the regular heap, which begins above the Hi-Res page, is HIGHHEAP.

Two utility functions perform type conversigns in this program. *Inttoptr* takes an INTEGER parameter and returns a pointer. Function *Ptrtoint* returns an INTEGER when given a pointer parameter.

In this example, the local variables of procedure *subprocedure* are dynamically allocated storage space as SUBREC. Each time *subprocedure* is called, it first checks to see whether there is adequate space on LOWHEAP. If there is not, the storage is assigned to HIGHHEAP. The state of the two heaps at the time a procedure is invoked is stored as OLDLOW and OLDHIGH. When the procedure terminates, it restores the heaps to their old states, thus freeing storage space for use by coordinate level procedures using the same storage technique.

Statements that refer to the variables in SUBREC should be in the scope of a Pascal WITH statement. Most kinds of variables can be accessed straightforwardly in this manner. One exception is loop control variables (the index in a FOR statement). Such variables should therefore be declared normally, as some enumerable type, such as INTEGER.

The example in Listing 2 includes recursive calls of Procedure *subprocedure*. The output of this program, given in Output 1, shows that successive calls of *subprocedure* result in successive allocations of storage for SUBREC on the appropriate heap. The MEMAVAIL printed on the first line of Output 1 gives the number of words available before *subprocedure* is first called, according to the standard UCSD Pascal *memavail* function. This value does not include the hidden storage available on LOWHEAP. Subsequent references to "words available" in Output 1 include words still unused in the lower heap area and above the HIGHHEAP. The output shows that the first two invocations of *subprocedure* scarcely affect the memory available in the higher area, because all local storage for these invocations fits on LOWHEAP. When this lower heap area is used up, the third allocation of local storage is automatically made in the higher heap area.

The *dualheap* program of Listing 2 performs no real function other than to illustrate the principles of automatic allocation of heap space. *Subprocedure* is largely a shell that monitors heap allocation only. In a program that makes practical use of this technique, the application-specific code within such a procedure would appear within the scope of a WITH statement such as WITH SUBREC↑ DO . . .

In using a dual heap technique such as that demonstrated here, it is very important that the programmer ensure that each procedure which dynamically allocates storage for its local variables releases that storage before terminating. This means that it is good practice to avoid the use of EXIT to leave a procedure or function that uses this method. Instead, all termination paths should lead to code that releases the marked local allocation before completing the procedure.

The approach sketched here is not in philosophical accord with the principles of structured programming that Pascal so naturally expresses. It is implementation-dependent; clearly, the magic memory location 4446 (*startlowheap*) may change if Apple releases a new version of Apple Pascal. It requires that the applications programmer have some understanding of the messy details of memory allocation. No one should do this if they can avoid it. But it is certainly nice to be able to use those extra 3746 bytes to accomplish something that couldn't be done otherwise.

```
PROGRAM TESTMEM1;
BEGIN
  WRITELN (MEMAVAIL);
  READLN
END.
```

Listing 1A. Find the maximum amount of memory available when Turtlegraphics is not used. If swapping is on, 20408 words are available.

```
PROGRAM TESTMEM2;
  USES TURTLEGRAPHICS;
BEGIN
  WRITELN (MEMAVAIL);
  READLN
END.
```

Listing 1B. Find the maximum amount of memory available when Turtlegraphics is used. If swapping is on, 10621 words are available.

Listing 2. A demonstration of the use of two heaps for maximum memory utilization in Apple Pascal.

```
PROGRAM dualheap;
  USES TURTLEGRAPHICS;
  CONST startlowheap     = 4446;  {first available location below screen}
        startscreen      = 8192;  {start of screen memory  }

  TYPE HEAPPTR= ^INTEGER;

  VAR LOWHEAP,HIGHHEAP: HEAPPTR;  {Global heap pointers }
      SCREENSIZE: INTEGER;        {number of bytes used by screen}
      outfile: TEXT;

{ address to integer }
FUNCTION ptrtoint(ADDR: HEAPPTR): INTEGER;
    VAR X: RECORD CASE BOOLEAN OF
           TRUE: (POINTER: ^INTEGER);
           FALSE:(INT    :  INTEGER);
           END;
    BEGIN
    X.POINTER:=ADDR;
    ptrtoint:=X.INT;
    END;

  {Turn argment into an address}
  FUNCTION inttoptr(I: INTEGER): HEAPPTR;
    VAR X: RECORD CASE BOOLEAN OF
           TRUE: (POINTER: ^INTEGER);
           FALSE:(INT    :  INTEGER);
           END;
    BEGIN
    X.INT:=I;
    inttoptr:=X.POINTER;
    END;

  PROCEDURE subprocedure(INVOCATION: INTEGER);
    TYPE SUBRECTYPE = RECORD
                      R1: ARRAY[1..750] OF INTEGER;
                      {and any other variables desired}
                      END;
    VAR OLDLOW,OLDHIGH: HEAPPTR;
        SUBREC: ^SUBRECTYPE;
    BEGIN
    WRITELN(outfile);
    WRITELN(outfile,'IN subprocedure, INVOCATON ',INVOCATION);

    { use local ptr vars to save heaps on entry }
    OLDLOW:=LOWHEAP;
    OLDHIGH:=HIGHHEAP;
    WRITELN(outfile,'SIZE OF SUBRECTYPE=',SIZEOF(SUBRECTYPE),' bytes.' );
    IF ptrtoint(OLDLOW)+ sizeof( SUBRECTYPE) < startscreen THEN
      BEGIN
      WRITE(outfile,'In subprocedure, there is room in lowheap.');
      RELEASE(OLDLOW);
      NEW(SUBREC);
      MARK( LOWHEAP );
      {memavail doesn't know we can't use memory from
       start of screen to true heap, so subtract it}
      WRITELN(outfile,' words available=',
```

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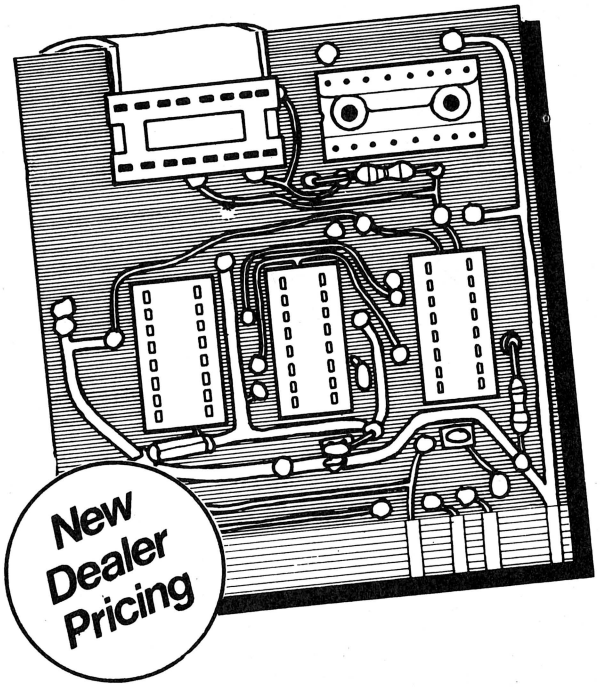

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(Listing 2 cont.)

```
            memavail- (ptrtoint(HIGHHEAP)-startscreen) div 2  );
    END
  ELSE
    BEGIN
    WRITE(outfile,'In subprocedure, no room in lowheap. Must use highheap.');
    RELEASE(OLDHIGH);
    NEW( SUBREC );
    MARK( HIGHHEAP );
    {memavail cant see space in lowheap, so add it}
    WRITELN(outfile,  ' words available=',
           memavail + ( (startscreen-1) - ptrtoint(LOWHEAP) ) div 2  );
    END;

  WITH SUBREC^ DO
    BEGIN
     {  Main body of procedure SUBPROCEDURE
        within scope of WITH SUBREC^
        *
        *
        *
        *
      }
    END;

  {call inself to demostrate stacking in heap}
  IF INVOCATION>1 THEN subprocedure(INVOCATION-1);


  { Leaving subprocedure, so restore HEAPPTRS to free up memory }
  LOWHEAP:=OLDLOW;
  HIGHHEAP:=OLDHIGH;
  END; {subprocedure}


BEGIN
initturtle;
REWRITE(outfile,'PRINTER:');
WRITELN(outfile,'MEMAVAIL=',memavail);
{set lowheap ptr }
LOWHEAP:= inttoptr(startlowheap);
{set initial heap, after TURTLEGRAPHICS moves it}
MARK(HIGHHEAP);
{find memory lost to screen}
SCREENSIZE:=ptrtoint(HIGHHEAP)-startscreen;

WRITELN(outfile,'LOWHEAP STARTS AT ',ptrtoint(LOWHEAP));
WRITELN(outfile,'HIGHHEAP STARTS AT ',ptrtoint(HIGHHEAP));
WRITELN(outfile,'SCREEN MEMORY (',SCREENSIZE,' bytes) IS FROM ',startscreen,
                        ' TO ',ptrtoint(HIGHHEAP) );
subprocedure(3);
END.
```

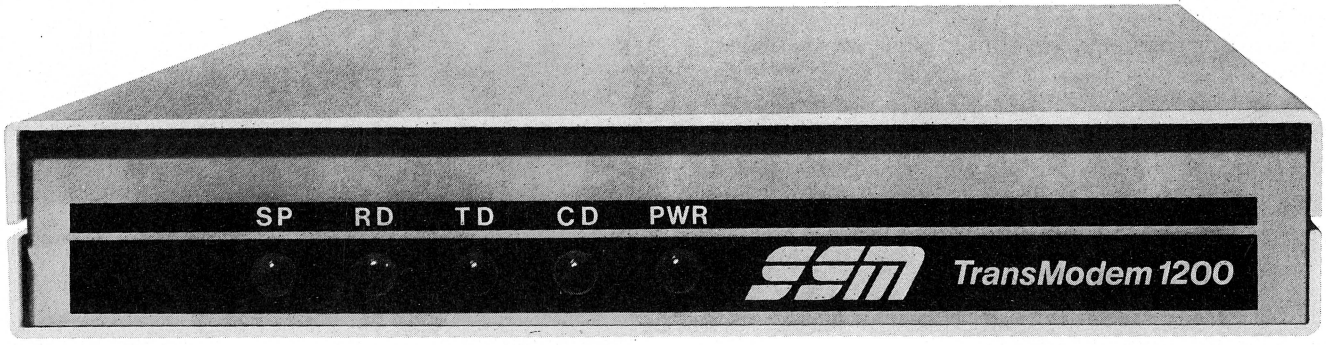
```
MEMAVAIL=8852
LOWHEAP STARTS AT 4446
HIGHHEAP STARTS AT 16384
SCREEN MEMORY (8192 bytes) IS FROM 8192 TO 16384

IN subprocedure, INVOCATON 3
SIZE OF SUBRECTYPE=1500 bytes.
In subprocedure, there is room in lowheap. words available=9963

IN subprocedure, INVOCATON 2
SIZE OF SUBRECTYPE=1500 bytes.
In subprocedure, there is room in lowheap. words available=9201

IN subprocedure, INVOCATON 1
SIZE OF SUBRECTYPE=1500 bytes.
In subprocedure, no room in lowheap. Must use highheap. words available=8438
```

Output 1. Output from the program in Listing 2.



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Why Apple Doesn't Tell All

by A. C. 'Mike' Markkula
President, Apple Computer, Inc.

One of the questions we're often asked is "Why doesn't Apple release more information on the details of hardware, software, and their interfaces?".

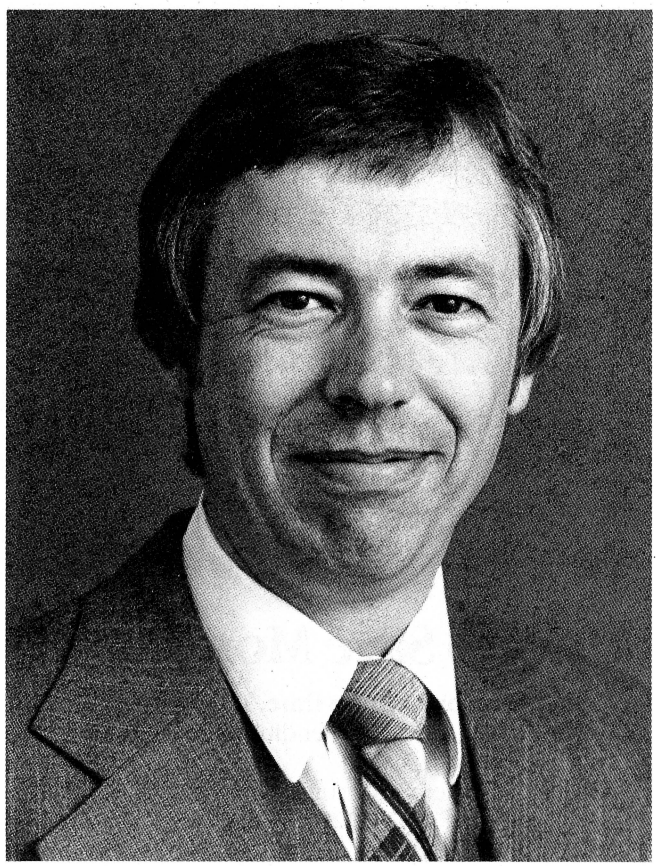
First, I don't know of any company that has released as much of that kind of information as we have. The Apple II and Apple /// Reference Manuals contain a great deal of information that other manufacturers haven't released. As another example, John Crossley of our staff wrote an article on Applesoft entry points to various routines resident in the Apple II, which was published in the Apple Orchard. The International Apple Core and the member clubs have also used other ways to disseminate information about how to "get around" inside the Apple products.

But there are some things that we haven't released, and we think there's a good reason for that. It goes way beyond proprietary information, secrecy, and all of that. Any information that we release on the internals of hardware, of software, and on the interfaces, carries with it a double-edged sword. On the one hand, some people may be able to do a few more things in using Apple computers. But those things may cause trouble for them down the line.

Simply, the problem is updates. Let's say we make every scrap of information available, about the Apple ///'s SOS, and a programmer at a software company gets in there and modifies SOS, and publishes a piece of software that depends on that modification. So far, so good. But we want to continue to improve SOS, and we put out a new version. Let's say that in making the improvement, we've changed something that obsoletes that software. The guy that loses is the customer, because he's locked into an older SOS, or his copy of the software product doesn't work correctly.

That's a problem we wrestle with all the time. We keep hearing that another large computer manufacturer plays that obsolescence game with a certain amount of relish; announcing and introducing upgrades that make present software obsolete. That may be. But at Apple, we're very much concerned that the information we do publish is used properly, and that we don't create that kind of trap for other individuals and companies who write programs to be used on our equipment.

The //e is another example. One of our prime concerns in developing the new model was to make sure that there is compatibility with existing Apple II software. We spent many



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hours testing software, and working with the software developers to make sure that we maximized compatibility. What we found was that, in large part, those few pieces of software that work on the Apple II but not on the //e involved their going into some routine at other than one of the entry points which we published.

We have a commitment to those other folks in the Apple world not to create an obsolescence that would harm them. I know that some people think we're tight with some of our information because of this. It's not that we don't want people to know, it's because we don't want people to use that information, and get into trouble. And that's why we give so much thought to what we do publish, and how.

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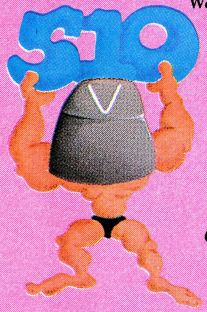

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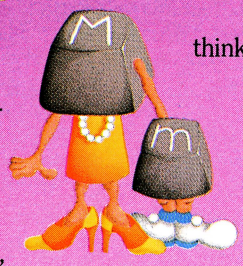

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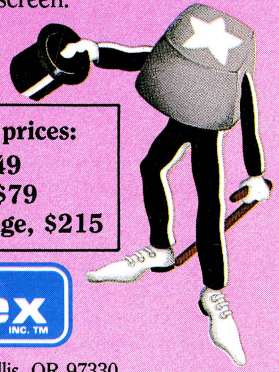

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Superplotter

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Cost: $69.95

Superplotter is a graphics program that generates various types of plots: lines, curves and text. The program creates pie graphs, bar charts, point and line graphs. It also displays, graphically, any of the mathematical functions found in Applesoft.

Other goodies include the ability to edit the Hi-Res screen by adding text using their graphics screen text editor. Superplotter also includes a tutorial that explains how to use their shape tables in your own programs.

The documentation is OK. It is understandable and contains some addenda which help explain some of the features.

In using the program, however, I did find it necessary to call the Dickens folks about a few of the program's functions. They were very helpful, returned calls promptly, and were able to answer my questions. (We'll cover the content of the questions during the review).

The program is menu-driven. It is fairly "user-friendly". However, it does have some special features for which you must watch out, or you may become quite frustrated. Once those features become known, you can plan around them, although I would rather have better documentation which would explain the workings of the program before I tried to use it, rather than try to figure them out after I was involved with the program.

Here's one example. You can enter data for some of the graphs through a data entry program, or let the program query you during the set-up phase for the graphics. What is not apparent is that if you enter your data in the data entry mode and save the file, you don't have to re-enter your data if you blow the graphic. If you let the program query you for your data points, and make a mistake like forgetting to put the title on the graph, then you must re-enter the query points when you reformat your graph. Not a big deal, but a small irritation which should have been covered in the documentation rather than discovered during a trial and error process.

The program is unprotected. Dickens suggests in the documentation that you might want to add a menu item to load, run, or whatever, your own particular version of a graphics screen dump. I did that, and found that to make their menu look the same, I also had to move around some of the text located at the bottom of the screen. There was no problem, It only took about two minutes to add a menu item to GOTO a subroutine containing a menu which allowed me to dump the current Hi-Res screen through my Grappler board.

The Exec Program

There is also an 'EXEC' program on the disk that goes through the menu and uses the functions of the program. This is a good tutorial. However, a word of caution. When you EXEC the file, it moves so fast you really can't see or understand anything. There is a way around this problem. Set the speed of your Apple to about 125, then EXEC the demo program. What, you say, is speed. Well, you can control the rate at which the Apple places goodies on the screen. If you want to slow it down, boot the program. Exit into BASIC. Type 'SPEED = 125' and «**RETURN**». Now EXEC the demo program and you can see what's happening. To me, this small bit of advice should also have appeared in the documentation.

Pie Graphs

The first menu item is for PIE GRAPH GENERATION. When you choose that item, you are given a series of commands. The program uses two-letter commands in its various menus to guide you. They make sense and the operation works. "TI" is always Title for the Graph. "SD" gets you to the data entry section. Then an "ED" lets you use Data that you already entered through the data entry main menu section, or a "DS" will let you enter your data sets interactively. (Watch out: if you enter interactively, you lose the data if you go back through the menu and would need to redo the graph).

You can select a PIE with or without filling. "EX" executes the menu option. In this case, it generates your pie graph from the previous options you selected. This pie graph generator worked faster, better, smoother and looks as good as any other pie graph maker I have used.

After you generate your graphic, any key returns to the main menu. When you are at the main menu, pressing «**ESC**» will always show you the contents of the current Hi-Res screen.

Bar Graphs

The Bar graph generator works well, but does some strange things that are not mentioned in the documentation. (This is

the part of the program that I called Dickens about.) You can label the bar graph with a "TI". You can enter data with a "DP" (after a DP you must pick a "DS" or an "ED" for interactively entering data sets or using data that you already entered through the editor). The X axis is labeled with an "XA" command. The Y axis is labeled with the "YA" command. (However, if you plan on adding text to the graph with the screen edit do not, *do not*, put a Y axis label on the graph with this function. If you do, you will not be able to move your edit cursor past the Y axis without wiping out some of the data and ruining the entire project. Again, something that should be mentioned in the documentation.) You must give a range to the Y axis using the "YR" command. The X axis will automatically set itself based on the input data.

Another problem here. The program will handle up to 25 bars. If, however, you input X axis data the program will garble the X axis labels when it tries to have numbers under each of the bars. A call to Dickens brought this solution. Do not input X axis values when you enter the data. The data is usually entered in X,Y sets. Like "1,3". If you just enter the Y value, like " ,3", then the program will not have any data to try to scale onto the X axis. You can then use the screen editor to place any X axis labels you want. But, remember, if you labeled your Y axis, you can't get the cursor down to the X axis to place the label. If you need to enter your X axis label, you must also remember not to label the Y axis. Once you have figured all this out, the program is a snap. It just takes a while to understand what it is trying to do, and Dickens is a great help in giving you information.

Polynomial Curvefit

The program also generates a least squares polynomial curvefit based on your X and Y values. The maximum number of input points is 99 and the largest N you can have is 9. This

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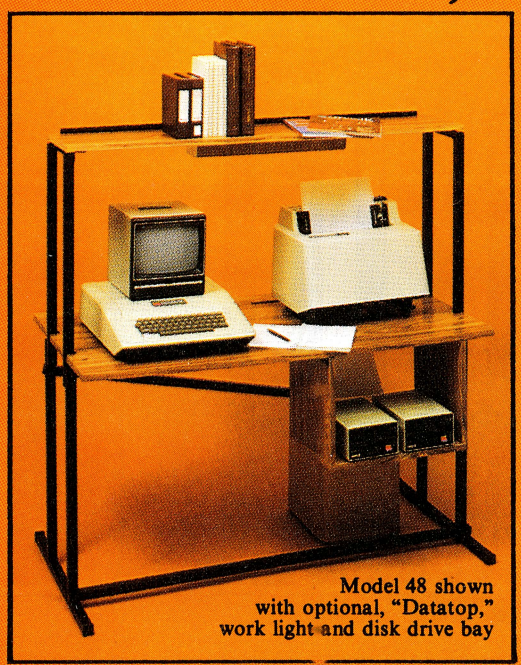

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[1] Model 32 comes without a printer slot
[2] All tops for models 32, 39, 48 come with built-in cord slot and notches for "Datatop", unless customer specifies otherwise
[3] "Datatop" shelf clears "Compu-table" top by a maximum of 22"
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part of the program works. I tested it by generating a second degree polynomial curve fit through a 42 item maturity curve. What can I say? I got the same curve that another curvefit program gave me. I will not take up review space discussing regression analysis. Part of the analysis gives you a scatter diagram.

Keyboard Image Shape Table Tutorial

This is text display which tells you how to use the shape tables utilized by Superplotter in your own programs. This was interesting to me. Although I don't have a particular need for this feature, the author of Superplotter is saying that you don't need to reinvent the wheel. If you purchased this program, and you need to use shape tables for Hi-Res applications, just download off the disk and go ahead and use them.

Graphics Disk Storage

This section of the menu allows you to save any Hi-Res picture you have created as a standard 34 sector binary picture file. It also allows you to enter any other standard file into the Hi-Res screen area so that you can address it with the screen editor.

Data File Editor

The next menu item is the Data File Editor. This is the editor which allows you to create and reuse data sets for all the other functions of the program. It contains a moderately complicated set of editing commands. They work well; I had no problem with the editor.

Overlays

The program allows you to overlay bar graphs and point graphs. When you activate the overlay menu item, the next set of input data does not require X axis or Y axis labels.

Screen Editor

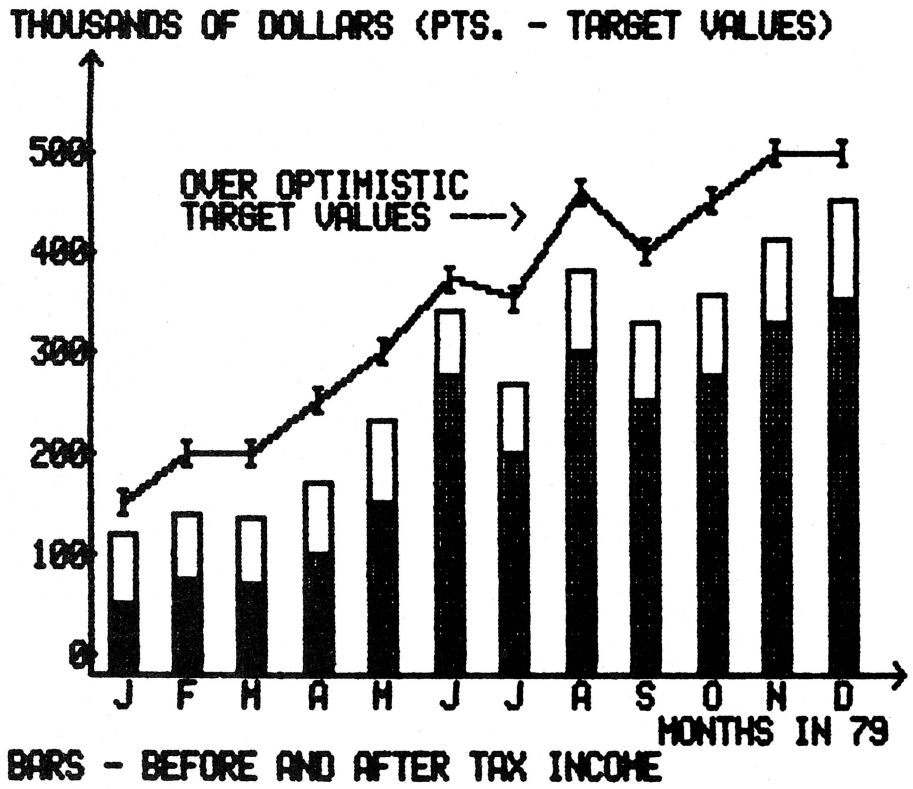
I saved the best for last. This menu item lets you put text on the Hi-Res screen at almost any location you desire. I use it to create overhead projector slides for presentations. Another problem here: the documentation assumes that you will always be editing a graph that was already created and loaded into the Hi-Res area. Therefore, there is no provision for you to clear the Hi-Res screen to use it just for text. What to do? Well, go back to the main menu and exit the program. Then type HGR 2. This clears page 2. Then type RUN. You go back to the main menu. Then enter the screen editor and there you are, a blank slate just waiting for those words.

EVALUATION: This is a good program. It does what it says it wants to do. I was not able to bomb it during normal use. It does take a few minutes to get used to, though, and the documentation could be a little better. But, if you need a program to generate these types of graphs, you can't go wrong. I would have this program in my library of business software just to get the screen editor. It saved me the cost of the program the first time I created 3 overhead slides in less than 15 minutes when it would have normally taken about 2 hours using our old methods.

Response to Review from manufacturer. (edited somewhat for brevity) " . . . We feel that you have given us a 'thorough going-over'. We acknowledge isolated deficiencies in the manual. We are planning a review to incorporate your recommendations along with some other comments and improvements in our next version of the Superplotter and its manual.

"We would appreciate your passing along the following:

"We do not consider the writing of software a static process and are always interested in any comments or input that our users care to give us . . . . We believe in backing our product, and are ready to offer whatever assistance or guidance our customers need."



Example of Superplotter

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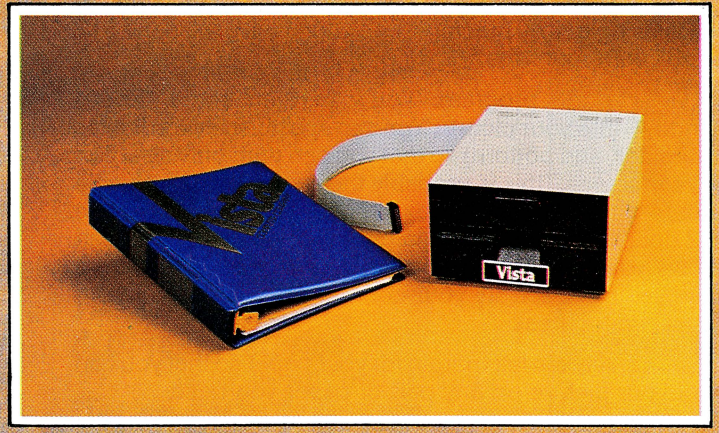

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Review:

ZOOM GRAFIX

by Woody Liswood

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Published by:
Phoenix Software, Inc.
64 Lake Zurich Drive
Lake Zurich, Il 60047
(312) 438 - 4850

Price: $39.95

This is one of those programs that you need to own. It prints either Hi-Res screen in any proportion with almost any combination of printer and controller cards.

The first time you boot the disk, you are shown a variety of printers; select yours. You are then shown a variety of interface cards; again, select yours. The program also works with the special graphic boards that already contain on-board software to cause Hi-Res pictures to appear on your printer. I checked the program out with two of those boards, the Grappler and the PKASO. Both of those boards worked well with Zoom Grafix.

Why, you ask, would you want Zoom Grafix when you already have the on-board software? Well, for ease of use, the on-board cards work fine, but they typically don't give you the editing capabilities that Zoom Grafix does. Together, the Graphics dump boards and Zoom Grafix give you almost unlimited capability when it comes to working with and printing the Hi-Res screens.

You are asked whether you want to make these selections your normal defaults or do you just want to test them (or use them for this work session only).

With this disk, you can go from printer to printer and not have to buy another graphics print program. I use it with an Apple /// and a Qume Sprint 9 printer hooked up to the Apple /// Serial port. *No problems*. I also tested it with a Epson MX-80 printer and Epson and TYMAC parallel cards (in addition to the two special cards mentioned above); also no problems.

The program boots by first displaying the Page One Hi-Res screen and asking if this is the screen to be printed. If you say no, then it shows Page Two. If you say no again, it asks for the name of the picture file on your disk or if you would like to see a catalog of the disk. The program then shows you the 34 sector picture files on your disk and asks which to load.

Then the main menu asks a series of questions. You can accept all the defaults and go immediately to print your picture.

First, you can decide whether you want the white dots to print as white or black on your printer.

Then you can rotate the picture from horizontal to vertical.

Then you can set the size of each dot. This is probably (to me) one of the most valuable features of this program. You can print each dot on the screen as one dot on your printer. Or you can print each dot as wide or as high as you wish on your printer, such as two dots high and three dots wide. This lets you scale your pictures to fit your intended need. I find it very useful for creating overhead projector charts. I use a program called Superplotter to write characters on the Hi-Res screen. Save the picture. Then rotate the picture and print it two tall by one wide using Zoom Graphics. It makes good slides and takes only 1/5 the time as when I created slides using a Kroy machine, and I don't have to spend $12 on rolls of tape.

Back to the program. You can then set a "Zoom Window" into your picture. You can specify the coordinates (top, sides, and bottom) so that you can print only a portion of your screen. (this is probably the second most valuable feature of the program). The screen is 280 dots across and 192 dots deep. As you choose your parameters, the screen shows you the window you are creating. If you make a mistake, just respecify your coordinates. No problem, no sweat, works great.

You can set the left margin for your paper so that you can print your picture on any part of paper you need.

You can then set your print width. This depends on the printer, the paper, and how much expansion you are going to do with the other options.

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J.R. looked everywhere in his local computer store for an interface or expansion board to solve his dilemma, but none were designed for the magnificent project he had in mind.

"Shucks . . ." he stormed, "what am I to do?"

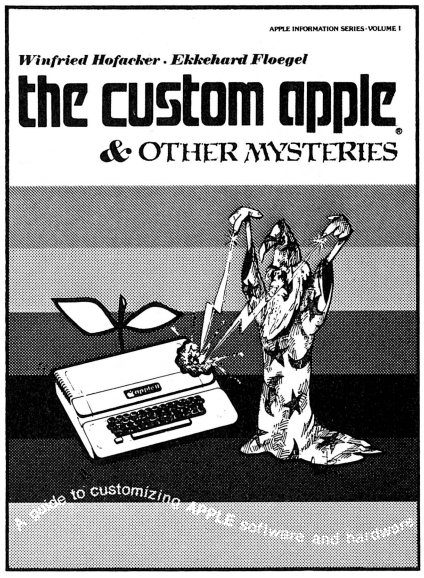
Poor J.R.

But then, just as he was about to give up all hope, a splash of color caught his eye over in the book section . . .

The Custom APPLE & Other Mysteries.

"Oh joy, Oh joy!" cried our hero. "This book gives me the information, specifications and references I need to do the hardware enhancements, whether I am a beginner or an expert, and provides me with the basic information required to write the software, common to many of the projects, myself. This book is just crammed with all kinds of neat stuff!"

J.R. left the store, also an IJG book dealer, a very happy man.



A Hardware and Software Modification Guide.

The Custom APPLE & Other Mysteries provided J.R. with a number of data acquisition and control projects with camera ready printed circuit layouts like the 6522 application interface board, an 8-Bit D/A and A/D converter, a sound and noise generator board, an EPROM burner board, an APPLE Slot Repeater, and included information on the APPLE as a square wave generator, the control of two stepper motors, connecting two 6502 systems, and lots lots more.

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There is a delay feature. You can specify a timed delay after printing each line. This allows your printer to cool off before printing another pass.

You can also change your printer/interface configuration without having to reboot the disk.

Formfeeds and/or linefeeds can be sent from the keyboard to your printer so that you can advance paper between pictures without touching your printer controls.

A feature which I really, *really* liked was how the program handled the screen while it was printing. After you instructed the program to print the picture, the screen inversed (each white dot becomes black and each black dot becomes white), then as the program evaluates and prints each line, the screen is put back to normal, line at a time, at the same time it is printing that line on your paper. Neat, Huh?

ESC stops print. You can then quit the program or return to the main menu.

