80 Columns For The 64

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Did you ever wish for an 80-column screen? "Screen-80" transforms your 64 into an 80-column machine without affecting the normal screen editing keys. We've also included "Custom-80," which allows you to create your own 80-column character set with a joystick.

"Screen-80" offers a full 80-column screen and provides you the ability to use your 64 to write, edit, and even run BASIC programs (including some commercial software). You can also use all the cursor controls of the normal screen editor. It runs concurrently with the normal system, allowing a quick switch between 40- and 80-column modes.

Best of all, little memory is used by Screen-80. The program consists of approximately 3K of machine language which goes into RAM "underneath" ROM. There are also 43 bytes which are placed in a little used area of RAM (locations 710–753). Since the bulk of Screen-80 uses the same memory locations as the operating system, and the location of the 43 bytes used from RAM are normally unused anyway, Screen-80 works without any apparent loss of programming space.
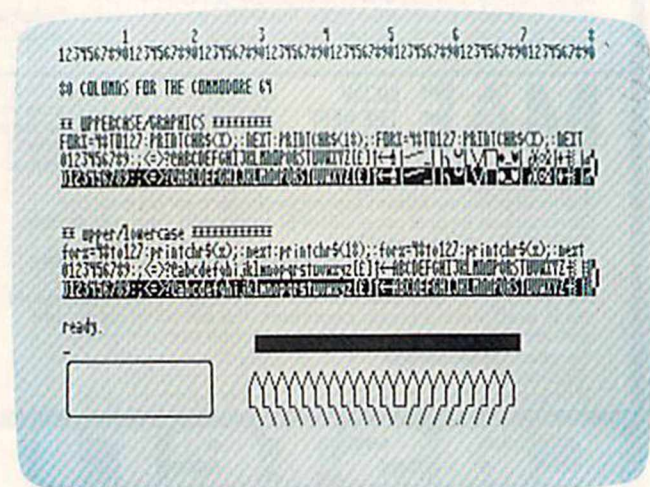
Using 80 Columns

Once you enter 80-column mode, the first thing you're likely to notice is the smaller size characters. Since increasing the size of the screen is impossible, adding 40 more columns to the 64 makes it necessary to halve the size of each character. Some televisions may not produce a clear enough picture to make these smaller characters readable, so you may find it difficult to read text in 80 columns. We recommend using a video monitor with the color turned off. You may want to change the character set to suit your personal taste or needs. "Custom-80" (discussed later) is designed to let you do just that.

Screen-80 provides a different cursor than does the normal 40-column mode. Rather than a blinking block, it uses an underline character; but like the normal cursor, it can move anywhere on the screen. In fact, you can use all the cursor
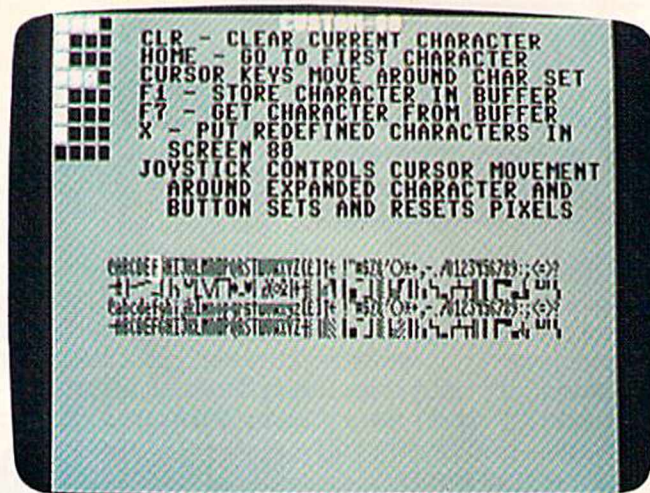
control keys, just as you would normally, to insert or delete, home the cursor, clear the screen, or create BASIC program lines.

Both uppercase/graphics and lower/uppercase modes are supported in Screen-80, but you cannot toggle between these modes with the SHIFT-Commodore key combination. Instead, you can put the screen editor in lower-/uppercase mode by pressing the CTRL and N keys simultaneously, or by printing CHR$(14). To return to uppercase/graphics mode, simply print CHR$(142) to the screen. These methods affect only characters printed after these commands. Thus, you may have both sets (for example, graphics and lowercase) on the screen at the same time for increased programming flexibility.

You can change the color of the background, text, or border by simply POKEing the appropriate color number into location 53281 (for the background), location 646 (for text), or location 53280 (for the border). Changing text color changes the color of all text on the screen. If you want to change the background or text color during program mode, print a CHR$(13) after POKEing the appropriate location. Since color memory is fixed on the 64, it's impossible to have true 80-column color. Therefore, Screen-80 does not recognize color codes in PRINT state-

Graphics, upper- and lowercase can be displayed simultaneously with Screen-80.

Redefining characters is easy with Custom-80.

ments as being any different from other graphics characters. All printing to the screen uses the color specified in location 646.

Graphics And Sound Routines

Screen-80 can be used with sprites, high-resolution graphics, and sound—just like the normal 64 screen. Since this program actually uses a hi-res screen, you can also use it for other graphics displays. You can even have text and hi-res graphics on the screen at the same time. (Check your *Programmer's Reference Guide* for more detailed information on how to plot points on the hi-res screen.)

