



Congratulations! You now own a Symtec Light Pen. This is the finest light pen available for the Apple Computer and meets professional quality and specification standards.

A System equipped with a light pen opens entire new vistas of application for computers. Applications are numerous and include graphics, games, scientific and technical uses as well as educational, exhibit and handicapped uses. Literally any function programmable on your computer, can be controlled by your light pen. Disk control, printer control, light pen music, and lo-res graphic data measurement, and more, are all achievable with a light pen. In fact, programs can be written to allow users to operate your computer without ever requiring the use of the keyboard.

The Symtec Light Pen is also designed to operate with video provided from non-computer sources such as videotape, videodisc, or closed circuit television and can control identification and measurement uses.

We hope that you will enjoy this powerful professional instrument and the new dimensions that it provides to your system.

Symtec, Inc.

WHAT YOU WILL NEED

This manual was in the box. The box should also contain:

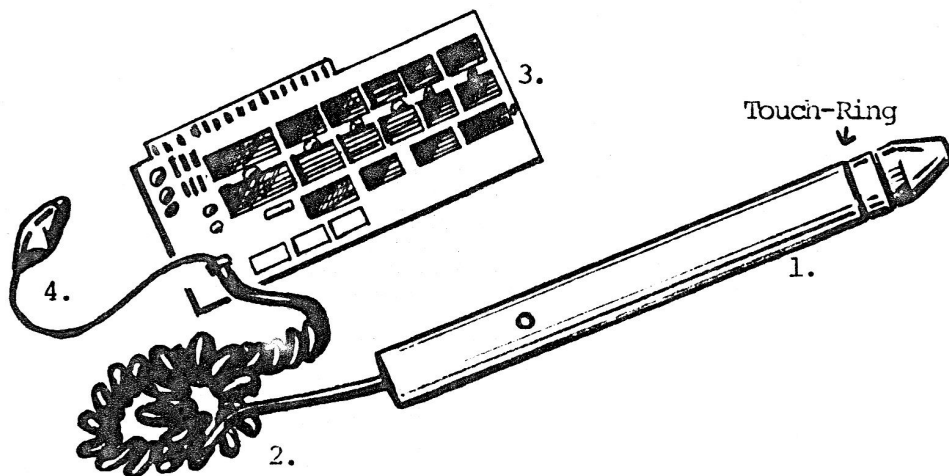
1. Light Pen barrel on a,
2. black telephone cord attached to,
3. the Apple interface card with a,
4. colored wire with a red, covered clip.
5. A 5 1/4" diskette.

On the barrel, just behind the nose of the pen, is the "touch-ring". (NOTE: A Push-Tip Light Pen is available, same price)

You, of course, must supply the Apple computer, and 1 or 2 disk drives. Our diskette is DOS 3.3 if your DOS is 3.2 please call or write us and we'll exchange it for you.

Your light pen can be used on a monitor or color TV. A color TV will require an "RF Modulator" with connecting cables, a monitor (color or B&W) can be hooked up directly with a cable that has a phono plug (male RCA connector) for the Apple and something to match the monitor at the other end. The light pen reacts best to B&W and color screens and can even be adjusted with most sets to respond to areas of the screen normally said to be "black". however, the Light Pen is designed to respond to light from the screen and this implies that a display is on the screen that provides something for the pen to "see". Some TV monitors with green screens do not permit enough light to pass through and the light pen cannot "see" anything on these sets.

If you already have your Apple computer set up you won't have to do much more.

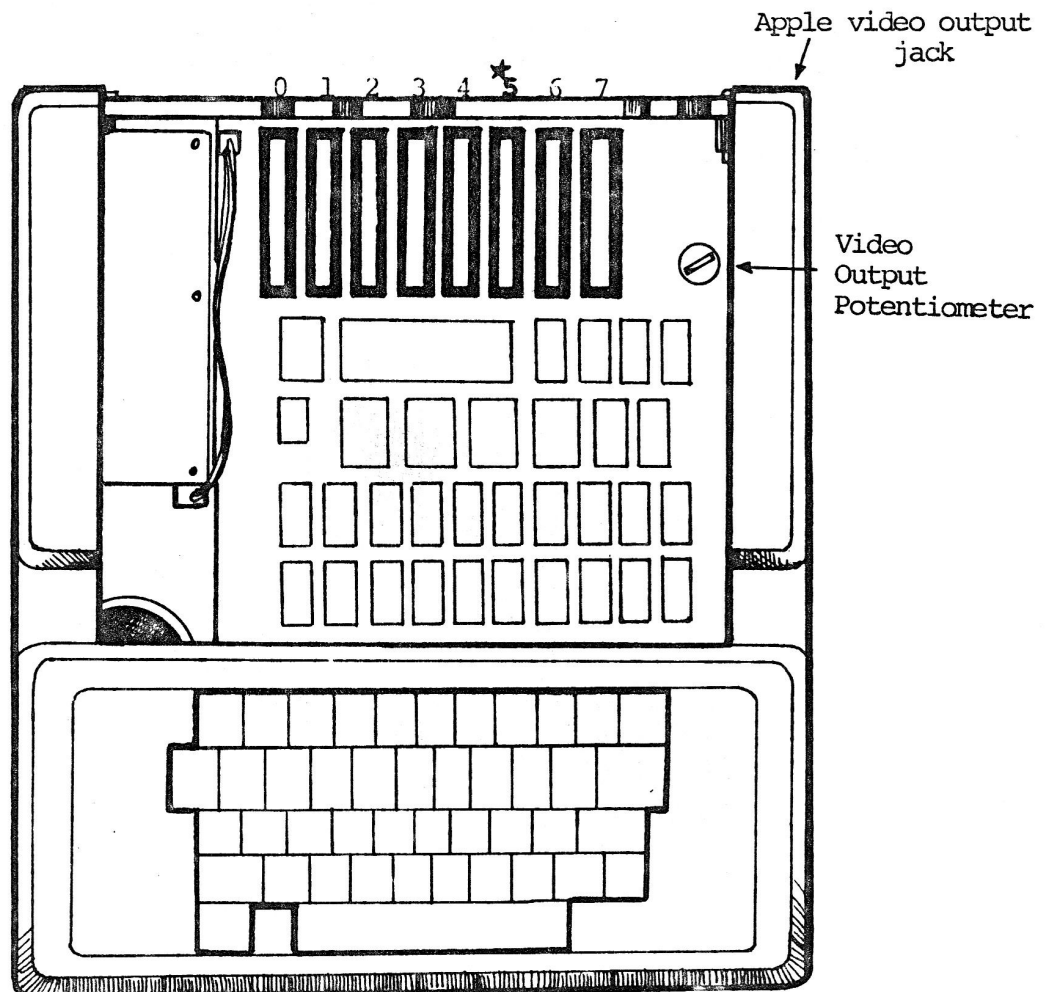


TO INSTALL THE SYMTEC LIGHT PEN IN YOUR COMPUTER PERFORM THE FOLLOWING:

1. Turn the Apple II OFF.
2. Open the lid of the Apple II case.
3. Install the interface card in slot #5*
(see Figure 1). NOTE: The slots are numbered at the back end of the motherboard. When installing the interface card, the components are to the right as you sit in front of the keyboard.
4. Clip the colored wire to the center post of the Apple VIDEO OUTPUT JACK. (Locate the video output jack and the video output potentiometer adjustment screw at the back right corner of the Apple.)
5. Turn the VIDEO OUTPUT POTENTIOMETER fully clockwise.
6. Run the light pen cord through the rear of the case.
7. Leave the lid off and turn the power ON.

You are now ready to align the Pen and register it to your own TV set.

*To operate the light pen in a different slot, refer to page 17.



Put the light pen diskette in and "boot it" by turning the computer on or hit reset then type 6 control-p or pr#6

If the boot is good, on the screen will appear

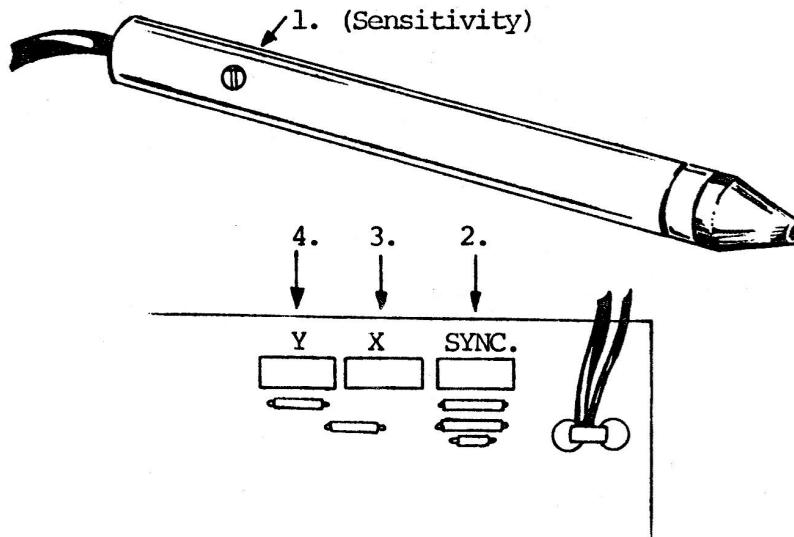
SYMTEC LIGHT PEN DISK
VERSION 2
APPLE DOS 3.3
ALL PROGRAMS COPYRIGHT SYMTEC, INC.

1. LIGHT PEN OPERATED CATALOG
2. CATALOG
3. EXIT

PLEASE TYPE OPTION:

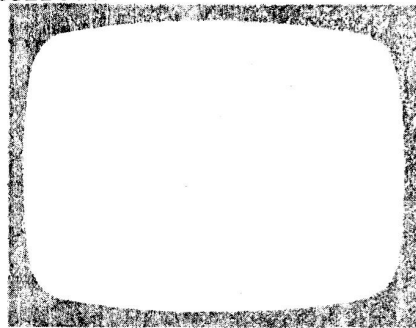
If not, you may have a D.O.S. 3.2 machine or a loose connection between your computer and disk drive. Try again or refer to page 15 of the Applesoft tutorial manual supplied with your Apple.

Now type "2" and hit RETURN. You'll get a catalog of files on the diskette. Type "run startup". There are 4 adjustments you may have to make, they are (1)Sensitivity, (2)Sync, (3)Horizontal alignment (X), (4)Vertical alignment (Y). See below.

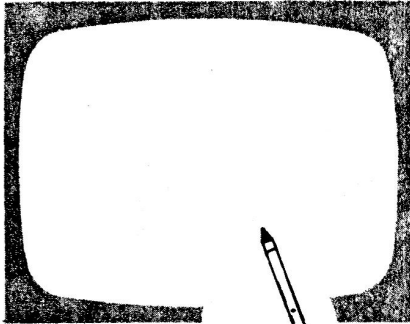


(1) Adjust the sensitivity as instructed on the screen. See below for reference.

Sensitivity Correct

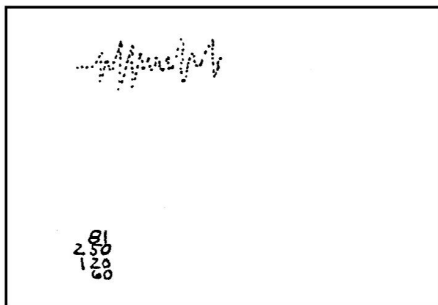


Sensitivity Incorrect

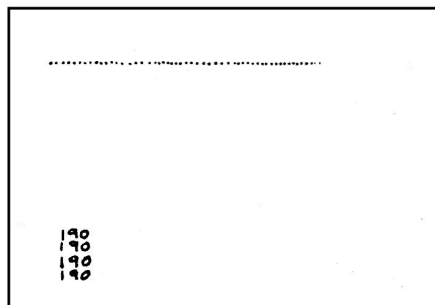


(2) To adjust the "sync", touch the ring and the screen should go black. If a straight line moves left to right and the same numbers appear at the bottom, your light pen is already in sync. If not, turn the sync pot until the numbers are appearing the same and the dots plot a straight line. Once completed, hit RESET, type RUN X Y CHECK, and do adjustments 3 and 4.

Incorrect Sync



Correct Sync



Note: The number 190 is used as an example. Your number may be different.

(3 and 4) This adjustment is for aligning your pen to the exact pixel. 4 dots will appear and their coordinates will be the same as below. To verify that your light pen sees only these dots, turn the brightness down until numbers flash only when you point at one of the 4 dots. Then turn your X and Y pots until the numbers below (the X coordinate is on the left) match. When you are finished hit RESET and type BRUN C to get to the light pen operated catalog.

(20,20)

(250,20)

(20,140)

(250,140)

Now that you have successfully set up your light pen, you are ready to program your light pen. But you need to learn the commands.

