

Chapter 39 - Whole-Machine Capstone

The previous chapters describe cards one at a time. This last program puts four of them in the same BASIC listing: VideoChip draws the picture, SoundChip plays the chord, the file block writes a short note to the disk volume, and the coprocessor block reports that no 6502 service is running yet. It is not a large program. Its purpose is to show the book's central rule in one place: every part is reached through the same machine.

39.1 Type the program

```
10 REM WHOLE MACHINE CAPSTONE
20 FB=&H00100000:ST=320*4
30 POKE32 &H000F0004,&H04:POKE32 &H000F0080,0:POKE32 &H000F0084,FB:POKE32 &H000F0000,1
40 BLIT FILL FB,320,200,&H00001830,ST
50 BLIT FILL FB+40*ST+40*4,240,80,&H00105090,ST
60 BLIT LINE 0,0,319,199,&H00FFFFFF:BLIT LINE 0,199,319,0,&H00FFCC40
70 POKE32 &H000F0800,1:SOUND 0,262,180,1,128:SOUND 1,330,140,2
80 ENVELOPE 0,4,8,180,16:ENVELOPE 1,4,8,180,16
90 GATE 0,ON:GATE 1,ON:SOUND FILTER 190,80,1:SOUND REVERB 70,100
100 N=&H00730000:D=&H00730100
110 POKE8 N,67:POKE8 N+1,65:POKE8 N+2,80:POKE8 N+3,46
120 POKE8 N+4,84:POKE8 N+5,88:POKE8 N+6,84:POKE8 N+7,0
130 POKE8 D,73:POKE8 D+1,69
140 POKE32 &H000F2200,N:POKE32 &H000F2204,D:POKE32 &H000F2208,2:POKE32 &H000F220C,2
150 PRINT "FILE ";PEEK32(&H000F2210)
160 R=MEMALLOC(8,4):S=MEMALLOC(16,4):POKE32 R,123
170 Q=COCALL(3,1,R,4,S,4):PRINT "COP ";PEEK32(&H000F234C)
180 FOR T=1 TO 30:NEXT T
190 GATE 0,OFF:GATE 1,OFF
RUN
FILE 0
COP 6
```

You should see a VideoChip screen with a coloured panel and crossed lines. You should hear a short two-voice chord with filter and reverb. The file status line should print FILE 0, meaning the write succeeded. On a clean machine with no 6502 worker running, the coprocessor error line should print COP 6, meaning COPROC_ERR_NO_WORKER.

39.2 What each part proves

Lines 20 to 60 use the VideoChip framebuffer and blitter. The program chooses the 320 by 200 mode, points FB_BASE at VRAM, fills two rectangles, and draws two diagonal lines.

Lines 70 to 90 use the IE-native SoundChip. They enable the master mixer, set two voices, add envelopes, open the gates, and apply the shared filter and reverb stages.

Lines 100 to 150 use the file block directly. The program writes the NUL-terminated name string "CAP.TXT" and two data bytes into RAM, points the file registers at those buffers, writes the byte count, and fires FILE_OP_WRITE.

Lines 160 and 170 use the coprocessor block. The request and response buffers come from public MEMALLOC memory, as required by COCALL. The call asks CPU type 3, the 6502, to handle operation 1. Since this capstone does not start a service

program, the expected result is the documented `COPROC_ERR_NO_WORKER` path. Chapter 32 shows the positive service pattern when a worker file is present.

The important detail is not the size of the program. It is that the same BASIC listing touches display memory, audio registers, disk I/O, and cross-CPU control registers without changing computers.