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MITAC Global Support Problem Worksheet

Preface

This Service Manual explains basic procedures of maintenance, troubleshooting, and disassembly for the 3026E series notebook computers. It is for technicians trained in basic electronic repair and testing.

For easy reference, this manual is divided into the following chapters:

Chapter 1, *General System Description*, gives the standard specifications, features, and configuration of the computer.

Chapter 2, *System View and Disassembly*, provides a view of the system and components disassembly/reassembly instructions.

Chapter 3, *Connector Input/Output Definition*, provides connector information of the system.

Chapter 4, *Troubleshooting*, contains error information during POST and run-time.

Chapter 5, *Maintenance Diagrams and Parts Lists*, shows an exploded view and block diagram of the system.

Chapter 8, *Peripheral Devices*, contains specifications on the peripherals (i.e. floppy disk drive, hard disk, and LCD display).

You will also find a "MITAC Global Support Problem Worksheet" at the back of this manual. Please fill in this form when you encounter technical problems with any of our products and send the form to us or our service dealer.

For better technical support, we will keep you updated on technical information through the Service Bulletin, Question & Answer, and Engineering Change Notice.

3 General System Description

Figure 1-1. The Notebook Computer

3.1 System Features

Light, compactly designed in an A4-sized clam shell chassis, your notebook computer is a battery-powered computer fully compatible with the IBM PC/AT. It is equipped with the high-performance functions of an 80386SX CPU and is easily upgradable via the expansion connectors.

3-8 General System Description

Your computer comes with the following basic features:

20MHz 80386SX microprocessor

80387SX numeric coprocessor (factory-installed option)

3½-inch, 1.44MB floppy disk drive

Hard disk

NiCad rechargeable battery pack

Flat-panel, backlit LCD screen with a resolution of 640 x 480 dots in 16 shades of gray

80/81-key or 84/85-key keyboard, with 12 function keys, cursor-control keys, and built-in numeric keypad

Connectors for external expansions (i.e. PS/2 mouse/keyboard, VGA monitor, serial device, and parallel device)

2MB of DRAM standard, expandable with a 2MB or 4MB Memory Card

AC adapter

Power Management feature that automatically conserves power

Suspend/resume feature

3.2 System Specifications

The major components of the computer include the system board, VGA board, CPU, system memory, system and VGA BIOS, floppy and hard disk drive, LCD display, CPU/AT bus controller, keyboard, power supply, AC adapter, and the battery pack. Figure 1-2 shows how these components are integrated:

Note: Dotted lines indicate optional device.

Figure 1-2. System Block Diagram

3-10 General System Description

3.2.1 System Board

Figure 1-3 shows the layout of the system board, followed with key components descriptions.

Figure 1-3. Major Components of System Board

| Mark | Reference | Description | Name |
|------|-----------|---|--------------|
| A | U1 | Battery charge controller | SANYO SCU-A2 |
| B | U2 | Single power, single chip RS232 driver | AD241 |
| C | U3 | Dual UART with floppy disk controller, parallel port and AT-bus hard disk drive interface | NS87310 |
| D | U10 | Address/data buffers and bus conversion logic | C&T 82C242 |

| | | | |
|------|-----------------------|--|------------------|
| F | U11 | Power controller | C&T 82C636 |
| I | U17 | CPU | Intel 80386SX-20 |
| J | U19 | Interrupt, DMA controller, timer, RTC and | C&T 82C206 |
| | CMOS RAM | | |
| M | U21 | CPU control, bus control and memory control | C&T 82C841-20 |
| N | U22, U28 | System and VGA BIOS | NS 27C512 |
| O | U24, U25, U29, U30 | System DRAM (SOJ) | NEC 424400-80 |
| P | U16 | Supply 15V | LT1054 |
| E | OSC1 | 24MHz for floppy disk driver | KYOCERA 24.0000 |
| G | OSC2 | 14.31818MHz for system timer | KYOCERA 14.31818 |
| H | Y1 | 32.768KHz for 82C636 time base and refresh circuitry | |
| K | OSC3 | 16MHz for AT-bus time base | KYOCERA 16.0000 |
| L | OSC4 | 40MHz for CPU time base | KYCERA 40.0000 |
| U518 | | Numeric coprocessor | Intel 80387SX-20 |

3-12 General System Description

3.2.2 VGA Board

The VGA board is stacked on top of the system board. On-board controllers are the VGA controller and keyboard controller and encoder. Figure 1-4 shows the layout of the VGA board, followed with key components descriptions.

Figure 1-4. Major Components of VGA Board

| Mark | Reference | Description | Name |
|------|-----------|--|-------------------|
| Q | U17, U18 | 256KB video memory implemented by two 64K x 16 bit DRAM chips | TC 511664-10 |
| R | U14 | Frame buffer accelerator for LCD display only; 64K x 4 bit memory provides 4-bit data to low panel of LCD display | TMS 4464-10 |
| S | U15 | VGA sequencer and CRT controller for video output sequencing and flat-panel/CRT control | CL-GD620C |
| T | U16 | VGA graphics and attribute control | CL-GD610C |
| V | U7 | Battery low warning controller; blinks power LED after sensing the voltage of battery pack low | TL 555 |
| W | U6 | RAM DAC for VGA CRT display; implements the VGA palette and converts screen data (from video memory) to analog signals output to the CRT display | BT 475-50 |
| X | U12 | Audio amplifier for speaker | LM386 |
| Y | U4 | Keyboard controller ; implements all standard PC/AT-compatible keyboard and PS/2 mouse controller functions | Intel 8742 |
| Z | U5 | Keyboard encoder; provides PC/AT-compatible keyboard scan code to keyboard controller | NT 114 (MC68HC05) |
| U | Y3 | 14.31818MHz for video clock generator | |
| A1 | Y1 | 10MHz for keyboard controller | |
| B1 | Y2 | 4MHz for keyboard encoder | |

VGA Modes

The following display modes are supported by the VGA controller:

For a flat panel display**For an external CRT monitor**

| Compatible Mode | | Compression | | Expansion | | | |
|-----------------|--------|-------------------|---------------------|-----------|-------------|-----------|------------|
| Mode (hex) | Type | Shades of Gray | Col. x Rows Size | Character | Resolution | Character | Resolution |
| 0 | text | 16 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 16 | 640 x 400 |
| 0* | text | 16 | 40 x 25 | 16 x 14 | 640 x 350 | 16 x 14 | 640 x 350 |
| 0/1+ | text | 16 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 19 | 640 x 475 |
| 1 | text | 16 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 16 | 640 x 400 |
| 1* | text | 16 | 40 x 25 | 16 x 14 | 640 x 350 | 16 x 14 | 640 x 350 |
| 2 | text | 16 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 16 | 640 x 400 |
| 2* | text | 16 | 80 x 25 | 8 x 14 | 640 x 350 | 8 x 14 | 640 x 350 |
| 2/3+ | text | 16 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| 3 | text | 16 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 16 | 640 x 400 |
| 3* | text | 16 | 80 x 25 | 8 x 14 | 640 x 350 | 8 x 14 | 640 x 350 |
| 4 | graph. | 4 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 19 | 640 x 475 |
| 5 | graph. | 4 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 19 | 640 x 475 |
| 6 | graph. | 2 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| 7 | text | 4 | 80 x 25 | 8 x 14 | 640 x 350 | 8 x 14 | 640 x 350 |
| 7+ | text | 4 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| D | graph. | 16 | 40 x 25 | 16 x 16 | 640 x 400 | 16 x 19 | 640 x 475 |
| E | graph. | 16 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| F* | graph. | 4 | 80 x 25 | 8 x 14 | 640 x 350 | 8 x 19 | 640 x 475 |
| 10* | graph. | 16 | 80 x 25 | 8 x 14 | 640 x 350 | 8 x 19 | 640 x 475 |
| 11 | graph. | 2 | 80 x 30 | 8 x 16 | 640 x 480 | 8 x 19 | 640 x 480 |
| 12 | graph. | 16 | 80 x 30 | 8 x 16 | 640 x 480 | 8 x 19 | 640 x 480 |
| 13 | graph. | 32 | 40 x 25 | 16 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| 53 | text | 16 | 80 x 60 | 8 x 8 | 640 x 480 | 8 x 8 | 640 x 480 |
| 61 | graph. | 16 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| 70 | graph. | 32 | 45 x 30 | 8 x 16 | 360 x 480** | 8 x 16 | 640 x 480 |
| 74 | graph. | 32 | 40 x 30 | 16 x 16 | 640 x 480 | 16 x 16 | 640 x 480 |
| 75 | graph | 32 | 80 x 25 | 8 x 16 | 640 x 400 | 8 x 19 | 640 x 475 |
| HGC | graph. | 2 | 80 x 25 | 8 x 14 | 640 x 348** | 8 x 19 | 640 x 472 |

Table Notes:

* = EGA state. + = VGA state. ** = The resolution is available when width compression is in use.