To plot points (or do anything else) to the hi-res screen, it is important to know how to POKE and PEEK to the screen. The hi-res screen for Screen-80 is located at 57344 ($E000). Since this screen memory shares addresses with ROM, you may POKE graphics safely to the screen, but attempting to PEEK from the screen will give you values from the ROMs. To PEEK these screen locations, you must first disable interrupts, then use location 1 to reconfigure the 64. Location 1 allows you to selectively replace ROM locations with RAM—making it possible to have a full 64K of RAM on the 64. Once you reconfigure the 64, you can PEEK locations on the screen. Since the operating system must access the ROMs to function properly, you must immediately restore the 64 to its normal configuration and re-enable interrupts. Here's an example of how to do it in BASIC:

```
10 POKE 56334,PEEK(56334)AND254:REM DISAB
   LE INTERRUPTS
20 POKE 1,53:REM RECONFIGURE 64
30 PRINT PEEK(57344): REM PEEK THE FIRST
   {SPACE}BYTE OF SCREEN RAM
40 POKE 1,55:REM RETURN 64 TO NORMAL
```

```
50 POKE 56334,PEEK(56334)OR1:REM REENABLE
   INTERRUPTS
```

Using sprites in Screen-80 requires all sprite data to be kept within the same 16K block as the hi-res screen. Locations 49152 ($C000) to 53247 ($CFFF) are perfect places to put sprite data. The sprite pointers for Screen-80 are located at 53248+2040 to 53248+2047. To cause sprite 0 to get its data from 49152 ($C000), put a zero into location 53248+2040. Since POKEs to this area of memory are normally intercepted by the I/O chip, we must disable interrupts and I/O to put a value into these locations. Here's a program to put a sprite onto the screen:

```
10 V = 53248
20 POKE V,100:POKE V+1,100
30 POKE V+39,2
40 POKE 56334,PEEK(56334)AND254
50 POKE 1,PEEK(1)AND251
60 POKE 53248+2040,0
70 POKE 1,PEEK(1)OR4
80 POKE 56334,PEEK(56334)OR1
90 POKE V+21,1
```

Creating sound from within Screen-80 is done exactly the same way as from the normal screen. In fact, since you want to POKE the information to the SID chip (in the I/O area), you don't have to disable interrupts or do any bank switching, as was necessary for hi-res graphics or sprites. The normal POKEs will do.

Using Other Programs With Screen-80

This program is designed to intercept any calls to the normal Kernal PRINT routine ($FFD2). Software which bypasses this routine or POKEs directly to the screen will not work correctly with Screen-80. An example of a program which bypasses the PRINT vector is the DOS wedge program (on the TEST/DEMO disk which comes with 1541 disk drives). Fortunately, this problem can easily be fixed by changing all PRINTs to pass through the standard vector. This program, when used in place of the normal DOS boot program ("C-64 Wedge"), changes these references.

```
10 IF A=0THENA=1:LOAD"DOS 5.1",8,1
20 FORI=1TO7 : READ A:POKEA,210: POKE A+1
   ,255:NEXT
30 DATA 52644,52650,52712,52726,52752,527
   65,53075
40 SYS 52224
```

With these changes, the DOS support program will work with Screen-80.

One of the best applications of Screen-80 is with terminal software. We tested Screen-80 with the terminal software that comes with the VICmodem and the 1650 Automodem by Commodore. Since both programs use the standard

PRINT vector, they work fine. Programs which depend on sprites should be avoided, as should programs which move screen memory or otherwise change the normal configuration of the 64.

SpeedScript does not use the PRINT vector at $FFD2 to update the screen, which makes it incompatible with Screen-80.

How To Enter And Use Screen-80

Like most machine language programs in COMPUTE!'s GAZETTE, Screen-80 is listed in MLX format. That means you must first type in the MLX program and then use it to enter Screen-80. The newest version of MLX has a built-in numeric keypad to ease the burden of typing all those numbers (see the MLX article for details). Initially, Screen-80 resides in the same area as the beginning of BASIC. To protect MLX from being overwritten by Screen-80, we'll use a starting address of 49152 and an ending address of 52811. Once you've entered the program and saved it to tape or disk, turn your computer off and then on again.

Now LOAD the program from disk or tape using the normal format for LOADing BASIC programs:

    LOAD "filename",8 (for disk)
    LOAD "filename" (for tape)

Notice that we LOADed our program without the ,1 that generally accompanies ML programs. If the program loaded correctly, you can LIST it. You should see one line with a SYS command. Simply RUN the program and you'll have Screen-80. Pressing RUN/STOP–RESTORE will put you into 40-column mode, and typing SYS710 and pressing RETURN will bring back 80 columns. You can make a backup copy by simply saving it as you would a BASIC program:

    SAVE "filename",8 (for disk)
    SAVE "filename" (for tape)

At this point, type NEW to begin programming in 80 columns.

Custom-80: Creating Your Own Character Set

"Custom-80" (Program 2) allows you to create your own character set for use with Screen-80. It's easy to use and requires a joystick. Custom-80 "borrows" the character set from Screen-80 and then moves it to a safe location in memory for editing. After editing, you can return the custom characters to the Screen-80 program, or save your new character set to disk or tape. Like Screen-80, it's in MLX format. The starting address is 49152 and the ending address is

51240. To load Custom-80, type:

    LOAD"CUSTOM-80",8,1 (for disk)
    LOAD"CUSTOM-80",1,1 (for tape)

After loading it into memory, type NEW to reset the BASIC pointers. Next, LOAD Screen-80 into memory and SYS 49152. This puts you in Custom-80 and, at the same time, accesses the character set included with Screen-80.

The Screen-80 character set is displayed in the lower half of the screen, while the current character being edited is framed by a yellow cursor. In the upper-left corner of the screen the character is enlarged for editing, and brief instructions are provided to the right.

Customizing Characters

You can choose which character you want to edit by moving the cursor around the screen using the joystick or the cursor keys. The flashing blue square indicates the current pixel in the character you are editing. To set the pixel, press the fire button on the joystick. To reset the pixel, press the fire button again.

