# TROUBLESHOOTING

# 3

CHAPTER

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## 3.1 MODULAR TROUBLESHOOTING

Modular troubleshooting enables isolation of malfunction to the items listed in Table 3-1, and is accomplished using the following test sequence, which verifies the operation of the main CPU unit, monitor, keyboard, and FDDs. Table 3-2 lists tools necessary for modular testing. Table 3-3 lists the IPL error codes, and Table 3-4 is a troubleshooting reference guide for determining malfunctioning ICs according to malfunction symptom.

**NOTE:** *Units received from the field should be carefully inspected for signs of misuse or shipping damage. Note the packing materials used to ship the system, if applicable, and look for protective spacers between the read/write heads and for the shipping support at the option port.*

TABLE 3-1. MODULAR SUBASSEMBLIES

| REPLACEMENT MODULE/COMPONENT | PART NUMBER |
|---|---|
| Q10PS Power Supply Board Unit (100/115V) | Y130203000 |
| Fan Unit | Y130501000 |
| APX-ISYM Control Board Unit (without ROMs) | Y141201000 |
| Z-80A CPU | X400007801 |
| 8088-2 CPU | X400080881 |
| 2764 BIOS EPROM | Y141800102 |
| 2764 IPL EPROM | Y141810102 |
| 50256 256K DRAMs | X400502560 |
| 8237 DMA Controller | X400082370 |
| 8259 Interrupt Controller | X400082590 |
| 8253 Counter Timer | X400082530 |
| 7201 ~~Graphic Display Controller~~ SERIAL INTERFACE | X400072010 |
| 8255 Programmable Peripheral Interface | X400082550 |
| 146818 Real Time Clock | X400014630 |
| 449 CMOS RAM | X400004491 |
| 765 FDD Controller | X400007651 |
| APX-IGGS Video Board Unit | Y142202000 |
| 7220 Graphic Display Controller | X400072204 |
| GAAPGD | Y140800000 |
| 41254 64K x 4 DRAMs | X400412541 |
| APX-ICRT Video Emulation Board Unit | Y143201000 |
| 46505 CTRC | X400065050 |
| 2764 Character Generator | X630112830 |
| Monitor Unit | Q602A |
| Monitor Main Circuit Board | Y139501213 |
| CRT | Y139501007 |
| SD-543 FDD Unit | Y141501000 |
| Main Circuit Board | Y395250401 |
| Keyboard Unit | Q603A AA |
| Keyboard Upper Case #2 | Y142501001 |
| Keyboard Cover Case | Y142501002 |
| Keyboard Circuit Board | Y142501011 |

TABLE 3-2. MODULAR TROUBLESHOOTING TOOLS

| TOOL | PART NUMBER |
|---|---|
| Phillips screwdriver (#1) | B743800100 |
| Digital VOM | ---------- |
| System disk (CP/M and MS-DOS) | ---------- |
| Blank disk (96 tpi) | ---------- |

**STEP 1:** Connect the main unit to AC (monitor and keyboard disconnected) and turn the power on. Do the main unit power LED and FDD drive select LEDs light, and does the fan operate?

**YES:** Go to step 3.

**NO:** Make sure the AC cable is securely connected and retest. If the problem is not corrected, remove the upper case from the main unit (Section 4.2.1) and check fuse F1 on the Q10PS board. Replace the fuse if damaged, and retest. If the fuse blows or the unit remains malfunctional, go to step 2.

**STEP 2:** Measure the supply voltage at CN11 on the APX-ISYM board. Is +5V present at pin 7, +12V at pins 2, 3, and 4, and -12V at pin 5?

**YES:** If the voltage is correct but the fan or LEDs are inoperative, replace the malfunctioning item. When the main unit is operative, go to step 3.

