KEYBOARD TUTOR

Improve your typing with this graphic learning aid.

Before the days of computing, streams of words flowed from pen to paper. Now, with increasing frequency, they run from fingers to keyboard. The educational emphasis on basic skills has expanded to include keyboard technique.

Keyboard Tutor is an Applesoft program that will help you acquire basic keyboard skills. It provides home key instruction, key/finger drills and an accuracy (not speed) test. Keyboard Tutor also features on-screen help and fast animation of finger-to-key visual aids.

USING THE PROGRAM

Keyboard Tutor consists of five files. KEYBOARD.TUTOR is the BASIC program that combines all the other files into one working unit. When you run it, it loads three shape tables and the cursor bar selection routine, which assists in menu item selection. (On the IIGS, be sure to turn off keyboard buffering from the Control Panel.)

Since the program is menu-driven, all you need to do is select the desired option from the menu. You move the inverse cursor bar by

> *K*eyboard Tutor provides home key instruction, key/finder drills and an accuracy test.

pressing the arrow keys. Final selection is made by pressing the Return key.

When the prompt ? = Help is shown near the top of a screen, press the question mark (?) key to get a display of help messages for the highlighted menu option. If you press Escape, you'll either return to the previously accessed menu, or exit from the program. Be sure

to read the prompts.

The main menu choices are: Learn Home Keys, Home Finger Drill, and Keyboard Test. It is probably best to run them in order, since they represent a logical development of skills.

Learn the Home Keys

Move the inverse cursor bar over the first choice, and press Return to finalize your selection. Two information screens will appear, providing definitions of the home keys and the fingers that should cover these keys.

When you've read and absorbed this information, you pass automatically into the actual drill screen. You'll see the keyboard drawn on the screen row by row. If you have a IIe keyboard, you'll recognize it immediately. Other keyboards have a couple of extra keys, but the basic keys will be the same. Also, the positions of the Escape and Return keys are a little different on the II Plus.

After reading the information in the boxes, press Return to proceed with the drill.

FIGURE 1: The Home Keys Drill Screen

TABLE 1: Numeric Variables

Variable	Function
BEEP	Location of sound routine
C	Horizontal graphic offset
CUR	Location of cursor routine
H	Horizontal graphic string print offset
HK	Horizontal key shape offset
I,J	General counting variables
LE( )	Left-edge graphic offset
LINE	Cursor menu line selected
N	String input variable
R	Row number of key
TABLE	High-byte shape table pointer (233 decimal)
T1,T2,T3	Shape table high bytes
V	Vertical graphic string print offset
VK	Vertical key shape offset
W,X,Y,Z	Dialog box coordinates
FL	Flag variable for right/left drills
F1	Home-key drill flag. Set if drill is running
F2	Repeat home-key drill flag

Each home key is displayed with an accompanying message and a blinking finger to point out which finger you should use to strike a particular home key. Each key is displayed sequentially from left to right until all eight home keys have been correctly struck (see Figure 1).

To repeat the drill, simply press the Space Bar, as prompted, after the last home key has been pressed correctly. To return to the main menu, press Return instead of the Space Bar when prompted. You may quit the drill at any time by pressing Escape.

Home Finger Drill

After you have mastered the home keys and the finger placement, practice learning the keys associated with each home key finger.

Each finger strikes a range of keys from all four rows. The hunt and peck method is not appropriate for this drill. You must use all four fingers on each hand. After typing this exercise for a while, you should be able to strike the correct keys.

After you choose this option from the main menu, another screen of information is displayed, with prompts at the bottom of the screen. To receive additional information about the drill, press the question mark (?) key whenever this display is present.

Inside an inverse box, in the middle of the screen, is a horizontal row of keyboard characters: The home keys, A, S, D, F, J, K, L, and ;. These are the choices of home key fingers. To select the ring finger of your right hand, press the L key. By keeping your

TABLE 2: String Variables

Variable	Function
DS	Control-D
E$	Error message string
E1$	Error message string
F$	Equals "Right" or "Left" for key drill
F$( )	Finger names. e.g., index, ring, etc.
HK$	Home keys (ASDFJKL;)
K$( )	Used to swap keys when switching hands
L$	A string of 39 equal signs (=) for headings
L$( )	Left-hand home keys (ASDF)
R$( )	Right-hand home keys (JKL;)
S$	String of all keyboard test characters
T$( )	Used to swap home key arrays
X$	General purpose string
Y$	The next character to type in the keyboard drill
Z$	Keys controlled by any one finger

hands poised over the home keys, you only need to strike the key underneath any finger.

If you select the character J, the keys outlined on the keyboard are those that the J key home finger will strike during normal typing.

By observing your screen, rather than the keyboard, you will get a feel for the reach that's necessary to strike all the keys associated with each home finger. You'll find that the most difficult keys to strike consistently with any accuracy are the topmost row of keys, typically the numerical keys and the special character keys. Since the placement of the character keys (obtained by shifting the numbers) are not consistent with all Apples, only the numbers are displayed on this keyboard.

As you practice typing with the home finger keys, you'll hear two sounds. When you strike any of the correct keys, an affirmative beep will be heard; if you strike an incorrect key, you will hear a short buzz. Remember, watch your screen, not your fingers!

When you've mastered this drill, you'll be ready to try the Keyboard Test.

The Keyboard Test

This menu option lets you test yourself for keyboard accuracy. After you select this option, move the inverse cursor bar over the range of numbers (10, 20, 50, and 100), to choose the length of the drill you want to practice. The numbers represent how many characters you'll need to type to complete the test. At first, you'll probably want to select the shorter tests.

If you select 10, an inverse box containing 10 blank spaces will appear on your screen. Above this box is another smaller box containing a single character, which is the one you should type. It will change after each keystroke, faster than you can type. What you see will always be the next character you need to type. Since the character displayed is generated randomly, the same character may appear twice in a row. Stay alert.

If you strike the wrong key, you will hear a short click, noting an incorrect keypress; no sound will occur for a correct keypress. When the correct key is pressed, it will be printed in the larger box, until the box is filled. Incorrect presses will be displayed in inverse.

When the box has been filled, the drill stops. Your score is displayed, noting how many out of the total you got right. In addition, your correct percentage is given. Follow the prompts to either repeat the drill or return to the main menu.

The purpose of this drill is accuracy, not speed. Keep your eyes on the screen throughout the exercise. After all the practice drills, you should now be able to type without looking down at the keyboard.

ENTERING THE PROGRAMS

Start by keying in the Applesoft program from Listing 1. Save it with the command:

SAVE KEYBOARD.TUTOR

If you have an assembler, enter the source code from Listing 2, and assemble the object code to the file CURSOR.5. If you don't have an assembler, enter the Monitor with CALL −151 and key in the hex code. Save the program with the command:

BSAVE CURSOR.5,A$9500,L$CF

Enter the Monitor with CALL −151 and key in the hex code from Listing 3. Save the file with the command:

BSAVE KEYS,A$9400,L$AE

Key in the hex code from Listing 4 and save the file with the command:

BSAVE FINGERS,A$8F00,L$4D

Key in the hex code from Listing 5 and save the file with the command:

BSAVE CHAR.SET,A$9000,L$313

For help with entering *Nibble* listings, see the Typing Tips section.

HOW IT ALL WORKS TOGETHER

This program package uses an unusually large number of files: In addition to the Applesoft program, there are three shape tables and a machine language cursor routine. Table 1 describes the function of the major numeric variables and Table 2 covers the string variables.

You may also notice that all the shape tables are loaded at page boundary addresses, e.g., $9400, $9500, and $8F00. Although this wastes a fair amount of memory between tables, it's convenient for another reason. With a sequential tabling procedure for shape table usage, establishing the low byte of the address at zero makes

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*T*he inverse cursor bar routine...
responds to all four arrow keys as
well as Escape and the question mark.

POKEing the table address easier and faster. Whenever the shapes of a particular table are to be used, you must POKE the high byte of the address of that table into memory location 233 (TABLE=233) and the low byte into 232. By keeping the low byte zero (on a page boundary), only one POKE is necessary (see line 260) to set this pointer to zero.

Switching tables is demonstrated in lines 530, 1240, and 1280. The variables T1, T2, and T3 represent the three shape tables, CHAR.SET, KEYS, and FINGERS, respectively.

Another feature of this program deserves some mention. Since you seldom see the Applesoft function DEF FN(X), you may wonder about its purpose in this program. If you look at the function definitions in lines 330-410, you'll see that each function name is assigned according to its home key, except for FN C (A) (C for semicolon) in line 410.

Note also that string expressions cannot normally be part of a FN(X) function, but they can be used in Boolean expressions. In this program, these functions simply determine which row of keys (1-4) a particular key is on, based on a keypress (X$). By multiplying a True 1 by the row the key is on, the result is the row number when a particular key is struck. A graphic DRAW routine then uses this number to draw a key or character symbol on the correct row of the keyboard displayed on your screen.