THE SEVEN COMMANDS OF THE SYMTEC HIGH RESOLUTION LIGHT PEN
(Applesoft)

1. 29000 POKE -16176,0
this starts the light pen receiving light from the TV screen and calculates the X and Y position of where the pen is being pointed. It stores the numbers in Apple memory.
2. 29010 IF PEEK(-16175)<128 then 29010
this command stalls the program until the entire screen is scanned.
3. 29020 IF PEEK(-16170)<128 then 29020
stalls the program until the ring is touched.
4. 29030 ZY = PEEK(-16173)
this reveals the high resolution Y coordinate to the computer and stores it in variable ZY
5. 29040 ZX = PEEK(-16174)+256*(PEEK(-16172)>127)
this reveals the high resolution X coordinate to the computer, makes adjustments for X values over 255, and stores it in variable ZX
6. 29050 Y =INT(ZY/8)+1
this resolves the Y high resolution coordinate into low resolution format.
7. 29060 X =INT(ZX/7)+1
this does the same conversion to low-res for X as Y
8. 29100 Return

]LIST

```
10 REM MENU EXAMPLE
25 HOME
29 HTAB 20
30 VTAB 1: INVERSE : PRINT "1"
39 HTAB 20
40 VTAB 2: INVERSE : PRINT "2"
49 HTAB 20
50 VTAB 3: INVERSE : PRINT "3"
51 NORMAL
52 VTAB 15: PRINT "PLEASE POINT THE LIGHT PEN AT ONE OF THE NUMBERS"
60 GOSUB 29000
70 IF Y = 1 THEN GOSUB 1000
80 IF Y = 2 THEN GOSUB 2000
90 IF Y = 3 THEN GOSUB 3000
500 GOTO 25
1000 HOME : PRINT "SEGMENT 1 COULD BE A FILE OF A CUSTOMER"
1001 VTAB 10: PRINT "TOUCH RING TO RETURN TO MENU"
1010 FOR G = 1 TO 1000: NEXT G
1020 GOSUB 29000
1040 RETURN
2000 GOTO 2010
2010 HOME : FLASH : PRINT "NEW"
2011 NORMAL : PRINT "HOW MANY LETTERS IN THE ALPHABET?"
2020 VTAB 5: PRINT "29"
2030 VTAB 10: PRINT "26"
2035 VTAB 15: PRINT "23"
2040 GOSUB 29000
2050 AN = Y
2060 IF AN < 10 THEN PRINT "TOO HIGH, TRY AGAIN": GOTO 2011
2070 IF AN > 10 THEN PRINT "TOO LOW, TRY AGAIN": GOTO 2011
2080 IF AN = 10 THEN PRINT "RIGHT!": FOR D = 1 TO 500: NEXT
2100 RETURN
3000 HOME : VTAB 15: PRINT "YOU COULD PUT YOUR CHECKBOOK UNDER THIS SEGMENT"
3010 FOR M = 1 TO 1000: NEXT
3020 VTAB 10: FLASH : PRINT "TOUCH RING TO RETURN TO MENU"
3040 GOSUB 29000
3060 RETURN
29000 POKE - 16176,0
29010 IF PEEK ( - 16175) < 128 THEN 29010
29020 IF PEEK ( - 16170) < 128 THEN 29020
29030 ZY = PEEK ( - 16173)
29040 ZX = PEEK ( - 16174) + 256 * ( PEEK ( - 16172) > 127)
29050 Y = INT (ZY / 8) + 1
29060 X = INT (ZX / 7) + 1
29100 RETURN
```

Type the commands in first whenever you are writing a program to use the light pen and then put in "GOSUB 29000" whenever you want to use the light pen. We recommend the Applesoft Tutorial as a prerequisite for continuing.

You can make a flip chart type program that is activated by the light pen. Type in the 7 commands and the return statement first and then type this:

```
100 VTAB 12:PRINT "1981 was a good year"  
110 GOSUB 29000  
120 VTAB 14:PRINT "1980 was a great year"  
130 GOSUB 29000  
140 VTAB 16:PRINT "1982 will be better!"  
150 GOSUB 29000  
160 HOME:VTAB 12:PRINT"how's that for optimism?"  
170 GOTO 100
```

You must touch the ring before the next print statement will be activated. Try it.

On the following page is an example of a light pen operated menu. Remember that the Apple prints text in the screen mode called 'LORES/TEXT' or resolution of 40 pixels across by 24 down. To make your light pen "see" 40 X 24 we use commands #6 and #7. This enables you to make the light pen coordinates of X and Y equal to VTABS and HTABS. Thus, you can VTAB 1:HTAB 20 and then print the number "1", and know that when the light pen is pointing at the number "1", its x and y coordinates in LORES/TEXT will match(Y will equal 1, X will equal 20). Now you can tell the computer to do a specific task if Y equals 1 and if Y is equal to something else, then do another specific task. Take a minute or two and try this program.

SYMTEC LIGHT PEN SOFTWARE

LIGHT PEN TABLET

WHAT YOU'LL NEED

- .Apple II (with applesoft card) or Apple II Plus, 48K
- .1 or 2 disk drives (Dos 3.3)
- .Color Monitor
- .Symtec High-Res Light Pen
- .Symtec L.P. Diskette

WHAT YOU'LL BE ABLE TO DO

Use the light pen to create colorful graphics or pictures. Designed to work similar to the Apple Graphics Tablet. You can draw in different colors on colored backgrounds. You can touch two dots on the screen and the computer will make a colored box or frame or line using the dots as corners or endpoints. You can touch two dots on the screen and the computer will draw the perimeter of a circle or a colored disk using the first dot as the center and the second dot as the edge of the circle. Or the pen will draw colored dots only! You can save your artwork on disk for future touch-ups or put the picture on another disk to use in a program.

HOW TO START

Hook up the Apple equipment according to the manual. Hook up the Symtec light pen according to the manual and calibrate it to the TV. Then put the Light Pen diskette into disk drive #1. "RUN TABLET"

The first menu you'll see will be the "main menu". Point to "pen mode", touch the ring, okay the choice and the "pen mode" menu will appear. Choose "BACKGROUND COLOR". (You must choose your background color before any other pen mode choice.) Eight colors will be displayed in columns (left to right-black, magenta, ..., etc.). Choose a color by pointing the pen to a color and touching the ring. When the color is chosen the computer will fill the screen with that color background and then display the "pen mode" menu. Choose "pen color", pick a color, then box or disk, etc. and off you go.

MAIN MENU

CLEAR-clears screen
PEN MODE-takes you to "pen mode" menu
DISK COMMANDS-lets you "save" or "load" a picture. You must type the picture name in. Catalog allows you to see what's already on the disk.
DISTANCE-plot two points (by touching the ring) on your picture and the distance (in pixels) will be displayed.
QUIT-lets you go on to another program.

PEN MODE

DRAW-draws in color-when the ring is touched it will draw. When you let go, it won't.
LINES-draws line from first dot to second dot. Dot is plotted when you touch the ring
DOTS-puts colored dots on the screen when ring is touched.
FRAME-uses first dot as upper left corner of frame and second dot as lower right corner. Draws rectangular frame.
BOX-same as frame only the entire inside is filled in color.
CIRCLE-same principle as frame only first dot is center, second dot outside edge of circle.
DISK-same as circle only inside is filled in color.
BACKGROUND COLOR-changes entire screen to one color, which you choose immediately after okaying background color.
PEN COLOR-changes pen color, same way as changing background color.
VIEW PICTURE-lets you view the drawing
MAIN-takes you to main menu

COLOR ANOMALIES

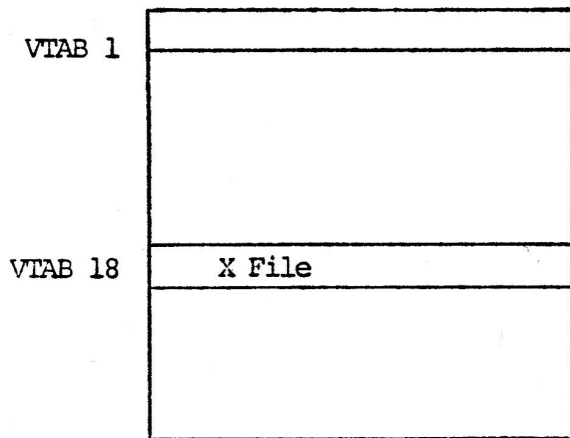
UNUSUAL COLOR EFFECTS

Unusual things happen with color combinations and the Symtec Tablet software program. These dashed lines, zebra stripes, and color shadows are a result of the Apple computer and not your light pen or software. The reason is that in the high resolution graphics mode, there are 280 X 192 or 53,760 pixels that require a "bit" of memory. Multiply that by 8 colors and the Apple would require several hundred thousand bits of information to properly handle an 8 color high resolution picture. A 48K Apple simply cannot handle all the colors.

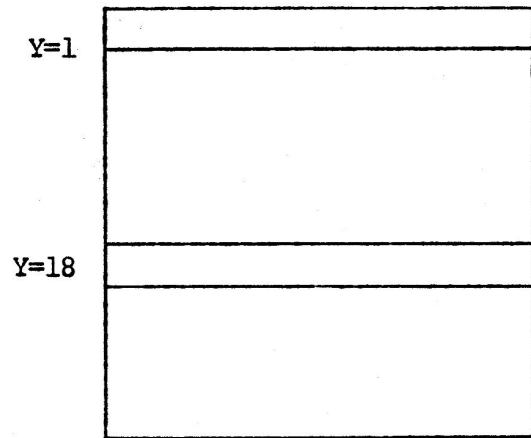
The best way to avoid the "anomalies" is to use only black and white. The functions draw, frame, lines, and circle are most affected, while box, disk, and dots are least bothered by using colors. You can also get better results by using colors in the "1" group with "1"'s and "2"'s with 2's. The "1" group includes the four colors on the left and the "2"'s are the rest, each group has its own black and white.

MENU EXAMPLE is a partially completed menu. Study it and this page to understand the basic idea.

How you view the screen...



How your light pen views the screen...



Whatever you print after VTAB 1 will correspond equally with the "Y" value returned by the light pen. (You have 40 characters with which to print on that line). Thus when you VTAB 18:PRINT "X File" and then GOSUB 29000, the light pen will be pointing at "X File" when Y=18. Then just say "If Y=18 GOTO (X File)

The following programs are on your diskette:

- *A 024 LIGHT PEN TABLET
- *B 006 PEN DRAW OBJ V2
- *B 016 ZPEN DRAW.OBJ
- *A 003 LIGHT PEN DRAW APLSFT
- *I 003 LIGHT PEN DRAW INT BASIC
- *A 003 HELLO
- *I 003 APPLESOFT
- *A 007 ZAPPLESOFT PEN ROUTINE
- *I 026 CHECKERS
- *B 037 HYDRAULICS TUTOR
- *I 008 ZINTEGER PEN ROUTINE
- *A 017 LIGHT PEN CONCENTRATION
- *B 005 C
- *B 002 ZMACHINE CODE PEN ROUTINE
- *A 009 STARTUP
- *A 004 X Y CHECK
- *B 002 YCNT
- *A 005 MENU EXAMPLE

MENUEXAMPLE, STARTUP, and X Y CHECK have already been explained. LIGHT PEN TABLET is explained on the following pages. Programs that have a Z in the front of their file names are machine code programs called by other programs on this diskette. YCNT and PEN DRAW OBJ V2 are binary files called by startup and LIGHT PEN TABLET. HELLO and APPLESOFT are catalog programs. The program C is the light pen operated catalog which will automatically add any new files that you save onto the disk.

LIGHT PEN DRAW has an integer, applesoft, and machine code version. First, choose a background color by typing a B or W (black or white) and then the pen will draw the opposite color. To erase the screen, point at the bottom line. To point at the screen and not draw, touch the ring. To save a drawing, hit RESET, then type BSAVE(picture name),A\$2000,L\$3FFF. To recall a saved picture on disk, type HGR2, hit RETURN and type BLOAD (picture name).

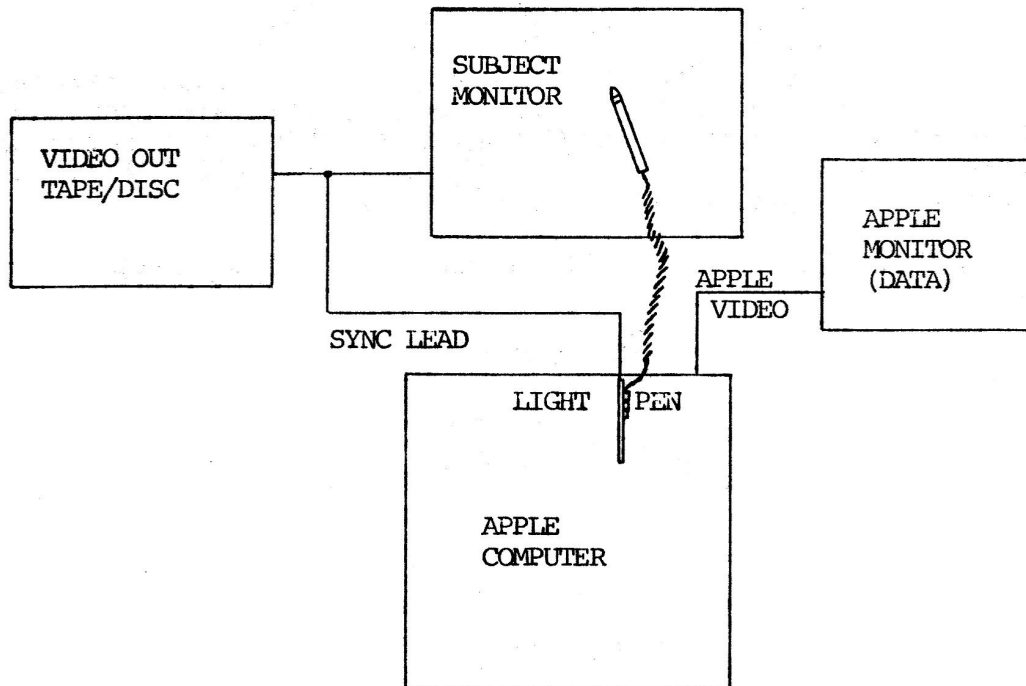
Try LIGHT PEN CONCENTRATION. The object is to match two squares and score a point. To uncover the contents of a square, point the light pen at it and touch the ring. The computer will keep score. You can have 2 players or try your luck against the computer.

CHECKERS requires your computer to have Integer language. First, choose the colors of your checkerboard and players. Point and touch the ring to move a player.

HYDRAULICS TUTOR has its instructions built into it and is an interactive training system. Students use the light pen to take readings and locate the malfunction in the system.

HOW TO USE YOUR SYMTEC HIGH-RES LIGHT PEN WITH VIDEO FROM NON-COMPUTER SOURCES

The Symtec light pen for the Apple has an interesting feature. The pen can be used to measure, trace, etc., video images from a tape recorder, video-disc player, live camera, etc. You'll need another monitor and a source of video. The diagram below shows you how to hook up this system.



THE SCREEN

The Apple Computer sends out signals to the CRT (cathode ray tube) or TV which then displays the message on the screen. The screen mode or picture is a collection of tiny dots or pixels which can be individually colored. The Apple picture does not use all the possible pixels that are available to it from the CRT. It uses a square in the middle that is 280 pixels across and 192 pixels down or most of the screen. When your light pen is pointing to the screen, it "sees" a grid of pixels (280 x 192) or 53,760 dots. It automatically puts the X and Y coordinate in memory. Since it is working with the Apple computer, it can only receive or work with the pixels that it is given or the 53,760 in the square. Sometimes, this accuracy is not necessary because you would be happy to be somewhat near a general area. There are ways to do this with software.

A popular screen mode is called low resolution with text (LORES/TEXT). A LORES/TEXT pixel is actually 4 HIRES pixels high and 7 HIRES pixels wide. To make your light pen "see" only LORES/TEXT pixels you have to tell it that pixels in an area 7 pixels across and 4 pixels deep (28 pixels in all) are the same point. Your light pen always sees individual pixels, so after you find out what the HIRES coordinates are, you have to mathematically convert HIRES to LORES/TEXT. The formulas are below. We mostly convert to the popular LORES/TEXT which is the screen mode your Apple prints text in.