**NO:** Replace the Q10PS board (Section 4.2.3).

**STEP 3:** Connect the monitor to the CPU unit and to AC, and power both. Does the monitor LED light and does the following display appear:

IPL VERSION X.X TESTING RAM

And, does the second line of the display change to the following:

INSERT SYSTEM DISK IN LEFT DRIVE

**YES:** Go to step 7.

**NO:** If there is no display, check the brightness and contrast controls, then check all cable connections and retest. If necessary, test the monitor with another CPU unit to verify whether the malfunction lies in the monitor or the CPU.

If the monitor operates with the second CPU unit, inspect the APX-IGGS and APX-ICRT circuit boards for poorly seated or damaged components, cracks, lifted traces, or misplaced or loose connectors. Replace any board showing obvious damage. If the boards appear undamaged, exchange the following ICs, one at a time, retesting after each swap:

| | | | |
|---|---|---|---|
| APX-IGGS: | 7220 | APX-ICRT: | 46505 |
| | GAAPGD | | 2764 |
| | 2764 | | |

If the malfunction is not eliminated by chip exchange, replace the APX-IGGS or APX-ICRT, or exchange the 7201C on the APX-ISYM board, or replace the APX-ISYM board.

If the monitor does not operate at all with the second CPU unit, exchange the monitor, or further troubleshoot it by referring to step 4.

If the monitor operates but the vertical or horizontal adjustment cannot be corrected, replace the monitor main circuit board, or exchange the monitor.

If the TESTING RAM display message appears, followed by an error code, refer to Table 3-3 and perform the appropriate IC exchange.

TABLE 3-3. IPL CODES

| MESSAGE | REMEDY |
|---|---|
| IPL VERSION 1.XX<br>TESTING RAM<br>INSERT SYSTEM DISKETTE IN LEFT DRIVE | Normal operation. |
| RAM ERROR! PRESS RESET TO RETRY | Replace suspect socketted RAMs, or replace the APX-ISYM board then retry. |
| Z80 PROCESSOR CHIP FAILED!<br>PRESS RESET TO RETRY | Replace the Z-80A CPU. Replace the APX-ISYM board if necessary |
| 16 BIT CARD NOT INSTALLED!<br>UNABLE TO BOOT SYSTEM | Replace the system control latch (74LS154) and retry. Replace the APX-ISYM board if necessary. |
| INVALID SYSTEM TRACKS FOUND | Replace the disk and retry. |
| HARD DISK NOT RESPONDING<br>ERROR READING HARD DISK!<br>PRESS RESET TO RETRY<br>ERROR READING THE HARD DISK PARTITION TABLE.<br>INVALID PARTITION TABLE FOUND | Probable hard disk damage. Refer to the operation and technical manuals for the hard disk. |

**STEP 4:** To troubleshoot the monitor, begin by removing the monitor upper case and discharging the CRT anode (Section 4.5.1).

**DANGER**

***THE MONITOR CONTAINS HIGH VOLTAGE CIRCUITRY. DISCHARGE THE ANODE IMMEDIATELY AFTER THE CASE IS REMOVED. USE CAUTION IF POWER IS APPLIED DURING TESTING, AND USE NON-CONDUCTIVE ADJUSTMENT TOOLS WHEN WORKING ON THE MONITOR.***

Inspect the interior of the monitor for burned or damaged components or loose connections. Repair or replace malfunctioning components and retest. Is the monitor functional?

**YES:** Go to step 7.

**NO:** Check the SUB-BRIGHT adjustment (R37). If adjustment does not produce a clear display, go to step 5.

**STEP 5:** Test the monitor power supply on the + 12V line. Is the voltage 10.8-13.2V?

**YES:** Check the heater of the CRT and the voltage at pin 2 of the FBT. If the heater is not lit or the voltage is not approximately 485V, replace the flyback transformer (Section 4.5.5) and retest. If the FBT is operative but the monitor remains malfunctional, go to step 6.

**NO:** Replace the monitor power supply and retest; if the malfunction is not corrected, go to step 6.

**STEP 6:** Check the CRT G1 and G2 voltages. Is G1 approximately -21V to -44V and G2 approximately 485V?

**YES:** Exchange the monitor unit if malfunctional at this step.

**NO:** Replace the monitor main circuit board (Section 4.5.7) and retest; if the malfunction is not corrected at this step, exchange the monitor unit.