3.2.3

| Mode (hex) | Type | Colors | Col. x Rows | Buffer | Character Size | Resolution |
|---------------|--------|----------|-------------|--------|-------------------|------------|
| 0 | text | 4/256K | 40 x 25 | B8000 | 8 x 8 | 320 x 200 |
| 0* | text | 16/256K | 40 x 25 | B8000 | 8 x 14 | 320 x 350 |
| 0/1+ | text | 16/256K | 40 x 25 | B8000 | 9 x 16 | 360 x 400 |
| 1 | text | 4/256K | 40 x 25 | B8000 | 8 x 8 | 320 x 200 |
| 1* | text | 16/256K | 40 x 25 | B8000 | 8 x 14 | 320 x 350 |
| 2 | text | 4/256K | 80 x 25 | B8000 | 8 x 8 | 640 x 200 |
| 2* | text | 16/256K | 80 x 25 | B8000 | 8 x 14 | 640 x 350 |
| 2/3+ | text | 16/256K | 80 x 25 | B8000 | 9 x 16 | 720 x 400 |
| 3 | text | 4/256K | 80 x 25 | B8000 | 8 x 8 | 640 x 200 |
| 3* | text | 16/256K | 80 x 25 | B8000 | 8 x 14 | 640 x 350 |
| 4 | graph. | 4/256K | 40 x 25 | B8000 | 8 x 8 | 320 x 200 |
| 5 | graph. | 4/256K | 40 x 25 | B8000 | 8 x 8 | 320 x 200 |
| 40 | text | 16/256K | 100 x 30 | B8000 | 8 x 13 | 800 x 390 |
| 41 | text | 16/256K | 100 x 50 | B8000 | 8 x 8 | 800 x 400 |
| 42 | text | 16/256K | 100 x 60 | B8000 | 8 x 8 | 800 x 480 |
| 43 | text | 16/256K | 100 x 75 | B8000 | 8 x 8 | 800 x 600 |
| 50 | text | 16/256K | 132 x 30 | B8000 | 8 x 13 | 1056 x 390 |
| 51 | text | 16/256K | 132 x 50 | B8000 | 8 x 8 | 1056 x 400 |
| 52 | text | 16/256K | 132 x 60 | B8000 | 8 x 8 | 1056 x 480 |
| 53 | text | 16/256K | 80 x 60 | B8000 | 9 x 8 | 640 x 480 |
| 61 | graph. | 16/256K | 80 x 25 | A0000 | 8 x 16 | 640 x 400 |
| 62 | graph. | 16/256K | 80 x 28 | A0000 | 8 x 16 | 640 x 450 |
| 63 | graph. | 16/256K | 90 x 33 | A0000 | 8 x 16 | 720 x 540 |
| 64 | graph. | 16/256K | 100 x 37 | A0000 | 8 x 16 | 800 x 600 |
| 70 | graph. | 256/256K | 45 x 30 | A0000 | 8 x 16 | 360 x 480 |
| 71 | graph. | 256/256K | 66 x 25 | A0000 | 8 x 16 | 528 x 400 |
| 72 | graph. | 16/256K | 90 x 33 | A0000 | 8 x 16 | 720 x 540 |
| 73 | graph. | 16/256K | 100 x 37 | A0000 | 8 x 16 | 800 x 600 |
| 74 | graph. | 16/256K | 100 x 37 | A0000 | 8 x 16 | 800 x 600 |
| 75 | graph. | 16/256K | 100 x 37 | A0000 | 8 x 16 | 800 x 600 |

Table Notes:

1. * = EGA state. + = VGA state.

2. Modes 43, 50, 51, 52, 53, 64, and 73, 74, and 75 are for multi-frequency monitors

3-16 General System Description

LCD Display

FSTN type monochrome, B/W VGA LCD

640 x 480 resolution, 25 lines x 80 characters, 16 gray scales

Brightness/Contrast controls

CCFT backlighting

Dimensions (effective viewing area)

Height: 133 mm

Width: 180 mm

Diagonal: 224 mm

Non-glare glass face has a near 180 degree adjustable tilt

Reverse video feature via keyboard

Power saving feature

Screen automatically blanks out after a set period of time of non-operation; can be reactivated when any key is pressed after the screen blank-out

3.2.4 Power Supply System

AC Adapter

Portable, brick-shaped power supply with a separate AC power cord

Full-range operating between 90V and 265V

Frequency 47—63Hz

Output voltage below 11V, with overcurrent and overcharging protection

AC input current:

0.7A (RMS) Max. for 115V

0.4A (RMS) Max. for 230V

Charge current:

Fast-charge 2.8A

Trickle charge 0.28A

DC-AC Inverter

The DC-AC inverter converts the DC to AC for the CCFT backlight in the LCD panel.

DC-DC Converter

The DC-DC converter supplies the 5V DC power to the system and protects the computer from over current and power surges.

Battery Pack

The battery pack is composed of six C-size NiCad battery cells (nominal capacity 2800mAh, 7.2V per pack).

When the AC adapter is connected to the notebook, it automatically charges the battery pack. Required charging time is approximately 1.5 hours. If the AC power fails, the battery pack will supply power for the system automatically without interrupting the system. If the battery power is low, the Power-ON Indicator blinks.

AC Adapter Power Conditions

| | |
|-----------------------|---|
| Power supply | 30 Watts |
| Operating temperature | -10°C to 40°C |
| Storage temperature | -20°C to 85°C |
| Operating humidity | 20% to 80%, non-condensed |
| Storage humidity | 10% to 90%, non-condensed |
| Altitude | 3000 meters |
| Weight | 490g |
| Size | 139mm x 83.9 mm x 56.5 mm |
| Shock | 5G (10 ¹ / ₃ microseconds pulse duration) |

2 System View and Disassembly

2.1 System View

2.1.1 Front View

Figure 2-1. Computer Front View

1. Power-ON and Suspend Mode Indicators

2. Memory Card Cover

An IC memory card (2MB or 4MB) is installed here to expand system memory.

3. Cover Latch

4. 3½-inch Floppy Disk Drive

5. Battery Pack Cover

The battery pack is installed here.

2.1.2 Rear and Left View

Figure 2-2. Computer Rear and Left View

1. **Power Connector**

Connects the AC adapter.

2. **Parallel Port (PIO)**

3. **Serial Port (SIO 1)**

4. **Auxiliary Device Port (Mini DIN-6)**

5. **Analog video Port**

6. **Brightness Dial**

For the LCD screen.

7. **Contrast Dial**

For the LCD screen.

2.2 System Disassembly

2.2.1 Preparation

Tools Required

The following tools are needed for the disassembly/assembly work on the notebook computer:

Phillips screwdriver (small)

Phillips screwdriver (medium-sized)

Hexnut driver (5 mm)

Awl, pocketknife, or other sharp pointed instrument

Precautions

Before system disassembly, turn OFF power and disconnect the AC adapter and all other cables from the computer.

Integrated circuits in the computer are sensitive to static electricity. To avoid damaging chips caused by electrostatic discharge, observe the following precautions:

Do not remove a board or chip from its antistatic packaging until you are ready to install it.

Before handling a board or chip, touch an unpainted metal surface for a few seconds to discharge any static electricity from your body.

Wear a wrist grounding strap, available from most electronic stores, when handling boards and chips.

Assembly Overview

The notebook computer consists of three major assembly sections: the keyboard section, the LCD/cover section, and the chassis section.

The keyboard has to be separated from the chassis before the other parts can be removed.

Exploded views of the computer and parts lists are provided in Chapter 5. The next subsections will discuss at length each major part for disassembly and show corresponding illustrations.

2.2.2 Battery Pack

Disassembly (Figure 2-3)

1. Place the computer upside down. The battery pack compartment is at the upper left corner.
2. Push and slide the battery pack cover (1) out. Remove the battery pack with the help of the ribbon (2).

Reassembly (Figure 2-3)

1. Replace the battery pack. Note the ribbon end should come out from under the battery pack.
2. Slide the battery pack cover (1) back into place.

Figure 2-3. Battery Pack Disassembly/Reassembly

2.2.3 Keyboard Section

Disassembly (Figure 2-4)

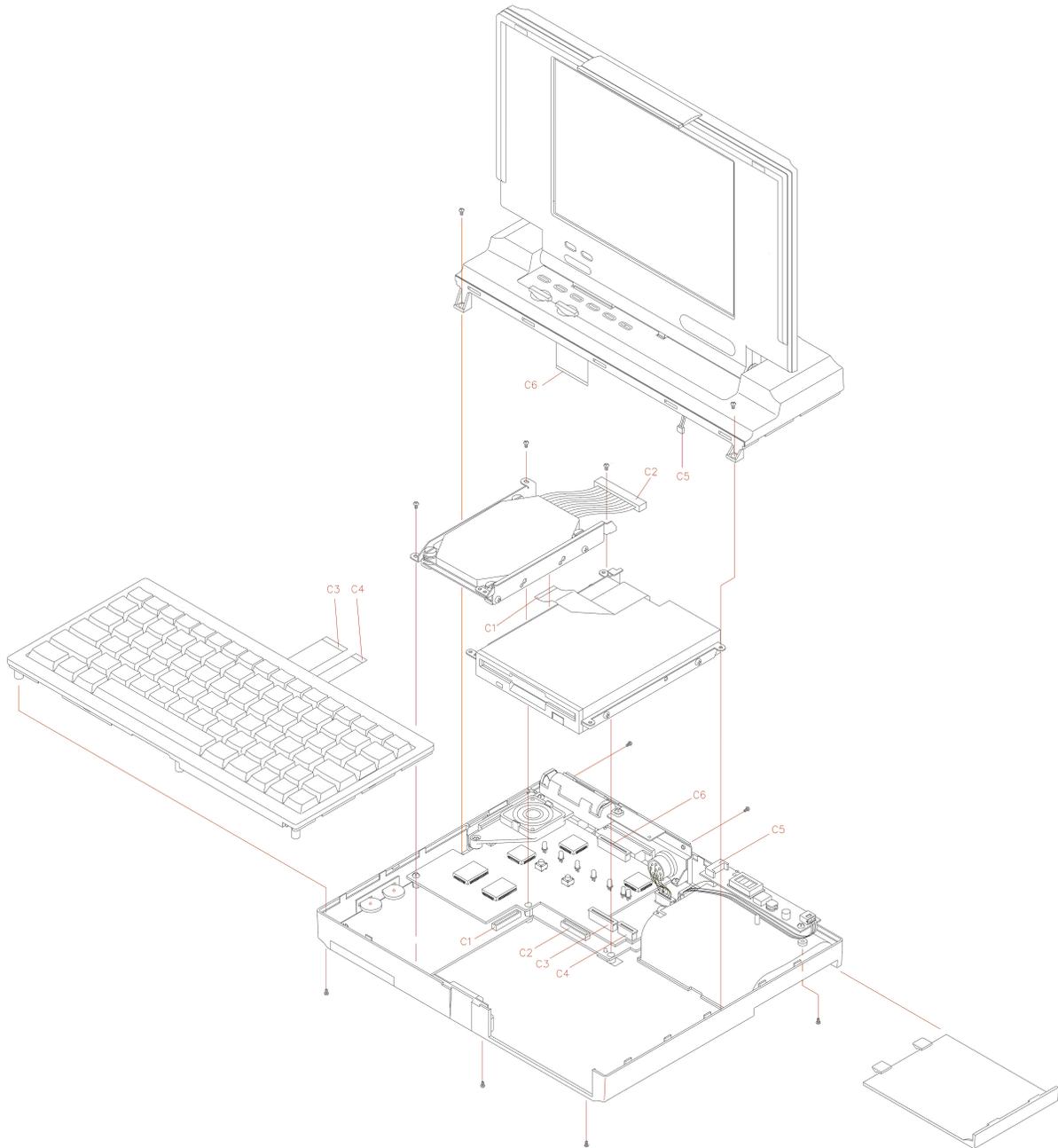
1. Remove the battery pack. (See Section 2.2.2 Disassembly.)
2. Place the computer upside down. Remove the three screws (1) attaching the keyboard to the chassis. Remove one screw (2) attaching the LCD/cover to the chassis.
3. Place the computer back to its upright position. Open the LCD/cover.
4. To separate the keyboard from the chassis (without pulling the keyboard cables off):
 - a. Remove the memory card cover.
 - b. With a pointed instrument inserted into the gap between the chassis border and the system board (3), force the chassis border outward to facilitate removal of the keyboard.
5. Remove the screws attaching the LCD/cover section to the chassis: two screws (4) from the rear panel and two screws (5) from the LCD/cover feet.
6. Carefully separate the LCD/cover from the chassis without pulling the LCD cables off.
7. To unplug the two keyboard cables (6) from the VGA board:
 - a. With your fingers, pry the connector lock upward on one side and then the
 - b. Carefully pull the keyboard cable out of the connector.