Cursor Bar Routine

Listing 2 is the assembly source code for the inverse cursor bar routine used for menu selection. I'm sure many of you are familiar with this routine, which has been modified from the original Jim Ganz routine. I call this version CURSOR, a linear and final descendant of the original CURSOR.BAR. The original version only responded to the Left- and Right- Arrow keys. The latest version (number 5) responds to all four arrow keys as well as Escape and the question mark.

When you select a menu option by pressing Return, the line number of the menu item selected is placed in memory location 4 in page zero. If you press Escape, however, a zero is placed in memory location 4. The routine then returns to the Applesoft program as if a Return had been pressed. It is up to you to determine that Escape had been pressed and respond accordingly.

When the question mark key is pressed, a 255 is placed in memory location 4. In Keyboard Tutor, the question mark is used for the Help function.

LISTING 1: KEYBOARD.TUTOR

```
10   REM   ************************
20   REM   *    KEYBOARD.TUTOR    *
30   REM   *  BY MARK R. CRAVEN   *
40   REM   *  COPYRIGHT (C) 1987  *
50   REM   *  BY MICROSPARC, INC  *
60   REM   *  CONCORD, MA  01742  *
70   REM   ************************
100  HOME  : TEXT
110  FOR I = 1 TO 39:LS = LS + "=": NEXT
120  GOSUB 630
130  REM  LOAD FILES
140  VTAB 10: HTAB 2: PRINT "READING DISK FIL
     ES -- DON'T GO AWAY."
150  ONERR  GOTO 2660
160  PRINT  CHR$ (4)"BLOAD CHAR.SET,A$9000": REM
     36864
170  PRINT  CHR$ (4)"BLOAD KEYS,A$9400": REM
     37888
180  PRINT  CHR$ (4)"BLOAD CURSOR,A$9500": REM
     38144
190  PRINT  CHR$ (4)"BLOAD FINGERS, A$8F00": REM
     36608
200  POKE 216,0: REM CLEAR DISK ONERR
210  VTAB 7: CALL  - 958
220  HIMEM: 35328: REM $8A00
230  LS = "": FOR I = 1 TO 39:LS = LS + "=": NEXT
240  CUR = 38144:TABLE = 233:T1 = 144:T2 = 148
     :T3 = 143: REM HI BYTES OF 3 SHAPE TABLE
     S
250  BEEP = CUR - 15:VK = 20:HK = 18: SCALE= 1
     : ROT= 0: HCOLOR= 3: POKE 230,64: REM NO
     ISE. VERTICAL KEY,HORIZ.KEY,PLOT PAGE
260  POKE 232,0: REM LO BYTE OF SHAPE TABLE P
     OINTER
270  HK$ = "ASDFJKL;": REM HOME KEYS
280  FOR I = 1 TO 4: READ LE(I): NEXT : REM L
     EFT EDGE FOR GRAPHICS
290  FOR I = 0 TO 13: READ J: POKE I + BEEP,J
     : NEXT : REM TONE ROUTINE POKE INTO MEMO
     RY
300  REM
310  REM DEFINE KEY POSITIONS
320  REM
330  DEF  FN H(A) = LE(3) + (A + 6 * (FLAG >
     0)) * HK: REM HOME KEY H POSITIONS
340  DEF  FN A(A) = (X$ = "1") + 2 * (X$ = "Q
     ") + 3 * (X$ = "A") + 4 * (X$ = "Z")
350  DEF  FN S(A) = (X$ = "2") + 2 * (X$ = "W
     ") + 3 * (X$ = "S") + 4 * (X$ = "X")
360  DEF  FN D(A) = (X$ = "3") + 2 * (X$ = "E
     ") + 3 * (X$ = "D") + 4 * (X$ = "C")
370  DEF  FN F(A) = (X$ = "4" OR X$ = "5") +
     2 * (X$ = "R" OR X$ = "T") + 3 * (X$ = "
     F" OR X$ = "G") + 4 * (X$ = "V" OR X$ =
     "B")
380  DEF  FN J(A) = (X$ = "6" OR X$ = "7") +
     2 * (X$ = "Y" OR X$ = "U") + 3 * (X$ = "
     H" OR X$ = "J") + 4 * (X$ = "N" OR X$ =
     "M")
390  DEF  FN K(A) = (X$ = "8") + 2 * (X$ = "I
     ") + 3 * (X$ = "K") + 4 * (X$ = ",")
400  DEF  FN L(A) = (X$ = "9") + 2 * (X$ = "O
     ") + 3 * (X$ = "L") + 4 * (X$ = ".")
410  DEF  FN C(A) = (X$ = "0") + 2 * (X$ = "P
     ") + 3 * (X$ = ":") + 4 * (X$ = "/")
420  FOR I = 1 TO 4: READ LS(I): NEXT : REM L
     EFT HOME KEYS
430  FOR I = 1 TO 4: READ RS(I): NEXT : REM R
     IGHT HOME KEYS
440  FOR I = 1 TO 4: READ FS(I): NEXT : REM F
     INGER NAMES
450  FOR I = 1 TO 4: READ Y(I): NEXT
460  S$ = "1234567890QWERTYUIOPASDFGHJKL;ZXCVB
     NM,./"
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```
470  GOTO 950: REM MAIN MENU
480  REM
490  REM DRAW KEYBOARD
500  REM
510  REM ROWS 1 & 2
520  REM
530  POKE TABLE,T2: FOR I = 1 TO 12: DRAW 1 AT
     LE(1) + HK * I,VK: NEXT : FOR I = 1 TO 1
     2: DRAW 1 AT LE(2) + HK * I,2 * VK: NEXT
     : FOR I = 1 TO 3: DRAW 1 AT 8 + I * 9,3 *
     VK: NEXT
540  REM ROW 3
550  FOR I = 1 TO 12: DRAW 1 AT LE(3) + HK *
     I,3 * VK: NEXT : FOR I = 1 TO 2: DRAW 1 AT
     LE(3) + 12 * HK + (HK * I) / 2,3 * VK: NEXT
560  FOR I = 1 TO 4: DRAW 1 AT 8 + 8.8 * I,4 *
     VK: NEXT : FOR I = 1 TO 11: DRAW 1 AT LE
     (4) + HK * I,4 * VK: NEXT : FOR I = 1 TO
     4: DRAW 1 AT LE(4) + 11 * HK + I * HK /
     2.5,4 * VK: NEXT
570  REM ROW 4
580  DRAW 1 AT 4 * HK + LE(1),5 * VK: FOR I =
     1 TO 9: DRAW 1 AT 4 * HK + LE(1) + I * H
     K / 2.5 * VK: NEXT : RETURN
590  REM
600  REM SUBROUTINES
610  REM
620  HOME : TEXT
630  VTAB 1: PRINT  TAB( 10)"NIBBLE KEYBOARD
     TUTOR": PRINT  TAB( 19)"by": PRINT  TAB(
     13)"Mark R. Craven": PRINT : PRINT "Copy
     right (c) 1987 by microSPARC, Inc.": PRINT
     LS: RETURN
640  VTAB 21: HTAB 1: PRINT LS: PRINT " <- ->
     TO SELECT <RETURN>  TO EXECUTE": PRINT
     TAB( 4)" UP AND DOWN ARROWS MAY BE USE
     D": PRINT LS;: RETURN : REM PROMPTS
650  FL = 0: FOR K = 1 TO 4:T(K) = Y(K):TS(K) =
     LS(K):KS(K) = FS(K): NEXT :FS = "LEFT ":
     RETURN : REM LEFT HOME KEYS
660  LINE = ( PEEK (4) + 1) / 2: RETURN : REM
     CURSOR CHOICE
670  VTAB 22: HTAB 1: PRINT LS: VTAB 23: HTAB
     1: PRINT "Press <RETURN> to Continue..."
     :: POKE  - 16384,0: GET XS: RETURN
680  HCOLOR= 0: FOR I = 1 TO  LEN (XS):N =  ASC
     ( MIDS (XS,I,1)) - 31: DRAW N AT C + HK +
     7 * I,R * VK: DRAW N AT C + 1 + HK + 7 *
     I,R * VK: NEXT : HCOLOR= 3: RETURN : REM
     DOUBLE THICK LETTERS
690  FOR I = 1 TO  LEN (XS): DRAW  ASC ( MIDS
     (XS,I,1)) - 31 AT H + 8 * I,V: DRAW  ASC
     ( MIDS (XS,I,1)) - 31 AT H + 1 + 8 * I,V
     : NEXT : RETURN : REM DRAW TEXT
700  FOR I = 1 TO  LEN (XS): XDRAW  ASC ( MIDS
     (XS,I,1)) - 31 AT H + 5 * I,V: NEXT : RETURN
     : REM DRAW TEXT
710  W = 20:X = 120:Y = 260:Z = 150: RETURN : REM
     BIG BOX
720  HPLOT W,X TO Y,X TO Y,Z TO W,Z TO W,X: FOR
     I = 1 TO 2: HPLOT W - I,X + I TO W - I,Z
     + I TO Y - I,Z + I TO Y - I,X + I: NEXT : RETURN : REM
     BIG MESSAGE BOX
730  XS = "PRESS <RETURN>..."
740  W = 60:X = 165:Y = 215:Z = 185: RETURN : REM
     <RETURN> BOX
750  HCOLOR= 0: FOR I = X + 1 TO Z - 1: HPLOT
     W + 1,I TO Y - 1,I: NEXT : HCOLOR= 3: RETURN
     : REM ERASE BOX
760  HCOLOR= 0: FOR I = X + 19 TO Z - 1: HPLOT
     W + 1,I TO Y - 1,I: NEXT : HCOLOR= 3: RETURN
     : REM ERASE BOX
770  HOME
780  POKE 49232,0: POKE 49239,0: POKE 49234,0
     : POKE 49237,0: RETURN : REM SWITCH TO G
     RAPHICS
790  GOSUB 530: POKE TABLE,T1: GOSUB 710: GOSUB
     720: GOSUB 740: GOSUB 720: RETURN : REM
     MESSAGE BOXES
800  POKE TABLE,T2: FOR J = 1 TO 5: XDRAW 1 AT
     LE(1),VK: FOR Z = 1 TO 200: NEXT : GOSUB
     820: NEXT : DRAW 2 AT LE(1),VK: POKE TAB
     LE,T1:XS = "ESC":V = VK:H = 11: GOSUB 70
     0: RETURN
810  XS = "RTN":V = 3 * VK:H = LE(1) + 7 + 12 *
     HK: HCOLOR= 0: GOSUB 690: HCOLOR= 3: RETURN
     : REM PRINT ON KEY
820  POKE 7,10: POKE 6,15: CALL BEEP: RETURN
     : REM SPECIAL KEY
830  POKE 7,15: POKE 6,24: CALL BEEP: RETURN
     : REM MESSAGE BEEP
840  POKE 6,20: POKE 7,40: CALL BEEP: CALL BE
     EP: RETURN : REM RIGHT ANSWER
850  POKE 7,15: FOR I = 1 TO 8: POKE 6,20 - I
     : CALL BEEP: NEXT : RETURN : REM RIGHT K
     EY
860  POKE 6,60: POKE 7,20: CALL BEEP: RETURN
     : REM WRONG ANSWER
870  DRAW 1 AT HK + LE(I), FN A(I) * VK: RETURN
880  DRAW 1 AT 2 * HK + LE(I), FN S(I) * VK: RETURN
890  DRAW 1 AT HK * 3 + LE( FN D(I)), FN D(I)