**STEP 7:** Install the keyboard. Do the LEDs on the SHIFT/ALPHA and INSERT keys blink, then turn off, and does the character generated by each key correspond with the symbol on the keytop?

**YES:** Go to step 8.

**NO:** Check the keyboard with another QX system, if possible, to verify whether the malfunction lies in the keyboard or the main CPU unit.

If the keyboard is operable when connected to the second QX, exchange APX-ISYM board ICs in the following order, retesting after each swap:

7201 (1B)
8253 (9C)
8259 (9D)

If the malfunction is not corrected, or the keyboard is not functional with a known operative machine, check the socket contact of the keyboard CPU. If necessary, replace the keyboard circuit board (Section 4.4.3) or the keyboard.

**STEP 8:** Insert a system disk in the left drive and press the disk insertion button. Does the system boot?

**YES:** Go to step 9.

**NO:** Recheck the unit using another system disk; if the system boots the backup, go to step 9.

If the system does not boot, remove the the FDD connectors from the APX-ISYM board and install the drive B connector at CN6. Retest the booting operation by inserting the system disk in the B (right) drive. If the system boots on FDD B, replace FDD A and reconnect the connectors in their original orientation (FDD A to CN6, FDD B to CN7) and retest.

If the system still does not boot, exchange the 765 (13A) on the APX-ISYM board and retest. If the malfunction is still not corrected, replace the FDD (Section 4.3.1) or the APX-ISYM board (Section 4.2.9). When the system is operative, proceed to step 9.

**STEP 9:** With the system disk booted at FDD A and a blank disk inserted in FDD B, attempt to format the blank disk and write and read data to and from each drive. Is the data recorded and retrieved accurately, and is the time display accurate?

**YES:** Go to step 10.

**NO:** If the time drifts or is incorrect, replace the NiCd battery and recheck. If formatting or data read/write fails, exchange the 765 (13A) on the APX-ISYM board and retest. If swapping the ICs does not remedy the malfunction, replace the APX-ISYM board.

**STEP 10:** From the operating system, type CTRL G. Does the speaker sound?

**YES:** Repeat the modular test sequence: the unit should now be completely functional. If an optional peripheral fails to operate with the QX-16, test the device in a known operative computer; if the option operates with the second CPU unit, replace the 8255 or the APX-ISYM board.

**NO:** Replace the 8253s (9C and 10C) on the APX-ISYM board, one at a time, retesting after each swap, then repeat the modular test sequence: the unit should now be functional.

TABLE 3-4. PLUG-IN IC TROUBLESHOOTING REFERENCE GUIDE

| SYMPTOM | PROBABLE CAUSE |
|---|---|
| System does not boot | 8237 DMA controller, 256K DRAMs, Z-80A or 8088 CPUs, 2764s (IPL or BIOS), 74LS154 I/O selectors |
| FDD does not read/write | 765 FDD controller, GAAFDC, SED9421COB VFO, 8237 DMA controllers, 8259 interrupt controlers, 8255 printer interface, 146818 real time clock. |
| RS 232C does not operate | 7201C serial interface, 8259 interrupt controllers, 8253 timer/counter (9C), 8255 printer interface, 74LS154 I/O selector. |
| No printout | 8255 printer interface, 8259 interrupt controller (8D). |
| Calendar does not update | 146818 real time clock, 8259 interrupt controllers. |
| Option card does not operate | 8259 nterrupt controllers, 8237 DMA controllers. |
| Keyboard does not input | 7201C serial interface, 8259 interrupt controllers, 8253 timer/counter (9C), 74LS154 I/O selector. |
| Display malfunctions | APX-IGGS: 7201 graphic display controller, GAAPGD, 8284A character generator<br>APX-ICRT: 6845 CRT controller, character generator. |