Reassembly (Figure 2-4)

1. To connect the two keyboard cables (6) to the VGA board:
 - a. With your fingers, pry the connector lock upward on one side and then the
 - b. Firmly insert the cable end into the connector.
 - c. Push down the connector lock to fix it into place.
2. Secure the LCD/cover to the chassis with two screws (4) on the rear panel and two screws (5) on the LCD/cover feet.
3. Align and fix the keyboard back onto the chassis.
4. Close the LCD/cover and place the computer upside down.
5. Replace the three screws (1) attaching the keyboard to the chassis. Replace one screw (2) in the battery pack compartment.
6. Replace the battery pack. (See Section 2.2.2 Reassembly.)

Figure 2-4. Keyboard Disassembly/Reassembly

2.2.4 Hard Disk



The hard disk is located under the keyboard.

Disassembly (Figure 2-5)

1. Place the computer upside down. Remove the three screws (1) attaching the keyboard to the chassis.
2. Place the computer back to its upright position. Open the LCD/cover.
3. To separate the keyboard from the chassis (without pulling the keyboard cables off):
 - a. Remove the memory card cover.
 - b. With a pointed instrument inserted into the gap between the chassis border and the system board (2), force the chassis border outward to facilitate removal of the keyboard.
4. Temporarily unplug the floppy disk drive cable (3) from the system board. To do so:
 - a. With your fingers, pry the connector lock upward on one side and then the other.
 - b. Carefully pull the cable out of the connector. The cable should come loose.
5. Remove the three screws (4) attaching the hard disk to the chassis.
6. Unplug the hard disk cable (5).
7. Lift the hard disk free.
8. To detach the hard disk brackets, remove the mounting screws (6) from both sides. For later reassembly, note which set of holes on the bracket is used. (Depending on the hard disk model, either the first set or second set of holes is used.)

Reassembly (Figure 2-5)

1. Secure the brackets to the hard disk with four screws (6) at the first set or second set of holes.
2. Reconnect the hard disk cable (5).
3. Align and fix the hard disk back onto the chassis and secure with three screws (4).
4. Reconnect the floppy disk drive cable (3) to the system board:
 - a. With your fingers, pry the connector lock upward on one side and then the other side until the connector lock comes loose.
 - b. Firmly insert the cable end into the connector.
 - c. Push down the connector lock to fix it into place.
5. Align and fix the keyboard back onto the chassis.
6. Close the LCD/cover and place the computer upside down.
7. Replace the three screws (1) attaching the keyboard to the chassis.

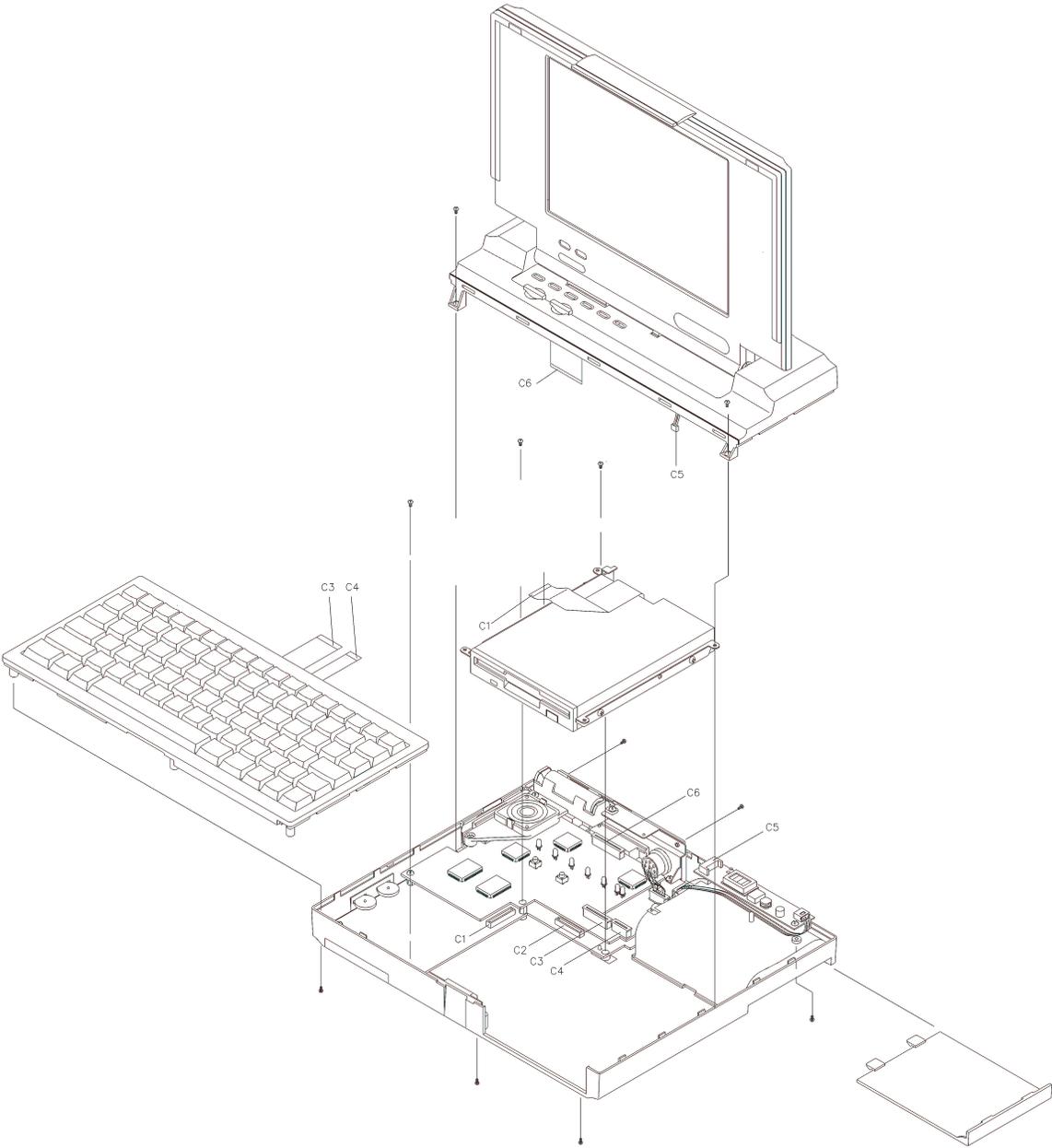


Figure 2-5. Hard Disk Disassembly/Reassembly

2.2.5 Floppy Disk Drive

The floppy disk drive is located under the keyboard.

Disassembly (Figure 2-6)

1. Separate the keyboard and LCD/cover from the chassis. (See Section 2.2.3 Disassembly steps 1 to 6.)
2. Unplug the floppy disk drive cable (1). To do so:
 - a. With your fingers, pry the connector lock upward on one side and then the other.
 - b. Carefully pull the cable out of the connector. It will come loose.
3. Remove the three screws (2) attaching the hard disk to the chassis and move the hard disk toward the left about 20 mm (without disconnecting the hard disk cable).
4. Lift the floppy disk drive free.
5. To detach the floppy disk drive brackets, remove the mounting screws (3) from both sides.

Reassembly (Figure 2-6)

1. Secure the brackets to the floppy disk drive with four screws (3).
2. Align and fix the floppy disk drive back onto the chassis.
3. Replace the hard disk and secure with the three screws (2).
4. Reconnect the floppy disk drive cable (1):
 - a. With your fingers, pry the connector lock upward on one side and then the other.
 - b. Firmly insert the cable end into the connector. It will come loose.
 - c. Push down the connector lock to fix it into place.
5. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly steps 2 to 6.)