     * VK: RETURN
900  DRAW 1 AT HK * (4 + (XS = "5") + (XS = "
     T") + (XS = "G") + (XS = "B")) + LE( FN
     F(I)), FN F(I) * VK: RETURN
910  DRAW 1 AT HK * (6 + (XS = "7") + (XS = "
     U") + (XS = "J") + (XS = "M")) + LE( FN
     J(I)), FN J(I) * VK: RETURN
920  DRAW 1 AT HK * 8 + LE( FN K(I)), FN K(I)
     * VK: RETURN
930  DRAW 1 AT HK * 9 + LE( FN L(I)), FN L(I)
     * VK: RETURN
940  DRAW 1 AT HK * (10 + (XS = "-") + 2 * (X
     S = "=") + (XS =  CHRS (91)) + 2 * (XS =
     "]") + (XS = "'")) +  + LE( FN C(I)), FN
     C(I) * VK: RETURN
950  VTAB 7: HTAB 1: PRINT "'?'=Help": TAB( 2
     9)"<ESC>=Quit":F1 = 0: REM KEY DRILL FLA
     G
960  GOSUB 640: HTAB 1: VTAB 11: PRINT  TAB(
     12)"LEARN HOME KEYS": PRINT : PRINT  TAB(
     11)"HOME FINGER DRILL": PRINT : PRINT  TAB(
     13)"KEYBOARD TEST"
970  CALL CUR,11,17,9,29
980  GOSUB 660: ON LINE GOTO 1010,1520,2130
990  IF LINE > 100 THEN 2460: REM '?'
1000 TEXT : HOME : END : REM 'ESC'
1010 HOME : CALL 62450: PRINT  TAB( 9)"LEARN
     ING THE HOME KEYS": PRINT : PRINT LS: PRINT
     TAB( 27)"<ESC> to Menu"
1020 PRINT : PRINT "The keys known as the HO
     ME KEYS are the": PRINT : PRINT "keys up
     on which your fingers lightly": PRINT : PRINT
     "rest when not actually typing."
1030 PRINT : PRINT "For your ";: INVERSE : PRINT
     "LEFT";: NORMAL : PRINT " hand, these ke
     ys are": PRINT : PRINT  TAB( 15)"A  S  D
     F": PRINT : PRINT "and for your ";: INVERSE
     : PRINT "RIGHT";: NORMAL : PRINT " hand
     they are": PRINT : PRINT  TAB( 15)"J  K
     L   ;"
1040 GOSUB 670: IF XS =  CHRS (27) THEN  GOSUB
     620: GOTO 950
1050 VTAB 5: HTAB 1: CALL  - 958: PRINT : PRINT
     "Follow the instructions given next for"
     : PRINT : PRINT "help in learning the co
     rrect position "
1060 PRINT : PRINT "for your fingers in orde
     r to learn to": PRINT : PRINT "type.": GOSUB
     670: IF XS =  CHRS (27) THEN  GOSUB 620:
     GOTO 950
1070 GOSUB 770: REM GRAPHICS
1080 XS = "LEARN THE HOME KEYS":V = 3:H = 65:
     POKE TABLE,T1: GOSUB 690
1090 GOSUB 790: REM MESSAGE BOXES
1100 GOSUB 710:XS = "THIS IS THE TYPICAL COM
     PUTER":H = W + 2:V = X + 5: GOSUB 690:XS
     = "KEYBOARD.":V = X + 14: GOSUB 690
1110 GOSUB 730:H = W + 2:V = X + 5: GOSUB 69
     0: GOSUB 830: GOSUB 810: REM PRINT RTN
1120 POKE  - 16368,0: GET XS
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1130  GOSUB 740: GOSUB 750: GOSUB 710: GOSUB
      750: REM ERASE
1140  X$ = "DURING THE DRILL, YOU MAY":H = W +
      2:V = X + 5: GOSUB 690:X$ = "QUIT BY PRE
      SSING <ESC>":V = X + 14: GOSUB 690
1150  GOSUB 800: REM <ESC>
1160  GOSUB 730:H = W + 2:V = X + 5: GOSUB 69
      0
1170  X$ = "  OR <ESC>...":V = X + 14: GOSUB 6
      90: GOSUB 830: GET X$
1180  IF X$ = CHR$ (27) THEN GOSUB 620: GOTO
      950
1190  GOSUB 740: GOSUB 750: GOSUB 710: GOSUB
      750
1200  REM
1210  REM HOME KEY DRILL
1220  REM
1230  GOSUB 650: REM SET LEFT KEYS
1240  HCOLOR= 3: FOR K = 1 TO
      4: DRAW 1 AT 20 + 187 * (FL = 1) + 8 * K
      ,99 - T(K): FOR I = 99 - T(K) + 8 TO 115
      : HPLOT 20 + 187 * (FL = 1) + K * 8 + 1,
      I TO 20 + 187 * (FL = 1) + K * 8 + 7,I: NEXT
      : NEXT
1250  IF FLAG = 0 THEN DRAW 2 AT 60,107
1260  IF FLAG = 1 THEN ROT= 48: DRAW 2 AT 20
      7,115: ROT= 0
1270  FOR K = 1 TO 4: REM FOR EACH SET OF HOM
      E KEYS
1280  POKE TABLE,T1:X$ = "PRESS THE '" + T$(K
      ) + "' KEY WITH YOUR ":V = X + 5:H = W +
      2: GOSUB 690:X$ = F$ + K$(K) + " FINGER.
      ":V = X + 14: GOSUB 690: GOSUB 830
1290  POKE TABLE,T2: FOR I = 1 TO 5: XDRAW 1 AT
      FN H(K),3 * VK: NEXT : HCOLOR= 3: DRAW
      1 AT FN H(K),3 * VK: POKE TABLE,T3: XDRAW
      ASC (T$(K)) - 31 AT FN H(K),3 * VK
1300  POKE - 16368,0
1310  IF PEEK ( - 16384) > 128 THEN X$ = CHR$
      ( PEEK ( - 16384) - 128): GOTO 1330
1320  POKE TABLE,T3: XDRAW 1 AT 20 + 187 * (F
      L = 1) + 8 * K,99 - T(K): FOR J = 1 TO 5
      0: NEXT : GOTO 1310
1330  IF X$ = CHR$ (27) THEN K = 4: NEXT : GOSUB
      650: GOSUB 620: GOTO 950
1340  IF X$ = CHR$ (91) THEN 1370
1350  IF X$ < " " THEN GOSUB 860: GOTO 1300
1360  IF X$ < > T$(K) THEN X$ = CHR$ ( ASC
      (X$) - 32)
1370  IF X$ < > T$(K) THEN GOSUB 860: GOTO
      1300
1380  HCOLOR= 3: DRAW 1 AT 20 + 187 * (FL = 1
      ) + 8 * K,99 - T(K)
1390  POKE TABLE,T1: GOSUB 840: GOSUB 710:X$ =
      "VERY GOOD!":V = X + 23:H = Y - 90: GOSUB
      690
1400  GOSUB 710: GOSUB 750
1410  NEXT : IF FLAG = 1 THEN FLAG = 0: GOTO
      1440
1420  FLAG = 1:F$ = "RIGHT ": FOR I = 1 TO 4:T
      $(I) = R$(I):K$(5 - I) = F$(I):T(I) = Y(
      5 - I): NEXT : GOTO 1240: REM RIGHT HOME
      KEYS
1430  POKE TABLE,T3: FOR K = 1 TO 4: XDRAW 1 AT
      207 + 8 * K,99 - T(K): FOR I = 99 - T(K)
      + 8 TO 115: HPLOT 207 + K * 8 + 1,I TO
      20 + K * 8 + 7,I: NEXT : NEXT
1440  POKE TABLE,T1:X$ = "SPACE BAR":R = 5:C =
      80: GOSUB 680: GOSUB 710: GOSUB 750:X$ =
      "HOME KEY DRILL COMPLETE.":V = X + 5:H =
      W + 2: GOSUB 690:X$ = "SPACE BAR TO REPE
      AT DRILL.":V = V + 18: GOSUB 690
1450  GOSUB 730:H = W + 2:V = X + 5: GOSUB 69
      0
1460  X$ = "OR SPACE BAR...":V = X + 14: GOSUB
      690
1470  POKE - 16368,0: GET X$: IF X$ < > CHR$
      (32) THEN GOSUB 620: GOTO 950: REM BACK
      TO MAIN MENU
1480  POKE TABLE,T2: GOSUB 550: POKE TABLE,T1
      : GOSUB 810: GOSUB 740: GOSUB 750: GOSUB
      710: GOSUB 750: GOTO 1230: REM REPEAT DR
      ILL
1490  REM
1500  REM  * HOME KEY DRILL *
1510  REM
1520  HOME : PRINT TAB( 12)"HOME KEY DRILL":
      PRINT : PRINT L$: PRINT "'?'=Help" TAB(
      28)"<ESC> to Menu"
1530  FOR I = 1 TO 8: VTAB 10: HTAB 5 + 3 * I
      : PRINT " " + MID$ (HK$,I,1)" ": NEXT
1540  INVERSE : FOR I = 1 TO 5: VTAB 7 + I: HTAB
      7: PRINT " ";: HTAB 32: PRINT " ";: NEXT
      : FOR J = 8 TO 12 STEP 4: FOR I = 7 TO 3
      2: VTAB J: HTAB I: PRINT " ";: NEXT : NEXT
      : NORMAL : PRINT
1550  VTAB 21: PRINT L$
1560  VTAB 22: HTAB 1: PRINT "Select by press
      ing the HOME KEY you want";: PRINT "to P
      ractice ";
1570  POKE - 16368,0: GET X$
1580  IF X$ = CHR$ (27) THEN GOSUB 620: GOTO
      950: REM <ESC>
1590  IF X$ = "?" THEN 2570: REM HELP (?)
1600  IF X$ = CHR$ (91) THEN 1640
1610  FOR I = 1 TO 8: IF X$ = MID$ (HK$,I,1)
      THEN LINE = I:I = 8: NEXT : GOSUB 820: GOTO
      1650
1620  NEXT
1630  IF X$ > " " THEN X$ = CHR$ ( ASC (X$) -
      32): GOTO 1600
1640  GOSUB 860: GOTO 1570
1650  VTAB 10: HTAB 5 + LINE * 3: INVERSE : PRINT
      " " MID$ (HK$,LINE,1)" ";: NORMAL
1660  IF F1 THEN GOSUB 780: GOTO 1680: REM S
      ET GRAPHICS
1670  POKE TABLE,T1: CALL 62450:X$ = "FINGER
      DRILL":H = 86:V = 4: GOSUB 690: GOSUB 78
      0: GOSUB 790
1680  ON LINE GOTO 1690,1720,1750,1780,1820,1
      870,1900,1930
1690  Z$ = "1QAZ": FOR I = 1 TO 4:X$ = MID$ (
      Z$,I,1)
1700  POKE TABLE,T2: XDRAW 1 AT HK + LE(I), FN
      A(I) * VK: XDRAW 2 AT HK + LE(I), FN A(I
      ) * VK: POKE TABLE,T1: XDRAW ASC (X$) -
      31 AT HK + LE(I), FN A(I) * VK: GOSUB 82
      0: NEXT
1710  GOTO 1970
1720  Z$ = "2WSX": FOR I = 1 TO 4:X$ = MID$ (
      Z$,I,1)
1730  POKE TABLE,T2: XDRAW 1 AT 2 * HK + LE(I
      ), FN S(I) * VK: XDRAW 2 AT 2 * HK + LE(
      I), FN S(I) * VK: POKE TABLE,T1: XDRAW ASC
      (X$) - 31 AT 2 * HK + LE(I), FN S(I) * V
      K: GOSUB 820: NEXT
1740  GOTO 1970
1750  Z$ = "3EDC": FOR I = 1 TO 4:X$ = MID$ (
      Z$,I,1)
1760  POKE TABLE,T2: XDRAW 1 AT HK * 3 + LE( FN