CONVERTING HIRES COORDINATES TO LORES /TEXT OR LORES

LORES/TEXT

$$\begin{aligned} X &= \text{INT}(ZX/7) + 1 \\ Y &= \text{INT}(ZY/8) + 1 \end{aligned}$$

LORES

$$\begin{aligned} X &= \text{INT}(ZX/7) \\ Y &= \text{INT}(ZY/4) \end{aligned}$$

USING A DIFFERENT SLOT

Moving the Symtec Light pen card to a different slot requires that you change the card addresses in the driver routines. If you are willing to do this, you may place the Light Pen card in any slot except #0. The addresses for the peeks and pokes can be calculated as follows:

$$\text{address} = \text{old address} + 16 * (\text{slot \#} - 5)$$

or in hexadecimal*

$$\text{\$CO8X} + \text{\$NO}$$

Where N is slot # and X is card address

The old addresses are:

START	POKE-16176,LINE	\$COD0
DONE	PEEK(-16175)>127	\$COD1
X>255	PEEK(-16172)>127	\$COD4
X	PEEK(-16174)	\$COD2
Y	PEEK(-16173)	\$COD3
RING	PEEK(-16170)>127	\$COD6

SLOT	1	2	3	4	6	7
Start	-16240	-16224	-16208	-16192	-16160	-16144
Done	-16239	-16223	-16207	-16191	-16159	-16143
X	-16238	-16222	-16206	-16190	-16158	-16142
Y	-16237	-16221	-16205	-16189	-16157	-16141
X>255	-16236	-16220	-16204	-16188	-16156	-16140
Ring	-16234	-16218	-16202	-16186	-16154	-16138

Or In Hexidecimal

SLOT	1	2	3	4	6	7
Start	CO90	COA0	COB0	COC0	COE0	COF0
Done	CO91	COA1	COB1	COC1	COE1	COF1
X	CO92	COA2	COB2	COC2	COE2	COF2
Y	CO93	COA3	COB3	COC3	COE3	COF3
X>255	CO94	COA4	COB4	COC4	COE4	COF4
Ring	CO96	COA6	COB6	COC6	COE6	COF6

Section IV. APPENDICES

APPENDIX 1
Subroutine Listings

Machine Code Pen Routine	16
Light Pen Draw	19
Catalog Select Program	32
Integer Pen Routine	42
Applesoft Pen Routine	43
Light Pen Concentration	44

```

0800          1          DCM "PR#1"
0800          2          ;
0800          3          ; MACHINE CODE LIGHT PEN DRIVFR ROUTINE
0800          4          ; ON ENTRY
0800          5          ; RWAIT = 0 FOR NO PEN SWITCH WAIT
0800          6          ;          =-1 FOR PFN SWITCH WAIT
0800          7          ;
0800          8          ; ON FXIT:
0800          9          ; XHIGH,XLOW      = HI-RFS X COORD
0800         10          ; YLOW          = HI-RFS Y COORD
0800         11          ; XLORFS,YLORFS = LORFS COORDS
0800         12          ; XTEXT YTEXT  = TFXT COORDS
0800         13          ;
0800 A9FF      14 LPEN   LDA  #$FF                ;INIT MAX X-COORD
0802 8D3103   15          STA XHIGH
0805 8D3003   16          STA XLOW
0808 8D3203   17          STA YLOW
080B 8D3803   18          STA LINE
080E A528     19          LDA BASE                ;SAVE OLD TEXT BASE ADDRESS
0810 8596     20          STA OLDBAS
0812 A529     21          LDA BASE+1
0814 8597     22          STA OLDBAS+1
0816 EE3803   23 LOOP   INC LINE                ;INCREMENT PEN COORDINATES AROUND
0819 AD3803   24          LDA LINE                ;'TFARDROP' WINDOW UNTIL MINIMUM X IS
081C 8DD0C0   25          STA START                ;START PEN
081F 2CD1C0   26 WAIT   BIT DONE                ;WAIT FOR PEN TO GO DONE
0822 10FB     27          BPL WAIT
0824 2C3903   28          BIT RWAIT                ;IF PEN WAIT IS TRUF (-1)
0827 1005     29          BPL DNT
0829 2CD6C0   30          BIT RING                ;THFN WAIT FOR PFNSWITCH
082C 10F1     31          BPL WAIT
082F ADD4C0   32 DNT   LDA  XOVL                ;GET X OVERFLOW VALUF (0 OR 1)
0831 2A       33          ROL
0832 A900     34          LDA #0
0834 2A       35          ROL
0835 CD3103   36          CMP XHIGH                ;CHECK IF WE HAVE NEW MINIMUM
0838 9008     37          BCC NEWC                ;SO WE CAN SFT UP TO FIND THE
083A ADD2C0   38          LDA XCOORD                ;NFXT VALUF OR SFF IF
083D CD3003   39          CMP XLOW                ;WE HAVE ALREADY HAD A SMALLEST X
0840 B019     40          BCS GREST
0842 ADD4C0   41 NEWC  LDA  XOVL                ;SFT UP A NEW MINIMUM VALUF
0845 2A       42          ROL
0846 A900     43          LDA #0
0848 2A       44          ROL
0849 8D3103   45          STA XHIGH
084C ADD2C0   46          LDA XCOORD
084F 8D3003   47          STA XLOW
0852 ADD3C0   48          LDA YCOORD
0855 8D3203   49          STA YLOW
0858 38       50          SEC
0859 B0BB     51          BCS LOOP
;AND GET ANOTHER VALUE FROM PEN

```

085B		52	PAG		
085B	AD3203	53	GRFST	LDA YLOW	;CALCULATE RFST OF COORDS
085F	4A	54		LSR	;XLORFS = (XHIGH,XLOW)/7
085F	4A	55		LSR	;YLORFS = YLOW/4
0860	8D3403	56		STA YLORES	;XTEXT = (XHIGH,XLOW)/7 + 1
0863	4A	57		LSR	;YTEXT = YLOW/8 + 1
0864	8D3603	58		STA YTEXT	
0867	A907	59		LDA #7	
0869	8D3F03	60		STA YH	
086C	AD3103	61		LDA XHIGH	
086F	8D3D03	62		STA XH	
0872	AD3003	63		LDA XLOW	
0875	8D3C03	64		STA XL	
0878	A900	65	DIVIDE	LDA #0	;DIVIDE XH,XL/YH -> QUOTH
087A	8D3A03	66		STA QUOTL	
087D	8D3B03	67		STA QUOTH	
0880	8D3E03	68		STA YL	
0883	A010	69		LDY #16	;SIXTEEN BITS
0885	0E3A03	70	DIV2	ASL QUOTL	
0888	2E3B03	71		ROL QUOTH	
088B	2E3C03	72		ROL XL	
088F	2E3D03	73		ROL XH	
0891	38	74		SFC	
0892	AD3C03	75		LDA XL	
0895	ED3E03	76		SBC YL	
0898	AA	77		TAX	
0899	AD3D03	78		LDA XH	
089C	FD3F03	79		SBC YH	
089F	9009	80		BCC DIV3	
08A1	8E3C03	81		STX XL	
08A4	8D3D03	82		STA XH	
08A7	EE3A03	83		INC QUOTL	
08AA	88	84	DIV3	DFY	
08AB	D0D8	85		BNF DIV2	
08AD	AD3B03	86		LDA QUOTH	;STORE QUOTIENT IN X-COORD
08B0	8D3503	87		STA XTEXT	
08B3	8D3303	88		STA XLORES	
08B6	AD3603	89		LDA YTEXT	
08B9	20C1FB	90		JSR BASCAL	;GET THE CHARACTER OFF SCREEN
08BC	AC3503	91		LDY XTEXT	
08BF	B128	92		LDA (BASE),Y	
08C1	8D3703	93		STA CHAR	
08C4	EE3503	94		INC XTFXT	;TEXT COORD'S ARE RELATIVE
08C7	EE3603	95		INC YTEXT	;TO ONE NOT ZERO SO INCREMENT
08CA	A596	96		LDA OLDBAS	;RESTORE OLD TEXT BASE ADDRESS
08CC	8528	97		STA BASE	
08CE	A597	98		LDA OLDBAS+1	
08D0	8529	99		STA BASE+1	
08D2	60	100		RTS	

```
8D3      101      PAG
8D3      102  DONE  EQU  $C0D1      ;PEN DONE FLAG
8D3      103  START EQU  $C0D0      ;START AT LINE Q
8D3      104  XOVFL EQU  $C0D4      ;X > 255 FLAG
8D3      105  XCOORD EQU  $C0D2      ;LOW X-COORD
8D3      106  YCOORD EQU  $C0D3      ;Y-COORD
8D3      107  RING  EQU  $C0D6      ;TOUCH SWITCH FLAG
8D3      108  BASCAL EQU  $FBC1      ;CALCULATE TEXT BASE ADDRESS AT BASE
8D3      109  BASE  EPZ  $28      ;TEXT LINE BASE ADDRESS
8D3      110  OLDBAS FPZ  $96
8D3      111  XLOW  EQU  $330      ;X RETURN COORDINATE
8D3      112  XHIGH FOU  $331      ;HIGH PART OF X
8D3      113  YLOW  FOU  $332      ;HIRFS Y-COORD
8D3      114  XLORFS EQU  $333      ;LORFS X-COORD
8D3      115  YLORFS FOU  $334      ;LORFS Y-COORD
8D3      116  XTEXT FOU  $335      ;X TEXT COORD
8D3      117  YTEXT EQU  $336      ;Y TEXT COORD
8D3      118  CHAR  FOU  $337      ;CHARACTER AT TEXT COORD. X,Y
8D3      119  LINE  EQU  $338      ;SCAN LINE OF 'TEARDROP' WINDOW OF MIN
8D3      120  RWAIT EQU  $339      ;PARAMETER TO WAIT FOR PEN SWITCH
8D3      121  QUOTL EQU  $33A
8D3      122  QUOTH EQU  $33B
8D3      123  XL    EQU  $33C
8D3      124  XH    EQU  $33D
8D3      125  YL    EQU  $33E
8D3      126  YH    EQU  $33F
8D3      127  LENGTH EQU  *-LPEN
128      END
```

**** END OF ASSEMBLY

```
*****
*                                           *
* SYMBOL TABLE -- V 1.5 *
*                                           *
*****
```

ABFL. LOC. LABFL. LOC. LABFL. LOC.

* ZERO PAGE VARIABLES:

BASE 0028 OLDBAS 0096

* ABSOLUTE VARIABLES/LABELS

```
.PEN 0800 LOOP 0816 WAIT 081F DNT 082E
JEWK 0842 GREY 085B DIVIDE 0878 DIV2 0885 DIV3 08AA DONE C0D1
START C0D0 XOVFL C0D4 XCOORD C0D2 YCOORD C0D3 RING C0D6 BASCAL FBC1
XLOW 0330 XHIGH 0331 YLOW 0332 XLORES 0333 YLORES 0334 XTEXT 0335
YTEXT 0336 CHAR 0337 LINE 0338 RWAIT 0339 QUOTL 033A QUOTH 033B
XL 033C XH 033D YL 033E YH 033F LENGTH 00D3
```