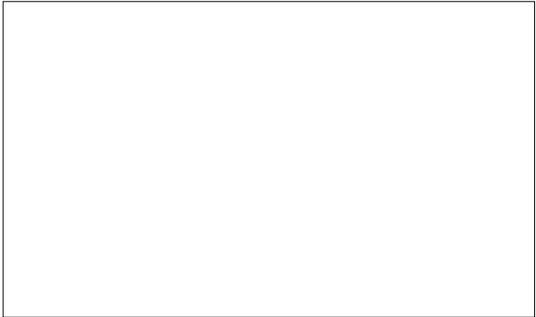
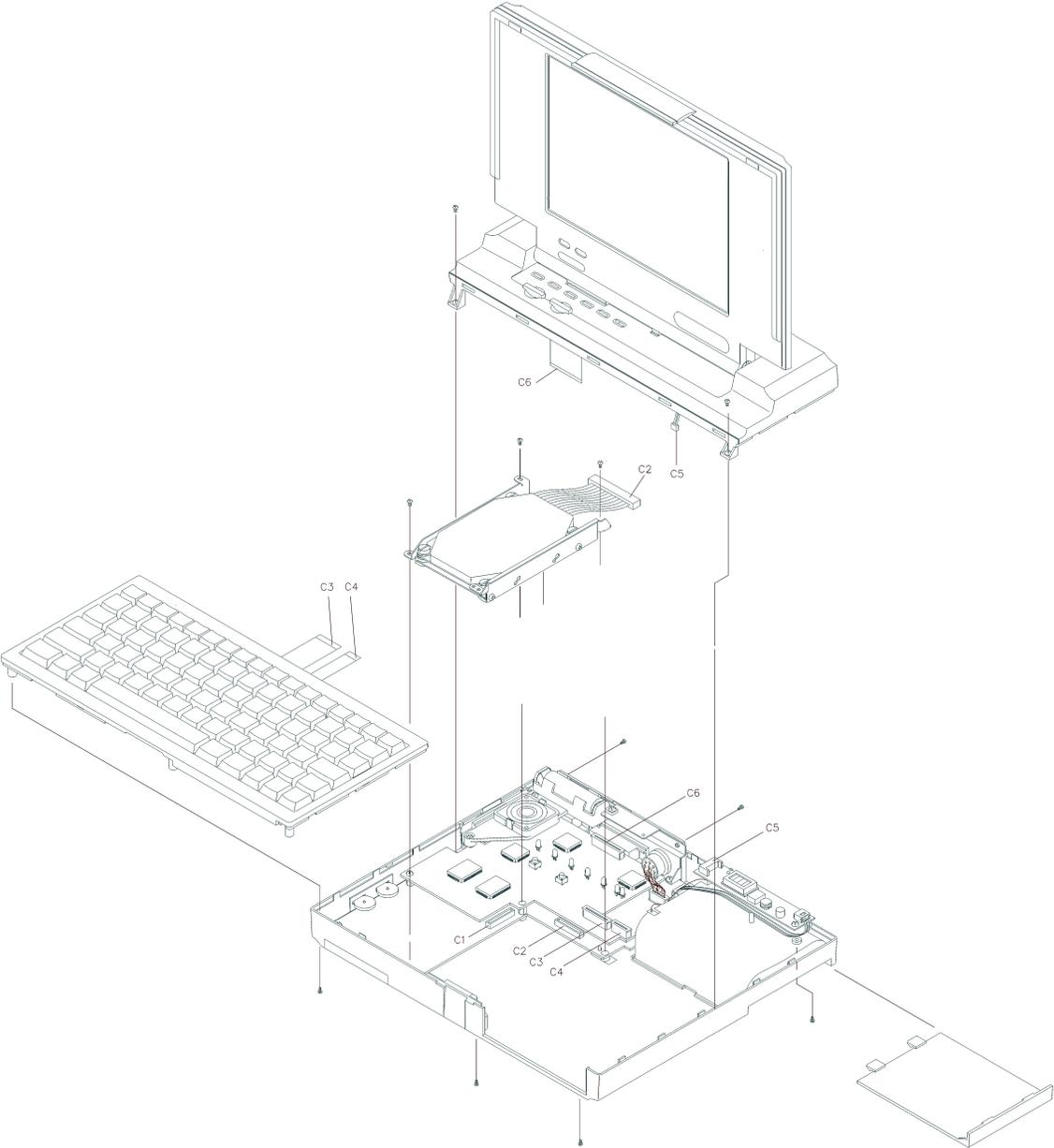


Figure 2-6. Floppy Disk Drive Disassembly/Reassembly

2.2.6 Li-Battery

The Li-battery is mounted on the speaker/Li-battery assembly at the upper left corner of the chassis.

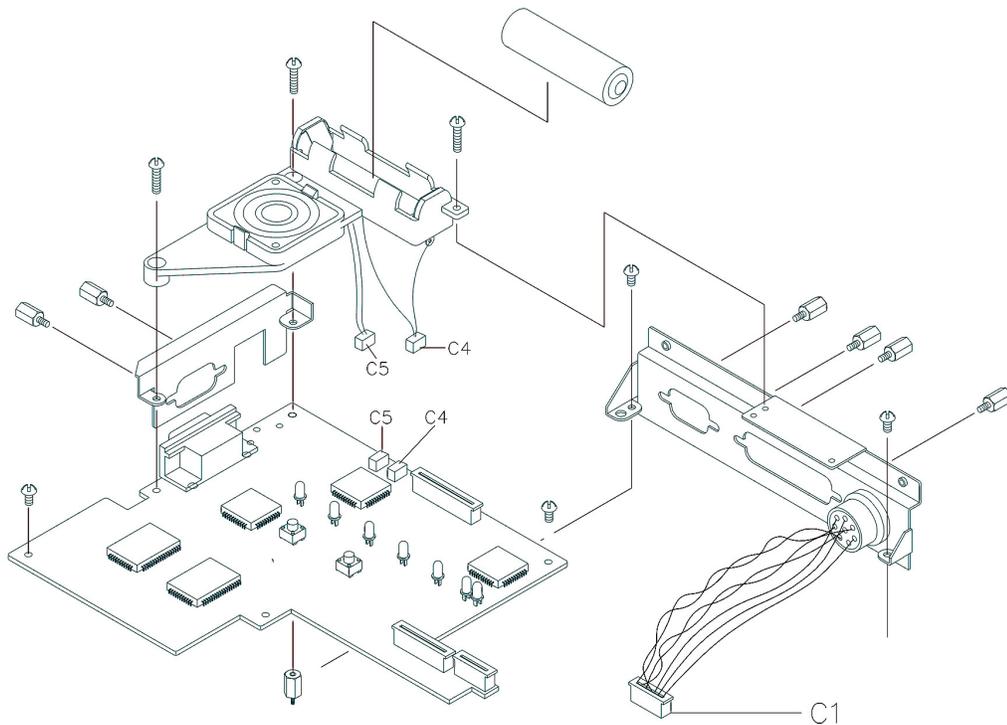
Disassembly (Figure 2-7)

1. Separate the keyboard and LCD/cover from the chassis. (See Section 2.2.3 Disassembly steps 1 to 6.)
2. Remove the lithium battery (1).

Reassembly (Figure 2-7)

1. Replace the Li-battery (1) back to its compartment.
2. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly steps 2 to 6.)

Figure 2-7. Li-Battery Disassembly/Reassembly



2.2.7 Speaker

The speaker is mounted on the speaker/Li-battery assembly at the upper left corner of the chassis.

Disassembly (Figure 2-8)

1. Separate the keyboard and LCD/cover from the chassis. (See Section 2.2.3 Disassembly steps 1 to 6.)
2. Remove the three screws (1) attaching the speaker/Li-battery assembly to the VGA board.
3. Unplug the two cables (2) connecting the speaker/Li-battery assembly to the VGA board.
4. Lift the speaker/Li-battery assembly free.
5. Remove the speaker.

Reassembly (Figure 2-8)

1. Place the speaker into its compartment.
2. Reconnect the two cables (2) to the VGA board.
3. Secure the speaker/Li-battery assembly to the VGA board with three screws (1).
4. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly steps 2 to 6.)

Figure 2-8. Speaker Disassembly/Reassembly

2.2.8 DC/AC Board

Disassembly (Figure 2-9)

1. Separate the keyboard and LCD/cover from the chassis. (See Section 2.2.3 Disassembly steps 1 to 6.)

2-32 System View and Disassembly

2. Remove the two screws (1) attaching the DC/AC board to the chassis.
3. Unplug the two cables (2) from the DC/AC board.
4. Lift the DC/AC board free.

Reassembly (Figure 2-9)

1. Secure the DC/AC board to the chassis with two screws (1).
2. Reconnect the two cables (2). Note the cables should go alongside or under the DC/AC board. Do not allow the cables to scatter on the chassis surface.
3. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly steps 2 to 6.)

Figure 2-9. DC/AC Board Disassembly/Reassembly



2.2.9 VGA Board

Disassembly (Figure 2-10)

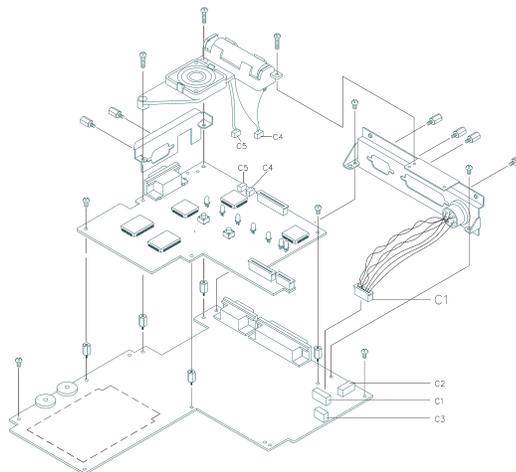
1. Remove the keyboard and LCD/cover. (See Section 2.2.3 Disassembly.)
2. Remove the hard disk. (See Section 2.2.4 Disassembly.)
3. Remove the speaker/Li-battery assembly. (See Section 2.2.7 Disassembly steps 1 to 4.)
4. Remove the remaining two screws (1) attaching the VGA board to the system board.
5. Lift the VGA board free.
6. To detach the side panel, remove the two hexnut screws (2).