Press SHIFT and CLR/HOME to clear all the pixels in the character you're editing. (This will not affect the characters previously edited.) To home the cursor to the first character, press CLR/HOME without pressing SHIFT. To copy a character from one position to another, press f1 to store the current character into the buffer. Then move the cursor to the new position of the character and press f7 to retrieve it from the buffer.

Pressing S saves the character set to tape or disk as a short program file. It can then be loaded back into memory with the L command. When loading or saving, you will first be asked for the name of the file, then asked to press T for tape or D for Disk. If an error occurs during a

Programming in BASIC with 80 columns.

disk operation, the program will return with the error message.

If you wish to make the new character set a permanent part of Screen-80, press X. This puts the redefined character set back into Screen-80 and exits to BASIC. You can then save the new version of Screen-80 to disk with the redefined characters already in the program by entering:

SAVE"SCREEN-80",1 (for tape)
SAVE"SCREEN-80",8 (for disk)

The next time you run Screen-80, you'll have your new character set in the program.

If you wish to use various character sets with Screen-80, you should save the character sets to tape or disk using the method just discussed and load the individual character sets by using Program 3 while in Screen-80. This program LOADs the new character set into Screen-80 *after* it is activated. When the program prompts you for the name of the character set you want to load, enter the filename, comma, and the number of the device you want to LOAD the character set from. Use 8 for disk, 1 for tape.

One important note: You cannot SYS to Custom-80 from Screen-80. You must press RUN/STOP–RESTORE to leave Screen-80 before typing SYS 49152 to run Custom-80.

How It Works

First, Custom-80 performs a block memory move of the character set data from Screen-80 to 12288 ($3000). This is done to make it easier to display the character set at the bottom of the screen.

Next, a raster interrupt splits the screen to show both the redefined character set and the normal character set. The instructions and the enlarged character are printed on the top half of the screen. The enlarged character is a 4×8 matrix of reverse SHIFT-Os. Before entering the main loop, all variables are initialized.

The main loop has two major routines. The first routine checks the joystick and keyboard. If a key is pressed, the appropriate flag is set. Pressing X sends the program to the routine that moves the character set back into Screen-80. The S key saves a character set, while the L key loads a character set.

The second routine prints the enlarged character on the screen. If any flags were set, this routine handles them. It takes care of the save-to-buffer routine, the get-from-buffer routine, the clear-character routine, and the routine that handles the flashing of the blue cursor in the enlarged character.