SYMBOL TABLE STARTING ADDRESS:5800

SYMBOL TABLE LENGTH:012A

```

0800          1          DCM "PR#1"
0900          2          ORG $0900
0900          3          ;
0900          4          ; LIGHT PEN HIRES DRAW SUBROUTINE PACKAGE
0900          5          ; WITH AVERAGING
0900          6          ;
0900 20DA0A    7  MAIN   JSR INIT           ;CLFAR SCREEN
0903 A9FF     8          LDA #$FF         ;HCOLOR = WHITE
0905 8DE90C   9          STA HCLR1
0908 8DF60C  10         STA HCOLOR
090B A9BD    11         LDA #$BD         ;DRAW CLEARING LINE AT BOTTOM
090D 8DED09  12         STA YP
0910 ADED09  13  STLP   LDA YP
0913 A200    14         LDX #0
0915 A000    15         LDY #0
0917 20140B  16         JSR HPOSN
091A A917    17         LDA #23
091C A201    18         LDX #1
091E ACED09  19         LDY YP
0921 20500C  20         JSR HLIN
0924 EEED09  21         INC YP
0927 ADED09  22         LDA YP
092A C9C0    23         CMP #$C0
092C D0F2    24         BNF STLP
092F A900    25  ST1    LDA #0           ;ZFRO TOTALS
0930 8DF709  26         STA XA
0933 8DF809  27         STA XA+1
0936 8DF909  28         STA YA
0939 8DFA09  29         STA YA+1
093C A208    30         LDX #8           ;GFT A LIGHT PEN NUMBER
093E 208B0A  31  LOOP1 JSR LPFN
0941 ADE709  32         LDA XA
0944 6DD50A  33         ADC XLOW
0947 8DF709  34         STA XA
094A ADE809  35         LDA XA+1
094D 6DD60A  36         ADC XHIGH
0950 8DE809  37         STA XA+1
0953 18      38         CLC           ;YA = YA + YLOW
0954 ADE909  39         LDA YA
0957 6DD70A  40         ADC YLOW
095A 8DE909  41         STA YA
095D A900    42         LDA #0
095F 6DEA09  43         ADC YA+1
0962 8DEA09  44         STA YA+1
0965 CA      45         DEX           ;IF LAST ONE THE PLOT
0966 D0D6    46         BNF LOOP1
0968 ADE909  47         LDA YA           ;YP = YA
096B 8DED09  48         STA YP
096E ADEA09  49         LDA YA+1
0971 8DEE09  50         STA YP+1
0974 ADE709  51         LDA XA           ;XP = XA
0977 8DFB09  52         STA XP
097A ADE809  53         LDA XA+1
097D 8DFC09  54         STA XP+1
0980 20F209  55         JSR DIV8       ;XP=XP/8 : YP=YP/8
0983 ADED09  56         LDA YP           ;NOW PLOT THE POINT
0986 AEFB09  57         LDX XP
0989 ACEC09  58         LDY XP+1
098C 20620B  59         JSR HPLOT

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098F		60	PAG	
098F	208B0A	61	LOOPM JSR LPEN	;NOW GET REST OF POINTS
0992	2CD6C0	62	BIT RING	
0995	303B	63	BMI WTRING	
0997	ADD70A	64	LDA YLOW	;CLFAR SCREEN IF Y>188
099A	C9BD	65	CMP #SBD	
099C	9003	66	BCC ST23	
099E	4C0009	67	JMP MAIN	
09A1	20060A	68	ST23 JSR MPY7	;XP = (7*XP + ZX)
09A4	18	69	CLC	
09A5	ADEB09	70	LDA XP	
09A8	6DD50A	71	ADC XLOW	
09AB	8DEB09	72	STA XP	
09AF	ADEC09	73	LDA XP+1	
09B1	6DD60A	74	ADC XHIGH	
09B4	8DFC09	75	STA XP+1	
09B7	18	76	CLC	;YP = (7*YP + ZY)
09B8	ADEF09	77	LDA YP	
09BB	6DD70A	78	ADC YLOW	
09BE	8DEF09	79	STA YP	
09C1	ADEF09	80	LDA YP+1	
09C4	6900	81	ADC #0	
09C6	8DEF09	82	STA YP+1	
09C9	20F209	83	JSR DIV8	;XP=XP/8 : YP=YP/8
09CC	205C0A	84	JSR PLOT	;NOW PLOT
09CF	4C8F09	85	JMP LOOPM	
09D2	2CD6C0	86	WTRING BIT RING	
09D5	30FB	87	BMI WTRING	
09D7	4C2E09	88	JMP ST1	
09DA	AD56C0	89	RETURN LDA \$C056	
09DD	AD54C0	90	LDA \$C054	
09E0	AD53C0	91	LDA \$C053	
09E3	AD51C0	92	LDA \$C051	
09E6	60	93	RTS	
09E7	0000	94	XA HFX 0000	
09E9	0000	95	YA HFX 0000	
09EB	0000	96	XP HFX 0000	
09ED	0000	97	YP HEX 0000	
09EF	00	98	T1 HEX 00	
09F0	00	99	T2 HFX 00	
09F1	00	100	T3 HFX 00	

09F2	101		PAG	
09F2	102	;		
09F2	103	;	DIVIDE XP,YP BY 8	
09F2	104	;		
09F2 A203	105	DIV8	LDX #3	;SHIFT RIGHT 3 TIMES
09F4 18	106	DIVL	CLC	
09F5 6EEC09	107		ROR XP+1	
09F8 6EFB09	108		ROR XP	
09FB 18	109		CLC	
09FC 6EEE09	110		ROR YP+1	
09FF 6EED09	111		ROR YP	
0A02 CA	112		DFX	
0A03 D0EF	113		BNE DIVL	
0A05 60	114		RTS	
0A06	115	;		
0A06	116	;	MULTIPLY XP,YP BY 7	
0A06	117	;		
0A06 A202	118	MPY7	LDX #2	
0A08 ADEB09	119		LDA XP	
0A0B 8D580A	120		STA XT	
0A0E ADEC09	121		LDA XP+1	
0A11 8D590A	122		STA XT+1	
0A14 ADED09	123		LDA YP	
0A17 8D5A0A	124		STA YT	
0A1A ADEE09	125		LDA YP+1	
0A1D 8D5B0A	126		STA YT+1	
0A20 18	127	MPYL	CLC	
0A21 2F580A	128		ROL XT	
0A24 2F590A	129		ROL XT+1	
0A27 18	130		CLC	
0A28 2F5A0A	131		ROL YT	
0A2B 2F5B0A	132		ROL YT+1	
0A2E 18	133		CLC	
0A2F ADFB09	134		LDA XP	
0A32 6D580A	135		ADC XT	
0A35 8DFB09	136		STA XP	
0A38 ADFC09	137		LDA XP+1	
0A3B 6D590A	138		ADC XT+1	
0A3E 8DEC09	139		STA XP+1	
0A41 18	140		CLC	
0A42 ADED09	141		LDA YP	
0A45 6D5A0A	142		ADC YT	
0A48 8DFD09	143		STA YP	
0A4B ADEE09	144		LDA YP+1	
0A4E 6D5B0A	145		ADC YT+1	
0A51 8DEF09	146		STA YP+1	
0A54 CA	147		DFX	
0A55 D0C9	148		BNE MPYL	
0A57 60	149		RTS	
0A58 0000	150	XT	ADR \$0000	
0A5A 0000	151	YT	ADR \$0000	

0A5C	152		PAG
0A5C	153	;	
0A5C	154	;	PLOT HLIN TO X,Y
0A5C	155	;	
0A5C	ADED09	156	PLOTP LDA YP
0A5F	C9BD	157	CMP #\$BD
0A61	9005	158	BCC PP1
0A63	A9BC	159	LDA #\$BC
0A65	8DED09	160	STA YP
0A68	ADEC09	161	PP1 LDA XP+1
0A6B	F011	162	BEQ PP3
0A6D	ADEB09	163	LDA XP
0A70	C916	164	CMP #\$16
0A72	900A	165	BCC PP3
0A74	A901	166	LDA #1
0A76	8DFC09	167	STA XP+1
0A79	A916	168	LDA #\$16
0A7B	8DFB09	169	STA XP
0A7E	ADEB09	170	PP3 LDA XP
0A81	AEFC09	171	LDX XP+1
0A84	ACED09	172	LDY YP
0A87	20500C	173	JSR HLIN
0A8A	60	174	RTS

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0A8B      175          PAG
0A8B      176          ;
0A8B      177          ; MACHINE CODE LIGHT PEN DRIVER ROUTINE
0A8B      178          ;
0A8B      179          ; ON EXIT:
0A8B      180          ; XHIGH,XLOW      = HI-RFS X COORD
0A8B      181          ; YLOW          = HI-RES Y COORD
0A8B      182          ;
0A8B A9FF      183 LPEN      LDA #$FF
0A8D 8DD60A    184          STA XHIGH
0A90 8DD50A    185          STA XLOW
0A93 8DD70A    186          STA YLOW
0A96 8DD80A    187          STA LINE          ;LOOP FOR PEN COORDINATES
0A99 EED80A    188 LOOP      INC LINE          ;INCREMENT AROUND 'TEARDROP'
0A9C ADD80A    189          LDA LINE          ;UNTIL MINIMUM X IS FOUND
0A9F 8DD0C0    190          STA START          ;START PEN AT LINE Q
0AA2 2CD1C0    191 WAIT      BIT DONE          ;WAIT FOR PEN TO GO DONE
0AA5 10FB      192          BPL WAIT
0AA7 ADD4C0    193 DNT       LDA XOVL          ;GET X OVERFLOW VALUE (0 OR 1)
0AAA 2A        194          ROL
0AAB A900      195          LDA #0
0AAD 2A        196          ROL
0AAE CDD60A    197          CMP XHIGH          ;IF LOWER THAN OLD X
0AB1 9009      198          BCC NEWC          ;THEN SET NEW MINIMUM X COORD
0AB3 ADD2C0    199          LDA XCOORD
0AB6 CDD50A    200          CMP XLOW
0AB9 9001      201          BCC NEWC
0ABB 60        202          RTS
0ABC ADD4C0    203 NFWC      LDA XOVL          ;SET UP A NFW MINIMUM VALUF
0ABF 2A        204          ROL
0AC0 A900      205          LDA #0
0AC2 2A        206          ROL
0AC3 8DD60A    207          STA XHIGH
0AC6 ADD2C0    208          LDA XCOORD
0AC9 8DD50A    209          STA XLOW
0ACC ADD3C0    210          LDA YCOORD
0ACF 8DD70A    211          STA YLOW
0AD2 4C990A    212          JMP LOOP          ;AND GET ANOTHER VALUF FROM PEN
0AD5        213 DONF      FQU $C0D1
0AD5        214 START    FQU $C0D0
0AD5        215 XOVL     EQU $C0D4
0AD5        216 XCOORD   FQU $C0D2
0AD5        217 YCOORD   EQU $C0D3
0AD5        218 RING     FQU $C0D6
0AD5        219 BASCAL   EQU $FBC1
0AD5 00        220 XLOW     HEX 00
0AD6 00        221 XHIGH    HEX 00
0AD7 00        222 YLOW     HEX 00
0AD8 00        223 LINE     HEX 00
0AD9 00        224 RWAIT    HEX 00

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0ADA	225		PAG	
0ADA	226		;	
0ADA	227		; INITIALIZE SCREEN	
0ADA	228		;	
0ADA	A940	229	INIT LDA #\$40	;INIT PAGE 2
0ADC	8DF80C	230	STA HPAG	
0ADF	AD57C0	231	LDA HIRES	;SET HIRES DISPLAY MODE
0AE2	AD52C0	232	LDA \$C052	;NO TEXT
0AE5	AD55C0	233	LDA \$C055	;PAGE 2
0AE8	AD50C0	234	LDA TXTCLR	;SET GRAPHICS DISPLAY MODE
0AEB	A900	235	HCLR LDA #0	;SET FOR BLACK BACKGROUND
0AED	8DE90C	236	BKGND0 STA HCLR1	
0AF0	ADF80C	237	BKGND LDA HPAG	
0AF3	85E9	238	STA SHAPEH	;INIT HI-RES SCREEN MEMORY
0AF5	0910	239	ORA #\$10	
0AF7	85E1	240	STA HBASH	
0AF9	A000	241	LDY #0	;FOR CURRENT PAGE, NORMALLY
0AFB	84E0	242	STY HBASL	
0AFD	84E8	243	STY SHAPEL	;\$2000-3FFF OR \$4000-5FFF
0AFF	ADF90C	244	BKGND1 LDA HCLR1	
0B02	91E8	245	STA (SHAPFL),Y	
0B04	91E0	246	STA (HBASL),Y	
0B06	C8	247	INY	
0B07	D0F6	248	BNE BKGND1	
0B09	E6E9	249	INC SHAPEH	
0B0B	F6E1	250	INC HBASH	
0B0D	A5E1	251	LDA HBASH	
0B0F	291F	252	AND #\$1F	
0B11	D0EC	253	BNE BKGND1	
0B13	60	254	RTS	

OB14	255	PAG
OB14	256	;
OB14	257	; HI=RES GRAPHICS POSITION AND
OB14	258	; PLOT SUBROUTINES
OB14	259	;
OB14	260	; ENTFR:
OB14	261	; Y - A REG.
OB14	262	; XL- X REG.
OB14	263	; XH- Y REG.
OB14	8DF50C	264 HPOSN STA YO
OB17	8EF30C	265 STX XOL
OB1A	8CF40C	266 STY XOH
OB1D	48	267 PHA
OB1F	29C0	268 AND #SCO
OB20	85E0	269 STA HBASL
OB22	4A	270 LSR
OB23	4A	271 LSR
OB24	05E0	272 ORA HBASL
OB26	85E0	273 STA HBASL
OB28	68	274 PLA
OB29	85E1	275 STA HBASH
OB2B	0A	276 ASL
OB2C	0A	277 ASL
OB2D	0A	278 ASL
OB2E	26E1	279 ROL HBASH
OB30	0A	280 ASL
OB31	26E1	281 ROL HBASH
OB33	0A	282 ASL
OB34	66E0	283 ROR HBASL
OB36	A5E1	284 LDA HBASH
OB38	291F	285 AND #\$1F
OB3A	0DF80C	286 ORA HPAG
OB3D	85E1	287 STA HBASH
OB3F	8A	288 TXA
OB40	C000	289 CPY #0
OB42	F005	290 BEQ HPOSN2
OB44	A023	291 LDY #\$23
OB46	6904	292 ADC #4
OB48	C8	293 HPOSN1 INY
OB49	F907	294 HPOSN2 SBC #\$07
OB4B	B0FB	295 BCS HPOSN1
OB4D	8CF70C	296 STY HNDX
OB50	AA	297 TAX
OB51	BD020C	298 LDA MSKTEL-\$F9,X
OB54	8DEB0C	299 STA HMASK
OB57	98	300 TYA
OB58	4A	301 LSR
OB59	ADF60C	302 LDA HCOLOR
OB5C	8DF90C	303 HPOSN3 STA HCLR1
OB5F	B02F	304 BCS CSHFT2
OB61	60	305 RTS
OB62	306	;
OB62	20140B	307 HPLOT JSR HPOSN
OB65	ADE90C	308 LDA HCLR1
OB68	51E0	309 EOR (HBASL),Y
OB6A	2DEB0C	310 AND HMASK
OB6D	51E0	311 EOR (HBASL),Y
OB6F	91E0	312 STA (HBASL),Y
OB71	60	313 RTS

OB72	314		PAG
OB72	315	;	
OB72	316	;	L,R,U,D SUBROUTINES
OB72	317	;	
OB72	102A	318	LFTRT BPL RIGHT
OB74	ADEF0C	319	LEFT LDA HMASK
OB77	4A	320	LSR
OB78	B006	321	BCS LEFT1
OB7A	49C0	322	FOR #\$C0
OB7C	8DEF0C	323	LR1 STA HMASK
OB7F	60	324	RTS
OB80	88	325	LEFT1 DEY
OB81	1002	326	BPL LFFT2
OB83	A027	327	LDY #\$27
OB85	A9C0	328	LEFT2 LDA #\$C0
OB87	8DEF0C	329	NEWNDX STA HMASK
OB8A	8CF70C	330	STY HNDX
OB8D	ADE90C	331	CSHIFT LDA HCLR1
OB90	0A	332	CSHFT2 ASL
OB91	C9C0	333	CMP #\$C0
OB93	1008	334	BPL RTS1
OB95	ADE90C	335	LDA HCLR1
OB98	497F	336	FOR #\$7F
OB9A	8DF90C	337	STA HCLR1
OB9D	60	338	RTS1 RTS
OB9E	ADEF0C	339	RIGHT LDA HMASK
OBA1	0A	340	ASL
OBA2	4980	341	FOR #\$80
OBA4	30D6	342	BMI LR1
OBA6	A981	343	LDA #\$81
OBA8	C8	344	INY
OBA9	C028	345	CPY #\$28
OBAB	90DA	346	BCC NEWNDX
OBAD	A000	347	LDY #\$00
OBAF	B0D6	348	BCS NEWNDX
OBb1	18	349	LRUDX1 CLC
OBb2	ADEF0C	350	LRUDX2 LDA SHAPEX
OBb5	2904	351	AND #\$04
OBb7	F02C	352	BEQ LRUD4
OBb9	A97F	353	LDA #\$7F
OBbb	2DEF0C	354	AND HMASK
OBbE	31E0	355	AND (HBASL),Y
OBC0	D01F	356	BNE LRUD3
OBC2	EFFA0C	357	INC COLLSN
OBC5	A97F	358	LDA #\$7F
OBC7	2DEF0C	359	AND HMASK
OBCA	1015	360	BPL LRUD3
OBCc	18	361	LRUD1 CLC
OBCD	ADEF0C	362	LRUD2 LDA SHAPFX
OBd0	2904	363	AND #\$04
OBd2	F011	364	BEQ LRUD4
OBd4	B1E0	365	LDA (HBASL),Y
OBd6	4DF90C	366	FOR HCLR1
OBd9	2DFB0C	367	AND HMASK
OBdC	D003	368	BNE LRUD3
OBdE	EFFA0C	369	INC COLLSN
OBf1	51E0	370	LRUD3 FOR (HBASL),Y
OBf3	91E0	371	STA (HBASL),Y

OBE5		372		PAG
OBE5	ADEF0C	373	LRUD4	LDA SHAPEX
OBE8	6DF00C	374		ADC QDRNT
OBEB	2903	375		AND #3
OBED		376	EQ3	FQU *-1
OBED	C902	377		CMP #2
OBFF	6A	378		ROR
OBFO	B080	379	LRUD	BCS LFTRT
OBF2	3030	380	UPDOWN	BMI DOWN4
OBF4	18	381	UP	CLC
OBF5	A5F1	382		LDA HBASH
OBF7	2C020D	383		BIT FQ1C
OBFA	D022	384		BNF UP4
OBFC	06E0	385		ASL HBASL
OBFF	B01A	386		BCS UP2
OC00	2CFE0B	387		BIT FQ3
OC03	F005	388		BFQ UP1
OC05	691F	389		ADC #\$1F
OC07	38	390		SFC
OC08	B012	391		BCS UP3
OC0A	6923	392	UP1	ADC #\$23
OC0C	48	393		PHA
OC0D	A5E0	394		LDA HBASL
OC0F	69B0	395		ADC #\$B0
OC11	B002	396		BCS UP5
OC13	69F0	397		ADC #\$F0
OC15	85E0	398	UP5	STA HBASL
OC17	68	399		PLA
OC18	B002	400		BCS UP3
OC1A	691F	401	UP2	ADC #\$1F
OC1C	66E0	402	UP3	ROR HBASL
OC1E	69FC	403	UP4	ADC #\$FC
OC20	85E1	404	UPDOWN1	STA HBASH
OC22	60	405		RTS
OC23	18	406	DOWN	CLC
OC24	A5E1	407	DOWN4	LDA HBASH
OC26	6904	408		ADC #\$04
OC28		409	FQ4	FQU *-\$01
OC28	2C020D	410		BIT FQ1C
OC2B	D0F3	411		BNF UPDOWN1
OC2D	06E0	412		ASL HBASL
OC2F	9019	413		BCC DOWN1
OC31	69E0	414		ADC #\$E0
OC33	18	415		CLC
OC34	2C270C	416		BIT FQ4
OC37	F013	417		BFQ DOWN2
OC39	A5E0	418		LDA HBASL
OC3B	6950	419		ADC #\$50
OC3D	49F0	420		EOR #\$F0
OC3F	F002	421		BFQ DOWN3
OC41	49F0	422		EOR #\$F0
OC43	85E0	423	DOWN3	STA HBASL
OC45	ADF80C	424		LDA HPAG
OC48	9002	425		BCC DOWN2
OC4A	69E0	426	DOWN1	ADC #\$E0
OC4C	66E0	427	DOWN2	ROR HBASL
OC4E	90D0	428		BCC UPDOWN1