Reassembly (Figure 2-10)

1. Secure the side panel to the VGA board with two hexnut screws (2).
2. Align the VGA board with the system board and replace the two screws (1).
3. Replace the speaker/Li-battery assembly. (See Section 2.2.7 Reassembly.)
4. Replace the hard disk. (See 2.2.4 Reassembly.)
5. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly.)

Figure 2-10. VGA Board Disassembly/Reassembly

2.2.10 System Board



Disassembly (Figure 2-11)

1. Remove the VGA board. (See Section 2.2.9 Disassembly.)

2-34 System View and Disassembly

2. Remove the four screws (1) attaching the system board to the chassis.
3. Remove the five hexnut screws (2) from the system board.
4. Unplug all the connectors from the system board.
5. Lift the system board free.
5. To detach the rear panel, remove the four hexnut screws (3) and unplug the power cable (4) from the system board.

Reassembly (Figure 2-11)

1. Secure the rear panel to the system board with four hexnut screws (3).
2. Align the system board with the chassis. Note that the brightness and contrast dials are inserted into the corresponding openings on the chassis. Secure the system board with four screws (1) and five hexnut screws (2).
3. Reconnect all the connectors. Note that the cables from the DC/AC board should go alongside or under the DC/AC board. The chassis surface should be free of any cables.
4. Replace the VGA board. (See Section 2.2.9 Reassembly.)

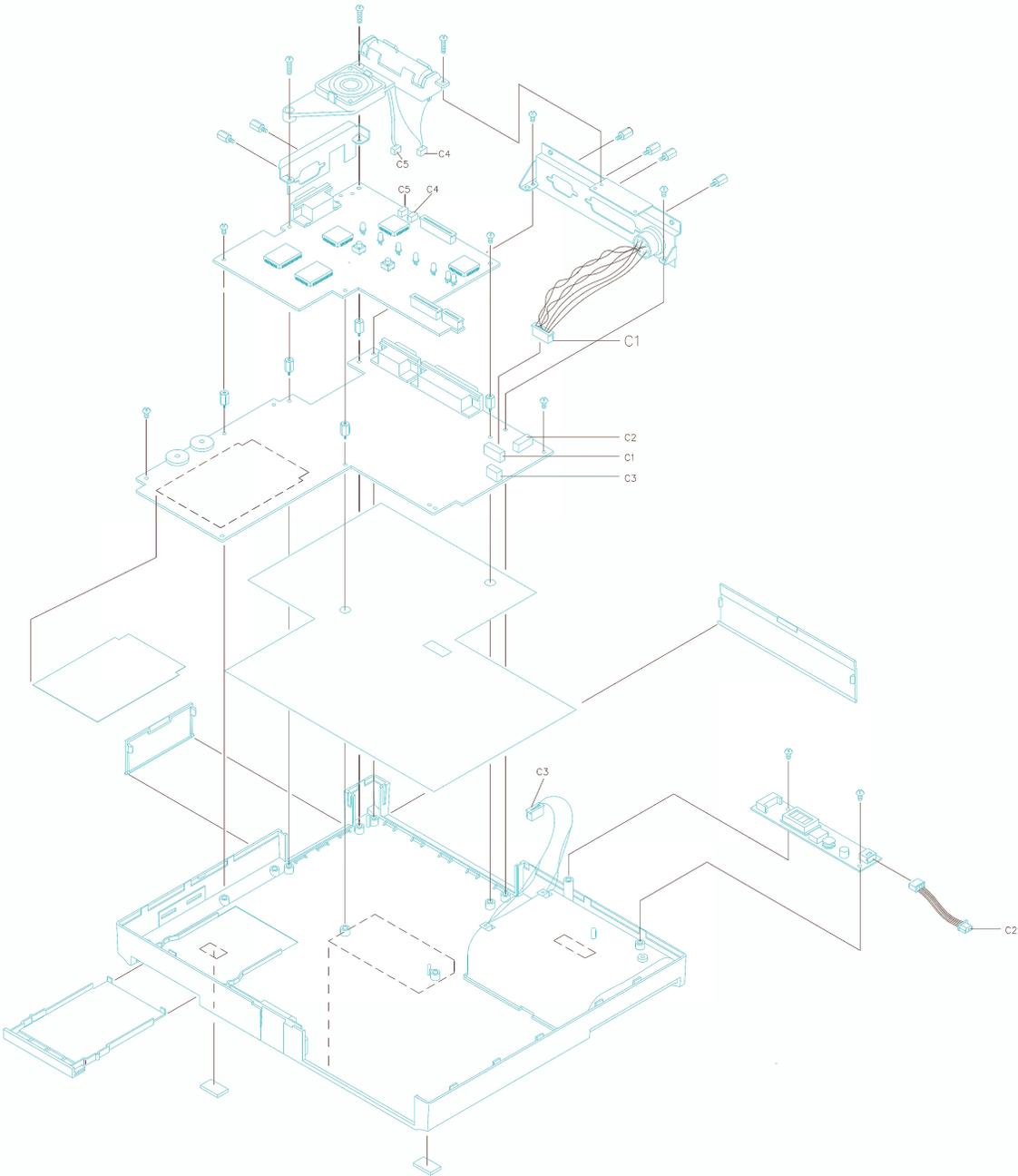


Figure 2-11. System Board Disassembly/Reassembly

2.2.11 LCD Section

Disassembly (Figure 2-12)

1. Separate the keyboard and LCD/cover from the chassis. (See Section 2.2.3 Disassembly steps 1 to 6.)
2. Unplug the data cable (1) from the VGA board and the power cable (2) from the DC/AC board.
3. Remove the two nameplates at the lower corners of the LCD/cover and the screws underneath (3).
4. Remove the two cushion pads at the upper corners of the LCD/cover and the screws underneath (4).
5. Separate the LCD frame.
6. Remove the four screws (5) to separate the LCD from the back cover.

Reassembly (Figure 2-12)

1. Secure the LCD to the back cover with four screws (5). Insert the data cable (1) and power cable (2) into the openings.
2. Attach the LCD frame.
3. Replace the two screws and cushion pads (4) at the upper corners of the LCD/cover.
4. Replace the two screws and nameplates (3) at the lower corners of the LCD/cover.
5. Reconnect the data cable to the VGA board (1) and the power cable to the DC/AC board (2). Note that the data cable should be folded backward and then forward (6) for reassembly.
6. Replace the LCD/cover and keyboard. (See Section 2.2.3 Reassembly steps 2 to 6.)