See program listings on page 158. @

```
265 I=ASC(A$)-64:IFI<1THENPRINT"NO DOOR":
    PRINT"NO MOVE":GOSUB4050:GOTO275
                                        :rem 10
270 R=I:P%(Q+25)=I                      :rem 218
275 GOSUB4050                           :rem 231
276 PRINT"{CLR}{2 DOWN}YOU ARE IN":PRINT"
    THE ";:X=R+22:GOSUB3000              :rem 229
280 PRINT"YOU HAVE";:X=P%(31+Q)+1:IFX=1TH
    ENPRINT" NO ITEM":GOTO290            :rem 1
285 PRINT" THE ";:GOSUB3000             :rem 9
290 P=0:PRINT"YOU SEE:":FORI=0TO21:rem 84
295 IFP%(I)=RTHENX=I+1:PRINT"THE ";:GOSUB
    3000:P=1                            :rem 210
300 NEXT:IFP%(24)=RTHENGOSUB3100:P=1
                                        :rem 193
305 FORJ=1TO6:IFJ<>QANDP%(J+25)=RTHENPRIN
    T"PLAYER"J:P=1                       :rem 1
310 NEXT:IFP=0THENPRINT"NOTHING!":rem 145
315 INPUT"{DOWN}PRESS {RVS}RETURN{WHT}";A
    $                                   :rem 162
400 PRINT"{CLR}{DOWN}{BLK}{3 SPACES}OPTIO
    NS:{2 SPACES}"                      :rem 255
401 PRINT"{DOWN}{BLU}1 ACCUSE":PRINT"2 DR
    OP":PRINT"3 TAKE":PRINT"4 SEARCH"    :rem 69
405 PRINT"5 PILFER":PRINT"6 NO ACTION":PR
    INT"{DOWN}{BLK}CHOOSE NOW!"         :rem 127
415 GETA$:I=VAL(A$):ONIGOTO600,700,750,80
    0,850,500                          :rem 0
420 GOTO415                             :rem 105
500 INPUT"{DOWN}PRESS {RVS}RETURN{WHT}";A
    $                                   :rem 158
505 Q=Q+1:IFQ>P%(38)THENQ=1             :rem 76
510 IFP%(Q+25)=0THEN505                 :rem 4
515 GOTO200                             :rem 102
600 P=1:W=0:Z=10:GOSUB3200:INPUT"{DOWN}VI
    CTIM";J:IFJ<>P%(25)THENP=0          :rem 25
605 GOSUB3200:INPUT"{DOWN}MURDERER";J:IFJ
    <>P%(22)THENP=0                     :rem 141
610 W=10:Z=12:GOSUB3200:INPUT"{DOWN}WEAPO
    N";J:IFJ<>P%(23)THENP=0             :rem 81
615 W=22:Z=14:GOSUB3200:INPUT"{DOWN}SCENE
    ";J:IFJ<>ABS(P%(24))THENP=0         :rem 39
650 IFPTHENPRINT"{CLR}{3 DOWN}THAT'S RIGH
    T!":PRINT"YOU WIN!":GOTO670         :rem 177
655 PRINT"{CLR}{2 DOWN}WRONG SOLUTION!":P
    RINT"{DOWN}YOU LOSE!"               :rem 190
660 P%(25+Q)=0:P%(39)=P%(39)+1:GOSUB3300:
    IFP%(39)<P%(38)THEN500              :rem 149
665 PRINT"{DOWN}ALL PLAYERS HAVE LOST!"
                                        :rem 3
670 PRINT"{DOWN}{RED}THE SOLUTION:":PRINT
    "{BLK}{DOWN}THE ";:X=P%(22):GOSUB3000
                                        :rem 113
673 PRINT"KILLED THE ";:X=P%(25):GOSUB300
    0                                   :rem 187
675 PRINT"IN THE ";:X=22+ABS(P%(24)):GOSU
    B3000                               :rem 84
678 PRINT"WITH THE ";:X=P%(23)+10:GOSUB30
    00:END                             :rem 226
700 GOSUB3300:IFX=0THENPRINT"DROP NO ITEM
    ":GOTO500                          :rem 116
705 PRINT"YOU DROP THE ";:GOSUB3000:GOTO5
    00                                 :rem 64
750 P=1:PRINT"AVAILABLE:":FORI=10TO21:IFP
    %(I)=RTHENGOSUB3400                 :rem 11
760 NEXT:IFP=1THENPRINT"NO ITEMS":GOTO500
                                        :rem 138
765 INPUT"CHOOSE";Z:IFZ<0ORZ>=PTHEN765
                                        :rem 242
770 IFZ=0THENPRINT"TAKE NOTHING":GOTO500
                                        :rem 56
775 GOSUB3300:IFX>0THENPRINT"DROP THE ";:
    GOSUB3000                          :rem 70
780 I=PEEK(900+Z):P%(I)=100+Q:P%(Q+31)=I:
    X=I+1:PRINT"YOU TAKE THE ";:GOSUB3000
    :GOTO500                           :rem 244
800 P=0:PRINT"{DOWN}YOU FIND:":FORI=0TO21
    :IFP%(I)<>-RORRND(1)>.6THEN810      :rem 232
805 P=1:PRINT"THE ";:X=I+1:GOSUB3000:P%(I
    )=R                                 :rem 75
810 NEXT:IFP%(24)=-RANDRND(1)<.6THENP=1:G
    OSUB3100:P%(24)=R                  :rem 194
820 IFP=0THENPRINT"--NOTHING"          :rem 87
825 GOTO500                             :rem 109
850 P=0:PRINT"{DOWN}NOW HERE:":FORI=1TO6:
    IFP%(25+I)=RANDI<>QTHENPRINT"PLAYER #
    "I:P=1                             :rem 138
860 NEXT:IFP=0THENPRINT"NOBODY!":GOTO500
                                        :rem 87
865 INPUT"STEAL FROM WHOM";W:IFW<0ORW>P%(
    38)THEN865                         :rem 182
870 IFP%(25+W)<>RTHENPRINT"NOT HERE!":GOT
    O865                               :rem 245
875 GOSUB3300:IFX>0THENPRINT"DROP THE ";:
    GOSUB3000                          :rem 71
880 P=P%(W+31):IFP=0THENPRINT"NOTHING TAK
    EN":GOTO500                        :rem 241
885 P%(Q+31)=P:P%(W+31)=0:P%(P)=100+Q:X=P
    +1:PRINT"YOU TAKE THE ";:GOSUB3000:GO
    TO500                              :rem 14
3000 FORJ=1TOX:READX$:NEXT:PRINTX$:RESTOR
     E:RETURN                          :rem 99
3100 X=P%(25):PRINT"THE BODY OF":PRINT"TH
     E ";:GOSUB3000:RETURN             :rem 243
3200 PRINT"{CLR}{BLK}":FORI=1TOZ:X=I+W:PR
     INTITAB(4)": THE ";:GOSUB3000:NEXT:R
     ETURN                             :rem 62
3300 I=P%(Q+31):X=0:IFI=0THENRETURN
                                        :rem 127