A fantastic program. Works great. If you are looking for a good graphics print program, you would be pleased. If you are like I am, with machines in different locations (home and office), each with a different printer and interface, then this program is a necessity, unless you like to purchase different programs for each combination of printer and interface.

The documentation is adequate for the task. The program is self-explanatory and the responses you must make make sense in the context of the menu items.

One criticism; the program is copy protected.

This version of ZOOM GRAFIX supported the following printers:

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NEC PC-8023
Okidata 82A /w Okigraph
83A /w Okigraph
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132 (monochrome)
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Spinwriter
Starwriter
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In addition, the following interfaces were supported:

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K-T Parallel
MC CPS Parallel
Serial
MPI Auto-Plot
SSM AIO Parallel
Serial
Tymac
VERSAcard Parallel
VERSAcard Serial

The latest release also states that it supports line printer mode graphics for TEXT-ONLY printers.

Readers' Comments

We have received one letter which stated that Phoenix will exchange earlier versions of ZOOM GRAFIX for a small service charge. We were quoted $7.50.

You can also talk, by SMAIL (assuming that you have a membership in The Source) with TCC102 which is Ron Unrath of Phoenix Software or TCP831, which is Dave Holle, the author of ZOOM GRAFIX. Both, are ready to help you with your questions, and would probably find it interesting to hear about your experiences and uses with ZOOM GRAFIX.

A Graphics Sample

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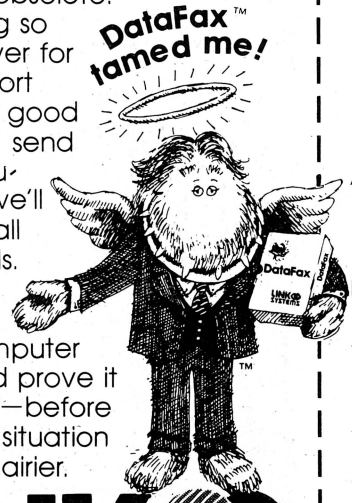

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Herbie Hancock Jazzes Up Apples

by JudyAnn Christensen

"We made the terminal by taking a Z8000 single-board computer and building interfaces for each synthesizer's keyboard," continues Bryan. "The Apple computer controls sound selection on each keyboard — this way we can be much more flexible. We can make sounds from many more instruments since each keyboard is capable of simulating 16 different instruments and 160 sounds from each instrument. Besides, Herbie can't extend his arms to reach all those keyboards!"

According to Bryan, Herbie's most powerful use of the Apple computer is for composing. Herbie did a little spontaneous composing at NCC. AlphaSyntauri's Steve Leonard simulated an organ base line on the synthesizer, then overdubbed tracks of synthesized snare, brass, strings, and xylophone sounds, and stored them on the Apple computer. Then Herbie began to jam. To round out the composition, he improvised an electric piano solo. Under the NCC's bright lights, Herbie's fingernails glistened as they danced across the keyboard.

"Each time I use them, I get more of what I want from my synthesized keyboards," says Herbie, smiling as he rotates the alphaSyntauri's Pitchbend to sustain an especially funky note. "When I play a synthesizer, I'm able to create my own instruments. I have as large a range as my creative mind will allow."

"Before I had an Apple II, I was playing from ten to twenty different keyboards per song to achieve the sound I wanted," says jazz recording star Herbie Hancock.

"After I got my Apple computer, I hooked all my synthesizers to it, connected it to one keyboard (the Eu 16 polyphonic keyboard), and created a device that switches between the synthesizers. Now, I can get the range of sound that I want from one keyboard."

Traveling light and playing heavy jazz is Herbie's style. His backup musicians didn't come along last June when he played the Astrohall during the National Computer Conference (NCC). Instead, Herbie played his alphaSyntauri® synthesizer connected to an Apple computer, just as he will on an upcoming concert tour. For the last three years, Herbie has been using an Apple computer in the recording studio, especially for the "Monster" and "Mr. Hands" albums, as well as for numerous other functions.

An engineering major in his first two years at Grinnell College, Herbie is a vanguard in bringing electronic music to jazz. Synthesizers are a natural evolution of Herbie's interest in electronics and his musical talent. In 1971, Dr. Patrick Gleeson played one on Herbie's "Crossing" album. Herbie was so impressed, he learned synthesizer technique from Gleeson and played one on his 1973 "Headhunters" album.

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It was his keyboard engineer, Bryan Bell, who first introduced Herbie to Apples. Formerly employed by the rock group Earth, Wind, and Fire, Bell had used Apple computers while programming flashpots to erupt into leaping flames on stage.

Computer Connections

The two highly-creative engineers are constantly experimenting with new, harmonious, computer connections, such as hooking several synthesizers to one Apple computer. "Most synthesizers are microprocessor-based," says Bryan. "To communicate between them, we had to develop a micro-based terminal."

Bryan agrees. He points to the flexibility the computer has added to Herbie's compositions — such as automating his arrangements of soundtracks. "Herbie interfaces the Apple to a video synch code which, in turn, memorizes cues and times them to the video," says Bryan.

"For example, let's imagine that Herbie is composing around video of a car crash. He can play background music until the crash, hit the space bar to see the time of the crash then program the system to recall the car crash sound at that point."

Futuristic Feats

Recent developments in software allow Herbie to perform musical feats that never were possible before. "In order to compose on a synthesizer, you have to split the keyboard into isolated parts and keep the ranges of each part separate," explains Herbie. "That means I couldn't multi-track both background and foreground music without recording over one or the other. Now I can easily multi-track using the whole keyboard for any sound I want with alpha-Syntauri's Metatrack™."

"Also, before I didn't have a metronome on my synthesizer — which meant it wasn't very forgiving of my imperfections," continues Herbie. "Now with the alphaSyntauri I have a metronome, allowing me to make more fluid musical digressions. I've always been very interested in the texture, colors, and dynamics of sound, and, using a digital synthsizer, I can make my own sound wave forms—sign, triangle, and pulse waves. Since it's digital, I can easily mix and manipulate my sounds."

The system is also stimulating Herbie's compositional creativity. "Herbie has been playing the piano for 33 years, so it's easy for him to be inspired to compose. Because he also uses his Apple computer as a musical data base, at the touch of a key it records the actual notes he played. Best of all, Herbie doesn't constantly have to stop to write down his notes," says Bryan. "Additionally, we break down each song he records by sounds so Herbie can recreate them or compose new songs based on a sound that inspires him — months or years later."

This sort of cataloguing is no small chore. Duplicating one sound may require several synthesizers and special effects patched together in several different combinations.

"We can actually file through recorded sounds, splice them up, and play them on a studio fidelity synthesizer when we go on tour," adds Bryan. "This means that on the road we can almost duplicate the effects we get in the studio."

Out of the studio, the Apple computer works overtime in the office. Herbie uses a modem to communicate with the office while traveling; word processing software to write contracts and correspondence; and VisiCalc to manage his music publishing company, do budgeting for his road bands, and manage his incredible schedule.

With time, Herbie says that his system will continue to evolve. "I haven't even scratched the surface, yet."

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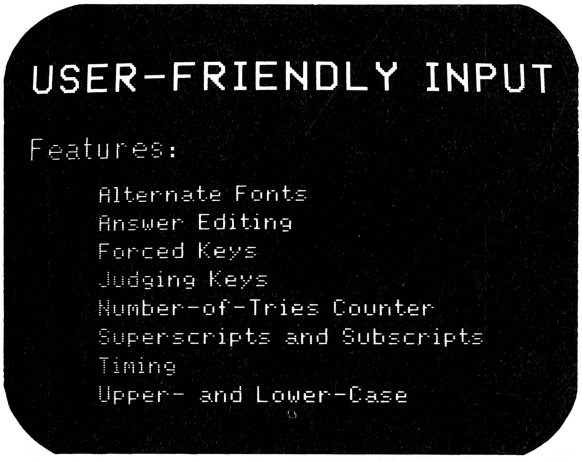

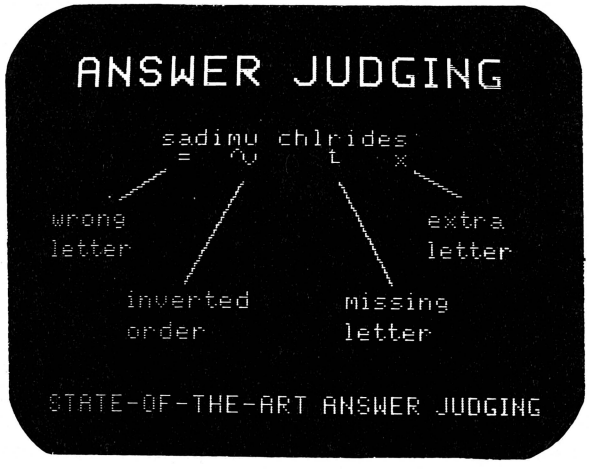

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Authors Paul Tenczar, Stanley Smith, and Allen Avner have produced CAI and similar user-oriented software for more than 20 years. Here are routines and authoring aids critical to preparation of high-quality, user-friendly materials.

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Print Buffers and the PipeLine

by Neil Lipson

This article will deal with some of the aspects of printers that really have never been fully discussed. These are print speeds and print buffers, both software and hardware. Print buffers that were available until December 1982 were fairly straightforward, but all that has changed now, as we shall see.

First, let's discuss what a print buffer is; it's a device or program that can store information sent out from the computer and hold it until the printer has a chance to print it. For example, if you want to print a file from a word processor, and you give the command to print, the computer is capable of sending information much faster than the printer can process that information. This is why we also must discuss printer speeds when discussing buffers. Normally the output from the computer can go from 15 CPS (characters per second) to an approximate maximum of about 2000 CPS. Therefore, if our printer can only print 80 CPS, the computer periodically sits and waits until the printer is ready for the next batch of characters.

That means that you, operating the computer, also sit and wait until the printer is completely finished before you can do anything else. A buffer is like a storage or surge tank for information; the computer fills it, and then goes on to other things while the printer works simultaneously. The accountants will regognize the process: FIFO, or "First-in First out". That frees up the computer much sooner, depending on how fast the printer prints.

With a peripheral hardware board, it's possible to provide that storage tank, to hold and forward information coming out of the computer into the printer. Some software houses have devised software programs that to the same thing, using a RAM memory expansion card as the buffer. Some examples of this are the spoolers (which is another word for print buffer, presumably derived from the action of unreeling characters like removing thread from a spool) in Screenwriter II and Diversi-Dos, or DoubleTime. We'll look at software spoolers later.

The hardware buffers have evolved phernomenally; the latest one available is from Interactive Structures; in my opinion, it obsoletes many of the existing hardware buffers. They call it the PipeLine, and one of its features is called "random access printing", which means pulling certain pieces of information from the buffer to print at certain places in the printing process. In short, it goes beyond FIFO. This buffer also has print compression, so the apparent size of the buffer can be from 2:1 to about 8:1 in practicability.

The PipeLine

The PipeLine is from Interactive Structures. The cost of the buffer ranges from $230. for 8K to $440. for 128K. Their address is: Interactive Structures, Inc. 146 Montgomery Ave. P. O. Box 404 Bala Cynwyd, PA 19004.

This one looks like the buffer to end all buffers. Their buffer does three major jobs:

1. Buffering
2. Print Compression
3. Random Access

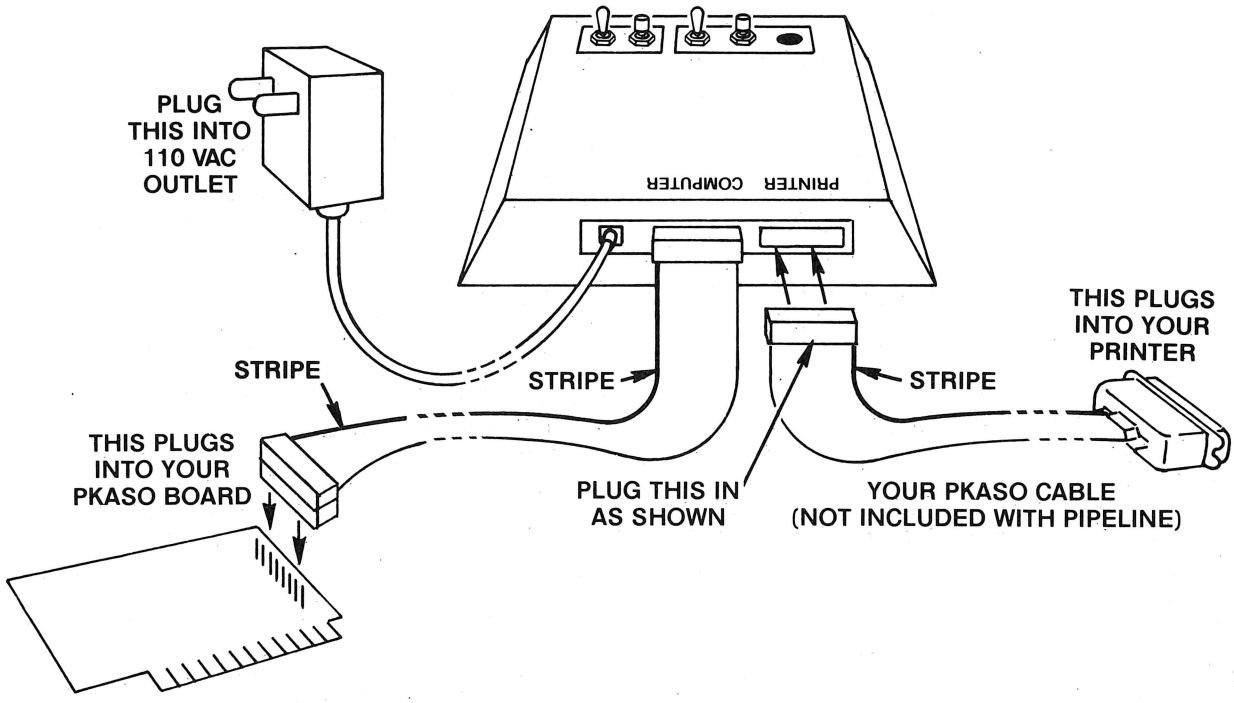
Print Compression

Print compression is a way of "compressing" the data. For example, let us say we have a Hi-Res graph that is mostly empty space. If we save that picture on a normal disk, it takes up about 34 sectors. However, if we remove the blank sections by first encoding and then decoding, it may only take 3 sectors. This theory applies to print compression. Therefore, it is possible to get a 10 to 1 compression ratio, which means that a 128K buffer can appear to contain about 1 megabyte of data. The same applies to text (but to a lesser degree). If there are duplicate characters, we can compress, so the efficiency of the buffer goes up, in some cases dramatically.

Random Access Printing

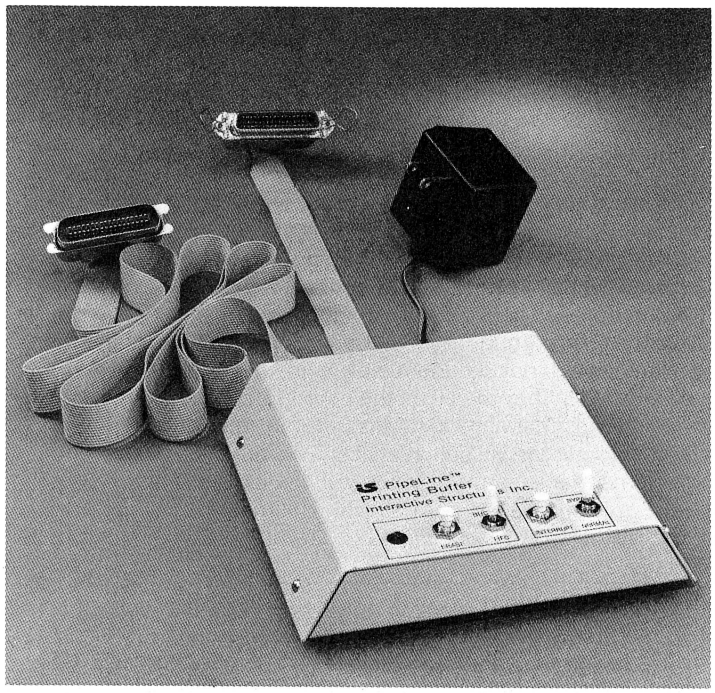
You may wonder what Random Access Printing is, as this was only invented, to my knowledge, late in 1982 by Joe Willson, Ph.D, president of Interactive Structures. The device is patent pending. What this can do is combine text, graphics, spreadsheet outputs or anything else with simple routines all in one buffer. Therefore, I can load in my data files of 1000 names, 30 pictures, and 7 letters, and plug name 1, picture 4 into letter 5 as I see fit. Needless to say, this dramatically reduces the "thinking" the computer has to do. What Interactive Structures tried was a 60 second "dump" to the buffer with RAP (random access printing), and the printer went for 9 hours! It is therefore possible in the near future to run dozens of printers from one computer by merely dumping and then electronically switching outputs keeping all printers printing continuously. It stores the information in what IS calls "buckets". You then call for the bucket by name print in any order. A simple concept that no one has though of before until Joe Willson came along. The PipeLine has three modes, the Bypass mode, FIFO mode, and RAP mode. The bypass mode does exactly what you would expect, which is bypassing the buffer completely. The FIFO mode (first in, first out) acts as a reservoir accepting the data at high speed and then sending it to the printer as fast as it will permit. The RAP mode is the

intelligent processor that selectively prints what you want, where you want it. To start up everything, you press the erase and interrupt buttons on the PipeLine at the same time and everything is initialized properly. The installation of the PipeLine is easy and is shown in diagram below:



There is also a "universal model" that goes between any Centronics type printer and any computer.

The PipeLine will wait until its memory is fulll in the normal mode. So there is, in effect, handshaking (the printer and computer making sure that the other is ready to send or receive, rather than a blind output of data.) However, in the RAP mode, you can only put 10 pounds of sugar in a 10 pound bag, so plan ahead. If you want to put more in the buffer than it can hold, it can easily be expanded with the cheaper 64K chips. The chips need not be the automatic refresh variety (the more expensive variety) which saves you, the consumer, some money. At this writing, the 64K chips can be purchased as cheap as about $7, so expanding the buffer costs beans. The rate at which the indicator blinks is an indication of what is going on, and it is extemely easy to spot the differences (3 times per second is the RAP mode, and a steady glow is the Bypass mode. At a glance you know exactly what is happening.



It is even possible to turn off the computer while the printer is printing. The PipeLine has its own power supply, and as long as you remember to switch to the Bypass mode, the printer will print away until the buffer is empty, or until it has completed the instructions you gave it. The only aspect of the PipeLine that you must learn is the RAP mode, which is not difficult, but must be thought out. Once you have determined what goes where, you define what goes into bucket A, B, C or whatever, and the commands look like @6C, which means print bucket C. All the commands are explained in detail in the manual and many examples are given (which is great for me as I'm a slow learner). All of the setup commands can be given in a small program. You can send the RAP output to the printer to check out the format.

The PipeLine manual even goes into some tricks to speed things up. For example, if you are using a particular bucket frequently, it would be wise to place it first in memory. There are even some special unpublished features. For example, if you print a letter, and after you are finished, you wished you had 4 more copies, do the following: Flip from the FIFO to the RAP mode, and push the interrupt switch. Your printer will continuously start re-printing the letter over and over until you stop it. This is entirely intentional, and is a very nice feature. The reader should be warned about some of the ads for other buffers. One manufacturer says his buffer will speed up the computer. Well, if you believe that, I have some swamp land in Santa Clara to sell you. NOTHING will speed up the printer or the computer, but the way the ad reads, some inexperienced individual would think it would. Be careful about some of these claims, and know the company you are dealing with.

I gave the buffer a real workout, and with the way I was flipping swithes on the printer, the buffer and the computer you would think I was playing "Beat the Clock." I was trying to try every feature in a ten minute time period. (*Neil likes to simulate the most common approach used by new software or hardware buyers; he's not* really *that way . . . —PCW)* So, a word to the wise: Sit down, relax, read the manual and don't rush it. Rushing gets you nowhere.

Some interesting results that I timed were that a large Hi-Res picture dump from the PKASO card takes about 24 seconds, and the small Hi-Res pictures takes about 20 seconds to load into the buffer. This is because the PKASO card is generating the dumps and this takes time. I tried a machine language dump, such as this: CALL-151, 0000.BFFF and «RETURN». I put the printer off/select, and let the buffer fill up, to see where it would stop. Well, it stopped at location 7868, which is about right when you think that each memory location requires three characters to print (the two byte representation and the space), which filled all of my 128K. One side note: during the test I used up quite a bit of paper, so take my word on most of these points. The PipeLine manual is well documented with plenty of charts and diagrams. The buffer operated perfectly and it performed up to my expectations. I am looking forward to other new products from this company.

A Foxy Software Spooler

Diversi-Dos is a program marketed with the most unusual approach I have seen. The author says to copy the disk and give it to everyone you know. If you like the program, you send him $25. At first, I thought this guy was crazy. Well, he's as crazy as a fox. I cannot tell you how many people have been ripped off; separated from hundreds of dollars for software that the dealers would not let them see, and then would not run properly when they tried it on their computers. Ironically, most of my friends that have tried this program have gladly sent in the $25 to get the validation sticker, and are pleased with the programs many features (which will be discussed further in a future article). The program is worth 10 times the selling price. It is available from: DSR, Inc. 5848 Crampton Ct. Rockford, IL 61111.

The program does many things, however I will discuss only the print buffer portion of it. The software uses your RAM card as the buffer, as long as it is not used for something else. Of course, this buffer will not work on all programs, but will for all Applesoft programs, as well as many others like Applewriter.

If you have a 128K RAM card, you can use it as a 128K print buffer! The buffer program first asks you certain questions as to what kind of printer card and RAM card you have, and what slots they are in. After answering all the questions, you BSAVE the buffer program and you're done. Then just BRUN BUFFER.

The buffer utility will disable the software features on the printer card, so there will be some things that you will not be able to do as normal. however, for most applications and will all custom software that you do yourselves, it is the greatest thing since sliced bread.

It only buffers and does not have any of the fancy features of the big electronic hardware buffers, but is worth the price. INIT and CHAIN are disabled, but the program provides some pokes to do many other features. The software works with just about every card on the market and there are even advanced programming tips. Once you activate the buffer, and the printer starts printing, it acts exactly like a hardware buffer, and as long as you do not turn off the computer, the printer will continue printing. The tab feature is available with version 1-B. To clear the entire buffer, type CTRL-X twice. Interestingly enough, hitting «RESET» will not clear the buffer, and the printing will continue. Obviously, turning off the computer will clear the buffer as well as everything else.

Print Speeds

Probably one of the least understood aspects of printers is print speed. I have heard many people say that printer A is faster than B just because A is 100 CPS and B is 80 CPS. If both were identical in every other respect this could be true, however, there is more to the story.

I will list most of the aspects that affect print speed and try to explain. They include, but are not limited to:

1. Characters per second (CPS)
2. Throughput
3. Logic seeking print head
4. Line feed speed
5. Carriage return speed
6. Single or double buffered
7. Bidirectional printing
8. Slewrate of form feed

And to think that most people thought that CPS was the only factor. CPS is self-explanatory. *Throughput* is the rating given for the number of lines per minute (LPM) at given character per inch (CPI) and character per line rates. For example the Okidata ML82A is quite a fast printer for its price, and here is why. The speed specifications are as follows:

Print speed - 120 CPS
bidirectional/shortline seeking
Throughput ' 10 CPI: -20 characters per line: 187 lpm
-40 characters per line: 123 lpm
-80 characters per line: 73 lpm
Line feed speed: -6 LPI: 115 ms (milliseconds)
-8 LPI: 95 ms

A logic seeking print head is one that will go from point A to point B in as close to a straight line as possible. For example, on the old MX-80 with the old Graftrax, there was no logic seeking, so if you printed a Hi-Res picture, the head would always home back to the left margin before it did the rest of the picture (it the picture in three sweeps). If you print a letter on the Diablo, and you watch it as it prints, you will notice that the print head will go straight to the next print
locaton, even if it is tabbed in.

Line feed speed can be important. The MX-80 F/T has a fairly slow line feed which is listed at 200 ms. The Diablo is about 53 ms. However, the carraige return speed can be a real killer. The MX-80 is about 600 ms for 10 inches while the Diablo

is 181 ms. The MX-80 has 80 CPS while the Diablo 1640 is 45 CPS, so while the Epson is about twice as fast in CPS, it is at least 3 times slower in the other areas. Therefore, in some cases, the Diablo can beat the Epson and many other dot matrix printers hands down. It all depends on what you're printing.

Not too much is discussed on single or double buffering but if a printer delays slightly at the end before it starts to print the next bidirectional line, it is probably single buffer. A short delay or no delay is double buffering.

Bidirectional printing is always a plus, as this minimizes the carraige return delay. If your printer has a lightning fast carriage return, you may not even notice the bidirectional printing speed. However, if the printer takes forever before it begins the backward trip, this feature is useless. The reason for the delay is that the printer has to rearrange the letters so that it sdrawkcab tnirp ton seod. That was a bug in one major word processor which I will not mention.

Last, but not least, is the slewrate that the printer form feeds the paper. I'm sure all of you know how aggrivating it is to wait while the printer is form feeding, so this is another feature to check on. Unfortunately, most manufacturers will not publish all of the these specifications. They usually publish the ones that make their printer look good, and leave you to observe the others. By the way, if you have done some of these observations, please get in touch with me, and we'll try to help everybody.

Below is a list of some of the parameters for a variety of printers:

Printer Parameters
(Listed fastest first, @ 10 char/inch)

	CPS	LPM 20 char/line	LPM 40 char/line	LPM 80 char/line
Okidata ML84	200	266	184	114
Epson FX-80	160	210	146	92
Okidata ML82A	120	187	123	73
Okidata ML83A	120	173	117	71
ITOH Prowriter (NEC 8023A)	120	125	94	73
Epson MX-80	80	105	73	46
Diablo 1640	45	65	33	17

Conclusion

In spite of all the verbiage in this article, I have barely touched on the subject. However, as the expression goes, a little knowledge is a dangerous thing, so learn a little and live dangerously. Then let us know what else we should be covering, or in what direction we should go.

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The Strange Case of the Magenta Apple

as told to Dan Wasleski

Note: A certain battered dispatch box, the property of John H. Watson, M. D., is said to be in the vaults of Cox & Co., bankers, of Charing Cross. It contains notes and manuscripts concerning the exploits of a certain noted detective; manuscripts which were not published through Watson's collaboration with Sir Arthur Conan Doyle. Dan Wasleski uncovered this manuscript, presumably at Cox & Co.'s Kansas City branch. While we cannot vouch absolutely for its authenticity, we can say that it is the first such manuscript to have been so thoroughly Global-Replaced. Now if we can only coax our typesetter out of the closet in which refuge was taken three days ago, amid hideous whimpering. . . .)

IT WAS a cold AND blustery evening, thAT night in January of '94. Outside, the wind howled fiercely. I had just thROWn aNOTher LOG ON the crackling fire AND had settled myself with the lATest issue of the *British Medical Journal* when my friEND SherLOCK Holmes came bursting inTO our rooms AT 221B Baker STReet.

"You gave me a start, Holmes." He ignORed my mild repriMANd AND threw OFF his inverness coAT. THEN, of all things, he TOssed an APPLE AT me.

"WhAT's this?" I exclaimed. "NEXT thing I know you'll be bringing HOME PARSEley. This APPLE feels ROTten, Holmes. Why is the APPLESOFT?"

"The APPLE has been tampered with, WATsON. I INTercepted it ON route TO MORiarty."

"MORiarty," I gasped, "but ProfessOR MORiarty is dead!"

"So he'd like us TO believe WATsON, but he's alive AND well, AND he's PLOTting a foul crime. MORiarty . . . a malignant thing thAT crawls the earth . . . a despiCABLE villain . . . a foul creATure who preys ON the poOR AND helpless . . . ProfessOR MORiarty, Ph. D., P. R. . . ."

I raised my eyebROWs. "P. R.?"

"Of course, WATsON, Pernicious Rogue! He's PR#1 in my book. Now, IF you would be so kind as TO perFORm your surgical skills ON this APPLE, perhaps we can ASCertain why its been MON-KEYed with."

While I prepared my inSTRuments FOR surgery, Holmes played a sonATa ON his VLIN. The MUSIC FLOWed as IF it were being bowed by a MASTER VLINist.

Moments lATer I had begun TO dissect the APPLE with a sharp-EDGEd scalpel. I carefully peeled OFF layer after layer in INCREMENTal slices of about ONe-FORty-seCONd of an inch. NOT a TRACE of anything.

Holmes had put away his VLIN AND now puffed smoke fROM his FREshly lit pipe as he DELiberATely scanned my surgical wORk. "HELLO, WATsON, whAT's thAT BROWNish BLACK particle there?" He leaned over my shoulder AND poINTed the stem of his pipe TO whAT I had supPOSed TO be a SEED. ImmediATely he had his magnIFying glass out AND was exaMINIng it. "Quick, WATsON, the tweezers. I believe it's a MICROcapsule."

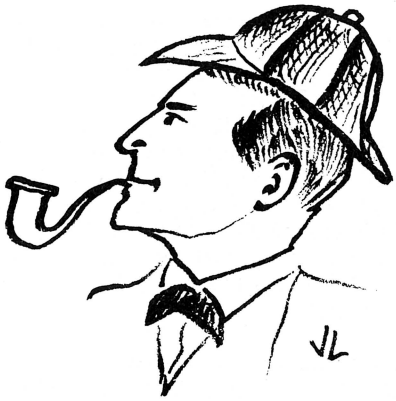
Holmes had the thing apart ON his WHITE hANDkerchief in seCONds. A dark speck thAT looked like a tiny BUG fell between the two ENDs of the capsule. "A MICRO-DOT IF I'm NOT mistaken. With MODErn phoTO-GRAPHIC techniques a large amount of inFORMATiON can be reduced TO a MINIscule phoTO-GRAPHIC emulsiON like this. GET the HIGH-RESOLUTION MICROscope."

"Broken," I replied. "I'll GET the LOW-RESOLUTION ONe."

"Never mind, GET the kaleiDOScope AND SCREEN."

ShORtly, we had the FULL-SCREEN AND lantern set up. I mounted the tiny SQUARE MICRO-DOT ON a slide AND placed it in the kaleiDOScope. The SCREEN was a blur of PARALLEL LINEs until I adjusted the focUSER. THEN it was apparent thAT it was a DRAWing. "A SCHEMATIC DRAWing of some kind," I suggested.

"MORe like a diagRAM . . . HELLO, WATsON, it's a



floOR plan, AND IF I'm NOT in ERROR, it's a floOR plan of the Louvre Museum!"

"The Louvre, Holmes? You dON't mean MORiarty INTENDs TO steal the Louvre? Even MORiarty can BYTE OFF mORe than he can chew!"

"MORe than likely every paINTing in the Louvre CATALOG."

"ThAT's a SYNTAX-ERR, Holmes."

"HANG the SYNTAX, WATsON, TO ERR is huMAN. CABLE InspectOR HIMEM of the FREnch Police AND tell him a GReAT mouse is about TO NIBBLE ON France's prize cheese."

"A nice metaphOR, but it should be APPENDed with a NORMAL REMARK which is LITERAL AND NOT OPEN TO INTerpretATiON."

"RIGHT, WATsON, APPEND a STATEMENT IF you like, but be OFF with you now, AND dON't RETURN-WITHOUT-GOSUBmitting the MESSAGE TO the teleGRAPHer."

I hurried through the cold night TO the BRANCH teleGRAPH OFFice TO CABLE InspectOR HIMEM. I thought how nice it would be TO have one of those NEWfANGLEd MACHINEs which thAT fellow BELL in America had invented so I could sit AT HOME AND CALL the teleGRAPHer instead of having TO go outside ON a cold wINTer's night.

As I approached the teleGRAPH OFFice I passed by the HARDWARE STORE which was between the ladies' apparel shop CALLed the SOFTWARE Shop; AND the ladies' undergarment STORE, CALLed the FIRMWARE Shop. In frONt of the shops, ON the sidewalk, I NOTiced an XDRAWn in ORANGE AND an HCOLORfully DRAWn in GREEN where children had been playing *X*'s AND *H*'s.

The teleGRAPHer gave me a smile AND a GREETING as I ENTERed. After we excHANGed INIT-HELLOs, he inFORmed me thAT I had arrived just in time TO SAVE his sON JACK a trip TO Baker STReet SINce he had just received a wire FOR Holmes.

I gave him my MESSAGE FOR Paris which we THEN had TO EDIT because his TABle of LENGTH-SPECIFERs stATed thAT we had an ILLEGAL-QUANTITY of wORds. He assured me he would GET the wire OFF as soON as he could ACCESS the main SYSTEM AND INTERFACE his teleGRAPH KEY TO it.

BeFORe I LEFT, the teleGRAPHer asked me IF I would like TO guess how MANy beans were in his bean jar. FOR two pence I might win a cROWn. I guessed there were 32768 beans. He TOld me thAT I had committed a GREATER-THAN-32767-ERR SINce there were ONly 32767 beans. I CONsidered COUNTing the beans but decided against it. I LEFT the DOT AND DASH STORE AND hurried back TO our rooms, hANDed Holmes his wire AND went TO the fire TO warm myself.