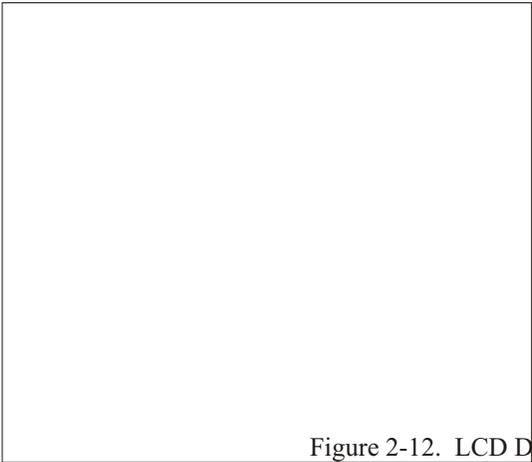
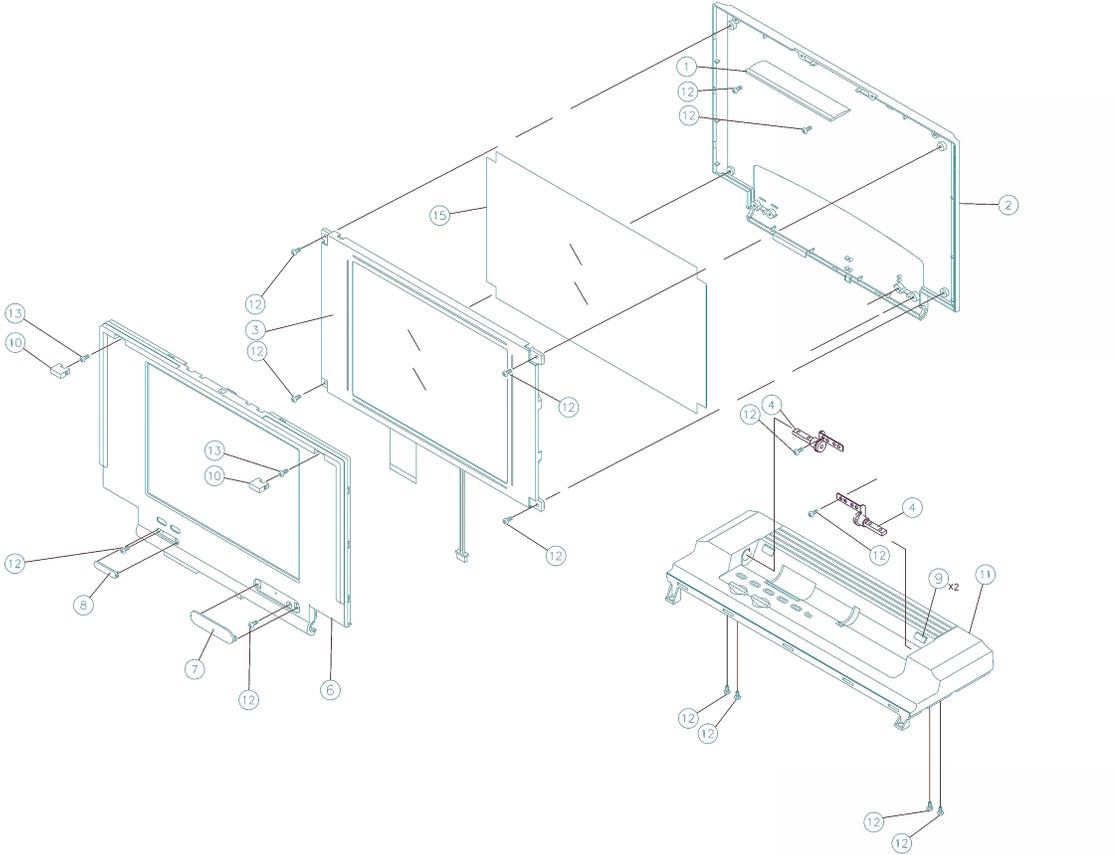
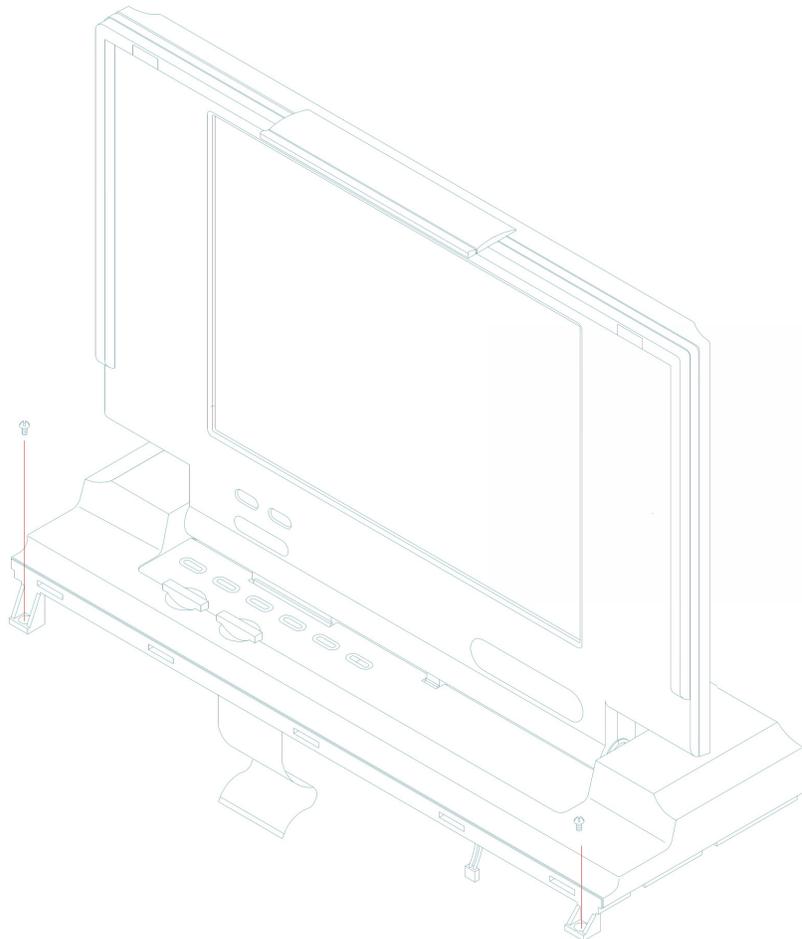
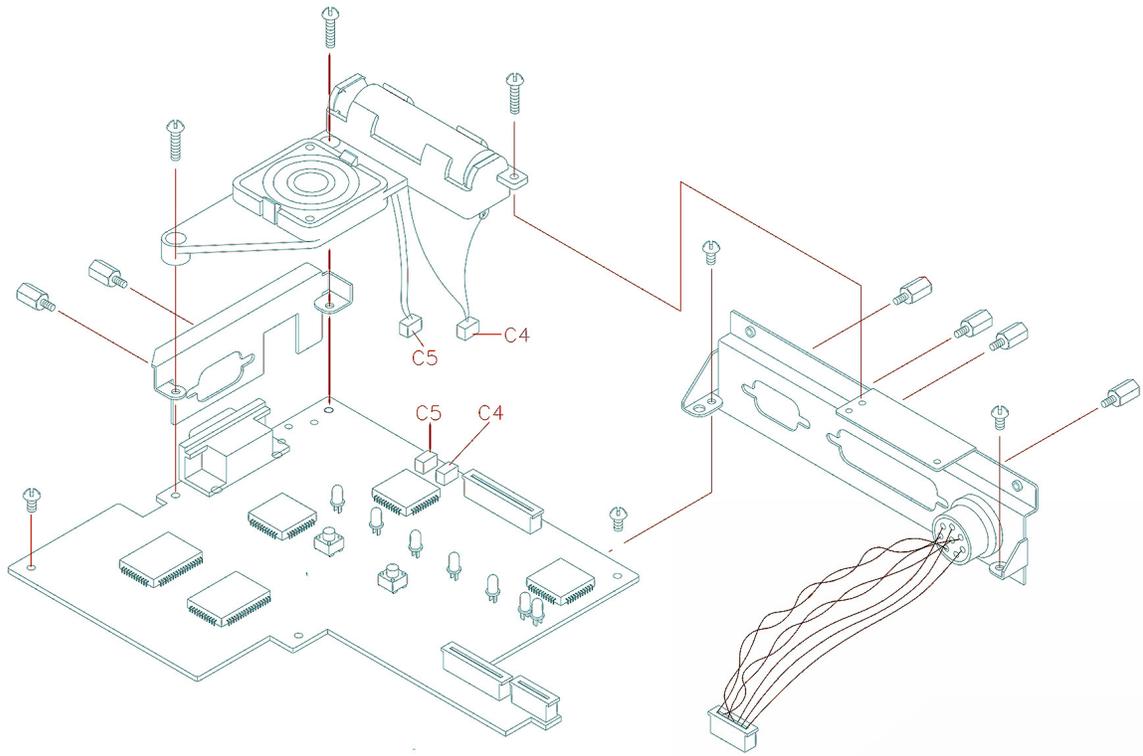
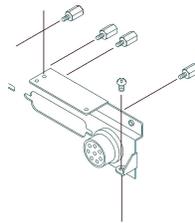
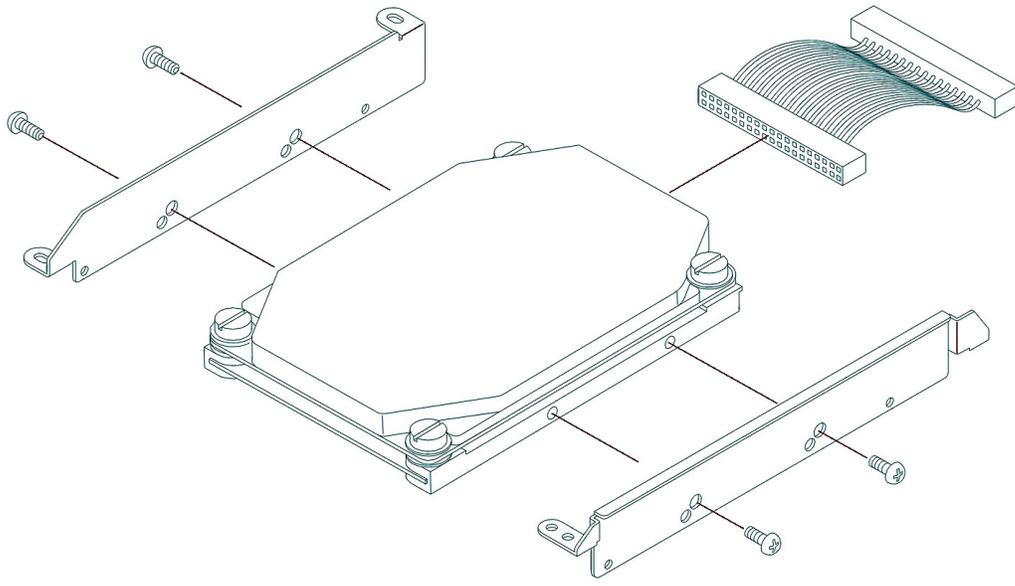
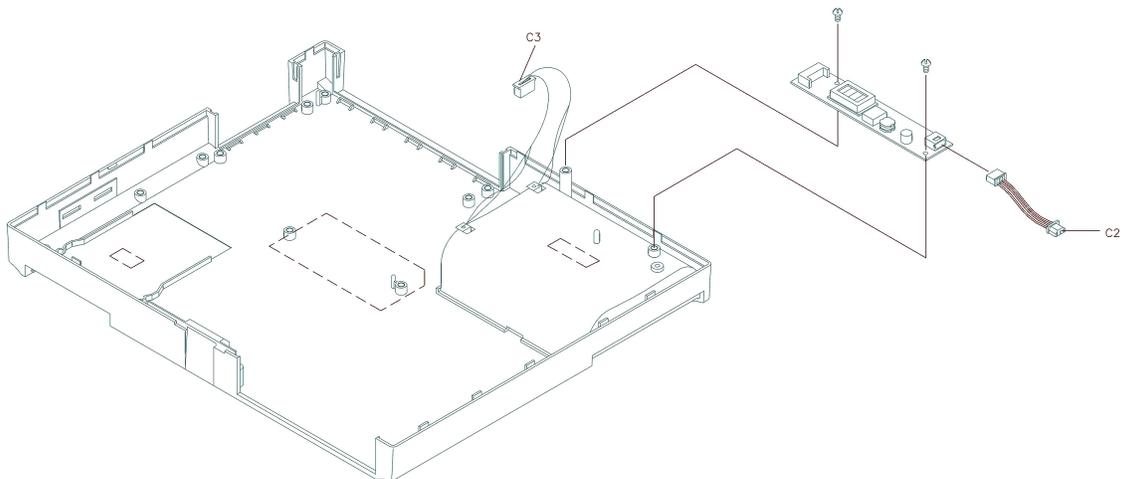


