VOLUME I NUMBER 2 1983 $3.50

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UTILITIES

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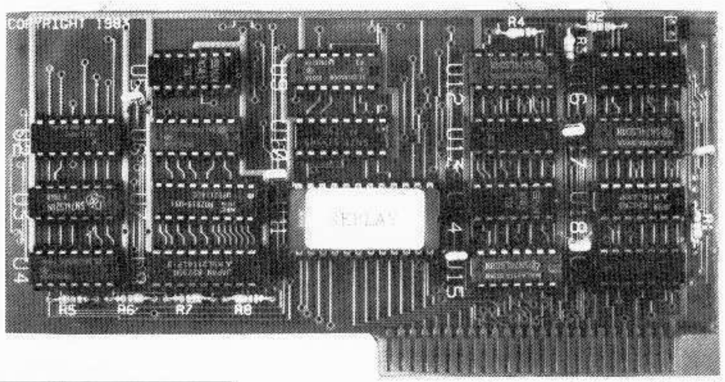

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REPLAY II is intended to be used as an analysis tool, for program development, and for making archival backup copies.

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REPLAY II is an interface card that is slot independent. Users can stop a program, examine and change memory, or copy the program, and restart. Control of the APPLE is obtained by pressing the remote switch which comes on an 18 inch cord outside the APPLE. REPLAY II does not copy the original disk, rather it copies the program executing in memory. If a copy is desired a blank disk is inserted in drive 1 and the options on the menu are contained in the eprom on the REPLAY II card, no other disk needs to be booted for copying, unlike other copy cards. The very act of booting another disk alters memory which is detectable by some protected software.

REPLAY II does not change ANY memory. Extra memory is buffered to allow copying and analysis without altering the original memory contents. Other copy cards always change specific points in the original memory. REPLAY II faithfully reproduces the lower 48K of memory in a fast load format. The upper 16K can also be copied for a 64K copy. Standard DOS 3.3 files are created automatically for storage on floppy or hard disks. A RAM card is needed for this.

REPLAY II is fully documented in a 60 page manual. Utility programs supplied with the REPLAY II card include Program Analysis, Comparisons, Packing and Compression. A language card is not needed to run packed program copies.

Because most programs are written in Assembly language, the user should be familiar with Assembly in order to fully utilize the advanced Analysis and Packing programs. Users can now freeze a binary program and perform a transparent step or trace while continuous disassembly is shown. View text or hires during trace.

REPLAY II can automatically move protected APPLESOFT programs to a standard DOS 3.3 disk for listing or modification.

Now game players can save a game at any level and QUICKLY restart with the REPLAY II card. Users can freeze games, change variables to obtain unlimited ships or power, etc., then restart the program. Saving high scores is easy!

Minimum requirements are an APPLE II and a single disk drive.

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core™ UTILITIES

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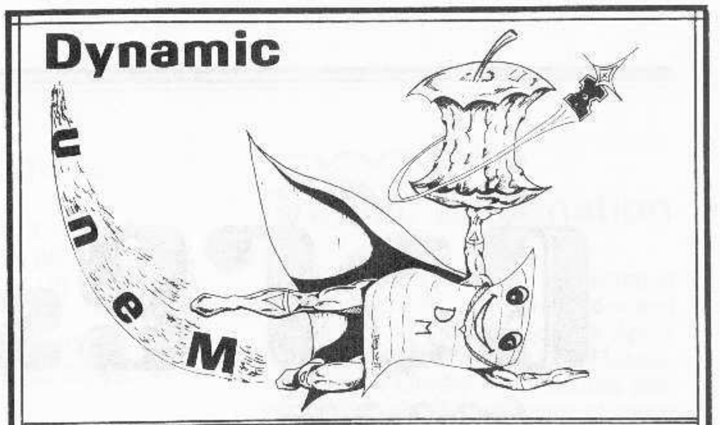

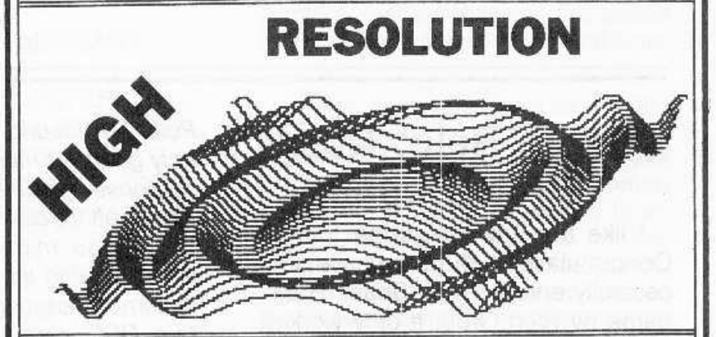

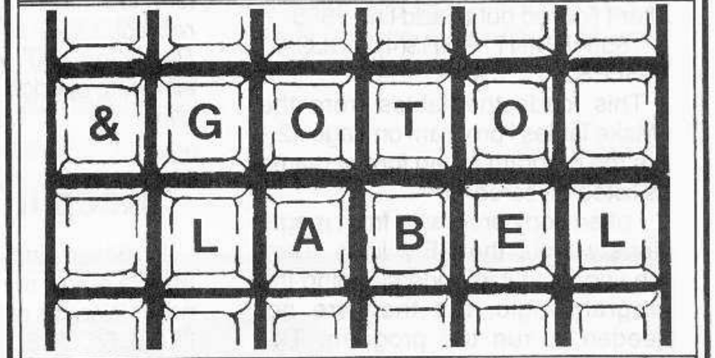

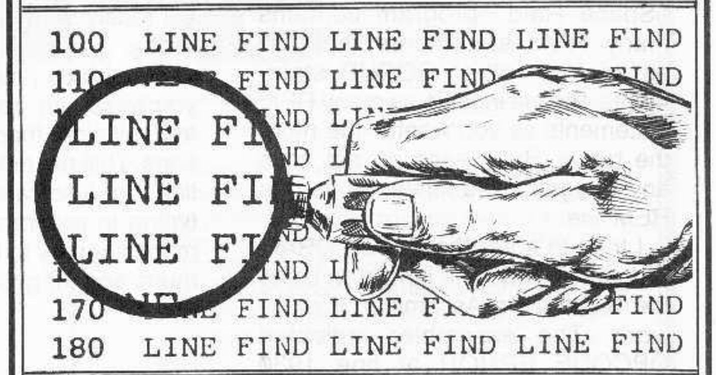
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LINE FI
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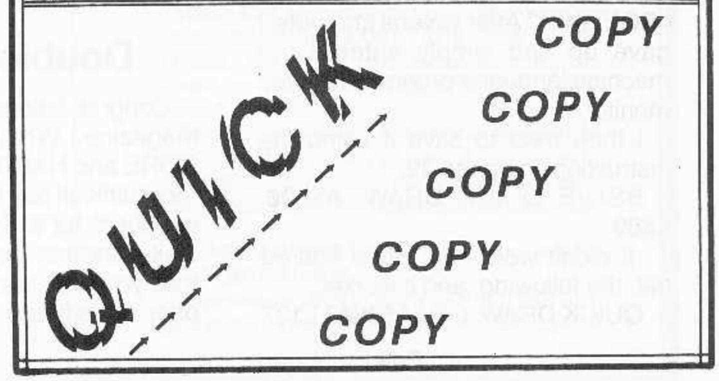
170 FIND
180 LINE FIND LINE FIND LINE FIND



COREspondence

Space Raid, Quick Draw Repair

I like the new magazine format. Congratulations. Bugs —I have successfully entered the "Space Raid" game by Rich Orde. It only worked after I figured out to add line 1555:

1555 PRINT CHR$(4) "BLOAD TABLES"

This loads the tables from the "Make Tables" program on page 42. I like the program listing format (same as listed on screen.)

I often copy programs from magazines without the REM lines. They are very useful in understanding the program logic, but they are not needed to run the program. The "Space Raid" program contains many REM statements that are called from other GOSUB statements. Please include as many REM statements as you want —the more the better. But please do not have any program branches go to the REM line.

I tried to enter the QUICK DRAW program in machine language using the S.C. Macro Assembler. It didn't work. The assembler indicated OPCODE ERROR at line 193Ø "BGE SKIP." After several attempts, I gave up and simply entered the machine language program from the monitor.

I then tried to save it using the instructions on page 39:

BSAVE QUICK DRAW, A$8ØØ, L$89

It didn't work, so I then figured out the following, and it worked:

QUICK DRAW. OBJ,A$Ø8Ø3,L137

Peter V. Young
Ardmore, PA

Peter—We found that you were probably getting a FILE TYPE MISMATCH response because there is already an Applesoft file on the disk called Quick Draw. You might find success by instead using the file name QD. Any assembly language listings that contain BGE commands can be corrected by substituting BCS. Replacing BLT with BCC will also eliminate opcode errors when assembling.

Keep It Together

Enclosed find my check for $2Ø. Please renew my subscription for the next 12 issues of HARDCORE COMPUTIST/CORE.

I received my first issue of CORE today. I find it very informative, although I do have one gripe. I urge you to refrain from splitting articles and placing them at various locations. This not only leads to aggravation, but also causes mistakes while typing in programs. Most computer magazines try to keep this to a minimum, and for good reason.

George Pleau
St. Louis, MO

Double Header

Congratulations on a great new magazine. What a combination—CORE and HARDCORE—it will be a most difficult pair to beat! Enclosed is our check for $15 to cover the CORE disk—another real bargain. Hope that you can keep this economical offer in the future.

Harry M. Randel
Scotch Plains, NJ

What Is It?

What in Heaven's name does the latest issue of CORE have to do with the magazine I subscribed to? I don't have the slightest interest in computer graphics, but am interested in encoding and decoding the materials on Apple II and III disks. Please hold the graphics stuff.

Professor E.J. Blawie
University of Santa Clara
School of Law

Dear Mr. Blawie—Publishing a magazine is much like designing an academic curriculum —every issue will not titillate every reader just as every lecture will not thrill every student. But if you bear with us, you will find that HARDCORE will continue to delve into the same problems as always — Apple II and III programs. Every third month you will receive CORE, which will explore in-depth topics, such as graphics, or in the next two editions, utilities and games. So each year you will still receive eight issues of HARDCORE, packed with valuable coding-encoding information. You might want to look at the CORE issues as a bonus to your HARDCORE subscription.

Bob's Graphic Needlework

Although I'm less interested in the graphic aspect of Apple programming, I enjoyed vol.1/no.1 very much. I can't wait for no.2, considering your plans, if it's even half as good as this!

I was intrigued by the use of graphics commands to format the text screen. The idea had never occurred to me before, and it does seem to be rather more spiffy.

After playing around with the idea for a bit, I came up with a little variation. The enclosed listing explains how to use the lo-res color characteristic charts on page 17 to alter lines 30 and 40 to vary the box. (I chose an inverse "x" because the appearance is more like old needlework.)

Bob Curtin
Rochester, NY

```
5   REM BOX THREE
6:
7   REM INSPIRED BY TWO SIMI-
    LAR UTILITIES IN CORE 1-1
8:
9:
10  TEXT : HOME : CLEAR
15  WW = 75
20  GR
30  COLOR = 8: GOTO 50
40  COLOR = 1
50  HLIN 0,39 AT X: X = X+1
60  IF X = 40 THEN 90
70  IF X / 2 = INT (X / 2) THEN 30
80  GOTO 40
90  POKE 32,1: POKE 33,38:
    POKE 3 4,1: POKE 35,19:
    HOME
100 POKE - 16303,0
110 MS$ = "YOUR MESSAGE
    HERE"
120 FOR V = 18 TO 2 STEP - 1:
    VTAB V: HTAB (19- LEN (MS$) /
    2): PRINT MS$: VTAB V + 1:
    CALL - 868: FOR W = 1 TO
    WW: NEXT W: NEXT V: HOME
    : GOTO 120
```

Savage Comments

You need more hard in your Core and an update of Castle Wolfenstein.

Thomas C. Savage
Sacramento, CA

Graphic Explanation

Your readers might be interested in a relatively new user's group devoted specifically to graphics for the Apple family of computers. The High Resolution Picture Library is concerned with compilation and dissemination of public domain graphics software. We collect hi-res pictures, shape tables, and fonts.

Anyone who would like to join the HRPL and receive the HRPL software currently available can send a diskette in a returnable mailer to HRPL. Return postage in the form of stamps is required. Any software suitable for contribution to the library (programs, shapes, fonts, etc.) may be included on the diskette. Send all correspondence to: HRPL, c/o Paul Pritchard; 2353 S. 8th St.; Omaha, NE 68109. Membership is free.

Paul Pritchard
Omaha, NE

core ™

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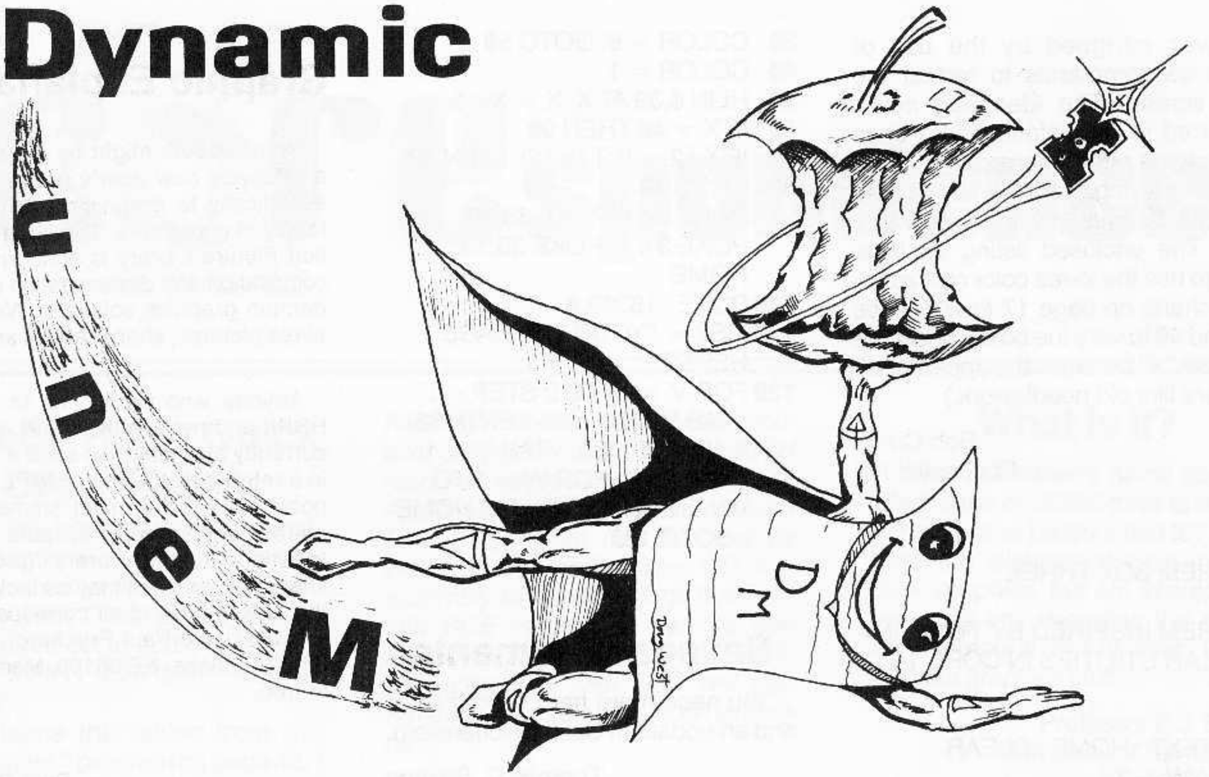
Dynamic Menu



By Brent Millirans

Requirements:
Blank, initialized disk
48K Applesoft in ROM
At least one disk drive

The Dynamic Menu Utility uses a push-button approach to writing a menu routine. It creates a text file from .5 to perhaps 4K of Applesoft code which will place a RUNable menu in memory with the touch of only a few keys.

Using the Dynamic Menu Utility, it is quite simple to generate a menu of your choice in about five minutes.

Once the menu has been saved to disk and EXECed back into memory, renumbering, further editing and interfacing to other program routines can take place. The time saved is substantial, especially if a large number of selections is necessary.

The Dynamic Menu Utility sets up a dummy menu from which to work. This will be referred to as the "information block." The only time an information block is not available is when the edit mode is entered and memory is empty.

There are four areas within the program (each will be explained in detail later in the article):

1) The Main Menu
2) The Director Screen
3) The Edit Screen
4) The Fix Screen

A short tutorial will provide the user with a functional method of exploring each area and of handling the program as a whole for the first time. Practice, as always, makes perfect.

How to Use Dynamic Menu Utility

Type in the Dynamic Menu Utility Applesoft listing which starts on page **5**.

Save the program.

Running the Dynamic Menu Utility brings you to the main menu. Although various functions are available at this point, select number 1, "Develop Menu."

You will be asked to select either double (D) or single (S) spacing. Type "D" for now. Next, enter the number of lines that the proposed menu requires. Type "4" and press return. The program will go to the director screen with a dummy menu and title line. This is what is used to construct the real menu.

To enter the edit mode, press "E". The dummy menu, or information block, will be transferred to the edit screen. At the bottom, note the command line (< < Command) and the prompt "Line Symbol." Press "L" for line and "Line = " will appear. Enter "A" for line A of the alphabetic scaler, which is where the title will be placed. The line will disappear awaiting your entry. Type in "Apple II Tests" and press return.

The new title line will appear and the prompt "Title in Inverse or Normal" will be displayed. Press "I" for inverse. Now the information block should have the inverse title "Apple II Tests" plus four lines, each with the word "selection" in normal video.

Use the "Line" command again, placing in each line (C,E,G,H) the selections "RAM Card," "ROM Card," "Memory Test" and "Integer Card." When the prompt "Line Symbol" returns, press "S" for symbol. Next press "L" for letter followed by "I" for inverse. The information block should now look like this:

```
                APPLE II TESTS

                 A RAM CARD

                 B ROM CARD

               C MEMORY TEST

               D INTEGER CARD
```

At this point, exit by pressing "X" and return to the director. The information block will follow.

Type "F" for fix, and you are back in a similar screen area but in the fix mode.

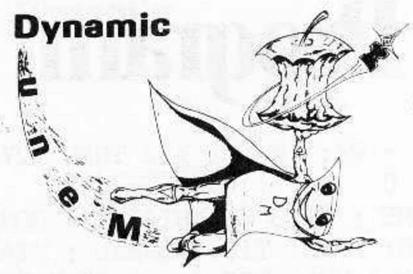
The next step is to position the block for the most pleasing look. Type "P" for position and the prompt will read "Title or Item." Press "T" for title and then "C" for center. The title should now be centered, but the rest of the block should not have moved.

Now press "P" again, followed by "I" for item. Again, entering "C" should center the remainder of the information block. The column command could have been used here as well. Try it if you like and then return the information block to center.

The menu is now ready to be positioned vertically. By pressing "V" for vertical, the next entry will position the title and the menu body using the alphabetic scaler in the left margin. The whole menu is repositioned with the title to prevent overlapping.

Enter "C" and watch the information block reposition from line C on down. Now press "G" and the menu body will position downward separately from the title.

At this point you may wish to play around with different



Program

```
10  ONERR  GOTO 1760
20 D$ =  CHR$ (13) +  CHR$ (4):G$
    =  CHR$ (7):ST = 1:TZ$ = "N
   ORMAL": GOTO 120
30 H% = 20 -  LEN (OB$) / 2: RETURN
40 H1% = 19 -  LEN (OB$) / 2: RETURN
50 T =  PEEK (36) + 1: HTAB T: PRINT
    A$;G$;: HTAB T: CALL  - 868:
    HTAB T: PRINT A$;: RETURN
60  FOR I = 1 TO 500: NEXT : RETURN
70  FOR I = 1 TO LI: POKE  - 1633
    6, PEEK ( - 16336): NEXT : RETURN
80  IF I < 10 AND NN = 1 THEN  PRINT
    S$;: RETURN
90  RETURN
100  IF TZ$ = "INVERSE" THEN  INVERSE
    : RETURN
110  FOR I = 1 TO 100: NEXT : RETURN
120  DIM IT$(16),V%(24),SY$(16),L
    M$(22): IF TG THEN  RETURN
130  REM  ********************
140  REM  **                **
150  REM  **   FIRST PAGE   **
160  REM  **                **
170  REM  ********************
180  TEXT : HOME :V% = 3:S$ = " "
    :LI = 7:TT$ = ": DYNAMIC MEN
    U UTILITY :": FOR I = 1 TO 5
    : READ SE$(I): NEXT : RESTORE
190  VTAB 3: INVERSE : HTAB 9: PRINT
    TT$: PRINT : VTAB 7: FOR I =
    1 TO 4: HTAB 14: PRINT I;: NORMAL
    : PRINT SE$(I): INVERSE : PRINT
    : NEXT : VTAB 21: HTAB 9: INVERSE
    : PRINT ":      PROGRAM AIDE
      :": NORMAL
200  GOSUB 70: GOSUB 110: GOSUB 7
    0: GOSUB 110: GOSUB 70: PRINT
    : FLASH : HTAB 14: VTAB 17: PRINT
    "E";: NORMAL : PRINT SE$(5);
    : HTAB 14: GET AN$: INVERSE
    : PRINT AN$: NORMAL : GOSUB
    70: GOSUB 110: GOSUB 70:AN =
     VAL (AN$): IF AN < 1 OR AN >
    4 THEN 200
210  ON AN GOTO 280,590,700,220
220  VTAB 21:SG$ = ": PROGRAM IS
    COMPLETED :": HTAB 9: INVERSE
    : PRINT SG$: NORMAL : VTAB 2
    3: END
230  REM  ********************
240  REM  **   PARAMETERS   **
250  REM  ** FOR DEVELOPER  **
260  REM  **                **
270  REM  ********************
280  VTAB 21: HTAB 14: INVERSE : PRINT
```

arrangements. But remember, going back to edit will always refix the information block to the edit position.

The next step is to save the finished menu to disk. This is accomplished by returning to the director screen (press "X") and pressing "S" for save. Add your file name (say "test-menu") and press return. If you mistakenly select save or load, entering "X" for a file name will allow an escape.

The drive will start as two files are saved to disk. The screen will display the files being manufactured and saved. One is a data file which, when read in under "load," will reinstall a menu for further editing. The other is an EXECutable text file which will install the menu Applesoft code in memory.

NOTE: The NEW command should be entered before EXECing any file because the EXEC command does not clear memory as RUN or BRUN does.

The rest is up to you. Reading the explanation of each area of the program and the corresponding commands should answer most questions.

Main Menu

Main Menu selections:

1) Develop Menu—Allows building a menu from scratch with full-time editing available.

2) Revise Files—Brings file into memory for further editing or revision.

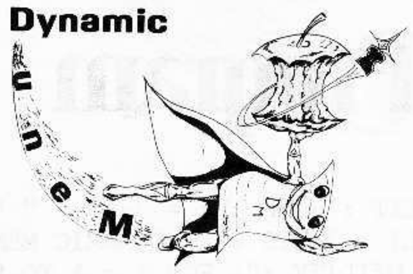
3) Edit Program—Allows reentry to editing without loss of data in case of irrecoverable error.

4) Exit Program—Returns user to Applesoft.

The setup entry for the "Develop Menu" selection will require two initial inputs before allowing editing. You must specify: 1) single or double spacing, and 2) the number of items in the proposed menu.

As a programming hint, two or three shorter menus are much more user-friendly than one long one.

In "Revise Files" mode you will be asked for a file name, but only the user portion (i.e., "test"). Since the program assigns a primary file name (menu.mod.), the user provides only the latter portion (menu.mod.test). The display will say,



Program

```
    " DEVELOP MENU ": NORMAL : GOSUB
    60: CLEAR :WA$ = "": TEXT : HOME
    :MX = 16:S$ = " ":TG = 1: GOSUB
    20:TI$ = " -DEVELOPEMENT- ":
     FOR I = 0 TO 16:IT$(I) = "S
    ELECTION": NEXT
290  VTAB 2: HTAB 12: INVERSE : PRINT
    TI$: NORMAL :LI = 2
300  VTAB 5: PRINT "SINGLE SPACES
     OR DOUBLE ... D";: HTAB 29:
     GET PC$: INVERSE : PRINT PC
    $: NORMAL : GOSUB 70: IF PC$
     = "D" THEN SP = 1:MX = 8
310  IF PC$ <  > "D" AND PC$ <  >
    "S" THEN 300
320  VTAB 7: PRINT "HOW MANY ENTR
    IES ..........": PRINT "(MAX
    IMUM=";MX;")": VTAB 7: HTAB
    29: INPUT "";N: GOSUB 70: IF
    N < 1 OR N > MX THEN  VTAB 8
    :A$ = " -INVALID- ": GOSUB 5
    0: GOSUB 60: PRINT : GOTO 32
    0
330 V1% = 2:V% = 2:H% = 3:H1% = 2
    :TI$ = "TITLE LINE": IF SP THEN
    ST = 2:N = N * 2
340 GOTO 460
350 V2% = V%: IF V1% > 2 THEN V2%
     = 0
360  HOME : VTAB V%: HTAB H%: GOSUB
    100: PRINT TI$: NORMAL : VTAB
    V1% + V2%: FOR I = 1 TO N STEP
    ST: IF FH THEN  FLASH : HTAB
    H1%: PRINT SY$(I);: NORMAL :
     GOSUB 80: PRINT S$;IT$(I): GOTO
    390
370  IF IV THEN  INVERSE : HTAB H
    1%: PRINT SY$(I);: NORMAL : GOSUB
    80: PRINT S$;IT$(I): GOTO 39
    0
380  HTAB H1%: GOSUB 80: PRINT SY
    $(I);S$;IT$(I)
390  IF SP THEN  PRINT
400  NEXT : RETURN
410  REM  **********************
420  REM  **                  **
430  REM  **   THE DIRECTOR   **
440  REM  **                  **
450  REM  **********************
460  HOME : POKE 32,2: POKE 33,38
    : VTAB 22: FOR I = 2 TO 38: PRINT
    "-";: NEXT : HTAB 1: INVERSE
    : PRINT "<DIRECTOR>";: NORMAL
    : HTAB 24: PRINT "-('X' TO E
    XIT)"
470  VTAB 23: HTAB 1: PRINT "[E]D
    IT";: HTAB 8: PRINT "[F]IX";
    : HTAB 14: PRINT "[S]AVE";: HTAB
```

"Add file name: menu.mod." The user will simply type "test" or whatever file name is chosen.

With "Edit" selection, if memory has a file in it, you will be returned to the edit mode. If memory is empty you will be returned to the director. A file may be loaded from disk just as in the revise mode.

Director Screen

While working from the director screen (as noted at the bottom left corner) there are four basic commands available. Any selection from the main menu will be processed through the director screen, except the edit mode selection if a file is in memory.

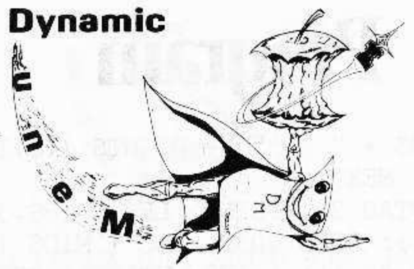
Edit—Places the information block in the edit mode using a formatting grid. While in this mode the text of each line of the information block may be altered.

Fix—Places the information block in the fix mode using a formatting grid. While in this mode the vertical and horizontal position of the information block may be changed. It is important that all editing work be completed before "fixing" the position of the information block. The reason for this is that the edit mode automatically fixes the information block so the program can accurately locate the line currently being altered.

Save—Asks for the name under which you wish to save the finished menu. The name chosen should be short, as it is appended to an internally selected file name. You will be asked to "add file name: menu.mod." Your chosen name, say "testmenu," would result in a file name of "menu.mod.testmenu". The reason for this is that the Dynamic Menu Utility writes two files. One is executable and one is for data only. Two files would result on disk from the above example, "menu.mod.menutest" and "menu.val.menutest."

Load—Asks for the name to be appended to the internal file name "menu.val." This is the data file and memory will be loaded with proper data resulting in an editable information block. You are then returned to the director screen.

X—Exit to main menu. In the edit and fix modes, additional commands are available. The edit mode is described first as this is the usual starting point.