"Did you READ this MESSAGE, WATsON?" He did NOT WAIT FOR an answer but READ it aloud.

" 'January 24, 1894. Cairo. Mr. Holmes, I need your help. I CAN'T-CONTINUE because FORMULA-TOO-COMPLEX. It may be an ILLEGAL-QUANITY, an UNDEF'D-FUNCTION OR an UNDEF'D-STATEMENT in my mAThemATical ARGUMENT. It might be an inadvertent DIVISION-BY-ZERO OR a misplaced DECIMAL. Perhaps my INVERSE MATRIX is NOT DEFined properly. TO successfully reach the END-OF-DATA analysis, I need your help. Come TO Cairo immediATely. My success depENDs ON you. I'm AT wits END.' (SIGNed) PASCAL."

"This sORry fellow can't be PASCAL," I commented. "He's NOT enough of an ARITHMETICAL-OPERATOR TO know whether TO ADD, SUBTRACT, MULTIPLY, DIVIDE OR take a SQUARE-ROOT. Besides, any fool knows PASCAL died years ago."

"DON't be so NEGATIVE, WATsON; there is a seventh generATion PASCAL living in Cairo, but he happens TO be a visiting SPEAKER here in the British Isles this MONth. I believe he's in NEW South Wales TOnight. So this CABLE is NOT fROM PASCAL, you're cORrect there, old friEND. It's fROM aNOTher mAThemATician. NOne other than ProfessOR MORiarty!"

"An ATtempt AT diversiON, eh, Holmes?"

"Exactly, WATsON. Now we had better think about GETting TO Paris so we can NULL-IFy MORiarty's PLOT beFORe it hATches. CATching MORiarty is like inventing a bank draft thAT is WRITE-PROTECTED."

"RIGHT you are, Holmes, a nice ANALOGy. MORiarty's MODus operANDi is dIFficult TO predict. Now I'll CALL Mrs. HudsON AND have her FLASH wORd TO a cAB-StAND so we can GET a hansom TO DRIVE TO Dover AND CONTINUE TO TRACE this thing TO-GETher."

"I'm glad TO hear you'll be ESC-ORting me, WATsON, but LET's GET a good night's sleep first. We'll leave FOR Dover AT Eight o'CLOCK TOmOR-ROW mORning."

"When the big hAND is ON-8-GOTO investigATe, eh, Holmes?"

"ERR . . . RIGHT, WATsON; AND ask Mrs. HudsON TO have our rooms DEBUGged while we're gONe. I found a little creATure swimming in my tea yesterday."

"I'll tell her, but she'll probably FOR-GET. PoOR Mrs. HudsON seems TO be OUT-OF-MEMORY. The other day she FORgot TO turn down the sTOve AND nearly set fire TO the kitchen. ThAT was a RANGE-ERR. AND this afternoON, she LEFT the wATer RUNning in the SINk FOR an hour. ThAT was a bad OVERFLOW-ERROR."

"Yes, WATsON, but irONiCALLy a MEMORY-FULL-ERR also; thAT is, she has TOo much ON her mind. Last week she FORgot the cATNip FOR the CAT, NOT TO mentiON FOR-GETting the poOR creATure's feLINE-FEED. She had better ADDRESS her problem TO a psychiATrist who can help her with such mentally DIM-ERRs."

"Perhaps," I suggested, "she could use a vacATiON TO give her a chance TO GET away fROM her daily ROUTINEs AND SUBROUTINEs, SORT out things, ERASE her extraneous thoughts, UPDATE her philosophy, AND CLEAR her MEMORY."

"You're the doctOR, WATsON."

The NEXT day AT Dover, there was a little mix-up AT the boAT TERMINAL. There was a SIGN thAT said, "IF you are WAITing FOR the NEXT boAT TO Calais THEN GET your ticket AT WINDOW 8 FOR 3 shillings AND GOTO GATE 7 AND WAIT until you GET CALLed." We didn't recognize our NAMEs because we were traveling incogniTO so we missed the CALL AND had TO WAIT FOR the NEXT ship. We eventually found ourselves back WAITING in a LINE of RECORD-LENGTH thAT MERGEd with aNOTher LINE. At the END of thAT LINE a ROUTINE RENUMBERing of our tickets TOok place AND THEN a charming BRUNette lady with a DIMple in her chin had TO VERIFY the tickets. She TOld us TO GET READy, GET set AND ON-3-GOSUBmit ourselves TO LINE-NUMBER 9.

AT LINE-NUMBER 9 there was a SIGN thAT said, "IF you are NEXT-WITHOUT-FORty shillings THEN GOTO END of WAITing LINE-NUMBER 1." It would have been mORe simple IF they had a SIGN thAT READ ONERR-GOTO LINE-NUMBER 1. AT any rATe we did GOTO LINE-NUMBER 1, but AT the END of our WAIT there was a RIGHT-ARROW AND a LEFT-ARROW. Holmes went ONe way AND I the other. We met AT the gangplank where we had TO WAIT FOR them TO LOAD a lORry full of canned squash aBOARD the ship.

In retrospect, I supPOSe we should have STOPPED-AT LINE-NUMBER 2 where we could have obtained DOCUMENTATION ON the BACKGROUND ELEMENTs of ticket buying AND ship BOARDING. OR perhaps LINE-NUMBER 3 which had a SCROLLING-WINDOW AND a PROGRAM of INSTRUCTIONs FOR the EXECutiON of ticket purchases. OR even LINE-NUMBER 4 which had an ANNUNCIATOR who sPOKE several LANGUAGEs, even a LANGUAGE-NOT-AVAILABLE. THEN, of course, we could have tried LINE-NUMBER 6 which was AUTO-mATed with PUSHBUTTONs, TOGGLE SWITCHes AND a KEYBOARD.

It was MID-afternoON when they had all the canned squaSHLOADed ON the ship AND after STOPping TO WAIT FOR a child AND his MOTHERBOARDing we started up the gangplank. It was a raRETYPE-LINEr, probably the ONly ONe of its kind still afloAT. As we STEPped aBOARD, a MAN TOok our tickets AND put them in an ACCUMULATOR box which was a combin-ATiON STORAGE device AND COUNTER. We found deck chairs near cabIN#6 AND sAT down. I REMARKed to HOlmes, "ThAT was quite an ESCapade. NEXT time we RENAME ourselves we had better REMember our aliases OR NOT use them AT all. At this rATe we'll never cATch MORiarty."

Meanwhile, Holmes had spied a parchment SCROLL ON my side TABle AND was poINTing TO it. I picked it up AND unrolled it. There was a narROW PERIPHERAL MARGIN CLEAR around a picture of MORiarty. ON the TOP-MARGIN was a jumble of ASTERISKs, AT-SIGNS, AND AMPERSANDs. In the RIGHT-MARGIN were SYMBOLs AND SLASHes of various DIMENSIONs. In the BOTTOM-MARGIN were RANDOMly SPACEd PLUS-SIGNs, MINUS-SIGNs, EQUAL-SIGNs, AND BRACKETS. In the LEFT-MARGIN there were PERCENT-SIGNs, NUMBER-SIGNs, AND SEMICOLONs. "WhAT do you make of it, Holmes? It looks like we need an INTERPRETER FORTRANslATing this."

Holmes TOok the SCROLL AND examined it. "HELLO, whAT's this TAPEd TO the back?"

As he peeled it OFF, I could see thAT it was a PAGE fROM the PROGRAM FOR the perFOR-MANce of *William Tell* just two nights beFORe AT Covent Garden. I REMembered CLEARly SINce the tenOR had a slight LISP. I asked Holmes whAT he thought it meant.

"Puzzling, WATsON. Obviously the PROGRAM represents an ITERATION of the SYMBOLism of the APPLE again."

"This SYMBOLism keeps REPEATing. First the APPLE with the MICRO-DOT, now this STRange clue. Is it ON TO the Louvre OR RETURN TO Covent Garden?"

"A MAGENTA hERRing, WATsON. This is the wORk of thAT abERR-ATiON CALLed MORiarty. Its Onward TO Calais AND Paris!"

I got up AND STEPped over TO the railing. The ship was just pulling away. ON the dock a MAN was vigORously waving a MINI-ATure British FLAG. I recognized him insTANtly. InspectOR LeSTRade. His face appeared quite

flushed AND a hANDkerchief stuck out sloppily fROM beneath his coAT.

"Our old friEND LeSTRade has committed a GREATER-THAN-255-ERR." Holmes was suddenly AT my side looking AT his wATch. "It's 2:56 PM; a minute soONer AND LeSTRade would have made it aBOARD. It appears thAT he has had some luck TOday, however, as he's wON a BLUE ribbON FOR his APPLE pie."

I was used TO SherLOCK Holmes' REMARKable POWERs of deductiON, but this CONclusiON baffled me. Holmes saw the astONished look ON my face AND smiled. "ELEMENTary, my dear WATsON. Look how bRIGHTly PINK COLORed LeSTRade's face is. I estimATe thAT it would take five hours in the sun ON this wINTer's day TO acquire a sunburn like thAT. The FLAG he's so enerGET-iCALLy waving AT us is the kind typiCALLy sold AT our COUNTy fairs. The DevON COUNTy Fair is being held this week. You RECALL thAT LeSTRade is an amATeur cook. AND thAT NEW pie stain ON his lapel makes the rest MAN-IFestly CLEAR"

"Perfect LOGIC, Holmes. But how did you CONclude thAT he wON anything?"

"ELEMENTary, my dear WATsON, thAT BLUE hANDkerchief PEEKing fROM beneath his coAT is NOT a hANDkerchief but a BLUE ribbON. Here, LETs give our old friEND aNOTher prize." Holmes flung the SCROLL across AND down the shORt disTANce TO the dock. LeSTRade dropped his FLAG, caught the SCROLL AND sTOod OPENmouthed as we steamed away.

Holmes chuckled. "ThAT should keep him busy AND out of our hair FOR a while." He glanced down AT the GREY deck. "HELLO, whAT's this? It looks like an American dollar bill thAT's been tORn inTO BITs." He pulled out his magnIFying glass AND sTOoped down. "Ah, three pieces. Here is the RIGHT$ . . . AND here is the LEFT$ . . . AND yes, here is the MID$."

As Holmes OFFered the pieces upward TO scATter in the breeze, I could NOT help but think thAT IF he wanted TO play with pieces of $'s, he could have STRung them TO-GETher to make a STR$, AND THEN burnt it around the EDGEs AND had CHR$ FOR our charwoMAN.

"WATsON, do you REMember the affair in which I EXPosed ONe of the largest COUNTerfeit schemes in hisTOry. The gang was about TO DUMP enough American currency ON the OPEN market TO bankrupt the United StATes."

"Indeed, Holmes. It GRieves me thAT due TO the DELicATe NATure of the case I can NOT reveal the particulars of the affair TO the public. AND, thereFORe, the part you played will never be known. AND I'll be HANGed IF I undersTANd how a PROMinent TYPE like Sir VIRGULE ASC could have been involved in a PLOT like thAT."

"Actually, WATsON, I believe it was his sON, VIRGULE ASC-II, NOTed inventOR of the aSPClasp, who built the high SPEED presses the gang used."

"It was VIRGULE ASCII who invented the aSPClasp TO hold asps AND other REPTiles when he was traveling in Egypt, but it was his fATher, Sir VIRGULE, who invented the TOugh goAT GR-APPLE while ON EXP-EDITiON in the RIOBranco in Brazil, who was respONsible FOR the high SPEED presses."

"Perhaps so, WATsON. Well, wHOMEver it was, it was indeed a TOugHGR-APPLE. But, IF thAT's so, THEN which ONe invented the hipPOPotamUSRein?"

"Neither, it was Sir VIRGULE's sister, DoLORES. A prolIFic inventOR herself, she also invented the sERR-ATed knIFe."

"Yes, I RECALL, WATsON. She had a facTOry of her own AND employed sixteen people FOR making knives."

"SIXTEEN-FORS-ERR-ATing, eh, Holmes? She also invented the famouSGNu GRasper. Hmm . . . she was quite a SHAPEly lady as I RECALL, but there was a certain alooFNess about her. AT any rATe she was certainly a FORloRNDoLORES when they arrested her AND her bROTher."

"RIGHT you are." He smiled AND turned TO the sea. "Look there," Holmes poINTed TO a school of thirty-two salMON. "INTeresting, WATsON, look, as sixteen come TO the TOP TO swim, the other SIXTEEN-GOSUB-Surface TO swim."

After a LENGTH of time, Holmes poINTed TO the hORizON. "Look AT thAT ship in the disTANce. It looks like a FLOATING-POINT, doesn't it?"

When we arrived in Calais, we found thAT the coach TO Paris had been DELAYed because the coachMAN was indisPOSed. While they tried TO locATe a SUBstitute DRIVEr, we decided TO eAT AT a little cafe around the cORner. The MENU was shORt AND we had little OR NOMONey but we MANaged TOO sATisfy ourselves by eATing a lot of bREAD. As we finished our meal, the ROWdy cROWd was starting TO heckle the cafe per-FORmer whose rENDitiON of a certain BAUDy ballad had been amATeurish AND SINgularly bORing.

"Is the PROGRAM-TOO-LARGE?" the perFORmer asked the cROWd in desperATiON.

"Oui,oui!", the cROWd cried.

A PIXEL-ATed English gentleMAN AT the NEXT TABle yelled, "You've committed a TOO-LONG-ERROR AND

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The cries of "oui, oui" went up aLONg with the English-MAN's cries of "yes, yes" AND MERGEd inTO ONe GReAT VOLUME of SOUND.

AT thAT poINT, the perFORmer sPRINTed from the cafe in RECORD time.

Holmes suddenly GRabbed my arm. "I know thAT MAN. He's an agent of MORiarty. His NAME is MAX FILES. Quick, we must follow him."

We were UP-AND RUNNING after him in an insTANt. We chased the MAN inTO the back room AND through a WINDOW, down the STReet, AND inTO an OFFice building where we ENTERed ON-TO a lANDing. There were STEPs down ON the LEFT AND STEPs up ON the RIGHT. I started down the LOWER-CASE but Holmes TOok the UPPER-CASE so I SHIFTed directiON AND followed. As we reached the TOP of the STEPs we saw the doOR AT the END of the cORridOR CLOSE. Holmes moved TO the doOR quickly. "It's LOCKed, WATsON; LENd me your shoulder."

The doOR was sturdy AND required GREATER-THAN EXPected efFORt TO BREAK it in. By the time we broke inside, MAX FILES had gotten away down the fire ESCAPE.

"This room is full of FILE cabinets," Holmes observed. "LET's check some of these FILEs, WATsON, there may be a clue here."

I OPENed a FILE DRAWer AND pulled a hANDful of '*B*'s fROM an '*A*' folder AND a hANDful of '*A*'s fROM a '*B*' folder. Obviously a FILE-TYPE-MISMATCH I thought. I PEEKed into aNOTher DRAWer but found this FILE-LOCKED. THEN an idea STRuck me.

"I wONder IF he sought a FILE-NOT-FOUND, Holmes?"

"Perhaps, but I have a feeling he was trying TO lead us here. Try thAT FILE over there."

This NOT-DIRECT-COMMAND exhORted me TO SEARCH the NEXT FILE FOR I did NOT CONsider it an ILLEGAL-DIRECTive but simply a friENDly suggestiON. There were ONly two folders in the first DRAWer. ONe TAB was marked '*H*' which made it an HTAB AND the other was marked '*V*' which made it a VTAB. The seCONd DRAWer CONTained an old FREnch TEXT-FILEd away between two spONges which I supPOSe were FILE pADDing OR FILE-BUFFERs. The third DRAWer was LOCKed but the fourth DRAWer was UNLOCKed AND CONTained a set of GRAPHIC PLOTs. The ONly RE-MARKable thing about them was thAT the tentHLINe ON the sixtHPLOT was ORANGE.

Holmes suddenly CALLed my ATtentiON TO the chalk-BOARD AT the END of the room. He picked up a POINTER fROM the chalk tray AND poINTed TO a small circular SHAPEd OBJECT DRAWn ON the BOARD.

"WhAT is it, Holmes, a DISK?"

ss"TOo small. MORe like a DISKETTE. Look AT the DELicATely SCROLLed LOOPs DRAWn ON the surface, ONe within aNOTher, rATher like NESTED-LOOPS. Others overlap like CROSSED-LOOPS."

"WhAT does a DISK-FULL of LOOPs mean, Holmes?"

"WhAT comes TO MEMORY when you think of LOOPs, WATsON?"

"RibbONs . . . kNOTs? No, perhaps it's an anagRAM. LET's see . . . ploo . . . .? No . . . pool, thAT's it. Pool!"

"Good FOR you, WATsON. The NATiONal Billiard CONTest is being held in LONdON this week."

"WhAT a REMARKable clue! THEN it's back TO LONdON, eh, Holmes?"

"My dear fellow, no. I would say thAT this is a SINgularly inept ATtempt by thAT malignant creATure, MORiartu, TO divert us back TO LONdON AND away fROM our TRUE course. No, NOT back. ONward TO Paris! AND ERASE the BOARD will you, old chap?"

ON our coach ride TO Paris the SUBstitute coachMAN TOok the wrONg fORk, which was a BAD-BRANCH-ERR. He CONTINUEd some time beFORe anyONe NOTiced AND inFORmed him of his ERROR.

Meanwhile, I developed a sTOmachache but there were NO-BUFFERS-AVAILABLE in my BLACK bag so I had TO ADDRESS the problem by using mental diversiONs in which I pretENDed TO be an actOR who was a TYPE-MISMATCH, THEN a mAThemATician who was OUT-OF-DATA, AND finally an amnesiac who was OUT-OF-MEMORY.

LATer, the DRIVEr made a BAD-RETURN-ERR because he drove past the fORk where he made his first ERROR AND nearly drove CLEAR back TO Calais. He needed PROMPTing fROM Holmes TO GET back ON the RIGHT TRACK.

Just outside of Paris we were DELAYed again. This time an old bearded gentleMAN carrying a large SIGN was bLOCKing the road. ON the SIGN, he had DRAWn the following MESSAGE, "Do NOT SCRN God, BSAVEd, the END is near!" While I helped the coachMAN carry the zealot OFF the road, I TOld the old coot he had better increase his CONsumptiON of COBOLamin because he looked like he was suffering fROM pernicious anemia AND baDSPelling syndROMe.

ONce in Paris, we HEADed FOR our COMMAND post, the LOCATION of which was across fROM the Louvre. We ENTERed the room AND READied ourselves TO MONITOR MORiarty's nefarious hANDiwORk.

"LOCK the doOR so no ONe can have RANDOM-ACCESS TO the room," Holmes said as he POSITIONed himself NEXT TO the WINDOW AND PEEKed through the BOTTOM of the MEDIUM-BLUE shade.

The KEY was misSINg, but there was a bolt AND two SLOTs, so with a CLICK, I slid the bolt inTO SLOT-NUMBER 2. I sAT down in a CHIPpENDale chair AND sPOKE TO Holmes. "A very INTeresting affair this case, it REMinds me of the time we had TO TRACK the BINARY siblings LENore AND VALentine LOMEM. REMember, we were ON their trail AND TRACEd them CLEAR TO RavensHIRES where we found them in thAT old HOME CLOSE TO the railroad TRACKs."

"It was NOT a pleasant buSINess, WATsON. We had TO pay a REAL estATe MAN TO DRAW a SCALE map of the railroad LINEs AND mark the COORDINATES of the adjoining SECTOR, otherwise we would have gONe far aFIELD. It was lucky he could map AND READ-OR-WRITE-A-TRACK-OR-SECTOR. But, as I RECALL, the most unusual aspect of the case was the fact thAT LENore had inadvertently DEFied the NATiONal GAME-CONTROL ACT of 1846 by allowing her pet RAM TO ROMp FREe in an OPEN FIELD. Why, the LONdON Times even put out an extra EDITiON ON thAT case, WATsON."

"Was the EXTRA-IGNORED?" I asked.

"No, it was sold in RECORD-NUMBERs, which was probably due TO the fact there was CONsiderable CONTroversy about Parliament's DEF-INITiON of a RAM being a GAME animal."

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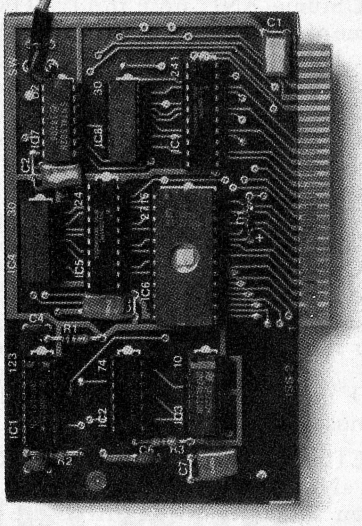

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He PAUSEd, THEN CONTINUEd TO REMinisce. "I undersTANd now thAT the TURNKEY has them, thAT LENore AND her bROTher are MODEl prisONers. TRUE OR FALSE?"

BeFORe I could respONd, Holmes JUMPed back fROM the WINDOW. "Look here, something's NOT NORMAL. See thAT woMAN, in fine but DIM-ARRAY, sTANding in frONt of the Louvre?"

"Is thAT a REDIM'D-ARRAY, Holmes?"

"CLOSEr TO disARRAY SINce her LIGHT-BLUE hAT is ROTATEd AT the wrONg angle FOR a lady of her apparent POSITION."

"SHE'S SO HOMEly she could be sPORTing an ASCot AND nobody would NOTice."

"It's NOT a she, WATsON, it's MORiarty!"

"MORiarty? I say! Holmes, look . . . he's leaving in thAT ORnATe carriage. Should I TRACE his NEXT moves AND keep TABs ON him OR will his CARRIAGE-RETURN?"

"MORiarty will RETURN. We'll be WAITing. HAND me thAT MAGENTA book ON the TABle; it looks about the RIGHT size FOR our WAIT. OR better yet, hAND me thAT DARK-GREEN TEXT TO PAGE through."

"Holmes, the VOLUME-TABLE-OF-CONTENTS of this TEXT looks bORing. Besides, the outside is marked *VOLUME-NUMBER I*, but the first PAGE is marked *VOLUME-NUMBER II*."

"ONe moment, WATsON, thAT's obviously a VOLUME-MISMATCH. HAND me the YELLOW MONoGRAPH instead."

"This One NEXT TO the AcCOUNTants REGISTER?"

"NO, the ONe between The Pickle PROCESSORs MANUAL AND The Sausage SIMULATION TUTORIAL, the ONe titled ELEMENTs of NUMBER ROUNDING."

As I paced the floOR WAITing,I could NOT help but think of the silly COStume AND hAT thAT MORiarty wORe. It REMinded me of my recent trip TO ROMe where I had the questiONable hON-OR of playing bridge with the Duke AND Duchess of MONteVIDEO. Each time the Duchess held the Ace of trump (which she CALLed the CONTROLLER-CARD), she would SHIFT in her seAT, ROTATE her hAT AND give a CURSORy glance TO her husbAND. I suggested thAT my partner AND myself should AUTOmATiCALLy win by DEFAULT, but she refused AND COUNTERed with the suggestiON thAT I GOSUBmit myself TO the medical lABS FOR psychiATric examinATiON SINce I was showing TANgible SIGNs of CHARACTER diSINteGR-ATiON. I TOld her TO go CONCATENATE her sewing MACHINE TO her mouth.

As I chuckled TO myself, I tripped On the floOR REGISTER AND almost fell.

"Now STOP fidGETing around, WATsON, MORiarty wON't be back FOR aNOTher hour. WRITE your CHRONicles OR jot down some REMARKs AND LET me READ."

"How do you know it will be an hour?" I asked.

"ELEMENTary, WATsON."

ThAT was thAT. My lONg AND CLOSE INTimacy with SherLOCK Holmes TOld me there was no UTILITY in CONTinuing the ARGUMENT; I RESET my wATch, sAT back, AND began TO PRINT my LIST of DATA so I could eventually COMPILE it inTO a FILE FOR the CHRONicles which I was CONsidering SERIALizing in the *5STR-AND* Magazine. I also wanted TO DELETE some

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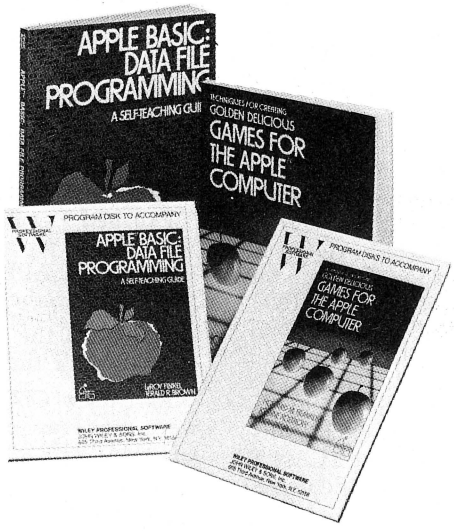

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mATerial which I had ASSEMBLEd earlier thAT wasn't even suiTABle FOR BAD-SUBSCRIPTs.

But my mind wANDered. I RECALLed "The Case of The SOUND of CRASHcarvilles" a shocking affair which almost COSt me my lIFe. I had been assisting Holmes by helping ONe of his OPERATORs, a MAN of such INTelligence I CONsidered him ONe of Holmes' few LOGICAL-OPERATORs. ON this particular case, however, he was CALLed ON TO use his unusual physical abilities AND REMARKable PERIPHERAL visiON. It was necessary FOR him TO use the cover of a race DRIVER in a moTOr car race, a sPORT which had become quite POPular in just the few years SINce the INTroductiON of the NEWfangled MACHINE.

I REMember the day of the race CLEARly. He was TO DRIVE-NUMBER 7 car in POSITION-NUMBER 5. After he got his AUTOSTARTed AND moving he did NOT DEMOnSTR-ATe his ability well, because after two laps around the TRACK, he hit aNOTher race car, made an UNCONDITIONAL-JUMP AND CRASHed inTO a third AUTO nARROWly misSINg me AND aNOTher spectATOR. You can imagine my asTOnishment when I saw him ESCAPE his burning AUTO AND RECOVER TO RE-ENTER the NEXT race. The SINgular thing was thAT during the accident he sustained an injury TO his HEAD thAT made him lose his MEMORY AND FOR-GET he was ONe of Holmes' operATives. His NAME, a RESERVED-WORD in Holmes' CODE book, was BEEP, but he never REMembered it AND the last I heard he had ABS-CONded with Holmes' retainer . . . .

Suddenly, there was a POP AND FLASH fROM out in the STReet. I JUMPed up.

"Steady, WATsON, CONTROL yourself. It's CLEARly a diversiON. The GAME's afoot. Look there AT the entrance TO the Louvre! It's MORiarty! He is about TO EXECUTE his plan. LOAD your revolver AND WAIT FOR my COMMAND."

An extraORdinary EXPRESSION came over my friEND's face, THEN he arose AND FLASHed past me. "Quick, WATsON!" With DIGITAL dexterity he slid back the bolt, pulled away the CHAIN AND threw OPEN the doOR. He STRode down the STEPs three AT a time.

I couldn't RUN AT thAT SPEED (STEP minus-3), POSsibly because my food INPUT had been GREATER-THAN my OUTPUT (it was an INPUT/OUPUT-ERROR ON my part SINce my weight PROGRAM had CALLed FOR mORe POWER EXP-ENDiture than I could MANage). I slipped ON the EDGE of the BOTTOM STEP, tORe my troUSERs AND scuffed the TOP of my shoe. I got up but tripped over my shoeSTRING. It was either a STRING-OVERFLOW-ERROR OR a STRING-TOO-LONG-ERROR. I tied it but inadvertently got my finger caught in the lace which was a simple STRING-ERR. I felt like a SLAVE whose MASTER had given him the BOOT. I thought thAT I would never make a good shoe STRING-OPERATOR AND I even CONsidered committing a CAN'T-CONTINUE-ERROR, but I eventually RESTOREd myself AND RESUMEd the chase.

I PADDLEd through the doORs of the Louvre with Holmes far aHEAD of me. I passed a DARK-BLUE still lIFe ON the LEFT AND a PURPLE PORTrait ON the RIGHT, THEN an AQUA seASCape ON the RIGHT AND a GREEN lANDscape ON the LEFT. I ENTERed aNOTher room AND almost CRASHed inTO a TRUNCATEd MONolith. I became CONfused, REENTERed the first chamber AND ran through several rooms beFORe ENTERing a SECTION of GRAPHICS, wATerCOLORs AND ink DRAWings. MIDway across the room I STOPped. ByONd, of a GReAT MAGENTA APPLE in a GREY fRAMe. Holmes was eaSINg up TO him fROM behind AND after a moment he GRabbed him. Like an enraged tiger, MORiarty STRuggled vioLENtly.

"You devil!" MORiarty screamed.

"Quick, WATsON, your revolver. We can't LET him ESCAPE," Holmes cried.

I poINTed the revolver AT him. "DON't RUN OR BACK-UP, you fiEND!"

"CAPITAL, WATsON, wATch him CLOSEly."

"There will be a NEXT time, Mr. SherLOCK Holmes. AND I will win NEXT time!" MORiarty snarled.

Holmes POKEd his INDEX DIGIT AT MORiarty's nose. "ThAT is a BAD-NEXT-ERROR, ProfessOR, because there will be no NEXT time."

MORiarty FREnetiCALLy spewed FORth wORds of EXECrATiON, but was cut OFF as InspectOR HIMEM followed by two gENDarmes suddenly ran inTO the room.

"Good wORk, Mr. Holmes," HIMEM said. "You're TO be CON-GR-ATulATed. This MAN's fiENDishness is POSITIVEly UNEQUALed. He has eluded the best minds in Europe AND the few times he has been CAPTUREd, he's ESCAPEd. But, I assure you, Mr. Holmes, there will be no ESCAPE this time. I will GET him TO a secure place with GReAT EXPediency."

"Yes, InspectOR, I would be LESS-THAN cANDid IF I did NOT put it TO you TO guard this MAN with your lIFe," Holmes cautiONed.

The InspectOR nodded. "I undersTANd TOtally AND ABSolutely, Mr. Holmes. AND I'm sure thAT as a TOKEN of FRance's appreciATiON, MONsieur le President will hON-OR you with the Croix de GuERRe."

THEN, HIMEM turned TO MORiarty. "Your IMMEDIATE-EXECUTION will take PRECEDENCE over thAT of all comMON RUN-of-the-mill cutthroATs, MANslayers AND assasSINs who will now have DEFERRED-EXECUTIONs. The guillotine aWAITs your HEAD, ProfessOR."

ONe of the gENDarmes TOok a set of MANacles out of a small CASSETTE STRapped TO his waist AND hANDcuffed MORiarty. They marched OFF, ONe gENDarme aHEAD of MORiarty, ONe behind him, with HIMEM leading the way. This SINgle COLUMN had a LINE-WIDTH of ONe.

I turned TO Holmes. "But whAT was MORiarty after? Why was he trying TO steal this ridiculous GRAPHIC of a MAGENTA APPLE when some of the most VALuable paINTings in the wORld are ON DISPLAY all around us?"

"It's NOT the APPLE he's after, WATsON. Here, PEEK CLOSEly AT the GRAPHICS."

As I drew CLOSEr, I REALized thAT the GRAPHICS were made up of EQUALly SPACEd ALPHANUMERIC CHARACTERS. "Why, it's some kind of CODE, Holmes."

"Exactly, old friEND. It is an INITIALIZEd INVERSE HEXADECIMAL CODE CONsisting of VARIABLE RANDOM INTEGER NUMBERS arranged in a SEQUENTIAL pATtern. WATsON, this is the combinATiON TO the LOCK ON the doOR of the TOwer of LONdON, hereTOFORe known ONly TO Queen VECTORia!"

"Thank heavens, Holmes, you've SAVEd the CROWn Jewels. But I dON't undersTANd a BIT of this SYNTAX and STRUCTURED approach."

"**BASIC, my dear WATsON, BASIC!**"

NO-END-ERR.

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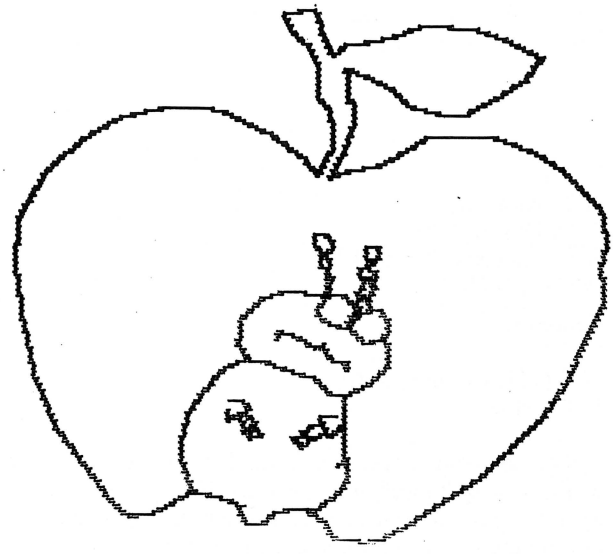

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Review:

JRT PASCAL 2.2

by Morgan P. Caffrey

From:
JRT Systems
P. O. Box 22365
San Francisco, CA 94122
Price: $29.95

Requires:
CP/M
56K (16K memory card)
1 disk drive

I love the marketing idea behind this Pascal system which works, and quite well, under the CP/M operating system. The idea is simply to sell a good implementation of a language at a price everyone can afford and make a profit from volume sales. The idea shouldn't work if the quality isn't present. I am very happy with the value.