      D(I)), FN D(I) * VK: XDRAW 2 AT 3 * HK +
      LE( FN D(I)), FN D(I) * VK: POKE TABLE,T
      1: XDRAW ASC (X$) - 31 AT 3 * HK + LE( FN
      D(I)), FN D(I) * VK: GOSUB 820: NEXT
1770  GOTO 1970
1780  Z$ = "45RTFGVB": FOR I = 1 TO 8:X$ = MID$
      (Z$,I,1)
1790  POKE TABLE,T2: XDRAW 1 AT HK * (4 + (X$
      = "5") + (X$ = "T") + (X$ = "G") + (X$ =
      "B")) + LE( FN F(I)), FN F(I) * VK: XDRAW
      2 AT HK * (4 + (X$ = "5") + (X$ = "T") +
      (X$ = "G") + (X$ = "B")) + LE( FN F(I)),
      FN F(I) * VK
1800  POKE TABLE,T1: XDRAW ASC (X$) - 31 AT
      HK * (4 + (X$ = "5") + (X$ = "T") + (X$ =
      "G") + (X$ = "B")) + LE( FN F(I)), FN F(
      I) * VK: GOSUB 820: NEXT
1810  GOTO 1970
1820  Z$ = "67YUHJNM": FOR I = 1 TO 8:X$ = MID$
      (Z$,I,1)
1830  POKE TABLE,T2: XDRAW 1 AT HK * (6 + (X$
      = "7") + (X$ = "U") + (X$ = "J") + (X$ =
      "M")) + LE( FN J(I)), FN J(I) * VK
1840  XDRAW 2 AT HK * (6 + (X$ = "7") + (X$ =
      "U") + (X$ = "J") + (X$ = "M")) + LE( FN
      J(I)), FN J(I) * VK
1850  POKE TABLE,T1: XDRAW ASC (X$) - 31 AT
      HK * (6 + (X$ = "7") + (X$ = "U") + (X$ =
      "J") + (X$ = "M")) + LE( FN J(I)), FN J(
      I) * VK: GOSUB 820: NEXT
1860  GOTO 1970
```

```
1520  HOME : PRINT  TAB( 12)"HOME KEY DRILL":
      PRINT : PRINT L$: PRINT "'?'=Help" TAB(
      28)"<ESC> to Menu"
1530  FOR I = 1 TO 8: VTAB 10: HTAB 5 + 3 * I
      : PRINT " " + MID$ (HK$,I,1)" ": NEXT
1540  INVERSE : FOR I = 1 TO 5: VTAB 7 + I: HTAB
      7: PRINT " ";: HTAB 32: PRINT " ";: NEXT
      : FOR J = 8 TO 12 STEP 4: FOR I = 7 TO 3
      2: VTAB J: HTAB I: PRINT " ";: NEXT : NEXT
      : NORMAL : PRINT
1550  VTAB 21: PRINT L$
1560  VTAB 22: HTAB 1: PRINT "Select by press
      ing the HOME KEY you want";: PRINT "to P
      ractice ";
1570  POKE - 16368,0: GET X$
1580  IF X$ =  CHR$ (27) THEN  GOSUB 620: GOTO
      950: REM <ESC>
1590  IF X$ = "?" THEN 2570: REM HELP (?)
1600  IF X$ =  CHR$ (91) THEN 1640
1610  FOR I = 1 TO 8: IF X$ =  MID$ (HK$,I,1)
      THEN LINE = I:I = 8: NEXT : GOSUB 820: GOTO
      1650
1620  NEXT
1630  IF X$ > " " THEN X$ =  CHR$ ( ASC (X$) -
      32): GOTO 1600
1640  GOSUB 860: GOTO 1570
1650  VTAB 10: HTAB 5 + LINE * 3: INVERSE : PRINT
      " " MID$ (HK$,LINE,1)" ";: NORMAL
1660  IF F1 THEN  GOSUB 780: GOTO 1680: REM S
      ET GRAPHICS
1670  POKE TABLE,T1: CALL 62450:X$ = "FINGER
      DRILL":H = 86:V = 4: GOSUB 690: GOSUB 78
      0: GOSUB 790
1680  ON LINE GOTO 1690,1720,1750,1780,1820,1
      870,1900,1930
1690  Z$ = "1QAZ": FOR I = 1 TO 4:X$ =  MID$ (
      Z$,I,1)
1700  POKE TABLE,T2: XDRAW 1 AT HK + LE(I), FN
      A(I) * VK: XDRAW 2 AT HK + LE(I), FN A(I
      ) * VK: POKE TABLE,T1: XDRAW  ASC (X$) -
      31 AT HK + LE(I), FN A(I) * VK: GOSUB 82
      0: NEXT
1710  GOTO 1970
1720  Z$ = "2WSX": FOR I = 1 TO 4:X$ =  MID$ (
      Z$,I,1)
1730  POKE TABLE,T2: XDRAW 1 AT 2 * HK + LE(I
      ), FN S(I) * VK: XDRAW 2 AT 2 * HK + LE(
      I), FN S(I) * VK: POKE TABLE,T1: XDRAW  ASC
      (X$) - 31 AT 2 * HK + LE(I), FN S(I) * V
      K: GOSUB 820: NEXT
1740  GOTO 1970
1750  Z$ = "3EDC": FOR I = 1 TO 4:X$ =  MID$ (
      Z$,I,1)
1760  POKE TABLE,T2: XDRAW 1 AT HK * 3 + LE( FN
      D(I)), FN D(I) * VK: XDRAW 2 AT 3 * HK +
      LE( FN D(I)), FN D(I) * VK: POKE TABLE,T
      1: XDRAW  ASC (X$) - 31 AT 3 * HK + LE( FN
      D(I)), FN D(I) * VK: GOSUB 820: NEXT
1770  GOTO 1970
1780  Z$ = "45RTFGVB": FOR I = 1 TO 8:X$ =  MID$
      (Z$,I,1)
1790  POKE TABLE,T2: XDRAW 1 AT HK * (4 + (X$
      = "5") + (X$ = "T") + (X$ = "G") + (X$ =
      "B") + LE( FN F(I)), FN F(I) * VK: XDRAW
      2 AT HK * (4 + (X$ = "5") + (X$ = "T") +
      (X$ = "G") + (X$ = "B")) + LE( FN F(I)),
      FN F(I) * VK
1800  POKE TABLE,T1: XDRAW  ASC (X$) - 31 AT
      HK * (4 + (X$ = "5") + (X$ = "T") + (X$ =
      "G") + (X$ = "B")) + LE( FN F(I)), FN F(
      I) * VK: GOSUB 820: NEXT
1810  GOTO 1970
1820  Z$ = "67YUHJNM": FOR I = 1 TO 8:X$ =  MID$
      (Z$,I,1)
1830  POKE TABLE,T2: XDRAW 1 AT HK * (6 + (X$
      = "7") + (X$ = "U") + (X$ = "J") + (X$ =
      "M")) + LE( FN J(I)), FN J(I) * VK
1840  XDRAW 2 AT HK * (6 + (X$ = "7") + (X$ =
      "U") + (X$ = "J") + (X$ = "M")) + LE( FN
      J(I)), FN J(I) * VK
1850  POKE TABLE,T1: XDRAW  ASC (X$) - 31 AT
      HK * (6 + (X$ = "7") + (X$ = "U") + (X$ =
      "J") + (X$ = "M")) + LE( FN J(I)), FN J(
      I) * VK: GOSUB 820: NEXT
1860  GOTO 1970
1870  Z$ = "8IK,": FOR I = 1 TO 4:X$ =  MID$ (
      Z$,I,1)
1880  POKE TABLE,T2: XDRAW 1 AT HK * 8 + LE( FN
      K(I)), FN K(I) * VK: XDRAW 2 AT HK * 8 +
      LE( FN K(I)), FN K(I) * VK: POKE TABLE,T
      1: XDRAW  ASC (X$) - 31 AT HK * 8 + LE( FN
      K(I)), FN K(I) * VK: GOSUB 820: NEXT
1890  GOTO 1970
1900  Z$ = "9OL.": FOR I = 1 TO 4:X$ =  MID$ (
      Z$,I,1)
1910  POKE TABLE,T2: XDRAW 1 AT HK * 9 + LE( FN
      L(I)), FN L(I) * VK: XDRAW 2 AT HK * 9 +
      LE( FN L(I)), FN L(I) * VK: POKE TABLE,T
      1: XDRAW  ASC (X$) - 31 AT HK * 9 + LE( FN
      L(I)), FN L(I) * VK: GOSUB 820: NEXT
1920  GOTO 1970
1930  Z$ = "0P;/": FOR I = 1 TO  LEN (Z$):X$ =
      MID$ (Z$,I,1)
1940  POKE TABLE,T2: XDRAW 1 AT HK * 10 + LE(
      FN C(I)), FN C(I) * VK
1950  XDRAW 2 AT HK * 10 + LE( FN C(I)), FN C
      (I) * VK
1960  POKE TABLE,T1: XDRAW  ASC (X$) - 31 AT
      HK * 10 + LE( FN C(I)), FN C(I) * VK: GOSUB
      820: NEXT
1970  VTAB 10: HTAB 5 + LINE * 3: PRINT " " MID$
      (HK$,LINE,1)" ";: ON F2 GOTO 2060
1980  IF LINE < 5 THEN F$ = "LEFT": FOR I = 1
      TO 4:K$(I) = F$(I): NEXT :F = LINE: GOTO
      2000
1990  F$ = "RIGHT": FOR I = 1 TO 4:K$(I) = F$(
      5 - I): NEXT :F = LINE - 4: REM SWAP FIN
      GER NAMES
2000  GOSUB 710: ON F1 GOSUB 710: ON F1 GOSUB
      760: ON F1 GOTO 2010:X$ = "THE OUTLINED
      KEYS ARE YOUR":V = X + 5:H = W + 3: GOSUB
      690:X$ = "DRILL KEYS.  TYPE USING ONLY":
      V = X + 14: GOSUB 690
2010  GOSUB 710:X$ = "YOUR " + F$ + " " + K$(
      F) + " FINGER.":H = W + 3:V = X + 23: GOSUB
      690
2020  IF F1 THEN  GOSUB 830: GOTO 2050: REM D
      ON'T PRINT <ESC> AGAIN
2030  GOSUB 740: GOSUB 750:X$ = " <ESC> TO ME
      NU":V = X + 5:H = W + 3: GOSUB 690: GOSUB
      800
2040  X$ = "BEGIN TYPING":V = X + 14:H = W + 2
      0: GOSUB 690: GOSUB 830:F2 = 1:F1 = 1
2050  POKE - 16368,0: GET X$: IF X$ < > CHR$
      (27) THEN 2070
2060  TEXT : POKE TABLE,T2: FOR I = 1 TO  LEN
      (Z$):X$ =  MID$ (Z$,I,1): ON LINE GOSUB
      870,880,890,900,910,920,930,940: NEXT :F
      2 = 0: GOTO 1560
2070  IF X$ >  CHR$ (96) THEN X$ =  CHR$ ( ASC
      (X$) - 32)
2080  FOR J = 1 TO  LEN (Z$): IF X$ =  MID$ (
      Z$,J,1) THEN J =  LEN (Z$): NEXT : GOSUB
      850: GOTO 2050
2090  NEXT : GOSUB 860: GOTO 2050
2100  REM
2110  REM   KEYBOARD TEST
2120  REM
2130  TEXT : HOME : PRINT  TAB( 13)"KEYBOARD
      TEST": PRINT L$: PRINT "'?'=Help" TAB( 2
      7)"<ESC> to Menu": POKE 34,3: HOME
2140  VTAB 8: HTAB 18: PRINT "10": PRINT : PRINT
      TAB( 18)"20": PRINT : PRINT  TAB( 18)"5
      0": PRINT : PRINT  TAB( 17)"100": VTAB 1
      8: PRINT "SELECT LENGTH OF TEST (# OF CH
      ARACTERS)": GOSUB 640
2150  CALL CUR,8,14,15,22: GOSUB 660: IF LINE
      > 100 THEN 2510: REM HELP
2160  IF LINE < 1 THEN  TEXT : GOSUB 620: GOTO
      950
2170  B = 10 * (LINE = 1) + 20 * (LINE = 2) +
      50 * (LINE = 3) + 100 * (LINE = 4)
2180  HOME
2190  INVERSE : VTAB 4: HTAB 18: PRINT "*****