```

0C50          429          PAG
0C50          430          ;
0C50          431          ; LINE DRAW SUBROUTINFS
0C50          432          ;
0C50          433          ; ON ENTRY:
0C50          434          ; XL - A REG
0C50          435          ; XH - X REG
0C50          436          ; Y - Y REG
0C50 48       437          HLIN   PHA
0C51 38       438          SEC
0C52 EDF30C   439          SBC  X0L
0C55 48       440          PHA
0C56 8A       441          TXA
0C57 EDF40C   442          SBC  X0H
0C5A 8DF00C   443          STA  QDRNT
0C5D B00B     444          BCS  HLIN2
0C5F 68       445          PLA
0C60 49FF     446          FOR  #$FF
0C62 6901     447          ADC  #$01
0C64 48       448          PHA
0C65 A900     449          LDA  #$00
0C67 EDF00C   450          SBC  QDRNT
0C6A 8DFD0C   451          HLIN2  STA  DXH
0C6D 8DF20C   452          STA  FH
0C70 68       453          PLA
0C71 8DFC0C   454          STA  DXL
0C74 8DF10C   455          STA  FL
0C77 68       456          PLA
0C78 8DF30C   457          STA  X0L
0C7B 8EF40C   458          STX  X0H
0C7E 98       459          TYA
0C7F 18       460          CLC
0C80 EDF50C   461          SBC  Y0
0C83 9004     462          BCC  HLIN3
0C85 49FF     463          FOR  #$FF
0C87 69FE     464          ADC  #$FF
0C89 8DEE0C   465          HLIN3  STA  DY
0C8C 8CF50C   466          STY  Y0
0C8F 6EF00C   467          ROR  QDRNT
0C92 38       468          SFC
0C93 EDEC0C   469          SBC  DXL
0C96 AA       470          TAX
0C97 A9FF     471          LDA  #$FF
0C99 EDED0C   472          SBC  DXH
0C9C 8DEA0C   473          STA  COUNTH
0C9F ACF70C   474          LDY  HNDX
OCA2 B005     475          BCS  MOVEX2
OCA4 0A       476          MOVEX  ASL
OCA5 20720B   477          JSR  LFTRT
OCA8 38       478          SFC
OCA9 ADF10C   479          MOVEX2 LDA  FL
OCAC 6DFF0C   480          ADC  DY
OCAF 8DF10C   481          STA  FL
OCB2 ADF20C   482          LDA  FH
OCB5 E900     483          SBC  #0

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0CB7		484		PAG
0CB7	8DF20C	485	HCOUNT	STA FH
0CBA	B1E0	486		LDA (HBASL),Y
0CBC	4DE90C	487		EOR HCLR1
0CBF	2DEB0C	488		AND HMASK
0CC2	51E0	489		EOR (HBASL),Y
0CC4	91E0	490		STA (HBASL),Y
0CC6	E8	491		INX
0CC7	D005	492		BNE HLIN4
0CC9	EEEE0C	493		INC COUNTH
0CCC	F01A	494		BFQ RTS2
0CCF	ADF00C	495	HLIN4	LDA QDRNT
0CD1	B0D1	496		BCS MOVEX
0CD3	20F20B	497		JSR UPDWN
0CD6	18	498		CLC
0CD7	ADF10C	499		LDA FL
0CDA	6DEC0C	500		ADC DXL
0CDD	8DF10C	501		STA FL
0CF0	ADF20C	502		LDA FH
0CF3	6DFD0C	503		ADC DXH
0CF6	50CF	504		BVC HCOUNT
0CF8	60	505	RTS2	RTS