Program

```
     21: PRINT "[L]OAD";
480  HTAB 28: PRINT "<< SELECT";:
      POKE 35,21: GOSUB 570: GOSUB
     550: VTAB 23: HTAB 37: GET S
     E$: GOSUB 70
490  IF SE$ = "E" THEN FX = 0:V% =
     2:V1% = 4:H% = 2:H1% = 2: GOTO
     770
500  IF SE$ = "F" THEN 1050
510  IF SE$ = "S" THEN 1410
520  IF SE$ = "L" THEN 650
530  IF SE$ = "X" THEN 180
540  GOTO 480
550  IF WA$ < > "" THEN  VTAB 10
     :OB$ = WA$: GOSUB 30: HTAB H
     %: PRINT WA$
560  RETURN
570  IF  NOT EX THEN  GOSUB 350
580  RETURN
590 LI = 2: VTAB 21: HTAB 14: INVERSE
     : PRINT " REVISE FILES ": NORMAL
     : GOSUB 60:EX = 1: TEXT : HOME
     :WA$ = "LOAD FILE TO BE MODI
     FIED":OB$ = WA$: GOSUB 30: GOTO
     460
600  REM  ********************
610  REM  **                **
620  REM  **   LOAD ROUTINE **
630  REM  **                **
640  REM  ********************
650  HOME : VTAB 3: HTAB 14: INVERSE
     : PRINT ": FILE LOAD :": NORMAL
     : POKE 34,4: VTAB 7:XF = 1:F
     L$ = "MENU.VAL.": HTAB 15: PRINT
     FL$;: HTAB 1: PRINT "ADD FIL
     ENAME: ";: HTAB 24: INPUT ""
     ;NA$: GOSUB 70:FL$ = FL$ + N
     A$
660  IF NA$ = "" THEN  HOME :A$ =
     "NO ENTRY - RESELECT": VTAB
     10: HTAB H%: GOSUB 50: VTAB
     23: GOSUB 60: GOTO 480
670  IF NA$ = "X" THEN 180
680  PRINT : PRINT D$;"MONICO": PRINT
     D$;"OPEN";FL$: PRINT D$;"REA
     D";FL$: INPUT FH: INPUT IV: INPUT
     TI$: INPUT H%: INPUT H1%: INPUT
     V%: INPUT N: INPUT SP: INPUT
     TZ$:ST = 1: IF SP THEN ST =
     2
690  FOR I = 1 TO N STEP ST: INPUT
     SY$(I): INPUT IT$(I): NEXT :
      INPUT TY$: INPUT V1%: INPUT
     V2%: PRINT D$;"CLOSE": PRINT
     D$;"NOMONICO": POKE 34,0: HOME
     :WA$ = "":EX = 0: GOTO 460: END
```

Edit Screen

When entering the edit mode, the Apple will beep and "< <Command" will appear in the right bottom corner. This simply draws attention to the command queries. You will be prompted by the words "Line Symbol." Pressing the key corresponding to the first letter of either command will provide the desired operation.

Line—Asks for which line to edit using the left margin scale A through S. Line "T" is reserved for the prompt. Enter the wording desired, but keep it short (under 3Ø characters). Use the left arrow key as usual to backspace and correct mistakes. You may, of course, reselect the line. When selecting Line A (Line = A), you will always be altering the title. After typing in the title of the menu being built (or leaving it blank) you will be asked whether you wish the title in normal or inverse video. Select by keypress as desired. You will be returned to the command line and prompted with "Line Symbol."

Symbol—Refers to the "keypress symbol" that you wish to use in your menu. You will be prompted to select "letter or number" symbols. The letters A through Z (if necessary) will be assigned to the left of each selection entry if letters are selected. Numbers may otherwise be assigned. You will afterward be prompted to choose whether the assigned symbols will be displayed normally, or in flashing or inverse video. There is no interference between the Line or Symbol commands. Either may be selected at any time.

X—At the point of completion in the edit mode the X command will return you to the director screen.

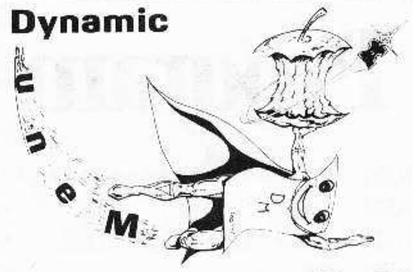
NOTE: The Dynamic Menu Utility will automatically assign a "prompt line" for your menu in a complementary style to the finished information block. This is only visible when running the finished product.

Fix Screen

The fix mode would be the next step in building the menu. Depending on the size of the menu in progress, its position on the screen will need to be changed.

The command line will feature the prompt "Position Column Vertical." Again, pressing a key corresponding to the first letter of each word will produce the desired operation.

Position—Asks for the desired horizontal position of the



Program

```
700 LI = 2: VTAB 21: HTAB 14: INVERSE
     : PRINT " EDIT PROGRAM ": NORMAL
     : GOSUB 60:WA$ = "":EX = 0: TEXT
     : HOME : IF IT$(1) = "" THEN
    WA$ = "NO FILE IN MEMORY": GOTO
     460
710 SE$ = "E": GOTO 490
720  REM  **********************
730  REM  **                  **
740  REM  **    EDIT  MENU    **
750  REM  **                  **
760  REM  **********************
770  TEXT : HOME : HTAB 22: FLASH
     : PRINT "EDIT";: NORMAL : PRINT
     " ('X' TO EXIT)": POKE 34,1
780  FOR I = 1 TO 21:LM$(I) =  CHR$
     (I + 64): PRINT LM$(I) + "-"
     : NEXT : PRINT ;: POKE 32,2:
      POKE 33,38: VTAB 22: PRINT
     "--^";: FOR IR = 1 TO 7: FOR
     I = 1 TO 4: PRINT "-";: NEXT
     I: PRINT "^";: NEXT IR
790  VTAB 23: HTAB 2: PRINT "C0";
     : FOR I = 10 TO 40 STEP 5:I$
      =  STR$ (I): PRINT  SPC( 3)
      + "C" +  LEFT$ (I$,1);: NEXT
     :B$ = "  5": FOR I = 10 TO 4
     0 STEP 5:I$ =  STR$ (I):B$ =
     B$ + "    " +  RIGHT$ (I$,1)
     : NEXT
800  VTAB 24: PRINT  LEFT$ (B$,37
     );: POKE 2039, ASC ( MID$ (B
     $,38,1)) + 128: VTAB 1: POKE
     35,21
810  GOSUB 350: VTAB 21: HTAB 29:
      PRINT "<<COMMAND";: VTAB 21
     : HTAB 1: POKE 33,38: GOSUB
     60: IF FX THEN 1060
820  HTAB 1: PRINT  SPC( 27);: HTAB
     1: PRINT "[L]INE [S]YMBOL
                 <<COMMAND";: HTAB
     28: GET CM$: IF CM$ <  > "L"
      AND CM$ <  > "S" AND CM$ <
      > "X" THEN 820
830  GOSUB 1220: IF CM$ <  > "L" THEN
     910
840 V% =  ASC (LN$) - 63: IF V% >
     24 THEN V% = 2: TEXT : HOME
     : GOTO 460
850  IF V% < 1 OR V% > 22 THEN 82
     0
860  VTAB V%: HTAB 3: IF LN$ = "A
     " THEN  HTAB 1:TI$ = "": PRINT
      SPC( 30);: HTAB 3: INPUT ""
     ;TI$: GOSUB 70: GOTO 880
870 LN =  ASC (LN$) - 66: HTAB 1:
      PRINT  SPC( 30);: HTAB 4: INPUT
     "";IT$(LN): GOSUB 70
880  IF LN$ = "A" THEN  VTAB V%: HTAB
     H%: PRINT  SPC( 25);: HTAB H
```

title or the item of the information block. Enter "T" for title or "I" for item. One of the prompts, flush left, flush right or centered, will then be offered. A single keypress will automatically fix the horizontal position of the selected part of the information block.

Column—Should the position command not be adequate for horizontal positioning, the column command uses the numeric scale along the bottom of the screen. The entry range is 1 through 40, and will HTAB the information block accordingly. This command also moves the title and the item block separately. Only the first item of the information block is aligned. Other items following are keyed to the first item.

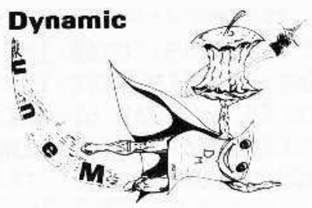
Vertical—Asks for the vertical position of the information block using the left margin alphabetic scale. This is done in two parts. When first selected, you will be prompted for the vertical position of the title line (even though blank). Enter the letter corresponding to the vertical position you wish to use for the title only. Although the entire information block will move, a second prompt will ask for the vertical position of the initial selection entry (item). The body of the menu will then be moved separately, leaving the title as it was originally positioned.

X—Exits the fix mode and returns control to the director screen.

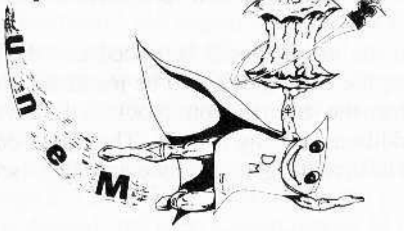
At this point the menu should be edited and the position fixed. However, the edit mode could be reentered if desired. Note again that the information block will have to be "refixed" if additional editing is done. The SAVE command will allow you to save the generated menu to disk (see SAVE command).

Improving the Program

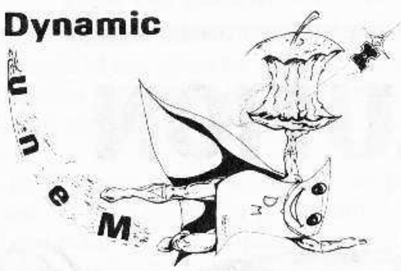
By now you may have several ideas for program improvements. One suggestion is to make it possible for the Menu program to be incremented by any number of lines, starting at any line number. This would allow the menu to be placed conveniently in other programs.



```
      %: GOSUB 100: PRINT TI$: NORMAL
      : VTAB 21: PRINT "TITLE IN "
      ;: PRINT "[I]NVERSE OR [N]OR
      MAL ?";: CALL  - 868: HTAB 3
      2: GET TZ$: GOSUB 70
890   IF TZ$ = "I" THEN TZ$ = "INV
      ERSE": GOTO 900
900 V% = 2: GOSUB 350: VTAB 21: GOTO
      820
910   IF SY$ = "L" THEN  GOSUB 127
      0:SY$ = ""
920   IF SY$ = "N" THEN  GOSUB 130
      0:SY$ = ""
930   IF CM$ = "T" THEN 950
940 CM$ = "T": GOSUB 1250
950   IF TY$ = "F" THEN FH = 1:TY$
       = ""
960   IF TY$ = "I" THEN IV = 1:FH =
      0:TY$ = ""
970   IF TY$ = "N" THEN FH = 0:IV =
      0
980   GOTO 810
990   TEXT : GOTO 460
1000  REM  *********************
1010  REM  **                 **
1020  REM  **  FIX POSITIONS  **
1030  REM  **                 **
1040  REM  *********************
1050  TEXT : HOME : HTAB 23: FLASH
      : PRINT "FIX";: NORMAL : PRINT
      " ('X' TO EXIT)": POKE 34,1:
      FX = 1: GOTO 780
1060  VTAB 21: HTAB 1: PRINT  SPC(
      37);: HTAB 1: PRINT "[P]OSIT
      ION [C]OLUMN [V]ERTICAL ";: GET
      CM$: IF CM$ <  > "X" AND CM$
       <  > "P" AND CM$ <  > "C" AND
      CM$ <  > "V" THEN 1060
1070  GOSUB 1330
1080  IF CM$ = "V" THEN V% =  ASC
      (VT$) - 63:V1% = V% + 2: GOSUB
      350: GOSUB 1380:V1% =  ASC (
      V1$) - 63: GOSUB 350: GOTO 1
      060
1090  IF CM$ = "P" THEN 1130
1100  IF QL$ = "I" THEN H1% =  VAL
      (CL$) - 2: GOSUB 1200
1110  IF QL$ = "T" THEN H% =  VAL
      (CL$) - 2: GOSUB 1200
1120  GOSUB 350: GOTO 1060
1130  IF AN$ = "L" AND QL$ = "T" THEN
      H% = 1
1140  IF AN$ = "L" AND QL$ = "I" THEN
      H1% = 1
1150  IF AN$ = "R" AND QL$ = "T" THEN
      H% = 38 -  LEN (TI$)
1160  IF AN$ = "R" AND QL$ = "I" THEN
      H1% = 36 -  LEN (IT$(1))
1170  IF AN$ = "C" AND QL$ = "T" THEN
      OB$ = TI$: GOSUB 30
1180  IF AN$ = "C" AND QL$ = "I" THEN
      OB$ = IT$(1): GOSUB 40
1190  GOSUB 350: GOTO 1060
1200  IF H% < 1 OR H% > 38 THEN A
      $ = "-INVALID-": VTAB 3: HTAB
```



```
    27: GOSUB 50: VTAB 21: POP :
     GOTO 1060
1210  RETURN : END
1220  IF CM$ = "X" THEN 990
1230  VTAB 21: IF CM$ = "L" THEN
     HTAB 1: PRINT  SPC( 20);: HTAB
    1: PRINT "LINE= ";: GET LN$:
     PRINT LN$;: RETURN
1240  VTAB 21: HTAB 1: IF CM$ = "
    S" THEN  PRINT "SYMBOL= [L]E
    TTER [N]UMBER ";: GET SY$: GOSUB
    70: PRINT SY$;: RETURN
1250  VTAB 21: HTAB 1: PRINT  SPC(
    37);: HTAB 1: IF CM$ = "T" THEN
     PRINT "TYPE= ";: PRINT "[F]
    LASH [I]NVERSE [N]ORMAL ";: GET
    TY$: GOSUB 70: PRINT TY$;: RETURN
1260  GOTO 1220
1270 RL = 16:NN = 0:R = 0: IF SP THEN
     RL = 8
1280  FOR I = 1 TO RL:SY$(I + R) =
     CHR$ (I + 64): IF SP THEN R
     = R + 1
1290  NEXT : RETURN
1300 NN = 1:RL = 16:R = 0: IF SP THEN
     RL = 8:NN = 0
1310  FOR I = 1 TO RL:SY$(I + R) =
     STR$ (I): IF SP THEN R = R +
    1
1320  NEXT : RETURN
1330  IF CM$ = "X" THEN 990
1340  IF CM$ = "P" THEN  GOSUB 14
    00
1350  VTAB 21: HTAB 1: IF CM$ = "
    P" THEN  PRINT "POS.=FLUSH "
    ;: PRINT "[L]EFT [R]IGHT OR
    [C]ENTER";: GET AN$: GOSUB 7
    0: RETURN
1360  IF CM$ = "V" THEN  PRINT  SPC(
    37);: HTAB 1: PRINT "VTAB TI
    TLE AT LINE= ";: GET VT$: GOSUB
    70: RETURN
1370  IF CM$ = "C" THEN  GOSUB 14
    00: HTAB 1: PRINT  SPC( 26):
     HTAB 1: PRINT "COLUMN NUMBE
    R=";: HTAB 16: INPUT "";CL$:
     GOSUB 70: RETURN
1380  IF CM$ = "V" THEN  VTAB 21:
     HTAB 1:V2% = 0: PRINT "VTAB
     FIRST ENTRY AT= ";: GET V1$
    : GOSUB 70: RETURN
1390  GOTO 1330
1400  HTAB 1: VTAB 21: PRINT "[T]
    ITLE OR [I]TEM POSITION  ";:
     CALL  - 868: GET QL$: GOSUB
    70: RETURN
1410 FI$ = "MENU.MOD.":FL$ = "MEN
    U.VAL."
1420  REM  ********************
1430  REM  **                **
1440  REM  **  GET FILE NAME  **
1450  REM  **                **
1460  REM  ********************
1470  HOME : VTAB 3: HTAB 13: INVERSE
    : PRINT ": FILE SAVE :": NORMAL
    : POKE 34,4: VTAB 6: PRINT "
    ADD FILENAME: ";FI$;: INPUT
    "";NA$: GOSUB 70
1480  GOSUB 1490: GOSUB 1510:FI$ =
    FI$ + NA$:FL$ = FL$ + NA$: VTAB
    8: PRINT "DISK READY PLEASE
    ...DRIVE 1": VTAB 10: PRINT
    "PRESS RETURN ";: GET RT$: GOSUB
    70: GOTO 1530
1490  IF NA$ = "" THEN  POP : VTAB
    8: PRINT "NO FILE NAME ...":
     VTAB 10: PRINT "RE-ENTER OR
     TYPE 'X' TO EXIT ";G$: GOSUB
    60: GOSUB 60: GOTO 1470
1500  RETURN
1510  IF NA$ = "X" THEN  POKE 34,
    0: HOME : POP : GOTO 460
1520  RETURN
1530  IF FH THEN TY$ = "FLASH"
1540  IF IV THEN TY$ = "INVERSE"
1550  REM  ********************
1560  REM  **                **
1570  REM  **  SAVE ROUTINE   **
1580  REM  **                **
1590  REM  ********************
1600  PRINT D$;"MONICO": PRINT D$
    ;"OPEN";FI$: PRINT D$;"DELET
    E";FI$: PRINT D$;"OPEN";FI$:
     PRINT D$;"WRITE";FI$: PRINT
    "1000 TEXT:HOME": PRINT "100
    5 VTAB";V%;":HTAB";H%;":";TZ
    $;":PRINT"; CHR$ (34);TI$; CHR$
    (34);":NORMAL"
```

Dynamic 

Program

```
1605  END
1610  IF SP THEN  FOR I = 1 TO N STEP
    2: GOTO 1630
1620  FOR I = 1 TO N
1630  PRINT "10" +  STR$ ((I * 5)
     + 5) + "VTAB";(V1% - 1) + I
    ;":HTAB";H1%;":";TY$;":PRINT
    "; CHR$ (34);SY$(I); CHR$ (3
    4);";:NORMAL:PRINT"; CHR$ (3
    4);S$ + IT$(I); CHR$ (34): NEXT
1640  PRINT "1200 VTAB 21:HTAB";H
    1%;":";TY$;":PRINT"; CHR$ (3
    4);"S"; CHR$ (34);";: NORMAL
     : PRINT "; CHR$ (34);" SELE
    CT..."; CHR$ (34);";: HTAB "
    ;H1%;": GET SE$: PRINT SE$":
     IF SP THEN  FOR I = 1 TO N STEP
    2: GOTO 1660
1650  FOR I = 1 TO N
1660  PRINT "12" +  STR$ ((I * 5)
     + 5) + " IF SE$="; CHR$ (34
    );SY$(I); CHR$ (34);"THEN 14
    " +  STR$ ((I * 5) + 5): NEXT
    : PRINT "1390 GOTO 1200": IF
    SP THEN  FOR I = 1 TO N STEP
    2: GOTO 1680
1670  FOR I = 1 TO N
1680  PRINT "14" +  STR$ ((I * 5)
     + 5) + " VTAB 23:PRINT"; CHR$
    (34);IT$(I);" ROUTINE"; CHR$
    (34);": END ": NEXT : PRINT
    "1500 END": PRINT D$;"CLOSE"
    : PRINT D$;"OPEN";FL$: PRINT
    D$;"DELETE";FL$: PRINT D$;"O
    PEN";FL$: PRINT D$;"WRITE";F
    L$
1690  PRINT FH: PRINT IV: PRINT T
    I$: PRINT H%: PRINT H1%: PRINT
    V%: PRINT N: PRINT SP: PRINT
    TZ$:ST = 1: IF SP THEN ST =
    2
1700  FOR I = 1 TO N STEP ST: PRINT
    SY$(I): PRINT IT$(I): NEXT :
     PRINT TY$: PRINT V1%: PRINT
    V2%: PRINT D$;"CLOSE": PRINT
    D$;"NOMONICO": GOTO 180
1710  REM  *********************
1730  REM  **  ERROR TRAPPER  **
1750  REM  *********************
1760  TEXT : HOME : VTAB 12: HTAB
    10: INVERSE : PRINT "-IRRECO
    VERABLE ERROR-": HTAB 13: PRINT
    "-AUTO RE-START-": NORMAL : PRINT
    G$G$G$: GOSUB 60: GOSUB 60:T
    M = TM + 1: IF TM = 3 THEN  RUN
1770 V% = 2:V1% = 2:V2% = 2: GOTO
    460
1780  REM  * * * * * * * * * * *
1800  REM  *   MENU-GENERATOR  *
1820  REM  *         BY        *
1840  REM  * BRENT A.MILLIRANS *
1860  REM  *                   *
1880  REM  * * * * * * * * * * *
1890  DATA   " DEVELOP MENU"," RE
    VISE FILES"," EDIT PROGRAM",
    " EXIT PROGRAM"," ENTER ITEM
     #"
```

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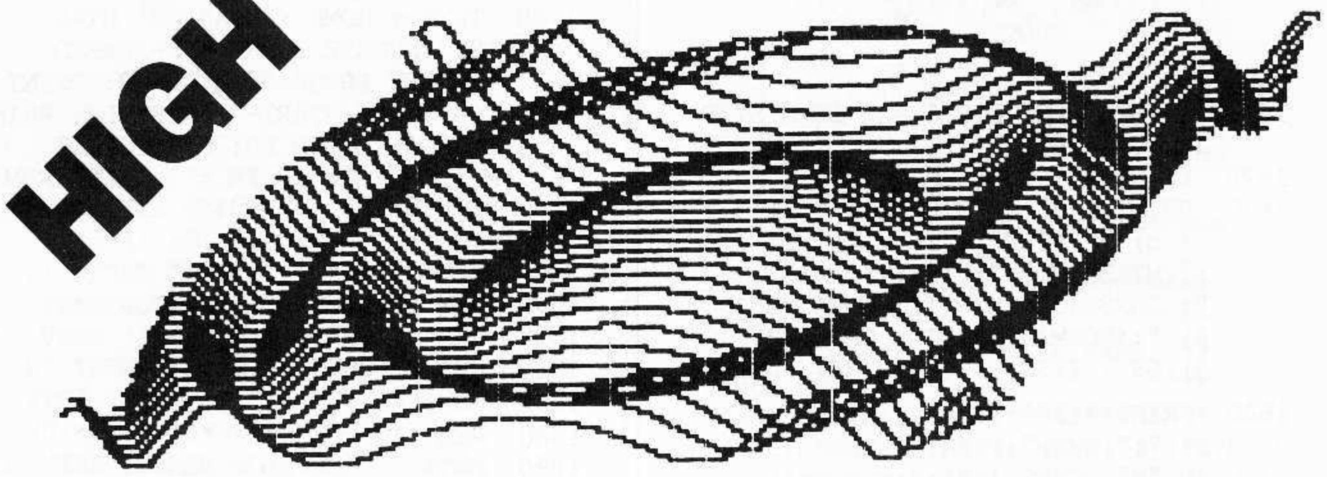
HIGH RESOLUTION



By Michael Patrick Scanlin

Requirements:

Blank, initialized disk
48K, Applesoft in ROM
One disk drive

In one smooth motion the screen phased from white on black into black on white. The inverse routine in Juggler was my motivation to devise an original one.

But just inverting the screen proved unchallenging, so I added a few twists to the program. Besides the normal inverse routine, I created routines for inverting the screen from top to bottom and from right to left, and a programmable delay to be used with any of these functions.

Inverting the screen in various ways was a bigger challenge, but then I decided to add more routines which would transpose and flip the screen. Next, I added a separate program which simulates the game Ultima by scrolling hi-res page one up, down, right or left. The result of all this is a complete set of hi-res utilities.

ROUTINES PROGRAM

The inverse, flip, and transpose routines are part of the hi-res utility program ROUTINES. To use the program:

1) Type in the ROUTINES listing on page 16.
2) **BSAVE ROUTINES, A $9ØØØ, L$1FB**
3) **BLOAD ROUTINES**
   CALL 36864

This sets up a table of base addresses that the routines use at $92ØØ in memory. To access the inverse routines described earlier simply make the appropriate CALL.

Routine	**CALL**
fast	36997 ($9085)
top to bottom w/delay	37024 ($90AØ)
right to left w/delay	37058 ($90C2)

Transpose Routine

The transpose routine included with the inverse package is used to move hi-res page two onto page one while displaying page one. There are three ways to move the pages, which correspond to the inverse sequence.

Routine	**CALL**
fast	36874 ($9ØØA)
top to bottom w/delay	369Ø8 ($902C)
right to left w/delay	36947 ($9053)

Flip Routine

Two flip routines are included with this package. They can be used to turn hi-res page one upside down or to turn it right to left.

Routine	**CALL**
top to bottom w/delay	371Ø7 ($90F3)
right to left w/delay	37172 ($9134)

Delay Routine

The delay routine used is the monitor's ($FCA8). To change the delay for all of the routines, POKE 254,X where X is any number from 1 to 255. The smaller the number, the shorter the delay.

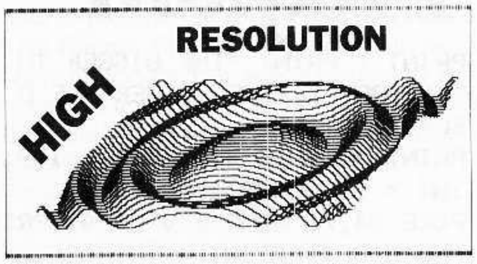
How the Routines Work

The inverse routines use the logical EOR function, which allows the status of any given bit or set of bits in a byte to be changed. All that is necessary is to EOR the bit (or bits) with one. This will change it to the opposite of what the bit was originally.

A byte on the hi-res screen contains seven pixels, each of which is one bit. The eighth bit is the color bit. In order to invert all the pixels on the graphics page, EOR the lower seven bits (preserving the color bit) of every byte with one, from memory locations $2000 to $3FFF (the hi-res screen).

The transpose routines aren't too difficult to understand. They are memory move commands which take place in a definite order to give special effects. The only one that requires any explanation is the right-to-left routine, which uses the logical AND function. This function can be thought of like multiplication. If you AND zero and one, you get zero (because $0 * 1 = 0$). If you AND one and one, you get one ($1 * 1 = 1$).

So, in order to get the smooth right to left motion, create a loop that will show one more bit of each byte each time it goes through the loop. The first time through, AND each byte in a column with 00000001. This will cut off all but the first bit. Next time through the loop, AND each byte with 00000011



Program

```
10  REM
20  REM ** VARIBLES SET TO SUBROU
     TINES **
30  REM
40 IRL = 37058:ITB = 37024:INV =
     36997
50 FTB = 37107:FRL = 37172:SETUP =
     36864
60 TNS = 36874:TRL = 36947:TTB =
     36908
70 DLAY = 254
80  TEXT : HOME
90  VTAB 1: HTAB 1: PRINT "INVERS
     E & FLIP DEMONSTRATION": NORMAL
     : POKE 34,3
100  HOME : HTAB 1: PRINT "LOADIN
     G ROUTINES"
110  PRINT  CHR$ (4)"BLOAD ROUTIN
     ES"
120  HIMEM: 36864
130  CALL SETUP
140  PRINT : PRINT "DO YOU HAVE A
      HI-RES PICTURE TO LOAD ?"; CHR$
     (8);
150  GET A$: IF A$ <  > "Y" THEN
      GOSUB 820: GOTO 190
160  HTAB 1: PRINT "NAME OF PICTU
     RE =>" TAB( 39)
170  HTAB 19: INPUT "";A$: PRINT
     : PRINT "LOADING ";A$
180  PRINT  CHR$ (4);"BLOAD";A$;"
     ,A$4000"
190  CALL TNS
200  GOTO 260
210  POKE  - 16304,0: POKE  - 163
     02,0: POKE  - 16300,0: POKE
      - 16297,0: RETURN
220  VTAB 23: HTAB 8: PRINT "HIT
     ANY KEY TO CONTINUE": POKE  -
     16368,0
230  IF  PEEK ( - 16384) < 128 THEN
     230
240  POKE  - 16368,0: RETURN
250  GOSUB 220: GOSUB 210: GOSUB
     220: POKE DLAY,WT: CALL VAR:
      GOSUB 220: POKE  - 16303,0:
     RETURN
260  REM
270  REM ** MAIN PROGRAM **
280  REM
290  HOME : VTAB 5
300  PRINT : PRINT "THESE ROUTINE
     S CAN BE USED FROM WITHIN"
310  PRINT : PRINT "A BASIC PROGR
     AM TO DO THE FOLLOWING:": PRINT
     : PRINT
320  PRINT "INVERSE SCREEN => MAK
     E EVERY WHITE DOT"
330  PRINT  TAB( 19)"A BLACK ONE
     AND EVERY"
340  PRINT  TAB( 19)"BLACK DOT A
     WHITE ONE": PRINT
350  PRINT "FLIP SCREEN"; TAB( 16
     );"=> TURN SCREEN UPSIDE"
360  PRINT  TAB( 19)"DOWN OR TURN
      SCREEN"
370  PRINT  TAB( 19)"RIGHT TO LEF
     T": PRINT
380  PRINT "TRANSPOSE"; TAB( 16);
     "=> MOVE HIRES PAGE TWO"
390  PRINT  TAB( 19);"ON TO PAGE
     ONE": PRINT : PRINT
400  GOSUB 220
410  REM
420  REM ** INVERSE EXAMPLES **
430  REM
440  HOME : VTAB 6: PRINT "THERE
     ARE THREE DIFFERENT WAYS TO"
```

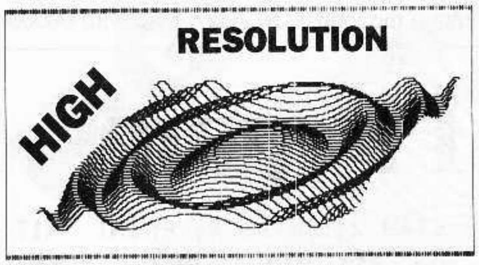
and so on until you are transferring the entire byte by ANDing it with 11111111.