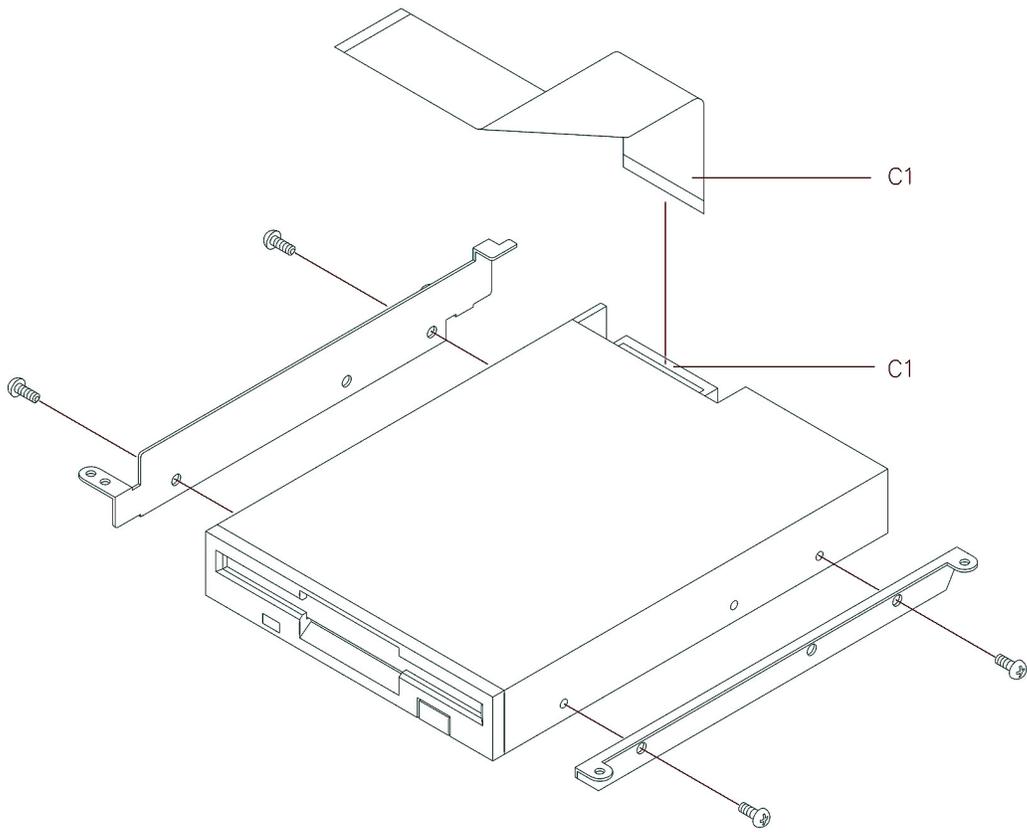
Figure 2-12. LCD Disassembly/Reassembly





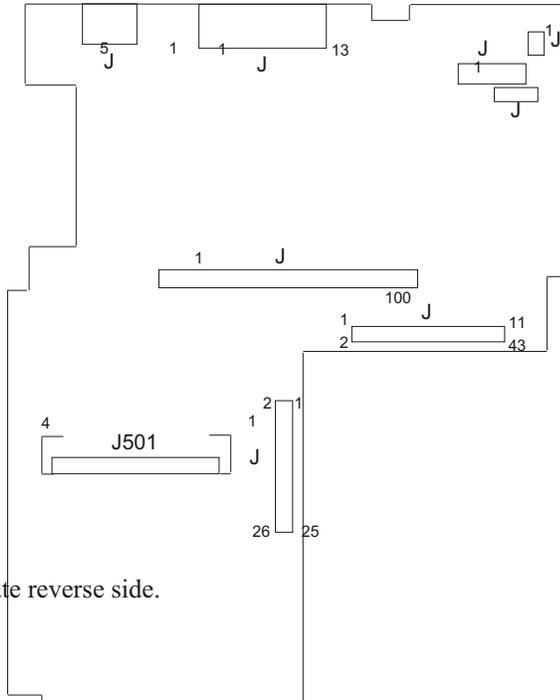
C1





3 Connector Input/Output Definition

3.1 System Board Connector Definitions



Note: Dotted lines indicate reverse side.

Figure 3-1. System Board Connector Positions

| Connector | Definition | Number of Pins |
|-----------|---------------------------------------|----------------|
| J1 | Serial port (SIO 1) | 9 |
| J2 | Parallel port (PIO) | 25 |
| J3 | Backlight control to D/A inverter | 3 |
| J4 | Power connector to AC adapter | 7 |
| J5 | Battery connector to battery pack | 4 |
| J6 | Board-to-board connector to VGA board | 100 |
| J7 | Hard disk connector | 44 |
| J8 | Floppy disk drive connector | 26 |
| J501 | IC memory card connector | 40 |

3.1.1

Serial Port (J1)

| Pin | Signal | Description |
|-----|--------|---------------------|
| 1 | CD | Carrier Detect |
| 2 | RXD | Receive Data |
| 3 | TXD | Transmit Data |
| 4 | DTR | Data Terminal Ready |
| 5 | GND | Signal Ground |
| 6 | DSR | Data Set Ready |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |
| 9 | RI | Ring Indicator |

3.1.2 Parallel Port (J2)

| Pin | Signal | Description |
|---------|--------------|---|
| 1 | Strobe | Indicates data at the parallel port is valid |
| 2 | Data bit 0 | Parallel port data |
| 3 | Data bit 1 | Parallel port data |
| 4 | Data bit 2 | Parallel port data |
| 5 | Data bit 3 | Parallel port data |
| 6 | Data bit 4 | Parallel port data |
| 7 | Data bit 5 | Parallel port data |
| 8 | Data bit 6 | Parallel port data |
| 9 | Data bit 7 | Parallel port data |
| 10 | ACK | Indicates printer has received data. |
| 11 | Busy | Indicates printer can't accept another character. |
| 12 | PE | Indicates when printer is out of paper. |
| 13 | SLCT | Indicates when printer is selected. |
| 14 | Auto feed XT | Signals the printer to automatically feed line after printing a line. |
| 15 | Error | Indicates when printer has detected an error. |
| 16 | INIT | Initializes the printer. |
| 17 | SLCT In | Selects the printer. |
| 18 - 25 | GND | |

3.1.3 DC-AC Inverter (J3)

| Pin | Signal | Description |
|-----|------------------|--|
| 1 | Backlight/Adjust | Square-wave output control the brightness by adjusting the duty cycle. |
| 2 | GND | |
| 3 | +5V | Power supply for inverter |

3.1.4 Power Connector (J4)

Connected to Rear Bracket

| Pin | Signal | Description |
|-----|----------|--|
| 1 | ADINP | Output voltage of AC adapter |
| 2 | ADINP | Output voltage of AC adapter |
| 3 | ADINPGND | |
| 4 | ADINPGND | |
| 5 | QCHARGE | Signal AC adapter into fast-charge mode |
| 6 | +ISENSE | Signal AC adapter to supply constant current |
| 7 | -ISENSE | Signal AC adapter to supply constant current |

Connected to AC Adapter

| Pin | Signal | Description |
|-----|----------|--|
| 1 | ADINP | Output voltage of AC adapter |
| 2 | ADINP | Output voltage of AC adapter |
| 3 | ADINPGND | |
| 4 | ADINPGND | |
| 5 | QCHARGE | Signal AC adapter into fast-charge mode |
| 6 | +ISENSE | Signal AC adapter to supply constant current |
| 7 | -ISENSE | Signal AC adapter to supply constant current |
| 8 | NC | |
| 9 | NC | |
| 10 | NC | |

3.1.5 Battery Connector (J5)

| Pin | Signal | Description |
|-----|--------|---------------------------|
| 1 | +BAT | Output voltage of battery |
| 2 | +BAT | Output voltage of battery |
| 3 | BATGND | |
| 4 | BATGND | |

3.1.6 Board-to-board Connector (J6)

| Pin | Signal | Description | Pin | Signal | Description |
|-------------------|--------|---|-----|----------------|--------------------------------|
| 1 | SA0 | Address line from system | 31 | XBHE/ | Data bus high-byte enable |
| 2 | XA2 | Address line from system | 32 | XIOR/ | I/O read |
| 3 | XA4 | Address line from system | 33 | SMEMW/ | Memory write |
| 4 | XA6 | Address line from system | 34 | GND | |
| 5 | XA8 | Address line from system | 35 | GND | |
| 6 | XA10 | Address line from system | 36 | TMROUT2 | Timer 2 output |
| 7 | XA12 | Address line from system | 37 | 8042CS/ | Select 8042 |
| 8 | XA14 | Address line from system | 38 | KBIRQ | IRQ from keyboard controller |
| 9 | XA16 | Address line from system | 39 | STDBY/ | Signal to drive Suspend LED |
| 10 | XA18 | Address line from system | 40 | 475RS2 | Reset drive to RAMDAC |
| 11 | GND | | 41 | PF1/ | Indicates battery low |
| 12 | GND | | 42 | STDBYBTMSignal | to toggle |
| | | Suspend/Resume system | 43 | LCDVR1 | Pin of variable resistor to |
| 13 | REF/ | System in DRAM refresh cycle control voltage of LCD (-) | 44 | +BATTERY | Voltage supply from |
| 14 | GND | | 45 | LCD5V | Voltage supply to LCD (+) |
| | | Li-battery | 46 | +5V | Voltage supply to VGA board |
| 15 | SD2 | Data bus from system bus | 47 | +5V | |
| 16 | SD4 | Data bus from system bus | 48 | VCC1 | Voltage supply to VGA board in |
| 17 | SD6 | Data bus from system bus | 49 | VCC1 | |
| 18 | SD8 | Data bus from system bus | 50 | GND | |
| | | Suspend mode | 51 | XA1 | Address line from system |
| 19 | SD10 | Data bus from system bus | 52 | XA3 | Address line from system |
| 20 | SD12 | Data bus from system bus | 53 | XA5 | Address line from system |
| 21 | SD14 | Data bus from system bus | 54 | XA7 | Address line from system |
| 22 | GND | | 55 | XA9 | Address line from system |
| 23 | XD0 | Data bus from X-bus | 56 | XA11 | Address line from system |
| 24 | XD2 | Data bus from X-bus | 57 | XA13 | Address line from system |
| 25 | XD4 | Data bus from X-bus | 58 | XA15 | Address line from system |
| 26 | XD6 | Data bus from X-bus | 59 | A17 | Address line from system |
| 27 | IRQ1 | IRQ from keyboard | 60 | A19 | Address line from system |
| 28 | IRQ12 | IRQ from PS/2 mouse | | | |
| 29 | RESET4 | Reset drive from system | | | |
| 30 | ALE | Address latch enable | | | |
| (To be continued) | | | | | |
| Pin | Signal | Description | Pin | Signal | Description |