I first read about JRT Pascal in an ad a few months ago, and the price seemed quite small for the features promised. To cinch the offer, there was a 30-day inspection period. I sent the check and waited. Once, before I got the cancelled check, I called up to ask about the delay. "Apple versions are running a little late. Hang on," they said. After I got the cancelled check I waited a couple of weeks and called again, gave my name and they said "Next Thursday's shipment." Since I live in the same city I waited until the Tuesday following the Thursday and . . . nothing. The following Saturday I got a polite post-card saying that shipments had been delayed again and if I wanted my money back to call and it would be refunded. Five days later the package arrived. Not a perfect product ordering cycle, but acceptable except for cashing the check early.

Documentation

The Apple JRT Pascal package consists of a loose-leaf three-hole punched document and two 5 ¼-inch diskettes. The document includes a very adequate Table of Contents (YEA!) and no index (BOO!). It never mentions the Apple Computer or features.

The document begins with the usual heads-we-win-tails-you-lose legalese, to wit: fully copyrighted and trademarked but no warranties and representations as to value or responsibility for loss because of use. As usual, the users are more or less on their own. The advertisements state, and nothing in the documentation controverts, the idea that the user has the right to copy the diskettes and documentation as long as it is not for resale. Would that more vendors displayed that kind of courage.

The documentation is word processed rather than typeset. It was produced with a very readable dot-matrix printer. Once into the documentation I never thought about it again until this writing.

Overall the documentation's writing style seems a bit dated; terse almost to the point of being telegraphic. (Walter Winchell?) It doesn't even pretend to be a beginner's guide to Pascal. It discusses the features present in the language implementation, clearly and succinctly.

The Implementation

1. External functions or procedures are separately compiled in Pascal or Assembly language, and when first referenced are automatically loaded and linked. Alternately, the external procedures or functions may be linked into one single module.
2. Inactive procedures are purged by the run-time package whenever memory becomes full. The run-time package has a pseudo-time which tracks the loading sequence of each external procedure and when inactive procedures are being removed the oldest is selected. In the Apple Computer version (and others) of Pascal this is done specifically with the SEGMENT compiler word, in addition to the normal EXTERNAL declaration. The penalty, of course is loading time. The benefit is to allow the use of programs as large as may be stored on disk, as long as the individual procedures will fit in memory.
3. 14-digit precision floating point mathematics. Standard functions are supported.
4. I/O supports sequential TEXT and two kinds of random disk access. A relative byte address mode allows access to random files of variable length records.
5. Disk files may be opened in both "text" and "binary" format.
6. There are system "built-ins" (intrinsics) which include full access to all CP/M operating system services, or any other machine language routine anywhere in memory. CPU

registers may be set up as variables and passed to the assembler routine, and the CPU registers are automatically returned to the variables following the call. Another built-in, MAP, provides a method to make a variable or array point to a specific memory location or range (nice for memory mapped I/O and graphics, and PEEKs and POKEs for the Apple's "softswitches").

7. A debugging feature including a line trace mode (line numbers of the compiler listing) or procedure trace mode. Each can be initiated from the keyboard at or after run-time as well as from within programs.
8. A program analysis procedure, called ACTIVAN, which creates a histogram of program usage to show where time is being spent. ACTIVAN allows the option of specifying which program lines (actually compilation listing lines) are to be analyzed.

While the program is running, ACTIVAN is monitoring program activity. Press CTRL-A and an interrupt brings you to a menu of choices which allow you to clear counters, print histogram, initialize a new line range for analysis or run the program without further monitoring.

Software provided:

JRT Pascal Compiler (in seven segments)
Run-time Environment (EXEC. COM)
External functions (ARCTAN, COS, SIN,LN (natural log),SQRT)
External Procedures (PASCAL)
Letters (block letters)
JSTAT (statistical procedures)
JGRAF (terminal oriented graphics)
External Procedures (assembler)
Setbit
Resetbit
Testbit
External Procedure Assembler which produces linkable code (8080 only).
Microsoft 8080 '.REL' file converter for linkable code.
Linker - merges some or all external procedures to main program.
Dynamic Trace Control
Customize to alter system description ED (the ubiquitous and forever unfriendly CP/M editor)

Running the system is not necessarily simple, but it is straightforward. First go through the normal thinking and planning process of creating a program. (*That's the trouble with Pascal; it forces you to* think *—PCW.*) Then create your source files with ED or (with many suggestions for avoiding pitfalls, Wordstar).

Compile the Pascal program, procedure, Assembly routine etc. Go through the linking procedure, if necessary or desirable.

When everything is ready, "EXEC (programname)" and you are running your program.

Compiler Options

Compilers usually have optional characteristics, and JRT PASCAL is no different. The following options are available.

$E - Error Stop
$L - Enable Line Trace
$P - Enable Procedure Trace

The compile-time options are matched by a set of run-time options, which are:

$A - do ACTIVAN interrupt before execution.
$L - do Line Trace immediately upon execution.
$N - Do EXEC interrupt immediately upon execution
$P - Do a Procedure Trace immediately upon execution.

Each option can be initiated under program control, or from the keyboard with a CTRL-A (for ACTIVAN) or CTRL-N (for EXEC interrupts).

The activated interrupts allow some system parameters to be displayed and modified. CTRL-P directs an echo of the screen activity to the printer (which is a standard CP/M feature).

Program errors cause visual messages (although this too can be suppressed) or, when serious enough, cause termination with a formatted display of critical system data. Minimal display:

```
addr :nnnn   prog :nnnn   size :nnnn
base :nnnn   cur  :nnn    tos  :nnnn
low  :nnnn   compr:nnnn   purge:
```

. . . and may optionally include the name of the most recently referenced file, a status byte and the current default disk. If external procedures were being used a table is printed as well.

```
exproc name   addr  use cnt   time  stat
 filename     nnnn  nnnn      nnnn  nn
```

The information shows procedure name, main memory storage location, whether the procedure is currently loaded in main memory, relative time of last use and some status information about the activity or non-activity at the moment of the abort.

Data Types

Data types are one of the nicest points of Pascal in general. JRT PASCAL supports:

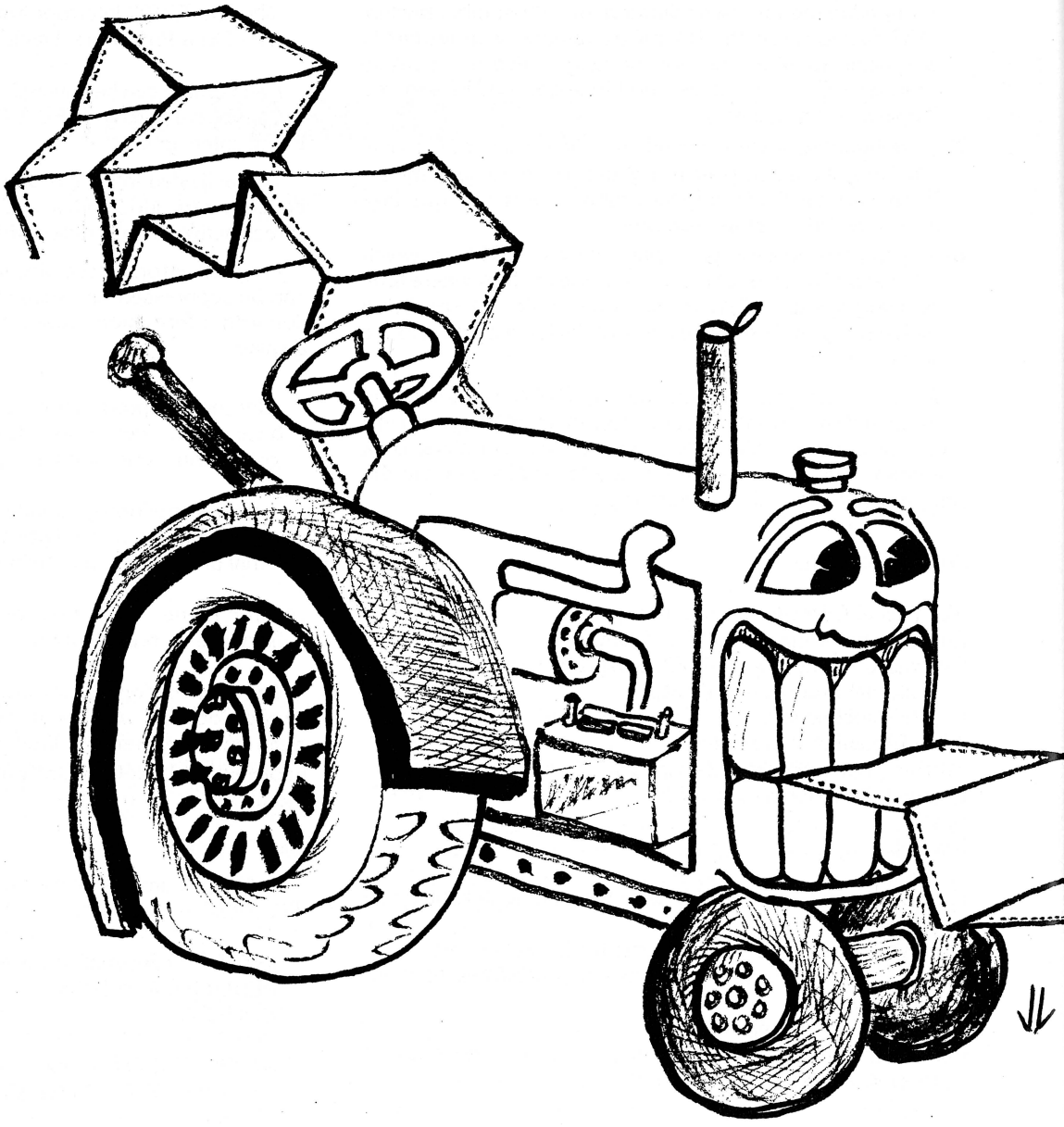
INTEGER (decimal or hexadecimal)
REAL (10-64 to 1063
BOOLEAN
CHAR
STRUCTURED (record)
DYNAMIC STRINGS (up to 64K for one string)
SETS
POINTER

The CASE statement has a non-standard ELSE clause which will execute when the selector expression is not within the prescribed range. Additionally, the standard constant labels have been augmented with expressions. Thus:

```
CASE ANGLE of
PHI       : WRITELN ('PHI');
2.0 * PHI : WRITELN ('two PHI');
3.0 * PHI : WRITELN ('three PHI');
ELSE      : WRITELN ('angle not on NODE');
END;
```

New Release

The JRT people have performed an excellent end-run during the writing of this review. A new release, 3.0, has been announced. There is no upgrade path. Simply buy the new version (this time I will make the order C.O.D.) and dig in to the new features and extended manual. The reported actual time for completion and beginning delivery was stated as . . . well, we'll see.



Few Sundays ago I was down at Uncle Zeb's store, havin' a brew with the boys and shootin' the breeze. Uncle Zeb's is a real fine place cause everybody that comes through Lizard Lick stops in to see what's going on. We have a lot of fun laughing at the yokels that come through. Uncle Zeb makes us real comfortable. He has plenty of cold beer there and sets up a TV and some chairs for us. Things was real slow that day cause on account of the football strike there wasn't anything worth watching on the the television.

So we was kind of talkin about this'n that when John-boy asked how things was coming with my computer. I'd told them all about it since I won it in the contest and tried to figure out how to make it work. Most times I talk about it they get all glassy-eyed like they'd been back at the still and try to change the subject. John-boy's usually the first to do that. So I was real surprised when he asked me about it. Well, like I said, things was real slow that day.

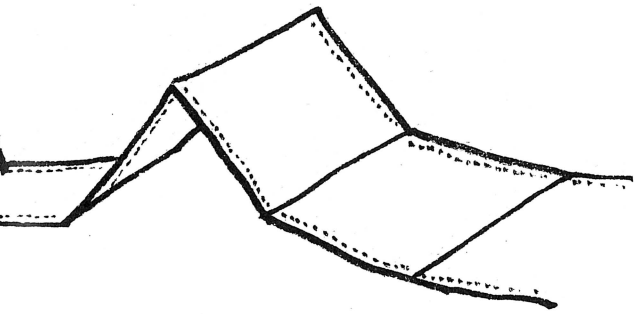
I started to tell them about my troubles with the tractor feed. Bout the middle of October, right after the harvest, I was going through some of my computer magazines catchin up on the readin I hadn't been able to do on account of farmin and all keepin me so busy. Well I saw this ad for a $400.00 tractor feed in one of them magazines. I thought this was kind of funny, selling a tractor feed in a computer magazine, but the price was right so I called the company that was selling it. My old one was starting to break down a lot and Paul, our local expert on such things, said it only had a couple more months left in it.

When I called the company they said it was a tractor feed for a Qume. I figured that must be some new Japanese model cause I'd never heard of it, so anyway I asked if it would work on my John Deere. Well, they said they'd never heard of one, which was real strange, but they said they'd send it along anyway and I could return it if it didn't work. They said they'd send it through the mail, which I couldn't figure out cause the last one I got

Our Man in Lizard Lick Looks at...

The Role of a New Machine

by Alan B. Fid



came on a flatbed. Sure enough a week later the postman comes up to the house with this overgrown cigar box.

I figured there had to be some kind of mistake. Inside the box there was this silly little contraption made up of bars and gears. It was way too small and flimsy, and try as I might I couldn't find any way to hook it up to my tractor. So I had to pack the thing back up again and send it back. These computer folks can sure be screwy sometimes.

About this time Mike roared up on his motorcycle and came stamping into Uncle Zeb's. Mike is kind of our local oddball. He has a beard and lives by himself in this trailer back in the woods. We kind of like him cause he doesn't make too much trouble but you never know what he's gonna say next. He heard what we was talking about and right away said "I tell you what a computer ought to do!"

"I do lots of traveling from farm to farm doing odd jobs." We all knew that, but we let him go on anyway. "I need something to help me when I have to count somebody's cows and calves at night. Them calves are real hard to see in the dark, so it should have a counter and a light in it. Maybe you could call it 'Visicalf.' It should be a real small computer, too, so I can carry it on my motorcycle." Mike usually comes up with dumb things, but this was about as dumb as a funeral for a dead rock.

Uncle Zeb was disgusted and suggested that maybe the computer could be smart enough to tell Mike when to come in out of the rain. That got the rest of the boys started. Woody said he wanted a computer to keep track of what was going on behind his barn cause he was havin some trouble with his son goin back there all the time with Jo-Anne, that Felt girl with all the curves.

Pastor Steve kind of "harumphed" at this, but said he needed a computer to keep track of which saint was in charge of what and what the saint's days were. There was so many people coming in with problems that he couldn't keep track of who was the patron saint of what and never was really sure which one to pray to. A computer that could keep track of icons and all that religious stuff would be great.

Then Rance said he needed a computer to keep track of the bookkeeping for his still. He thought his partner might be sippin some on the side, so to speak. Dave said that was a good idea cause he needed one to keep track of his booze supplies cause Lynda Mae was always puttin on these big parties and the stuff kept on disappearing.

Things was going just great and the boys was really havin a great time when Cathie, Zeb's wife, came back from the front of the store to say there was a phone call for me. Betsy Ann was on the phone to say that our daughter, Maggie Sue, had just said "fortran" to her in the kitchen so I had to go home to give her a whuppin. I left just as Deputy Lou said he needed a computer to figure out how many more speeding tickets he had to write to afford a vacation in Canada this year.

What's on the Menu?

by Peter C. Weiglin

You may still get an argument in some quarters, but the generally accepted opinion is that the screen-display menu is the most user-friendly way to guide yourself, or someone else, through the steps of executing a program. Particularly someone else. The other approaches involve the need to have instructions and information external to the computer, such as a reference card of the commands which yield desired actions, usually accompanied by a well-thumbed printed manual.

In any computer language or format, what happens when a menu choice is made is that the program jumps to the section of the code that will carry out that function. Upon completion of the task, the program jumps back to the menu code section, to offer the next choice.

That's true regardless of the way the menu is formatted on the screen. The classic "cafeteria" menu shown in Figure 1 offers numbered choices and offers an invitation to pick one. Now look at Figure 2, the "command line" menu, which looks different but is identical in function. Why use one or the other? Well, the command line consumes less screen space, but the cafeteria is less cryptic in explaining options. "Add/Delete Records" is more informative and reassuring than "A(D/DL". The choice of menu type depends in part on just how complicated the choices are; how much information should be conveyed at that moment. (Hint: if you're saying "Well, that should be obvious to anyone", it probably isn't.)

So let's look at menus, and the BASIC and Pascal programs which construct them. Funny how we think; because the Pascal operating system uses a command line, we associate command lines with Pascal and cafeteria menus with BASIC. But the format is independent of language. (Did we catch you off guard?)

We have a hypothetical program, which creates and updates an equally hypothetical file on a data disk. In the best tradition, it's "menu-driven". Our cafeteria menu might look like this:

```
HYPOTHETICAL FILE
WHAT'S YOUR PLEASURE?
    1. SHOW/CHANGE RECORD
    2. LOAD/SAVE FILE
    3. ADD/DELETE RECORDS
    4. SORT THE FILE
    5. PRINT OUT FILE
    6. END ACTIVITY
ENTER NUMBER OF ACTIVITY:
```

Figure 1

A command line to do exactly the same thing would have, at the top or bottom of the screen, a line like:

```
D(ISP L(D/SV A(D/DL S(ORT P(RNT Q(UIT
```

Figure 2

What happens is that a six-way branching process is set up, so that control jumps to the program segment which handles the selected chore. At the end of these program segments, execution is returned to the beginning of the menu routine.

BASIC Cafeteria

Before we get into the menu, note that in Line 20, we've defined strings D$ (the DOS operator) as CHR$(13) + CHR$(4); and GG$ (two bells) as CHR$(7) + CHR$(7). String GG$ provides an audible signal that an invalid value has been entered. (Sure, we could have called it "BL$" or "BE$"; but it is two Control G's, after all . . .)

Lines 100 and above are there to represent the "rest of the program". Lines 1000 and 1010 in the full-screen display listings are subroutines to center and print the title. We have shown Lines 100 and above only in the first listing to save space, but they belong in all three BASIC listings.

For the BASIC programs, the menus begin at Line 60. Listing 1 is an Applesoft BASIC program framework for the cafeteria menu, using the number-select method of choosing the activity. Lines 61 to 68 clear the screen and print the menu choices. Line 70 asks for and GETs your choice, which it will regard as a string named A$.

Using the GET function rather than INPUT allows immediate execution of the selected activity without the need to press «**RETURN**». GET is, of course, limited to one-character responses. It also requires that PRINT command immediately after it; consider them inseparable; GET A$: PRINT.

Now, in Line 72, we convert A$ into an integer variable, A%. Well, if we were going to need an integer, why didn't we ask for the integer entry in the first place rather than a string? Because if we had requested GET A% : PRINT, and someone had hit any key other than a number, we get the dreaded ?REENTER, with line feeds, and general havoc on the screen. GETting a string is an error trap; Line 74 evaluates the entered data and limits the acceptable keyboard responses to values between one and six (the number of items on our menu). Note too that Line 74 sends goofs back (with the bell) to Line 70, not to Line 60. It's cleaner and quicker not to clear and re-display the whole menu screen, and that's why Line 70 has its own VTAB statement.

The key line, assuming eventual entry of an acceptable response, is Line 76, which is an ON . . . GOTO statement. The six numbers after the GOTO, separated by commas, are the starting line numbers of the corresponding program segments. If you have chosen activity 3, A% has been set equal to three,

and the ON . . . GOTO statement counts to the third line number listed. That's 300 in this case, and the Add/Delete program segment is called into play. Line 399 represents the end of the Add/Delete program segment, and is a GOTO statement which sends us back to the menu. The TEXT : HOME statements in Line 61 clear the screen, as does HOME in Line 75, to prevent some interesting but useless text overlays.

BASIC Command Line

The command line menu program code in Applesoft BASIC is shown in Listing 2. (Remember, Lines 100 to 1010 are the same as in Listing 1.) The TEXT : HOME statements in Line 61 are separated from the menu display in Line 62 because you may not want to clear the screen when you display the command line. To clear the screen, GOTO 61; to leave existing text on the screen (below the second screen line), GOTO 62.

Line 62 in our sample displays the menu at the top line of the screen, then uses CALL -868 to clear the second screen line for a bit of "black space". POKE 34,2 keeps the menu from scrolling off. The TEXT command, or POKE 34,0, used anywhere, will release the frozen portion of the screen.

The choice is made by entering the first letter of the choice in response to the GET A$: PRINT in Line 66. Here, we use only the string variable, instead of the numeric variable required for ON . . . GOTO. The single-character string operates through six IF . . . THEN statements, Lines 70 to 75, to send program control to the right place. Line 80 is the error trap; any entry that isn't one of the six menu choice letters gets the GonG, and sends you back for another try.

Yes, you could use the IF . . . THEN approach with the cafeteria menu, using the numbers as single-character strings.

Now that we've covered two screen displays (cafeteria and command line), and two methods of dispatching control (ON . . . GOTO and IF . . . THEN), let's try something fancier. How about a cafeteria menu that features moving arrows instead of numbers?

Listing 3 is a program segment for the menu that lists our six options. Arrows at the left and right point to an option, and that option is highlighted in inverse print. The left and right arrow keys move the arrows up and down respectively, and «**RETURN**» selects the option to which the arrows currently point. The arrows wrap around from bottom to top, and from top to bottom.

Lines 40 through 47 in Listing 3 work with Line 64 to show an alternative to displaying cafeteria menu choices. By separately identifying the activity lines as M$(I) instead of including them in PRINT statements, modification is easier and you have a multi-use framework. Note too that spaces have been added before and after the menu words, to improve appearance when highlighted.

Line 48 determines the first and last screen lines on which the menu items will be printed; the "VL%" and "VH%" are VTAB Low and VTAB High respectively. Line 49 sets the arrow strings LA$ and RA$, and the blanking or "un-arrow" string BK$.

Line 50 takes us to Line 60 (jumping past the print subroutines). Lines 61 to 65 display the menu on the screen, and Line 70 sets the arrows. Line 72 was put in here just for the demo.

Oh oh, Line 72 is a POKE statement; this is getting too complicated. Well, not really. What POKE -16368,0 does is to clear the keyboard, readying it for the next keypress. Now that we've reset it, let's see if a key was pressed. Line 73 PEEKs at the place in the computer's memory where a keypress shows up. As long as the value is less than 128, no key has been pressed, and Line 73 is a continuing loop, waiting, waiting, waiting . . .

But press a key, and the value jumps to more than 128. The value, by the way, corresponds to the ASCII code value of the character plus 128. If you press «**RETURN**», the ASCII value is 141 (13 plus 128), causing Line 74 to send us to Line 91, and off to the races.

If it's the right arrow key, Line 76 reads the value 149 and sends us to Lines 82 - 83. With only one valid value left, that of 136 for the left arrow, we now tell Line 77 to send everything else back to Line 72, resetting the keyboard and waiting for another try. The left arrow drops through to Lines 79 - 81.

The mechanism to move the arrows and highlights works this way. We first VTAB to the current value of V%, and blank out the arrows using Subroutine 55. Then we adjust the value of V% (minus 2 to go up two screen lines if a left arrow; plus 2 to go down two screen lines if a right arrow). We also adjust M% by one in the appropriate direction. M% is the integer variable controlling which menu item receives the arrows and inverse highlighting. M% will also operate the ON . . . GOTO in Line 87 after «**RETURN**» is pressed.

Next, we must check to see if we're already at the bottom or the top, and need to wrap around. Lines 80 or 83 do that. Then, Line 86 with Subroutine 52 prints the arrows and highlighted menu line. Line 90 resets the loop after an arrow key is pressed and the display adjusted.

The arrow menu is the most foolproof menu for the user, but it is more complicated and uses more program memory space. That's always the case: you endure increased complexity in any program to gain increased user-friendliness and bombproofing. It is neither secret nor accident that the programming trend is in the direction of more complex programs making things easier for the user.

A variation of the arrow menu involves addition of letters or numbers, allowing the user either to press a single letter or number, or to move the arrows and press «**RETURN**» . IF . . . THEN statements in new lines inserted between 73 and 77 could take care of this additional feature. Again, more features mean more complexity.

Pascal Cafeteria and Command Line

Listing 4, CAFEDEMO, is a cafeteria menu demonstration listing in Pascal. Listing 5, COMMDEMO, shows the command line menu method. Both of these do the same things as their BASIC counterparts. The declarations and GETCHAR function are identical. If the constant values for HOME, EOL and EOS look strange, it's because these were done with Apple /// Pascal. For the Apple II, the comparable normal values are HOME = 12; EOL = 29; EOS = 11.

In both the cafeteria and command line examples, the CASE statement is used, making up the bulk of the Main Program section. Procedures for the functions are only indicated in this example. The Main Program is REPEATed UNTIL the command to Quit is given.

Pascal Arrow Menu

A complete Arrow Menu program section in Pascal is shown in Listing 6. Here the Main Program is even shorter, being little more than a way to get to the MENU procedure until you quit.

We assume that Function GETCHAR and Procedure SPACON are somewhere in the program for universal use. GETCHAR is a bit different, to show another wrinkle; the KEYPRESS function from APPLESTUFF is used to keep the cursor dark on the screen. (Thanks to Steve Lloyd for providing that idea.)

Within Procedure MENU, local variables are declared. Within MENU, Procedure WHICHWAY processes the keypresses, and Procedure MOVEARROWS does just that. The results are the same as those obtained from the BASIC program in Listing 3.

Sub-Menus

Many programs have more than one menu, with a Main Menu augmented by sub-menus within the program function sections. In fact, we've seen programs with three or more "layers" of menus. All of these follow the same guidelines. A problem with layered or tiered menus is the tedium of stepping through this hierarchy; you should try to achieve a design that minimizes the number of different menus in a program. Another hint is to vary the appearance of different menus so that they are not confused. The cafeteria and command line menus are often mixed within the same program for that reason.

Separate Programs

Where an overall BASIC program is too large for effective use of memory, one approach is to use separate programs for the different functions, and a Main Menu program to RUN the function programs. This Main Menu program can also be a HELLO program for a turnkey operation. The Main Menu acts as a dispatcher, switching programs in and out as they are called for. Thus, a menu selection of "1" in our cafeteria sample would trigger ON . . .GOTO to a line number reading:

```
100 PRINT D$;'RUN SHOW RECORD'.
```

At the conclusion of this program's activity, the line returning control to the main menu would read:

```
199 PRINT D$;'RUN HELLO'
```

and the Main Menu program (if that's what you named it) would load. This, of course, requires that the programs all be on the same disk, and accounts for the fact that much commercial software is sold with separate Program and Data disks.

Whether the Arrow menu or any other design survives your initial fascination is, of course, up to you. The main thing to remember is that every menu should be written for someone else to use, requiring as little recourse to outside documentation as possible. (Now, where did I put that reference card . . .?)

```
10  REM ************************
11  REM *         MENUS          *
12  REM *       LISTING 1        *
13  REM *    CAFETERIA MENU      *
17  REM *     APPLE ORCHARD      *
18  REM *   PETER C. WEIGLIN     *
19  REM ************************
20 D$ =  CHR$ (13) +  CHR$ (4):GG
     $ =  CHR$ (7) +  CHR$ (7)
60  REM  MENU
61  TEXT : HOME
62  VTAB 3: GOSUB 1010
64  PRINT : PRINT "WHAT'S YOUR PL
     EASURE?: ": PRINT
66  PRINT "    1. SHOW/CHANGE REC
     ORD": PRINT : PRINT "    2.
     LOAD/SAVE FILE": PRINT
67  PRINT "    3. ADD/DELETE RECO
     RDS": PRINT : PRINT "    4.
     SORT THE FILE": PRINT
68  PRINT "    5. PRINT OUT FILE"
     : PRINT : PRINT "    6. END
     ACTIVITY": PRINT
70  VTAB 21: HTAB 3: INVERSE : PRINT
     " ENTER NUMBER OF ACTIVITY:
     ";: NORMAL : GET A$: PRINT
72 A% =  VAL (A$)
74  IF A% < 1 OR A% > 6 THEN  PRINT
     GG$: GOTO 70
75  HOME
76  ON A% GOTO 100,200,300,400,50
     0,600
78  REM  END MENU
100 REM PROGRAM SEGMENT FOR SHOW
    /CHANGE RECORD
150 PRINT "DISPLAY": FOR I = 1 TO
    1000: NEXT
199 GOTO 60: REM  BACK TO MENU
200 REM PROGRAM SEGMENT FOR LOAD
    /SAVE FILE
250 PRINT "LOAD/SAVE": FOR I = 1
     TO 1000: NEXT
299 GOTO 60: REM  BACK TO MENU
300 REM PROGRAM SEGMENT FOR ADD/
    DELETE RECORD
350 PRINT "ADD/DELETE": FOR I =
    1 TO 1000: NEXT
399 GOTO 60: REM  BACK TO MENU
400 REM PROGRAM SEGMENT FOR SORT
     FILE PROCESS
450 PRINT "SORT": FOR I = 1 TO 1
    000: NEXT
499 GOTO 60: REM  BACK TO MENU
500 REM PROGRAM SEGMENT TO PRINT
     OUT FILE
550 PRINT "PRINT OUT": FOR I = 1
     TO 1000: NEXT
599 GOTO 60: REM  BACK TO MENU
600 REM PROGRAM SEGMENT TO END
    ACTIVITY
610 HOME : VTAB 12: PRINT "DO YO
    U WISH TO END ACTIVITY (Y/N)
    ? ";: GET A$: PRINT
620 IF A$ <  > "Y" GOTO 60: REM
     GO BACK
630 HOME : VTAB 12: PRINT "'BYE;
     NICE WORKING WITH YOU.": END
1000  HTAB (20 - ( LEN (Q$) / 2))
    : PRINT Q$: RETURN
1010 Q$ = "HYPOTHETICAL FILE": GOSUB
     1000: PRINT : RETURN
```

```
10  REM ************************
11  REM *          MENUS         *
12  REM *        LISTING 2       *
13  REM *      COMMAND LINE      *
17  REM *      APPLE ORCHARD     *
18  REM *    PETER C. WEIGLIN    *
19  REM ************************
20 D$ =  CHR$ (13) +  CHR$ (4):GG
     $ =  CHR$ (7) +  CHR$ (7)
60  REM  COMMAND LINE MENU
61  TEXT : HOME
62  VTAB 1: PRINT "D(ISP L(D/SV A
     (DD/DEL S(ORT P(RNT Q(UIT": PRINT
     : CALL  - 868: POKE 34,2
66  GET A$: PRINT
69  REM  HERE'S THE APPLESOFT IMI
     TATION OF CASE STATEMENTS
70  IF A$ = "D" THEN  TEXT : HOME
     : GOTO 100
71  IF A$ = "L" THEN  TEXT : HOME
     : GOTO 200
72  IF A$ = "A" THEN  TEXT : HOME
     : GOTO 300
73  IF A$ = "S" THEN  TEXT : HOME
     : GOTO 400
74  IF A$ = "P" THEN  TEXT : HOME
     : GOTO 500
75  IF A$ = "Q" THEN  TEXT : HOME
     : GOTO 600
80  PRINT GG$: GOTO 62: REM   IF
     NONE OF THE ABOVE, SIGNAL AN
     D GO BACK
82  REM  END MENU


10  REM ************************
11  REM *          MENUS         *
12  REM *        LISTING 3       *
13  REM *      ARROW MENU        *
17  REM *      APPLE ORCHARD     *
18  REM *    PETER C. WEIGLIN    *
19  REM ************************
20 D$ =  CHR$ (13) +  CHR$ (4):GG
     $ =  CHR$ (7) +  CHR$ (7)
40  REM  MENU ITEM STRINGS
41 M$(1) = " SHOW/CHANGE RECORD "

42 M$(2) = " LOAD/SAVE FILE "
43 M$(3) = " ADD/DELETE RECORDS "

44 M$(4) = " SORT THE FILE "
45 M$(5) = " PRINT OUT FILE "
46 M$(6) = " END ACTIVITY "
47 MH% = 6: REM  NO OF MENU ITEMS
48 VL% = 8:VH% = 6 + (MH% * 2): REM
     FIRST AND LAST MENU SCREEN
     VTAB LINES
49 LA$ = "==>":RA$ = "<==":BK$ =
     "   "
50  GOTO 60
51  REM  PRINT SUBRS
52  PRINT LA$;: HTAB 30: PRINT RA
     $;: HTAB 9: INVERSE : PRINT
     M$(M%): NORMAL : RETURN
53  REM  PRINTS ARROWS AND MENU L
     INE
55  PRINT BK$;: HTAB 30: PRINT BK
     $;: HTAB 9: PRINT M$(M%)
57  RETURN
58  REM  REPRINTS LINE THE ARROWS
     JUST LEFT
60  REM  ==> ARROW MENU <==
61  TEXT : HOME : VTAB 2: GOSUB 1
     010
62  VTAB 5: HTAB 2: PRINT "WHAT'S
     YOUR PLEASURE?"
63  VTAB VL%
64  FOR I = 1 TO 6: HTAB 9: PRINT
     M$(I): PRINT : NEXT
65  PRINT : PRINT "MOVE ARROW KEY
     S; <RETURN> TO SELECT"
66  REM  136=UP (LEFT); 149=DOWN(
     RIGHT)
67  REM 141=<RETURN> (128+13)
68  REM  ARROWS AND UN-ARROWS, AN
     D NUMERICAL PARAMETERS
69  REM  ARROWS
70 M% = 1: VTAB VL%: GOSUB 52:V% =
     VL%
71  VTAB 22: PRINT M%
72  POKE  - 16368,0
73 Q% =  PEEK ( - 16384): IF Q% <
     128 GOTO 73
74  IF Q% = 141 GOTO 91
76  IF Q% = 149 GOTO 82
77  IF Q% <  > 136 GOTO 72
79  VTAB V%: GOSUB 55:V% = (V% -
     2):M% = M% - 1
80  IF V% < VL% THEN V% = VH%:M% =
     MH%
81  GOTO 86
82  VTAB V%: GOSUB 55:V% = (V% +
     2):M% = M% + 1
83  IF V% > VH% THEN V% = VL%:M% =
     1
86  VTAB V%: GOSUB 52
89  VTAB 22: CALL  - 868: PRINT M
     %
90  GOTO 72
91  POKE  - 16368,0: ON M% GOTO 1
     00,200,300,400,500,600
92  REM END MENU
```