The flip routines are about as straightforward as any. To flip the screen from top to bottom, all you have to do is set up a loop that takes any given line in the top half of the screen, stores it somewhere, and gets its matching symmetrical line on the lower half of the screen. The loop must then move the lower line to the top line, and move the top line (which was stored somewhere) to the lower line.

These are the steps used in flipping row Ø and row 191 (the first and last rows on the screen):

1) Move row Ø into the buffer.
2) Move row 191 to row Ø.
3) Move the buffer to row 191.

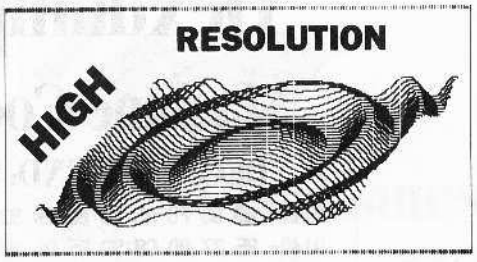
To flip right to left, a similar process is used (but right to left instead of top to bottom). You must flip the sequence of the lower seven bits (or pixels) in order to maintain the picture. For example, if the bit pattern 10110101 were present in the



Program

```
450  PRINT "INVERSE THE HI-RES SC
     REEN:": PRINT : PRINT
460  INVERSE : PRINT "TOP TO BOTT
     OM": NORMAL
470  PRINT " WITH PROGRAMMABLE DE
     LAY": PRINT
480  INVERSE : PRINT "RIGHT TO LE
     FT": NORMAL
490  PRINT " WITH PROGRAMMABLE DE
     LAY": PRINT
500  INVERSE : PRINT "FAST": NORMAL

510  PRINT " (NO DELAY - FADES IN
     )": PRINT
520  GOSUB 220: POKE 34,Ø
530  HOME : VTAB 6: PRINT "FOR AL
     L OF THESE EXAMPLES, FIRST R
     EAD"
540  PRINT "WHAT IT SAYS, THEN HI
     T ANY KEY TO TURN"
550  PRINT "ON THE GRAPHICS PAGE,
      HIT ANY KEY AGAIN TO START
     THE ROUTINE, AND HIT ANY KEY
      A"
560  PRINT "THIRD TIME TO GET BAC
     K TO THE TEXT PAGE"
570  GOSUB 220
580  HOME : VTAB 6: PRINT "EXAMPL
     E: INVERSE - FAST"
590 VAR = INV: GOSUB 25Ø: HOME
600  VTAB 6: PRINT "EXAMPLE: INVE
     RSE - TOP TO BOTTOM W/DELAY"
610  PRINT : PRINT "IN EACH ROUTI
     NE WHERE A DELAY IS"
620  PRINT "POSSIBLE, ALL YOU HAV
     E TO DO IS": PRINT : PRINT
630  PRINT "POKE 254,X (WHERE X I
     S BETWEEN 1-255)": PRINT : PRINT
640  PRINT : PRINT "THE BIGGER TH
     E NUMBER X, THE LONGER THE D
     ELAY": PRINT
650  PRINT "HERE'S X=1":VAR = ITB
     :WT = 1: GOSUB 25Ø
660  POKE 34,7: HOME : VTAB 9: PRINT
     "HERE'S X=6Ø":WT = 6Ø: GOSUB
     25Ø
670  POKE 34,Ø: HOME
680  VTAB 6: PRINT "EXAMPLE: INVE
     RSE - RIGHT TO LEFT W/DELAY"
     : PRINT
690  PRINT "HERE'S X=1":WT = 1:VA
     R = IRL: GOSUB 25Ø: POKE 34, 7
700  VTAB 9: PRINT "HERE'S X=8Ø":
     WT = 8Ø: GOSUB 25Ø
710  POKE 34,Ø: HOME
730  REM ** FLIP EXAMPLES **
740  REM
750  VTAB 6: PRINT "EXAMPLE: FLIP
      - TOP TO BOTTOM W/DELAY": VTAB
     9
760  PRINT "HERE'S X=1":WT = 1:VA
     R = FTB: GOSUB 25Ø: POKE 34, 7
770  HOME : VTAB 9: PRINT "HERE'S
      X=1ØØ":WT = 1ØØ: GOSUB 25Ø
780  POKE 34,Ø: HOME : VTAB 6: PRINT
     "EXAMPLE: FLIP - RIGHT TO LE
     FT W/DELAY"
790  VTAB 9: PRINT "HERE'S X=1":V
     AR = FRL:WT = 1: GOSUB 25Ø: POKE
     34,7
800  HOME : VTAB 9: PRINT "HERE'S
      X=9Ø":WT = 9Ø: GOSUB 25Ø
810  TEXT : HOME : PRINT "END OF
     DEMONSTRATION": END
820  HTAB 1: PRINT  TAB( 39);: PRINT
     : PRINT "CREATING A PICTURE"
     : POKE 23Ø,64
830  CALL 6245Ø: HCOLOR= 3: FOR X
      = Ø TO 279 STEP 2.3
840  HPLOT 26Ø,191 TO X,2Ø + 2Ø *
      SIN (X / 7): NEXT
850  RETURN
```



byte at $2000 (the first position in the first row), you would want to store 11010110 at $2027 (the last position on the first row).

In order to preserve the color, the MSB (Most Significant Bit) is not flipped. But, before $2000 could be moved you would have to store the byte which is currently at $2027 in a buffer area so as not to lose it. After you finish with the $2000 byte, flip it and then store it at $2027. The steps involved with moving the first pair of bytes would be:

1) Move $2027 to the buffer.
2) Load $2000, and flip its bits.
3) Store it at $2027.
4) Get the byte from the buffer and flip it.
5) Store it at $2000.

In the case of the flip routines, the stack is used as the buffer (since only one byte will be there at any given time).

SCROLL PROGRAM

This program makes it possible to scroll hi-res page one up, down, right or left (seven pixels at a time), similar to the effect achieved in the game Ultima.

1) Type in the SCROLL listing on page **18**.
2) **BSAVE SCROLL, A$9380, L$219**
3) Load the picture to be scrolled into hi-res page one.
4) **BRUN SCROLL**

The following commands move the picture.

A	Up
Z	Down
<-	Left
->	Right
ESC	Exit program

If you want to use the routines from within a BASIC program to scroll the hi-res screen:

1) **BLOAD SCROLL**
2) **CALL 38207**
3) Set **HIMEM:37376**
4) Make the appropriate CALL

Scroll Direction	**CALL**
up	37833 ($93C9)
down	37900 ($940C)
right	38106 ($94DA)
left	38139 ($94FB)

NOTE: If used in conjunction with ROUTINES, set **HIMEM:36864.**

The hi-res utilities included in the programs ROUTINES and SCROLL show what can be achieved by learning from imitation. What began as a simple attempt to copy the effects of somebody else's program resulted in a unique set of hi-res utilities. Now they can become a new addition to your software library, and may give you ideas for your own programs.

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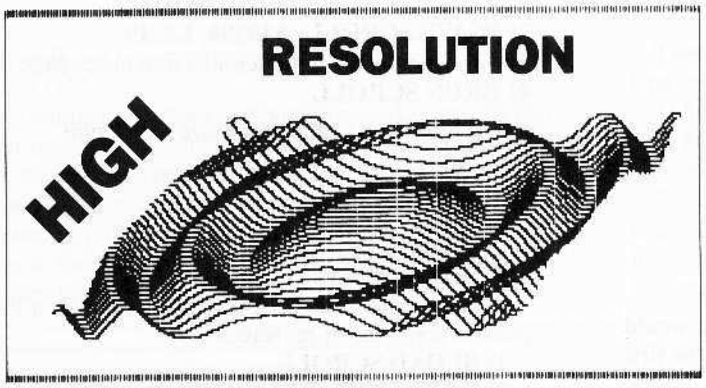


Hexdump

Machine Code

BEG: 9000; END: 91FA

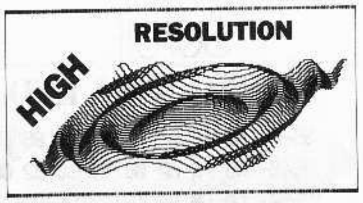
```
9000- 20 A2 91 60 A5 FE 20 A8  $2806
9008- FC 60 A9 00 85 06 85 08  $BAF0
9010- A9 20 85 07 A9 40 85 09  $B0D3
9018- A0 00 B1 08 91 06 C8 D0  $CE38
9020- F9 E6 07 E6 09 A5 07 C9  $48C8
9028- 40 D0 ED 60 A2 00 BD C0  $D03C
9030- 92 85 06 85 08 BD 00 92  $9475
9038- 85 07 18 69 20 85 09 A0  $2540
9040- 00 B1 08 91 06 C8 C0 28  $726A
9048- D0 F7 20 04 90 E8 E0 C0  $870D

9050- D0 DC 60 A0 00 A9 01 85  $ED26
9058- FF A2 00 BD 00 92 85 07  $5CB3
9060- 18 69 20 85 09 BD C0 92  $9B0F
9068- 85 06 85 08 B1 08 25 FF  $F6C3
9070- 91 06 E8 E0 C0 D0 E4 20  $B075
9078- 04 90 38 26 FF 90 DA C8  $2251
9080- C0 28 D0 D1 60 A9 20 85  $CF21
9088- 07 A9 00 85 06 A8 B1 06  $2FDA
9090- 49 7F 91 06 C8 D0 F7 E6  $2100
9098- 07 A5 07 C9 40 D0 EF 60  $F689
```

```
90A0- A2 00 BD 00 92 85 07 BD  $03E9
90A8- C0 92 85 06 A0 00 B1 06  $C9FC
90B0- 49 7F 91 06 C8 C0 28 D0  $80FA
90B8- F5 20 04 90 E8 E0 C0 D0  $3C8F
90C0- E1 60 A0 00 A9 01 85 FF  $2223
90C8- A2 00 BD 00 92 85 07 BD  $4763
90D0- C0 92 85 06 B1 06 45 FF  $CE94
90D8- 91 06 E8 E0 C0 D0 EB 20  $919D
90E0- 04 90 18 26 FF 26 FF B0  $8887
90E8- 04 66 FF D0 DB C8 C0 28  $3D4A

90F0- D0 D2 60 A9 00 85 FF A6  $FA9B
90F8- FF BD 00 92 85 07 BD C0  $ED1E
9100- 92 85 06 A9 BF 38 E5 FF  $879F
9108- AA BD 00 92 85 09 BD C0  $3290
9110- 92 85 08 A0 00 B1 08 8D  $E23C
9118- 00 03 B1 06 91 08 AD 00  $C3E9
9120- 03 91 06 C8 C0 28 D0 ED  $ED82
9128- 20 04 90 E6 FF A5 FF C9  $8551
9130- 60 D0 C4 60 A9 01 A2 06  $0D1B
9138- 9D 00 03 0A CA 10 F9 A9  $7C61
```

```
9140- 00 85 FD A6 FD BD 00 92  $9E6F
9148- 85 07 BD C0 92 85 06 A0  $5600
9150- 00 B1 06 48 84 FF A9 27  $6A43
9158- 38 E5 FF A8 B1 06 20 85  $7FA4
9160- 91 A4 FF 91 06 A9 27 38  $1009
9168- E5 FF A8 68 20 85 91 91  $5178
9170- 06 E6 FF A4 FF C0 14 D0  $7228
9178- D8 20 04 90 E6 FD A5 FD  $5320
9180- C9 C0 D0 BF 60 A2 00 86  $5A4C
9188- FC 0A 08 A2 06 0A 90 09  $5409

9190- 48 BD 00 03 05 FC 85 FC  $F030
9198- 68 CA 10 F1 A5 FC 0A 28  $9240
91A0- 6A 60 A9 00 A8 85 06 A9  $D6FF
91A8- 04 85 08 A5 06 A2 08 99  $CAFC
91B0- C0 92 C8 CA D0 F9 18 69  $BCAE
91B8- 80 90 F2 C6 08 D0 EC A5  $2C5D
91C0- 06 69 27 85 06 C9 78 D0  $D804
91C8- DE A9 03 85 FC A0 00 A9  $88C3
91D0- 00 85 06 A9 02 85 08 A5  $6543
91D8- 06 18 69 20 99 00 92 38  $9139

91E0- E9 20 C8 18 69 04 C9 20  $23EA
91E8- 30 EF C6 08 D0 E9 E6 06  $D55E
91F0- A5 06 C9 04 D0 DD C6 FC  $5B47
91F8- D0 D5 60                 $E394
```

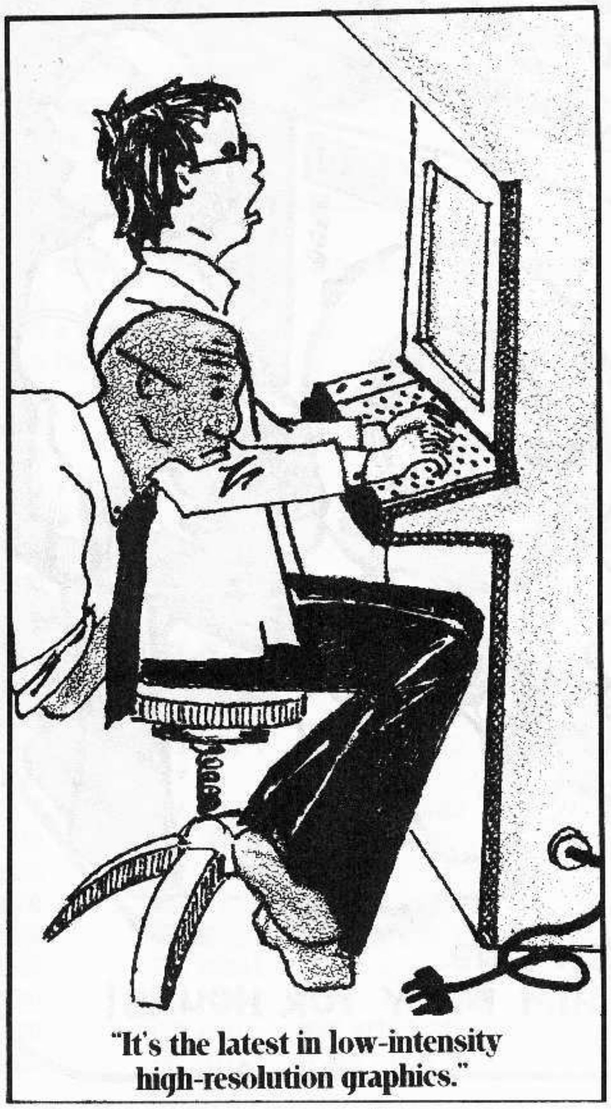
Checksums

```
10   - $BADD    210  - $094F    410  - $048B    610  - $3BA8    810  - $6301
20   - $9B13    220  - $8861    420  - $A7C0    620  - $E681    820  - $3C62
30   - $4D3B    230  - $C307    430  - $F068    630  - $4915    830  - $8013
40   - $197D    240  - $B01B    440  - $52F2    640  - $2882    840  - $6E17
50   - $88B8    250  - $3559    450  - $0918    650  - $A59A    850  - $C52E
60   - $A51B    260  - $3581    460  - $28A1    660  - $1669
70   - $A172    270  - $A520    470  - $C721    670  - $A4DB
80   - $738A    280  - $5895    480  - $C662    680  - $2A6D
90   - $E74C    290  - $11A7    490  - $0457    690  - $8F99
100  - $9BDD    300  - $3097    500  - $DE1D    700  - $66AD
110  - $AFAD    310  - $9EE3    510  - $342F    710  - $1847
120  - $A357    320  - $1A05    520  - $08E2    720  - $6CE5
130  - $0154    330  - $9AC5    530  - $BA6F    730  - $CE14
140  - $D9CB    340  - $00F7    540  - $6BB7    740  - $13BF
150  - $7997    350  - $4E9D    550  - $423B    750  - $4D7B
160  - $C90C    360  - $157E    560  - $E7E4    760  - $61AB
170  - $D998    370  - $30AD    570  - $8D02    770  - $05EF
180  - $5C21    380  - $A93B    580  - $E619    780  - $1FCF
190  - $1706    390  - $94F7    590  - $EFE4    790  - $362F
200  - $9906    400  - $3AFC    600  - $C601    800  - $8006
```



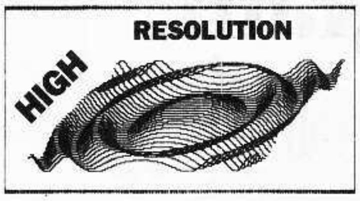
Checksums

10	- $BADD	170	- $5C94
20	- $9B13	180	- $E00E
30	- $4D3B	190	- $929A
40	- $2E52	200	- $D884
50	- $0A8A	210	- $EC78
60	- $E7FE	220	- $577D
70	- $E3FA	230	- $50EA
80	- $DDA7	240	- $393F
90	- $5E46	250	- $60E9
100	- $3F87	260	- $E734
110	- $6DC1	270	- $994C
120	- $B7E0	280	- $8E38
130	- $5BAE	290	- $912C
140	- $697E	300	- $179A
150	- $31D5		
160	- $F3E8		


"It's the latest in low-intensity high-resolution graphics."

Program
Scroll

```
10  REM
20  REM ** SCROLL DEMO **
30  REM
40  TEXT : HOME
50  VTAB 2: HTAB 1: PRINT "SCROLL
     DEMONSTRATION"
60  POKE 34,3: VTAB 4
70  PRINT "LOADING SCROLL": PRINT
     CHR$ (4)"BLOAD SCROLL"
80  HIMEM: 37375
90  PRINT : PRINT "DO YOU HAVE A
    HI-RES PICTURE TO LOAD ?"; CHR$
    (8);
100  GET A$: IF A$ < > "Y" THEN
      GOSUB 270: GOTO 140
110  HTAB 1: PRINT "NAME OF PICTU
     RE =>"; TAB( 39)
120  HTAB 19: INPUT "";A$: PRINT
     : PRINT "LOADING "A$
130  PRINT  CHR$ (4);"BLOAD";A$;"
     ,A$2000"
140  HOME
150  PRINT "THIS SCROLL ROUTINE S
     IMULATES THE"
160  PRINT "EFFECTS OF THE GAME U
     LTIMA.  YOU CAN"
170  PRINT "SCROLL THE SCREEN UP,
      DOWN, RIGHT AND   LEFT."
180  PRINT : PRINT "THE COMMANDS
     ARE:": PRINT : PRINT
190  PRINT " A     = UP": PRINT "
     Z     = DOWN"
200  PRINT " ->    = RIGHT": PRINT
     " <-    = LEFT"
210  PRINT " ESC   = EXIT PROGRAM"

220  VTAB 23: HTAB 11: PRINT "HIT
      ANY KEY TO BEGIN"
230  POKE  - 16368,0
240  IF  PEEK ( - 16384) < 128 THEN
     240
250  POKE  - 16368,0: TEXT : HOME
260  CALL 37760
270  HTAB 1: PRINT  TAB( 39);: PRINT
     : PRINT "CREATING A PICTURE"
280  POKE 230,32: CALL 62450: HCOLOR=
     3: FOR X = 20 TO 259 STEP 2.
     3
290  HPLOT 140,171 TO X,20 + 20 *
      SIN ((X - 20) / 25.5): NEXT
300  RETURN
```



Hexdump

Scroll

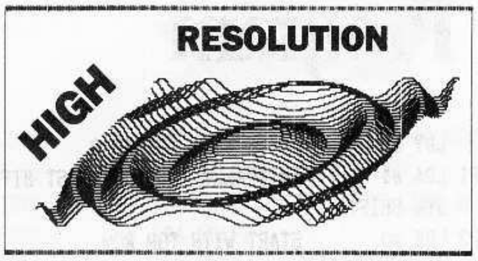
BEG: 938Ø; END: 9597

```
9380- 2C 50 C0 2C 52 C0 2C 54  $7D8B
9388- C0 2C 57 C0 20 3F 95 20  $592A
9390- BE 93 C9 C1 D0 03 20 C9  $3807
9398- 93 C9 DA D0 03 20 0C 94  $4A49
93A0- C9 88 D0 03 20 DA 94 C9  $02A8
93A8- 95 D0 03 20 FB 94 C9 9B  $77FD
93B0- D0 DD 20 58 FC 2C 51 C0  $AA32
93B8- 2C 10 C0 4C D0 03 AD 10  $C9E6
93C0- C0 AD 00 C0 C9 80 90 F9  $C57B
93C8- 60 A9 00 8D 53 94 8D A7  $D37A

93D0- 94 A9 18 8D 5F 94 8D B3  $5989
93D8- 94 A9 69 8D 60 94 8D B4  $7511
93E0- 94 A9 38 8D 6E 94 8D C5  $094C
93E8- 94 A9 E9 8D 6F 94 8D C6  $F440
93F0- 94 A9 B9 8D 7F 94 8D 83  $DC3E
93F8- 94 A9 C0 8D A2 94 A9 07  $4ADE
9400- 8D D6 94 A9 E8 8D 7D 94  $1AA7
9408- 20 4F 94 60 A9 BF 8D 53  $CFA6
9410- 94 A9 B9 8D A7 94 A9 38  $6AA1
9418- 8D 5F 94 8D B3 94 A9 E9  $140D

9420- 8D 60 94 8D B4 94 A9 18  $1D09
9428- 8D 6E 94 8D C5 94 A9 69  $6587
9430- 8D 6F 94 8D C6 94 A9 06  $8E71
9438- 8D 7F 94 A9 00 8D 83 94  $1850
9440- A9 07 8D A2 94 A9 C0 8D  $D15C
9448- D6 94 A9 CA 8D 7D 94 20  $471F
9450- A6 94 A2 00 BD 00 92 85  $F3E2
9458- FD BD C0 92 85 FC 8A 18  $C5A7
9460- 69 07 AA BD 00 92 85 FF  $A344
9468- BD C0 92 85 FE 8A 38 E9  $7B80

9470- 07 AA A0 00 B1 FE 91 FC  $7690
9478- C8 C0 28 D0 F7 E8 E0 B9  $3040
9480- D0 D2 A2 B9 BD 00 92 85  $5232
9488- FD 18 69 20 85 FF BD C0  $61EB
9490- 92 85 FC 85 FE A0 00 B1  $F4B5
9498- FE 91 FC C8 C0 28 D0 F7  $03AB
94A0- E8 E0 C0 D0 DF 60 A2 00  $C97F
94A8- BD 00 92 85 FD BD C0 92  $8616
94B0- 85 FC 8A 18 69 B9 AA BD  $3C10
94B8- 00 92 18 69 20 85 FF BD  $34D4

94C0- C0 92 85 FE 8A 38 E9 B9  $B45E
94C8- AA A0 00 B1 FC 91 FE C8  $7C5E
94D0- C0 28 D0 F7 E8 E0 07 D0  $0EEA
94D8- CF 60 A9 00 8D 25 95 A9  $658A
94E0- C8 8D 2F 95 8D 30 95 8D  $5F11
```

```
94E8- 29 95 A9 28 8D 32 95 A9  $C368
94F0- 88 8D 2C 95 8D 35 95 20  $F20A
94F8- 18 95 60 A9 27 8D 25 95  $5DE0
9500- A9 88 8D 2F 95 8D 30 95  $142C
9508- 8D 29 95 A9 C8 8D 2C 95  $0C5C

9510- 8D 35 95 A9 FF 8D 32 95  $6881
9518- A2 00 BD 00 92 85 FD BD  $A49B
9520- C0 92 85 FC A0 00 B1 FC  $AE8A
9528- 48 C8 B1 FC 88 91 FC C8  $739F
9530- C8 C8 28 D0 F5 88 68 91  $CC0E
9538- FC E8 E0 C0 D0 DC 60 A9  $C3F8
```

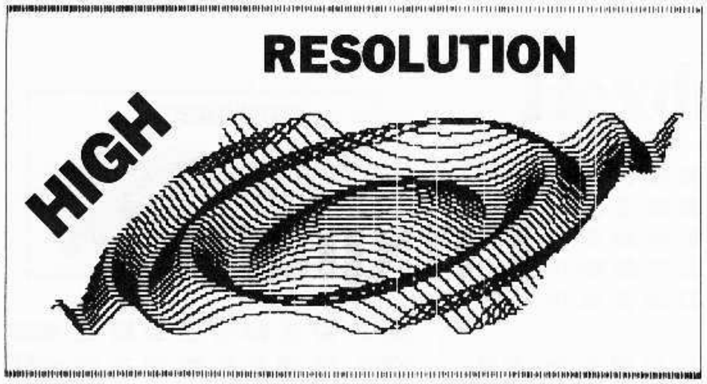
```
9540- 00 A8 85 FC A9 04 85 FE  $250E
9548- A5 FC A2 08 99 C0 92 C8  $DF04
9550- CA D0 F9 18 69 80 90 F2  $AA31
9558- C6 FE D0 EC A5 FC 69 27  $DED9

9560- 85 FC C9 78 D0 DE A9 03  $972C
9568- 85 FB A0 00 A9 00 85 FC  $3C0C
9570- A9 02 85 FE A5 FC 18 69  $A151
9578- 20 99 00 92 38 E9 20 C8  $1300
9580- 18 69 04 C9 20 30 EF C6  $7E8A
9588- FE D0 E9 E6 FC A5 FC C9  $7D40
9590- 04 D0 DD C6 FB D0 D5 60  $743E
```

HIGH RESOLUTION Program



```
1000 *******************************
1010 *                             *
1020 *      HI-RES  ROUTINES       *
1030 *                             *
1040 *     By: Mike Scanlin        *
1050 *                             *
1060 *******************************
1080 START   .EQ $9000
1100 PTR1    .EQ $06       2 BYTE POINTER
1110 PTR2    .EQ $08       2 BYTE POINTER
1120 GEN1    .EQ $FC       GENERAL STORAGE
1130 GEN2    .EQ $FD       GENERAL STORAGE
1140 DELAY   .EQ $FE
1150 SHIFT   .EQ $FF
1160 TABLE   .EQ $0300     TO BE USED BY FLIP (R TO L)
1170 HIRESH  .EQ $9200     TABLE OF HI-RES HIBYTES
1180 HIRESL  .EQ HIRESH+$C0 TABLE OF HI-RES LOBYTES
1190 WAIT    .EQ $FCA8
1210 *
1220 * SET UP HI-RES BASE ADDRESS TABLE
1230 *
1250 SETUP   JSR CALCLO    CALC  BASE HI-RES ADDRESSES
1260         RTS
1280 * DELAY LOOP
1300 DELAYLP LDA DELAY
1310         JSR WAIT
1320         RTS
1340 *
1350 * TRANSPOSE - FAST
1360 *
1380 TRANS   LDA #0
1390         STA PTR1      LOBYTE OF PAGE1 PTR
1400         STA PTR2      LOBYTE OF PAGE2 PTR
1410         LDA #$20
1420         STA PTR1+1    HIBYTE OF PAGE1 PTR
1430         LDA #$40
1440         STA PTR2+1    HIBYTE OF PAGE2 PTR
1460 TLOOP   LDY #0
1470 TLP2    LDA (PTR2),Y LOAD FROM PAGE2
1480         STA (PTR1),Y STORE ON PAGE1
1490         INY
1500         BNE TLP2      MOVE $FF BYTES
1520         INC PTR1+1    INC HIBYTE OF PTR1 & PTR2
1530         INC PTR2+1
1540         LDA PTR1+1
1550         CMP #$40      DONE WITH PAGE?
1560         BNE TLOOP     IF NOT, MOVE
1570         RTS
1590 *
1600 * TRANSPOSE - TOP TO BOTTOM W/DELAY
1610 *
1630 TRANSTB  LDX #0       START WITH TOP LINE
1640 TRTBLP1  LDA HIRESL,X GET LOBYTE
1650          STA PTR1
1660          STA PTR2
1670          LDA HIRESH,X GET HIBYTE OF LINE (PAGE1)
1680          STA PTR1+1
1690          CLC
1700          ADC #$20     GET HIBYTE OF LINE (PAGE2)
1710          STA PTR2+1
1730          LDY #0       MOVE ONE LINE ($28 BYTES)
1740 TRTBLP2  LDA (PTR2),Y
1750          STA (PTR1),Y
1760          INY
1770          CPY #$28
1780          BNE TRTBLP2
1800          JSR DELAYLP  DELAY LOOP
1820          INX          INCREASE LINE NUMBER
1830          CPX #$C0     DONE WITH SCREEN?
1840          BNE TRTBLP1  IF NOT, MOVE NEXT LINE
1850          RTS
1870 *
1880 * TRANSPOSE - RIGHT TO LEFT W/DELAY
1890 *
1910 TRANSRL  LDY #0       START WITH HORZ. COLUMN 0
1920 TRRLLP1  LDA #1       SET LSB
1930          STA SHIFT
1940 TRRLLP2  LDX #0       START WITH VERT. LINE 0
1960 TRRLLP3  LDA HIRESH,X GET HIBYTE (PAGE1)
1970          STA PTR1+1
1980          CLC
1990          ADC #$20     GET HIBYTE (PAGE2)
2000          STA PTR2+1
2010          LDA HIRESL,X GET LOBYTE
2020          STA PTR1
2030          STA PTR2
2050          LDA (PTR2),Y GET BYTE AT ROW X,COL Y (PAGE2)
2060          AND SHIFT    CUT OFF PART OF BYTE
2070          STA (PTR1),Y PUT ON PAGE1
2080          INX          INC ROW COUNTER
2090          CPX #$C0     DONE WITH COLUMN?
2100          BNE TRRLLP3  IF NOT, DO NEXT BYTE
2120          JSR DELAYLP  DELAY LOOP
2140          SEC
```