0CE9	506		PAG	
0CE9	507	;		
0CE9	508	;	FQUATES	
0CE9	509	;		
0CE9	510	SHAPEL	FPZ	SE8
0CE9	511	SHAPEH	FPZ	SE9
0CF9 00	512	HCLR1	HEX	00
0CEA 00	513	COUNTH	HEX	00
0CEB	514	HBASL	FPZ	SE0
0CEB	515	HBASH	FPZ	SE1
0CEB 00	516	HMASK	HEX	00
0CEC 00	517	DXL	HEX	00
0CED 00	518	DXH	HEX	00
0CEE 00	519	DY	HEX	00
0CEF 00	520	SHAPEX	HEX	00
0CF0 00	521	QDRNT	HEX	00
0CF1 00	522	EL	HEX	00
0CF2 00	523	EH	HEX	00
0CF3 00	524	XOL	HEX	00
0CF4 00	525	XOH	HEX	00
0CF5 00	526	YO	HEX	00
0CF6 00	527	HCOLOR	HEX	00
0CF7 00	528	HNDX	HEX	00
0CF8 00	529	HPAG	HEX	00
0CF9 00	530	SCALE	HEX	00
0CFA 00	531	COLLSN	HEX	00
0CFB 818284	532	MSKTBL	HEX	8182848890A0C0
0CFF 8890A0				
0D01 C0				
0D02 1C	533	FQ1C	HEX	1C
0D03 FFFEFA	534	COS	HEX	FFFEFAF4ECF1D4C5
0D06 F4ECF1				
0D09 D4C5				
0D0B B4A18D	535		HEX	B4A18D7861493118FF
0D0E 786149				
0D11 3118FF				
0D14	536	HIRES	EQU	SC057
0D14	537	MIXSFT	EQU	SC053
0D14	538	TXTCLR	EQU	SC050
0D14	539	LENGTH	EQU	*-MAIN


```

0800          1          DCM "PR#1"
0900          2          ORG $0900
0900          3          ;
0900          4          ; THIS PROGRAM WILL PRINT OUT THE ENTIRE CATALOG IN SECTIONS
0900          5          ; AND WAIT FOR THE USER TO SELECT A FILE TO RUN WITH THE
0900          6          ; LIGHT PEN. IF THE USER PAGES THROUGH THE WHOLE CATALOG
0900          7          ; WITHOUT SELECTING ANYTHING, THE PROGRAM WILL END.
0900          8          ;
0900 2058FC    9  CONTRL JSR HOME
0903 A900     10         LDA #0
0905 8D3903   11         STA WAIT          ;SET UP RING WAIT
0908 8D0F0C   12         STA INDEX
090B 20170A   13         JSR GETCUR          ;GET CURRENT SLOT AND DRIVE
090E 20F309   14         JSR CAT
0911 A949     15         LDA #BUFFER          ;SET UP BUFFER POINTER
0913 85FE     16         STA BUFPTR
0915 A90C     17         LDA /BUFFER
0917 85FF     18         STA BUFPTR+1
0919          19         ;
0919          20  CTRLP:
0919 2058FC   21         JSR HOME          ;CLEAR THE SCREEN
091C 20320A   22         JSR CAT1          ;PRINT 15 FILES
091F A999     23         LDA #MESS
0921 A00B     24         LDY /MESS
0923 20B10A   25         JSR PBUFF
0926 AD130C   26         LDA OLDY          ;GET INITIAL CHAR AT X,Y
0929 20C1FB   27         JSR BASCAL
092C AC120C   28         LDY OLDX
092F B128     29         LDA (BASE),Y
0931 8D140C   30         STA TFMP
0934          31         ;
0934          32  CTRL:
0934 20C60A   33         JSR LPFN          ; AND WAIT FOR USER RESPONSE
0937 CF3603   34         DFC YTEXT          ;DFCREFMNT FOR M.C. PURPOSES
093A AD120C   35         LDA OLDX
093D CD3503   36         CMP XTEXT
0940 D008     37         BNE CHANGE
0942 AD130C   38         LDA OLDY
0945 CD3603   39         CMP YTEXT
0948 F028     40         BEQ CTR2
094A          41         ;
094A          42  CHANGE:
094A AD130C   43         LDA OLDY
094D 20C1FB   44         JSR BASCAL
0950 AC120C   45         LDY OLDX
0953 AD140C   46         LDA TEMP
0956 9128     47         STA (BASE),Y
0958 AD3603   48         LDA YTEXT
095B 8D130C   49         STA OLDY
095E 20C1FB   50         JSR BASCAL
0961 AC3503   51         LDY XTEXT
0964 8C120C   52         STY OLDX
0967 B128     53         LDA (BASE),Y
0969 8D140C   54         STA TEMP
096C 293F     55         AND #$3F
096E 0940     56         ORA #$40
0970 9128     57         STA (BASE),Y

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0972	58	PAG	
0972	59	;	
0972	60	CTR2:	
0972	61	BIT RING	
0975	62	BPL CTR1	
0977	63	LDX YTEXT	;CHECK Y COORD AGAINST
097A	64	DEX	; THE NUMBER OF FILES PRINTED OUT
097B	65	CPX COUNT	; TO SEE IF THE LIGHT PFN
097E	66	BCS CTR3	; WAS ON ONE OF THE FILFS
0980	67	TXA	;POINT TO FILE DESCRIPTOR
0981	68	ASL	
0982	69	TAX	
0983	70	LDA PTRS,X	
0986	71	STA POINT	
0988	72	INX	
0989	73	LDA PTRS,X	
098C	74	STA POINT+1	
098E	75	LDY #2	;CHECK IF A GOOD FILE TO RUN
0990	76	LDA (POINT),Y	
0992	77	AND #7	;CAN'T RUN ANYTHING BUT
0994	78	BEQ FILFRR	; INT, APPL, BINARY
0996	79	PHA	
0997	80	JSR SFTTXT	;SFTUP FOR NORMAL OPERATION
099A	81	JSR HOMF	
099D	82	PLA	
099E	83	AND #4	;CHFK IF BASIC OR BINARY
09A0	84	BEQ BASIC	
09A2	85	LDA #BRUN	
09A4	86	LDY /BRUN	
09A6	87	JSR PBUFF	
09A9	88	JMP PFILE	;PRINT FILE NAMF
09AC	89	;	
09AC	90	BASIC:	
09AC	91	LDA #RUN	;RUN THE BASIC FILE
09AE	92	LDY /RUN	
09B0	93	JSR PBUFF	
09B3	94	;	
09B3	95	PFILE LDY #3	;PRINT OUT FILE NAME
09B5	96	LDX #30	
09B7	97	PFLP LDA (POINT),Y	
09B9	98	JSR PUTC	
09BC	99	INY	
09BD	100	DEX	
09BE	101	BNF PFLP	
09C0	102	LDA #\$8D	
09C2	103	JSR PUTC	;RUN THF FILE
09C5	104	RTS	
09C6	105	;	
09C6	106	CTR3:	
09C6	107	LDA #0	;WAIT FOR USFR
09C8	108	JSR WAIT1	
09CB	109	BIT FOB	;CHECK FOR FND OF CATALOG
09CF	110	BMI CTRFX	
09D0	111	JMP CTRLP	
09D3	112	CTREX RTS	

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09D4          113          PAG
09D4          114          ;
09D4          115          FILERR:
09D4 A914      116          LDA #20          ;TAB DOWN TO LINE 20
09D6 2024FC   117          JSR VTAB
09D9 A900      118          LDA #0
09DB 8524      119          STA CSRHRZ
09DD A9F2      120          LDA #FRR          ; AND PRINT ERROR MESSAGE
09DF A00B      121          LDY /FRR
09E1 20B10A   122          JSR PBUFF
09E4 A900      123          LDA #0
09E6 20A8FC   124          JSR WAIT1          ;WAIT FOR USER READ
09E9 A900      125          LDA #0          ; AND FRASE THE LINE
09FB 8524      126          STA CSRHRZ
09ED 209CFC   127          JSR FRFOL
09F0 4C7209   128          JMP CTR2
09F3          129          ;
09F3          130          ;
09F3          131          ;
09F3          132          ; READ IN CATALOG TRACK OFF DISK
09F3          133          ;
09F3          134          CAT:
09F3 A90C      135          LDA /BUFFER          ;SELECT BUFFER POINTER
09F5 8D3D0C   136          STA BUF+1
09F8 A911      137          LDA #$11          ;TRACK NUMBFR
09FA 8D380C   138          STA TRACK
09FD A90C      139          LDA #$C          ;SECTOR NUMBER
09FF 8D390C   140          STA SECTOR
0A02 A901      141          LDA 01
0A04 8D400C   142          STA CMD
0A07 A90C      143          CLOOP LDA /IOB
0A09 A034      144          LDY #IOB
0A0B 2000BD   145          JSR $BD00
0A0F FF3D0C   146          INC BUF+1          ;INCRFMNT BUFFFR ADDRESS
0A11 CF390C   147          DFC SECTOR
0A14 D0F1      148          BNF CLOOP
0A15 60        149          RTS
0A17          150          ;
0A17          151          ;
0A17          152          ; GET CURRENT SLOT AND DRIVE
0A17          153          ;
0A17 20F303   154          GETCUR JSR GETIOB          ;GET IOCB
0A1A 85FF      155          STA BUFPTR+1
0A1C 84FF      156          STY BUFPTR
0A1E A00F      157          LDY #$F          ;GET DRIVE AND SLOT
0A20 B1FE      158          LDA (BUFPTR),Y
0A22 8D430C   159          STA PRVSLT
0A25 8D350C   160          STA SLOT
0A28 C8        161          INY
0A29 B1FE      162          LDA (BUFPTR),Y
0A2B 8D440C   163          STA PRVDRV
0A2E 8D360C   164          STA DRIVE
0A31 60        165          RTS

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0A32          166          PAG
0A32          167          ;
0A32          168          ; PRINT OUT SFGMENT OF CATALOG (15 FILFS MAX)
0A32          169          ;
0A32          170          CAT1:
0A32 A900      171          LDA #0          ;INIT COUNT OF FILES
0A34 8D100C    172          STA COUNT
0A37 8D110C    173          STA EOB          ;END OF BUFFER = FALSE
0A3A A98D      174          LDA #$8D          ;SPACE DOWN ONF LINE
0A3C 20EDFD    175          JSR PUTC          ; FROM THE TOP
0A3F AD0F0C    176          LDA INDEX
0A42 D00E      177          BNE CATLP2
0A44          178          ;
0A44          179          CATLP:
0A44 A90B      180          LDA #FILE1          ;INIT INDEX TO FILES
0A46 8D0F0C    181          STA INDEX
0A49 A001      182          LDY #LINK          ;WHEN BOTH BYTES OF LINK ARE
0A4B B1FE      183          LDA (BUFPTR),Y          ; ZERO YOU ARE THROUGH
0A4D C8        184          INY
0A4E 11FE      185          ORA (BUFPTR),Y
0A50 F01D      186          BEQ FXIT
0A52          187          ;
0A52          188          CATLP2:
0A52 AC0F0C    189          LDY INDFX          ;PRINT A FILF NAME
0A55 20700A    190          JSR PRTFIL
0A58 AD100C    191          LDA COUNT
0A5B C90F      192          CMP #15
0A5D B010      193          BCS FXIT
0A5F 18        194          CLC
0A60 AD0F0C    195          LDA INDFX          ;INCRFMNT TO NEXT
0A63 6923      196          ADC #$23
0A65 8D0F0C    197          STA INDEX
0A68 D0F8      198          BNE CATLP2
0A6A E6FF      199          INC BUFPTR+1          ;INCREMNT POINTER FOR NEXT SFCTOR
0A6C 4C440A    200          JMP CATLP          ;LOOP FOR MORE
0A6F 60        201          FXIT      RTS

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0A70      202      PAG
0A70      203      ;
0A70      204      ; THIS PROCEDURE LOOKS AT THE
0A70      205      ; BUFFER AND PULLS OUT THE FILE
0A70      206      ; NAMES PRESENT.  THESE FILENAMES
0A70      207      ; ARE THEN PRINTED TO THE SCREEN.
0A70      208      ;
0A70      209      ;
0A70      210      PRTFIL:
0A70 B1FE      211      LDA (BUFPTR),Y
0A72 F037      212      BEQ SETEOB          ;END OF CATALOG
0A74 C9FF      213      CMP #$FF
0A76 F032      214      BEQ PRTX
0A78 A903      215      LDA #3
0A7A 8524      216      STA CSRHRZ          ;TAB 3
0A7C AD100C    217      LDA COUNT
0A7F EF100C    218      INC COUNT          ;COUNT # OF FILES PRINTED
0A82 0A        219      ASL
0A83 AA        220      TAX
0A84 18        221      CLC          ;POINT TO FILE DESCRIPTOR
0A85 98        222      TYA
0A86 65FE      223      ADC BUFPTR
0A88 9D160C    224      STA PTRS,X
0A8B E8        225      INX
0A8C A900      226      LDA #0
0A8E 65FF      227      ADC BUFPTR+1
0A90 9D160C    228      STA PTRS,X
0A93 C8        229      INY
0A94 C8        230      INY
0A95 C8        231      INY
0A96 A200      232      LDX 00
0A98 B1FE      233      PRT1 LDA (BUFPTR),Y
0A9A F00E      234      BEQ PRTX
0A9C 20EDFD    235      JSR PUTC
0A9F C8        236      INY
0AA0 E8        237      INX
0AA1 E01E      238      CPX #30
0AA3 90F3      239      BLT PRT1
0AA5 A98D      240      LDA 8D
0AA7 20EDFD    241      JSR PUTC
0AAA 60        242      PRTX RTS
0AAB          243      ;
0AAB A9FF      244      SETEOB LDA #$FF          ;FOB = TRUE
0AAD 8D110C    245      STA FOB
0AB0 60        246      RTS
0AB1          247      ;
0AB1          248      ; PRINT A BUFFER TO SCREEN (Y,A) --> BUFFER
0AB1          249      ;
0AB1 85FC      250      PBUFF STA PMESS
0AB3 84FD      251      STY PMESS+1
0AB5 A000      252      LDY #0
0AB7 B1FC      253      PBLP LDA (PMESS),Y
0AB9 F00A      254      BEQ PBEXIT
0ABB 20EDFD    255      JSR PUTC
0ABE C8        256      INY
0ABF D0F6      257      BNE PBLP
0AC1 E6FD      258      INC PMESS+1
0AC3 D0F2      259      BNE PBLP
0AC5 60        260      PBEXIT RTS

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0AC6      261      PAG
0AC6      262      ;
0AC6      263      ; MACHINE CODE LIGHT PEN DRIVER ROUTINE
0AC6      264      ; ON ENTRY:
0AC6      265      ;   RWAIT = 0 FOR NO PEN SWITCH WAIT
0AC6      266      ;           =-1 FOR PEN SWITCH WAIT
0AC6      267      ;
0AC6      268      ; ON EXIT:
0AC6      269      ;   XHIGH,XLOW   = HI-RES X COORD
0AC6      270      ;   YLOW           = HI-RES Y COORD
0AC6      271      ;   XLORES,YLORES = LORES COORDS
0AC6      272      ;   XTEXT,YTEXT  = TEXT COORDS
0AC6      273      ;
0AC6 A9FF      274      LPEN   LDA  #$FF           ;INIT MAX X-COORD
0AC8 8D3103    275      STA  XHIGH
0ACB 8D3003    276      STA  XLOW
0ACE 8D3203    277      STA  YLOW
0AD1 8D3803    278      STA  LINE
0AD4 A528      279      LDA  BASE           ;SAVE OLD TEXT BASE ADDRESS
0AD6 8506      280      STA  OLDBAS
0AD8 A529      281      LDA  BASE+1
0ADA 8507      282      STA  OLDBAS+1
0ADC EE3803    283      LOOP  INC  LINE           ;INCRFMFNT PEN COORDINATES AROUND
0ADF AD3803    284      LDA  LINE           ;'TEARDROP' WINDOW UNTIL MINIMUM X IS
0AF2 8DD0C0    285      STA  START         ;START PEN
0AE5 2CD1C0    286      WAIT  BIT  DONE         ;WAIT FOR PEN TO GO DONE
0AE8 10FB      287      BPL  WAIT
0AEA 2C3903    288      BIT  RWAIT         ;IF PFN WAIT IS TRUE (-1)
0AED 1005      289      BPL  DNT
0AEF 2CD6C0    290      BIT  RING         ;THEN WAIT FOR PENSWITCH
0AF2 10F1      291      BPL  WAIT
0AF4 ADD4C0    292      DNT  LDA  XOVL         ;GET X OVERFLOW VALUE (0 OR 1)
0AF7 2A        293      ROL
0AF8 A900      294      LDA  #0
0AFA 2A        295      ROL
0AFB CD3103    296      CMP  XHIGH         ;CHECK IF WE HAVE NEW MINIMUM
0AFE 9008      297      BCC  NEWC         ;SO WE CAN SET UP TO FIND THE
0B00 ADD2C0    298      LDA  XCOORD       ;NEXT VALUE OR SEE IF
0B03 CD3003    299      CMP  XLOW         ;WE HAVE ALREADY HAD A SMALLEST X
0B06 B019      300      BCS  GREY
0B08 ADD4C0    301      NEWC LDA  XOVL         ;SET UP A NEW MINIMUM VALUE
0B0B 2A        302      ROL
0B0C A900      303      LDA  #0
0B0E 2A        304      ROL
0B0F 8D3103    305      STA  XHIGH
0B12 ADD2C0    306      LDA  XCOORD
0B15 8D3003    307      STA  XLOW
0B18 ADD3C0    308      LDA  YCOORD
0B1B 8D3203    309      STA  YLOW
0B1E 38        310      SEC
0B1F B0BB      311      BCS  LOOP
;AND GET ANOTHER VALUE FROM PEN

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0B21		312	PAG		
0B21	AD3203	313	GREST	LDA YLOW	;CALCULATE REST OF COORDS
0B24	4A	314		LSR	;XLORES = (XHIGH,XLOW)/7
0B25	4A	315		LSR	;YLORES = YLOW/4
0B26	8D3403	316		STA YLORES	;XTTEXT = (XHIGH,XLOW)/7 + 1
0B29	4A	317		LSR	;YTEXT = YLOW/8 + 1
0B2A	8D3603	318		STA YTEXT	
0B2D	A907	319		LDA #7	
0B2F	8D3F03	320		STA YH	
0B32	AD3103	321		LDA XHIGH	
0B35	8D3D03	322		STA XH	
0B38	AD3003	323		LDA XLOW	
0B3B	8D3C03	324		STA XL	
0B3E	A900	325	DIVIDE	LDA #0	;DIVIDE XH,XL/YH -> QUOTH
0B40	8D3A03	326		STA QUOTL	
0B43	8D3B03	327		STA QUOTH	
0B46	8D3E03	328		STA YL	
0B49	A010	329		LDY #16	;SIXTEEN BITS
0B4B	0E3A03	330	DIV2	ASL QUOTL	
0B4E	2E3B03	331		ROL QUOTH	
0B51	2E3C03	332		ROL XL	
0B54	2E3D03	333		ROL XH	
0B57	38	334		SEC	
0B58	AD3C03	335		LDA XL	
0B5B	ED3E03	336		SBC YL	
0B5E	AA	337		TAX	
0B5F	AD3D03	338		LDA XH	
0B62	ED3F03	339		SBC YH	
0B65	9009	340		BCC DIV3	
0B67	8E3C03	341		STX XL	
0B6A	8D3D03	342		STA XH	
0B6D	EE3A03	343		INC QUOTL	
0B70	88	344	DIV3	DFY	
0B71	D0D8	345		BNE DIV2	
0B73	AD3B03	346		LDA QUOTH	;STORE QUOTIENT IN X-COORD
0B76	8D3503	347		STA XTEXT	
0B79	8D3303	348		STA XLORES	
0B7C	AD3603	349		LDA YTEXT	
0B7F	20C1FB	350		JSR BASCAL	;GET THE CHARACTER OFF SCREEN
0B82	AC3503	351		LDY XTFXT	
0B85	B128	352		LDA (BASE),Y	
0B87	8D3703	353		STA CHAR	
0B8A	FF3503	354		INC XTFXT	;TEXT COORD'S ARE RFLATIVE
0B8D	FE3603	355		INC YTEXT	;TO ONE NOT ZERO SO INCREMENT
0B90	A506	356		LDA OLDBAS	;RFSTORF OLD TEXT BASE ADDRESS
0B92	8528	357		STA BASE	
0B94	A507	358		LDA OLDBAS+1	
0B96	8529	359		STA BASE+1	
0B98	60	360		RTS	