3305 P%(I)=R:P%(Q+31)=0:X=I+1:RETURN    :rem 68
3400 PRINTPTAB(4)":THE ";:X=I+1:GOSUB3000
     :POKE900+P,I:P=P+1:RETURN         :rem 10
4000 DATACOOK,BUTLER,GARDENER,DOCTOR,DUKE
     ,DUCHESS,NANNY,"FILM STAR"        :rem 129
4005 DATASENATOR,JUDGE,KNIFE,ROPE,POISON,
     MACE,PISTOL,SWORD,"ICE PICK"      :rem 5
4010 DATABOMB,RAZOR,LAMP,CLUB,SHOVEL,FOYE
     R,CORRIDOR,HALL,PANTRY,"DINING ROOM"
                                        :rem 92
4015 DATAKITCHEN,STUDY,BEDROOM,BATHROOM,C
     LOSET,GREENHOUSE,GARDEN,POOL:rem 197
4020 DATAGARAGE,NORTH,EAST,SOUTH,WEST
                                        :rem 197
4050 FORI=1TO1200:NEXT:RETURN          :rem 96
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80-Columns

(Article on page 48.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Screen-80

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49152 :011,008,000,000,158,050,227
49158 :048,054,049,000,000,000,157
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49164 :160,044,185,065,008,153,115
49170 :198,002,136,192,255,208,241
49176 :245,160,000,169,160,133,123
49182 :252,132,251,169,008,133,207
49188 :254,169,109,133,253,177,107
49194 :253,145,251,200,208,249,068
49200 :165,252,201,173,240,007,062
49206 :230,254,230,252,076,042,114
49212 :008,076,198,002,169,054,055
49218 :133,001,032,000,160,169,049
49224 :055,133,001,096,072,169,086
49230 :054,133,001,104,032,028,174
49236 :162,072,169,055,133,001,164
49242 :104,096,072,169,054,133,206
49248 :001,104,032,148,161,072,102
49254 :169,055,133,001,104,096,148
49260 :169,090,141,250,255,169,158
49266 :169,141,251,255,173,002,081
49272 :221,009,003,141,002,221,205
49278 :169,252,045,000,221,141,186
49284 :000,221,169,032,013,017,072
49290 :208,141,017,208,169,072,185
49296 :141,024,208,169,000,141,059
49302 :244,173,169,011,141,134,254
49308 :002,169,000,141,243,173,116
49314 :133,212,141,236,173,169,202
49320 :015,141,033,208,169,015,237
49326 :141,032,208,032,244,160,223
49332 :032,003,164,169,210,141,131
49338 :038,003,169,002,141,039,066
49344 :003,169,226,141,036,003,002
49350 :169,002;141,037,003,032,070
49356 :099,160,096,160,000,185,136
49362 :116,160,141,227,173,032,035
49368 :042,162,200,192,129,208,125
49374 :242,096,147,013,029,029,010
49380 :029,029,029,029,029,029,146
49386 :029,029,029,029,029,029,152
49392 :029,029,029,029,029,029,158
49398 :029,029,029,029,056,048,210
49404 :032,067,079,076,085,077,156
49410 :078,083,032,070,079,082,170
49416 :032,084,072,069,032,067,108
49422 :079,077,077,079,068,079,217
49428 :082,069,032,054,052,017,070
49434 :017,157,157,157,157,157,060
49440 :157,157,157,157,157,157,206
49446 :157,157,157,157,157,157,212
49452 :157,157,157,157,157,066,127
49458 :089,032,071,082,069,071,208
49464 :071,032,080,069,069,076,197
49470 :069,017,017,157,157,157,124
49476 :157,157,157,157,157,157,242
49482 :157,157,157,157,157,157,248
49488 :065,078,068,032,075,069,211
49494 :086,073,078,032,077,065,241
49500 :082,084,073,078,160,000,057
49506 :173,033,208,041,015,170,226
49512 :173,134,002,010,010,010,187
49518 :010,141,237,173,138,013,054
49524 :237,173,032,058,169,153,170
49530 :000,208,153,000,209,153,077
49536 :000,210,200,008,032,074,140
49542 :169,040,208,216,160,231,134
49548 :032,058,169,153,000,211,251
49554 :032,074,169,136,192,255,236
49560 :208,242,096,072,169,001,172
49566 :141,244,173,104,032,042,126
49572 :162,169,000,141,244,173,029
49578 :165,198,240,252,120,032,153
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49584 :180,229,201,131,208,016,117
49590 :162,009,120,134,198,189,226
49596 :230,236,157,118,002,202,109
49602 :208,247,240,228,201,013,051
49608 :208,209,160,007,032,058,106
49614 :169,177,251,077,223,173,252
49620 :145,251,032,074,169,160,019
49626 :079,132,208,032,058,169,128
49632 :177,209,201,032,208,003,030
49638 :136,208,244,200,132,200,070
49644 :160,000,132,211,132,212,059
49650 :165,202,048,060,165,202,060
49656 :133,211,197,200,144,052,161
49662 :176,094,165,153,208,014,040
49668 :165,009,133,202,173,222,140
49674 :173,133,201,133,214,076,172
49680 :190,161,032,074,169,076,206
49686 :102,241,160,007,032,058,110
49692 :169,177,251,077,223,173,074
49698 :145,251,032,074,169,076,013
49704 :062,161,152,072,138,072,185
49710 :165,208,240,230,032,058,211
49716 :169,164,211,177,209,133,091
49722 :215,032,074,169,041,063,140
49728 :006,215,036,215,016,002,042
49734 :009,128,144,004,166,212,221
49740 :208,004,112,002,009,064,219
49746 :032,074,169,230,211,032,062
49752 :132,230,196,200,208,026,056
49758 :169,000,133,208,169,013,018
49764 :166,153,224,003,240,006,124
49770 :166,154,224,003,240,003,128
49776 :032,042,162,169,013,032,050
49782 :074,169,133,215,104,170,215
49788 :104,168,165,201,201,222,175
49794 :208,002,169,255,024,096,116
49800 :072,165,154,201,003,208,171
49806 :004,104,076,042,162,076,094
49812 :213,241,072,141,227,173,191
49818 :152,072,138,072,169,000,245
49824 :141,235,173,032,070,162,205
49830 :032,068,168,032,146,168,012