      ": VTAB 5: HTAB 18: PRINT "*";: HTAB 22:
      PRINT "*": VTAB 6: HTAB 18: PRINT "*";:
      HTAB 22: PRINT "*": VTAB 7: HTAB 18: PRINT
      "*";: HTAB 22: PRINT "*": VTAB 8: HTAB 1
      8: PRINT "*****"
2200  VTAB 10: HTAB 15: PRINT "       ";:
      FOR I = 1 TO B / 10: VTAB 10 + I: HTAB
      15: PRINT " ";: HTAB 26: PRINT " ": NEXT
```

```
       : VTAB 10 + I: HTAB 15: PRINT "
          ": NORMAL : REM BIG BOX--12 SPACES IN
         QUOTES
2210   VTAB 6: HTAB 25: PRINT "INCORRECT": HTAB
       25: PRINT "RESPONSES SHOWN": HTAB 25: PRINT
       "AS ";: INVERSE : PRINT "INVERSE";: NORMAL
       : PRINT "."
2220   VTAB 22: PRINT LS: PRINT "Type the char
       acter that appears in the": PRINT "small
        box as it appears.";: HTAB 1: VTAB 3: PRINT
       "          ": REM 8 SPACES IN QUOTES
2230   POKE 33,10: POKE 32,15: POKE 34,10: POKE
       35,10 + B / 10: HOME : POKE 35,11 + B /
       10
2240   WR = 0: FOR J = 1 TO B:Y$ = MID$ (S$, LEN
       (S$) * RND (1) + 1.1): REM # WRONGS=WR
2250   POKE 1683, ASC (Y$) + 128: REM POKE CHA
       RACTER INTO TEXT SCREEN
2260   POKE  - 16368,0: GET X$
2270   IF X$ = CHR$ (27) THEN J = B: NEXT : GOTO
       2130
2280   IF X$ < CHR$ (32) THEN  GOSUB 860: GOTO
       2260
2290   IF X$ = Y$ THEN  PRINT X$;: NEXT : GOTO
       2320
2300   IF X$ > CHR$ (96) THEN X$ = CHR$ ( ASC
       (X$) - 32): GOTO 2290
2310   GOSUB 820: INVERSE : PRINT X$;: NORMAL
       :WR = WR + 1: NEXT
2320   VTAB 23: POKE 34,3: POKE 35,24: POKE 32
       ,0: POKE 33,40: REM RESET WINDOW
2330   VTAB 5: HTAB 1: PRINT "YOU GOT "B - WR;
       : VTAB 6: HTAB 1: PRINT "RIGHT ANSWERS";
       : VTAB 7: HTAB 1: PRINT "OUT OF "B".";: VTAB
       11
2340   PRINT : PRINT "THAT'S " INT (100 * (B -
       WR) / B)" %";
2350   VTAB 22: HTAB 1: CALL  - 958: VTAB 22: PRINT
       LS
2360   VTAB 23: HTAB 1: PRINT "Press <RETURN>
       to Continue...";: POKE  - 16368,0: GET X
       $: IF X$ = CHR$ (13) THEN 2130
2370   IF X$ = CHR$ (27) THEN  TEXT : GOSUB 6
       20: GOTO 950
2380   GOSUB 860: GOTO 2360
2390   REM SOUND ROUTINE
2400   DATA  20,29,35,43: REM LEFT EDGE OFFFSE
       T FOR EACH KEY ROW
2410   DATA  166,7,173,48,192,165,6,32,168,252,
       202,208,245,96
2420   DATA  A,S,D,F
2430   DATA  J,K,L,;
2440   DATA  LITTLE,RING,MIDDLE,INDEX
2450   DATA  0,7,9,5
2460   HOME : PRINT  TAB( 10)"MAIN MENU HELP S
       CREEN": PRINT : PRINT LS: POKE 34,5
2470   PRINT : PRINT "The LEARN HOME KEYS sele
       ction will ": PRINT : PRINT "teach which
       keys go with which finger": PRINT : PRINT
       "on the HOME KEY row."
2480   PRINT : PRINT : PRINT "The HOME FINGER
       DRILL will exercise ": PRINT : PRINT "ea
       ch HOME KEY finger over the range": PRINT
       : PRINT "of keys used by that finger."
2490   PRINT : PRINT : PRINT "The KEYBOARD TES
       T will provide a 'press": PRINT : PRINT
       "the right key' drill with scoring.": PRINT
       : PRINT LS
2500   VTAB 24: HTAB 1: PRINT "Press <RETURN>
       to Return to Main Menu";: GET X$: TEXT :
       GOSUB 620: GOTO 950
2510   TEXT : HOME : PRINT  TAB( 11)"KEYBOARD
       TEST HELP": PRINT : PRINT LS
2520   PRINT : PRINT "This is a test of ACCURA
       CY, not speed.": PRINT : PRINT "Each cor
       rect response to the framed": PRINT : PRINT
       "character will cause the same character
       ": PRINT : PRINT "to be printed in the l
       arger box.": PRINT
2530   PRINT : PRINT "An incorrect response wi
       ll produce a ": PRINT : PRINT "click, an
```

```
d the character will be print-": PRINT :
       PRINT "ed in INVERSE mode in the large
       box."
2540   PRINT : PRINT "The score is given at th
       e end of the ": PRINT : PRINT "exercise.
       ": VTAB 23: PRINT LS: VTAB 24: HTAB 1: PRINT
       "Press <RETURN> to Continue...";: GET X$
2550   VTAB 4: CALL  - 958: VTAB 6: HTAB 1: PRINT
       "REMEMBER:": PRINT : PRINT : PRINT "Keep
       your fingers over the appropriate": PRINT
       : PRINT "HOME KEYS.": PRINT : PRINT "Tak
       e your time.  Accuracy is more ": PRINT
       : PRINT "important than speed."
2560   VTAB 22: PRINT LS: VTAB 23: HTAB 1: PRINT
       "Press <RETURN> to Continue...";: GET X$
       : GOTO 2130
2570   HOME : PRINT  TAB( 7)"HOME KEY DRILL HE
       LP SCREEN": PRINT : PRINT LS: POKE 34,4
2580   PRINT : PRINT "This drill lets you prac
       tice with the": PRINT : PRINT "individua
       l HOME KEYS previously ": PRINT : PRINT
       "learned.  From the horizontal row of": PRINT
2590   PRINT "letters, select the finger you w
       ish to": PRINT : PRINT "practice with by
       pressing the": PRINT : PRINT "associate
       d HOME KEY."
2600   PRINT : VTAB 23: PRINT LS: VTAB 24: HTAB
       1: PRINT "Press <RETURN> to Continue..."
       ;: GET X$: HOME
2610   PRINT : PRINT "You may exit the exercis
       e by pressing": PRINT : PRINT "the ESC k
       ey while typing.  At that ": PRINT : PRINT
       "point, you may return to the main": PRINT
       : PRINT "menu or select another finger t
       o ": PRINT : PRINT "practice."
2620   VTAB 23: PRINT LS: VTAB 24: HTAB 1: PRINT
       "Press <RETURN> to Return to DRILL MENU"
       ;: GET X$: TEXT : GOTO 1520
2630   REM
2640   REM ** ONERR DOS ERRORS **
2650   REM
2660   IF  PEEK (222) = 6 THEN E$ = "BINARY FI
       LE NOT FOUND ON THIS DISK.": GOTO 2690
2670   IF  PEEK (222) = 8 THEN E$ = "DISK I/O
       ERROR ENCOUNTERED.":E1$ = "CHECK DRIVE D
       OOR AND RUN PROGRAM AGAIN": GOTO 2690
2680   E$ = "DOS ERROR # " PEEK (222)" ENCOUNT
       ERED.  ":E1$ = "CHECK YOUR DOS MANUAL FO
       R DETAILS.":
2690   VTAB 7: CALL  - 958: VTAB 10:X$ = E$: GOSUB
       2700: VTAB 12:X$ = E1$: GOSUB 2700: VTAB
       21:X$ = "FATAL ERROR -- CANNOT CONTINUE.
       ": GOSUB 2700: POKE 216,0: END
2700   HTAB 20 - LEN (X$) / 2: PRINT X$: RETURN
END OF LISTING 1
```

```
                    KEY PERFECT 5.0
                        RUN ON
                    KEYBOARD.TUTOR
      ===========================================
      CODE-5.0     LINE# - LINE#     CODE-4.0
      ---------                      ---------
      69C93C04       10  -    120       5C7A
      8C47EAB8      130  -    220       7943
      53EBD376      230  -    320       B040
      4A2D2577      330  -    420       0112BE
      62E80F9E      430  -    520       5856
      B0FE2C8E      530  -    620       A63C
      94BC2324      630  -    720       015F7A
      3BAEB47C      730  -    820       E91B
      0536A2B7      830  -    920       CD99
      599489E6      930  -   1020       ECB4
      64F938E8     1030  -   1120       010251
      453F2B9A     1130  -   1220       7F5B
      F7296E9D     1230  -   1320       010808
      42602A01     1330  -   1420       9E76
      74A97069     1430  -   1520       E852
      FEEE7DF8     1530  -   1620       9A5D
      B17A1EA2     1630  -   1720       BA62
      8B4A10C8     1730  -   1820       011FBD
      083C1D1A     1830  -   1920       0119B4
      AD15A7E5     1930  -   2020       01  8C
      7977A75F     2030  -   2120       A2ED
      D93F6FD3     2130  -   2220       014E10
      F1BBD13F     2230  -   2320       A3A3
      1F39C0FB     2330  -   2420       A600
      8DD1A67B     2430  -   2520       01355B
      092EA680     2530  -   2620       01D0CB
      0985FED5     2630  -   2700       AEE2
      2AEF48D8 = PROGRAM TOTAL =        306C
```