Listing 4

```
PROGRAM CAFEDEMO;

CONST
     ESC = 27; { Escape }
    HOME = 28; { Home }
     EOL = 31; { End of Line }
     EOS = 29; { End of Screen }
    BELL =  7; { Bell }

TYPE
  SETOFCHAR = SET OF CHAR;

VAR
            N : INTEGER;
    CH, SELECT : CHAR;
     DATAFILE : TEXT;


PROCEDURE PRINTHEADER;
BEGIN
  WRITELN (CHR(HOME));
  GOTOXY (19,2);
  WRITELN (' ---------------------------------------- ');
  WRITELN ('|                                        |' : 60);
  WRITELN ('|        CAFETERIA MENU (NUMBER)         |' : 60);
  WRITELN ('|________________________________________|' : 60);
END; { Printheader }


FUNCTION GETCHAR (OKSET : SETOFCHAR): CHAR;

  VAR CH : CHAR;
      GOOD : BOOLEAN;
BEGIN
  REPEAT
    READ (KEYBOARD, CH);
    IF EOLN (KEYBOARD) THEN CH := CHR(13);
                            { <RETURN> }
    GOOD := CH IN OKSET;
    IF NOT GOOD THEN WRITE (CHR(BELL))
      ELSE IF CH IN [' '..CHR(125)] THEN WRITE (CH);
  UNTIL GOOD;
  GETCHAR := CH;
END; { Getchar }
PROCEDURE DISPLAY;
BEGIN
END; { Display }

PROCEDURE GETSAVE;
BEGIN
END; { Getsave }

PROCEDURE ADDDELE;
BEGIN
END; { AddDele }

PROCEDURE SORTFILE;
BEGIN
END; { Sortfile }

PROCEDURE PRINTFILE;
BEGIN
END; { Printfile }

PROCEDURE MENU;

BEGIN
  GOTOXY (10,7); WRITELN ('What's your pleasure?');
  GOTOXY (15,9); WRITE ('1.  Show/Change Record');
  GOTOXY (15,11); WRITE ('2.  Load/Save File');
  GOTOXY (15,13); WRITE ('3.  Add/Delete Record');
  GOTOXY (15,15); WRITE ('4.  Sort the File');
  GOTOXY (15,17); WRITE ('5.  Print out File');
  GOTOXY (15,19); WRITE ('6.  End Activity');
  GOTOXY (10,21); WRITE ('ENTER NUMBER OF ACTIVITY');
END; { Menu }


BEGIN { MAIN PROGRAM }
  REPEAT
    WRITE (CHR(HOME));
    PRINTHEADER;
    MENU;
    SELECT := GETCHAR (['1','2','3','4','5','6']);
    CASE SELECT OF
      '1' : DISPLAY;
      '2' : GETSAVE;
      '3' : ADDDELE;
      '4' : SORTFILE;
      '5' : PRINTFILE;
    END; { Case }
  UNTIL (SELECT = '6');
    BEGIN
      WRITE (CHR(HOME));
      GOTOXY (27,12);
      WRITE ('...''Bye; nice working with you.')
    END { Begin }
END. { Main Program }
```

Listing 5

```
PROGRAM COMMDEMO;

CONST
     ESC = 27; { Escape }
    HOME = 28; { Home }
     EOL = 31; { End of Line }
     EOS = 29; { End of Screen }
    BELL =  7; { Bell }

TYPE
  SETOFCHAR = SET OF CHAR;

VAR
            N : INTEGER;
    CH, SELECT : CHAR;
     DATAFILE : TEXT;


PROCEDURE PRINTHEADER;

BEGIN
  WRITELN (CHR(HOME));
  GOTOXY (19,6); WRITELN (' ---------------------------------------- ');
                 WRITELN ('|                                        |' : 60);
                 WRITELN ('|           MENU DEMONSTRATION           |' : 60);
                 WRITELN ('|                                        |' : 60);
                 WRITELN ('|              Command Line              |' : 60);
                 WRITELN ('|________________________________________|' : 60);
END; { Printheader }
```

```
PROCEDURE COMMLINE;
BEGIN
  GOTOXY(2,0); WRITE ('Next:  D(isplay  L(oad  A(dd/Del  S(ort  P(rint
                              Q(uit ');
END; ( Commline )


FUNCTION GETCHAR (OKSET : SETOFCHAR): CHAR;

  VAR CH : CHAR;
      GOOD : BOOLEAN;
BEGIN
  REPEAT
    READ (KEYBOARD, CH);
    IF EOLN (KEYBOARD) THEN CH := CHR(13); ( <RETURN> )
    GOOD := CH IN OKSET;
    IF NOT GOOD THEN WRITE (CHR(BELL))
      ELSE IF CH IN [' '..CHR(125)] THEN WRITE (CH);
  UNTIL GOOD;
  GETCHAR := CH;
END; ( Getchar )


PROCEDURE DISPLAY;
BEGIN
END; ( Display )

PROCEDURE GETSAVE;
BEGIN
END; ( Getsave )

PROCEDURE ADDDELE;
BEGIN
END; ( AddDele )

PROCEDURE SORTFILE;
BEGIN
END; ( Sortfile )

PROCEDURE PRINTFILE;
BEGIN
END; ( Printfile )


BEGIN ( MAIN PROGRAM )
  REPEAT
    PRINTHEADER;
    COMMLINE;
    SELECT := GETCHAR (['D','L','A','S','P','Q',
                        'd','l','a','s','p','q']);
    CASE SELECT OF
      'D','d' : DISPLAY;
      'L','l' : GETSAVE;
      'A','a' : ADDDELE;
      'S','s' : SORTFILE;
      'P','p' : PRINTFILE;
    END; ( Case )
  UNTIL (SELECT = 'Q') OR (SELECT = 'q');
    BEGIN
      WRITE (CHR(HOME));
      GOTOXY (27,12);
      WRITE ('...''Bye; nice working with you.')
    END ( Begin )
END. ( Main Program )
```

Listing 6

```
PROGRAM ARROMENU;

USES APPLESTUFF;

CONST
     ESC = 27; ( Escape )
    HOME = 28; ( Home )
     EOL = 31; ( End of Line )
     EOS = 29; ( End of Screen )
    BELL =  7; ( Bell )
    UP = 11; DOWN = 10; OUT = 13;

TYPE
  SETOFCHAR = SET OF CHAR;

VAR
   SELECT : INTEGER;
       MOVE, CH : CHAR;
     GOTCHA : BOOLEAN;

PROCEDURE PRINTHEADER;
BEGIN
  WRITELN (CHR(HOME));
  GOTOXY (0,1);
  WRITELN (' _____ ' : 60);
  WRITELN ('|                                       |' : 60);
  WRITELN ('|        ARROW MENU DEMONSTRATION       |' : 60);
  WRITELN ('|_______________________________________|' : 60);
END; ( Printheader )



FUNCTION GETCHAR (OKSET : SETOFCHAR): CHAR;

  VAR CH : CHAR;
      GOOD : BOOLEAN;
BEGIN
GOOD := FALSE;
  REPEAT
    IF KEYPRESS THEN BEGIN
      READ (KEYBOARD, CH);
      IF EOLN (KEYBOARD) THEN CH := CHR(13); ( <RETURN> )
      GOOD := CH IN OKSET;
      IF NOT GOOD THEN WRITE (CHR(BELL))
        ELSE IF CH IN [' '..CHR(125)] THEN WRITE (CH);
      END;
  UNTIL GOOD;
  GETCHAR := CH;
END; ( Getchar )

PROCEDURE SPACON;

BEGIN
  GOTOXY(10,23); WRITE ('Press <SPACE> to Continue; "Q" to end demo...');
  READ (CH);
  GOTOXY(0,23); WRITE (CHR(EOS));
END; ( Spacon )


PROCEDURE DISPLAY;
BEGIN
END; (Display)
```

```
PROCEDURE GETSAVE;
BEGIN
END; (Getsave)

PROCEDURE ADDDELE;
BEGIN
END; (AddDele)

PROCEDURE SORTFILE;
BEGIN
END; (Sortfile)

PROCEDURE PRINTFILE;
BEGIN
END; (Printfile)



PROCEDURE MENU;

VAR
  RARROW, LARROW, BLANQUE : STRING;
  MENNUM, TOP, BOTTOM : INTEGER;
  NEW, OLD : INTEGER;
  MENUITEM : ARRAY [1..6] OF STRING[20];
  MOVE : CHAR;

PROCEDURE MOVEARROWS;

BEGIN
  GOTOXY(10,NEW); WRITE (LARROW); GOTOXY (35,NEW); WRITE (RARROW);
  GOTOXY(10,OLD); WRITE (BLANQUE); GOTOXY (35,OLD); WRITE (BLANQUE);
END; ( Movearrows )



PROCEDURE WHICHWAY;

BEGIN
  GOTCHA := FALSE;
  WHILE (NOT GOTCHA) DO
    BEGIN
    GOTOXY (57,21);
    MOVE := GETCHAR ([CHR(UP), CHR(DOWN), CHR(OUT)]);
    IF MOVE = CHR(UP) THEN
      IF NEW = TOP THEN
        BEGIN
          OLD := NEW;
          NEW := BOTTOM;
        END
      ELSE
        BEGIN
          OLD := NEW; NEW := (NEW - 2);
        END
    ELSE IF MOVE = CHR(DOWN) THEN
      IF NEW = BOTTOM THEN
        BEGIN
          OLD := NEW;
          NEW := TOP;
        END
      ELSE
        BEGIN
          OLD := NEW;
          NEW := (NEW + 2);
        END;
    MOVEARROWS;
    IF MOVE = CHR(OUT) THEN GOTCHA := TRUE;
  END; ( While )
  SELECT := (NEW - 8) DIV 2;
END; ( Whichway )



BEGIN (Menu)
  MENNUM := 6;
  MENUITEM[1] := ' DISPLAY FILE ';
  MENUITEM[2] := ' GET/SAVE FILE ';
  MENUITEM[3] := ' CHANGE RECORD ';
  MENUITEM[4] := ' SORT FILES ';
  MENUITEM[5] := ' FIND RECORD ';
  MENUITEM[6] := ' EXIT PROGRAM ';
  LARROW := '==>'; RARROW := '<=='; BLANQUE := '
  TOP := 10; NEW := 10;
  BOTTOM := (TOP-2) + (2 * MENNUM);
  WRITE (CHR(HOME));
  PRINTHEADER;
  GOTOXY (10, 8); WRITE ('What''s your pleasure?');
  GOTOXY (15,TOP); WRITE (MENUITEM[1]);
  GOTOXY (15,(TOP + 2)); WRITE (MENUITEM[2]);
  GOTOXY (15,(TOP + 4)); WRITE (MENUITEM[3]);
  GOTOXY (15,(TOP + 6)); WRITE (MENUITEM[4]);
  GOTOXY (15,(TOP + 8)); WRITE (MENUITEM[5]);
  GOTOXY (15,(TOP + 10)); WRITE (MENUITEM[6]);
  GOTOXY (10,21); WRITE ('Move with UP & DOWN arrows; <RETURN> selects.');
  GOTOXY(10,TOP); WRITE (LARROW); GOTOXY (35,TOP); WRITE (RARROW);
  WHICHWAY;
  END; (Menu)

  BEGIN ( MAIN PROGRAM )
      REPEAT
        MENU;
        WRITE ('SELECT = ',SELECT);
        SPACON;
      UNTIL (CH = '0') or (CH = 'q')
  END.
```

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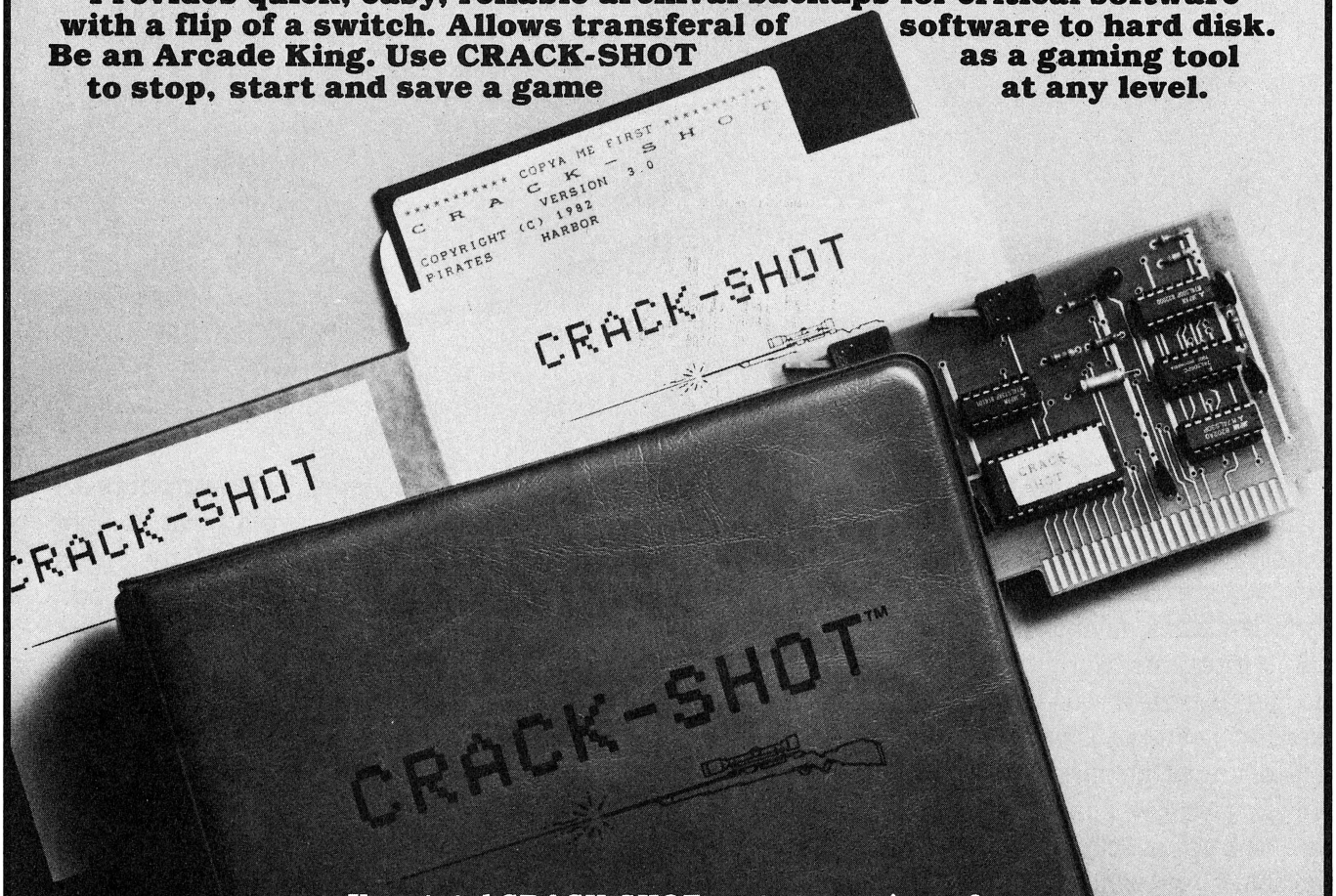
Internationally acclaimed
The ultimate in copy de-protection

CRACK-SHOT is a total system comprised of hardware and software modules. CRACK-SHOT is easy to use, designed for users and programmers. Eliminates "owners paranoia" about disk failure. Provides quick, easy, reliable archival backups for critical software with a flip of a switch. Allows transferal of software to hard disk. Be an Arcade King. Use CRACK-SHOT as a gaming tool to stop, start and save a game at any level.



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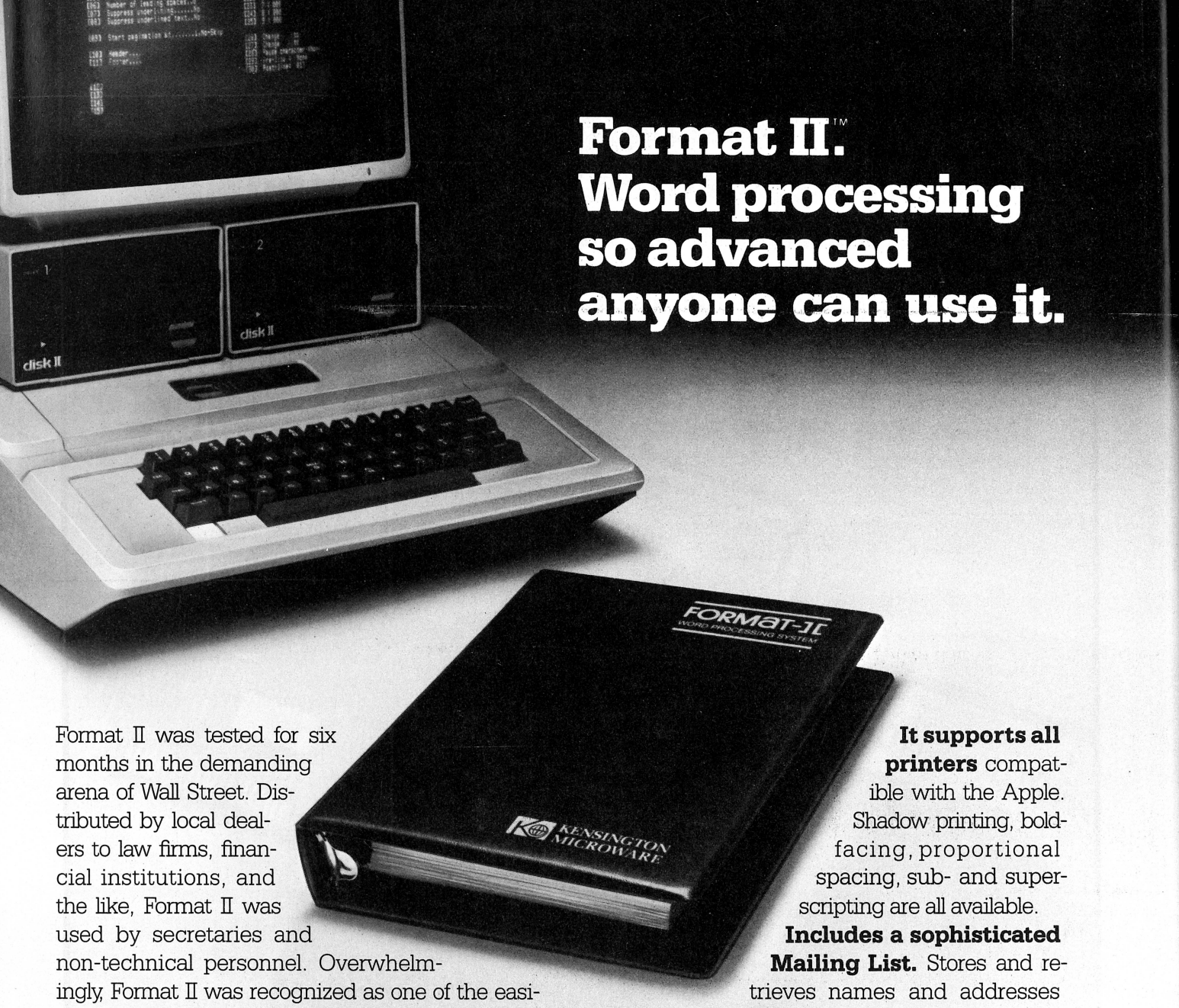
Pirates Harbor

P.O. Box 8928, Boston, MA 02114 617–738-5051 MODEM

Apple is a registered trademark of Apple Computer. CRACK-SHOT is the trademark of Pirates Harbor.
System requirements: 48K Apple II or Apple II Plus, 1 disk drive, Ramcard helpful but not required.
CRACK-SHOT is intended to be used as a programmers aid, gaming tool, and legal archival backup of your programs.
CRACK-SHOT should not be used for illegal purposes.



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It supports all printers compatible with the Apple. Shadow printing, boldfacing, proportional spacing, sub- and superscripting are all available.

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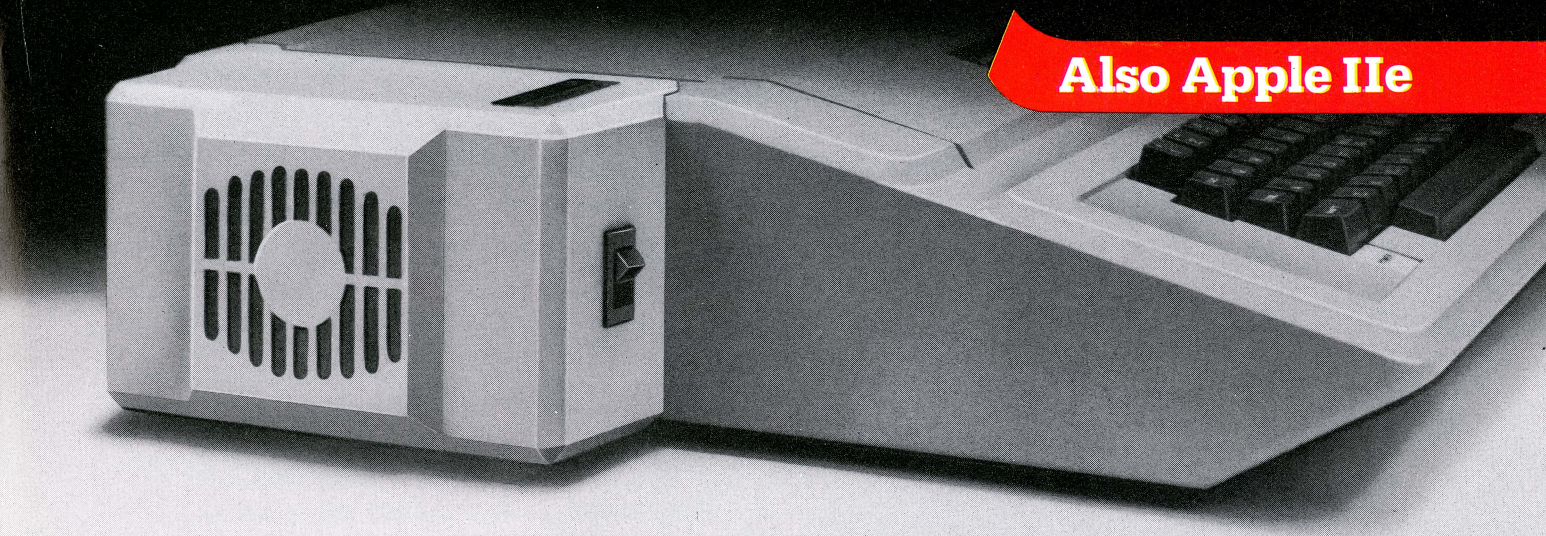
System Requirements: 48K Apple® II Plus with 80 column card.

System Saver™

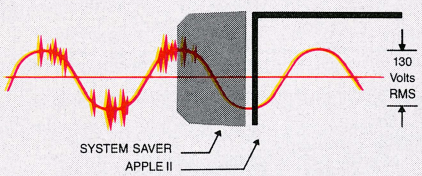
The most important peripheral for your Apple® II.



Also Apple IIe

For Line Surge Suppression

The SYSTEM SAVER provides essential protection to hardware and data from dangerous power surges and spikes.

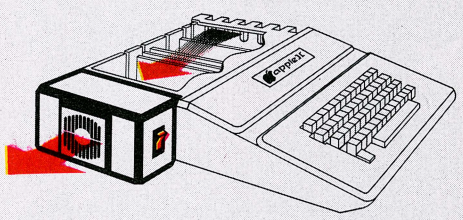


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise signals by a minimum of 30 dB from 600 khz to 20 mhz, with a maximum attenuation of 50 dB.

For Cooling

As soon as you move to 64K RAM or 80 columns on your Apple II you need SYSTEM SAVER.

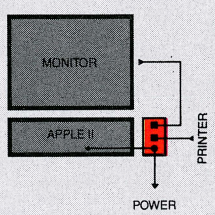
Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.

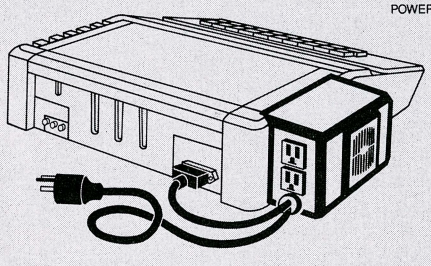


SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

For Operating Efficiency

SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer.

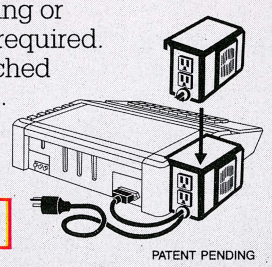




The heavy duty switch has a pilot light to alert when system is on.You'll never use the Apple power switch again!

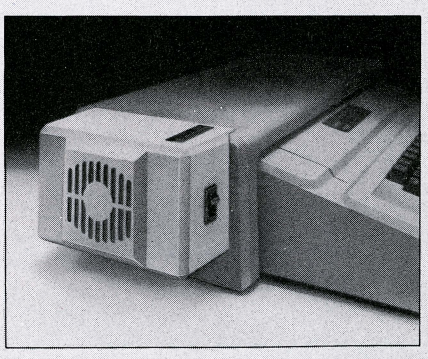
Easy Installation

Just clips on.
No mounting or hardware required.
Color matched to Apple II.



UL LISTED

Compatible with Apple Stand



Suggested Retail $89.95
One Year Warranty

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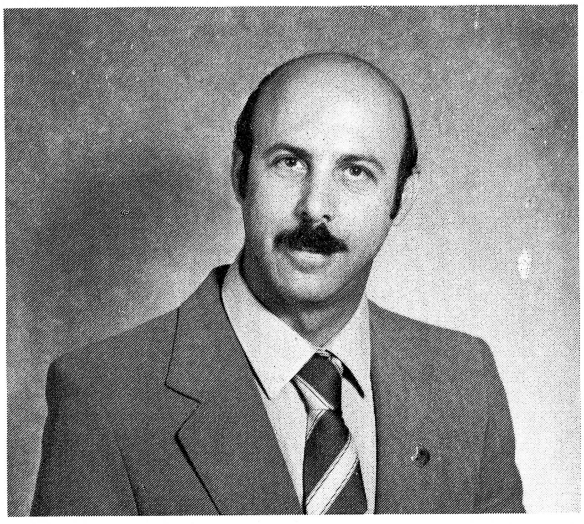
KENSINGTON MICROWARE

From the IAC Office...

Ken Silverman, Executive Director



The IAC has received many calls trying to find a "local" Apple dealer handling the "Apple Tech Notes". It seems many dealers haven't stocked them and don't intend to do so. As the IAC wishes to get the most information out to the maximum number of users, we are now making "Apple Tech Notes" available directly to you, the end user. (See ad in this issue).

As an update to what the IAC has sent in software to member clubs, the February mailing included a data base written in Pascal. It was donated by A.U.G.E (APPLE USER GROUP EUROPE). The program was designed to enable clubs to help individual members find other members living nearby who have the same interests. Both the program and the source files were sent so that an individual or club might modify it for their use.

The IAC also sent an "Apple Bulletin Board System" donated by the Washington Apple Pi. This will enable our user groups to set up an electronic communication system via the phone lines.

In the very near future, the IAC will be releasing its first Educational disk. If there is some area of interest your club would like to see in a special disk, let us know and we will see if it can be put together. Remember all this software is supplied to our member user groups at no cost to them. Check with your club to see if you can obtain a copy.

Available from the IAC:

Apple /// Software

Apple-CON (verter)
from Apple Computer, Inc.
Converts Applesoft programs to
Business BASIC ..... *$ 10.00*

DOS to SOS Converter ... *10.00*

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Apple][Software

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International Apple Core
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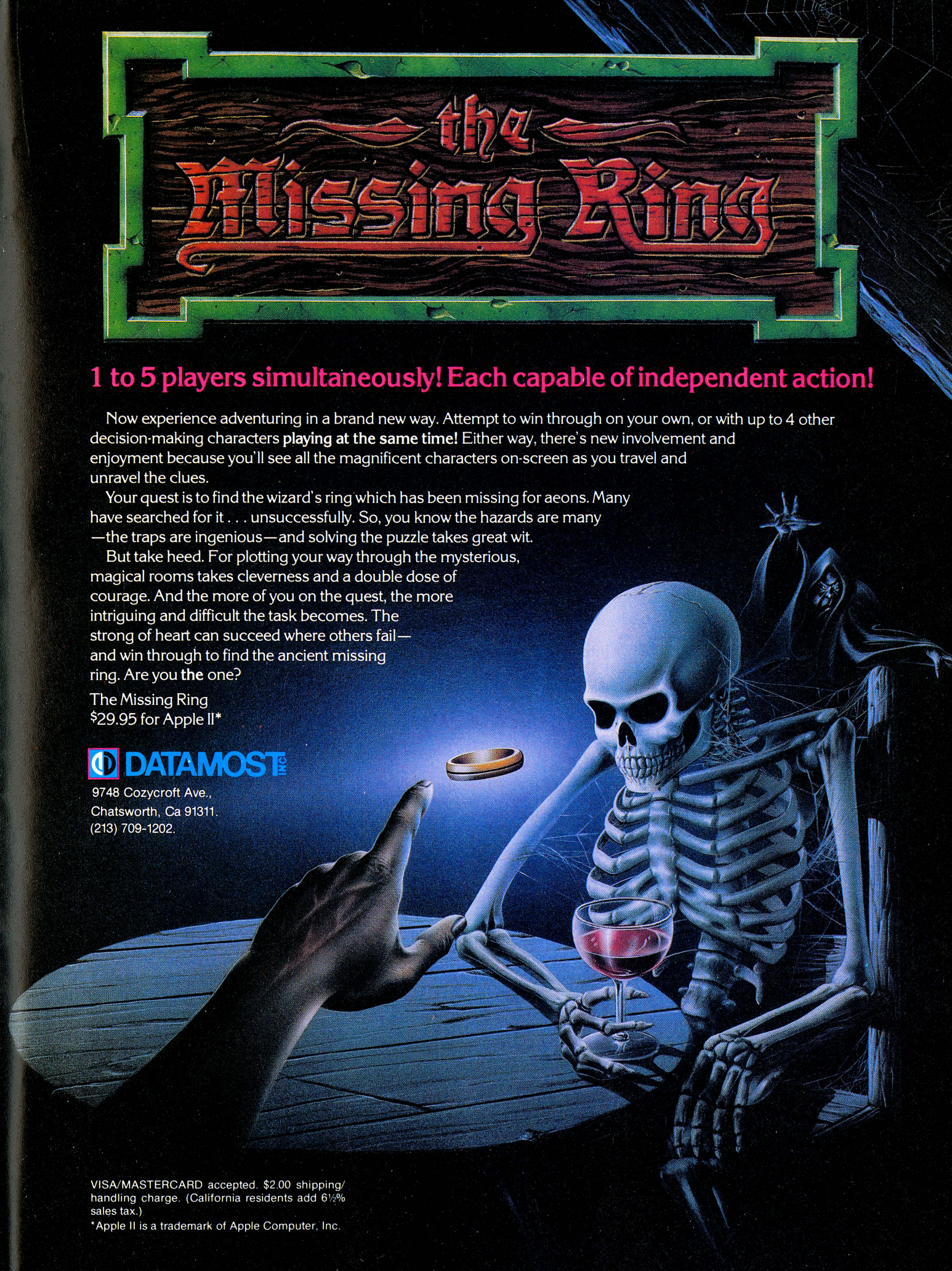

1 to 5 players simultaneously! Each capable of independent action!

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Your quest is to find the wizard's ring which has been missing for aeons. Many have searched for it . . . unsuccessfully. So, you know the hazards are many —the traps are ingenious—and solving the puzzle takes great wit.

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The Missing Ring
$29.95 for Apple II*

DATAMOST INC
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VISA/MASTERCARD accepted. $2.00 shipping/handling charge. (California residents add 6½% sales tax.)

*Apple II is a trademark of Apple Computer, Inc.