49836 :104,170,104,168,104,096,150
49842 :173,227,173,032,132,230,121
49848 :208,006,169,001,141,235,176
49854 :173,096,173,227,173,201,209
49860 :032,144,003,076,097,162,198
49866 :076,194,162,201,096,176,083
49872 :023,201,064,176,003,076,239
49878 :174,162,201,128,240,082,177
49884 :056,173,227,173,233,064,122
49890 :141,227,173,076,174,162,155
49896 :201,127,144,009,240,044,229
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52608 :234,000,206,170,170,170,054
52614 :170,170,174,000,196,170,246
52620 :170,202,138,138,132,002,154
52626 :198,168,168,196,162,162,176
52632 :172,000,234,074,074,074,012
52638 :074,074,078,000,170,170,212
52644 :170,170,174,174,074,000,158
52650 :170,170,074,068,068,164,116
52656 :164,000,226,034,066,079,233
52662 :066,130,226,002,066,130,034
52668 :066,130,066,130,066,130,008
52674 :082,169,084,162,089,164,176
52680 :082,169,012,012,012,012,243
52686 :012,012,012,012,015,100,013
52692 :000,000,240,240,240,240,148
52698 :008,008,008,008,008,008,010
52704 :008,248,161,081,161,081,196
52710 :161,081,161,081,004,009,215
52716 :002,004,169,082,164,089,234
52722 :050,050,050,051,050,050,031
52728 :050,050,002,002,002,003,101
52734 :048,048,048,048,000,000,190
52740 :000,224,032,032,047,047,130
52746 :002,002,002,063,032,032,143
52752 :032,032,002,002,002,254,084
52758 :034,034,034,034,140,140,182
52764 :140,140,140,140,140,140,100
52770 :063,063,048,048,048,048,096
52776 :048,048,240,240,240,000,088
52782 :000,015,015,015,000,032,123
52788 :032,032,172,108,044,012,196
52794 :050,050,050,062,000,000,014
52800 :000,000,204,204,204,204,112
52806 :003,003,003,003,000,013,095
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Program 2: Custom-80

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49152 :169,000,032,144,255,169,001
49158 :132,133,178,169,003,133,242
49164 :179,169,075,133,251,169,220
49170 :018,133,252,169,000,133,211
49176 :253,169,048,133,254,160,017
49182 :000,177,251,145,253,200,032
49188 :208,249,230,252,230,254,179
49194 :165,252,201,023,208,239,106
49200 :169,011,141,033,208,169,011
49206 :000,141,134,002,141,032,248
49212 :208,169,147,032,210,255,057
49218 :169,000,141,062,003,141,070
49224 :170,195,141,160,195,141,050
49230 :172,195,141,173,195,169,099
49236 :008,032,210,255,169,005,251
49242 :141,165,195,169,013,141,146
49248 :248,007,169,007,141,039,195
49254 :208,169,001,141,021,208,082
49260 :169,000,168,153,064,003,153
49266 :200,192,064,208,248,169,171
49272 :252,141,064,003,141,091,044
49278 :003,160,003,169,132,153,234
49284 :064,003,200,200,200,192,223
49290 :026,144,246,032,073,199,090
49296 :032,159,192,032,198,194,183
49302 :032,248,194,032,049,194,131
49308 :076,144,192,162,000,160,122
49314 :000,024,032,240,255,173,118
49320 :160,195,041,001,201,001,255
49326 :240,005,169,240,076,183,063
49332 :192,169,015,141,163,195,031
49338 :173,160,195,074,010,133,163
49344 :251,169,000,133,252,006,235
49350 :251,038,252,006,251,038,010
49356 :252,169,048,024,101,252,026
49362 :133,252,173,163,195,073,175
49368 :255,141,166,195,160,000,109
49374 :169,018,032,210,255,177,059
49380 :251,045,163,195,141,162,161
49386 :195,162,000,173,163,195,098
49392 :201,015,240,012,078,162,180
49398 :195,078,162,195,078,162,092
49404 :195,078,162,195,173,162,193
49410 :195,041,008,240,005,169,148
49416 :001,076,014,193,169,000,205
49422 :032,146,193,141,134,002,150
49428 :169,207,032,210,255,173,042
49434 :162,195,041,004,240,005,161
49440 :169,001,076,039,193,169,167
49446 :000,232,032,146,193,141,014
49452 :134,002,169,207,032,210,030
49458 :255,173,162,195,041,002,110
49464 :240,005,169,001,076,065,100
49470 :193,169,000,232,032,146,066
49476 :193,141,134,002,169,207,146
49482 :032,210,255,173,162,195,077
49488 :041,001,240,005,169,001,025
49494 :076,091,193,169,000,232,079
49500 :032,146,193,141,134,002,228
49506 :169,207,032,210,255,169,116
49512 :013,032,210,255,173,163,182
49518 :195,201,015,240,012,014,019
49524 :162,195,014,162,195,014,090
49530 :162,195,014,162,195,177,003
49536 :251,045,166,195,013,162,192
49542 :195,145,251,200,192,008,101
49548 :240,003,076,222,192,096,201
49554 :141,164,195,140,169,195,126
49560 :173,170,195,240,008,169,083
49566 :000,141,164,195,141,162,193
49572 :195,173,172,195,240,006,121
49578 :173,162,195,153,178,002,009
49584 :173,173,195,240,006,185,124
49590 :178,002,141,162,195,204,040
49596 :061,003,208,106,236,060,094
49602 :003,208,101,238,062,003,041
49608 :173,000,220,041,016,208,090
49614 :067,205,063,003,240,065,081
49620 :141,063,003,169,004,056,136
49626 :237,060,003,168,169,001,088
49632 :136,240,004,010,076,224,146
49638 :193,141,168,195,073,255,231
49644 :141,167,195,173,162,195,245
49650 :045,168,195,208,015,173,022
49656 :162,195,045,167,195,013,001
49662 :168,195,141,162,195,076,167
49668 :021,194,173,162,195,045,026
49674 :167,195,141,162,195,076,178
49680 :021,194,141,063,003,173,099
49686 :062,003,201,050,144,014,240