HIGH RESOLUTION Program

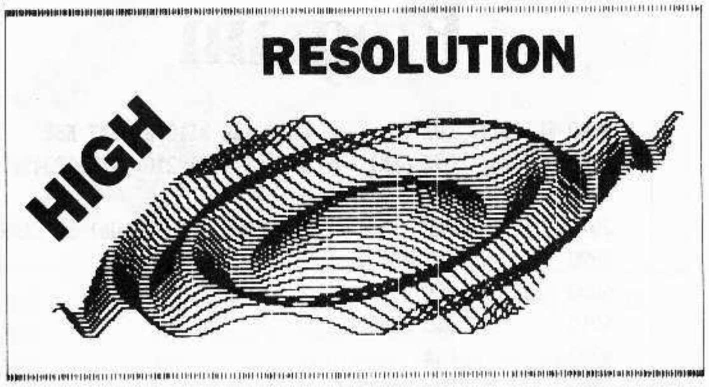


```
2150          ROL SHIFT    INC NUMBER OF PIXELS TO SHOW IN
2160          BCC TRRLLP2  CURRENT COLUMN
2180          INY          IF=8 THEN INC COLUMN COUNTER
2190          CPY #$28     DONE WITH SCREEN?
2200          BNE TRRLLP1  IF NOT, START NEXT COLUMN
2210          RTS
2230 *
2240 * INVERSE - FAST
2250 *
2270 INVERSE  LDA #$20     HIBYTE OF PTR
2280          STA PTR1+1
2290          LDA #0       LOBYTE OF PTR (PTR=$2000)
2300          STA PTR1
2320          TAY          START WITH Y=0
2330 INVLP    LDA (PTR1),Y LOAD BYTE
2340          EOR #$7F     FLIP ALL BITS EXCEPT MSB
2350          STA (PTR1),Y STORE INVERSED BYTE
2360          INY
2370          BNE INVLP    DONE WITH $FF BYTES?
2390          INC PTR1+1   IF YES, INC HIBYTE OF PTR
2400          LDA PTR1+1
2410          CMP #$40     DONE WITH PAGE?
2420          BNE INVLP    IF NOT, INVERSE ANOTHER $FF BYTES
2430          RTS
2450 *
2460 * INVERSE - TOP TO BOTTOM W/DELAY
2470 *
2490 INVTB    LDX #0       START WITH TOP ROW
2500 ITBLP1   LDA HIRESH,X GET HIBYTE
2510          STA PTR1+1
2520          LDA HIRESL,X GET LOBYTE
2530          STA PTR1
2550          LDY #0
2560 ITBLP2   LDA (PTR1),Y LOAD BYTE IN ROW X, COL Y
2570          EOR #$7F     FLIP ALL BITS EXCEPT MSB
2580          STA (PTR1),Y STORE INVERSED BYTE
2590          INY
2600          CPY #$28     DONE WITH ROW?
2610          BNE ITBLP2   IF NOT, DO NEXT BYTE
2630          JSR DELAYLP  DELAY LOOP
2650          INX          INC ROW COUNTER
2660          CPX #$C0     DONE WITH SCREEN?
2670          BNE ITBLP1   IF NOT, DO NEXT ROW
2680          RTS
2700 *
2710 * INVERSE RIGHT TO LEFT W/DELAY
2720 *
```

```
2740 INVRL    LDY #0       START WITH COLUMN 0
2750 INVRLLP1 LDA #1       INITIALLY INVERSE FIRST BIT
2760          STA SHIFT
2770 INVRLLP2 LDX #0       START WITH TOP ROW
2780 INVRLLP3 LDA HIRESH,X GET HIBYTE
2790          STA PTR1+1
2800          LDA HIRESL,X GET LOBYTE
2810          STA PTR1
2830          LDA (PTR1),Y GET BYTE AT ROW X, COL Y
2840          EOR SHIFT    FLIP SOME BITS
2850          STA (PTR1),Y STORE BYTE
2860          INX          INC ROW COUNTER
2870          CPX #$C0     DONE WITH COLUMN?
2880          BNE INVRLLP3 IF NOT, DO NEXT ROW
2900          JSR DELAYLP  DELAY LOOP
2920          CLC
2930          ROL SHIFT    INCR NUMBER OF FLIPPED BITS
2940          ROL SHIFT
2950          BCS IRLLP5
2960          ROR SHIFT
2970          BNE INVRLLP2
2980 IRLLP5   INY          INC COLUMN COUNTER
2990          CPY #$28     DONE WITH SCREEN?
3000          BNE INVRLLP1 IF NOT, DO NEXT COLUMN
3010          RTS
3030 *
3040 * FLIP - TOP TO BOTTOM W/DELAY
3050 *
3070 FLIPTB   LDA #0       START WITH VERT. LINE 0
3080          STA SHIFT
3090 FLOOP    LDX SHIFT    GET VERT. LINE NUMBER
3100          LDA HIRESH,X GET HIBYTE OF ORG ROW
3110          STA PTR1+1
3120          LDA HIRESL,X GET LOBYTE OF ORG ROW
3130          STA PTR1
3150          LDA #$BF     CALC DEST ROW NUMBER
3160          SEC
3170          SBC SHIFT
3180          TAX
3190          LDA HIRESH,X GET HIBYTE OF DEST ROW
3200          STA PTR2+1
3210          LDA HIRESL,X GET LOBYTE OF DEST ROW
3220          STA PTR2
3240          LDY #0       MOVE ORG ROW -> TABLE
3250 FLP2     LDA (PTR2),Y DEST ROW -> ORG ROW
3260          STA TABLE    TABLE -> DEST ROW
3270          LDA (PTR1),Y
3280          STA (PTR2),Y
3290          LDA TABLE
3300          STA (PTR1),Y
3310          INY
3320          CPY #$28     DONE WITH ROW?
```

```
3330          BNE FLP2     IF NOT, MOVE NEXT BYTE
3350          JSR DELAYLP  DELAY LOOP
3370          INC SHIFT    INC VERT LINE NUMBER
3380          LDA SHIFT
3390          CMP #$60     FLIPPED TOP HALF OF SCREEN?
3400          BNE FLOOP    IF NOT, FLIP NEXT PAIR OF ROWS
3410          RTS
3430 *
3440 * FLIP - RIGHT TO LEFT W/DELAY
3450 *
3470 FLIPRL   LDA #1       SET UP FLIP BIT TABLE
3480          LDX #6
3490 FLP3     STA TABLE,X
3500          ASL
3510          DEX
3520          BPL FLP3
3540          LDA #0       START AT VERT. LINE 0
3550          STA GEN2
3560 FLMAIN   LDX GEN2     GET VERT. LINE NUMBER
3570          LDA HIRESH,X GET HIBYTE
3580          STA PTR1+1
3590          LDA HIRESL,X GET LOBYTE
3600          STA PTR1
3620          LDY #0       START WITH LEFT MOST BYTE IN LINE
3630 FLP4     LDA (PTR1),Y
3640          PHA          STORE LEFT BYTE
3650          STY SHIFT    SAVE OFFSET LOCATION OF LEFT BYTE
3660          LDA #$27     CALC ITS SYMETRICAL POSITION
3670          SEC
3680          SBC SHIFT
3690          TAY
3700          LDA (PTR1),Y GET BYTE FROM THIS POSITION
3710          JSR FLIPBITS FLIP ITS BITS
3720          LDY SHIFT    GET ORG HORZ. POSITION
3730          STA (PTR1),Y STORE FLIPPED BYTE
3740          LDA #$27     CALC WHERE SECOND BYTE CAME FROM
3750          SEC
3760          SBC SHIFT
3770          TAY
3780          PLA          GET ORIGINAL BYTE
3790          JSR FLIPBITS FLIP ITS BITS
3800          STA (PTR1),Y STORE FLIPPED BYTE
3810          INC SHIFT    INC HORZ. COUNTER
3820          LDY SHIFT
3830          CPY #$14     FLIPPED HALF OF ROW?
3840          BNE FLP4     IF NOT, FLIP NEXT PAIR
3860          JSR DELAYLP  DELAY LOOP
3880          INC GEN2     GET VERT. LINE NUMBER
3890          LDA GEN2
3900          CMP #$C0     DONE WITH SCREEN?
3910          BNE FLMAIN   IF NOT, FLIP NEXT ROW
3920          RTS
```

```
3940 FLIPBITS LDX #0       FLIP ALL BITS EXCEPT MSB
3950          STX GEN1     BITS:  76543210 -> 70123456
3960          ASL
3970          PHP          PRESERVE MSB (COLOR) IN CARRY
3990          LDX #6
4000 FLB1     ASL
4010          BCC FLB2
4020          PHA
4030          LDA TABLE,X
4040          ORA GEN1
4050          STA GEN1
4060          PLA
4070 FLB2     DEX
4080          BPL FLB1
4100          LDA GEN1
4110          ASL
4120          PLP          RECALL MSB IN CARRY
4130          ROR
4140          RTS
4160 *
4170 * ROUTINE TO GENERATE HIBYTE AND LOBYTE TABLE OF
4180 *  HI-RES PAGE1 BASE ADDRESSES
4190 *
4210 CALCLO   LDA #0
4220          TAY
4230          STA PTR1
4250 CL1      LDA #4
4260          STA PTR2
4270 CL2      LDA PTR1
4280 CL3      LDX #8
4290 CL4      STA HIRESL,Y
4300          INY
4310          DEX
4320          BNE CL4
4330          CLC
4340          ADC #$80
4350          BCC CL3
4360          DEC PTR2
4370          BNE CL2
4380          LDA PTR1
4390          ADC #$27
4400          STA PTR1
4410          CMP #$78
4420          BNE CL1
4440 CALCHI   LDA #3       CALC HIBYTE FOR HI-RES BASE ADDR
4450          STA GEN1
4470          LDY #0
4480 CH1      LDA #0
4490          STA PTR1
4500 CH2      LDA #2
4510          STA PTR2
4520 CH3      LDA PTR1
```



Program

```
4530 CH4     CLC
4540         ADC #$20
4550         STA HIRESH,Y
4560         SEC
4570         SBC #$20
4580         INY
4590         CLC
4600         ADC #4
4610         CMP #$20
4620         BMI CH4
4630         DEC PTR2
4640         BNE CH3
4650         INC PTR1
4660         LDA PTR1
4670         CMP #4
4680         BNE CH2
4690         DEC GEN1
4700         BNE CH1
4710         RTS
```

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Program

Scroll

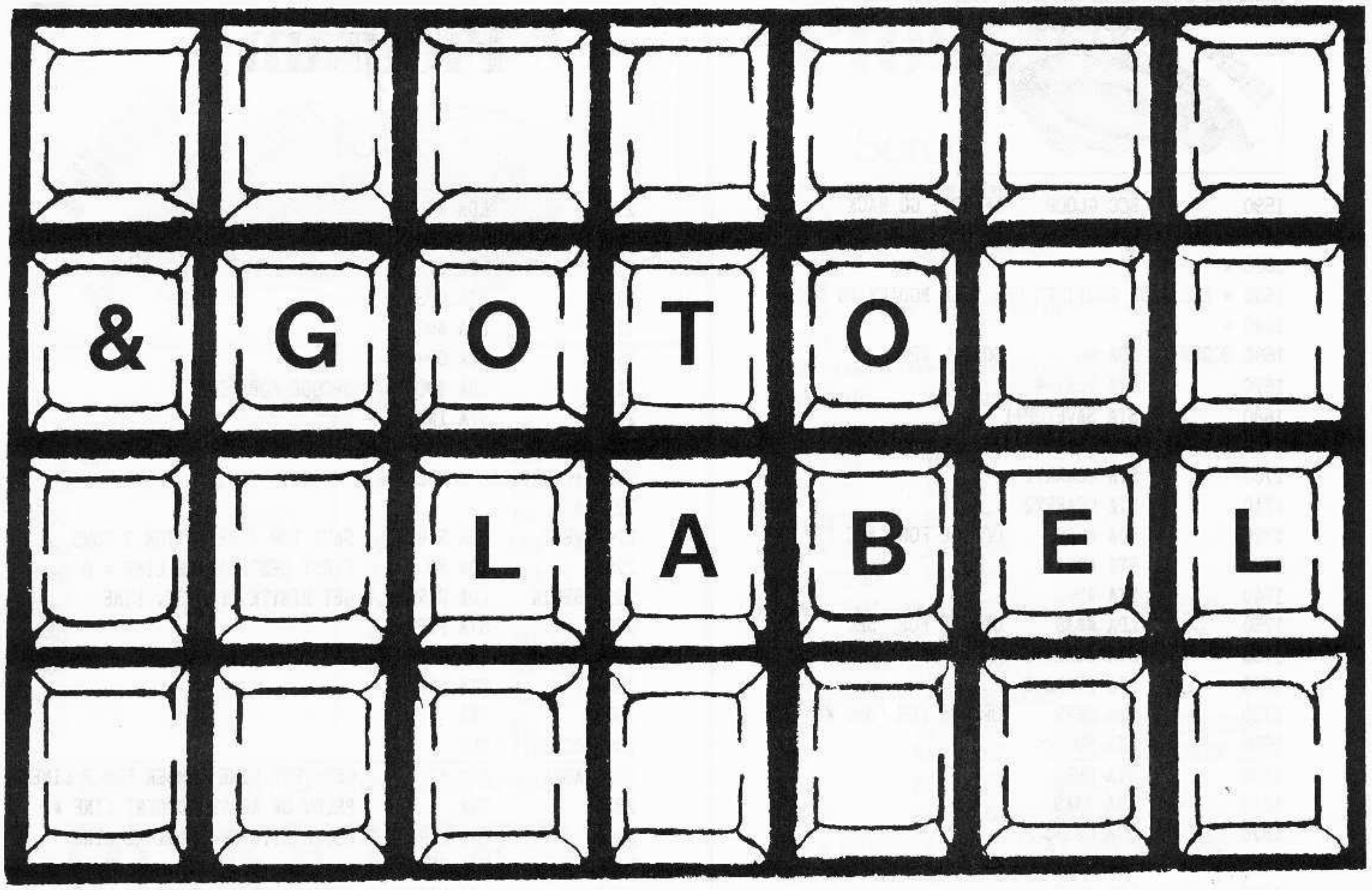
```
1000 *****************************
1010 *                           *
1020 *       HI-RES SCROLL       *
1030 *                           *
1040 *    By:  Mike Scanlin      *
1050 *                           *
1060 *****************************
1080 START    .OR $9380
1100 GEN1     .EQ $FB
1110 PTR1     .EQ $FC
1120 PTR2     .EQ $FE
1130 HOME     .EQ $FC58
1140 KYBD     .EQ $C000
1150 STROBE   .EQ $C010
1170 * TABLE OF HI-RES PAGE1 BASE ADDRESSES
1180 *  HIBYTES AT $9200, LOBYTES AT $92C0
1200 HIRESH   .EQ $9200
1210 HIRESL   .EQ HIRESH+$C0
1230          BIT $C050    SELECT GRAPHICS MODE
1240          BIT $C052    SELECT FULLSCREEN MODE
1250          BIT $C054    SELECT PAGE1
1260          BIT $C057    SELECT HI-RES
1280 * CALCULATE HI-RES PAGE1 BASE ADDRESSES
1300          JSR CALCLO
1320 *
1330 * PROGRAM STARTS HERE
1340 *
1360 CK0      JSR GETAKEY
1370          CMP #$C1     'A'=UP
1380          BNE CK1
1390          JSR SCRUP
1400 CK1      CMP #$DA     'Z'=DOWN
1410          BNE CK2
1420          JSR SCRDWN
1430 CK2      CMP #$88     '<-'=RIGHT
1440          BNE CK3
1450          JSR SCRRGHT
1460 CK3      CMP #$95     '->'=LEFT
1470          BNE CK4
1480          JSR SCRLEFT
1490 CK4      CMP #$9B     'ESC' EXITS
1500          BNE CK0
1510          JSR HOME
1520          BIT $C051    SELECT TEXT MODE
1530          BIT STROBE   CLEAR KEYBOARD STROBE
1540          JMP $03D0    EXIT TO BASIC
1560 GETAKEY  LDA STROBE   CLEAR KEYBOARD STROBE
1570 GLOOP    LDA KYBD     CHECK KEYBOARD
1580          CMP #$80     KEY PRESSED?
```

Program

Scroll

```
1590          BCC GLOOP     IF NOT, GO BACK
1600          RTS
1620 *
1630 * ALL FOUR ROUTINES USE SELF MODIFYING CODE
1640 *
1660 SCRUP    LDA #0        SCROLL UP
1670          STA VERT+4
1680          STA SAVETOP+1
1690          LDA #$18      OPCODE FOR 'CLC'
1700          STA CCARRY1
1710          STA CCARRY2
1720          LDA #$69      OPCODE FOR 'ADC #'
1730          STA ADD1
1740          STA ADD2
1750          LDA #$38      OPCODE FOR 'SEC'
1760          STA SCARRY1
1770          STA SCARRY2
1780          LDA #$E9      OPCODE FOR 'SBC #'
1790          STA SUB1
1800          STA SUB2
1810          LDA #$B9
1820          STA OP1+1
1830          STA OP2+1
1840          LDA #$C0
1850          STA OP3+1
1860          LDA #7
1870          STA OP4+1
1880          LDA #$E8      OPCODE FOR 'INX'
1890          STA INX
1900          JSR VERT
1910          RTS
1930 SCRDWN   LDA #$BF      SCROLL DOWN
1940          STA VERT+4
1950          LDA #$B9
1960          STA SAVETOP+1
1970          LDA #$38      OPCODE FOR 'SEC'
1980          STA CCARRY1
1990          STA CCARRY2
2000          LDA #$E9      OPCODE FOR 'SBC #'
2010          STA ADD1
2020          STA ADD2
2030          LDA #$18      OPCODE FOR 'CLC'
2040          STA SCARRY1
2050          STA SCARRY2
2060          LDA #$69      OPCODE FOR 'ADC #'
2070          STA SUB1
2080          STA SUB2
2090          LDA #6
2100          STA OP1+1
2110          LDA #0
2120          STA OP2+1
2130          LDA #7
2140          STA OP3+1
2150          LDA #$C0
2160          STA OP4+1
2170          LDA #$CA      OPCODE FOR 'DEX'
2180          STA INX
2200 *
2210 * VERTICAL SCROLLING ROUTINE
2220 *
2240 VERT     JSR SAVETOP   SAVE TOP 7 OR BOTTOM 7 ROWS
2250          LDX #0        FIRST DESTINATION LINE = 0
2260 BEGIN    LDA HIRESH,X GET HIBYTE OF DEST. LINE
2270          STA PTR1+1
2280          LDA HIRESL,X GET LOBYTE OF DEST. LINE
2290          STA PTR1
2300          TXA
2310 CCARRY1  CLC
2320 ADD1     ADC #7        GET VERT LINE NUMBER FOR 7 LINES
2330          TAX           BELOW OR ABOVE CURRENT LINE #
2340          LDA HIRESH,X GET HIBYTE OF ORIGINAL LINE
2350          STA PTR2+1
2360          LDA HIRESL,X GET LOBYTE OF ORIGINAL LINE
2370          STA PTR2
2380          TXA
2390 SCARRY1  SEC
2400 SUB1     SBC #7
2410          TAX
2420          LDY #0
2430 LP3      LDA (PTR2),Y LOAD FROM ORIGINAL LINE
2440          STA (PTR1),Y STORE IN DESTINATION LINE
2450          INY
2460          CPY #$28      DONE WITH LINE?
2470          BNE LP3       IF NOT, GET NEXT BYTE
2480 INX      INX           INC VERT LINE COUNTER
2490 OP1      CPX #$B9      DONE WITH SCREEN?
2500          BNE BEGIN     IF NOT, DO THE NEXT LINE
2520 OP2      LDX #$B9      RECALL TOP 7 OR BOTTOM 7 LINES
2530 RCLOOP1  LDA HIRESH,X FROM PAGE2
2540          STA PTR1+1
2550          CLC
2560          ADC #$20
2570          STA PTR2+1
2580          LDA HIRESL,X
2590          STA PTR1
2600          STA PTR2
2610          LDY #0
2620 RCLOOP2  LDA (PTR2),Y
```

continued on page 39



& GOTO LABEL

By Robb Canfield

Requirements:
- Apple II with 48K
- At least one disk drive
- Blank, initialized disk

GOTO Label is a utility which provides the user with the capacity to use true labels instead of line numbers. It was developed out of the frustration caused by constantly having to remember, by line number, the location of routines in long programs. (SOUND at 10000, GET INPUT at 20000, and COLLISION at 15060, etc.).

GOTO Label allows labels to be defined and branched to through the use of the ampersand command. (A branch in Applesoft is any command that alters the flow: GOTO, GOSUB and ON.)

The companion program, Replace, will substitute normal line numbers for all of the labels, thus converting the program to a normal Applesoft file for later compilation.

Entering GOTO Label

To place GOTO Label in memory, follow these steps:

1) Boot the 3.3 master disk.

2) Clear the Applesoft program from memory.
FP

3) Enter the monitor.
CALL -151

4) Enter the hexadecimal listing (if you have an assembler, enter the source code listing).

5) Return to BASIC.
3D0G

6) Save GOTO Label.
BSAVE GOTO LABEL,A$803,L$**143**

7) Return to BASIC.
3D0G

8) Save the program.

How to Use GOTO Label

To activate GOTO Label, simply **BRUN GOTO LABEL.** Any Applesoft program in memory at this time will be destroyed. When the prompt reappears (]), the program is ready. All of the normal Applesoft commands are available, with the additional advantage of labels.

There are two terms for labels: the source label and the target label. The source label follows a branch command (GOSUB, GOTO, or ON). The target label is where the program should branch. In other words, the source label is the FROM location and the target label is the TO location.

Source Labels

The source label must be enclosed in quotes and must follow an ampersand branch command (&GOTO, &GOSUB and &ON). When the program finds a quote, all characters, including spaces, are accepted until the end of the line is reached or until a control character is encountered. If no quote is found after the branch command, Applesoft will handle it normally. Below are some examples.

10 &GOTO "HELP"

This line will GOTO the label "HELP".

20 &GOSUB 23

In this line, the program will GOSUB to line 23. Since it is not enclosed in quotes, it is not a label.

30 &GOTO SOUND

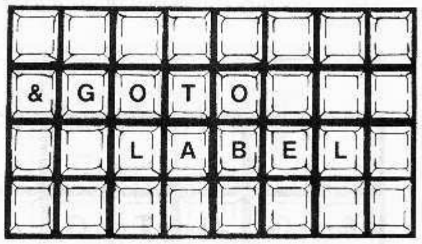
A SYNTAX ERROR will be generated by this line because it does not contain a line number and is not enclosed in quotes.

40 &ON A-4 GOTO 23,"HELLO",45,"SOUND"

Line 40 will GOTO any of the following: line 23, the "HELLO" label, line 45, or the "SOUND" label. As this example shows, line numbers and labels can be freely mixed within an ON statement. Only the ON is preceded by an ampersand; the branch type (GOTO/GOSUB) is never preceded by an ampersand when inside an ON statement.

Program

```
                 *---------------------------------
                 *  HANDLES THE AMPERSAND COMMANDS
                 * FOR &GOTO, &GOSUB AND &ON
                 *---------------------------------
                 *---------------------------------
                 * APPLESOFT TOKENS.
                 *---------------------------------
                            .OR $803
                            .TF GOTO LABEL1
00AB-            GOTO.T     .EQ $AB        GOTO COMMAND
00B0-            GOSUB.T    .EQ $B0        GOSUB COMMAND
00B4-            ON.T       .EQ $B4        THE ON COMMAND
0022-            QUOTE      .EQ $22
00B2-            REM.T      .EQ $B2
00AF-            AMPER.T    .EQ $AF
003A-            EOL        .EQ $3A        (A COLON ":")
0021-            LABEL.T    .EQ $21        DETEMINES LEGAL LABELS
0020-            SPACE.T    .EQ $20        A SPACE
002C-            COMMA      .EQ $2C        A COMMA "'"
                 *---------------------------------
                 * PAGE ZERO EQUATES.
                 *---------------------------------
009B-            LOWTR      .EQ $9B
009D-            FAC        .EQ $9D        TEMP VARIABLE
00A0-            FIRST.OFFSET .EQ FAC+3
0067-            TXTTAB     .EQ $67
00B8-            TXTPTR     .EQ $B8
00A0-            TOKEN.FOUND .EQ FAC+3
0076-            CURLIN     .EQ $76        CURR. LINE #
                 *---------------------------------
                 * ROUTINES USED BY APPPLESOFT.
                 *---------------------------------
00B1-            CHRGET     .EQ $B1        GET NEXT CHAR.
D959-            GO2        .EQ $D959      BASIC ROUTINE
DEC9-            SYNERR     .EQ $DEC9      ? SYNTAX ERROR
D9A6-            REMN       .EQ $D9A6
D64B-            SCRATCH    .EQ $D64B      CLR VAR & PTRS
D93E-            GOTO.FP    .EQ $D93E      NORM GOTO CMND
D828-            DO.NORMAL .EQ $D828       DO CMD IN A-REG
D7D2-            NEWSTT     .EQ $D7D2      DO NEW STATEMENT
D3D6-            CHKMEM     .EQ $D3D6      GOSUBS TOO DEEP?
D9F8-            ONCNT      .EQ $D9F8      NORM ON...CMD
E6F8-            GETBYTE    .EQ $E6F8      EVAL FORMULA
D43C-            RESTART    .EQ $D43C      ENTER APPLESOFT
03F5-            AMPER      .EQ $3F5       AMPERSAND VECTOR
                 *---------------------------------
                 INITIALIZE.AMPERSAND
                 *---------------------------------
0803- AD F5 03              LDA AMPER      TRANSFER OLD &
0806- 8D 53 08              STA OLD.AMPER
0809- AD F6 03              LDA AMPER+1
080C- 8D 54 08              STA OLD.AMPER+1
080F- AD F7 03              LDA AMPER+2
0812- 8D 55 08              STA OLD.AMPER+2
0815- A9 4C                 LDA #$4C       A JUMP COMMAND
0817- 8D F5 03              STA AMPER
081A- A9 32                 LDA #AMPERSAND.CONTROL
081C- 8D F6 03              STA AMPER+1
081F- A9 08                 LDA /AMPERSAND.CONTROL
0821- 8D F7 03              STA AMPER+2
0824- A9 42                 LDA #END.PROGRAM+1 RESET PTRS
0826- 85 67                 STA TXTTAB
```



Hexdump

BEG: 8Ø3; END: 944

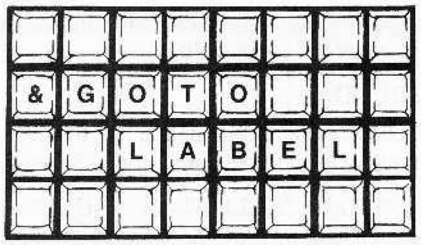
```
0803- AD F5 03 8D 53             $8FEF
0808- 08 AD F6 03 8D 54 08 AD    $C9A9
0810- F7 03 8D 55 08 A9 4C 8D    $8404
0818- F5 03 A9 32 8D F6 03 A9    $AB43
0820- 08 8D F7 03 A9 42 85 67    $3B9F
0828- A9 09 85 68 20 4B D6 4C    $D0AE
0830- 3C D4 C9 B4 F0 46 C9 AB    $01B8
0838- F0 04 C9 B0 D0 15 48 A0    $1687
0840- 01 B1 B8 C9 22 F0 04 68    $8138
0848- 4C 28 D8 68 C9 AB F0 06    $DC45

0850- 4C 5F 08 4C FF FF 20 B1    $243A
0858- 00 20 CF 08 4C 5C D9 20    $490A
0860- B1 00 A9 03 20 D6 D3 A5    $A21D
0868- B9 48 A5 B8 48 A5 77 48    $8ACE
0870- A5 76 48 A9 B0 48 20 59    $9048
0878- 08 4C D2 D7 20 B1 00 20    $7B29
0880- F8 E6 48 C9 B0 F0 07 C9    $32B5
0888- AB F0 03 4C C9 DE C6 A1    $A205
0890- D0 12 A0 01 B1 B8 C9 22    $2B55
0898- F0 03 4C FC D9 68 C9 B0    $FA4C

08A0- F0 BD D0 B2 20 B1 00 F0    $6C2F
08A8- 24 C9 22 F0 0B 20 B1 00    $8DCF
08B0- F0 1B C9 2C D0 F7 F0 D6    $85FD
08B8- 20 B1 00 F0 10 C9 22 D0    $ACF3
08C0- F7 20 B1 00 F0 07 C9 2C    $4275
08C8- F0 C4 4C C9 DE 68 60 A0    $D23B
08D0- 00 C8 B1 B8 F0 F4 C9 22    $2CAC
08D8- F0 F0 C9 21 90 F3 88 84    $D284
08E0- A0 A5 67 85 9B A5 68 85    $163A
08E8- 9C A0 00 B1 9B 48 C8 B1    $B9B3

08F0- 9B 48 D0 04 68 68 18 60    $40E0
08F8- C8 C8 C8 B1 9B C9 B2 F0    $AC6D
0900- 09 68 85 9C 68 85 9B 4C    $32CA
0908- E9 08 C8 B1 9B F0 F2 C9    $9264
0910- 21 90 F7 88 A6 A0 C8 E8    $301E
0918- B1 9B C9 20 90 0F 84 9E    $9E4F
0920- 86 9F A4 9F D1 B8 D0 D9    $3418
0928- A4 9E 4C 16 09 8A A8 B1    $7778
0930- B8 C9 22 F0 04 C9 20 B0    $54FA
0938- C8 68 85 9C 68 85 9B 38    $5E86

0940- 60 00 00 00 3F             $DD99
```



Target Labels

The target label will always follow a remark statement and should not be enclosed in quotes. The program handles target labels by ignoring all characters until a normal ASCII character is found (punctuation and upper- and lower-case letters). Then all characters, including spaces, are accepted until the end of the line is reached or until a control character is encountered.