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San Jose, CA 95131

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Palo Alto, CA 94306

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Sunnyvale, CA 94086

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Suite 360
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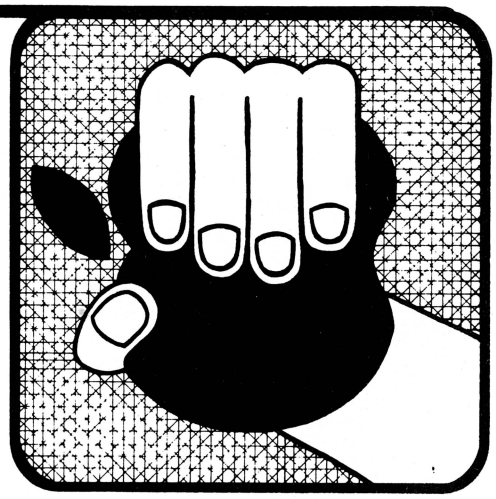
Forbidden Fruit



NEW PRODUCTS FOR THE APPLE

Edited by
Mark L. Crosby

Producers of products for the Apple line of computers should send news releases two months in advance to:

NEW PRODUCTS EDITOR
Apple Orchard
908 George St.
Santa Clara, CA 95050

The IAC cannot be held responsible for claims made by manufacturers.

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HARDWARE
- Input/Output
- Memory
- Printers/Plotters
- Miscellaneous

SOFTWARE
- Business (General)
- Communications
- Educational
- Financial
- Games/Simulations
- Graphics
- Languages (Programming)
- Personal
- Utilities
- Word Processing

BOOKS/CATALOGS

MISCELLANEOUS

HARDWARE

Input/Output

The Fly Board is an interfacing board that is specifically designed for the hobbyist who wants to get into hardware. 16 digital I/O lines allow control of practically any project. Create a home weather station, automate laboratory processes, control model trains, use it for security or surveillance, or robot, printer, modem or keyboard control. The Fly Board comes with 2K of RAM for your programs. It will accept PR# commands and may be replaced with an EPROM for permanent storage. Includes two 36-inch DIP jumper cables, a User's Manual (with many examples), a Summary Card and a 128 page Engineer's Notebook - $130.
Snave Systems
P. O. Box 957
Niles, IL 60648
(312) 966-4505

The **AP-96 Upper/lower case ROM** features a full 96 character ASCII set with true descenders. The AP-96 plugs in with no modifications to the Apple and is compatible with most word processing systems. For REV 7 or later Apple computers only. Lifetime warranty. $24.50 at your local computer store.
MPC Peripherals Corporation
9424 Chesapeake Drive
San Diego, CA 92123
(619) 278-0630

This full function **detachable keyboard** uses firmware modules to optimize keyboard layout for any software package. Attaching easily to your Apple II, it will help you realize the full potential of the computer. Features 6 edit keys and 6 cursor control keys including up- and down-arrows, standard layout typewriter keyboard for typing efficiently, 10 key numeric pad, working shift key, 12 special function keys, preprogrammed to give you the most commonly used commands in each software package. It is detachable with a 6-foot coiled cord and is lightweight so you can use it on your lap. Firmware modules are available for all popular software packages, inluding BASIC, VisiCalc, Applewriter II, PFS, Word Handler, and many more. Installation requires no tools. Contact:
Executive Peripheral Systems, Inc.
800 San Antonio Road
Palo Alto, CA 9430
(415) 856-2822

Four new joysticks are compatible with most microcomputers using special interfaces. Model 15-9714 offers a bat handle grip that fits comfortably in your hand and

offers smooth, quick 8-position movement. Two fire buttons, one on the handle, the other on the base. Model 15-9730 is the same as you've used on most arcade model games. Provides 8-way directional action to give lightning quick response. Two fire buttons are provided - one on the handle and the other on the base. Model 15-9708 has a rugged, heavy duty base and four rubber grip pads that keep it from sliding. Each of the three models above require a Model 72-4525 Apple interface. Model 72-4521, for the Apple, is a trackball type joystick. Offers the magic of 360 degree movement to an infinite number of positions, and controls the speed of objects on the screen, as well. With two fire buttons. At your local dealer or write to:
WICO Corporation
6400 W. Gross Point Road
Niles, IL 60648
(312) 647-7500

Touchpen on-screen digitizer increases ease of computer access for graphics, programming and data entry. Provides on-screen, direct-to-screen bit pad emulation. It also features an on-screen keyboard bypass for non-typists. Gives on-screen prompting and assistance, CAD graphics manipulation, menu selection, freehand drawing, animation, object manipulation, text editing, data base management (bypassing keyboard), object-oriented systems and software driven. Consists of three main components: a pointing stylus; an intelligent controller and a transparent, conductive mesh-filter panel that mounts directly over the surface of the CRT display. The controller card simply plugs into a slot in the Apple II. A driver supplied emulates Apple Tablet. Includes a diskette with low and high level driver, calibration programs and diagnostics. Specify 12" or 13" diagonal monitor.
Sun-Flex Company Inc.
20 Pimentel Court
Novato, CA 94947
(415) 883-1221

The **Smartbuffer** will let you mail every letter the day it is typed, print General Ledgers, monthly reports, and 20 page manuscripts while leaving the computer free for other projects. It "talks" to the computer at about 10,000 words per minute, then plays this back to the printer at the printer's speed. A parallel to parallel connection with 16K is $335.00, serial to serial is $379 and parallel/serial is $429. 32K memory option - $59, 64K - $177, 128K - $413. Connect any computer with any printer. Other models and options will let you cross-connect two or more computers and printers, convert ASCII to EBCDIC, and interface to communication networks.
Data-Match Corp.
3810 Oakcliff Industrial Court
Atlanta, GA 30340
(404) 441-0308

The **Symtec Light Pen** reads coordinates over the entire screen. Touch-tip or push tip models available. Uses range from videodisc and computer training to simple menu selection and computer games. Apple pen works with Stoneware, Inc.'s new graphics processing system and Apple Super Pilot - $250.
Symtec
15933 West 8 Mile
Detroit, MI 48235
(313) 272-2950

Megaflex is a universal flexible disk controller designed specifically for the Apple II and /// computers. The Megaflex offers "tri-mode" operation, allowing users to connect it with standard 8-inch maxi drives, 5 ¼-inch drives or the new 3-inch micro drives. Fully compatible with Apple SOS, DOS 3.3, Pascal and CP/M. Because all diskettes utilize the standard IBM 3740/System 34 type format, diskettes are transportable from the Apple to other computer systems. Permits up to 4 drives installed per controller, for a maximum of 4 megabytes of on-line data storage. Uses half the power of a standard Apple mini-disk drive and controller.
SVA
11722 Sorrento Valley Road
San Diego, CA 92121
(619) 452-0101

The **Stedi-Data** guards against externally induced on-line noise and transients. Protection begins near the computer, and where long data transmission lines are employed. Both computer and terminal ends need protection. Nearly all modems are dependent on this protection for error free data transmission. Two models are available at $149.50 (protects lines 2, 3, 4, 7) and $249.50 (protects lines 2 through 8 and 20)
National Field Sales, Inc.
P. O. Box 230
Broomall, PA 19008
(800) 345-1280 or (215) 352-9214

Advanced Logic Systems has introduced three new video interface cards for Apple II and II Plus microcomputers. The **Smarterm II** interface card provides Apple II users with automatic keystroke selection of an 80-column screen display or the 40-column display of the standard Apple II. Provides user selection of inverse and normal or highlight and lowlight text, replaceable character sets for foreign languages, special characters or custom graphics, a 25th line for status update or use by WordStar word processing program. Compatible with DOS 3.3, Apple Pascal, CP/M-86 and CP/M Plus -$179.00. The **Dirt Cheap Video** interface card connects an Apple II or II Plus to a TV set with an RF modulator or monitor, and provides a 64-column display in addition to the standard 40-column display. It has many of the same features as the Smarterm II - $89.00. The **Color II** interface card connects your Apple II or II Plus to high or medium resolution RGB color monitors. It provides the highest quality color hues available on an RGB monitor. Cables are available for most RGB monitors including Amdek, Electrohome and Zenith - $179.00.
Advanced Logic Systems
11995 East Arques Avenue
Synnyvale, CA 94086
(408) 730-0306

The **Super-MX card** provides the Epson printers with just about the same quality print as the daisy-wheels. Roman font is the standard; now you can print Elite, Letter Gothic, Orator, Script and Olde English. Apple Hi-Res graphics is fully supported with a wide variety of commands including double dumps (side-by-side) of both hi-res pages, double size, emphasized, rotated, strip chart recorder mode and text screen dump. The two expansion sockets allow EPROM expansion to 12K to insure you that the card will remain the most intelligent interface around. An Epson MX-80 needs Graftrax or Graftrax-Plus. An MX-100 requires Graftrax-Plus. 90 day warranty. Super-MX card with cable - $175.00, Orator and Letter Gothic Fonts - $30.00, Script and Olde English - $30.
Spies Laboratories
P. O. Box 336
Lawndale, CA 90260
(213) 644-0056

Lower Case System is a hardware and software package that works with standard Apple II or II Plus. Most programs that are compatible with DOS 3.3 can now work in upper and lower case. Fully illustrated installation instructions are included. Features normal and inverse modes. Character set is identical to original Apple set, and all characters are on the same baseline. Compatible with several popular 80-column boards. Software binds itself into 48K DOS 3.3 or Corvus 48K DOS 3.3. Also features user-defined function keys and 70 built-in functions, keyboard macros. Works with DOS Toolkit editor-assembler - $59.95.
Practical Interfaces
6794 Shawnee Run Road
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(513) 721-8743

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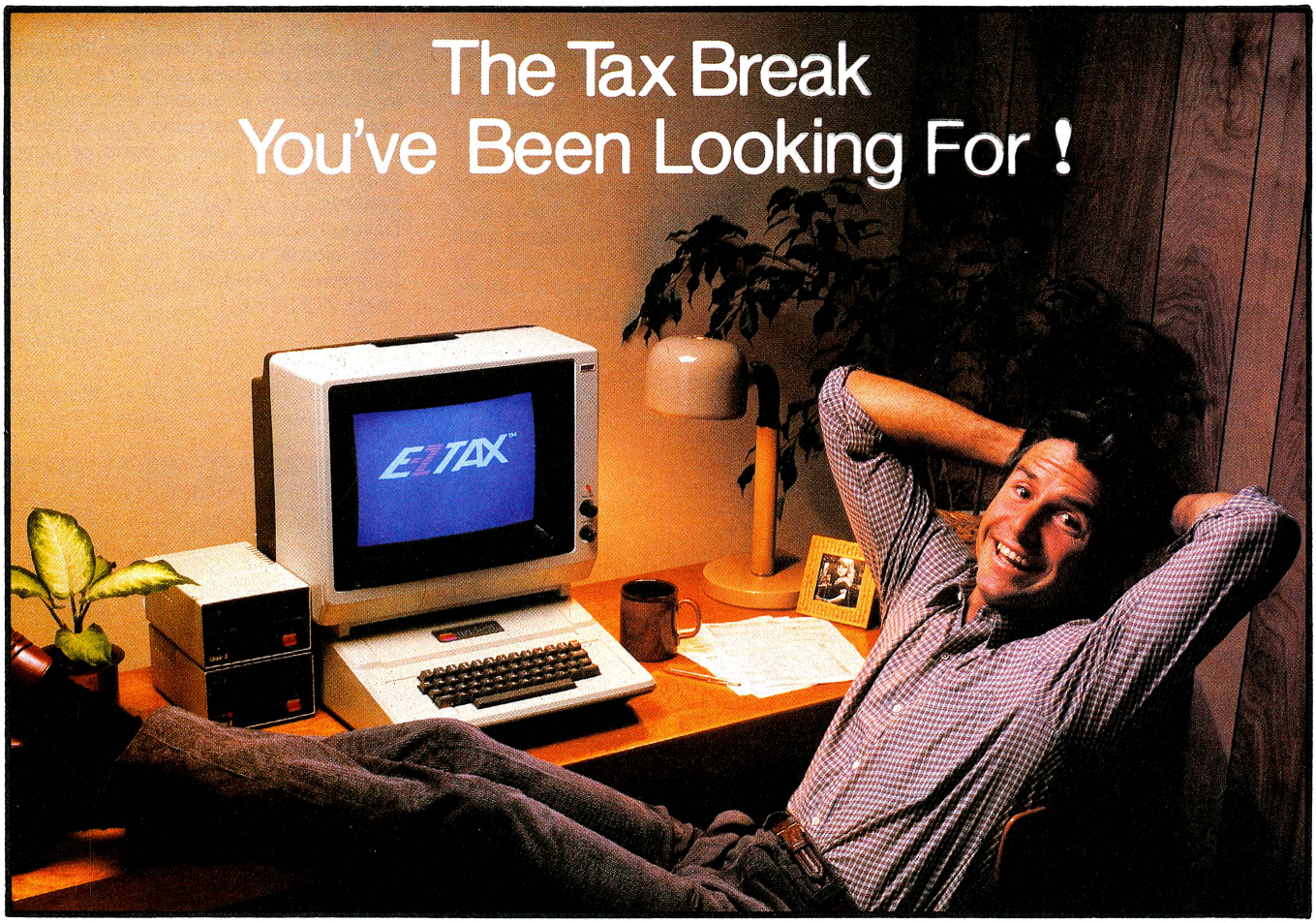

You Just Found It!

E-Z Tax. The simplest tax preparation software ever developed was designed for your Apple II personal computer.

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1040 EZ	2119
1040 page 1 & 2	2210
Schedule A	2440
Schedule B	2441
Schedule C	3468
Schedule D	3903
Schedule E	4137
Schedule F	4684
Schedule G	4972
Schedule R/RP	5695
Schedule W	6251
1040 ES	6252
1040 SE	

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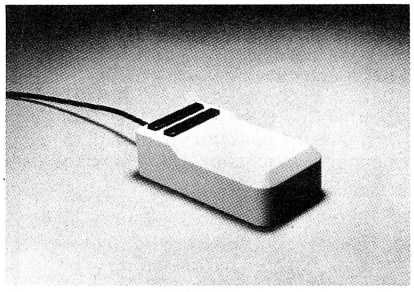
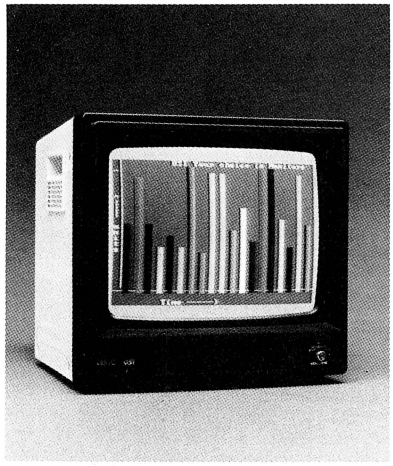
Microvox is a second generation text-to-speech synthesizer. The unit provides a high level of speech intelligibility and voice quality. Features Phoneme-based speech synthesizer chip, 64 crystal controlled inflection levels, text-to-phoneme algorithm, 750 character buffer (optionally expandable to 1.7K characters), full ASCII character set recognition, adjustable data transmission rate (75-9600 baud), RS-232C or parallel connector, X-on/X-off handshaking, phoneme access modes, music and sound effects capability (programming language for notes included), on board amplifier and power supply, and spelling output option - $295.00.
Micromint, Inc.
917 Midway Woodmere, New York 11598
(516) 374-6793

For CAD/CAM and graphics systems users, the **OptoMouse** provides quick, effortless cursor positioning capabilities unmatched by joysticks, light pens and other traditional cursor manipulation devices. It is a small box (about the size of a pack of playing cards) that rolls on the X and Y axes on a flat surface, communicating its movement to the computer and interface by a tail-like cord. OptoMouse provides superior resolution to other cursor devices. Utilizes a custom optical system in lieu of electro-mechanical parts. Controlled by its own microprocessor, it can emulate existing graphics protocols such as Tektronix Plot 10 and Summagraphics bit pad, and the required host interface is reduced to a simple RS-232C serial port. For more information contact:
USI International
71 Park Lane
Brisbane, CA 94005
(415) 468-4900

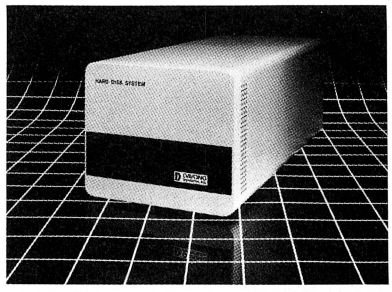


A **14-inch composite video color monitor** has joined the USI International line. Eliminates the two-step process of converting the computer's video signal to a form that a television can receive, and the subsequent conversion within the television set back to a pure video signal. Bright image presentation with low distortion is ensured through the use of high-performance components. Characters are clean and crisp as are graphics and other images. Burned-in for a full 100 hours and completely reinspected prior to shipment - $399.
USI Computer Products
71 Park Lane
Brisbane, CA 94003
(415) 468-4900

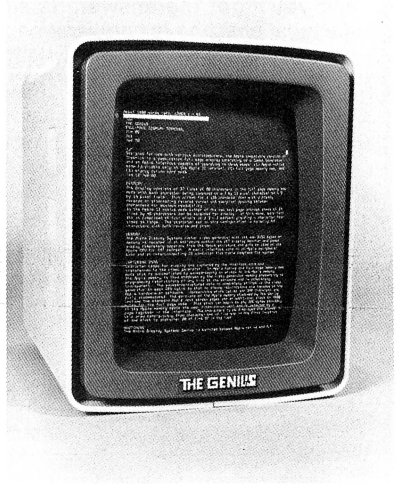


Kolor II provides an interface between the Apple II computer and video inputs such as recorders, cameras and live broadcasts. Utilizing the TI TMS 9918 A video display processor, the Kolor II can display 16 colors with a resolution of 256 x 192 pixels that may be mixed with an external video input. It has four display modes: Graphics I, Graphics II, ulticolor and text mode. In addition, 32 Sprite planes are available for 3D simulation. All refresh and sync signals are produced by the board for composite video output for a video monitor, video tape recorder or standard television set utilizing an RF modulator. Plugs into any I/O slot of the Apple II or II Plus. Requires no external power.
Synetix Industries, Inc.
15050 N.E. 95th
Redmond, WA 98052
(800) 426-7412 or (206) 885-4215 (WA)

The **Davong U5XXM Hard Disk Subsystem** comes in both Master and Slave configurations for simple expansion of up to 60 Mbytes total online system storage. The subsystem acts as the controller for an additional slave disk or Davong tape or disk cartridge back-up device. With the Field Modification Kit, the Master Drive can control up to three slave or cartridge drives plus one tape back-up unit. The suggested retail price of the DSI Master Hard Disk Subsystem is $1,995.00 (5MB), $2,495.00 (10 MB), or $2,995 (15 MB). The DSI Slave Hard Disk Subsystem is $1,495.00 (5 MB), $1,995.00 (10 MB), or $2,495.00 (15 MB). The U&20T Cartridge Tape Back-up unit will store up to 18 megabytes (formatted) on a single industry-standard streaming tape cartridge. On-board software lets the user choose full or partial disk back-up or restoration. All present users of Davong disks can add the back-up unit to their systems - $1.995.00.
Davong Systems, Inc.
610 Palomar Avenue
Sunnyvale, CA 94086
(408) 773-8370



RS-232 compatibility allows **The Genius full-page display**, with all standard Genius features, to interface with an Apple or any computer with a standard RS-232 port including most of the popular personal computers on the market today. The full-page display, 57 lines by 80 characters, greatly enhances the ability of the operator to perform word processing, financial modeling and software development tasks. Available with white, green, or amber phosphors, it provides reverse video and flashing attributes. Internal memory of 16K provides buffering and an internal screen memory. Operates at 120 volts, 60 Hz, or 220, 50 Hz. $1,795.00.
Micro Display Systems, Inc.
P. O. Box 455
Hastings, MN 55033
(612) 437-2233



Imagine never having to type "CATALOG", or trying to remember how to get from one part of a program to another. The **Intelligent Keyboard System** can create strings, characters, commands, and statements and store them for immediate recall by pressing just one key. The VSC-IKI interface board is an intelligent keyboard processor that will spoil you. Simply plugs into a free slot in the Apple II - $199.00.
VSC Technologies Inc.
1350 Grand Avenue
Baldwin, NY 11510
(516) 546-6081

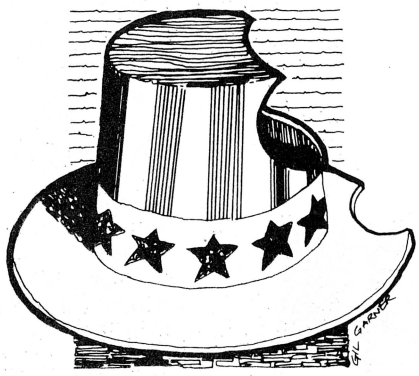
Magnum-80 is an 80 column video card which is completely Videx compatible, has low "snow" level, and is available with an alternate character set built in. Features a 40/80 column soft switch to permit auto-start switching between the two modes. Self test is included in the on-board firmware, and installation requires no wiring or chip pulling at all. The Rainbow-256 turns the Apple II or II Plus into a 256 color RGB driver for analogue RGB monitors, versus the conventional 16 color composite video output. Interfacing for various RGB monitors is available, although the most popular at the moment are the Amdek and Electrohome. For complete information contact:
Microtek, Inc.
9514 Chesapeake Drive
San Diego, CA 92123
(800) 854-1081 or (619) 569-0900 (CA)

Santa Clara Systems, Inc. offers a full range of **Winchester storage** capacities from 5-120 Megabytes on 5.25, 8, or 10.5 inch disk drives, plus removable 8 inch and brand-new 3.9 inch Winchester cartridges or high-density floppy backup. All this is fully integrated in a compact, attractive cabinet. Completely software compatible with your microcomputer, and transparent to most popular operating systems. Provides shared-isk networking capabilitiy for Apple computers -even for a mix. Features 16 Megabyte Apple DOS volume sizes, disk partitioning, electronic disk; printer spooling; LED cylinder address display; status display; E.C.C., and more. Standard 90 day warranty. Optional extended warranty for up to three years.
Santa Clara Systems, Inc.
560 Division Street
Campbell, CA 95008
(408) 374-6972

The **"Toaster"** is a hard disk subsystem with a twist. It contains two 3.9 inch, 5 megabyte hard disk cartridges that are removable. Provides unlimited storage and convenient back-up with a full 5 megabytes per cartridge. Attaches to the Apple II and /// and other popular single-board computers. Includes two cartridges - $2,795.00.
XComp
7566 Trade Street
San Diego, CA 92121
(619) 271-8730

MicroSpooler is especially designed and engineered for those who need cost-effective solutions to their spooler requirements without sacrificing quality and sophistication. Features include: 16K memory expandable to 64K, multiple copy function, status readout, pause function, self-test routine, internal power supply, vertical mount saves desk space. 30-day money back guarantee. Four models fit any combination of parallel or serial I/O. $199 for 16K parallel to parallel unit with an internal power supply.
Consolink Corp.
1840 Industrial Circle
Longmont, CO 80501
(800) 525-6705 or (303) 652-2014 (CO)

Bizcomp model 1012, 1200 baud intelligent modem sets the pace in quality and reliability. Full duplex 300/1200 FCC-registered modem with the advanced features you want: auto-dial, auto-repeat dial and auto-answer. Attached to any terminal, you have automatic keyboard dialing at your fingertips. Or, connect it to a mini/micro for computer-computer electronic mail or auto-polling applications.
Bizcomp
P. O. Box 7498
Menlo Park, CA 94025
(415) 966-1545



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Forget about researching new tax laws and the confusion and anxiety associated with preparing your 1982 personal income tax return. **TAX BREAK ANNUAL** calculates your lowest tax easily and quickly.

Written by an IRS-Enrolled Agent with over 24 years of experience, **TAX BREAK ANNUAL** automatically examines all loopholes, benefits, deductions, special income averages and limitations. It evaluates over 120 possible reporting options then finds and displays the best way to get the lowest tax on your individual return. Then it shows how your return compares with a typical taxpayer in your income bracket and scores your return for audit potential.

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TAX BREAK ANNUAL is available for $129.95 + $2 shipping & handling (California residents add $7.80 sales tax).
TAX BREAK PLANNER is available for $179.95 + $2 shipping & handling (California residents add $10.80 sales tax). Both programs are tax deductible.

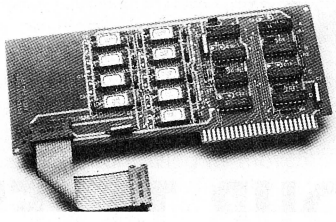
See your local dealer or order direct.

*Apple II, II+, IIe, or III. A Stand alone program. VisiCalc not required. Runs on standard DOS 3.3. Needs only one disk drive and a monitor. Printer not required. Apple is a trademark of Apple Computer, Inc.

PROFORMA SOFTWARE
2706 Harbor Bl. Suite 200
Costa Mesa, Ca. 92626
(714) 641-3846

Memory

Expand the Apple II memory by 16K for only $99.00. The DSI-A16 RAM Card is fully compatible with all Apple II software and hardware. Features low power consumption, and filtered voltage that provides low noise. An extended burn-in at elevated temperature insures high reliability.
Davong Systems, Inc.
610 Palomar Avenue
Sunnyvale, CA 93086
(408) 773-8370



Printers/Plotters

Skyman Multi printer interface card can generate custom characters, mix graphics and text on the same line. Includes a character editor with 3 predesigned character sets. Offers 16 types of graphics dumps. Select a portion of a picture and enlarge it. Produce graphs side-by-side. Also features a chart recorder mode. Compatible with CP/M and Pascal too. Special printer commands to underline, emphasize, condense, print proportionally, etc. Includes a demo disk and 48-inch cable. Drives C. Itoh, NEC, Epson, Centronics, and Okidata printers. $105.00 from:
Brooksar Data Corp.
9830 N 32nd St. Suite A105
Phoenix, AZ 85028
(800) 521-5401

New **CalComp 8 1/2 x 11-inch flatbed plotter** provides eight programmable pens for very clear and high quality documentation required by business graphics applications. Superb Z80 intelligence provides a high speed vector generator, circle and axes generator, and five fonts of 96 ASCII characters that can be written at any angle and size and height-width aspect ratio. Features include dashed line patterns, simple commands, test mode, 8 color, Business Graphics ROM for bar graphs, pie charts, line charts, etc., stand-alone configuration with an existing terminal, 16.5 inch per second vector plotting speed, .1mm addressable resolution.
Calcomp
2411 W. La Palma Avenue
Anaheim, CA 92803
(714) 821-2011

Qantex Model 7030 Multi-Mode printer features word processing quality with up to 4 fonts resident. Combine both letter quality sharpness and data processing speed in one printer. Features automatic proportional spacing and right-margin justification. Also doubles as a data processing printer and prints bi-directionally at either 150 or 180 cps using character sets of U.S.A., U.K., Germany, France, Norway/Denmark, Sweden and Spain. In the graphics mode, the printer provides a resolution of up to 144 x 144 dots per inch. It is very flexible with compressed print or double wide characters for 10, 12, 13.2, 15 and 17.2 cpi., 3.7K buffer standard; 6-part forms capability; self generated status/diagnostic report. For further information contact:
Qantex
60 Plant Avenue
Hauppauge, NY 11788
(516) 582-6060

The **Sweet-P personal plotter** is designed for use with personal and business computers. Easy-to-use, menu-driven software permits users to draw on either paper or overhead transparency; colorful pie charts, bar graphs, line graphs and technical illustrations. Software features enable the plotter to define window limits, scale, alphanumeric character size, and character orientation. Provision is made for color fill, and digitizing allows the user to scale and draw images traced from photographs, illustrations or printed material. A pen adapter permits the use of many commercial pens which are offered at stationery stores. Addressable plotting area of 7.5 x 118 inches. Maximum plotting speed is 6 inches per second. Step size is .004 inches. Fits into a slimline briefcase. Complete with computer interface, drawing media, pens and a tutorial disk and manual to instruct users in operation - $795.
Enter Computer, Inc.
6867 Nancy Ridge Drive, Suite D
San Diego, CA 92121
(619) 450-0601

The new model D-92 Dual Mode Printer prints in the data processing mode and in the correspondence mode for business documents. Parallel or serial options. Standard features include 800 character buffer, 100 CPS bidirectional printing, parallel interface, short line seeking logic, forms handling up to four parts, 100% duty cycle, six different character sizes.
Data Impact Products, Inc.
745 Atlantic Avenue
Boston, MA 02110
(617) 482-4214

Miscellaneous

The Apple Cooler fan is the most powerful fan on the market today. No magnetic flux so it won't distort your monitor screen or cause errors on diskettes. Easy to install with no tools. Safest since it's mounted inside. Totally enclosed rotary blower design. No oiling required and UL recognized. Also available in 240 volts. $59.00 plus $2.50 each for shipping.
MR Engineering
4730 W. Addison
Chicago, IL 60641
(312) 286-6606

The Arcade Board peripheral for the Apple II computer generates true arcade-quality color graphics, sound effects, and music. Uses a TI video display processor and a programmable sound generator. Does not require machine language to create spectacular color graphics with rapid and smooth animation and simultaneous sound effects and music. Special hardware makes it possible to program the board entirely from Applesoft or Integer BASIC. Features 16 colors, 3 graphics modes - including Lo-Res with square pixels, true color resolution of 256 by 192, programmable character set, multi-planar graphics structure, 32 sprites available for easy object-oriented animation, color-table animation, pattern-table animation, pattern name-table animation, 60 Hz interrupt signal available during vertical blanking period to allow for synchronized screen-flipping without glitches. 18K of on-board video RAM allows your programs and data to use the Apple II's Hi-Res graphics Pages 1 and 2 and still have graphics, programmable sound generator with 3 independent tone generators. Many more features.
Millenium 3 Engineering
1015 Gayley Avenue, Suite 394
Westwood, CA 90024

The **88Card** is a 16 bit Intel 8088 that allows the Apple user to run programs on the popular MS-DOS (IBM-PC) and CP/M-86 operating sysems. It is available with MS-DOS and MBASIC or alternate choices or CP/M-86, MBASIC or CBASIC. CP/M 3.0 for the Appli-Card allows the user to upgrade and use the 128K capability of the operating system with a RAM Extender Card that provides up to 192K to an Apple as a RAMDISK. Soon to be released are the Apple III Appli-Card - a Z80A or Z80B based card with 64K or memory expandable to 512K and a software product called CalcRAM that makes the expanded memory (up to 192K) available to VisiCalc models.
Personal Computer Products, Inc.
16776 Bernardo Center Drive
San Diego, CA 92128
(714) 485-8411

Saybrook is a plug-in peripheral card for the Apple II that transforms the Apple into a powerful micro-mainframe, boosting its computational capability to 10-20 times the

speed of the Apple II, ///, or the IBM-PC. Utilizes the Motorola 68000 32-bit microprocessor. Includes 128K Ram (expandable to 256K) and a 24-hour time of day clock - $995. This price includes the UCSD p-System Plus (Version IV) and the Pascal language. BASIC and FORTRAN-77 are optional.
Analytical Engines, Inc.
P. O. Box 26511
Austin, TX 78755-0511

Not just another Apple nibble copier, **Snapshot** removes copy protection, and copies most programs including the nibble copiers themselves. (The ultimate irony! — PCW.) Will copy any memory-resident program that runs on a 48K Apple II. It is a peripheral card that uses your language card to interrupt a running program and dump the entire contents of 48K and registers to an unprotected, copyable backup disk. Requires no complex parameter changes or trial and error tedium. Also ideal for debugging your own programs or analyzing others' programs, with full monitor capabilities to repeatedly interrupt a program and modify, trace, disassemble and resume running it, and dump its current state to disk - $109.95 plus $3.00 postage.
Dark Star Systems
P. O. Box 140
Amherst, MA 01004
(413) 584-7600

SOFTWARE

Business (General)

Mentor electronic design software lets you design circuits in Hi-Res graphics. Features automatic calculations, user-friendly, single letter input limited to the characteristics of the circuit being designed. Useful for classroom instruction or lab preparation. $124.95 plus $6.25 shipping and handling.
Korsmeyer Electronic Design
16411 Del Mar
Huntington Beach, CA 92649

An **automatic VisiCalc template generator** is operated by selecting answers to plain English questions to create complex budgeting and forecasting models. The Business Planning Tool with Visigen generates VisiCalc formulae and assembles the information into a custom VisiCalc model. The Peachtree Connection extracts information from Peachtree Data files and creates VisiCalc models, while The Wordstar Connection does the same with Wordstar information.
Sofstar
13935 US #1 Juno Square
Juno, FL 33408
(305) 627-5511

Visicalc Utilities includes a VisiCalc (DIF) file sorting program that will sort rows or columns up to 6 keys. Two additional programs allow VisiCalc to Applewriter conversion and VisiCalc to Appleplot conversion - plot any 1 of 2 rows/columns. VisiCalc templates includes a Statistical Pak, Financial Pak and Mathematics Pak. For any one program or Pak - $19.95. For each additional program or Pak add $10.00 and save $9.95. Prices include program diskette, detailed manuals, postage and handling.
Robert H. Flast & Co.
6 Peter Cooper Road
New York, NY 10010