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49692 :201,100,144,005,169,000,135
49698 :141,062,003,169,014,141,052
49704 :164,195,173,164,195,172,079
49710 :169,195,096,206,165,195,048
49716 :208,065,173,000,220,041,247
49722 :015,141,162,195,041,001,101
49728 :208,003,206,061,003,173,206
49734 :162,195,041,002,208,003,169
49740 :238,061,003,173,162,195,140
49746 :041,004,208,003,206,060,092
49752 :003,173,162,195,041,008,158
49758 :208,003,238,060,003,173,011
49764 :162,195,201,015,240,008,153
49770 :169,051,141,062,003,032,052
49776 :120,194,169,005,141,165,138
49782 :195,096,173,060,003,201,078
49788 :255,208,008,169,003,141,140
49794 :060,003,206,160,195,173,159
49800 :060,003,201,004,208,008,108
49806 :169,000,141,060,003,238,241
49812 :160,195,173,061,003,201,173
49818 :255,208,014,169,007,141,180
49824 :061,003,173,160,195,056,040
49830 :233,064,141,160,195,173,108
49836 :061,003,201,008,208,014,155
49842 :169,000,141,061,003,173,213
49848 :160,195,024,105,064,141,105
49854 :160,195,169,016,141,063,166
49860 :003,096,173,160,195,074,129
49866 :074,074,074,074,074,141,201
49872 :053,003,173,160,195,041,065
49878 :063,141,052,003,173,053,187
49884 :003,010,010,010,024,105,126
49890 :153,141,001,208,173,052,186
49896 :003,010,010,024,105,055,183
49902 :141,000,208,169,000,042,030
49908 :141,016,208,096,169,000,106
49914 :141,170,195,141,171,195,239
49920 :141,172,195,141,173,195,249
49926 :032,228,255,208,001,096,058
49932 :201,147,208,006,169,001,232
49938 :141,170,195,096,201,019,072
49944 :208,006,169,000,141,160,196
49950 :195,096,201,157,208,008,127
49956 :169,255,141,060,003,076,228
49962 :120,194,201,029,208,008,034
49968 :169,004,141,060,003,076,245
49974 :120,194,201,145,208,008,162
49980 :169,255,141,061,003,076,253
49986 :120,194,201,017,208,008,046
49992 :169,008,141,061,003,076,018
49998 :120,194,201,088,208,003,124
50004 :076,124,195,201,133,208,253
50010 :006,169,001,141,172,195,006
50016 :096,201,136,208,006,169,144
50022 :001,141,173,195,096,201,141
50028 :083,208,004,032,125,197,245
50034 :096,201,076,208,004,032,219
50040 :046,197,096,096,169,075,031
50046 :133,251,169,018,133,252,058
50052 :169,000,133,253,169,048,136
50058 :133,254,160,000,177,253,091
50064 :145,251,200,208,249,230,147
50070 :252,230,254,165,252,201,224
50076 :023,208,239,000,000,000,114
50082 :000,000,000,000,000,000,162
50088 :000,000,000,000,000,000,168
50094 :158,029,029,029,029,029,221
50100 :029,029,029,029,029,029,098
50106 :029,029,029,029,029,067,142

50112 :085,083,084,079,077,045,133
50118 :056,048,013,144,029,029,005
50124 :029,029,029,029,067,076,207
50130 :082,032,045,032,067,076,032
50136 :069,065,082,032,067,085,104
50142 :082,082,069,078,084,032,137
50148 :067,072,065,082,065,067,134
50154 :084,069,082,013,029,029,028
50160 :029,029,029,029,072,079,251
50166 :077,069,032,045,032,071,060
50172 :079,032,084,079,032,070,116
50178 :073,082,083,084,032,067,167
50184 :072,065,082,065,067,084,187
50190 :069,082,013,029,029,029,009
50196 :029,029,029,067,085,082,085
50202 :083,079,082,032,075,069,190
50208 :089,083,032,077,079,086,222
50214 :069,032,065,082,079,085,194
50220 :078,068,032,067,072,065,170
50226 :082,032,083,069,084,013,157
50232 :029,029,029,029,029,029,230
50238 :070,049,032,045,032,083,117
50244 :084,079,082,069,032,067,225
50250 :072,065,082,065,067,084,253
50256 :069,082,032,073,078,032,190
50262 :066,085,070,070,069,082,016
50268 :013,029,029,029,029,029,250
50274 :029,070,055,032,045,032,105
50280 :071,069,084,032,067,072,243
50286 :065,082,065,067,084,069,030
50292 :082,032,070,082,079,077,026
50298 :032,066,085,070,070,069,002
50304 :082,013,029,029,029,029,083
50310 :029,029,029,032,045,032,133
50316 :080,085,084,032,082,069,060
50322 :068,069,070,073,078,069,061
50328 :068,032,067,072,065,082,026
50334 :065,067,084,069,082,083,096
50340 :032,073,078,013,029,029,162
50346 :029,029,029,029,032,032,094
50352 :083,067,082,069,069,078,112
50358 :032,056,048,013,029,029,133
50364 :029,029,029,029,074,079,201
50370 :089,083,084,073,067,075,153
50376 :032,067,079,078,084,082,110
50382 :079,076,083,032,067,085,116
50388 :082,083,079,082,032,077,135
50394 :079,086,069,077,069,078,164
50400 :084,013,029,029,029,029,181
50406 :029,029,032,032,065,082,243
50412 :079,085,078,068,032,069,135
50418 :088,080,065,078,068,069,178
50424 :068,032,067,072,065,082,122
50430 :065,067,084,069,082,032,141
50436 :065,078,068,013,029,029,030
50442 :029,029,029,029,032,032,190
50448 :066,085,084,084,079,078,236
50454 :032,083,069,084,083,032,149
50460 :065,078,068,032,082,069,166
50466 :083,069,084,083,032,080,209
50472 :073,088,069,076,083,000,173
50478 :032,224,197,008,173,215,127
50484 :198,208,002,040,096,040,124
50490 :176,031,169,008,170,160,004
50496 :000,032,186,255,173,215,157
50502 :198,162,199,160,198,032,251
50508 :189,255,169,000,162,000,083
50514 :160,048,032,213,255,032,054
50520 :234,198,096,032,203,199,026
50526 :169,008,162,001,160,000,082