Various labels are shown below. The superscripted C signifies a letter as being a control character.

10 REM J^CJ^C PRINT NAMEJ^CJ^C

This line will have a label of "PRINT NAME".

10 REM J^CJ^C PRINT J^C NAME

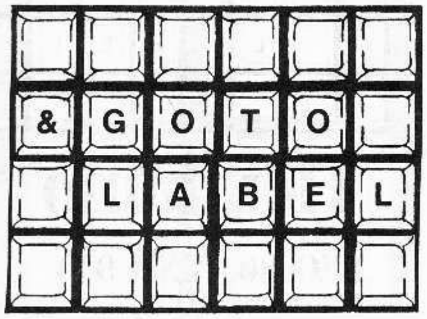
In this example, the label will be "PRINT" because the J^C cancels the rest of the line.

10 REM "PRINT NAME"

The last label will not be acknowledged since it is enclosed in quotes.

Active Memory

GOTO Label has another feature transparent to the user — any ampersand program in memory when GOTO Label is



INTRODUCING

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Program

```
0803-  C9 B4                         CMP #ON.T     IS IT THE ON... STATEMENT?
0805-  D0 03                         BNE .1
0807-  4C 49 08                      JMP ON        YES SO EXECUTE
080A-  48           .1               PHA           SAVE TOKEN
080B-  A0 01                         LDY #$01      LOOK FOR QUOTE AFTER THE STATEMENT
080D-  B1 B8                         LDA (TXTPTR),Y
080F-  C9 22                         CMP #QUOTE
0811-  F0 04                         BEQ DO.SPECIAL.COMMAND
0813-  68                            PLA           RESTORE STACK
0814-  4C 28 D8                      JMP DO.NORMAL DO A NORMAL COMMAND
               DO.SPECIAL.COMMAND
0817-  68                            PLA           RESTORE OLD TOKEN
0818-  C9 AB                         CMP #GOTO.T   IS IT A GOTO?
081A-  F0 07                         BEQ GOTO
081C-  C9 B0                         CMP #GOSUB.T  IS IT A GOSUB?
081E-  F0 0C                         BEQ GOSUB
0820-  4C C9 DE     .1               JMP SYNERR
               *--------------------------------
               *  HANDLES GOTO, GOSUB AND ON
               * GOTO/GOSUBS TO A LABEL OR LINE
               * NUMBER, LINKED THRU THE & KEY.
               *--------------------------------

               GOTO
0823-  20 B1 00                      JSR CHRGET    POINT TO THE QUOTE
               GOTO2
0826-  20 9C 08                      JSR SEARCH    FIND LINE
0829-  4C 5C D9                      JMP GO2+3
               *--------------------------------
               *  THIS ROUTINE HANDLES THE
               * GOSUB LABEL COMMAND.
               *--------------------------------

               GOSUB
082C-  20 B1 00                      JSR CHRGET    POINT TO THE QUOTE
               GOSUB2
082F-  A9 03                         LDA #$3
0831-  20 D6 D3                      JSR CHKMEM
0834-  A5 B9                         LDA TXTPTR+1 PUSH THE TXTPTR ONTO THE STACK
0836-  48                            PHA
0837-  A5 B8                         LDA TXTPTR
0839-  48                            PHA
083A-  A5 77                         LDA CURLIN+1 PUSH CURRENT LINE ONTO THE STACK
083C-  48                            PHA
083D-  A5 76                         LDA CURLIN
083F-  48                            PHA
0840-  A9 B0                         LDA #GOSUB.T SAVE THE COMMAND ONTO THE STACK
0842-  48                            PHA
0843-  20 26 08                      JSR GOTO2     LOOK FOR THE LINE
0846-  4C D2 D7                      JMP NEWSTT    EXECUTE A NEW STATEMENT

               *--------------------------------
               *   ON GOTO,GOSUB FOR LABEL.
               *--------------------------------

               ON
0849-  20 B1 00                      JSR CHRGET    POINT TO THE FORMULA
084C-  20 F8 E6                      JSR GETBYTE   EVAL. FORMULA
```

BRUN is left active (as long as it does not use the same memory space). This allows RENUMBER from the Apple master disk to reside in memory and remain accessible to the user at the same time as GOTO Label. To have both programs in memory at once, RUN RENUMBER, then BRUN GOTO LABEL. All the features of RENUMBER will still be active.

Replacing Labels with Line Numbers

The Replace program is GOTO Label's counterpart. It will scan through an Applesoft program to replace the ampersand GOTOs, GOSUBs and ONs with normal GOTOs, GOSUBs and ONs, and will replace the source labels with line numbers. This allows the Applesoft program to be run on any Apple (GOTO Label need not be in memory, since the Applesoft program is standard), or even compiled.

To enter Replace in memory, follow these steps:

1) Boot the 3.3 master disk.

2) Insert the blank disk in the drive.

3) Clear the Applesoft program from memory.
FP

4) Enter the monitor.
CALL -151

5) Type the Hex dump for REPLACE.

6) **Return to BASIC.**
3D0G

7) **Save the program.**
BSAVE REPLACE,A$803,L$360

Replace will overwrite GOTO Label. Because there is no need to have both in memory at the same time, this presents no major problem. Replace will also destroy any Applesoft program currently in memory, so the program to be converted must be saved to the disk. Replace should be BRUN.

Program

```
084F- 48        2160           PHA            SAVE COMMAND TYPE
0850- C9 B0     2170           CMP #GOSUB.T IS IT A GOSUB
0852- F0 07     2180           BEQ .1
0854- C9 AB     2190           CMP #GOTO.T  IS IT A GOTO
0856- F0 03     2200           BEQ .1
0858- 4C C9 DE  2210           JMP SYNERR   NEITHER,SO PRINT SYNTAX ERROR
                2220
085B- C6 A1     2230 .1        DEC FAC+4    DECREMENT ON LOOP
085D- D0 12     2240           BNE .3
085F- A0 01     2250           LDY #$01
0861- B1 B8     2260           LDA (TXTPTR),Y IS IT A QUOTE?
0863- C9 22     2270           CMP #QUOTE
0865- F0 03     2280           BEQ .2
0867- 4C FC D9  2290           JMP ONCNT+4  PROCESS COMMAND NORMALLY
                2300
086A- 68        2310 .2        PLA          GET COMMAND
086B- C9 B0     2320           CMP #GOSUB.T IS IT A GOSUB COMMAND
086D- F0 BD     2330           BEQ GOSUB
086F- D0 B2     2340           BNE GOTO     MUST BE A GOTO THEN
                2350
0871- 20 B1 00  2360 .3        JSR CHRGET   GET CHARACTER
0874- F0 24     2370           BEQ END.LINE IF END THEN EXIT
0876- C9 22     2380           CMP #QUOTE   IS IT A QUOTE (ENDING)
0878- F0 0B     2390           BEQ .10      USE  SEPERATE QUOTE COUNT ROUTINE
087A- 20 B1 00  2400 .20       JSR CHRGET   GET NEXT CHARACTER
087D- F0 1B     2410           BEQ END.LINE
087F- C9 2C     2420           CMP #COMMA   REACH THE END YET?
0881- D0 F7     2430           BNE .20
0883- F0 D6     2440           BEQ .1
0885- 20 B1 00  2450 .10       JSR CHRGET   GET NEXT CHARACTER
0888- F0 10     2460           BEQ END.LINE
088A- C9 22     2470           CMP #QUOTE   END OF QUOTE?
088C- D0 F7     2480           BNE .10
088E- 20 B1 00  2490           JSR CHRGET   MOVE TO NEXT POSITION IN THE LINE
0891- F0 07     2500           BEQ END.LINE
0893- C9 2C     2510           CMP #COMMA   IS IT A COMMA?
0895- F0 C4     2520           BEQ .1       CONTINUE WITH ON COMMAND
                2530
                2540 SYNTAX.ERROR
0897- 4C C9 DE  2550           JMP SYNERR   OTHERWISE IT'S A SYNTAX ERROR
                2560
                2570 END.LINE
089A- 68        2580           PLA          RESTORE STACK
089B- 60        2590           RTS          AND EXIT
                2600
                2610 *--------------------------------
                2620 *  SEARCH FOR THE LINE REQUESTED.
                2630 *--------------------------------
                2640
                2650 SEARCH
089C- A0 00     2660           LDY #$00     SCAN FOR A LEGAL LABEL
                2670 .0
089E- C8        2680           INY
089F- B1 B8     2690           LDA (TXTPTR),Y
08A1- F0 F4     2700           BEQ SYNTAX.ERROR BAD BRANCH,PRINT SYNTAX ERROR
08A3- C9 22     2710           CMP #QUOTE   FOUND ANOTHE QUOTE?
08A5- F0 F0     2720           BEQ SYNTAX.ERROR
```

Hexdump

Replace

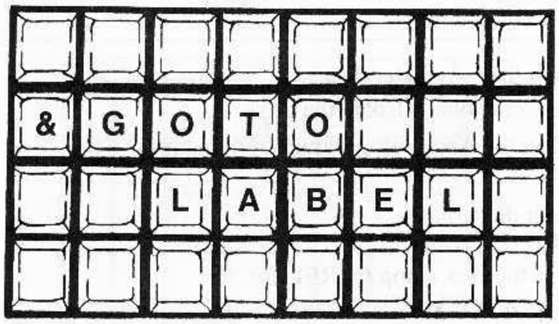
```
0803- A9 5B 85 67 A9             $F3A5
0808- 0B 85 68 20 4B D6 A9 4C    $E8F9
0810- 8D F5 03 A9 20 8D F6 03    $2050
0818- A9 08 8D F7 03 4C 3C D4    $2CD6
0820- A5 67 85 B8 A5 68 85 B9    $D413
0828- A5 AF E9 03 85 AF B0 02    $73BA
0830- C6 AF 20 DA 09 A5 B8 85    $CBB1
0838- 75 A5 B9 85 76 20 DA 09    $A8F9
0840- 20 E7 09 B0 03 4C BF 09    $BAA5
0848- A0 00 B1 B8 C9 AF F0 24    $3532

0850- C9 AD D0 11 C8 B1 B8 F0    $907D
0858- 0C C9 C4 D0 F7 C8 20 98    $7262
0860- D9 A0 00 F0 E5 20 A3 D9    $D2D1
0868- B1 B8 08 C8 20 98 D9 28    $6041
0870- D0 D6 F0 BE C8 B1 B8 C9    $BAEF
0878- B0 F0 08 C9 AB F0 04 C9    $8146
0880- B4 D0 E2 88 8C 58 0B A0    $6FEF
0888- 01 A2 02 B1 B8 C9 22 F0    $47D1
0890- 07 88 91 B8 C8 C8 D0 F3    $79C0
0898- CA D0 F6 88 A9 20 91 B8    $C192

08A0- AC 58 0B 20 F1 09 90 12    $7FFB
08A8- 20 A3 D9 A0 00 B1 B8 C8    $0193
08B0- C9 2C F0 06 20 98 D9 4C    $4988
08B8- 32 08 8C 58 0B A5 B8 85    $5B93
08C0- 77 A5 B9 85 78 A5 67 85    $BF70
08C8- B8 A5 68 85 B9 20 DA 09    $53C1
08D0- 20 DA 09 20 E7 09 B0 03    $6C1B
08D8- 4C E5 0A A0 00 B1 B8 C9    $2EC7
08E0- B2 F0 0A 20 A6 D9 C8 20    $EC6B
08E8- 98 D9 4C CD 08 C8 B1 B8    $58B6

08F0- D0 03 4C 29 09 C9 21 90    $211F
08F8- F4 8C 57 0B AC 58 0B C8    $B820
0900- B1 77 F0 25 C9 21 90 F7    $9E06
0908- 8C 56 0B AC 56 0B B1 77    $D4AD
0910- F0 36 C9 22 F0 32 C9 20    $6E2A
0918- 90 2E AC 57 0B D1 B8 D0    $23C9
0920- 08 EE 56 0B EE 57 0B D0    $367F
0928- E2 C9 20 D0 11 B1 B8 F0    $5F1E
0930- 17 C9 20 90 13 D0 03 C8    $7F03
0938- D0 F3 C9 22 F0 0A 20 A6    $3442

0940- D9 C8 20 98 D9 4C CD 08    $8019
0948- AC 57 0B B1 B8 F0 0F C9    $09AC
0950- 22 F0 0B C9 20 90 07 F0    $1F00
0958- 02 B0 CE C8 D0 ED 20 A6    $EADD
0960- D9 C8 20 98 D9 20 DA 09    $2A4F
0968- 20 E7 09 B0 03 4C 01 0B    $B94C
0970- A0 02 B1 B8 C9 B2 F0 E6    $718F
0978- A0 00 B1 B8 8D 53 0B C8    $93A3
0980- B1 B8 8D 54 0B 20 91 0A    $828C
0988- A5 77 85 B8 A5 78 85 B9    $5AC9
```



Conversion

After Replace is BRUN, the labels can be converted to line numbers. Load the Applesoft program to be converted, press the ampersand (&) key, and wait a few seconds. When the Applesoft prompt appears, the conversion is complete. The ampersands have been removed and the program has become standard Applesoft.

The conversion program will always point the branch to the next non-REM statement after the label. In this way no branches to a remark are made.

There are two error messages which can be encountered during the conversion process.

1) LABEL NOT FOUND IN LINE X

This means that there is a branch to a label that does not exist.

2) NO LINE AFTER LABEL CALLED FROM LINE X

This appears if there was no non-REM statement after the label.

Both of these errors cause the conversion process to halt, leaving the remaining portion of the program unconverted. These errors must be corrected before a conversion can be attempted again.

NOTE: Always save the original Applesoft program (the one with all the labels in it), since there is no way the labels can be restored after a conversion is made.

Program

```
08A7- C9 21    2730          CMP #LABEL.T IS IT A LEGAL LABEL?
08A9- 90 F3    2740          BCC .0       NO SO CONTINUE
08AB- 88       2750          DEY          BACK UP ONE
08AC- 84 A0    2760          STY FIRST.OFFSET
               2770
08AE- A5 67    2780          LDA TXTTAB   GET BEGINNING OF THE PROGRAM
08B0- 85 9B    2790          STA LOWTR
08B2- A5 68    2800          LDA TXTTAB+1
08B4- 85 9C    2810          STA LOWTR+1
               2820
08B6- A0 00    2830 .1       LDY #$00
08B8- B1 9B    2840          LDA (LOWTR),Y GET OFFSET TO NEXT LINE
08BA- 48       2850          PHA
08BB- C8       2860          INY
08BC- B1 9B    2870          LDA (LOWTR),Y
08BE- 48       2880          PHA
08BF- D0 04    2890          BNE .6
08C1- 68       2900          PLA
08C2- 68       2910          PLA
08C3- 18       2920          CLC
08C4- 60       2930          RTS
08C5- C8       2940 .6       INY          SKIP LINE#
08C6- C8       2950          INY
08C7- C8       2960          INY
08C8- B1 9B    2970          LDA (LOWTR),Y
08CA- C9 B2    2980          CMP #REM.T   IS IT A REM (MAYBE A LABEL)
08CC- F0 09    2990          BEQ .3
08CE- 68       3000 .2       PLA
08CF- 85 9C    3010          STA LOWTR+1  GOTO NEXT LINE
08D1- 68       3020          PLA
08D2- 85 9B    3030          STA LOWTR
08D4- 4C B6 08 3040          JMP .1       ALWAYS
               3050
08D7- C8       3060 .3       INY
08D8- B1 9B    3070          LDA (LOWTR),Y GET NEXT CHARACTER IN LINE
08DA- F0 F2    3080          BEQ .2
08DC- C9 21    3090          CMP #LABEL.T IS IT A LEGAL LABEL?
08DE- 90 F7    3100          BCC .3
08E0- 88       3110          DEY          SET Y-REG TO PT ONE BEHIND LEG LAB
08E1- A6 A0    3120          LDX FIRST.OFFSET OFFSET TO GOTO/GOSUB/ON LABEL
               3130
08E3- C8       3140 .4       INY
08E4- E8       3150          INX
08E5- B1 9B    3160          LDA (LOWTR),Y COMPARE LABEL
08E7- C9 20    3170          CMP #SPACE.T LOOK FOR SPACE OR CONTROL CHAR.
08E9- 90 0F    3180          BCC .5       IF FOUND THEN LABEL IS DONE
08EB- 84 9E    3190          STY FAC+1
08ED- 86 9F    3200          STX FAC+2    TRANSFER X-REG TO Y-REG
08EF- A4 9F    3210          LDY FAC+2
08F1- D1 B8    3220          CMP (TXTPTR),Y
08F3- D0 D9    3230          BNE .2
08F5- A4 9E    3240          LDY FAC+1    RESTORE Y-REG
08F7- 4C E3 08 3250          JMP .4       CONTINUE WITH COMPARISON
               3260 .5
08FA- 8A       3270          TXA          TRANSFER X-REG TO Y-REG
08FB- A8       3280          TAY
08FC- B1 B8    3290          LDA (TXTPTR),Y MAKE SURE GOTO LABEL IS FINISHED
08FE- C9 22    3300          CMP #QUOTE
0900- F0 04    3310          BEQ .7
0902- C9 20    3320          CMP #SPACE.T
```

Hexdump

Replace

```
0990- A0 FF 20 F1 09 AE 50 02  $E03B
0998- BD 51 02 91 B8 CA F0 15  $12B9
09A0- C8 B1 B8 F0 04 C9 22 D0  $A11F
09A8- EF 20 98 D9 8A A8 20 51  $5746
09B0- 0A A0 00 F0 E3 C8 20 98  $47FB
09B8- D9 20 02 0A 4C AB 08 A0  $6742
09C0- 04 A9 00 91 AF 88 10 FB  $2130
09C8- A5 B0 85 6A A5 AF 18 69  $D3E9
09D0- 04 85 69 90 02 E6 6A 4C  $B697
09D8- F2 D4 E6 B8 D0 02 E6 B9  $8278

09E0- E6 B8 D0 02 E6 B9 60 A5  $54A5
09E8- AF 38 E5 B8 A5 B0 E5 B9  $C8F1
09F0- 60 C8 B1 B8 F0 0A C9 3A  $C6C9
09F8- F0 06 C9 22 D0 F3 18 60  $0305
0A00- 38 60 A0 FF C8 B1 B8 F0  $59A4
0A08- 09 C9 3A F0 05 C9 22 D0  $E318
0A10- F3 C8 8C 55 0B A2 03 A5  $FEE2
0A18- B8 8D 28 0A 8D 2B 0A A5  $8201
0A20- B9 8D 29 0A 8D 2C 0A B9  $1D55
0A28- FF FF 8D FF FF D0 10 CA  $451B

0A30- D0 0F 38 A5 AF ED 55 0B  $8CB5
0A38- 85 AF B0 02 C6 B0 60 A2  $C885
0A40- 03 EE 28 0A EE 2B 0A D0  $D0F3
0A48- DE EE 29 0A EE 2C 0A D0  $F92C
0A50- D6 A5 AF 8D 62 0A 8D 65  $0B77
0A58- 0A A5 B0 8D 63 0A 8D 66  $C1B3
0A60- 0A AD FF FF 99 FF FF AD  $56EA
0A68- 62 0A D0 06 CE 63 0A CE  $0012
0A70- 66 0A CE 62 0A CE 65 0A  $5D5F
0A78- AD 62 0A C5 B8 B0 E2 AD  $4BDB

0A80- 63 0A C5 B9 D0 DB 98 18  $5695
0A88- 65 AF 85 AF 90 02 E6 B0  $8148
0A90- 60 A9 00 A8 8D 51 02 8D  $63C1
0A98- 50 02 A9 00 8D 59 0B 8D  $C09B
0AA0- 5A 0B A2 10 18 2E 53 0B  $FD0B
0AA8- 2E 54 0B 2E 59 0B 2E 5A  $DB80
0AB0- 0B 38 AD 59 0B E9 0A A8  $32F5
0AB8- AD 5A 0B E9 00 90 06 8C  $2D72
0AC0- 59 0B 8D 5A 0B CA D0 DD  $0A46
0AC8- 2E 53 0B 2E 54 0B AD 59  $FFBB

0AD0- 0B 09 30 EE 50 02 AC 50  $43D6
0AD8- 02 99 51 02 AD 53 0B 0D  $2EFF
0AE0- 54 0B D0 B6 60 A0 1A B9  $DB79
0AE8- 0F 0B 20 ED FD 88 10 F7  $75E3
0AF0- A0 00 B1 75 AA C8 B1 75  $509B
0AF8- 20 24 ED 20 8E FD 4C BF  $8B9F
0B00- 09 A0 28 B9 2A 0B 20 ED  $478F
0B08- FD 88 10 F7 4C F0 0A A0  $4DA7
0B10- C5 CE C9 CC A0 CE C9 A0  $EB30
0B18- C4 CE D5 CF C6 A0 D4 CF  $D8DE
```

How GOTO Label Works

GOTO Label makes use of the normal Applesoft branches. A description of how the normal GOSUB, GOTO and ON work will help explain how the program operates. Then these branches can be compared to the special ampersand branches used in GOTO Label.

GOSUB ($D921 to $D93B)

First makes certain there is enough room on the stack to execute another GOSUB.

a) If there isn't, generates an "out of memory" error.

b) If there is, saves the position in this line and the token for GOSUB. Enters step 1 of the GOTO routine.

GOTO ($D93E to $D968)

1) Converts the tokenized line number to a two-byte hexadecimal number.

2) Finds out if the line number being branched to is greater than 256 plus the current line number.

a) If so, starts the search from this line number.

b) If not, starts the search from the beginning of the program.

3) Searches for the line number. If it is found, moves the pointers there and executes the line, otherwise give an ?UNDEF'D STATEMENT ERROR.

ON ($D9EC to $DA0B)

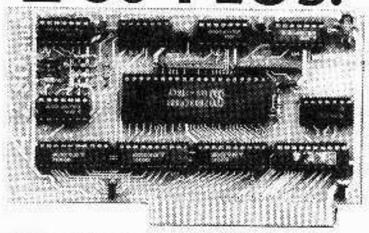
1) Evaluates the formula following the ON command.

2) Saves the type of branch (GOTO/GOSUB) on the stack. If the branch is not a GOTO or GOSUB, generates a SYNTAX ERROR.

Program

```
093A- 85 9C    3340          STA LOWTR+1
093C- 68       3350          PLA
093D- 85 9B    3360          STA LOWTR
093F- 38       3370          SEC           SET FOR BORROW
0940- 60       3380          RTS           RTS TO CALLER
               3390 END.PROGRAM
0941- 00 00 00 3400          .HS 000000
```

Z-80 PLUS!



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Hexdump

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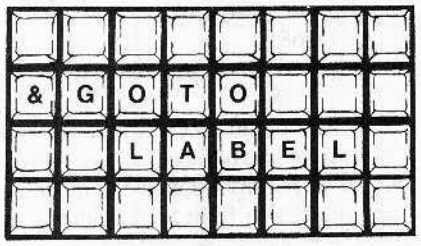
```
1200- 4C 6B 12 4C A8 12 4C C5  $35FA
1208- 12 4C 24 13 4C 2F 13 4C  $6981
1210- 50 12 00 60 01 00 00 00  $797D
1218- 23 12 00 14 00 00 00 00  $3CE7
1220- 00 60 01 00 01 EF D8 A9  $9E52
1228- 0C 85 24 A9 0B 20 5B FB  $6F41
1230- AE 1E 12 BD 3A 13 20 ED  $4143
1238- FD AD 16 12 20 DA FD A9  $02CD
1240- 2E 20 ED FD AD 17 12 20  $2E08
1248- DA FD 2C 83 C0 2C 83 C0  $7428

1250- A9 00 8D 1F 12 A9 12 A0  $5A67
1258- 12 20 B5 B7 08 2C 81 C0  $DEA6
1260- A9 00 85 48 28 B0 03 8D  $6CEF
1268- 1F 12 60 A9 00 8D 1A 12  $00B4
1270- 8D 1B 12 85 00 8D 15 12  $F80A
1278- A9 22 85 01 85 03 A9 0F  $DF5F
1280- 85 04 85 02 A9 B7 8D 14  $36CF
1288- 13 8D 83 C0 8D 83 C0 A2  $D41E
1290- 0F BD 3E 13 9D F0 FF DD  $F8A4
1298- F0 FF D0 08 CA 10 F2 A9  $E4AB

12A0- FF 8D 14 13 8D 81 C0 60  $04E8
12A8- A9 01 8D 1E 12 A5 01 8D  $5C96
12B0- 16 12 A5 02 8D 17 12 20  $F3D9
12B8- E9 12 AD 17 12 85 02 AD  $40B3
12C0- 16 12 85 01 60 A9 02 8D  $3301
12C8- 1E 12 A5 03 8D 16 12 A5  $FD36
12D0- 04 8D 17 12 20 E9 12 AD  $806E
12D8- 16 12 85 03 AD 17 12 85  $1F5B
12E0- 04 B0 01 60 A9 FF 85 00  $B637
12E8- 60 A9 14 8D 1B 12 20 27  $1AA0

12F0- 12 90 09 68 8D 4E 13 68  $2478
12F8- 8D 4F 13 60 CE 17 12 10  $E3CC
1300- 0C A9 0F 8D 17 12 CE 16  $52C2
1308- 12 10 02 38 60 EE 1B 12  $A3DD
1310- AD 1B 12 C9 FF F0 0B C9  $D1A7
1318- B7 D0 D3 A9 D0 8D 1B 12  $580B
1320- D0 CC 18 60 AD 4F 13 48  $20AE
1328- AD 4E 13 48 4C EE 12 AD  $4304
1330- 4F 13 48 AD 4E 13 48 4C  $1639
1338- FC 12 53 52 57 49 83 7F  $631D

1340- 5C CC B5 FC 17 17 F5 03  $6880
1348- FB 03 59 FF 86 FA 00 00  $0605
```

Replace

```
0B20- CE A0 CC C5 C2 C1 CC 8D  $1BC0
0B28- 8D 87 A0 C5 CE C9 CC A0  $ADB0
0B30- CD CF D2 C6 A0 C4 C5 CC  $D170
0B38- CC C1 C3 8D AE CC C5 C2  $7D91
0B40- C1 CC A0 D2 C5 D4 C6 C1  $931A
0B48- A0 C5 CE C9 CC A0 CF CE  $C140
0B50- 8D 8D 87 00 00 00 00 00  $77E6
0B58- 00 00 00 00 00           $106B
```



3) Enters a loop to find the proper statement to CALL.

a) Decrements the results from the calculation made in step 1.

b) If at zero, exits to step 4.

c) Skips to the next line number. If there are no more line numbers, restores the stack and continues with the next statement.

d) Loops back to step a.

4) Retrieves branch type and perform the branch specified.

GOTO Label Ampersand Commands

Compare the GOTO Label commands to the normal Applesoft branches.

&GOSUB

1) Duplicates step 1 from Applesoft.
2) Falls into &GOTO.