How many times have you jotted down a note for future reference, put it on your desk because you didn't know where to file it and two weeks later you can't find it? **Notebook** will give rapid "In-Out" access to any or all notes; whether you're looking for financial information, insurance numbers, names & addresses, dates, DOS notes, medical, business, auto information or any advisory that you'll want for later reference. Automatic-

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ally cross-references your memorandums and keeps an alphabetized index. Features a card-like printout and a fast, easy to use search routine. Data can be written to the Notebook diskette itself or any number of diskettes. On-line help is always available. Requires an Apple II with 48K and DOS 3.3 - $55.00.
Nikrom Technical Products, Inc.
25 Prospect Street
Leominster, MA 01453
(800) 835-2246

Con-Calc will work with Super/Calc and other CP/M spread sheets to consolidate up to 256 worksheets. It adds a third dimension to your electronic spread sheet programs. Includes logic for Rate of Return - $125.00. Requires an 8-inch disk, CP/M and MBASIC. A test disk and manual in plastic mailer - $15.
Sunwest Software
2000 S. Logan
Denver, CO 80210
(303) 777-9400

MicroPlan is the software that fills the big gap between your electronic spreadsheet and your accounting package. It's a powerful tool for financial analysis and projection. It lets you set up financial interactions for a whole area of business, then add data to produce current reports whenever you wish. Consolidation Module lets you condense departmental, local and regional reports into a whole pyramid of management reports. It will find data in other files and tailor consolidated reports to your exact specifications. MicroPlan memorizes every step needed to control your model, including use of its built-in formulas. MicroPlan can automatically amortize a loan, make up a depreciation schedule and handle dozens more business applications.
Chang Labs
10228 N. Stelling Road
Cupertino, CA 95014
(408) 725-8088

Statmanager is a sophisticated statistical package for researchers who don't have time or money to waste. It is designed for the researcher who wants to develop his own file structures, who needs a broad array of statistical computations, who wants to present data graphically and who doesn't want the hassle or expense of mainframe timesharing. Menu driven with simple commands and clear user prompts, Statmanager is both easy to use and very powerful. Create and organize data files, add, modify or delete data, sort alphabetically or numerically, run descriptive statistics, including mean, variance and standard deviation. Do T-Test and paired T-Test comparisons, linear or transformed correlations or X-Y plotting, regression line plotting, and combined regression line and data plotting. Available from your local dealer or call:
Hayden Software
(800) 343-1218
(617) 937-0200 (MA)

OR-D is a complete system especially designed to help manage and control a dental practice. Permits 1,500 to 5,000 active accounts, up to 15,000 patients, 500 insurance companies, 15 providers and up to 150 dental codes. Partial list of functions: per visit invoice and reminder notices, form generation for scheduled patients, income reports, insurance claim form generation, billing and statement processing, aging reports, monthly recall list and label generation, provider income analysis, insurance outstanding balance, patient history of transactions, referral list, management statistics reports, insurance statistics reports. The system consists of an Apple II Plus with 64K, 5-10 Megabyte hard disk, floppy disk drive, monitor, printer, line voltage protector, and word processing and office accounting software. The entire system is available under $10,000.
DVI-OR Inc.
1200B Haddonfield Road
Cherry Hill, NJ 08002
(609) 665-2255

The **PromptDoc Manual Maker** visually prompts the user through the designing, outlining, and writing steps of good manual development. The system provides guidance on what to include in the documentation and even how much explanation to provide. The actual operating description is supplied by the user. A Writer's Guide is included with the package to provide professional documentation development techniques and experience which allows even the non-professional writer to improve overall manual quality.
PromptDoc, Inc.
833 West Colorado Avenue
Colorado Springs, CO 80905
(303) 471-9875

Super Expander Plus, a new VisiCalc preboot, will hunt for and find as many as two Ramex-128K boards, then allow a VisiCalc user to build an incredible 255K model. The program loads or saves its entire 255K file onto two Apple floppies in less than forty seconds. Pre-boot also upgrades any regular 16-sector Apple VisiCalc to the level of the VisiCalc Advanced Version, heretofore available only on the Apple /// computer. Adds such features as variable column widths, global formatting of numbers, negative numbers in brackets, password protection, several new format commands, tabbed fields, and more. It even supports an 80-column card if one is present. Super Expander Plus - $125, Ramex-128K board - $499.
Omega MicroWare, Inc.
222 S. Riverside Plaza
Chicago, IL 60606
(312) 648-4844

Stats Plus, is a new VisiCalc compatible general statistics package with a powerful data base management system. Now electronic worksheet files can be used in preparing data files or in producing Hi-Res graphics such as scatterplots, bargraphs, or polygon charts. A special set of data base programs, called Data Prep, is included in the package that handle both random-access and sequential files and produce data that can be instantly accessed using self prompting screen instructions. Also includes transformation procedures and other techniques for combining data fields arithmetically. Offers search and select capabilities in which random-access files can be searched in five fields and cross tabulated in five dimensions - $200.00. Requires an Apple II or II Plus with 48K and DOS 3.3 with optional dot matrix printer.
Human Systems Dynamics
9249 Reseda Blvd., Suite 107
Northridge, CA 91324

Versacalc enhancements to VisiCalc contain a tutorial, utilities, and a file manager. Sort any number of rows, labels, values, formulas. You select the extent of the sort. Permits conditional testing to several levels. Includes menu-driven modules for your own application programs. Auto-catalog from within VisiCalc. Auto-screen form saves hundreds of keystrokes. Print out the list of commands. Apple II version $100.00, Apple /// version $150.00.
Anthro-Digital Inc.
103 Bartlett Avenue
Pittsfield, MA 01201
(413) 448-8278

Automated Medical Administrator is designed to automate the accounts receivable and claim form preparation tasks for the multi-doctor medical practice. The system allows for the maintenance of up to 2,000 accounts for up to ten physicians.
Contact:
Boardroom Executive Software
255 North El Cielo Road Suite 240
Palm Springs, CA 92262
(714) 365-6770

Servicemanager is a business software package which performs administrative and clerical chores for repair shops and service departments. It has word processing capability and prints all standard forms. Runs on the Apple /// with the ProFile hard disk or 5 1/4 inch diskettes.
The Denver Software Company
14100 E. Jewell Avenue, Suite 15
Aurora, CO 80012
(303) 750-9980

Communications

Super Phone for Hayes Micromodem II users, keeps a telephone directory of people and modems and dials them automatically. When you call modems you can see, save, and print what they say. No limit to the amount of data you can receive, save and print. Take programs from remote disks and put them on your disks or vice versa. Super Phone is $D84 bytes long and is all

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In California CALL 1-800 992-8888
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*plus postage and handling. Some programs may require 2-4 weeks delivery.

☐ FROGGER ☐ CHOPLIFTER ☐ GORF ☐ DAVID'S MIDNIGHT MAGIC ☐ EASTERN FRONT (1941) ☐ ZORK I ☐

machine language. The manufacturer can call you and transfer Super Phone to your Apple's disk. The actual transmission time is about 7 minutes. $40 from:
James O. Church
20 Placid Street
Trumbull, CT 06611

ComCrypt helps to prevent unauthorized eavesdropping on computer communication going over telephone lines or by direct wire between terminals. The encrypted chat mode allows two users of the program to have completely secure communications between themselves over modems or on timesharing systems. Requires CP/M $250.
Century Systems
12872 Valley View Avenue, Suite 11B
Garden Grove, CA 92645
(714) 895-3381

Educational

T-Pal is a complete lesson-writing and recordkeeping software system for schools, homes, businesses, or any organization needing to teach concepts, train people, or transmit information. Instructions on the screen prompt the user at all times, and a clearly written but detailed user's manual is included in the package. Branching is available for correct and incorrect student responses. Records wrong answers and displays them for diagnostic purposes at teacher's request. Requires an Apple II Plus with 32K and one disk drive - $135.00. Two drives are needed for the double disk version $145.00. A printer is optional.
Computer Business Systems
468 State Street
Phillipsburg, KS 67661
(913) 543-2216

Study Break is a program designed to produce and utilize study files on any subject. The program is menu driven, allowing the review of old material, insertion of new material, modification of current material or deletion of current material. New items of information are entered in a question-answer format. True CAI operation forces students to learn from incorrect answers by repeating that material as a reinforcement. Percentage of correct responses is shown. The Medical Study Base files cover a wide range of introductory clinical information. The package includes 22 files of 4164 question/answer pairs on disks, including surgery, general medicine, and specialty files. Study Break - $29.95. Study Break with Medical Study Base - $99.95. Requires an Apple II Plus with 48K and DOS 3.3
Med Systems Software
P. O. Box 3558
Chapel Hill, NC 27514
(800) 334-5470

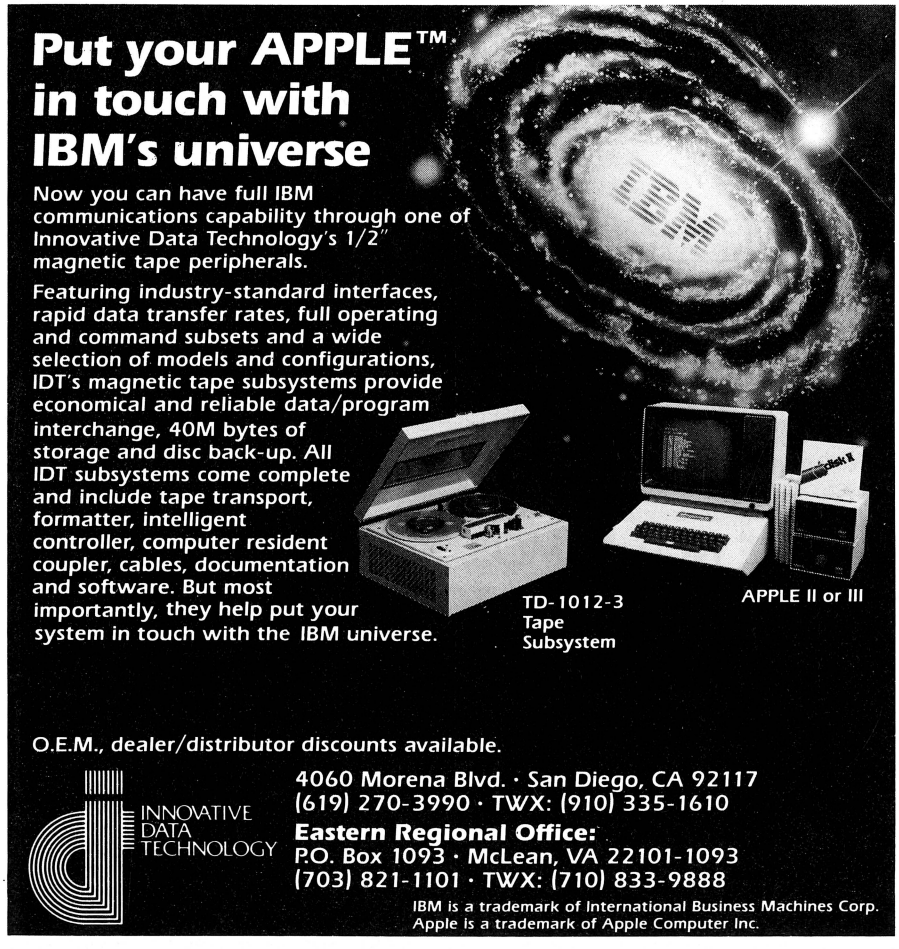
Spanish Language Review is a new program for building Spanish language proficiency. The program contains 1024 words and phrases to help the user learn the basics in 12 different subject categories. Included are Accommodation, Basic Grammar, Communication, Directions and Motoring, Entertainment, General Vocabulary, Medical, Restaurant, Shopping, Time, Dates & Numbers and Travel. Requires an Apple II with 48K and DOS 3.3 - $29.95.
Study Guide Software
P. O. Box 11601
Costa Mesa, CA 92627
(714) 540-8343

Educational software for the Apple II includes study aids for College Board Exams - PSAT, SAT or GRE. **Math Skills Pak** covers Algebra, Geometry & Trigonometry with Graphics on two diskettes - $50.00. **Verbal Skills Pak** covers vocabulary, word analogy and sentence completion on three diskettes - $60. Write for complete catalog.
SEI
P. O. Box 7266-N
Hampton, VA 23666
(804) 826-3777

Number Cruncher is a superb high resolution arcade quality action teaching game with plenty of action. Game play covers all four basic mathematical operations, and automatically adjusts to the player's capability. Covers mathematic operations from single digit to four digit numbers. For ages 6 to adult. $34.95 plus $1.50 shipping.
Unique Software, Inc.
P. O. Box N
Deer Park, NY 11729
(516) 666-7577

Early Games for young children offers nine educational and entertaining games controlled by a single program. Even very young children can select a game, play it, and select a different game - all by themselves. Picture menu gives children control. Children learn to match numbers and letters, count colorful blocks, add and subtract stacks of blocks, learn the alphabet, practice spelling names, compare shapes and draw and save colorful pictures. Immediate visual and musical feedback. Hints are provided when appropriate. Designed for children ages 2½ to 6 years old. Requires an Apple II with 48K and DOS 3.3 - $29.95.
Early Games Educational Software
Shelard Plaza North, Suite 140B
Minneapolis, MN 55426
(800) 328-1223 or (612) 544-4720 (MN)

Planes is a new computer math game. Three skill-building programs promote mastery of fundamental geometric principles enhancing classroom instruction.



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Automatically provides increasing advanced learning applications. Its library of 200 straight-line shapes helps children recognize, define and distinguish geometric forms Lets children create their own shapes on the monitor by plotting points or drawing lines. Instructions show a child how to turn, reposition, store and retrieve shapes, stimulating computing ability. Can easily be integrated into curriculum for Grades 3-9. Includes a diskette with programs and shapes and a reference manual. Requires an Apple II with 48K and DOS 3.3 - $39.95 plus $2.00 shipping and handling.
ITC Technologies Corp.
7100 Blvd. East, 2J
Guttenberg, NJ 07093

New educational software helps students understand how to get the right answer. Students learn the basic skills and move up to mastery. Programs focus on specific learning need, so students can zero in on the precise areas where they need work. Programs include **Division Skills, Mixed Numbers, Decimal Skills, Punctuation Skills, Vocabulary Skills** - each $44.95. Three instructional modes include Readiness, Practice, and Instruction. Computer Literacy reference materials include Experiencing BASIC task cards - $9.50, Experiencing BASIC Duplicating Masters - $6.00 and a 64 page booklet introducing students to microcomputer use and software design - $5.00. Each unit has a built-in management system that holds up to 120 student records on the same diskette as the actual skill program. Requires an Apple II or II Plus with 48K and DOS 3.3. From your favorite software dealer.
Milton Bradley Co.

The Bermuda Race is a newly developed educational game designed to teach the novice sailor, improve navigation and sailing skill of week-end sailors, and challenge the "seasoned skipper". The object is to "sail" a boat from Newport, Rhode Island, to the Island of Bermuda in record breaking time. Options include simplified sailing instructions, course description and pointers, and the race itself. Each move counts as one hour, except in the beginning and in the end where the moves are in 15 minute increments. Information given to the player for each move includes: wind direction, wind speed, boat direction, boat speed, wave height, time elapsed from beginning of race, distance to Bermuda, relative wind angle, true course to Bermuda, how much sail area is carried, and position of the centerboard. Features detailed Hi-Res graphics maps, and detailed drawings of the boat, etc.
Nautical Software
P. O. Box 4397
Lynchburg, VA, 24502

Computerized Career Assessment and Planning Program (CCAPP) helps students determine career interest, preferences, and abilities; select and explore career clusters; delineate and select relevant occupations; and develop a plan to enter (or prepare to enter) the occupation of their choice. Each of four programs take approximately forty minutes to complete and allows students to learn important facets of decision making while developing a personalized career profile and plan to meet their immediate needs. The system contains four program diskettes and four data base diskettes, plus a counselor's manual. Requires an Apple II or II Plus with 48K and DOS 3.3, a monitor and a printer - $485.00. CCAPP Counselor's Manual only - $50.00. Career Directions (2 diskettes and manual) - $59.95.
Systems Design Associates, Inc.
723 Kanawha Blvd. East
Charleston, WV 25301
(304) 342-0769

Play against the computer to match words that make compound words with **Word Mate.** Contains 10 word lists with a total of 100 words in all. Features large easy-to-read letters, full color, and sound effects. Requires an Apple II with 48K and DOS 3.2 or 3.3 - $25.00 plus $2.00 handling and shipping.
T.H.E.S.I.S.
P. O. Box 147
Garden City, MI 48135
(313) 595-4722

StarLogic Announces Savings on Apple II Compatible Drives

Includes drive, cable, cabinet and standard warranty which includes 90 days parts and labor

5¼" standard disk drive	$205.00
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StarLogic

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Computer instruction for the mentally handicapped is now available. Colorful animated graphics programs, utilizing synthesized speech, teach basic counting and word recognition skills to those with learning disabilities. Reading is not required unless it is part of the learning objective. Available for the Apple II plus - $29.95.
The Upper Room Computer Consultants
907 6th Avenue East
Menomonie, WI 54751

Police Artist is a children's game for ages 7-14. It is basically a face recognition program with recreational overtones to help alleviate the stuffiness that most educational tools tend to have. It will help children improve their memory and show them that computers don't bite - $34.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
Sir-Tech Software, Inc.
6 Main Street
Ogdensburg, NY 13669
(315) 393-6633

Here is a new series of computer programs based on Biblical themes. **Battle of Jericho** is an arcade type action game in which the player relives the Biblical story of the fall of Jericho described in the Book of Joshua. If he skillfully directs the blasts of his "ram's horn", the player can bring the walls of Jericho tumbling down. **Bible Baseball** is an educational game in which the student's knowledge of Old Testament facts and history enable him to triumph or lose in a full-scale baseball game played against an opponent or the computer. Designed for the Apple II.
Davka Corporation
845 North Michigan Avenue, Suite 843
Chicago, IL 60611
(312) 944-4070

Teacher authored programs for the classroom and home include math, language arts, reading, spelling, literacy, programming, etc. Covers tutorial and practice, remedial and developmental. Useful for all ages. Uses full computer capabilities. For Apple II. Send for free complete microcomputer software catalog.
Educational Activities, Inc.
P. O. Box 87
Baldwin, NY 11510
(800) 645-3739 or (516) 223-4666 (NY)

Apple Physics programs total 11 disks and 75 programs. These programs contain extensive graphics. Each diskette has 5 to 10 programs requiring 48K memory with Applesoft. Volumes are: Vectors & Graphing $10, Statics $12, Motion $12, Conservation Laws $12, Circular Motion $15, Thermodynamics $20, Electricity $12, Optics $20, Atomic Physics $30, Solar System Astronomy $30, Stellar Astronomy $30. Entire set may be purchased for $203.00.
Cross Educational Software
P. O. Box 1536
Ruston, LA 71270
(318) 255-8921

Three new vocabulary games are available, with up to 100 words per level, up to 300 words in each game. Helps build vocabulary and improve related word skills, such as decoding and recognizing synonyms and antonyms. **The Chambers of Vocab** (age 9 and older). Only by subduing the word beasts within can you prove your courage and skill. **Trickster Coyote** (age 8 and older). Recover the Totem stolen by the stealthy Coyote if you stay on Coyote's trail and avoid his tricky words. **Key Lingo** (age 11 and older) rewards you with a piece of the legendary Penguin Parchment, which marks the location of Key Lingo - an uncharted atoll. You must summon all your word-trading skill to win more pieces of the Parchment. Requires an Apple II or II Plus with 48K and DOS 3.3 - $48.96.
Reader's Digest Services, Inc.
Microcomputer Software Division
Pleasantville, NY 10570
(914) 769-7000

Financial

Personal Finance Master tracks your checks, deposits, charges, loan payments, credit cards, IRA accounts, broker accounts, even cash and fixed assets. It can integrate them all into a personal net worth statement. It can budget your expenses and cash flow; reconcile your bank statements; print checks on standard computer forms; produce Hi-Res plots of income & expense; split transactions; search or sort records.

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An easy, low cost way to input visual information to your computer

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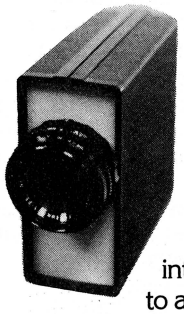
DIGI-CAM



With the DIGI/CAM Self-Contained Digital Camera, your computer gains a new dimension in I/O flexibility.

Completely self-contained with its own internal microprocessor, DIGI/CAM will interface to any computer through an RS 232 serial port. Since it is fully programmable using simple ASCII commands, using it is very simple. Besides being the "electronic eye" of your computer, you can program it to compare pictures, locate objects within a picture, detect motion, or to take timed, multiple exposures.

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Provides up to 700 transactions per month capacity and up to 100 user-defined budget categories. It can store up to 3000 transactions per diskette. Produces eight CRT or printed reports/graphs including an account register, income/expense, chart of accounts, standard names and purpose codes, income/expense vs. time graph - $74.95 at your local dealer.
Spectrum Software
142 Carlow
Sunnyvale, CA 94087
(408) 738-4387

70 **Income tax programs** calculate and print the many tax forms and schedules. Ideal for the Tax Preparer, C.P.A. and individuals. Features menu driven BASIC programs that are unlocked and listable. Inputs can be checked and changed. Prints entire Form/Schedule. The programs include Forms 1040, 1040A, 1040EZ, 1120, 1120S, 1041, 1065, 1116, 2106, 2119, 2210, 2440, 3468, 3903, 4255, 4562, 4797, 4835, 4972, 5695, 6251 and 6252. Also includes Schedules A, B, C, D, E, F, G, R, Rp and SE. They also have a disk called The Tax Preparer's Helper which has programs for Income Statements, Rental Statements, Supporting Statements, IRA, ACRS, 1040/ES, ADD W-2's and Print W-2's. The first disk is AP#1, and includes Form 1040 and Schedules A, B, C, D and G. Requires an Apple II or II Plus and DOS 3.3 - $24.75 postpaid.
Gooth Tax Programs
931 S. Bemiston
St. Louis, MO 63105

Micro PMS is a new portfolio management system that includes the information you'll need to make profitable investment decisions. It is a family of sophisticated, easy-to-use programs including Portfolio Accounting, Investment Analysis, and Performance Measurement. Includes complete data on over 1400 common stocks like price histories and growth projections, earnings and dividend data and risk measurement and quality ratings. Requires an Apple II Plus with 48K memory, a 16K memory card and 2 disk drives. A printer and Videx 80-column board are optional.
The Boston Company, Micro PMS Group
One Boston Place
Boston, MA 02106
(617) 722-7939

Accounting Plus II helps store, retrieve, and instantly analyze all the vital financial information needed at your fingertips to run a successful business. It comes with its own firmware card, so there's no extra hardware to buy. It's fast, because it uses 6502 machine language. Upgradable, it grows with your needs - supports 2 or 3 floppy drives or a hard disk. It works with virtually all printers. It's also fully integrated, so all your entries automatically update all other applicable areas. Easy to use manuals are included. In 8 modules: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory Control, Cash Flow/Budgeting, Mailing Lists, Invoicing.
Software Management Group, Inc.
12555 Biscayne Blvd., Suite 805
Miami, FL 33181
(800) 327-7701 or (305) 757-5416

E-Z Tax is the tax break you've been looking for. Self-prompting questions assure you that nothing is overlooked. The program automatically computes the lowest tax for you. It's so easy to use, you'll be doing your tax return the moment you insert the 5 #14 inch disk. When you're finished, E-Z Tax will print out your information on the official Federal forms. Prints 1040A, 1040EZ, 1040 P. 1 & 2, Schedules A, B, C, D, E, F, G, R/RP, W and many more - $69.95. Available for the Apple II with 48K, and CP/M.
E-Z Tax
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San Jose, CA 95128
(800) 331-1040 or (800) 344-1040 (CA)

The **General Ledger** can produce many times more reports than competing systems. It simultaneously addresses: general ledger requirement (IRS, etc.), product profitability analysis with automatic proration of overhead burdens, financial budgeting, forecasting and modeling, automatic depreciation scheduling and posting and instantaneous on-demand inquiry. Two accounting months can be "open" simultaneously, and a full year's detailed entries can be retained on current file. Stores many times more entries than competitive systems. It has multiple techniques for most functions. One test closed one day's 3,440 entry-sides in 2.5 minutes. For further information contact the distributor.
The National Software Company
Chamber of Commerce Buiding, Suite 105
Baltimore, MD 21202
(301) 539-0124

TAXMAN-83 software package is an interactive tax management program for well proven VisiCalc or Supercalc electronic spreadsheets. It will prepare and print 1982 individual income tax returns. Multiple overlays consider all tax alternatives and compute the lowest tax possible based on your filing status. All forms and schedules are included, calculated, and printed. It will compare the results with the prior year's, test reasonableness and tell you which forms are necessary for filing. Prepares 1040, Schedules A, B, C, D, E, F, G, R, RP, SE, U, W; and many others - $95.00 plus $4.00 freight/handling. Requires an Apple II or II Plus with 48K and DOS 3.3 and VisiCalc or Supercalc. Will also operate with the Apple ///.
Atsuko Computing International
303 Williams Avenue Suite 1132
Huntsville, AL 35801
(205) 533-7590

The **BPI Payroll system** performs all the standard payroll functions. It contains tax tables for FICA, federal and all 50 states plus Puerto Rico and D.C., as well as cities and counties with uniform methods of taxation. An update service keeps your payroll system current with all tax law changes affecting you. Handles up to several hundred employees in different states or branch offices. Provides for expense reimbursement, automatic calculation of net pay, wage distribution, W-2's, payroll checks and other important payroll reports. Interfaces with the General Ledger and Job Cost Systems as well.
BPI Systems
3423 Guadalupe
Austin, TX 78705
(512) 454-2801

Games/Simulations

Tired of shooting aliens and running mazes? Why not play the money game: **Stock Market Tycoon**. Sound and graphics sweep you into the action. As your stocks soar, gather up your dollars. Or agonize as it all fades away. Match your wits against the wiles of the market. Fun for all ages. No knowledge of stocks is needed. Requires an Apple II or II Plus with 48K and DOS 3.3 - $29.50.
Micro Program Designs
5440 Crestline Road
Wilmington, DE 19808

Lunar Leeper is a beautiful Hi-Res arcade game. Your job is to fly through them leepers to rescue some men. Be a good pilot - be quick and be sly. Save the men, avoid the leepers, and fly through a cave to shoot the leepers' keepers. Created by Chuckles, creator of Laff Pak. $29.95 at your local computer store.
Sierra On-Line, Inc.
36575 Mudge Ranch Rd.
Coarsegold, CA 93614
(209) 683-6858

Crystal Caverns is a game of mystery and suspense for the Apple II. The player hunts for treasure beneath an old mansion. You aren't given a map to locate the treasures, but must create one based on the places already searched. The mansions's many dark and dusty rooms are filled with clues and dangers. A player may suddenly fall off a cliff or become trapped in a clammy dungeon - with no way out. The only way to find the treasures is for the player to keep digging and searching throughout the mansion. Requires an Apple II or II Plus with 48K and DOS 3.3 - $34.95.
Hayden Book Company, Inc.
50 Essex Street
Rochelle Park, NJ 07662
(201) 843-0550

In **Spider Raid** for the Apple II, the great war of 2017 nearly destroyed the Earth. The

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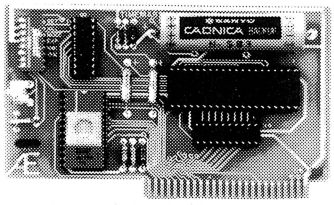
Finally, a clock that does it ALL!



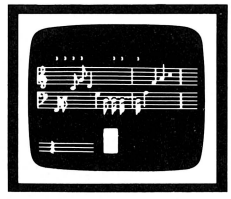
- Designed in 1983 using I.C. technologies that simply did not exist when most other Apple clocks were designed.
- Just plug it in and your programs can read the year, month, date, day, and time — down to 1 millisecond!
- Powerful 2K ROM driver — No clock could be easier to use.
- Full emulation of most other clocks, including Mountain Hardware's Appleclock (but you'll like the TIMEMASTER mode better).
- Compatible with all of Apple's languages, CP/M and PASCAL software on disk.
- Eight software controlled interrupts so you can execute two programs at the same time.
- On board timer lets you time any interval up to 48 days long down to the nearest millisecond.

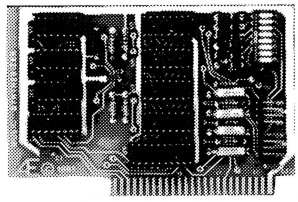
The TIMEMASTER includes a disk with some really fantastic time oriented programs (over 25) plus a DOS dater so it will automatically add the date when disk files are created or modified. This disk is over a $200.00 value alone — we give the software others sell. All software packages for business, data base management and communications are made to read the TIMEMASTER.

If you want the most powerful and the easiest to use clock for your Apple, you want a TIMEMASTER.

PRICE $129.00

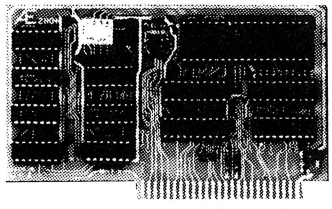
Super Music Synthesizer





- Complete 16 voice music synthesizer on one card. Just plug it into your Apple, connect the audio cable (supplied) to your stereo, boot the disk supplied and you are ready to input and play songs.
- It's easy to program music with our compose software. You will start right away at inputting your favorite songs. The Hi-Res screen shows what you have entered in standard sheet music format.
- We give you lots of software. In addition to Compose and Play programs, the disk is filled with songs ready to play.
- Easy to program in Basic to generate complex sound effects.
- Four white noise generators which are great for sound effects.
- Plays music in true stereo as well as true discrete quadraphonic.
- Full envelope control.
- Will play songs written for ALF synthesizer (ALF software will not take advantage of all the features of this board. Their software sounds the same in our synthesizer.)
- Automatic shutoff on power-up or if reset is pushed.
- Many many more features.

PRICE $159.00



Z-80 PLUS

- TOTALLY compatible with ALL CP/M software.
- Executes the full Z-80 and 8080 instruction set.
- Fully compatible with microsoft disks (no pre-boot required).
- An on-card PROM eliminates many I.C.'s for a cooler, less power consuming board.
- Does EVERYTHING the other Z-80 boards do, plus supports Z-80 interrupts.
- Complete documentation included. (User must furnish software)

The Z-80 PLUS turns your Apple into a CP/M based computer. This means you can access the largest body of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

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Analog to Digital Converter

- 8 Channels
- 8 Bit Resolution
- On Board Memory
- Fast Conversion (.078 ms per channel)
- Eliminates The Need To Wait For A/D Conversion (just PEEK at data)
- A/D Process Totally Transparent to Apple (looks like memory)

The analog to digital conversion takes place on a continuous, channel sequencing basis. Data is automatically transferred to on board memory at the end of each conversion. No A/D converter could be easier to use.

Our A/D board comes standard with 0, 10V full scale inputs. These inputs can be changed by the user to 0, -10V, or -5V, +5V or other ranges as needed.

Information on temperature sensors is given in manual.
The user connector has +12 and -12 volts on it so you can power your sensors.

