

The program also uses machine code subroutines to open or close up space. Although this could be done in BASIC, it would be unacceptably slow in even a medium-size program, with thousands of bytes to be moved every time.

There are two machine code routines: UP to make extra space; and DOWN to close up unneeded space. Details of the block of program to be moved are passed to the machine code through the memory locations CURR, LAST and DIFF.

For the subroutine UP, the following memory locations need to be initialised:

CURR: address of bottom of block to be moved  
 LAST: one less than address of top of block to be moved  
 DIFF: number of bytes to be freed

and for DOWN they need to be initialised as:

CURR: address of top of block to be moved  
 LAST: one less than address of bottom of block to be moved  
 DIFF: number of bytes to be reclaimed

Note that the two subroutines start at opposite ends of the block to be moved and make the moves in opposite directions. This is to avoid the data being overwritten before it has been moved.

To use the BBC version of the variable replace program, you first need to type in (or LOAD) and RUN the Assembly language program to put the machine code into memory. Then LOAD the program to be altered and type in:

P% = PAGE

This passes the start address of the program to the variable replacement program. Then set PAGE to a value above LOMEM, and LOAD and RUN the variable replacement program. You can get back to the altered program with:

HIMEM = PAGE - 1  
 PAGE = P%

To use the Commodore 64 version of the program you also need to get the machine code into memory; either with the BASIC loader program or by assembling the source code. If you assemble the source code, or load the machine code directly as machine code, you will need to POKE zeros into addresses 36864, 36865 and 36866. This is equivalent to NEWing the alternate program area.

After loading the machine code, SYS 49152 will change from one program area to the other. If you forget where you are, you can find out with PRINT PEEK (44), which will give 8 for the normal program area and 144 for the alternate program area.

Once you have the machine code in the computer, you can LOAD the program to be altered into the normal program area and the variable replacement program into the alternate program area, then RUN the variable replacement program.

## C64 Switch And Copy

```

10 ADDR=49152
20 FOR LINE=1000 TO 1180 STEP 10
30 S=0
40 FOR ADDR = ADDR TO ADDR+7
50 READ BYTE
60 POKE ADDR,BYTE
70 S=S+BYTE
80 NEXT ADDR
90 READ CHECKSUM
100 IF S<CHECKSUM THEN PRINT"DATA ERROR IN
    LINE";LINE:END
110 NEXT LINE
120 POKE36864,0:POKE36865,0:POKE36866,0
1000 DATA162,0,164,44,192,8,208,9,787
1010 DATA160,160,32,72,192,169,144,208,1137
1020 DATA7,160,144,32,72,192,169,8,784
1030 DATA162,1,134,43,133,44,134,45,696
1040 DATA133,46,160,0,177,45,170,200,931
1050 DATA177,45,224,0,208,240,201,0,1095
1060 DATA208,236,230,45,208,2,230,46,1205
1070 DATA136,16,247,165,45,133,47,133,922
1080 DATA49,165,46,133,48,133,50,96,720
1090 DATA134,51,132,52,134,55,132,56,746
1100 DATA202,136,134,53,132,54,96,160,967
1110 DATA0,177,251,164,255,145,251,160,1403
1120 DATA0,196,251,208,2,198,252,198,1305
1130 DATA251,165,253,197,251,208,234,165,1724
1140 DATA254,197,252,208,228,96,164,255,1654
1150 DATA177,251,160,0,145,251,230,251,1465
1160 DATA208,2,230,252,165,253,197,251,1558
1170 DATA208,236,165,254,197,252,208,230,1750
1180 DATA96,0,0,0,0,0,0,96
  
```

## BBC Copy

```

10 MODE 7
20 HIMEM=HIMEM-8:100
30 CURR = &70
40 LAST = &74
50 DIFF = &78
60 FOR PASS = 1 TO 2
70 P%=HIMEM
800 OPT 1
90 .UP LDY #0
100 .UP1 LDA (CURR),Y
110 LDY DIFF
120 STA (CURR),Y
130 LDY #0
140 CPY CURR
150 BNE UP2
160 DEC CURR+1
170 .UP2 DEC CURR
180 LDA LAST
190 CMP CURR
200 BNE UP1
210 LDA LAST+1
220 CMP CURR+1
230 BNE UP1
240 RTS
250 .DOWN LDY DIFF
260 LDA (CURR),Y
270 LDY #0
280 STA (CURR),Y
290 INC CURR
300 BNE DOWN1
310 INC CURR+1
320 .DOWN1 LDA LAST
330 CMP CURR
340 BNE DOWN
350 LDA LAST+1
360 CMP CURR+1
370 BNE DOWN
380 RTS
390]
400 NEXT PASS
410PRINT"UP","DOWN
  
```

## Variable Replacement

### Commodore 64

Make the following changes to the program on page 700:

```

30005 INPUT "REPLACE BY"; RS
30006 CURR = 251
30007 LAST = 253
30008 DI = 255
30035 GOSUB 30500
30036 IF ERR THEN PRINT "CAN'T FIND END OF
    PROGRAM": END
30060 IF NXTLINE = 0 THEN END
30065 CURRLINE = TEXTPTR
delete line 30085
30460 IF NAMES = TS THEN GOSUB 30600
30465 IF ERR THEN PRINT "NO ROOM AT LINE";
    LINENO: END
  
```

### BBC Micro

Make the following changes to the program on page 665:

```

30005 INPUT "Replace by"; REPLACEMENTS
30006 CURR = &70
30007 LAST = &74
30008 DIFF = &78
30055 GOSUB 30500
30056 IF Outofroom THEN PRINT "Can't find end
    of program": PRINT "PAGE in wrong place?":
    END
30060 Textpointer = P%
30070 IF Lineno > 32767 THEN END
30105 Lengthbyte = Textpointer
30460 IF Name$ = Target$ THEN GOSUB 30600
30465 IF Outofroom THEN PRINT "No room at
    line"; Lineno: END
  
```