LISTING 2: CURSOR

```
SOURCE FILE: CURSOR SOURCE
0000:        1 ;..............................
0000:        2 ;.                               .
0000:        3 ;.            CURSOR             .
0000:        4 ;.        by Mark  R. Craven    .
0000:        5 ;.                               .
0000:        6 ;.          Modified from        .
0000:        7 ;.            CURSOR.BAR          .
0000:        8 ;.          by Jim Ganz          .
0000:        9 ;.        COPYRIGHT (C) 1984      .
0000:       10 ;.        by MicroSPARC, Inc      .
0000:       11 ;.        CONCORD, MA  01742      .
0000:       12 ;.                               .
0000:       13 ;. from NIBBLE December 1984      .
0000:       14 ;. SYNTAX:                        .
0000:       15 ;. CALL MEM,TOPLIM,BOTLIM,        .
0000:       16 ;.      LMRGIN,RMRGIN             .
0000:       17 ;.                               .
0000:       18 ;. TOPLIM=(1-24)  BOTLIM=1-24)    .
0000:       19 ;. LMRGIN=(1-40)  RMRGIN=(1-40)   .
0000:       20 ;.                               .
0000:       21 ;. Returns with LINE = PEEK(4)    .
0000:       22 ;.  ESC=LINE =0                   .
0000:       23 ;.  '?'=LINE = 255                .
0000:       24 ;.                               .
0000:       25 ;. e.g.   CALL 768,2,18,10,30     .
0000:       26 ;.                               .
0000:       27 ;. APPLESOFT TOOLKIT ASSEMBLER    .
0000:       28 ;.                               .
0000:       29 ;..............................
0000:       30 ;
0000:       31 ;..............................
0000:       32 ;.  Equates:                     .
0000:       33 ;..............................
0000:       34 ;
0000:       35 ;
FBC1:        36 BASCALC EQU  $FBC1
0028:        37 BASL    EQU  $28
0003:        38 BOTLIM  EQU  $03
DEBE:        39 CHKCOM  EQU  $DEBE
C010:        40 CLRKBD  EQU  $C010
DD67:        41 FRMNUM  EQU  $DD67
E6FB:        42 CONINT  EQU  $E6FB
C000:        43 KYBD    EQU  $C000
0004:        44 LINE    EQU  $04
9500:        45 MEM     EQU  $9500
0002:        46 TOPLIM  EQU  $02
0000:        47 ;
0006:        48 LMRGIN  EQU  $06      ;LEFT MARGIN
0007:        49 RMRGIN  EQU  $07      ;RIGHT MARGIN
0000:        50 ;
------ NEXT OBJECT FILE NAME IS CURSOR
9500:        51          ORG  MEM
9500:        52 ;
9500:        53 ;..............................
9500:        54 ;.    Initialize limits         .
9500:        55 ;..............................
9500:        56 ;
9500:20 BE DE 57          JSR  CHKCOM   ;Advance TXTPTR past comma
9503:20 67 DD 58          JSR  FRMNUM   ;Get variable/expression
9506:20 FB E6 59          JSR  CONINT   ;Convert to integer in X
9509:CA      60          DEX
950A:86 02   61          STX  TOPLIM
950C:86 04   62          STX  LINE
950E:20 BE DE 63          JSR  CHKCOM
9511:20 67 DD 64          JSR  FRMNUM
9514:20 FB E6 65          JSR  CONINT
9517:CA      66          DEX
9518:86 03   67          STX  BOTLIM
951A:20 BE DE 68          JSR  CHKCOM
951D:20 67 DD 69          JSR  FRMNUM
9520:20 FB E6 70          JSR  CONINT
9523:CA      71          DEX
9524:86 06   72          STX  LMRGIN   ;Left Margin Value
9526:20 BE DE 73          JSR  CHKCOM
9529:20 67 DD 74          JSR  FRMNUM
952C:20 FB E6 75          JSR  CONINT
952F:CA      76          DEX
9530:86 07   77          STX  RMRGIN   ;Right Margin Value
9532:        78 ;
9532:        79 ;..............................
9532:        80 ;. Highlight cursor line        .
9532:        81 ;. (change NORMAL to INVERSE)    .
9532:        82 ;..............................
9532:        83 ;
9532:A5 04   84 START    LDA  LINE
9534:20 C1 FB 85          JSR  BASCALC  ;Set BASL,H
9537:A4 07   86          LDY  RMRGIN   ;Right Margin
9539:B1 28   87 CLOOP1   LDA  (BASL),Y ;Get a Character
953B:C9 A0   88          CMP  #$A0     ;Is it a SPACE?
953D:D0 05   89          BNE  CBAR
953F:88      90          DEY
9540:10 F7   91          BPL  CLOOP1   ;Test for blank line
9542:30 13   92          BMI  LEFT
9544:A4 07   93 CBAR     LDY  RMRGIN
9546:B1 28   94 CLOOP4   LDA  (BASL),Y
9548:29 3F   95          AND  #$3F     ;Change it to inverse
954A:91 28   96          STA  (BASL),Y ;and put it back
954C:88      97          DEY
954D:C4 06   98          CPY  LMRGIN   ;Compare to left margin
954F:10 F5   99          BPL  CLOOP4   ;Loop til end of line
9551:       100 ;
9551:       101 ;..............................
9551:       102 ;. Wait for keypress            .
9551:       103 ;..............................
9551:       104 ;
9551:AD 10 C0 105          LDA  CLRKBD   ;Clear keyboard
9554:AE 00 C0 106 KLOOP    LDX  KYBD     ;Get keypress
9557:E0 88   107 LEFT     CPX  #$88     ;Is it a LEFT ARROW?
9559:F0 41   108          BEQ  CONT
```

```
955B:E0 8B   109          CPX  #$8B     ;Is it a DOWN ARROW?
955D:F0 3D   110          BEQ  CONT
955F:E0 95   111          CPX  #$95     ;Is it a RIGHT ARROW?
9561:F0 39   112          BEQ  CONT
9563:E0 8A   113          CPX  #$8A     ;Is it an UP ARROW?
9565:F0 35   114          BEQ  CONT
9567:E0 8D   115          CPX  #$8D     ;Is it a RETURN char?
9569:F0 17   116          BEQ  CALLER  ;Go exit if RETURN
956B:E0 BF   117          CPX  #$BF     ;Is it a '?'
956D:F0 06   118          BEQ  HELP    ;Load 255 into memory
956F:E0 9B   119          CPX  #$9B     ;Is it the ESC Character?
9571:F0 07   120          BEQ  ESC     ;Exit without a choice
9573:D0 DF   121          BNE  KLOOP   ;None of the above.
9575:A9 FE   122 HELP     LDA  #$FE     ;Help flag
9577:18      123          CLC
9578:90 1A   124          BCC  OUT1
957A:A9 00   125 ESC      LDA  #$00     ;Put zero in accumulator
957C:85 04   126          STA  LINE    ;Store the ESC flag
957E:F0 18   127          BEQ  OUT2
9580:D0 B0   128 BACK     BNE  START   ;Loop back to start
9582:       129 ;
9582:       130 ;..............................
9582:       131 ;. Return to caller             .
9582:       132 ;..............................
9582:       133 ;
9582:A4 07   134 CALLER   LDY  RMRGIN   ;Reset last line to NORMAL
9584:B1 28   135 CLOOP3   LDA  (BASL),Y
9586:09 80   136          ORA  #$80
9588:91 28   137          STA  (BASL),Y
958A:88      138          DEY
958B:C4 06   139          CPY  LMRGIN   ;Check left margin
958D:10 F5   140          BPL  CLOOP3
958F:A5 04   141          LDA  LINE
9591:38      142          SEC
9592:E5 02   143          SBC  TOPLIM
9594:85 04   144 OUT1     STA  LINE
9596:E6 04   145          INC  LINE
9598:AD 10 C0 146 OUT2     LDA  CLRKBD
959B:60      147          RTS           ;Exit
959C:       148 ;
959C:       149 ;..............................
959C:       150 ;. Lowlight cursor line         .
959C:       151 ;. (Change INVERSE to NORMAL)   .
959C:       152 ;..............................
959C:       153 ;
959C:A4 07   154 CONT     LDY  RMRGIN   ;Load right margin value
959E:B1 28   155 CLOOP2   LDA  (BASL),Y
95A0:09 80   156          ORA  #$80     ;Change to NORMAL
95A2:91 28   157          STA  (BASL),Y
95A4:88      158          DEY
95A5:C4 06   159          CPY  LMRGIN   ;Check left margin
95A7:10 F5   160          BPL  CLOOP2
95A9:A5 04   161          LDA  LINE
95AB:E0 95   162          CPX  #$95
95AD:F0 12   163          BEQ  RCONT
95AF:E0 8A   164          CPX  #$8A     ;Right arrow
95B1:F0 0E   165          BEQ  RCONT
95B3:       166 ;
95B3:       167 ;..............................
95B3:       168 ;. Move cursor up one line      .
95B3:       169 ;..............................
95B3:       170 ;
95B3:C5 02   171          CMP  TOPLIM   ;Are we above the top line?
95B5:D0 06   172          BNE  LCONT   ;No, so move up one line.
95B7:A5 03   173          LDA  BOTLIM   ;Wraparound to bottom line
95B9:85 04   174          STA  LINE
95BB:D0 C3   175          BNE  BACK    ;Always.
95BD:C6 04   176 LCONT    DEC  LINE
95BF:10 BF   177          BPL  BACK
95C1:       178 ;
95C1:       179 ;..............................
95C1:       180 ;. Move cursor down one line    .
95C1:       181 ;..............................
95C1:       182 ;
95C1:C5 03   183 RCONT    CMP  BOTLIM   ;Are we below the bottom line?
95C3:D0 06   184          BNE  RCONT1  ;No, so move down one line
95C5:A5 02   185          LDA  TOPLIM   ;Wraparound to top line.
95C7:85 04   186          STA  LINE
95C9:10 B5   187          BPL  BACK
95CB:E6 04   188 RCONT1   INC  LINE
95CD:D0 B1   189          BNE  BACK    ;Back to START

... SUCCESSFUL ASSEMBLY: NO ERRORS
END OF LISTING 2
```