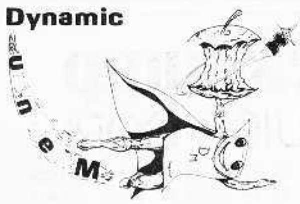
&GOTO

1) Searches for a label. Is there a quote following the &GOTO?

a) If no quote is found, there can't be a label, so the routine treats it as a normal GOTO and lets Applesoft handle it.

b) If a quote is found, a label was present. Falls into step 2.

Dynamic



Checksums

10	- $E1BE
20	- $5F0C
30	- $B4FA
40	- $C19F
50	- $1484
60	- $26C5
70	- $4AE3
80	- $F571
90	- $C402
100	- $676E
110	- $A891
120	- $7C77
130	- $F1FE
140	- $0C4E
150	- $FC1E
160	- $B4F9
170	- $A74E
180	- $B055
190	- $376D
200	- $6FAF
210	- $7BDD
220	- $BF20
230	- $7265
240	- $1331
250	- $376D
260	- $C1E3
270	- $EFC0
280	- $7CF0
290	- $BEC4
300	- $21D0
310	- $C13A
320	- $0B81
330	- $8205
340	- $59E8
350	- $BC7D
360	- $ABEF
370	- $D6F7
380	- $E600
390	- $5E1A
400	- $E6DC

Program

Replace

```

       *--------------------------------
       *      REPLACE GOTO LABEL
       *
       *            BY
       *       ROBB S. CANFIELD
       *
       *
       *--------------------------------

       *--------------------------------
       *  ROUTINE TO SEARCH FOR
       * AMPERSANDS AND GOTO, GOSUB, ON
       *--------------------------------

              .OR $803      PLACE BELOW BASIC PROGRAM
              .TF REPLACE



0067-  AP.START .EQ $67,68     POINTS TO WHERE APPLESOFT STARTS
0075-  CURLIN   .EQ $75,76     START OF CURRENT LINE
00AF-  AP.END   .EQ $AF,B0     POINTS TO END OF BASIC PROGRAM
0069-  LOMEM    .EQ $69        POINTER TO END+1
00B8-  CURRENT.LOC .EQ $B8,B9 POINTER TO CURRENT LOCATION
0077-  TEMP     .EQ $77,78     POINTER TO SEARCH LOCATION

0250-  LENGTH   .EQ $250       LENGTH OF LINE IN THE BUFFER
0251-  BUFFER   .EQ $251       BUFFER TO STORE LINE NUMBER
03F5-  AMPER.VECTOR .EQ $3F5 THE AMPERSAND JUMP VECTOR

       *--------------------------------
       * TOKENS FOR APP. COMMANDS
       *--------------------------------

00AF-  AMPER    .EQ $AF
00AD-  IF       .EQ $AD
00C4-  THEN     .EQ $C4
00B0-  GOSUB    .EQ $B0
00AB-  GOTO     .EQ $AB
00B2-  REM      .EQ $B2
00B4-  ON       .EQ $B4
0020-  SPACE    .EQ $20        THE TOKEN FOR A SPACE
002C-  COMMA    .EQ $2C

```

2) Searches from the beginning of the program for a matching label.
 a) If one is found, executes that line.
 b) If not, generates an error.

&ON

1) Duplicates step 1 from the normal ON command.

2) Duplicates step 2 from the normal ON command.

3) Enters a loop to find the correct statement to execute.
 a) Decrements the calculation made in step 1.
 b) If at zero, goes to step 4.
 c) Skips to the next line number/label. If at the end of the &ON command, executes the next statement.
 d) Loops back to step a.

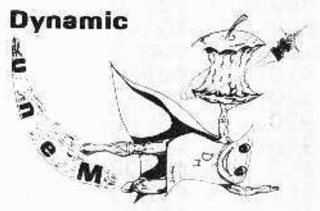
4) If the branch is to a line number, lets Applesoft handle it. Otherwise goes to the proper ampersand routine.

The GOTO Label ampersand commands nearly duplicate the corresponding Applesoft commands, except that instead of searching for a line number, the routines search for a label. After directing the pointer to the number of the line in which the label was found, the process switches to the appropriate Applesoft routine.

GOTO Label will make your programs more user-friendly. Instead of having to remember that a particular routine started at line 10500, you can simply GOTO the name of that routine. This is especially useful when dealing with programs of epic length, which may contain enough routines to bewilder the most organized user. Program documentation will obviously become a less-tedious chore.

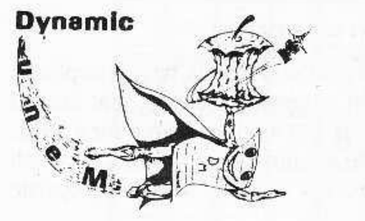
Program
Replace

```

           *--------------------------------
           * SUBROUTINES USED
           *--------------------------------

D43C-      RESTART   .EQ $D43C   ENTER APPLESOFT
D64B-      SCRATCH   .EQ $D64B   EXECUTE A NEW COMMAND
D9A3-      DATAN     .EQ $D9A3   MOVE ONTO NEXT STATEMENT
D9A6-      REMN      .EQ $D9A6   GOTO NEXT LINE
D4F2-      RELOCATE  .EQ $D4F2   REBUILD POINTERS SUBROUTINE
ED24-      LINPRT    .EQ $ED24   PRINT THE LINE NUMBER
D998-      ADDTXTPTR .EQ $D998   ADD Y-REG TO TXTPTR ($B8,$B9)
FDED-      COUT      .EQ $FDED   PRINT THE A-REG IN ASCII
FD8E-      CROUT     .EQ $FD8E   GENERATES A RETURN


           INIT
0803- A9 5B          LDA #END.PROGRAM RESET BASIC PROGRAM POINTERS
0805- 85 67          STA AP.START
0807- A9 0B          LDA /END.PROGRAM
0809- 85 68          STA AP.START+1
080B- 20 4B D6       JSR SCRATCH  EXECUTE THE NEW STATEMENT
080E- A9 4C          LDA #$4C     THE JUMP COMMAND
0810- 8D F5 03       STA AMPER.VECTOR
0813- A9 20          LDA #START
0815- 8D F6 03       STA AMPER.VECTOR+1
0818- A9 08          LDA /START
081A- 8D F7 03       STA AMPER.VECTOR+2
081D- 4C 3C D4       JMP RESTART  AND ENTER APPLESOFT

           START
0820- A5 67          LDA AP.START INITIALIZE THE PROGRAM
0822- 85 B8          STA CURRENT.LOC
0824- A5 68          LDA AP.START+1
0826- 85 B9          STA CURRENT.LOC+1
0828- A5 AF          LDA AP.END   POINT END OF PROGRAM POINTER TO
           *                      BYTE FOLLOWING LAST LINE
082A- E9 03          SBC #$03
082C- 85 AF          STA AP.END
082E- B0 02          BCS LOOP
0830- C6 AF          DEC AP.END

           LOOP
0832- 20 DA 09       JSR SKIP.TWO.BYTES
0835- A5 B8          LDA CURRENT.LOC SAVE CURRENT LINE FOR ERRORS
0837- 85 75          STA CURLIN
0839- A5 B9          LDA CURRENT.LOC+1
083B- 85 76          STA CURLIN+1
```



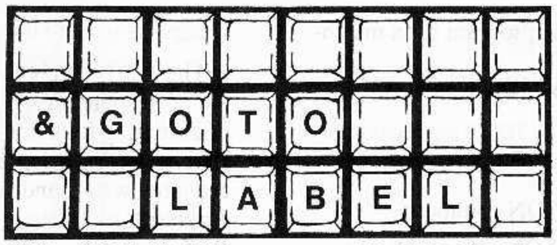
Checksums

410	-	$4467
420	-	$FB58
430	-	$E874
440	-	$B454
450	-	$1CF1
460	-	$A56E
470	-	$4E29
480	-	$7192
490	-	$336E
500	-	$9BE4
510	-	$5A5B
520	-	$8331
530	-	$A80F
540	-	$4FA5
550	-	$AB74
560	-	$88CD
570	-	$B69F
580	-	$F7A0
590	-	$BBD2
600	-	$95B4
610	-	$F387
620	-	$0404
630	-	$5B10
640	-	$3F8C
650	-	$F5B9
660	-	$3351
670	-	$D1B3
680	-	$492A
690	-	$C15C
700	-	$26F9
710	-	$830E
720	-	$D980
730	-	$97BF
740	-	$DCD4
750	-	$6B74
760	-	$AB78
770	-	$2F46
780	-	$3219
790	-	$9E2F
800	-	$6CD7



Checksums

810	- $90F5
820	- $1FEC
830	- $A13A
840	- $9A45
850	- $5E95
860	- $8207
870	- $94D2
880	- $232C
890	- $0307
900	- $00E5
910	- $050B
920	- $9E5A
930	- $F0BF
940	- $D84A
950	- $B19F
960	- $67F9
970	- $B4BA
980	- $4E7B
990	- $52AD
1000	- $9C3E
1010	- $5BD7
1020	- $16C5
1030	- $C116
1040	- $BE1C
1050	- $46FF
1060	- $ED41
1070	- $7115
1080	- $57D5
1090	- $A2C7
1100	- $1906
1110	- $8E06
1120	- $C2C4
1130	- $8A98
1140	- $C17E
1150	- $6088
1160	- $7BF6
1170	- $1C86
1180	- $31F4
1190	- $FE3E
1200	- $3092
1210	- $86C9
1220	- $06F1
1230	- $0726
1240	- $BEE5
1250	- $24A9
1260	- $B10F
1270	- $EC5E
1280	- $68D1
1290	- $0DB3
1300	- $E8FA
1310	- $0B92
1320	- $D631
1330	- $D8B7
1340	- $8A9F
1350	- $BD4D
1360	- $27A4
1370	- $5C11
1380	- $46C0
1390	- $AD38
1400	- $551B



```
083D- 20 DA 09 1960          JSR SKIP.TWO.BYTES
0840- 20 E7 09 1970          JSR CHECK.END
0843- B0 03    1980          BCS LOOP.2
0845- 4C BF 09 1990          JMP THE.END
0848- A0 00    2000 LOOP.2   LDY #$00
               2010 LOOP.3
084A- B1 B8    2020          LDA (CURRENT.LOC),Y
084C- C9 AF    2030          CMP #AMPER
084E- F0 24    2040          BEQ AMPER.FOUND
0850- C9 AD    2050          CMP #IF      IS IT AN IF THEN STATEMENT
0852- D0 11    2060          BNE LOOP.1
               2070 LOOP.4
0854- C8       2080          INY
0855- B1 B8    2090          LDA (CURRENT.LOC),Y
0857- F0 0C    2100          BEQ LOOP.1
0859- C9 C4    2110          CMP #THEN    LOOK FOR A "THEN"
085B- D0 F7    2120          BNE LOOP.4
               2130 LOOP.5
085D- C8       2140          INY          IS THE NEXT COMMAND AN "&"
085E- 20 98 D9 2150          JSR ADDTXTPTR
0861- A0 00    2160          LDY #$00
0863- F0 E5    2170          BEQ LOOP.3   ...ALWAYS
               2180 LOOP.1
0865- 20 A3 D9 2190          JSR DATAN    GO TO NEXT LINE
0868- B1 B8    2200          LDA (CURRENT.LOC),Y
086A- 08       2210          PHP          SAVE STATUS (AT END OF A LINE?)
086B- C8       2220          INY
086C- 20 98 D9 2230          JSR ADDTXTPTR
086F- 28       2240          PLP
0870- D0 D6    2250          BNE LOOP.2
0872- F0 BE    2260          BEQ LOOP
               2270 AMPER.FOUND
0874- C8       2280          INY
0875- B1 B8    2290          LDA (CURRENT.LOC),Y
0877- C9 B0    2300          CMP #GOSUB
0879- F0 08    2310          BEQ REPLACE
087B- C9 AB    2320          CMP #GOTO
087D- F0 04    2330          BEQ REPLACE
087F- C9 B4    2340          CMP #ON
0881- D0 E2    2350          BNE LOOP.1
               2360
               2370 REPLACE
0883- 88       2380          DEY
0884- 8C 58 0B 2390          STY TEMP.OFFSET
0887- A0 01    2400          LDY #$1      MOVE CODE AFTER & TILL SECOND QUOTE
0889- A2 02    2410          LDX #$02
088B- B1 B8    2420 .1       LDA (CURRENT.LOC),Y GET A CHARACTER
088D- C9 22    2430          CMP #'"      FOUND QUOTE
088F- F0 07    2440          BEQ .3
               2450 .2
0891- 88       2460          DEY
0892- 91 B8    2470          STA (CURRENT.LOC),Y
0894- C8       2480          INY
0895- C8       2490          INY
0896- D0 F3    2500          BNE .1       ALWAYS
               2510 .3
0898- CA       2520          DEX          ON SECOUND QUOTE
0899- D0 F6    2530          BNE .2
089B- 88       2540          DEY          REPLACE LAST LETTER WITH A SPACE
089C- A9 20    2550          LDA #SPACE
089E- 91 B8    2560          STA (CURRENT.LOC),Y
08A0- AC 58 0B 2570          LDY TEMP.OFFSET
08A3- 20 F1 09 2580          JSR SCAN.TO.QUOTE LOOK FOR A QUOTE
08A6- 90 12    2590          BCC REPLACE.2
08A8- 20 A3 D9 2600          JSR DATAN    GOTO THE END OF THE LINE
               2610
               2620 NEXT.LINE
08AB- A0 00    2630          LDY #$00
```

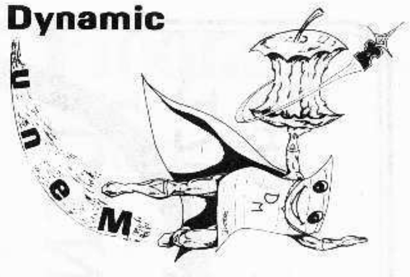
Program

Replace

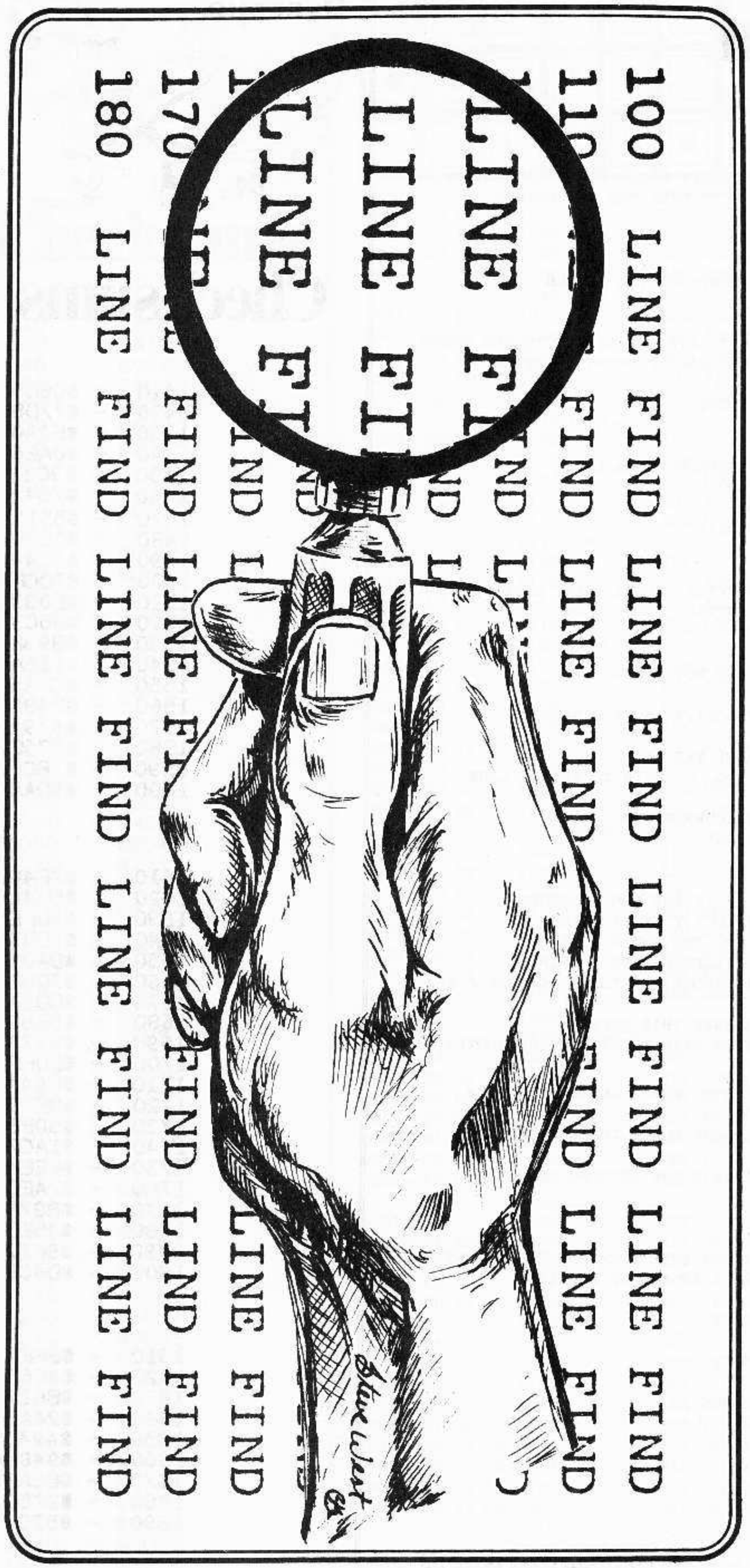
```
08AD- B1 B8    2640          LDA (CURRENT.LOC),Y CHECK FOR A COMMA (ON)
08AF- C8       2650          INY          SKIP OVER THE EOL MARKER
08B0- C9 2C    2660          CMP #COMMA
08B2- F0 06    2670          BEQ REPLACE.2
08B4- 20 98 D9 2680          JSR ADDTXTPTR
08B7- 4C 32 08 2690          JMP LOOP     CONTINUE THE SEARCH
               2710
               2720 REPLACE.2
08BA- 8C 58 0B 2730          STY TEMP.OFFSET SAVE THE OFFSET TO THE QUOTE
08BD- A5 B8    2740          LDA CURRENT.LOC SAVE CURRENT LOCATION
08BF- 85 77    2750          STA TEMP
08C1- A5 B9    2760          LDA CURRENT.LOC+1
08C3- 85 78    2770          STA TEMP+1
               2780
08C5- A5 67    2790          LDA AP.START SEARCH FOR A LABEL
08C7- 85 B8    2800          STA CURRENT.LOC
08C9- A5 68    2810          LDA AP.START+1
08CB- 85 B9    2820          STA CURRENT.LOC+1
               2840
               2850 SEARCH.LABEL
08CD- 20 DA 09 2860          JSR SKIP.TWO.BYTES IGNORE  NEXT LINE POINTER
08D0- 20 DA 09 2870          JSR SKIP.TWO.BYTES
08D3- 20 E7 09 2880          JSR CHECK.END
08D6- B0 03    2890          BCS .1
08D8- 4C E5 0A 2900          JMP LINE.NUMBER.NOT.FOUND
08DB- A0 00    2910 .1       LDY #$00
08DD- B1 B8    2920          LDA (CURRENT.LOC),Y IS IT A REM???
08DF- C9 B2    2930          CMP #REM
08E1- F0 0A    2940          BEQ FOUND.LABEL YES!!!
08E3- 20 A6 D9 2950          JSR REMN     NO, SO SKIP TO END OF LINE
08E6- C8       2960          INY
08E7- 20 98 D9 2970          JSR ADDTXTPTR CURRENT.LOC
08EA- 4C CD 08 2980          JMP SEARCH.LABEL
               3000
               3010 FOUND.LABEL
08ED- C8       3020 .2       INY          SKIP THE REM STATEMENT
08EE- B1 B8    3030          LDA (CURRENT.LOC),Y GET A VALUE
08F0- D0 03    3040          BNE .1       AT THE END SO SKIP IT
08F2- 4C 29 09 3050          JMP NO.MATCH ILLEGAL LABEL, SKIP IT
08F5- C9 21    3060 .1       CMP #SPACE+1 IGNORE EVERTHING =< THAN A SPACE
08F7- 90 F4    3070          BCC .2
08F9- 8C 57 0B 3080          STY OFFSET.2 SAVE THIS OFFSET
08FC- AC 58 0B 3090          LDY TEMP.OFFSET SKIP TO WITHIN THE QUOTES
08FF- C8       3100 .3       INY
0900- B1 77    3110          LDA (TEMP),Y FIND FIRST LEGAL CHARACTER
0902- F0 25    3120          BEQ NO.MATCH
0904- C9 21    3130          CMP #SPACE+1 LOOK FOR A LEGAL LABEL
0906- 90 F7    3140          BCC .3
0908- 8C 56 0B 3150          STY OFFSET.1 SAVE THE SECOUND OFFSET
               3160
               3170 CHECK.LABELS
090B- AC 56 0B 3180 .1       LDY OFFSET.1
090E- B1 77    3190          LDA (TEMP),Y GET BYTE FROM THE "TO" LOCATION
0910- F0 36    3200          BEQ FINAL.CHECK AT END OF LABEL?
0912- C9 22    3210          CMP #'"'
0914- F0 32    3220          BEQ FINAL.CHECK
0916- C9 20    3230          CMP #SPACE
0918- 90 2E    3240          BCC FINAL.CHECK
091A- AC 57 0B 3250          LDY OFFSET.2
091D- D1 B8    3260          CMP (CURRENT.LOC),Y
091F- D0 08    3270          BNE NO.MATCH
0921- EE 56 0B 3280          INC OFFSET.1
0924- EE 57 0B 3290          INC OFFSET.2
0927- D0 E2    3300          BNE .1
               3320
               3330 NO.MATCH
0929- C9 20    3340          CMP #SPACE
092B- D0 11    3350          BNE .1
```

continued on page 35

Dynamic Menu Checksums



1410	-	$C8D9
1420	-	$77D8
1430	-	$E2A0
1440	-	$0AE6
1450	-	$3C33
1460	-	$7544
1470	-	$5515
1480	-	$053D
1490	-	$3C44
1500	-	$7DCF
1510	-	$E033
1520	-	$86C3
1530	-	$B93F
1540	-	$116A
1550	-	$CF45
1560	-	$F49A
1570	-	$679A
1580	-	$C75E
1590	-	$7BCF
1600	-	$9DAA
1610	-	$7F4C
1620	-	$5B4A
1630	-	$ADFE
1640	-	$3DB3
1650	-	$DA05
1660	-	$708C
1670	-	$DD8A
1680	-	$5E82
1690	-	$697A
1700	-	$E0FF
1710	-	$064A
1720	-	$0F79
1730	-	$50FB
1740	-	$1AC7
1750	-	$EEE4
1760	-	$7AED
1770	-	$B878
1780	-	$35E5
1790	-	$9C77
1800	-	$D4CB
1810	-	$BFE7
1820	-	$4C65
1830	-	$B637
1840	-	$24A6
1850	-	$494F
1860	-	$9487
1870	-	$BCAF
1880	-	$2C50
1890	-	$57C4


100 LINE FIND LINE FIND LINE FIND LINE FIND
110 LINE FIND LINE FIND LINE FIND LINE FIND
LINE FIND LINE FIND
LINE FIND LINE FIND
LINE FIND LINE FIND
170 LINE FIND LINE FIND LINE FIND LINE FIND
180 LINE FIND LINE FIND LINE FIND LINE FIND

By Robb Canfield

Have you ever deleted what you thought was a useless line from your longest program and soon after witnessed the crash of the century? Maybe you were convinced the line was spare baggage, then found that other lines in the program needed to access that line.

Line Find was designed to prevent this problem before a critical line is deleted.

It is an ampersand routine which will reveal whether a particular line number is called by other lines in the program. If the answer is affirmative, Line Find lists which lines would be affected if the line in question were no longer present. If no dependent lines are found, the questionable line can be deleted. Otherwise, the modification should not be made.

Using Line Find

To place Line Find in memory, first type in the program listing. When finished, save Line Find with

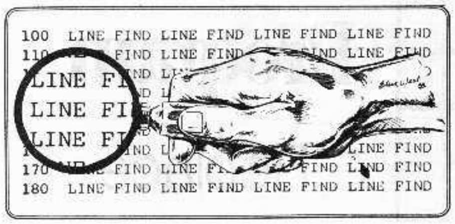
BSAVE LINE FIND A$290,L$132

While Line Find is in memory, load the Applesoft program to be examined. When you find a line to delete, or just a line to which you have forgotten the calls, activate Line Find with the command

&L LINE NUMBER

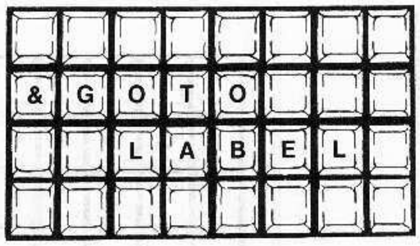
Line Find will search through your program and display in a column the numbers of all lines which use the chosen line number as a point of reference. To see any line, list the desired line number. If there are no calls to the chosen line, "NONE" will be printed.

The Line Find program will leave certain other ampersand features active in memory. For example, Line Find can be in memory at the same time as your favorite renumber program. This will allow you the advantage of using the programs simultaneously.