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50532 :032,186,255,173,215,198,135
50538 :162,199,160,198,032,189,022
50544 :255,169,000,170,160,048,146
50550 :032,213,255,032,236,199,061
50556 :096,032,224,197,008,173,086
50562 :215,198,208,002,040,096,121
50568 :040,176,042,032,045,199,158
50574 :169,008,170,160,255,032,168
50580 :186,255,173,215,198,162,057
50586 :199,160,198,032,189,255,163
50592 :169,048,133,252,169,000,163
50598 :133,251,169,251,162,000,108
50604 :160,056,032,216,255,032,155
50610 :234,198,096,032,203,199,116
50616 :169,008,162,001,160,000,172
50622 :032,186,255,173,215,198,225
50628 :162,199,160,198,032,189,112
50634 :255,169,048,133,252,169,204
50640 :000,133,251,169,251,162,150
50646 :000,160,056,032,216,255,165
50652 :032,236,199,096,160,000,175
50658 :162,011,024,032,240,255,182
50664 :169,032,162,040,032,210,109
50670 :255,202,208,250,160,000,033
50676 :162,011,024,032,240,255,200
50682 :162,000,189,192,198,032,255
50688 :210,255,232,224,007,208,112
50694 :245,162,000,169,164,032,010
50700 :210,255,138,072,032,228,179
50706 :255,168,104,170,152,201,044
50712 :000,240,243,201,020,240,200
50718 :042,201,034,240,235,201,215
50724 :013,240,065,201,032,144,219
50730 :227,201,128,176,223,224,197
50736 :016,240,219,157,199,198,053
50742 :232,072,169,157,032,210,158
50748 :255,104,032,210,255,169,061
50754 :164,032,210,255,076,014,049
50760 :198,224,000,240,193,169,072
50766 :157,032,210,255,169,032,165
50772 :032,210,255,169,157,032,171
50778 :210,255,032,210,255,202,230
50784 :169,164,032,210,255,076,234
50790 :014,198,142,215,198,160,005
50796 :000,162,011,024,032,240,065
50802 :255,162,017,169,032,032,013
50808 :210,255,202,208,250,174,139
50814 :215,198,208,001,096,160,236
50820 :000,162,011,024,032,240,089
50826 :255,162,000,189,216,198,134
50832 :032,210,255,232,224,018,091
50838 :208,245,032,228,255,240,078
50844 :251,201,068,240,009,201,102
50850 :084,208,243,056,008,076,069
50856 :172,198,024,008,160,000,218
50862 :162,011,024,032,240,255,130
50868 :162,017,169,032,032,210,034
50874 :255,202,208,250,040,096,213
50880 :159,078,065,077,069,058,186
50886 :155,000,000,000,000,000,097
50892 :000,000,000,000,000,000,204
50898 :000,000,000,000,000,000,210
50904 :153,018,084,146,065,080,250
50910 :069,032,079,082,032,018,022
50916 :068,146,073,083,075,063,224
50922 :032,183,255,041,191,208,120
50928 :001,096,162,011,160,000,158
50934 :024,032,240,255,169,018,216
50940 :032,210,255,169,150,032,076
50946 :210,255,169,000,032,189,089
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50952 :255,169,015,162,008,160,009
50958 :015,032,186,255,032,192,214
50964 :255,162,015,032,198,255,169
50970 :032,207,255,032,210,255,249
50976 :201,013,208,246,169,015,116
50982 :032,195,255,032,204,255,243
50988 :096,169,002,160,199,162,064
50994 :071,032,189,255,169,015,013
51000 :168,162,008,032,186,255,099
51006 :032,192,255,169,015,032,245
51012 :195,255,096,073,048,120,087
51018 :169,127,141,013,220,169,145
51024 :001,141,026,208,173,060,177
51030 :003,141,018,208,169,027,140
51036 :141,017,208,169,199,141,199
51042 :021,003,169,250,141,020,190
51048 :003,088,169,147,032,210,241
51054 :255,160,000,169,195,133,254
51060 :252,169,174,133,251,177,248
51066 :251,240,011,032,210,255,097
51072 :200,208,246,230,252,076,060
51078 :121,199,169,008,133,251,247
51084 :169,006,133,252,165,251,092
51090 :133,253,165,252,024,105,054
51096 :212,133,254,162,000,160,049
51102 :004,138,145,251,169,000,097
51108 :145,253,232,200,192,036,198
51114 :208,243,165,251,024,105,142
51120 :040,133,251,165,252,105,098
51126 :000,133,252,165,253,024,241
51132 :105,040,133,253,165,254,114
51138 :105,000,133,254,224,128,014
51144 :208,211,096,120,169,000,236
51150 :141,026,208,169,255,141,122
51156 :013,220,169,049,141,020,056
51162 :003,169,234,141,021,003,021
51168 :169,000,141,021,208,088,083
51174 :169,147,032,210,255,096,115
51180 :032,073,199,169,001,141,083
51186 :021,208,169,004,141,136,153
51192 :002,096,173,018,208,201,178
51198 :146,208,021,169,000,141,171
51204 :018,208,169,028,141,024,080
51210 :208,169,001,141,025,208,250
51216 :104,168,104,170,104,064,218
51222 :169,146,141,018,208,169,105
51228 :021,141,024,208,169,001,080
51234 :141,025,208,076,049,234,255
51240 :000,000,000,000,000,000,040
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Program 3: Custom Character Loader

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10 INPUT"FILENAME:";N$,D           :rem 205
20 F$=N$:ZK=PEEK(53)+256*PEEK(54)-LEN(F$)
   :POKE 782,ZK/256                :rem 180
25 POKE781,ZK-PEEK(782)*256:POKE780,LEN(F
   $):SYS65469                     :rem 39
30 POKE780,1:POKE781,D:POKE782,0:SYS65466
                                   :rem 177
40 POKE780,0:POKE781,222:POKE782,169:SYS6
   5493                            :rem 115
50 CLOSE1:PRINT:PRINT"{CLR}"CHR$(142)
                                   :rem 90
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BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.