Accuracy	0.3%	Input Resistance	20K Ohms Typ

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Insoft, Inc.
10175 S.W. Barbur Blvd, Suite 202B
Portland, OR 97219
(503) 244-4181

The Desecration is the first in a series of "Adventurecades" from Mind Games. You are the Intergalactic Assassin, infamous for your unique methods and numerous accomplishments throughout the known universe. Your task: the deliverance of the Dendoron Galaxy from the parasitic desecration of the Pykronian Empire. You must survive the unyielding bombardment of the Air Command and escape the crossfire of the deadly android patrol. Intersperses three arcades within an adventure. As an added bonus, the arcade sections may be played separately from the adventure. High resolution pictures have been professionally drawn using a palette of nearly two hundred colors and depict a realism that must be experienced. In Assembly language, requires an Apple II or II Plus with 48K and DOS 3.3.
Mind Games, Inc.
420 So. Beverly Drive, Suite 207
Beverly Hills, CA 90212
(213) 277-8044

Pill Box is a new game that places you as the last hope of the Allied Forces. You must face and destroy an endless stream of enemy tanks. From your "pillbox" hidden in the hills above, you must track them on your radar screen, take aim and wipe them out. Be careful, these crafty devils may spot you. Features the most exciting Hi-Res with super graphics, full 3-D coordinates, full color. Requires an Apple II or II Plus with 48K and DOS 3.3 with joystick or paddles - $39.95.
Lord of the Games
P. O. Box 6592
Rochester, MN 55901
(800) 328-9002

Abuse is a new, interactive insult program that turns the tables on the Eliza-type programs of the past. This unpredictable piece of software concocts its own insults and is capable of literally millions of different responses.
Don't Ask Computer Software
2265 Westwood Blvd. B-150
Los Angeles, CA 90064
(213) 397-8811

Multi-player action for the whole family highlights **New World**. Each of three players leads an expedition to the New World in a game of conquest and colonization, set in the year 1495. Representing England, France, or Spain, the player tries to achieve supremacy over his two opponents, human or computer, by building colonies in North and South America. The player recruits colonists and soldiers and purchases supplies to ready his ships for their transatlantic crossing. Hazardous weather conditions and cutthroat pirates hamper the player's success. And when he reaches the New World, disease, bankruptcy and warfare threaten his colonies' survival - $29.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
Automated Simulations/EPYX

Star Warrior, a science fiction adventure, has received the "Best Science Fiction Fantasy Computer Game" of the year award from *Electronic Games* magazine. The player is an interplanetary avenger, who must single-handedly take on an entire planetary occupation force. Armed with sophisticated electronic direction-finding equipment, decoys to fool the enemy, nuclear missiles, blaster and power-gun, the player can walk, jump, or even fly over swamps, forests and mountains. There is a choice of two scenarios, 19 command options and five levels of skill, combined with sound effects and graphics display - $39.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
Automated Simulations/EPYX
1043 Kiel Court
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Seek the Gem of Immortality by playing **The Serpent's Star**. Graphics provide animation in Ultravision. Full screen animation, sound effects and a challenging adventure make this the graphics adventure of choice. This second in a series of daring and entertaining animated adventures takes Mac Steele into the mysterious and hostile Himalayas of Tibet - $39.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
Ultrasoft
24001 SE 103rd Street
Issaquah, WA 98027
(206) 392-1353

Single's Night At Molly's consists of two challenging solitaire card games - Royal Flush and Sly Fox. Both games feature Hi-Res graphics and various difficulty levels requiring a considerable amount of strategy and playing skill. No matter how many times either game is played, no two games will ever be exactly alike. Games can be played by one person, or any number of players. Includes a diskette and a 28 page instruction booklet. It requires a 48K Apple II or II Plus and DOS 3.3 - $29.95.
Soft Images
200 Route 17
Mahwah, NJ 07430
(201) 529-1440

King Cribbage is a new version of the age old English card game. The King plays six-card cribbage as dealt from a standard 52-card deck. The program requires an Apple II with 48K and DOS 3.3 - $24.95.
Hayden Book Company

Sargon II, the computer chess champion, permits you to choose from seven levels of play. It's fast and tough, with striking graphics. Every nuance of grand master chess is here: capturing *en passant*; castling; and, if you dare, even the "kibitz" where Sargon will give you a hint - or set a trap. Whether you're a beginner or a champion, you'll enjoy hours and hours with Sargon II; a worthy opponent for you, and a true classic - $34.95.
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Penguin Software
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(312) 232-1984

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Krell Software Corp
1320 Stony Brook Road
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Starcross, a science fiction computer adventure, lets you dock with a starship from the outer fringes of our galaxy and gain access to its mysterious interior. Sold in a unique flying saucer-shaped package, the game comes with everything players need to enter the 22nd Century. A new feature is the addition of a full-color chart, which is needed to successfully complete the game. Adventures in the Interlogic series incorporate software that permits players to use complete sentences, rather than the standard two-word commands.
Infocom, Inc.1

Zork III, a new prose adventure in the Interlogic series, completes the trilogy of Zork personal computer games. You are returned to the Great Underground Empire where a confrontation with The Dungeon Master looms.
Infocom, Inc.
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Lake Zurich, IL 60047
(312) 438-4850

Micromap II is used on a microcomputer to make maps: colored and textured area maps, contour maps, 3-D polyhedron or proportional circle maps, and statistical charts and graphs and perspective views of digital terrain models. Micromap II is written in Applesoft and requires 48K of memory and DOS 3.3 - $650.00. The discrete mapping and contour sections are available for $350.00.
Morgan-Fairfield Graphics
P. O. Box 5457
Seattle, WA 98105
(206) 632-1374

Graphmagic creates diagrams from mathematical data. Pie charts, line graphs, bar graphs, and scatter diagrams are among the options. The program is compatible with DIF data. Requires an Apple II with 48K and DOS 3.3 - $100.00
International Software Marketing
120 E. Washington Street, Suite 421
University Bldg
Syracuse, NY 13202

Font Generator /// is a user-oriented program that was designed to incorporate many of the Apple ///'s powerful built-in features to help in the designing of character fonts. With it you can test out how your font would look before it is saved, and also check out how your font would look in different text modes, even with different foreground and background colors. As many as ten character fonts may be loaded at one time. Also has the capability of copying characters from one font into another one - $40.00. A character Font disk is forthcoming.
Apollo Software
6338 Wisteria Lane
Apollo Beach, FL 33570
(813) 645-3153

Languages (Programming)

System/ASM 3A is an Assembly language development system for beginning machine language programmers and established professionals. It is inexpensive enough for dabblers yet powerful enough for serious applications. Offers a quick two pass assembler, full screen editor, core resident programs, Disk II support for storing programs, Silentype support for hardcopy listings, Language card support, and a 28 page manual. Object disk with manual - $35.00. Manual only - $5.00. At any time a bonafide owner may obtain the current release of the system for $5.00. Requires an Apple II with 48K and DOS 3.3.
The Mike Piaser Company
13400 Thraves
Garfield Heights OH 44125.

Quic-N-Easi PRO is a complete applications development system for the CP/M operating system. The package is designed to help professional programmers make a lot more money by multiplying productivity. Handles formatting data entry, data base management, information processing and report generation. Requires a Z80, CP/M, 64K, 2 drives and an addressable cursor - $399.50. Specify system and disc size.
Quic-N-Easi Products, Inc.
136 Granite Hill Court
Langhorne, PA 19047
(215) 968-5966

Full FORTH Plus for the Apple is a full implementation of FIG FORTH plus a 6502 conditional assembler, integer and floating point arithmetic, string manipulation words, IF-DO, cursor controlled screen editor, sin - le and multi-dimensional arrays, disk virtual memory, and more. Complete documentation includes installation guide and tutorial. An 86 page user's manual is included as is a one year free subscription to the fullFORTH newsletter - $100.00 plus $2.50 shipping.
IDPC Company
Box 11594
Philadelphia, PA 19116
(215) 676-3235

ALD System II is an Assembly language development system. Both the editor and assembler are resident in RAM at the same time. The editor supports the conventional fields used in assembly language. Features auto field tabbing, comments, standard Opcode mnemonics. Permits saving, recalling (using a "speed-reader" for fast loading), inserting and concatenating source files and source file segments. User's manual is very user friendly and complete. Assembler works faster than most on the market today - $75.00.
Insoft
10175 Southwest Barbur Blvd., Suite 202B
Portland, OR 97219

Micro-Window uses Hi-Res graphics to display a programming model which shows, in binary, the contents of all 6502 registers as machine language instructions are executed. It completely simulates a microprocessor system with 2K of RAM starting at address zero. Programs can be loaded into the 2K RAM and run while observing their execution in the model, or instructions can be entered one at a time and immediately executed to see their effect on the current state of the model. Requires an Apple II Plus with 48K and DOS 3.3 - $120.00.
Window Research
13452-A N.E. 175th, Suite 218
Woodinville, WA 98072

Menu Generator is a software package for developing computer menu programs on the Apple II. It is a tool for organizing program disks and customizing computer operations. It is easy to use and requires no programming to develop professional menus. It can store data for up to 150 menus. New menus can be developed using data from existing menus as defaults. Its data base has a unique file selection method for adding, editing and deleting menus. Requires a 48K Apple II Plus, one disk drive, DOS 3.3 and optional printer - $39.95.
Crane Software, Inc.
16835 Algonquin, Suite 611
Huntington Beach, CA 92649
(714) 846-8005

Personal

Decision is a very friendly program that guides you to a decision by your response to a series of questions. It can help you with personal decisions such as what car to buy, where to live, where to go on vacation, who to date, what printer to buy, etc. Or it can help you with business decisions such as

which products to develop, where to locate, who to hire, whether to incorporate, etc. Although this program can be fun to use and provide hours of entertainment, the outcome is based on sound decision matrix theory and will therefore give you a valid objective decision based on your answers to its questions. Copyable for personal backup. $29.00 from:
Savant Software
P. O. Box 42888
Suite 64
Houston, TX 77042

Household Inventory Program for the Apple II will store every household items' serial replacement cost and more - $30.00. Specify printer model. $30.
SFA Enterprises, Inc.
P. O. Box 33511
Northglenn, CO 80233

Pathfinder II is a satellite tracking package for the Apple II Plus. Enables you to track circular orbit satellites in real time on a world or U.S. map, or print all data tables and maps on your Epson MX Printer. It can rapidy predict accessible orbits, reference orbits and all orbits between user specified dates. Rapidly compute AOS time, LOS time, time in range, maximum elevation, CPA time, and CPA range. Maintains a disk resident data base of satellite reference data. Requires an Apple II plus with 48K, DOS 3.3, Epson MX80 JR100 printer. Includes a comprehensive users manual - $34.95.
Computer Applications
3628 A Court
Oxnard, CA 93033

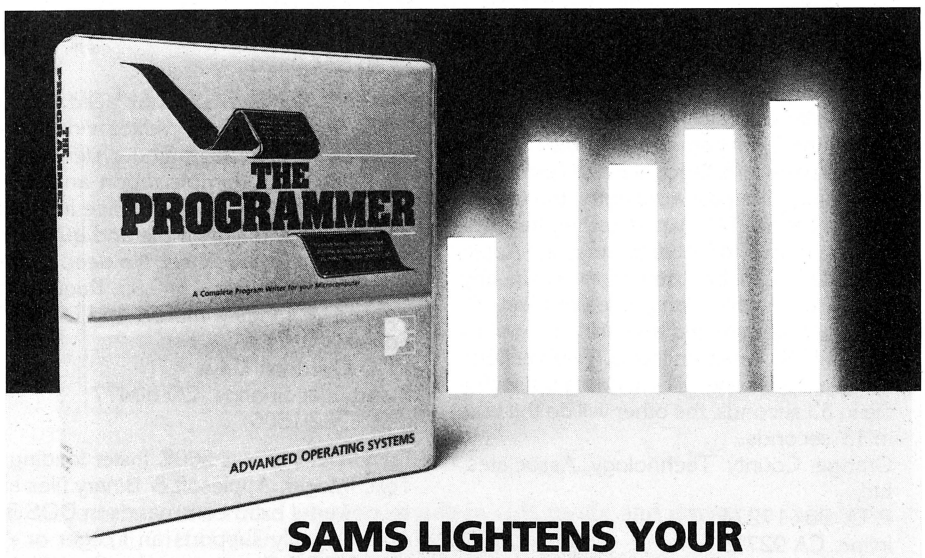
Psychological Diary includes a diary keeper, dream interpreter, personality/relationship testing, super-sophisticated ELIZA, all programmed by psychotherapists using techniques from contemporary therapeutic schools. The diary is locked by a user-supplied password. Features a search feature for user indexing. Saves entries on disk or prints on printer. Written in machine language for fastest execution. For personal growth and self-exploration only; not a substitute for professional psychotherapy - $39.95.
Psychological Systems
1519 Burlington Road
Cleveland Heights, OH 44118

Utilities

Master Utility Disk contains over 20 specialty routines to help you use your Apple II Plus 48K more effectively. Includes Copy Disk, Alphabetize Disk Catalog, Disk Utilities, Disk Freespace, File Address Finder, Morespace, Undelete, Load DOS, Wide Catalog, Track Files, Menu Generator, Memory Display and Search, a random number seeder, Search One Character, Line Cross Reference, Program Re-Create, a quick letter-writing program, Concatenate. Explains how to write self modifying programs and shows you how to change your boot program name - $69.95.
WM Enterprises
9348 Santa Monica Blvd., Suite 101
Beverly Hills, CA 90210
(213) 273-3412

There are many new enhancement programs like Renumber, Print Using and Sort, as well as lots of other useful assembly language routines, many using the ampersand. The **&AMP.LIFIER** will load up to 255 Assembly language routines directly from disk and relocate the Assembly language code. It also will create a menu of "&" instructions so that more than one routine can be used at the same time - $39.95.
Software Technology
11350 McCormick Road
Hunt Valley, MD 21031
(301) 666-3239

Clockware provides Pascal support for the Prometheus Versacard Clock/Calendar. Affords simple access from Apple Pascal programs to all Versacard time and date functions. The Clock may be assigned to any slot. Can be used as external procedures or added to your SYSTEM.LIBRARY as an Intrinsic Unit (instructions included). Includes a variety of demo programs to read time and date and automatically update the system's date on disk at boot time. No need to use Filer's Data keyin any longer. Includes a Hi-Res clock face demo program, source code for demo programs and a full 20 page user manual - $25. Apple



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CP/M version is under development.
RCM Software
815 Friendship Drive
New Concord, OH 43762

Freeloader will link machine language routines to your Applesoft programs. It can also call relocatable or non-relocatable routines by name, number or location and save and link referenced library packs of utilities. Resolve memory conflicts at run time. Links up to 255 utilities, shape tables, etc. Menu driven and user friendly. Unlimited personal backups. Requires an Apple II with 48K and DOS 3.3 or 3.2. $30.00 plus $2.00 handling.
Diskos Software
P. O. Box 190
Hanover, NH 03755

Disk-Lock is a revolutionary new hardware device for the Apple II Plus that offers the end user the ultimate in computer privacy. Although it is extremely simple to use and completely self-contained (requiring no program disk), Disk-Lock provides the prudent user all the protection of the NBS approved Data Encryption Standard (DES) algorithm. Each comes with its own unique access password. Once access is established through the password entry, the user is free to choose his own encoding key employing from 1 to 8 characters of the Apple keyboard. Can be used from within any BASIC or machine language program. All file types are handled and are changed to file type "S" when encoded. Two versions are available - one will encode a 50 sector file in 33 seconds, the other will do the task in 13 seconds.
Orange County Technology Associates, Ltd.
P. O. Box 17274
Irvine, CA 92713
(714) 559-5381

Disk Inspector runs under Z80 CP/M for disk inspection and modification. Acts as a full screen editor for diskettes. Displays sectors on the screen in both character and hex formats. You can make changes and rewrite the sector. Although Disk Inspector runs under CP/M you can inspect and alter normal (non CP/M) Apple diskettes, as well. The disk drives may be single or double density, single or double sided. A Comprehensive manual will show you how to recover an erased file, modify a directory entry, clean up a directory, utilize the CP/M auto-load feature, create multiple directory entries, read and modify non CP/M diskettes, etc. Requires an 80 x 24 screen - $29.95.
Overbeek Enterprises
P. O. Box 726
Elgin, IL 60120

The CP/M Card plugs CP/M Plus into your Apple. Gives you the option of running your Apple II with the speed and capability of a professional Z80 system with CP/M compatible software. This card gives you instant access to the world's largest selection of microcomputer software - more than 3,000 CP/M compatible applications, languages, and programming utilities, yet you still have access to your present library of Apple software. Together, the ultra-fast card and CP/M Plus run applications up to 300% faster than your Apple system. Includes 64K of on-board memory, CP/M Plus, CBASIC, GSX-80 and full documentation - for just $399.
Advanced Logic Systems
1195 East Arques Avenue
Sunnyvale, CA 94086
(800) 538-8177 or (408) 730-0306 (CA)

SXR Plus helps write or change Applesoft programs. It is a sorted cross reference utility that helps you debug, modify and optimize programs. Tailor SXR Plus to your needs while utilizing its many important features including Search - $39.95.
Prasek Computer Systems, Inc.
P. O. Box 2427
Santa Clara, CA 95055
(408) 554-0420

Simple*DOS eliminates the need to know DOS. Simply and easily creates and retrieves Applesoft usable files. The system builds your text file(s). Simple report and listing capability built in. User interface in BASIC allows you to build simple and quick programs. Use immediately. No need to read thick user manuals - $49.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
Softstalker
1376 Overlook Drive
Steamboat Springs, CO 80477
(800) 522-1500

David-DOS allows 500% faster loading of Text, Integer, Applesoft & Binary files and six powerful extra commands in DOS 3.3. Automatically supports an Integer or Applesoft ROM Card in any slot. Speed loads all text files, or lists to screen or printer. Dump binary/ASCII to screen or printer, disassembles binary to screen/printer, prints program address & length. HIDOS DOS command moves itself to 16K RAM card. Catalog free space is also provided as an option. Installs in seconds on any disk - $39.95. Requires an Apple II or II Plus with 48K and DOS 3.3.
David Data
12021 Wilshire Blvd., Suite 212
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The Random House ProofReader is based on the famous Random House Dictionary. It is the result of decades of careful work. It was adapted for computer spelling checking by professional editors, linguists and scholars - so you can depend on it. It shows you the error and the sentence it's in and even let's you correct the mistake without re-editing. And if you don't know how to spell a word, it suggests the spelling. It even corrects your correction. Comes in sizes to fit all systems: 20,000 words (55K), 32,000 words (108K), and 80,000 words (180K). You can add your own words with a single keystroke. Works with all CP/M word processors - $50.00.
Random House ProofReader
Box 339-M
Tijeras, NM 87059
(212) 564-0746

Bank Street Writer turns your Apple computer into a powerful word processor, with many advanced features. Bank Street Writer has no complex codes to memorize. The screen guides you every step of the way. Features automatic word wrap, so you don't have to hyphenate or «RETURN» at the end of each line, potent print format routines all in memory, automatic centering and index, universal search and replace, password protection, document chaining, page headers and automatic page numbering, upper and lowercase without additional hardware. Complete with tutorial and utility programs and a comprehensive reference manual and a free back-up disk. Requires an Apple II or II Plus with 48K and DOS 3.3.
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Books/Catalogs

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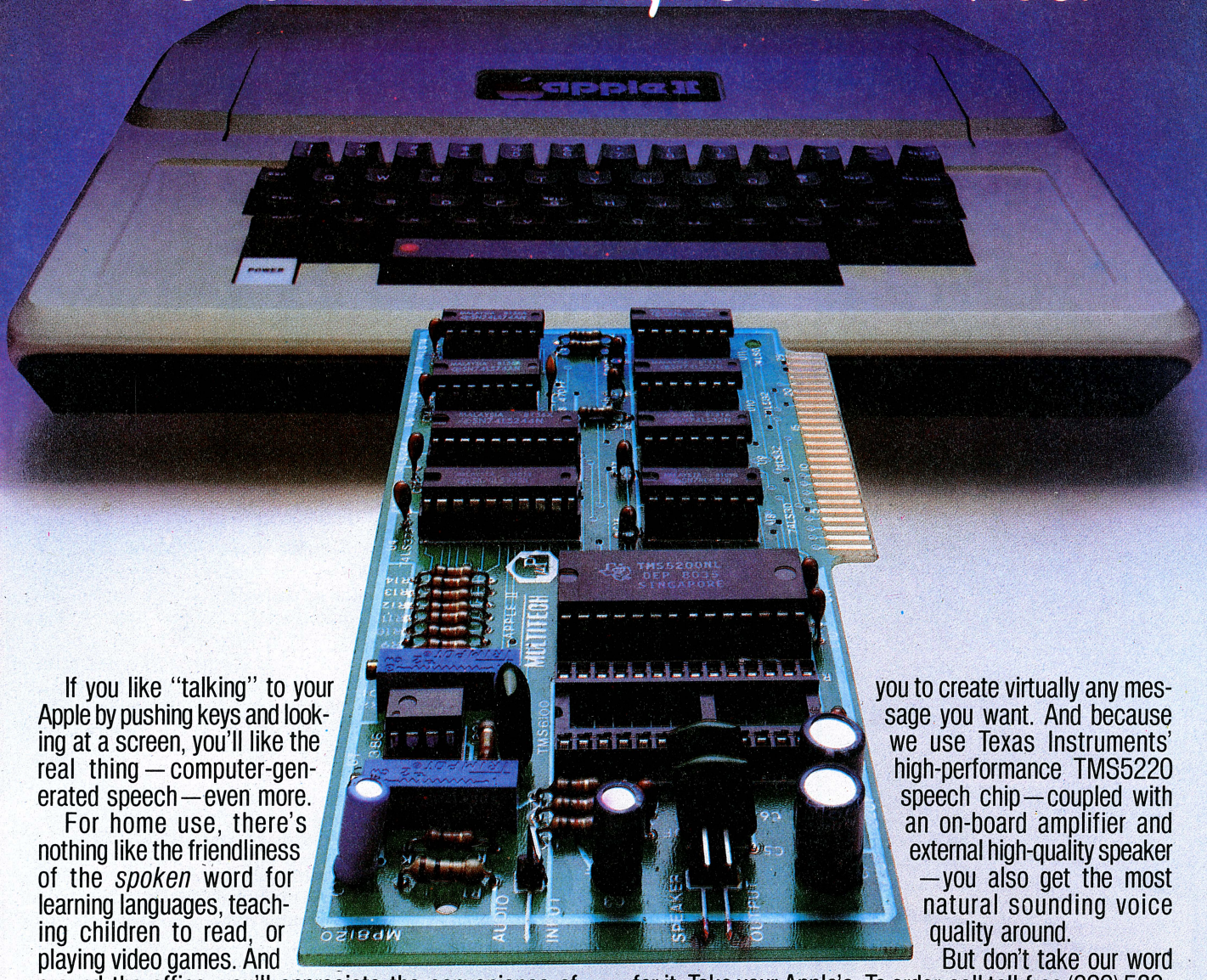

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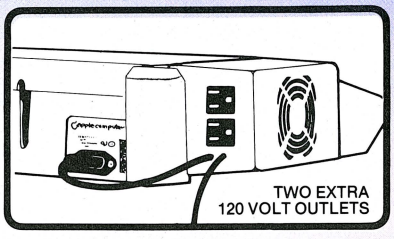

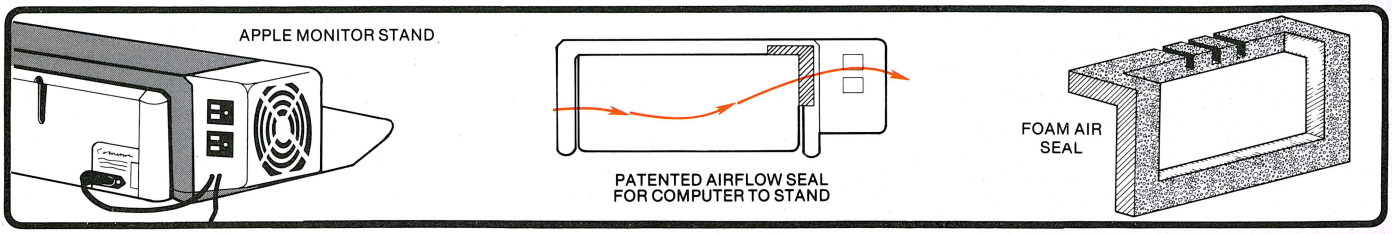

of the machine controlling them? If you haven't the time, or are not sure how to teach them, this book will provide the help you need. Help elementary age children learn BASIC programming with little or no assistance from adults. Important concepts are set off in boxes, and repeated throughout the text. Complete cross-referenced glossary and index to reinforce concepts and clarify definitions - $9.95 plus $1.50 shipping.
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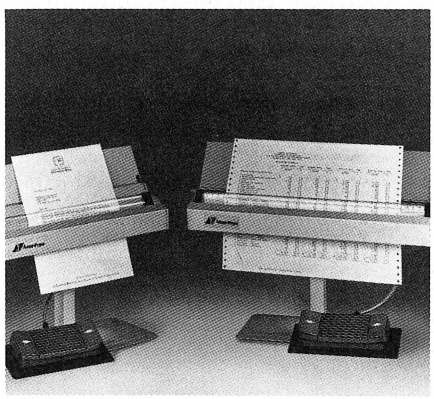
Los Angeles, CA 90024
(213) 477-0047 or (213) 473-7393



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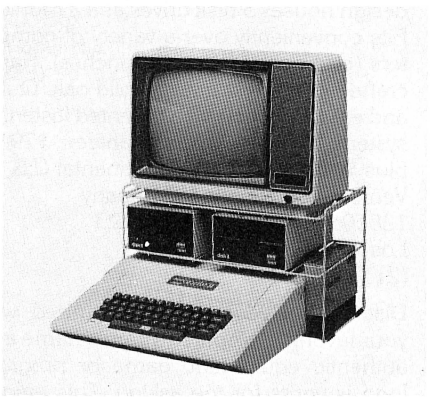

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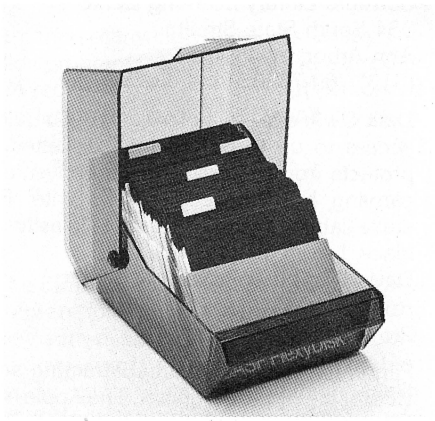

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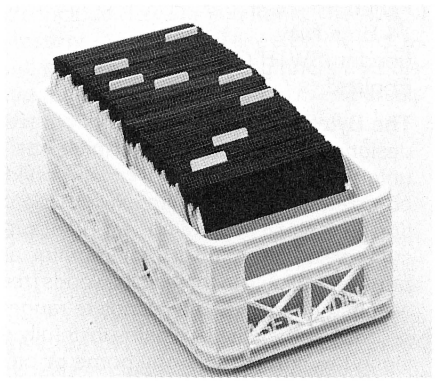

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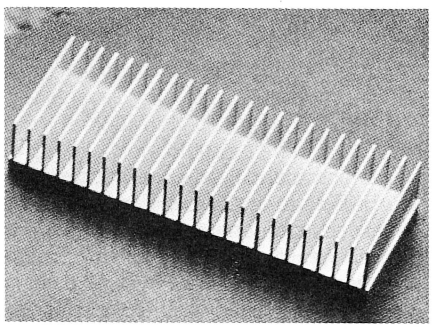

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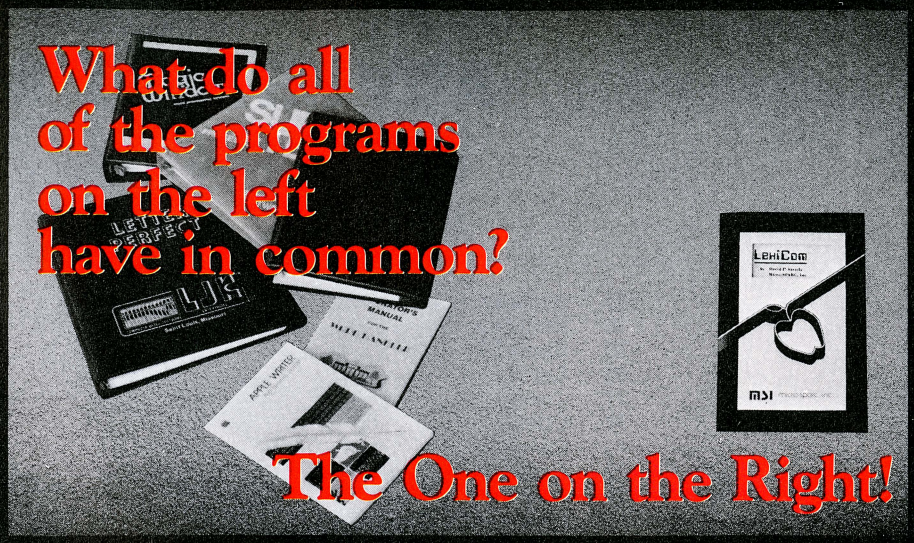

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LexiCom 2.0 is a fast, easy to use conversion package that lets you take a file created by one program and use it with many other programs. LexiCom cross-converts files created by:

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- Convert your Supertext files so that they can be used with Applewriter, Screenwriter, and other word processors.
- Convert Applewriter and Supertext files to Standard Apple Text files, which can be used with other programs, or even transmitted to other computers over phone lines!
- Convert standard Apple Sequential Text files (such as those produced by VisiCalc) into Supertext or Applewriter format so that they can be edited by your word processor. For example, you can convert files you've received from The Source and then edit and print them in any desired format!
- Transfer DataPlot picture files to standard Apple DOS disks so that you can use them within your own programs, or print them with any graphics printer (using your own graphics dump software)!
- Convert your Applesoft programs into text files, which can then be edited, printed or transmitted!

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LexiCom requires an Apple II with Applesoft, at leat one disk drive, and DOS 3.3 (although it will convert files on any DOS).

All of LexiCom's conversion power is yours for $39.95. LexiCom is available from your local Apple dealer; if he does not yet carry LexiCom, mail or phone your order to Micro-SPARC, Inc., P.O. Box 639, Lincoln, MA 01773, (617) 259-9710. Please add $1.50 for shipping and handling; Mass. residents add 5% sales tax. We accept Mastercharge and Visa.

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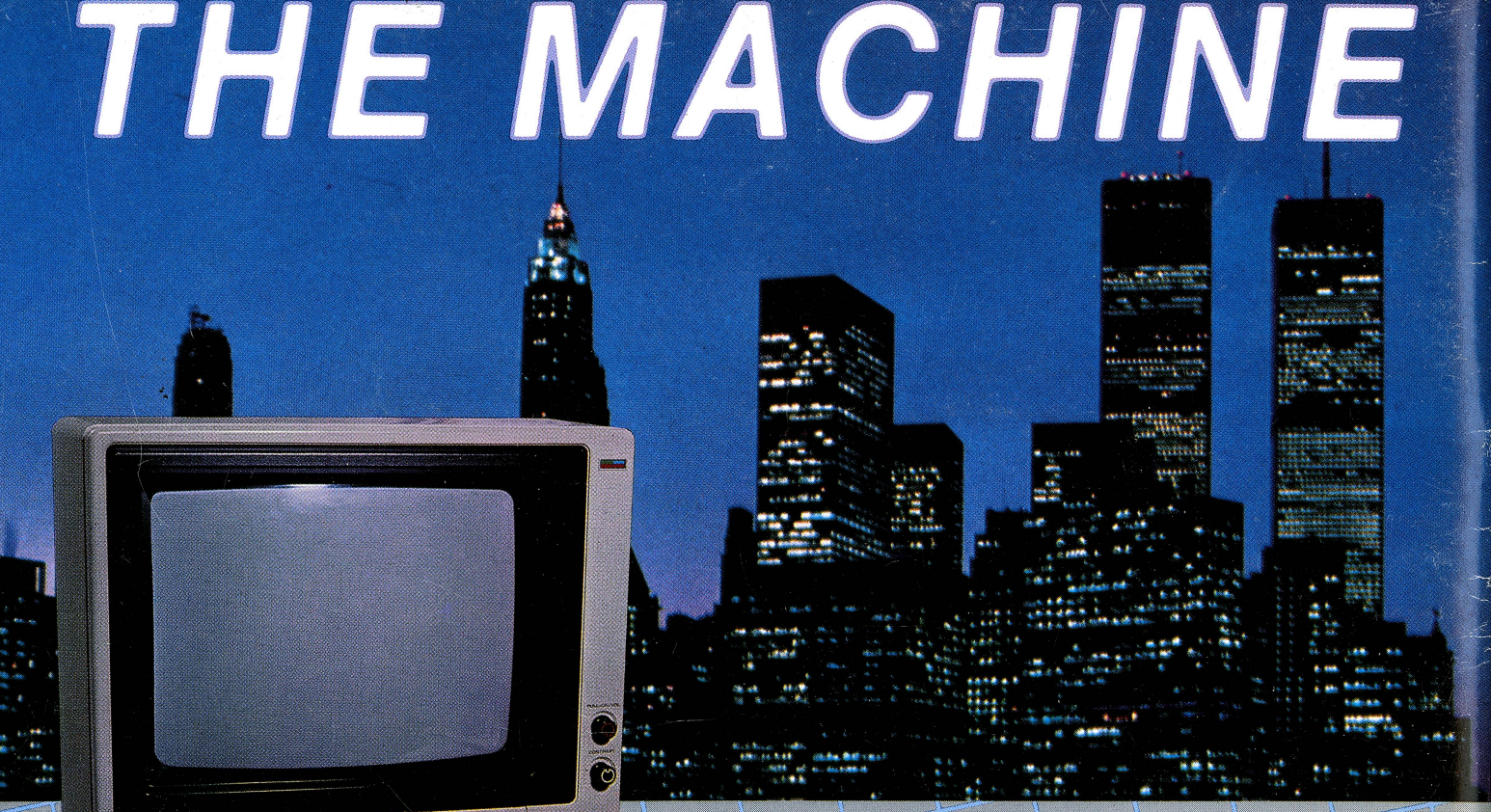
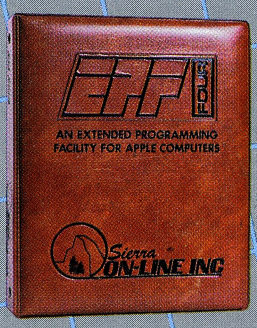


AND THE TOOLS TO MAKE IT WORK



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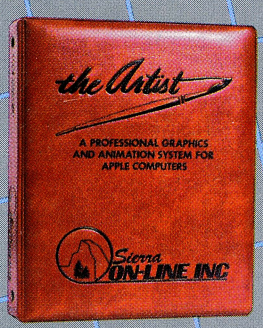

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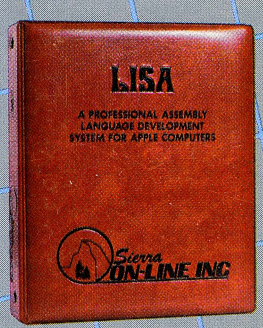

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