100 LINE FIND LINE FIND LINE FIND LINE FIND
LINE FI
LINE FI
LINE FI
180 LINE FIND LINE FIND LINE FIND LINE FIND

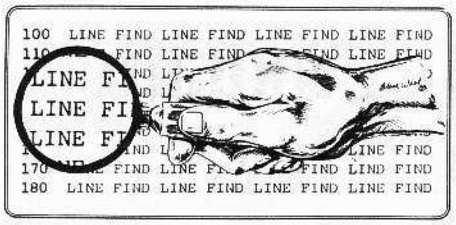
Program

```
1000          .OR $29D
1010
1020
1030          .TF LINE FIND
1040          LDY #0
1050 NXCHAR   LDA STMESS,Y
1060          BMI PRIT
1070          JMP INIT.LINE.SEARCH
1080 PRIT     JSR COUT1
1090          INY
1100          BNE NXCHAR
1110 STMESS   .HS 8D8D
1120          .AS -"LINE FIND INSTALLED."
1130          .HS 8D
1140          .AT -"USE &L 'LINENUM' <RET> "
1150 *--------------------------------
1160 *  FINDS A LINE NUMBER IN AN
1170 * APPLESOFT PROGRAM. USES THE
1180 * AMPERSAND COMMAND WITH AN
1190 * "L" PARAMETER.
1200 *--------------------------------
1210
1220 *--------------------------------
1230 * ZERO PAGE EQUATES
1240 *--------------------------------
1250 TXTPTR   .EQ $B8,B9
1260 LOWTR    .EQ $9B,9C
1270 CURLIN   .EQ $78,79
1280 AP.START .EQ $67,68
1290 NEXT.OFFSET .EQ $76,77
1300 ADDON    .EQ $D998     ADD Y TO TXTPTR
1310 *--------------------------------
1320 * TOKENS BEING USED
1330 *--------------------------------
1340 GOTO     .EQ $AB
1350 GOSUB    .EQ $B0
1360 THEN     .EQ $C4
1370 EOL      .EQ $3A
1380 SPACE    .EQ $20
1390
1400
1410 *--------------------------------
1420 * APPLESOFT ROUTINES USED
1430 *--------------------------------
1440 CHRGET   .EQ $B7
1450 WARM.BASIC .EQ $D43C
1460 REMN     .EQ $D9A6
1470 DATAN    .EQ $D9A3
1480 LINPRT   .EQ $ED24
1490 SYNERR   .EQ $DEC9
1500
1510
1520 *--------------------------------
1530 * MONITOR ROUTINES
1540 *--------------------------------
1550 CROUT    .EQ $FD8E
1560 AMPER    .EQ $3F5
1570 COUT1    .EQ $FDF0
1580 INIT.LINE.SEARCH
```

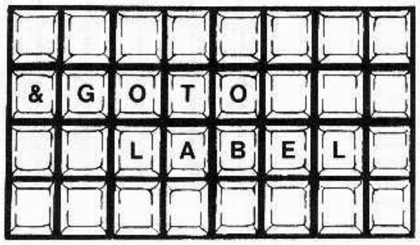


Program Replace

```
092D- B1 B8    3360 .2        LDA (CURRENT.LOC),Y
092F- F0 17    3370           BEQ FINAL.CHECK
0931- C9 20    3380           CMP #SPACE
0933- 90 13    3390           BCC FINAL.CHECK
0935- D0 03    3400           BNE .3
0937- C8       3410           INY
0938- D0 F3    3420           BNE .2         ...ALWAYS
093A- C9 22    3430 .3        CMP #'"
093C- F0 0A    3440           BEQ FINAL.CHECK
093E- 20 A6 D9 3450 .1        JSR REMN       POINT TO THE END OF THE LINE
0941- C8       3460           INY            PT TO FIRST BYTE OF NEXT LINE
0942- 20 98 D9 3470           JSR ADDTXTPTR
0945- 4C CD 08 3480           JMP SEARCH.LAB KEEP LOOKING FOR PROPER LAB
               3490
               3510
               3520 FINAL.CHECK
0948- AC 57 0B 3530           LDY OFFSET.2 MAKE SURE THE LABEL HAS ENDED
094B- B1 B8    3540 .0        LDA (CURRENT.LOC),Y
094D- F0 0F    3550           BEQ MATCH
094F- C9 22    3560           CMP #'"'
0951- F0 0B    3570           BEQ MATCH
0953- C9 20    3580           CMP #SPACE
0955- 90 07    3590           BCC MATCH
0957- F0 02    3600           BEQ .1
0959- B0 CE    3610           BCS NO.MATCH NO MATCH, SOCONTINUE SEARCH
095B- C8       3620 .1        INY
095C- D0 ED    3630           BNE .0         ...ALWAYS
               3640
               3650 MATCH
095E- 20 A6 D9 3660           JSR REMN       GO TO THE END OF THE LINE
0961- C8       3670           INY            AND ONE MORE
0962- 20 98 D9 3680           JSR ADDTXTPTR
0965- 20 DA 09 3690           JSR SKIP.TWO.BYTES SKIP THE LINE OFFSET
0968- 20 E7 09 3700           JSR CHECK.END
096B- B0 03    3710           BCS .1
096D- 4C 01 0B 3720           JMP NO.LINE.AFTER.REM
0970- A0 02    3730 .1        LDY #$2        MAKE SURE THIS IS NOT A REM
0972- B1 B8    3740           LDA (CURRENT.LOC),Y
0974- C9 B2    3750           CMP #REM       A REM?
0976- F0 E6    3760           BEQ MATCH      YES SO GOTO NEXT LINE
0978- A0 00    3770           LDY #$0        GET THE LINE NUMBER
097A- B1 B8    3780           LDA (CURRENT.LOC),Y
097C- 8D 53 0B 3790           STA LINE.NUMBER
097F- C8       3800           INY
0980- B1 B8    3810           LDA (CURRENT.LOC),Y
0982- 8D 54 0B 3820           STA LINE.NUMBER+1
0985- 20 91 0A 3830           JSR HEX.ASCII
0988- A5 77    3840           LDA TEMP       MOVE LINE TO CHGE TO CUR LOC
098A- 85 B8    3850           STA CURRENT.LOC
098C- A5 78    3860           LDA TEMP+1
098E- 85 B9    3870           STA CURRENT.LOC+1
               3880
0990- A0 FF    3890           LDY #$FF       SCAN FOR A QUOTE
0992- 20 F1 09 3900           JSR SCAN.TO.QUOTE
               3910
               3920 .3
               3930 *         LDA #$20       WRITE OVER 1ST QUOTE W SPACE
               3940 *         STA (CURRENT.LOC),Y
0995- AE 50 02 3950           LDX LENGTH     LENGTH OF NUM TO SUB FOR LAB
0998- BD 51 02 3960 .4        LDA BUFFER,X GET THE VALUE
099B- 91 B8    3970           STA (CURRENT.LOC),Y AND SAVE IT
099D- CA       3980           DEX
099E- F0 15    3990           BEQ DONE
09A0- C8       4000           INY
09A1- B1 B8    4010           LDA (CURRENT.LOC),Y DO WE NEED MORE ROOM?
09A3- F0 04    4020           BEQ .5
09A5- C9 22    4030           CMP #'"'
```


100 LINE FIND LINE FIND LINE FIND LINE FIND
LINE FI
LINE FI
LINE FI
170 FIND LINE FIND LIND FIND
180 LINE FIND LINE FIND LINE FIND LINE FIND

```
                LDA AMPER+1
                STA OLD.AMPER+1
                LDA AMPER+2
                STA OLD.AMPER+2
                LDA #LINE.SEARCH
                STA AMPER+1
                LDA /LINE.SEARCH
                STA AMPER+2
                RTS


OLD.AMPER
                JMP $FFFF
PRMESS          LDY #TBLLEN
NEXT            LDA TXTTBLE-1,Y
                JSR COUT1
                DEY
                BNE NEXT
                BEQ WARM
TXTTBLE         .AS -"
ENON"


LINE.SEARCH
        CMP #'L        IS IT A PROPER COMMAND
        BNE OLD.AMPER
INIT.SEARCH
        LDX TXTPTR     TRANSFER TXTPTR TO LOWTR
        INX
        STX LOWTR      LOWTR IS LOC IN PAGE
        LDA TXTPTR+1 TWO THAT THE LINE NUMBER
        STA LOWTR+1  IS STORED AT.
        LDA AP.START
        STA NEXT.OFFSET NEXT.OFFSET IS LOC
        LDA AP.START+1 IN MEMORY WHERE THE WE
        STA NEXT.OFFSET+1 READING FROM PROG


SEARCH.LINE
        LDA NEXT.OFFSET
        STA TXTPTR
        LDA NEXT.OFFSET+1
        STA TXTPTR+1
        LDY #$03       MV INFO FR LINE TO BUFFERS
.1      LDA (TXTPTR),Y
        STA NEXT.OFFSET,Y
        DEY
        BPL .1
        ORA NEXT.OFFSET+1 AT END OF PROGRAM?
        BNE WHAT
        LDA $FF
        BEQ PRMESS
.2      LDA #0
        STA $FF

        PLA            PULL OFF RETURN ADDRESS
        PLA
WARM    JMP WARM.BASIC RETURN TO BASIC


WHAT
        LDY #$3
SEARCH.LINE.2
        INY
        LDA (TXTPTR),Y
        BEQ END.LINE
        CMP #'"        IF A QUOTE THEN SKIP TO END
        BNE .1
```



Program Replace

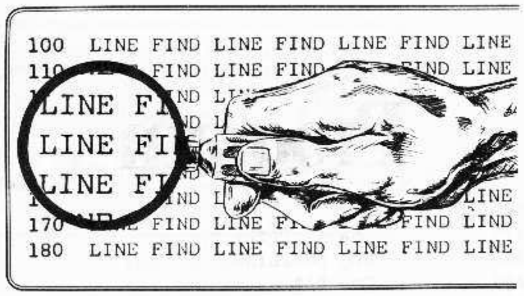
```
09A7- D0 EF                   BNE .4          NO, JUST CONT REPLACMENT

                    .5
09A9- 20 98 D9                JSR ADDTXTPTR SET UP FOR THE MOVE
09AC- 8A                      TXA             TRANSFER X TO Y
09AD- A8                      TAY             INSERT Y BYTES INTO CODE
09AE- 20 51 0A                JSR INSERT.Y.BYTES
09B1- A0 00                   LDY #$00
09B3- F0 E3                   BEQ .4          ...ALWAYS


                    DONE
09B5- C8                      INY             GO PAST THE LINE NUMBER
09B6- 20 98 D9                JSR ADDTXTPTR POINT B8 TO THIS SPOT
09B9- 20 02 0A                JSR DELETE.TO.EOL
09BC- 4C AB 08                JMP NEXT.LINE

                    *--------------------------------
                    *   UPDATE THE END OF THE PROGRAM
                    * POINTER (RELOCATE USES LOMEM AS
                    * THE END OF PROGRAM POINTER.
                    *--------------------------------

                    THE.END
09BF- A0 04                   LDY #$4         STORE ZEROS AT
                                                          END OF PROG
09C1- A9 00                   LDA #$00
09C3- 91 AF         .1        STA (AP.END),Y
09C5- 88                      DEY
09C6- 10 FB                   BPL .1
09C8- A5 B0                   LDA AP.END+1
09CA- 85 6A                   STA LOMEM+1
09CC- A5 AF                   LDA AP.END
09CE- 18                      CLC
09CF- 69 04                   ADC #$4
09D1- 85 69                   STA LOMEM
09D3- 90 02                   BCC .2
09D5- E6 6A                   INC LOMEM+1
09D7- 4C F2 D4      .2        JMP RELOCATE RESET
                                      LINE OFFSET POINTERS
                    *
                    * SKIP THE LINE OFFSET
                    *

                    SKIP.TWO.BYTES
09DA- E6 B8                   INC CURRENT.LOC
09DC- D0 02                   BNE .1
09DE- E6 B9                   INC CURRENT.LOC+1
09E0- E6 B8         .1        INC CURRENT.LOC
09E2- D0 02                   BNE .2
09E4- E6 B9                   INC CURRENT.LOC+1
09E6- 60            .2        RTS

                    *
                    * CHECK TO SEE IF PAST END
                    * CC IF PAST END.
                    *

                    CHECK.END
09E7- A5 AF                   LDA AP.END
09E9- 38                      SEC
09EA- E5 B8                   SBC CURRENT.LOC
09EC- A5 B0                   LDA AP.END+1
09EE- E5 B9                   SBC CURRENT.LOC+1
09F0- 60                      RTS

```

Program

```
                    4790 *--------------------------------
                    4800 *   LOOK FOR A QUOTE, THE CARRY
                    4810 * FLAG IS CLEARED IF ONE IS
                    4820 * FOUND, SET IF NOT.
                    4830 *--------------------------------
                    4850
                    4860 SCAN.TO.QUOTE
09F1- C8            4870 .1          INY            LOOK FOR A QUOTE MARK
09F2- B1 B8         4880             LDA (CURRENT.LOC),Y
09F4- F0 0A         4890             BEQ .2
09F6- C9 3A         4900             CMP #':'
09F8- F0 06         4910             BEQ .2
09FA- C9 22         4920             CMP #'"'
09FC- D0 F3         4930             BNE .1         CONTINUE THE SEARCH
09FE- 18            4940             CLC            NO ERROR
09FF- 60            4950             RTS
                    4960
0A00- 38            4970 .2          SEC            NO QUOTE
0A01- 60            4980             RTS
                    5020
                    5030 *--------------------------------
                    5040 *    ROUTINE TO DELETE BYTES
                    5050 *   FROM AN APPLESOFT PROGRAM
                    5060 *   ENTER WITH CURRENT.LOC
                    5070 *   CONTAINING THE TO LOCATION
                    5080 *   THE FROM LOCATION IS FOUND
                    5090 *   BY SCANNING TO THE END OF THE
                    5100 *   APPLESOFT LINE.
                    5110 *--------------------------------
                    5130
                    5140 DELETE.TO.EOL
0A02- A0 FF         5150             LDY #$FF       FIND END OF STNT (: OR 00)
0A04- C8            5160 .1          INY
0A05- B1 B8         5170             LDA (CURRENT.LOC),Y
0A07- F0 09         5180             BEQ DELETE.Y.BYTES
0A09- C9 3A         5190             CMP #':'
0A0B- F0 05         5200             BEQ DELETE.Y.BYTES
0A0D- C9 22         5210             CMP #'"'
0A0F- D0 F3         5220             BNE .1
0A11- C8            5230             INY
                    5240
                    5250 DELETE.Y.BYTES
0A12- 8C 55 0B      5260             STY NUM.BYTES
0A15- A2 03         5270             LDX #$3        COUNTER FOR ZEROS
0A17- A5 B8         5280             LDA CURRENT.LOC GET TO LOCATION
0A19- 8D 28 0A      5290             STA GET1+1
0A1C- 8D 2B 0A      5300             STA PUT1+1
0A1F- A5 B9         5310             LDA CURRENT.LOC+1
0A21- 8D 29 0A      5320             STA GET1+2
0A24- 8D 2C 0A      5330             STA PUT1+2
                    5340
                    5350 GET1
0A27- B9 FF FF      5360             LDA $FFFF,Y    GET A VALUE (OFFSET WITH
                                                                     Y-REG)
                    5370 PUT1
0A2A- 8D FF FF      5380             STA $FFFF
0A2D- D0 10         5390             BNE .1         NOT A ZERO SO DON'T COUNT
0A2F- CA            5400             DEX            COUNT THE ZERO
0A30- D0 0F         5410             BNE .11        NOT DONE, SO CONTINUE
0A32- 38            5420             SEC            UPDATE END OF PR POINTER
0A33- A5 AF         5430             LDA AP.END
0A35- ED 55 0B      5440             SBC NUM.BYTES
0A38- 85 AF         5450             STA AP.END
0A3A- B0 02         5460             BCS .2         NO BORROW
0A3C- C6 B0         5470             DEC AP.END+1
0A3E- 60            5480 .2          RTS            RETURN TO CALLER
                    5490
0A3F- A2 03         5500 .1          LDX #$3        RESET COUNTER
0A41- EE 28 0A      5510 .11         INC GET1+1     DO NOT RESET THE COUNTER
0A44- EE 2B 0A      5520             INC PUT1+1
0A47- D0 DE         5530             BNE GET1
0A49- EE 29 0A      5540             INC GET1+2
```

Program

```
2260 .0        INY
2270           LDA (TXTPTR),Y
2280           BEQ END.LINE
2290           CMP #'"'
2300           BNE .0
2310           INY
2320           LDA (TXTPTR),Y
2330 .1        CMP #GOTO
2340           BEQ SEARCH
2350           CMP #GOSUB
2360           BEQ SEARCH
2370           CMP #THEN
2380           BNE SEARCH.LINE.2
2390
2400 SEARCH
2410           INY
2420           LDA (TXTPTR),Y
2430           CMP #'"
2440
2450 HERE      BEQ SKIP.QUOTE
2460 .21       JSR ADDON
2470           LDY #$FF
2480 .4
2490           INY
2500           LDA (TXTPTR),Y NUMBER FOUND
2510           BEQ .41
2520           CMP #GOTO
2530           BEQ FIXBUG
2540           CMP #GOSUB
2550           BEQ FIXBUG
2560           CMP (LOWTR),Y
2570           BEQ .4
2580           CMP #EOL
2590           BEQ .41
2600           CMP #',      ON A ON STATEMENT?
2610           BNE NO.MATCH NO, SO THERE IS NO MATCH
2620
2630 .41
2640           LDA (LOWTR),Y
2650           BNE NO.MATCH
2660
2670
2680 MATCH
2690           LDX CURLIN
2700           LDA CURLIN+1
2710           JSR LINPRT
2720           LDA #1
2730           STA $FF
2740           JSR CROUT
2750 END.LINE
2760           JSR REMN     MOVE TO END OF  LINE
2770           JMP SEARCH.LINE
2780
2790 NO.MATCH
2800           LDA (TXTPTR),Y
2810           CMP #',      ARE WE IN A ON STATEMENT
2820           BEQ SEARCH   YES SO CONTINUE  SEARCH
2830           CMP #'0      IS IT A DIGIT
2840           BCC .1
2850           CMP #$3A     PAST DIGITS
2860           BCS .1
2870           INY          LOOK FOR A COMMA
2880           BNE NO.MATCH
2890 .1
2900           JSR DATAN    GOTO NEXT STATEMENT
2910           CMP #$00     AT END OF LINE? OR STMENT
2920           BNE JMPTOSEA
2930           JMP SEARCH.LINE
2940 JMPTOSEA JMP SEARCH.LINE.2+1
2950
```

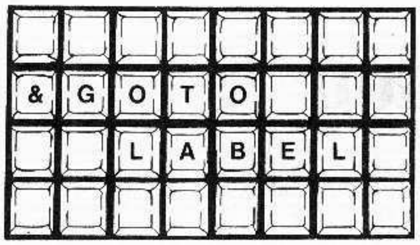

100 LINE FIND LINE FIND LINE FIND LINE
LINE FI
LINE FI
LINE FI
180 LINE FIND LINE FIND LINE FIND LINE

Program

```
2960
2970
2980 SKIP.QUOTE
2990           INY          POINT TO END OF QUOTE
3000           LDA (TXTPTR),Y
3010           BEQ NO.MATCH
3020           CMP #'"
3030           BNE SKIP.QUOTE
3040           INY          POINT TO AFTER QUOTE
3050           BNE NO.MATCH ...ALWAYS
3060
3070 TBLLEN    .EQ $05
3080 FIXBUG    INY
3090           BNE HERE
```

Checksums

```
029D- A0 00 B9                  $5BA1
02A0- AD 02 30 03 4C DE 02 20   $31AD
02A8- F0 FD C8 D0 F2 8D 8D CC   $14FE
02B0- C9 CE C5 A0 C6 C9 CE C4   $F5DB
02B8- A0 C9 CE D3 D4 C1 CC CC   $014E
02C0- C5 C4 AE 8D D5 D3 C5 A0   $C24A
02C8- A6 CC A0 A7 CC C9 CE C5   $C781
02D0- CE D5 CD A7 A0 BC D2 C5   $EE91
02D8- D4 D5 D2 CE BE 20 AD F6   $2BAE
02E0- 03 8D F6 02 AD F7 03 8D   $C3FD

02E8- F7 02 A9 0A 8D F6 03 A9   $64E4
02F0- 03 8D F7 03 60 4C FF FF   $04D1
02F8- A0 05 B9 04 03 20 F0 FD   $C7D5
0300- 88 D0 F7 F0 3A 8D C5 CE   $8020
0308- CF CE C9 4C D0 E7 A6 B8   $AFA2
0310- E8 86 9B A5 B9 85 9C A5   $074F
0318- 67 85 76 A5 68 85 77 A5   $5E07
0320- 76 85 B8 A5 77 85 B9 A0   $3D81
0328- 03 B1 B8 99 76 00 B8 10   $1FAE
0330- F8 05 77 D0 0D A5 FF F0   $E92F

0338- BF A9 00 85 FF 68 68 4C   $A54D
0340- 3C D4 A0 03 C8 B1 B8 F0   $8170
0348- 53 C9 22 D0 0C C8 B1 B8   $B444
0350- F0 4A C9 22 D0 F7 C8 B1   $586C
0358- B8 C9 AB F0 08 C9 B0 F0   $3BB3
0360- 04 C9 C4 D0 DF C8 B1 B8   $A36D
0368- C9 22 F0 54 20 98 D9 A0   $55CA
0370- FF C8 B1 B8 F0 14 C9 AB   $5DA8
0378- F0 52 C9 B0 F0 4E D1 9B   $7253
0380- F0 EF C9 3A F0 04 C9 2C   $35B7

0388- D0 18 B1 9B D0 14 A6 78   $E7B7
0390- A5 79 20 24 ED A9 01 85   $64A2
0398- FF 20 8E FD 20 A6 D9 4C   $6FA3
03A0- 1F 03 B1 B8 C9 2C F0 BD   $5AFD
03A8- C9 30 90 07 C9 3A B0 03   $8AFE
03B0- C8 D0 EF 20 A3 D9 C9 00   $D5A7
03B8- D0 03 4C 1F 03 4C 45 03   $D754
03C0- C8 B1 B8 F0 DD C9 22 D0   $E087
03C8- F7 C8 D0 D6 C8 D0 9B 39   $030A
```



Program

Replace

```
0A4C- EE 2C 0A 5550             INC PUT1+2
0A4F- D0 D6    5560             BNE GET1      ...ALWAYS
               5570
               5590 *--------------------------------
               5600 *  MAKE MORE ROOM FOR A LINE.
               5610 * MOVE BYTES FROM CURRENT.LOC
               5620 * TO CURRENT.LOC+Y, TO MAKE
               5630 * ROOM FOR MORE INFO.
               5640 *--------------------------------
               5670
               5680 INSERT.Y.BYTES
0A51- A5 AF    5690             LDA AP.END
0A53- 8D 62 0A 5700             STA GET2+1
0A56- 8D 65 0A 5710             STA PUT2+1
0A59- A5 B0    5720             LDA AP.END+1
0A5B- 8D 63 0A 5730             STA GET2+2
0A5E- 8D 66 0A 5740             STA PUT2+2
               5750
               5760 GET2
0A61- AD FF FF 5770             LDA $FFFF     GET A BYTE
               5780 PUT2
0A64- 99 FF FF 5790             STA $FFFF,Y   AND SAVE IT
0A67- AD 62 0A 5800             LDA GET2+1
0A6A- D0 06    5810             BNE .1
0A6C- CE 63 0A 5820             DEC GET2+2
0A6F- CE 66 0A 5830             DEC PUT2+2
               5840 .1
0A72- CE 62 0A 5850             DEC GET2+1
0A75- CE 65 0A 5860             DEC PUT2+1
0A78- AD 62 0A 5870             LDA GET2+1    DONE?
0A7B- C5 B8    5880             CMP CURRENT.LOC
0A7D- B0 E2    5890             BCS GET2      NO, SO CONTINUE
0A7F- AD 63 0A 5900             LDA GET2+2    MAYBE!?
0A82- C5 B9    5910             CMP CURRENT.LOC+1
0A84- D0 DB    5920             BNE GET2      NO, SO CONTINUE
0A86- 98       5930             TYA           UPDATE END OF
0A87- 18       5940             CLC                PROGRAM COUNTER
0A88- 65 AF    5950             ADC AP.END
0A8A- 85 AF    5960             STA AP.END
0A8C- 90 02    5970             BCC .2
0A8E- E6 B0    5980             INC AP.END+1
0A90- 60       5990 .2          RTS           RETURN TO CALLER
               6030
               6040 *--------------------------------
               6050 *
               6060 *  CONVERSION OF A BINARY NUMBER
               6070 * TO DECIMAL ASCII.
               6080 * THE ASCII VALUE IS STORED IN
               6090 * A REVERSED ORDER
               6100 *
               6110 *--------------------------------
               6130
               6140 HEX.ASCII
0A91- A9 00    6150             LDA #$00
0A93- A8       6160             TAY
0A94- 8D 51 02 6170             STA BUFFER
0A97- 8D 50 02 6180             STA LENGTH
               6190
               6200 .1
0A9A- A9 00    6210             LDA #$00
0A9C- 8D 59 0B 6220             STA MOD10
0A9F- 8D 5A 0B 6230             STA MOD10+1
0AA2- A2 10    6240             LDX #16
0AA4- 18       6250             CLC
               6270 .2
```

Program Replace

```
0AA5- 2E 53 0B 6280          ROL LINE.NUMBER SHIFT TO DIVND BIT 0
0AA8- 2E 54 0B 6290          ROL LINE.NUMBER+1 WHICH QUOTIENT
0AAB- 2E 59 0B 6300          ROL MOD10     ALSO SHIFT DIVIDEND
0AAE- 2E 5A 0B 6310          ROL MOD10+1
               6320
               6330 *--------------------------------
               6340 * A,Y= DIVIDEND-DIVISOR
               6350 *--------------------------------
               6360
0AB1- 38       6370          SEC
0AB2- AD 59 0B 6380          LDA MOD10
0AB5- E9 0A    6390          SBC #10
0AB7- A8       6400          TAY            SAVE LOW BYTE IN Y
0AB8- AD 5A 0B 6410          LDA MOD10+1
0ABB- E9 00    6420          SBC #0         BRANCH IF DIVIDEND < DIVIS
0ABD- 90 06    6430          BCC .3         ELSE
0ABF- 8C 59 0B 6440          STY MOD10
0AC2- 8D 5A 0B 6450          STA MOD10+1
               6470 .3
0AC5- CA       6480          DEX
0AC6- D0 DD    6490          BNE .2
0AC8- 2E 53 0B 6500          ROL LINE.NUMBER SHIFT IN CARRY FOR QUOT
0ACB- 2E 54 0B 6510          ROL LINE.NUMBER+1
               6530 *
               6540 * CONCATENATE THE NEXT CHARACTER
               6550 *
0ACE- AD 59 0B 6570          LDA MOD10
0AD1- 09 30    6580          ORA #$30       CONV 0..9 TO ASCII '0'...'9'
0AD3- EE 50 02 6590          INC LENGTH     INCREASE THE LENGTH BY ONE
0AD6- AC 50 02 6600          LDY LENGTH
0AD9- 99 51 02 6610          STA BUFFER,Y SAVE THE ASCII LINE.NUMBER
               6630 *
               6640 * IF LINE.NUMBER <>0 THEN CONTINUE
0ADC- AD 53 0B 6670          LDA LINE.NUMBER
0ADF- 0D 54 0B 6680          ORA LINE.NUMBER+1
0AE2- D0 B6    6690          BNE .1         BRANCH IF LINE.NUM
               6700
0AE4- 60       6710          RTS            RETURN TO CALLING PROGRAM
               6750
               6760 *--------------------------------
               6770 * ERROR MESSAGES
               6780 *--------------------------------
               6810
               6820 LINE.NUMBER.NOT.FOUND
0AE5- A0 1A    6830          LDY #NO.LINE-NO.LABEL-1
0AE7- B9 0F 0B 6840 .1       LDA NO.LABEL,Y
0AEA- 20 ED FD 6850          JSR COUT
0AED- 88       6860          DEY
0AEE- 10 F7    6870          BPL .1
               6900 PRINT.LINE.NUMBER
0AF0- A0 00    6910          LDY #$00       GET LINE WITH ILL BRANCH
0AF2- B1 75    6920          LDA (CURLIN),Y LOW BYTE
0AF4- AA       6930          TAX
0AF5- C8       6940          INY
0AF6- B1 75    6950          LDA (CURLIN),Y HIGH BYTE
0AF8- 20 24 ED 6960          JSR LINPRT     PRINT THE OFFENDING LINE
0AFB- 20 8E FD 6970          JSR CROUT
0AFE- 4C BF 09 6980          JMP THE.END
               7010 NO.LINE.AFTER.REM
0B01- A0 28    7020          LDY #END.MSG-NO.LINE-1
0B03- B9 2A 0B 7030 .1       LDA NO.LINE,Y
0B06- 20 ED FD 7040          JSR COUT
0B09- 88       7050          DEY
0B0A- 10 F7    7060          BPL .1
0B0C- 4C F0 0A 7070          JMP PRINT.LINE.NUMBER
               7110
               7120 NO.LABEL
0B0F- A0 C5 CE
0B12- C9 CC A0
0B15- CE C9 A0
0B18- C4 CE D5
0B1B- CF C6 A0
```

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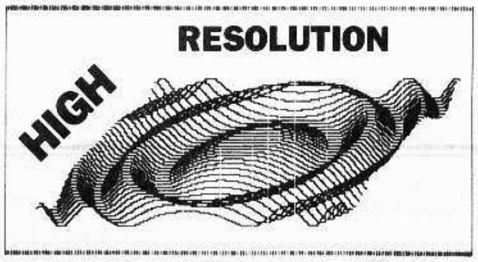


Scroll

```
2630           STA (PTR1),Y
2640           INY
2650           CPY #$28
2660           BNE RCLOOP2
2670           INX
2680 OP3       CPX #$C0
2690           BNE RCLOOP1
2700           RTS
2720 SAVETOP   LDX #0      SV TOP OR BOT 7 LNS
2730 STLOOP    LDA HIRESH,X ONTO PAGE2
2740           STA PTR1+1
2750           LDA HIRESL,X
2760           STA PTR1
2770           TXA
2780 CCARRY2   CLC
2790 ADD2      ADC #$B9
2800           TAX
2810           LDA HIRESH,X
2820           CLC
2830           ADC #$20
2840           STA PTR2+1
2850           LDA HIRESL,X
2860           STA PTR2
2870           TXA
2880 SCARRY2   SEC
2890 SUB2      SBC #$B9
2900           TAX
2910           LDY #0
2920 SLP2      LDA (PTR1),Y
2930           STA (PTR2),Y
2940           INY
2950           CPY #$28
2960           BNE SLP2
2970           INX
2980 OP4       CPX #7
2990           BNE STLOOP
3000           RTS
3020 SCRRGHT   LDA #0      SCROLL RIGHT
3030           STA OP6+1
3040           LDA #$C8    OPCODE FOR 'INY'
3050           STA INY1
3060           STA INY2
3070           STA INY3
3080           LDA #$28
3090           STA OP5+1
3100           LDA #$88    OPCODE FOR 'DEY'
3110           STA DEY
```

continued on page 46

QUICK COPY COPY COPY COPY COPY

By Robb Canfield

Apple II with 48K
At least one disk drive
Blank, initialized disk

Programmers need not be paralyzed by trepidation each time they use the disk containing the program they spent many weeks to compose or many dollars to buy. If you are among the countless Apple users who worry that valuable original program disks may be hopelessly mangled in day-to-day use, there is a solution to your dilemma.

Acquisition of a simple copy program will enable you to make backups easily and quickly, thus protecting your investment of hours or dollars. Most copy programs will not copy the so-called protected software. The copy program presented is no different, and can only copy disks in standard 3.3 format. But Quick Copy program will copy a disk faster and provide more information about the copy than COPYA.

To Enter the Program

1) Boot the 3.3 system master.
2) Clear the memory of any Applesoft programs.
FP
3) Type and save the BASIC listing, "Copy."
SAVE COPY
4) Enter the monitor.
CALL -151
5) Enter and save the hex dump for "Copy.Ø".
BSAVE COPY.O,A$1200, L$150
6) **Return to BASIC.**
3DØG

To use the program, **RUN COPY.**
"Copy" will load the machine code. This code handles all the reading and writing to the disk; BASIC is only used to handle errors. The default values for source and target drives will appear at the top of the screen. These may need to be changed for your particular system. The program will handle single drive users.

When the choices for the source and target drives have been entered, you will be prompted to enter those disks in the appropriate drives. Single drive users will be prompted to change disks occasionally (only three times if a RAM card is in operation).

