

E II SERVICE HINTS

This section presents typical service problems and techniques we've found helpful in solving them. We'll begin with "Dead Machine" problems (disk won't load).

The normal power sequence is as follows:

Power on. Display shows:

Emulator 2
Boot in Progress

2. If a diskette is properly locked into the upper drive, the display shows:

Insert Diskette

3. If a diskette is properly locked into the upper drive, the display shows:

Emulator 2
Software rev N.N

for about 2 seconds.

NOTE: N.N is the revision number of the software on the disk (e.g. 1.8).

4. The software will take about 30 seconds to load. The display will change to:

This will take a while

5. When the software has loaded properly, the display will show the name of the sound in the instrument, for example:

P01 Flute #1

The instrument will now play and function normally.

SERVICE NOTE: _____

Be sure you have a good disk before attempting to diagnose
a disk loading problem.

PROBLEM 1

SYMPTOM:

1. The disk won't load
2. The display shows:
Emulator 2
Boot in progress
3. The disk drive clicks 3 times and stops.
4. Nothing else happens.

BACKGROUND:

The loader software in EPROM initializes the E II System, and loads the operating system software from diskette into main memory. It then gives control of the E II to the operating system software. If the program was read correctly from the diskette, but a main memory location is faulty, the program code in that location will be wrong and the system will fail. If the program is read from diskette into main memory correctly, but into the wrong RAM segment, the loader will pass control to a blank memory correctly, but the communication between the Scanner CPU and the Main CPU is faulty, the system will hang up when the Main CPU interrogates the Scanner CPU and fails to get an answer.

DIAGNOSIS:

1. Run the disk based memory test.

If the test loads and starts running, the disk drive and its control circuitry are OK. (See the Memory Test Disk instructions p 6A-1)

2. If the disk won't load, the disk drive or its control circuitry may be faulty. DO NOT ASSUME DISK FAILURE AT THIS POINT. A memory failure can still be the problem. You must use the optional ROM based memory test. Proceed to test the main memory. (See the Main Debug EPROM Instructions, p 6B-1)

If the disk did not load correctly and memory tested OK or if the disk loaded correctly and the memory tested OK, then look for a memory segment selection problem. Memory segments are selected through a register set shown on page 6 of the digital board schematics. These registers are in IC 84. Check IC 84 and its support IC's.

PROBLEM 2

SYMPTOM:

1. The disk won't load.

2. The display shows:

```
***Emulator 2***  
Boot in progress
```

3. The display changes to:

```
Insert Diskette
```

4. Nothing else happens.

BACKGROUND:

During the boot process, the system reads disk drive status to determine how many drives are present and whether or not a diskette is properly latched into place. If neither drive indicates that it has a diskette in place or if the system can't read drive status, the "Insert Diskette" message is displayed. The system determines that a diskette is present by reading the index pulses generated by the spinning diskette.

DIAGNOSIS:

1. If the instrument has 2 disk drives, put the diskette into the lower drive and attempt to boot the system.

If the system boots successfully, the upper drive is faulty. Check the cables to the upper drive and check the upper drive power supply voltages (+12, +5, GND).

If the upper drive seems to be faulty and the cable and supply voltages are OK, swap the drive for a new one.

2. If neither drive boots, check the cables and supply voltages to the drives. If these are OK and the drives do not spin at boot time, the problem is most likely IC1 or IC2 on the digital board. Check the MOTOR ON signal.

If the drive motor comes on, check to see that the index pulse is present. This low going pulse occurs every 200 ms. If it is present, the SIO is probably not working. If it is not present, the drive is probably faulty.

If the cables and supply voltages are OK and the drives spin at boot time, the problem is most likely the SIO. Check the index pulse.

PROBLEM 3

SYMPTOM:

1. The disk won't load

2. The display shows;

```
***Emulator 2***  
Boot in progress
```

3. The disk drive doesn't click and its light doesn't flash. The display doesn't change.

BACKGROUND:

The Scanner CPU is working since the sign-on message is on the display. This is a main CPU problem. The Main CPU Z80 requires a clock to work, and generates a synchronizing signal (M1) at every opcode fetch cycle.

DIAGNOSIS:

1. Check the clock signal. It should switch between 0V. and +5V. and have a period of 250ns. If it is not present, check the clock circuitry.

If the clock is present, check for M1. This signal should switch between 0V. and +5V. M1 is not symmetrical signal like the clock signal. It should look very irregular.

If M1 is not present, the Z-80 could be faulty. If swapping it out doesn't help, one of the other LSI devices (SIO, PIA, CTC, DMA) may have shorted M1 input.

If M1 repeats a pattern, or looks like a square wave, the CPU is likely stuck in a loop. Swap out the PIO. If the PIO is faulty, the Scanner CPU and Main CPU can't communicate and the program will hang.

2. If the clock and M1 are present, and you have the optional Main Debug EPROM, install it in the EPROM socket and turn on the instrument. If the Debug program runs, the Z-80, EPROM socket and UART are OK. So are the data, address, and control lines. Use the Debug program to check memory and the disk drives (See Main Debug instructions p 6B-1).

SERVICE NOTE:

If you have not become familiar with the Debug program by using it on a working instrument, do not attempt to learn it while repairing a broken one. Swap out the digital board at this point.

3. If you do not have the optional Main Debug EPROM, OR the Debug program doesn't run, the easiest (and fastest) way to get the instrument running is to swap out the Digital Board. If time is not a consideration, the following procedure may be helpful:

Check the EPROM decode circuitry. If it is faulty, the Z-80 can't read its program.

Check the WAIT line. It's used to synchronize memory to the Z-80. If it isn't working, the CPU won't be able to read memory to run a program.

Check the memory decode circuitry. Same reason as above.

Check the data and address lines. They should all have irregular signals on them. The signals should all switch between 0V. and +5V. If a line continually is floating at about 2V. there is something wrong.

NOTE: Data lines float for part of every CPU cycle.

A stuck line indicates that an output from some device on the line has failed and will not tri-state (turn off). A floating line indicates that all devices are tri-stated and nobody is talking to the line. Shorts and broken traces are possible, but highly unlikely unless the instrument has been recently modified or repaired.

If all lines look OK, swap out the Digital Board

If a line is stuck, remove components on the buss until the line becomes active or floats. The last thing you removed is probably the failing part.

If a line is constantly floating, swap out buffers to the buss until the line becomes active. If this doesn't help, swap out the Z-80.

If these things don't help, swap out the Digital Board.

PROBLEM 4

SYMPTOM:

1. No display.
2. Random LED's lit.
3. The disk drive clicks 3 times and stops.

BACKGROUND:

Since the disk drive clicked, the Main CPU is working. The blank display and LED failure indicate a Scanner CPU problem.

DIAGNOSIS:

1. Check for a clock signal to the Scanner Z-80.
2. Check for M1 from the Scanner Z-80.
3. Check for a READ signal to the Scanner CPU EPROM.
4. Check the data and address busses. See the explanation in problem 3.