LISTING 3: KEYS

```
9400- 02 00 06 00 84 00 35 3F
9408- 24 2D 35 36 3F 3F 24 24
9410- 2D 2D 35 36 36 3F 3F 3F
9418- 24 24 24 2D 2D 2D 35 36
9420- 36 36 3F 3F 3F 3F 24 24
9428- 24 24 2D 2D 2D 2D 35 36
9430- 36 36 36 3F 3F 3F 3F 3F
9438- 24 24 24 24 24 2D 2D 2D
9440- 2D 2D 35 36 36 36 36 36
9448- 3F 3F 3F 3F 3F 3F 24 24
9450- 24 24 24 24 2D 2D 2D 2D
9458- 2D 2D 35 36 36 36 36 36
9460- 36 3F 3F 3F 3F 3F 3F E7
9468- 24 24 24 24 24 64 08 2D
9470- 2D 2D 2D 2D 6D 12 36 36
9478- 36 36 36 B6 1B 3F 3F 3F
9480- 3F 3F 3F 00 C1 C1 C1 C1
9488- C1 C1 D8 DB 2D 2D 2D 2D
9490- 2D 6D 1A 15 36 36 36 36
9498- 36 B6 03 C1 1E 3F 3F 3F
94A0- 3F 3F FF 08 07 C1 24 24
94A8- 24 24 24 64 04 00
```