As the copy is made, the screen will continuously display the command in operation and the track/sector being affected. The track and sector appear in hex code, while the command will appear as either R(ead) or W(rite.)

Error messages, if there are any, will appear below this display, followed by three choices:

C(ontinue) with the copy. This function will try to copy that sector again.

S(kip) the current sector and continue. This function will skip the bad sector and continue to copy the disk.

E(xit) the program. This will exit you from the copy mode.

Quick Copy consists of two parts. The first part is the controller and is written in BASIC. The second part is the actual routine that reads/writes to the disk, and is written in machine language.

The BASIC program first asks for the source and target drives. Then a call is made to the machine code to initialize all the variables (CALL 4608). This routine also checks for a RAM card and modifies the program if one is in use, allowing more tracks to be read at one time. Then a call is made to the routine that handles all the reading (CALL 4611). BASIC will prompt the user to change disks if necessary, and call the write routine (CALL 4614). This process continues until a copy of the disk is finished.

Entry points to the machine code:

$1200 (4608) : Initialize variables and check for a RAM card.

$1203 (4611) : Read some sectors.

$1206 (4614) : Write some sectors.

$1209 (4617) : This routine is called when an error occurs and that sector is to be reread.

$120C (4620) : This routine is called when an error occurs and the sector is to be skipped.

$120F (4623) : This is the routine that handles both R/W to the disk, a sector at a time.

$1212 (4626) : The IOB table is stored here.

A copy program is essential to the computer user. It will not eliminate the possibility of garbaging your disks. But it will prevent the destruction of hard-earned programs.

NOTE: Use of Quick Copy will leave the user without DOS, and will require cold booting the system.

Program Copy.O

```
1000 *----------------------------------
1010 *   THIS CODE WILL COPY A DISK
1020 * USING THE RAM CARD IF IT IS
1030 * AVAILABLE. WITH A RAM CARD
1040 * A COPY CAN BE MADE IN 3 PASSES
1050 *----------------------------------
1060
1070
1080           .OR $1200
1090           .TF COPY.O
1100
1110
1120 FLAG      .EQ $00      FLAG FOR JOB DONE
1130 TAB       .EQ 12       HTAB POS
1140 VTAB      .EQ 11       VTAB POS
1150 CH        .EQ $24
1160 SOURCE.TRACK .EQ $01
1170 SOURCE.SECTOR .EQ $02
1180 TARGET.TRACK .EQ $03
1190 TARGET.SECTOR .EQ $04
1200
1210
1220 BUFFER    .EQ $1400
1230
1240
1250 RWTS      .EQ $B7B5    MUST USE 48 DOS
1260 COUT      .EQ $FDED    PRINT A CHARACTER
1270 CROUT     .EQ $FD8E    GENERATE A RETURN
1280 PRHEX     .EQ $FDDA    PRINT ACCUM AS A HEX DIGIT
1290 RDKEY     .EQ $FD0C    GETS A CHARACTER
1300 TABV      .EQ $FB5B
1310
1320
1330
```

```
1340 *------------------------------
1350 * JUMP TABLE
1360 *------------------------------
1370
1380 JUMP.INIT
1390           JMP INIT
1400 JUMP.READ
1410           JMP READ
1420 JUMP.WRITE
1430           JMP WRITE
1440 JUMP.CONT.RWTS
1450           JMP CONT.RWTS
1460 JUMP.SKIP
1470           JMP SKIP
1480 JUMP.IOB
1490           JMP IOB2
1500
1510
1520
1530
1540 IOB.TABLE
1550           .HS 00
1560 SLOT      .HS 60
1570 DRIVE     .HS 01
1580 VOLUME    .HS 00
1590 TRACK     .HS 00
1600 SECTOR    .HS 00
1610 DVCT      .DA DEVICE.CHAR.TABLE
1620 DOS.BUFFER .HS 0014
1630 NOT.USED .HS 0000
1640 COMMAND   .HS 00
1650 ERROR     .HS 00
1660 LAST.VOLUME .HS 00
1670 LAST.SLOT .HS 60
```

QUICK COPY COPY COPY COPY COPY

Checksums

								810	$3D7A
								820	$3103
								830	$0190
								840	$F0C8
10	$70A8	210	$019B	410	$584F	610	$3456	850	$4FD4
20	$7131	220	$5A23	420	$CA76	620	$6FB7	860	$590D
30	$FB29	230	$2C7F	430	$3FCB	630	$2C27	870	$F395
40	$88E2	240	$4D88	440	$6A33	640	$1050	880	$575E
50	$EDB4	250	$63B2	450	$34DB	650	$939D	890	$8350
60	$B065	260	$82FB	460	$8F84	660	$D1F6	900	$41F1
70	$CD63	270	$768A	470	$958D	670	$63AD	910	$D95F
80	$3005	280	$869A	480	$0421	680	$555B	920	$3D24
90	$DAAA	290	$4ABF	490	$B709	690	$C343	930	$44DC
100	$F8C1	300	$6B24	500	$B23F	700	$FFA1	940	$6B6F
110	$A75F	310	$9D7B	510	$3ECD	710	$4C6D	950	$1889
120	$5814	320	$3E95	520	$01B2	720	$0740	960	$27BB
130	$7A9E	330	$BD21	530	$B5CB	730	$0430	970	$C764
140	$148B	340	$5D69	540	$6C3B	740	$15C1	980	$0C99
150	$A65F	350	$31EA	550	$B060	750	$8344	990	$6FB8
160	$C8D6	360	$69C1	560	$01A1	760	$4684	1000	$0100
170	$12C4	370	$7FB0	570	$F1C3	770	$9150		
180	$E885	380	$A2BA	580	$25CC	780	$D360	1010	$4122
190	$B2E3	390	$D24F	590	$2B50	790	$834D	1020	$A8A6
200	$3A9E	400	$3C23	600	$CBD5	800	$E0B9	1030	$E500

QUICK COPY COPY COPY COPY COPY

Program

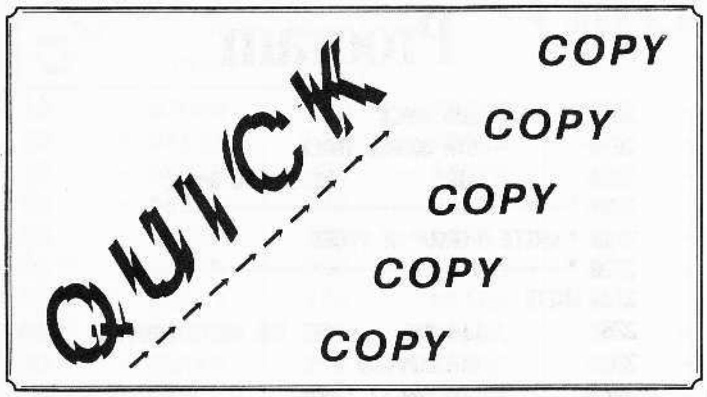
```
1680 LAST.DRIVE .HS 01
1690
1700
1710 DEVICE.CHAR.TABLE
1720           .HS 0001EFD8
1730
1740
1750 *-------------------------------
1760 * THE IOB
1770 *-------------------------------
1780
1790
1800 IOB
1810           LDA #TAB    PRINT OPERATION IN PROCESS
1820           STA CH
1830           LDA #VTAB
1840           JSR TABV
1850           LDX COMMAND
1860           LDA CMD,X   GET CHARACTER TO PRINT
1870           JSR COUT
1880           LDA TRACK
1890           JSR PRHEX
1900           LDA #'.
1910           JSR COUT
1920           LDA SECTOR
1930           JSR PRHEX
1940           BIT $C083   TURN ON THE RAM CARD
1950           BIT $C083
1960 IOB2
1970           LDA #$00    CLEAR THE ERROR FLAG
1980           STA ERROR
1990           LDA /IOB.TABLE
2000           LDY #IOB.TABLE
2010           JSR RWTS
2020           PHP
2030           BIT $C081   TURN ON MOTHER ROMS
2040           LDA #$00    RESET PROCESSOR STACK
2050           STA $48
2060           PLP
2070           BCS .1      NO ERROR SO LEAVE ERROR CODE INTACT
2080           STA ERROR   RESET ERROR FLAG
2090 .1
2100           RTS
2110
2120
2130
2140 *-------------------------------
2150 * INITIALIZE THE IOBS
2160 *-------------------------------
2170
```

QUICK COPY COPY COPY COPY COPY

Program

```
2180 INIT
2190          LDA #$00      RESET THE BUFFERS
2200          STA DOS.BUFFER
2210          STA DOS.BUFFER+1
2220          STA FLAG      RESET FLAG
2230          STA VOLUME    RESET THE VOLUME NUMBER
2240          LDA #34       RESET TRACKS TO START AT 34
2250          STA SOURCE.TRACK RESET THE TRACKS
2260          STA TARGET.TRACK
2270          LDA #$F       RESET THE SECTOR
2280          STA TARGET.SECTOR
2290          STA SOURCE.SECTOR
2300          LDA #$07      SHOW NO RAM CARD IN USE
2310          STA RAM.CARD+1
2320
2330          STA $C083     TURN ON THE RAM CARD
2340          STA $C083
2350          LDX #$0F      CHECK FOR A RAM CARD
2360 .1
2370          LDA VALUES,X MOVE SOME DATA INTO RAM CARD
2380          STA $FFF0,X
2390          CMP $FFF0,X
2400          BNE .2
2410          DEX
2420          BPL .1
2430          LDA #$FF
2440          STA RAM.CARD+1
2450
2460 .2
2470          STA $C081     TURN OFF THE RAM CARD
2480          RTS           RETURN TO CALLER
2490
2500
2510
2520 *-----------------------------
2530 * READ A GROUP OF PAGES.
2540 *-----------------------------
2550
2560 READ
2570          LDA #$1       SET COMMAND TO READ
2580          STA COMMAND
2590          LDA SOURCE.TRACK
2600          STA TRACK
2610          LDA SOURCE.SECTOR
2620          STA SECTOR
2630          JSR GO.RWTS  READ IN SOME SECTORS
2640          LDA SECTOR
2650          STA SOURCE.SECTOR
```

```
2660          LDA TRACK
2670          STA SOURCE.TRACK
2680          RTS              RETURN TO BASIC
2700 *-----------------------------
2710 * WRITE A GROUP OF PAGES
2720 *-----------------------------
2740 WRITE
2750          LDA #$2       SET THE WRITE COMMAND
2760          STA COMMAND
2770          LDA TARGET.TRACK
2780          STA TRACK
2790          LDA TARGET.SECTOR
2800          STA SECTOR
2810          JSR GO.RWTS  WRITE THE SECTORS TO THE DISK
2820          LDA TRACK
2830          STA TARGET.TRACK
2840          LDA SECTOR
2850          STA TARGET.SECTOR
2860          BCS .1
2870          RTS              RETURN TO BASIC
2890
2900 .1
2910          LDA #$FF      SHOW JOB DONE
2920          STA FLAG
2930          RTS              RETURN TO BASIC
2940
2980
2990 *-----------------------------
3000 * CONTROLLER FOR RWTS. EXITS WITH
3010 * CARRY SET IF ALL DONE.
3020 *-----------------------------
3030
3060 GO.RWTS
3070          LDA /BUFFER
3080          STA DOS.BUFFER+1
3090 CONT.RWTS2
3100          JSR IOB         READ/WRITE A SECTOR
3110          BCC SKIP2       NO ERROR SO CONTINUE
3120          PLA             GET RETURN ADDRESS
3130          STA LAST
3140          PLA
3150          STA LAST+1
3160          RTS             RETURN TO BASIC WITH AN ERROR
3170 SKIP2
3180          DEC SECTOR
3190          BPL .2
3200          LDA #$F         RESET SECTOR COUNT
3210          STA SECTOR
3220          DEC TRACK
3230          BPL .2
3240          SEC             SHOW THAT WE ARE ALL DONE
3250          RTS             RETURN TO CALLER
3260
```



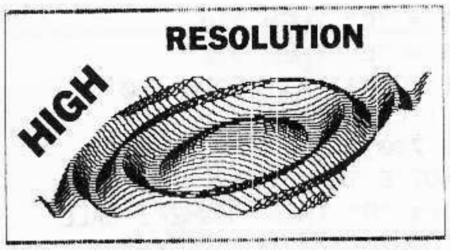
Program

```
327Ø .2
328Ø          INC DOS.BUFFER+1
329Ø          LDA DOS.BUFFER+1
33ØØ RAM.CARD
331Ø          CMP #$FF      ALL DONE?
332Ø          BEQ .1
333Ø          CMP #$B7      USE RAM CARD?
334Ø          BNE CONT.RWTS2 ...ALWAYS
335Ø          LDA #$DØ
336Ø          STA DOS.BUFFER+1
337Ø          BNE CONT.RWTS2 ...ALWAYS
338Ø .1       CLC
339Ø          RTS           RETURN TO CALLER
34ØØ
341Ø
342Ø CONT.RWTS
343Ø          LDA LAST+1    RESTORE THE STACK
344Ø          PHA
345Ø          LDA LAST
346Ø          PHA
347Ø          JMP CONT.RWTS2
348Ø
349Ø SKIP
35ØØ          LDA LAST+1
351Ø          PHA
352Ø          LDA LAST
353Ø          PHA
354Ø          JMP SKIP2
355Ø
356Ø *-----------------------------------
357Ø * CONTANTS USED
358Ø *-----------------------------------
359Ø
36ØØ
361Ø CMD      .AS "SRWI"
362Ø VALUES   .HS 837F5CCCB5FC1717
363Ø          .HS F5Ø3FBØ359FF86FA
364Ø LAST     .BS 2         THE RETURN ADDRESS FOR THE STACK
```

Program Copy

```
1Ø  HIMEM: 46Ø7: PRINT  CHR$ (4)"
    BLOAD COPY.O"
2Ø  PR# Ø: IN# Ø
3Ø M$ =  CHR$ (13):E$ =  CHR$ (27
   )
4Ø I = 4626
5Ø  TEXT : NORMAL : HOME
6Ø SS =  PEEK (1528) / 16:TS = SS
   :SD = 1:TD = 2
7Ø  VTAB 2: HTAB 11: PRINT "RAM C
    OPY"
8Ø  VTAB 6: HTAB 9: PRINT "SLOT";
    : HTAB 15: PRINT "DRIVE"
9Ø  PRINT "SOURCE:";: HTAB 11: PRINT
    SS;: HTAB 17: PRINT SD
1ØØ  PRINT
11Ø  PRINT "TARGET:";: HTAB 11: PRINT
    TS;: HTAB 17: PRINT TD
12Ø  VTAB 7: HTAB 11: GET A$
13Ø  IF A$ = M$ THEN 16Ø
14Ø  IF A$ < "Ø" OR A$ > "7" THEN
     PRINT  CHR$ (7): GOTO 23Ø
15Ø SS =  VAL (A$)
16Ø  PRINT SS;
17Ø  HTAB 17: GET A$
18Ø  IF A$ = M$ THEN 22Ø
19Ø  IF A$ = E$ THEN 7Ø
2ØØ  IF A$ < "1" OR A$ > "2" THEN
     PRINT  CHR$ (7);: GOTO 17Ø
21Ø SD =  VAL (A$)
22Ø  PRINT SD
23Ø  VTAB 9: HTAB 11: GET A$
24Ø  IF A$ = M$ THEN 28Ø
25Ø  IF A$ = E$ THEN 7Ø
26Ø  IF A$ < "Ø" OR A$ > "7" THEN
     PRINT  CHR$ (7): GOTO 23Ø
27Ø TS =  VAL (A$)
28Ø  PRINT TS;
29Ø  HTAB 17: GET A$
3ØØ  IF A$ = M$ THEN 34Ø
31Ø  IF A$ = E$ THEN 7Ø
32Ø  IF A$ < "1" OR A$ > "2" THEN
     PRINT  CHR$ (7);: GOTO 29Ø
33Ø TD =  VAL (A$)
34Ø  PRINT TD
35Ø  VTAB 12
36Ø  INVERSE : VTAB 14
37Ø  PRINT "INSERT SOURCE DISK IN
```

```
      SLOT:"SS", DRIVE:"SD
380  IF SS < > TS OR SD < > TD THEN
      PRINT : PRINT  TAB( 4)"AND
     TARGET DISK IN SLOT:"TS", DR
     IVE:"TD
390  VTAB 18: HTAB 5
400  NORMAL
410  PRINT "PRESS RETURN TO COPY/
     ESC TO EXIT";: GET A$: PRINT
     A$
420  IF A$ < > E$ AND A$ < > M$
      THEN  PRINT  CHR$ (7): GOTO
     390
430  IF A$ = E$ THEN  HOME : GOTO
     70
440  HOME
450  VTAB 2: HTAB 10: PRINT "COPI
     NG DISK"
460  CALL 4608
470 P = 0:ER = P
480  HOME
490  IF P AND SS = TS AND SD = TD
      THEN  HOME : VTAB 12: PRINT
     "INSERT SOURCE DISK IN SLOT:
     "SS", DRIVE:"SD;: GET A$: PRINT
     A$
500  POKE I + 1,SS * 16: POKE I +
     2,SD
510  HOME
520  CALL 4611
530  GOSUB 790
540  IF  NOT E THEN 580
550  IF A$ = "S" THEN  HOME : CALL
     4620: GOTO 530
560  IF A$ = "C" THEN  HOME : CALL
     4617: GOTO 530
570  IF A$ = "E" THEN 930
580  IF TS = SS AND TD = SD THEN
      HOME : HTAB 12: PRINT "INSE
     RT TARGET DISK IN SLOT:"TS",
      DRIVE:"TD;: GET A$: PRINT A
     $
590  POKE I + 3, PEEK (I + 14)
600  POKE I + 1,TS * 16: POKE I +
     2,TD
610  IF P > 0 THEN 710
620  HOME : VTAB 12: PRINT "INITI
     ALIZING TARGET DISK"
630  POKE I + 12,4: CALL 4623
640  IF  NOT E THEN 710
650  VTAB 12: PRINT  CHR$ (7)"INI
     TIALIZATION ERROR"
660  PRINT "TRY AGAIN, COPY DISK,
      EXIT (A,C,E)? ";: GET A$: PRINT
     A$
670  IF A$ = "A" THEN 620
680  IF A$ = "C" THEN 710
690  IF A$ = "E" THEN 930
700  PRINT  CHR$ (7): GOTO 650
710  HOME : CALL 4614
720  GOSUB 790
730  IF  NOT E THEN 770
740  IF A$ = "S" THEN  HOME : CALL
     4620: GOTO 720
750  IF A$ = "C" THEN  HOME : CALL
     4617: GOTO 720
760  IF A$ = "E" THEN 930
770  IF  PEEK (0) THEN 980
780 P = P + 1: GOTO 480
790 E =  PEEK (I + 13): IF  NOT E
      THEN  RETURN
800 A$ = "STRANGE ERROR"
810  IF E = 8 THEN A$ = "ERROR DU
     RING INITIALIZATION"
820  IF E = 16 THEN A$ = "DISKETT
     E IS WRITE PROTECTED"
830  IF E = 32 THEN A$ = "VOLUME
     MISMATCH ERROR"
840  IF E = 64 THEN A$ = "I/O ERR
     OR"
850  IF E = 128 THEN A$ = "READ E
     RROR"
860  INVERSE : VTAB 14: HTAB (40 -
      LEN (A$)) / 2: PRINT  CHR$
     (7);A$: NORMAL
870  NORMAL
880  VTAB 15:ER = ER + 1
890  PRINT : PRINT  TAB( 7)"SKIP/
     CONTINUE/EXIT (SCE)? ";: GET
     A$
900  IF A$ = E$ THEN A$ = "E"
910  IF A$ < > "S" AND A$ < > "
     C" AND A$ < > "E" THEN  PRINT
      CHR$ (7): GOTO 880
920  RETURN
930  HOME
940  VTAB 12: PRINT "COPY ABORTED
     "
950  PRINT : PRINT "DO ANOTHER DI
     SK (Y/N)? ";: GET A$
960  IF A$ = "Y" THEN  RUN
970  IF A$ < > "N" THEN  PRINT  CHR$
     (7): GOTO 940
980  HOME
990  PRINT "COPY COMPLETED"
1000  PRINT : PRINT "WITH "ER" ER
     RORS"
1010  VTAB 12: PRINT "ANOTHER COP
     Y (Y/N)? ";: GET A$: PRINT A
     $
1020  IF A$ = "Y" THEN  RUN
1030  HOME : PRINT "BYE BYE"
```



Program
Scroll

```
3120          STA DEY2
3130          JSR HORZ
3140          RTS
3160 SCRLEFT  LDA #$27     SCROLL LEFT
3170          STA OP6+1
3180          LDA #$88     OPCODE FOR 'DEY'
3190          STA INY1
3200          STA INY2
3210          STA INY3
3220          LDA #$C8     OPCODE FOR 'INY'
3230          STA DEY
3240          STA DEY2
3250          LDA #$FF
3260          STA OP5+1
3280 *
3290 * HORIZONTAL SCROLLING ROUTINE
3300 *
3320 HORZ     LDX #0       START WITH VERT LINE 0
3330 BLOOP    LDA HIRESH,X GET HIBYTE OF VERT LINE
3340          STA PTR1+1
3350          LDA HIRESL,X GET LOBYTE OF VERT LINE
3360          STA PTR1
3370 OP6      LDY #0
3380          LDA (PTR1),Y GET FIRST OR LAST BYTE ON LINE
3390          PHA          STORE IT IN STACK
3400 INY3     INY          MOVE EVERY OTHER BYTE
3410 MLOOP    LDA (PTR1),Y TO THE LEFT OR TO THE RIGHT
3420 DEY      DEY
3430          STA (PTR1),Y
3440 INY1     INY
3450 INY2     INY
3460 OP5      CPY #$28
3470          BNE MLOOP
3480 DEY2     DEY
3490          PLA          RECALL FIRST OR LAST BYTE
3500          STA (PTR1),Y
3510          INX          INC VERT LINE COUNTER
3520          CPX #$C0     FINISHED WITH 192 LINES?
3530          BNE BLOOP    IF NOT, DO NEXT LINE
3540          RTS
3560 *
3570 * ROUTINE TO CALCULATE LOBYTES OF
3580 *  HI-RES BASE ADDRESSES (PAGE1)
3590 *
3610 CALCLO   LDA #0
3620          TAY
3630          STA PTR1
3640 CL1      LDA #4
3650          STA PTR2
3660 CL2      LDA PTR1
3670 CL3      LDX #8
3680 CL4      STA HIRESL,Y
3690          INY
3700          DEX
3710          BNE CL4
3720          CLC
3730          ADC #$80
3740          BCC CL3
3750          DEC PTR2
3760          BNE CL2
3770          LDA PTR1
3780          ADC #$27
3790          STA PTR1
3800          CMP #$78
3810          BNE CL1
3830 *
3840 * ROUTINE TO CALCULATE HIBYTES OF
3850 *  HI-RES BASE ADDRESS (PAGE1)
3860 *
3880          LDA #3
3890          STA GEN1
3900          LDY #0
3910 CH1      LDA #0
3920          STA PTR1
3930 CH2      LDA #2
3940          STA PTR2
3950 CH3      LDA PTR1
3960 CH4      CLC
3970          ADC #$20
3980          STA HIRESH,Y
3990          SEC
4000          SBC #$20
4010          INY
4020          CLC
4030          ADC #4
4040          CMP #$20
4050          BMI CH4
4060          DEC PTR2
4070          BNE CH3
4080          INC PTR1
4090          LDA PTR1
4100          CMP #4
4110          BNE CH2
4120          DEC GEN1
4130          BNE CH1
4140          RTS
```

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ARCADE QUALITY GRAPHICS

Page 39, 3rd column:

BSAVE QUICKDRAW, A$800, L$89
should read
BSAVE QUICKDRAW.OBJ,A$800, L$89

Page 40:
The source code which begins on this page is "Quick Draw.Obj."

Page 42:
In the "Commands" box, the directional keys are W,A,X,D rather than W,A,Z,S.

Page 49, 2nd column:
30 PRINT CHR$(4)"BLOAD QUICK DRAW"
should read
30 PRINT CHR$(4)"BLOAD QUICK DRAW.OBJ"

SCREEN CRUNCHER

Page 22:

In illustration 1, there should be only two double zeros (00), rather than a series of three.

Page 25, 2nd column:

BSAVE UN-PACK,A$300,L$
should read
BSAVE UN-PACK,A$300,L$7A

HI-RES GRAPHICS

Page 20, 2nd column:

Page Five A$10000
should read
Page Five A$A000

Page 21:
The fourth decimal number in the chart on the top half of the page should read 3072 rather than 3027.

SHIMMERING SHAPES

Page 34:

In figure 3,
CMP $7F should read CMP #$7F
N0P should read NOP

QD.EDITOR

Page 43:
Change location 33D from 8D to 99.

Page 48
Delete line 2380

SPACE RAID

Page 60.
Add: 1545 PRINT CHR$(4)"BLOAD TABLES"

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Program Replace

```
0B1E- D4 CF CE
0B21- A0 CC C5
0B24- C2 C1 CC         .AS -" ENIL NI DNUOF TON LEBAL"
0B27- 8D 8D 87         .HS 8D8D87

                NO.LINE
0B2A- A0 C5 CE
0B2D- C9 CC A0
0B30- CD CF D2
0B33- C6 A0 C4
0B36- C5 CC CC
0B39- C1 C3            .AS -" ENIL MORF DELLAC"
0B3B- 8D               .HS 8D
0B3C- AE CC C5
0B3F- C2 C1 CC
0B42- A0 D2 C5
0B45- D4 C6 C1
0B48- A0 C5 CE
0B4B- C9 CC A0
0B4E- CF CE            .AS -".LEBAL RETFA ENIL ON"
0B50- 8D 8D 87         .HS 8D8D87

                END.MSG

                *-------------------------------
                * VARIABLES USED
                *-------------------------------

0B53-           LINE.NUMBER .BS 2      LINE NUMBER AFT LABEL (HEX)
0B55-           NUM.BYTES .BS 1        THE NUMBER OF BYTES FOR DEL
0B56-           OFFSET.1 .BS 1         OFFSET FOR THE JUMPS
0B57-           OFFSET.2 .BS 1         OFFSET FOR THE LABEL
0B58-           TEMP.OFFSET .BS 1
0B59-           MOD10     .BS 2


0B5B- 00 00     END.PROGRAM .HS 0000
```

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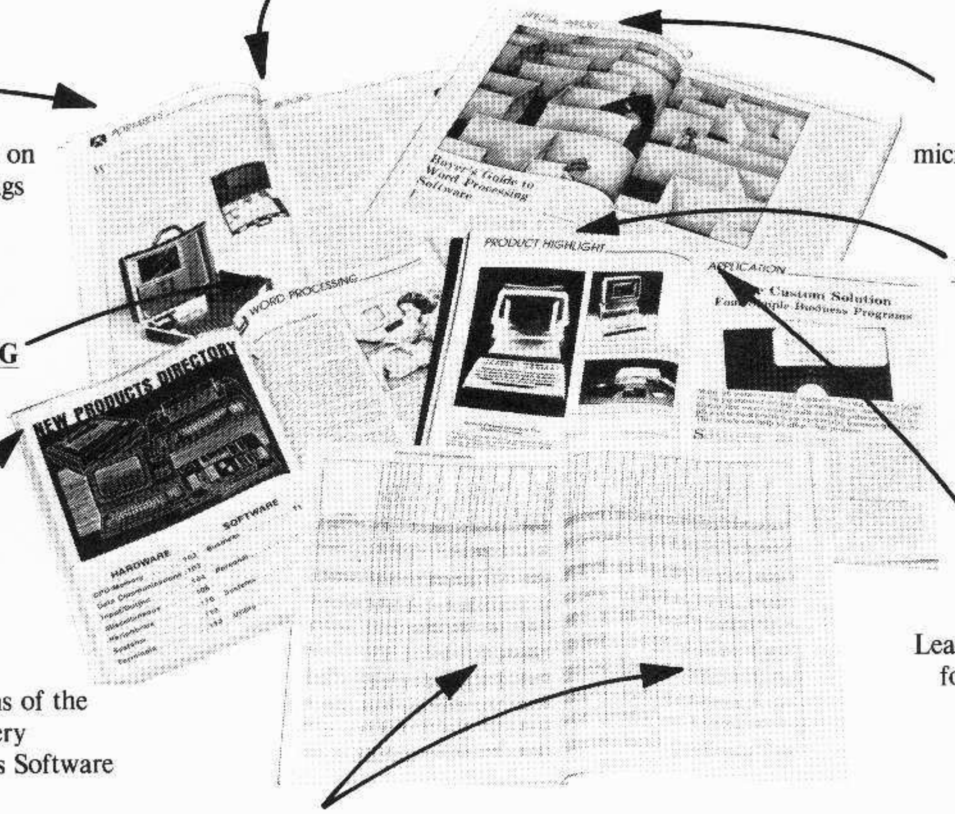

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