```

0B99      361      PAG
0B99      362      ;
0B99      363      ; *** EQUATFS
0B99      364      ;
0B99      365      HOME      EQU $FC58
0B99      366      DONE      EQU $C0D1      ;PEN DONF FLAG
0B99      367      START     EQU $C0D0      ;START AT LINE Q
0B99      368      XOVFL     EQU $C0D4      ;X > 255 FLAG
0B99      369      XCOORD    EQU $C0D2      ;LOW X-COORD
0B99      370      YCOORD    EQU $C0D3      ;Y-COORD
0B99      371      RING      EQU $C0D6      ;TOUCH SWITCH FLAG
0B99      372      BASCAL    EQU $FBC1      ;CALCULATE TEXT BASE ADDRESS AT BASE
0B99      373      BASE      EPZ $28      ;TEXT LINE BASE ADDRESS
0B99      374      OLDBAS    EPZ $06
0B99      375      XLOW      EQU $330      ;X RETURN COORDINATE
0B99      376      XHIGH     EQU $331      ;HIGH PART OF X
0B99      377      YLOW      EQU $332      ;HIRES Y-COORD
0B99      378      XLORES    EQU $333      ;LORES X-COORD
0B99      379      YLORES    EQU $334      ;LORES Y-COORD
0B99      380      XTEXT     EQU $335      ;X TEXT COORD
0B99      381      YTEXT     EQU $336      ;Y TEXT COORD
0B99      382      CHAR      EQU $337      ;CHARACTER AT TEXT COORD. X,Y
0B99      383      LINE      EQU $338      ;SCAN LINE OF 'TEARDROP' WINDOW OF MI
0B99      384      RWAIT     EQU $339      ;PARAMETER TO WAIT FOR PEN SWITCH
0B99      385      QUOTL     EQU $33A
0B99      386      QUOTH     EQU $33B
0B99      387      XL        EQU $33C
0B99      388      XH        EQU $33D
0B99      389      YL        EQU $33F
0B99      390      YH        EQU $33F
0B99      8D8D      391      MESS      HEX 8D8D
0B9B      D0CFC9    392      ASC      "POINT TO FILE AND TOUCH RING TO RUN"
0B9E      CFD4A0
0BA1      D4CFA0
0BA4      C6C9CC
0BA7      C5A0C1
0BAA      CFC4A0
0BAD      D4CFD5
0BB0      C3C8A0
0BB3      D2C9CE
0BB6      C7A0D4
0BB9      CFA0D2
0BBC      D5CE
0BBE      8D8D      393      HEX 8D8D
0BC0      A0A0A0    394      ASC      " "
0BC3      100F09    395      INV      "POINT BELOW FILES TO CONTINUE"
0BC6      0E1420
0BC9      02050C
0BCC      0F1720
0BCF      06090C
0BD2      051320
0BD5      140F20
0BD8      030F0E
0BDB      14090E
0BDE      1505
0BE0      00        396      HEX 00

```

OBE1		397		PAG	
OBE1	8D8D84	398	BRUN	HEX 8D8D84	
OBE4	C2D2D5	399		ASC "BRUN "	
OBE7	CEA0				
OBE9	00	400		HEX 00	
OBEA	8D8D84	401	RUN	HEX 8D8D84	
OBED	D2D5CE	402		ASC "RUN "	
OBFO	A0				
OBF1	00	403		HEX 00	
OBF2	A0A0A0	404	ERR	ASC " "	
OBF5	A0A0A0				
OBF8	A0				
OBF9	43414E	405		BLK "CAN'T RUN A TEXT FILE"	
OBFC	675460				
OBFF	52554E				
OC02	604160				
OC05	544558				
OC08	546046				
OC0B	494C45				
OC0E	00	406		HEX 00	
OC0F	00	407	INDEX	HEX 00	
OC10	00	408	COUNT	HEX 00	
OC11	00	409	FOB	HEX 00	;END OF BUFFFR FLAG
OC12	01	410	OLDX	HEX 01	;OLD TEXT COORDINATES
OC13	01	411	OLDY	HFX 01	
OC14	A0	412	TEMP	HFX A0	;TEMP STORAGE
OC15	00	413	TEMP1	HEX 00	
OC16		414	LINK	EQU \$1	;LINK DISPLACEMENT
OC16		415	FILE1	EPZ \$B	;FIRST FILE DISPLACMENT
OC16		416	CSRHRZ	EPZ \$24	
OC16		417	POINT	EPZ \$FA	;FILE POINTER TO RUN
OC16		418	PMESS	EPZ \$FC	
OC16		419	GETIOB	EQU \$03E3	
OC16		420	SETTXT	EQU \$FB39	
OC16		421	VTAB	EQU \$FC24	
OC16		422	FRFOL	EQU \$FC9C	
OC16		423	PUTC	EQU \$FDED	;CHARACTER OUTPUT ROUTINE
OC16		424	WAIT1	EQU \$FCA8	
OC16		425	BUFPTR	FPZ \$FE	;BUFFER POINTER
OC34		426	PTRS	DFS 30	;FILE POINTERS
OC34		427	; INPUT/OUTPUT CONTROL BLOCK AS DESCRIBED IN THE APPLE DOS 3.2 M		
OC34		428	; PAGES 91-98, AND 123-138.		
OC34	01	429	IOB	HFX 01	
OC35	60	430	SLOT	HFX 60	;SLOT 6
OC36	01	431	DRIVE	HFX 01	;DRIVE 1
OC37	00	432	VOL	HEX 00	;ANY VOLUME
OC38	11	433	TRACK	HFX 11	;TRACK TO BE RFAD/WRITTEN
OC39	00	434	SECTOR	HFX 00	;SFCTOR TO BE RFAD/WRITTEN
OC3A	450C	435	DCT	ADR DEVICE	;POINTER TO DEVICE CHAR. TABLE
OC3C	490C	436	BUF	ADR BUFFER	;POINTER TO BUFFFR ARFA.
OC3E	0000	437	UNUSED	HFX 0000	
OC40	00	438	CMD	HEX 00	;COMMAND CODE GOES HERE.
OC41	00	439	ERROR	HEX 00	;ERROR CODE RETURNED HERE.
OC42	00	440	ACTVOL	HEX 00	;ACTUAL VOLUME FOUND
OC43	60	441	PRVSLT	HEX 60	;PREVIOUS SLOT
OC44	01	442	PRVDRV	HEX 01	;PREVIOUS DRIVE
OC45	0001EF	443	DEVICE	HEX 0001EFD8	;DEVICE CHARACTERISTICS TABLE
OC48	D8				
OC49		444	BUFFER	EQU *	
OC49		445	LENGTH	EQU *-CONTRL	

0C49

446
447

PAG
END

***** END OF ASSEMBLY

*
* SYMBOL TABLE -- V 1.5 *
*

LABEL. LOC. LABEL. LOC. LABEL. LOC.

** ZERO PAGE VARIABLES:

BASE 0028 OLDBAS 0006 FILE1 000B CSRHRZ 0024 POINT 00FA PMESS 00FC
BUFPTR 00FE

** ABSOLUTE VARIABLES/LABELS

CONTRL 0900	CTRLP 0919	CTR1 0934	CHANGE 094A	CTR2 0972			
BASIC 09AC	PFILE 09B3	PFLP 09B7	CTR3 09C6	CTREX 09D3	FILFRR 09D4		
CAT 09F3	CLOOP 0A07	GETCUR 0A17	CAT1 0A32	CATLP 0A44	CATLP2 0A52		
EXIT 0A6F	PRTFIL 0A70	PRT1 0A98	PRTX 0AAA	SETEOB 0AAB	PBUFF 0AB1		
PBLP 0AB7	PBEXIT 0AC5	LPEN 0AC6	LOOP 0ADC	WAIT 0AE5	DNT 0AF4		
NEWC 0B08	GREST 0B21	DIVIDE 0B3F	DIV2 0B4B	DIV3 0B70	HOME FC58		
DONE C0D1	START C0D0	XOVFL C0D4	XCOORD C0D2	YCOORD C0D3	RING C0D6		
BASCAL FBC1	XLOW 0330	XHIGH 0331	YLOW 0332	XLORES 0333	YLORES 0334		
XTEXT 0335	YTEXT 0336	CHAR 0337	LINE 0338	RWAIT 0339	QUOTL 033A		
QUOTH 033B	XL 033C	XH 033D	YL 033E	YH 033F	MFSS 0B99		
BRUN 0BF1	RUN 0BFA	FRR 0BF2	INDFX 0C0F	COUNT 0C10	FOB 0C11		
OLDX 0C12	OLDY 0C13	TEMP 0C14	TFMP1 0C15	LINK 0001	GETIOB 03F3		
SETTXT FB39	VTAB FC24	ERFOL FC9C	PUTC FDED	WAIT1 FCA8	PTRS 0C16		
IOB 0C34	SLOT 0C35	DRIVE 0C36	VOL 0C37	TRACK 0C38	SECTOR 0C39		
DCT 0C3A	BUF 0C3C	UNUSED 0C3F	CMD 0C40	ERROR 0C41	ACTVOL 0C42		
PRVSLT 0C43	PRVDRV 0C44	DEVICE 0C45	BUFFER 0C49	LFNGTH 0349			

SYMBOL TABLE STARTING ADDRESS:5800
SYMBOL TABLE LENGTH:033A

!PR#0
PR#0

```

30000 REM MAKE THIS STATEMENT
30010 REM PART OF A DIM STATEMENT
30020 REM AT THE BEGINNING OF
30030 REM YOUR PROGRAM
30040 DIM ZX(2),ZY(2)
30050 REM INITIALIZE MINIMUM
30060 REM VALUES FOR X COORD.
30070 Z1=512:ZQ=0
30080 REM NOW RUN THROUGH LIGHT
30090 REM PEN'S TEARDROP WINDOW
30100 REM AND LOOK FOR A MINIMUM
30110 REM X VALUE
30120 REM FIRST START THE PEN
30130 POKE -16176,ZQ
30140 REM NOW WAIT FOR THE PEN
30150 REM TO GET POINT AND GO
30160 REM DONE SO WE CAN GET
30170 REM THE COORDINATES
30180 IF PEEK (-16175)<128 THEN 30180
30190 REM NOW PULL COORDINATES
30200 REM OFF THE PEN CARD
30210 ZX(0)= PEEK (-16174)+256*( PEEK (-16172)>127): REM HI-RES X COORDINATE
30220 ZY(0)= PEEK (-16173): REM HI-RES Y COORDINATE
30230 IF ZX(0)>Z1 THEN 30330
30240 REM X WAS LOWER THAN THE
30250 REM PREVIOUS MINIMUM SO
30260 REM CHECK IF NEXT ONE IS
30270 REM LESS THAN THIS ONE
30280 Z1=ZX(0):Z2=ZY(0):ZQ=ZQ+1: GOTO 30130
30290 REM THIS IS TO WAIT FOR
30300 REM RING TO BE PRESSED
30310 REM SO THE USER CAN
30320 REM INDICATE HIS RESPONSE
30330 IF PEEK (-16170)<128 THEN 30330
30340 REM MINIMUM X VALUE WAS
30350 REM FOUND SO CALCULATE
30360 REM THE VALUES FOR THE
30370 REM LO-RES AND TEXT SCREENS
30380 ZX(0)=Z1:ZX(1)=Z1/7:ZX(2)=ZX(1)+1
30390 ZY(0)=Z2:ZY(1)=Z2/4:ZY(2)=Z2/8+1
30400 REM CALCULATE MEMORY LOC.
30410 REM FOR TEXT SCREEN
30420 ZU=1024+128*(ZY(1) MOD 8)+40*(ZY(0)/64)+ZX(1)
30430 REM GET CHAR FROM SCREEN
30440 POS=14:CMD= PEEK (ZU): GOSUB 30450: GOTO 30460
30450 LC1= PEEK (224):LC2= PEEK (225)-(LC1>244): POKF 81+POS+LC1-256*(LC2>
127)+(LC2-255*(LC2>127))*256,CMD: RFTURN
30460 ZN= PEEK (ZU):Z$="L"
30470 RFTURN
30480 REM
30490 REM *****
30500 REM * *
30510 REM * COPYRIGHT 1979 *
30520 REM * *
30530 REM * SYMTEC, INC. *
30540 REM * *
30550 REM *****

```

```

60000 REM MAKE THIS STATEMENT
60010 RFM PART OF A DIM STATEMENT
60020 REM AT THE BEGINNING OF
60030 REM YOUR PROGRAM
60040 DIM ZX(2),ZY(2)
60050 RFM INITIALIZE MINIMUM
60060 REM VALUES FOR X COORD.
60070 Z1 = 512:ZQ = 0
60080 REM NOW RUN THROUGH LIGHT
60090 REM PEN'S TEARDROP WINDOW
60100 REM AND LOOK FOR A MINIMUM
60110 REM X VALUE
60120 REM FIRST START THE PEN
60130 POKE - 16176,ZQ
60140 REM NOW WAIT FOR THE PEN
60150 REM TO GET POINT AND GO
60160 REM DONE SO WE CAN GET
60170 REM THE COORDINATES
60180 IF PEEK ( - 16175) < 128 THEN 60180
60190 REM NOW PULL COORDINATES
60200 REM OFF THE PEN CARD
60210 ZX(0) = PEEK ( - 16174) + 256 * ( PEEK ( - 16172) > 127): REM HI-R
    ES X COORDINATE
60220 ZY(0) = PEEK ( - 16173): RFM HI-RES Y COORDINATE
60230 IF ZX(0) > Z1 THEN 60330
60240 REM X WAS LOWER THAN THE
60250 REM PREVIOUS MINIMUM SO
60260 REM CHECK IF NEXT ONE IS
60270 REM LESS THAN THIS ONE
60280 Z1 = ZX(0):Z2 = ZY(0):ZQ = ZQ + 1: GOTO 60130
60290 REM THIS IS TO WAIT FOR
60300 REM RING TO BE PRESSED
60310 REM SO THE USER CAN
60320 RFM INDICATE HIS RESPONSE
60330 IF PEEK ( - 16170) < 128 THEN 60330
60340 REM MINIMUM X VALUE WAS
60350 RFM FOUND SO CALCULATE
60360 REM THE VALUES FOR THE
60370 REM LO-RES AND TEXT SCREENS
60380 ZX(0) = Z1:ZX(1) = INT (Z1 / 7):ZX(2) = ZX(1) + 1
60390 ZY(0) = Z2:ZY(1) = INT (Z2 / 4):ZY(2) = INT (Z2 / 8) + 1
60400 REM CALCULATE MEMORY LOC.
60410 REM FOR TEXT SCREEN
60420 ZU = 1024 + 128 * INT ((ZY(1) / 8 - INT (ZY(1) / 8)) * 8) + 40 *
    INT (ZY(0) / 64) + ZX(1)
60430 REM GET CHAR FROM SCREEN
60440 ZN = PEEK (ZU):Z$ = CHR$ (ZN)
60450 RETURN
60460 REM
60470 REM *****
60480 REM *   COPYRIGHT   1979 *
60490 REM *
60500 REM *   SYMTEC, INC.   *
60510 REM *
60520 REM *****