END OF LISTING 3

LISTING 4: FINGERS

```
8F00- 02 00 06 00 23 00 49 89
8F08- 3F 17 2D 2D 3E 3F 37 2D
8F10- 2D 3E 3F BF 0D 2D 0D 3E
8F18- DF 3B 2E 2D 2D B5 92 52
8F20- 01 00 00 49 49 49 3A 3F
8F28- BF 2D 2D 3E 3F 3F 3F 3F
8F30- BF 2D 2D 2D 2D F5 3F 3F
8F38- 3F 3F 17 2D 2D 2D 2D 1E
8F40- 3F 3F 3F 37 2D 2D B5 92
8F48- 52 49 49 00 00
```

END OF LISTING 4

LISTING 5: CHAR.SET

```
9000- 40 00 82 00 84 00 8B 00
9008- 91 00 9F 00 AD 00 BA 00
9010- C6 00 C9 00 D4 00 DD 00
9018- EC 00 F3 00 F8 00 FD 00
9020- 00 01 07 01 15 01 1D 01
9028- 28 01 35 01 42 01 4E 01
9030- 5A 01 65 01 71 01 7D 01
9038- 80 01 84 01 8E 01 96 01
9040- A0 01 AA 01 B7 01 C3 01
9048- CF 01 DC 01 E8 01 F4 01
9050- 00 02 0C 02 18 02 22 02
9058- 2A 02 37 02 40 02 4D 02
9060- 5A 02 66 02 70 02 7E 02
9068- 8C 02 97 02 A0 02 AB 02
9070- B6 02 C2 02 CE 02 D8 02
9078- E5 02 F3 02 FB 02 08 03
9080- 0E 03 00 00 B6 04 40 18
9088- 24 04 00 18 24 0D 36 04
9090- 00 83 24 6C 36 FF 16 2D
9098- 25 0C 16 17 FE 24 00 24
90A0- 74 39 3F 17 0E 0D 0E 1E
90A8- 27 1E 77 21 00 18 38 2C
90B0- 56 09 B8 17 17 17 4D 35
90B8- 27 00 20 1C 17 76 1E 76
90C0- 65 1C 8C B1 04 00 20 24
90C8- 00 1B 40 18 09 17 1E 36
90D0- 0E 0E 04 00 40 18 0E 0E
90D8- 36 1E 1E 04 00 24 34 50
90E0- F1 1E 18 1C 96 62 0D 0E
90E8- 1F B4 04 00 2D DF 27 48
90F0- B6 26 00 12 30 1E 04 00
90F8- 1B 2D 2D 04 00 92 04 00
9100- 40 B9 17 17 17 04 00 0C
9108- 0C 1C 3F 1E 36 2E 1E 0E
9110- 2D 0C 24 24 00 24 BC 96
9118- 31 3E 0D 04 00 65 E4 3F
9120- 1E 96 F1 CE 2D 2D 04 00
9128- 25 05 20 3F 3F 96 4A 09
9130- F6 3F 1C 04 00 2A 36 04
9138- 28 07 20 24 17 17 17 2E
9140- 04 00 28 1F 27 2C 2D B5
9148- 32 F6 3F 1C 04 00 39 3F
9150- 2C 60 2D 96 32 1E 3F 1C
9158- 24 00 1A 0C 0C 0C 3C 3F
9160- B7 92 31 04 00 39 E7 2C
9168- 28 75 B6 F6 3F 07 20 04
9170- 00 2D 24 07 38 F7 76 4E
9178- F1 1E 3F 04 00 B0 04 00
9180- B0 F6 04 00 1B 0C 0C 0C
9188- 96 92 1C 1C 04 00 D8 2D
9190- 2D D6 39 3F 27 00 09 07
9198- 38 E0 96 4A 1E 1E 04 00
91A0- 92 04 20 0C 0C 1C 3F 1E
91A8- 04 00 30 2E 2C 24 1C 3F
91B0- 1E 36 36 0E 2D 25 00 2A
91B8- 25 3C 38 B8 17 36 F5 6E
91C0- 09 24 00 3F 24 2C 2D 15
91C8- F6 0E F6 3F 27 24 00 09
91D0- 40 03 1C 3F 1E 36 36 15
91D8- 2D 0C 04 00 1B 24 2C 2D
91E0- 0E 36 36 17 3F 27 24 00
91E8- 25 40 3F 36 3E 2E 1E 36
91F0- 2D 2D 04 00 19 2D 40 18
91F8- 3F 3F 36 2E 1E 36 04 00
9200- 0A 46 36 3F 3F 20 24 2C
9208- 28 2D 04 00 2D 24 FC 1B
9210- 36 2E 1E 36 4D 21 24 00
9218- 40 18 2B F5 36 36 3E 0D
9220- 04 00 93 73 2D 0C 24 24
9228- 24 00 63 0C 0C DF 33 36
9230- 36 6E 09 07 38 20 00 1B
9238- 24 B4 12 36 2D 2D 04 00
9240- 64 05 30 36 36 FE 1B 24
9248- 24 24 0E 04 00 18 0E 0E
9250- 56 24 24 24 DF 33 36 36
9258- 26 00 1B 24 05 28 75 36
9260- 36 1E 3F 1C 24 00 65 3C
9268- 38 3F 36 2E 1E 36 04 00
9270- 8A 11 1C 07 68 24 3C 38
9278- F7 36 36 0E 25 00 65 3C
9280- 38 37 18 36 2E 0E 0E 0E
9288- DF 23 24 00 75 F6 3F 1C
9290- 44 1C 64 2D 0E 04 00 24
9298- 3C 6F 29 96 DA 36 04 00
92A0- 1B 24 6C 09 36 36 F6 3F
92A8- 1C 24 00 92 0C 0C 24 24
92B0- DF 33 36 AE 04 00 76 0E
92B8- 24 24 24 DF 33 36 36 66
92C0- 04 00 0C 0C FC 1B AE 16
92C8- 17 6E 09 E4 04 00 07 68
92D0- 0C FC 1B B6 4A 36 04 00
92D8- 17 1E 2E 2D 25 40 18 2B
92E0- 20 3F 3F 04 00 1B 24 2C
92E8- 2D F5 1B 36 36 2E 2D DF
92F0- 23 24 00 19 1C 1C 96 49
92F8- 0E 04 00 21 24 3F 6F 09
9300- 36 36 36 27 B4 3B 27 00
9308- B8 17 4D E1 04 00 92 1F
9310- 6D 25 00
```

END OF LISTING 5