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35 DIM BO(5,5),SC(2),A$(2),CO(2),WX(6),WY(6),WN(6)
40 TEXT : HOME : VTAB 12
45 HTAB 16: PRINT "LIGHT PEN": PRINT
50 HTAB 14: PRINT "CONCENTRATION"
70 FOR T = 1 TO 2000: NEXT :CO(1) = 0:CO(2) = 0
80 GOTO 260
100 REM BOARD
105 RESTORE
110 FOR Q = 0 TO 4: FOR K = 0 TO 4: READ BO(Q,K): NEXT K,Q
170 FOR Q = 0 TO 4: FOR K = 0 TO 4
190 X3 = INT ( RND (1) * 5):X4 = INT ( RND (1) * 5)
200 Z = BO(X3,X4):BO(X3,X4) = BO(Q,K):BO(Q,K) = Z
230 NEXT K,Q:TURN = 0: GOTO 2000
260 HOME : VTAB 10
270 PRINT "HOW MANY PLAYERS ";: INPUT HG: PRINT : IF HG = 0 THEN 500
290 PRINT "WHAT IS PLAYER #1'S NAME ";: INPUT A$(1): IF HG = 1 THEN 600
310 PRINT "WHAT IS PLAYER #2'S NAME ";: INPUT A$(2): GOTO 1000
500 A$(1) = "APPLE I":CO(1) = 1
600 A$(2) = "APPLE II":CO(2) = 1
700 GOTO 1000
800 REM LIGHT PEN SUBROUTINE
810 Z1 = 512:ZQ = 0
820 POKE - 16176,ZQ
830 IF PEEK ( - 16175) < 128 THEN 830
840 ZX = PEEK ( - 16174) + 256 * ( PEEK ( - 16172) > 127)
850 ZY = PEEK ( - 16173)
860 IF ZX > Z1 THEN 890
870 Z1 = ZX:Z2 = ZY:ZQ = ZQ + 1: GOTO 820
890 ZX = Z1:ZY = Z2: RETURN
1000 TEXT : CALL - 936: GR : COLOR= 2
1005 FOR P = 0 TO 32 STEP 8: FOR L = 0 TO 6: FOR M = 1 TO 5
1040 HLIN (M - 1) * 8,(M - 1) * 8 + 6 AT P + L
1050 NEXT M,L,P:SC(1) = 0:SC(2) = 0: GOTO 100
2000 REM MAIN PROGRAM
2010 TURN = TURN + 1
2020 VTAB (22): PRINT " TURN #";TURN
2030 FOR TR = 1 TO 2
2040 PRINT A$(TR);"'S TURN"
2045 IF CO(TR) = 1 GOTO 2121
2050 GOSUB 800: IF PEEK ( - 16170) < 128 THEN 2050
2070 X = INT (ZX / 7):Y = INT (ZY / 4)
2075 IF X > 39 OR X < 0 OR Y > 39 OR Y < 0 GOTO 2050
2080 IF SCRN( X,Y) = 0 GOTO 2050
2090 X = INT (X / 8):Y = INT (Y / 8)
2100 IF BO(X,Y) > 0 GOTO 2125
2110 PRINT "ALREADY PICKED. TRY AGAIN."
2115 FOR H = 1 TO 100: NEXT H
2120 GOTO 2050
2121 GOSUB 25000
2125 MN = BO(X,Y)
2126 GOSUB 27000
2127 PRINT " ";
2130 ON MN GOSUB 11000,12000,13000,14000,15000,16000,17000,11500,12500,1
3500,14500,15500,16500
2140 FOR V = 1 TO 100: NEXT V
2150 A = X:B = Y
2155 IF CO(TR) = 1 GOTO 2261
2160 GOSUB 800: IF PEEK ( - 16170) < 128 THEN 2160
2180 X = INT (ZX / 7):Y = INT (ZY / 4)
2185 IF X > 39 OR X < 0 OR Y > 39 OR Y < 0 GOTO 2160
2190 IF SCRN( X,Y) = 0 GOTO 2160
2200 X = INT (X / 8):Y = INT (Y / 8)

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2210 IF BO(X,Y) > 0 GOTO 2240
2220 PRINT "ALREADY PICKED. TRY AGAIN."
2230 GOTO 2160
2240 IF X < > A OR Y < > B GOTO 2265
2250 PRINT "YOU JUST PICKED THAT. TRY AGAIN."
2260 GOTO 2160
2261 GOSUB 26000
2265 MN = BO(X,Y)
2267 GOSUB 27000
2268 PRINT "";
2270 ON MN GOSUB 11000,12000,13000,14000,15000,16000,17000,11500,12500,1
3500,14500,15500,16500
2280 IF BO(X,Y) = BO(A,B) OR BO(A,B) = 7 OR BO(X,Y) = 7 GOTO 3000
2290 PRINT : PRINT "SORRY, NO MATCH."
2300 FOR KP = 1 TO 500: NEXT
2320 COLOR= 2
2330 FOR M = 0 TO 6: HLIN X * 8,X * 8 + 6 AT Y * 8 + M: HLIN A * 8,A * 8
+ 6 AT B * 8 + M: NEXT M
2390 GOTO 4000
3000 PRINT : PRINT "A MATCH !!!"
3005 IF BO(A,B) = 7 THEN WI = BO(X,Y)
3007 IF BO(X,Y) = 7 THEN WI = BO(A,B)
3010 SC(TR) = SC(TR) + 1
3020 BO(A,B) = 0:BO(X,Y) = 0
3030 HN = 0
3040 FOR V = 1 TO 5: FOR I = 1 TO 5: IF BO(V,I) > 0 THEN HN = HN + 1
3050 NEXT I,V
3090 IF HN < 2 THEN 30000
3095 GOTO 2040
4000 HOME : NEXT TR
4030 PRINT " THE SCORES ARE : "
4040 PRINT A$(1);": ";SC(1)
4050 PRINT A$(2);": ";SC(2)
4060 FOR N = 1 TO 1000: NEXT : HOME : GOTO 2000
11000 COLOR= 12: GOSUB 20000
11010 COLOR= 14
11020 HLIN X * 8 + 1,X * 8 + 5 AT Y * 8 + 1
11030 HLIN X * 8 + 1,X * 8 + 5 AT Y * 8 + 5
11040 VLIN Y * 8 + 1,Y * 8 + 5 AT X * 8 + 1
11050 VLIN Y * 8 + 1,Y * 8 + 5 AT X * 8 + 5
11060 RETURN
11500 COLOR= 4: GOSUB 20000
11510 COLOR= 10: GOTO 14020
12000 COLOR= 11: GOSUB 20000
12010 COLOR= 7: GOTO 11020
12500 COLOR= 13: GOSUB 20000
12510 COLOR= 14: GOTO 16020
13000 COLOR= 8: GOSUB 20000
13010 COLOR= 5: GOTO 11020
13500 COLOR= 8: GOSUB 20000
13510 COLOR= 6: GOTO 16020
14000 COLOR= 13: GOSUB 20000
14010 COLOR= 3
14020 HLIN X * 8 + 1,X * 8 + 5 AT Y * 8 + 3
14030 VLIN Y * 8 + 1,Y * 8 + 5 AT X * 8 + 3
14040 RETURN
14500 COLOR= 3: GOSUB 20000
14510 COLOR= 11
14520 FOR M = 1 TO 5 STEP 2
14530 HLIN X * 8 + 1,X * 8 + 5 AT Y * 8 + M
14540 VLIN Y * 8 + 1,Y * 8 + 5 AT X * 8 + M
14550 NEXT M
14560 RETURN
15000 COLOR= 14: GOSUB 20000
15010 COLOR= 9: GOTO 14020
15500 COLOR= 7: GOSUB 20000

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15510 COLOR= 4: GOTO 14520
16000 COLOR= 1: GOSUB 2000
16010 COLOR= 15
16020 FOR S = 1 TO 5
16030 PLOT X * 8 + S, Y * 8 + S
16040 PLOT X * 8 + (S * - 1) + 6, Y * 8 + S
16050 NEXT S
16060 RETURN
16500 COLOR= 1: GOSUB 20000
16510 COLOR= 6: GOTO 14520
17000 COLOR= 5: GOSUB 20000
17010 COLOR= 9
17020 FOR R = 1 TO 5 STEP 2
17030 VLIN Y * 8 + 1, Y * 8 + 5 AT X * 8 + R
17040 NEXT R
17050 PLOT X * 8 + 2, Y * 8 + 5: PLOT X * 8 + 4, Y * 8 + 5
17060 VTAB (24): PRINT " THE WILD CARD !!!
17070 RETURN
20000 FOR D = 0 TO 6
20010 HLIN X * 8, X * 8 + 6 AT Y * 8 + D
20020 NEXT D
20030 RETURN
25000 FOR K = 1 TO 5: FOR B = K + 1 TO 6
25020 IF WN(K) = WN(B) THEN 25100
25030 NEXT B, K
25050 X = INT ( RND (1) * 5): Y = INT ( RND (1) * 5)
25060 IF BO(X, Y) = 0 GOTO 25070
25061 IF BO(X, Y) = WI GOTO 25070
25062 IF TURN > 1 AND HN < 5 GOTO 25068
25063 FOR LT = 1 TO 6
25064 IF X = WX(LT) AND Y = WY(LT) GOTO 25050
25066 NEXT LT
25068 RETURN
25070 X = X + 1: IF X > 4 THEN Y = Y + 1
25080 IF X > 4 THEN X = 0: IF Y > 4 THEN Y = 0
25090 GOTO 25060
25100 IF BO(WX(K), WY(K)) = 0 GOTO 25030
25101 IF K = B GOTO 25030
25105 IF WX(1) = WX(3) AND WY(1) = WY(3) GOTO 25030
25110 IF BO(WX(B), WY(B)) = 0 GOTO 25030
25120 X = WX(B): Y = WY(B): RETURN
26000 FOR FV = 1 TO 6
26010 IF WN(FV) = BO(A, B) GOTO 26040
26020 NEXT FV
26030 GOSUB 25050
26032 IF X = A AND Y = B GOTO 26030
26035 RETURN
26040 IF BO(WX(FV), WY(FV)) = 0 GOTO 26020
26045 IF A = WX(FV) AND B = WY(FV) GOTO 26020
26050 X = WX(FV): Y = WY(FV): RETURN
27000 FOR PL = 5 TO 1 STEP - 1
27010 WX(PL + 1) = WX(PL)
27020 WY(PL + 1) = WY(PL)
27030 WN(PL + 1) = WN(PL)
27040 NEXT PL
27050 WX(1) = X: WY(1) = Y: WN(1) = BO(X, Y)
27060 RETURN
30000 TEXT : HOME : VTAB 9: PRINT " FINAL SCORES"
30020 PRINT : PRINT A$(1); " : "; SC(1); " : "; A$(2); " : "; SC(2)
30030 PRINT : SZ = 1: IF SC(2) > SC(1) THEN SZ = 2
30060 IF SC(2) = SC(1) THEN PRINT " A TIE !!!!!!!": GOTO 30100
30070 PRINT A$(SZ); " WINS !!!!!!"
30100 IF CO(1) = 0 OR CO(2) = 0 THEN 30109
30105 FOR Q = 1 TO 1000: NEXT : GOTO 1000
30109 PRINT : INPUT "DO YOU WANT TO PLAY AGAIN? "; X$
30118 IF LEFT$(X$, 1) = "Y" THEN 1000

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30120 VTAB 20: PRINT " BYE !": VTAB 22
30150 DATA 1,2,3,4,9,8,7,6,5,10,11,12,13,1,2,3,4,5,6,8,9,10,11,12,13
60000 END

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LIMITED WARRANTY

Implied warranties limited to duration of express warranty. (some states do not allow limitations on how long an implied warranty lasts, so the above may not apply to you).

To the original purchaser only, Symtec Inc. warrants the Symtec Light Pen, and all components therein contained, to be free from defects in materials and/or workmanship for a period of one (1) year from the date of purchase. In the event of malfunction, or other indication of failure attributable directly to faulty workmanship and/or material, then, upon return of the product to Symtec Inc. at P.O. Box 462, Farmington, Michigan 48024 (postage paid) "Attention Warranty Claims Department," Symtec Inc. will, at its option, repair or replace said products or components, to whatever extent deemed necessary, to restore said product to proper operating condition. All such repairs or replacements shall be rendered by Symtec Inc. without charge for parts or labor when the product is returned within ninety (90) days of the date of purchase. During the period after ninety (90) days but before one (1) year from date of purchase, all repairs or replacements will be rendered without charge for parts. Labor will be charged at the rate in effect as of the time of such repair.

The responsibility for the failure of the Symtec Inc. Light Pen product, or component thereof, which at the discretion of Symtec Inc., shall have resulted from accident, abuse, or misapplication of the product, shall be assumed by the customer, and Symtec Inc. shall assume no liability as a consequence of such events under the terms of this warranty. Further, the limited warranty provided with this Symtec Inc. product also shall be void if customer causes or permits the Symtec product to be repaired or modified by anyone other than the Symtec Inc. warranty service center.

While every effort on the part of Symtec Inc. has been made to provide clear and accurate technical information on the application of its products, Symtec Inc. assumes no liability in any events which may arise from the use of said technical information.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

This warranty is in lieu of all other express warranties which now or hereafter might otherwise arise with respect to this product. Any and all implied warranties, including the warrantids of mercantability and fitness for particular purpose, shall have no greater duration than the duration period for the express written warranty applicable to this product, as shown above, and shall terminate automatically at the expiration of such duration period. Some states do not allow limitations on how long an implied warranty lasts, so the

above limitation may not apply to you. No action shall be brought for breach of any implied or express warranty after one year subsequent to the expiration of the duration period of the express written warranty.

Incidental and consequential damages caused by malfunction, defect or otherwise, and with respect to breach of any express or implied warranty, are not the responsibility of Symtec Inc. and, to the extent permitted by law, are hereby excluded both for property damage and, to the extent not unconscionable, for personal injury damage. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Send Warranty Registration Card To:

Symtec Inc.
P.O. Box 462
Farmington, Michigan 48024

For Service on SYMTEC products
call (313) 272-2952

SYMTEC LIGHT PEN WARRANTY REGISTRATION CARD

Serial Number _____ Model Number _____

Purchased From _____
(Name of Store)

(Address)

Name _____

Address _____

City, State, Zip _____

Telephone Number _____ Purchase Date _____