3-46 Connector Input/Output Definition

| | | | | | |
|----|---------|--|-----|-------------|----------------------------|
| 61 | GND | | 81 | AEN | DMA access enable |
| 62 | GND | | 82 | XIOW/ | I/O write |
| 63 | GND | | 83 | SMEMR/ | Memory read |
| 64 | SD0 | Data bus from system bus access | 84 | MEMCS16/ | Signal 16-bit memory |
| 65 | SD1 | Data bus from system bus | 85 | GND | |
| 66 | SD3 | Data bus from system bus | 86 | GND | |
| 67 | SD5 | Data bus from system bus | 87 | BIOCHRDY | Signal I/O access ready |
| 68 | SD7 | Data bus from system bus | 88 | SPKDATA | Speaker data |
| 69 | SD9 | Data bus from system bus | 89 | IKBDEN/ | Select internal keyboard |
| 70 | SD11 | Data bus from system bus address line 20 | 90 | GATEA20 | Signal to gate CPU |
| 71 | SD13 | Data bus from system bus | 91 | CRT/LCD/ | Select CRT or LCD output |
| 72 | SD15 | Data bus from system bus | 92 | HDDLED | Signal to active HDD LED |
| 73 | GND | power | 93 | POWERSW/ | Signal to toggle system |
| 74 | XD1 | Data bus from X-bus voltage of LCD (-) | 94 | LCDBIASPWR/ | Signal to gate the |
| 75 | XD3 | Data bus from X-bus | 95 | LCDVR2 | Pin of variable resister |
| 76 | XD5 | Data bus from X-bus | 96 | +5V | Power supply for VGA board |
| 77 | XD7 | Data bus from X-bus | 97 | -30V | Power supply for LCD (-) |
| 78 | IRQ9 | IRQ from VGA | 98 | -30VGND | |
| 79 | RESET2/ | Warm reset from keyboard controller in Suspend | 99 | VCC1 | Power supply for VGA board |
| 80 | EALE/ | Early address latch enable | 100 | GND | |

3.1.7 Hard Disk Connector (J7)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|---------|
| 1 | RESET/ | 23 | IOW/ |
| 2 | GND | 24 | GND |
| 3 | SD7 | 25 | IOR/ |
| 4 | SD8 | 26 | GND |
| 5 | SD6 | 27 | NC |
| 6 | SD9 | 28 | ALE |
| 7 | SD5 | 29 | NC |
| 8 | SD10 | 30 | GND |
| 9 | SD4 | 31 | IRQ14 |
| 10 | SD11 | 32 | IOCS16/ |
| 11 | SD3 | 33 | SA1 |
| 12 | SD12 | 34 | NC |
| 13 | SD2 | 35 | SA0 |
| 14 | SD13 | 36 | SA2 |
| 15 | SD1 | 37 | CS0/ |
| 16 | SD14 | 38 | CS1/ |
| 17 | SD0 | 39 | HDDLED |
| 18 | SD15 | 40 | GND |
| 19 | GND | 41 | DRV5V |
| 20 | NC | 42 | DRV5V |
| 21 | NC | 43 | GND |
| 22 | GND | 44 | +5V |

Note: See Section 6.2.2 for descriptions.

3.1.8 Floppy Disk Drive Connector (J8)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | DRV5V | 14 | STEP/ |
| 2 | INDEX/ | 15 | GND |
| 3 | DRV5V | 16 | WDATA/ |
| 4 | DK0/ | 17 | GND |
| 5 | DRV5V | 18 | WGATE/ |
| 6 | DR1/ | 19 | GND |
| 7 | NC | 20 | TRK0/ |
| 8 | DSKCHG | 21 | GND |
| 9 | NC | 22 | WRTPRT |
| 10 | WTRO/ | 23 | GND |
| 11 | NC | 24 | RDATA/ |
| 12 | DIR | 25 | GND |
| 13 | NC | 26 | HDSEL |

Note: See Section 6.1.2 for descriptions.

3.1.9 IC Memory Card Connector (J501)

| Pin | Signal | Description | Pin | Signal | Description |
|-------------------|--------|--|-----|--------|-------------------------------|
| 1 | GND | | 11 | GND | |
| 2 | MD3 | Data for memory bus byte of bank 0 in IC card | 12 | CAS01/ | CAS control signal for high |
| 3 | MD4 | Data for memory bus | 13 | NC | |
| 4 | MD5 | Data for memory bus in IC card | 14 | RAS1/ | RAS control signal for bank 1 |
| 5 | MD6 | Data for memory bus | 15 | WE/ | Write enable |
| 6 | MD7 | Data for memory bus byte of bank 0 in IC card | 16 | CAS00/ | CAS control signal for low |
| 7 | MD8 | Data for memory bus | 17 | NC | |
| 8 | MD9 | Data for memory bus in IC card | 18 | RAS0/ | RAS control signal for bank 0 |
| 9 | MD10 | Data for memory bus | 19 | EA9 | Address for memory bus |
| 10 | EA8 | Address for memory bus | 20 | VCC1 | Power supply to IC card |
| (To be continued) | | | | | |

| Pin | Signal | Description | Pin | Signal | Description |
|-----|--------|-------------------------|-----|--------|------------------------|
| 21 | VCC1 | Power supply to IC card | 31 | EA0 | Address for memory bus |

| | | | | | |
|----|-------------------------------------|--------------------------------|------|---------------------|---------------------|
| 22 | EA7 | Address for memory bus | 32 | MD0 | Data for memory bus |
| 23 | EA6 | Address for memory bus | 33 | MD1 | Data for memory bus |
| 24 | EA5 | Address for memory bus | 34 | MD2 | Data for memory bus |
| 25 | EA4 | Address for memory bus | 35 | MD11 | Data for memory bus |
| 26 | EA3 | Address for memory bus | 36 | MD12 | Data for memory bus |
| 27 | EA2 | Address for memory bus | 37 | MD13 | Data for memory bus |
| 28 | EA1 | Address for memory bus | 38 | MD14 | Data for memory bus |
| 29 | CAS11/ byte of bank 1 in IC card | CAS control singal for high 39 | MD15 | Data for memory bus | |
| 30 | CAS10/ byte of bank 1 in IC card | CAS control singal for low | 40 | GND | |

3.2 VGA Board Connector Definitions

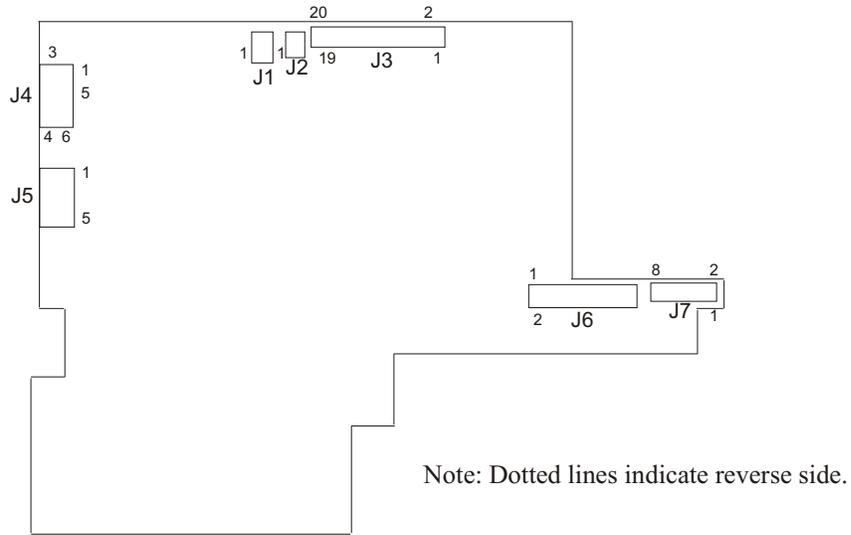


Figure 3-2. VGA Board Connector Positions

| Connector | Definition | Number of Pins |
|-----------|--|----------------|
| J1 | Speaker connector | 2 |
| J2 | Lithium battery connector | 2 |
| J3 | LCD connector | 20 |
| J4 | Auxiliary device port (Mini DIN-6) | 6 |
| J5 | Analog video port (DB-15) | 15 |
| J6 | Scan lines from keyboard encoder to keyboard | 16 |
| J7 | Keyboard matrix to keyboard encoder | 8 |

3.2.1 Speaker Connector (J1)

| Pin | Signal | Description |
|-----|--------|----------------|
| 1 | SPK1 | Speaker signal |
| 2 | SPK2 | Speaker signal |

3.2.2 Lithium Battery Connector (J2)

| Pin | Signal | Description |
|-----|----------|------------------------------|
| 1 | +BATTERY | Power supply from Li-battery |
| 2 | GND | |

3.2.3 LCD Connector (J3)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | LCD5V | 11 | UD0 |
| 2 | GND | 12 | UD1 |
| 3 | -VEE | 13 | UD2 |
| 4 | BCLK | 14 | UD3 |
| 5 | NC | 15 | LD0 |
| 6 | NC | 16 | LD1 |
| 7 | BCLK | 17 | LD2 |
| 8 | BLFS | 18 | LD3 |
| 9 | VDCLK | 19 | ENI |
| 10 | NC | 20 | ENO |

Note: See Section 6.3.2 for descriptions.

3-52 Connector Input/Output Definition

3.2.4 Auxiliary Device Port (J4)

| Pin | Signal | Description |
|-----|--------|------------------------------------|
| 1 | KBCLK | Clock to synchronous KBDATA |
| 2 | NC | |
| 3 | GND | |
| 4 | +5V | Power supply to AUX device |
| 5 | KBDATA | Serial data to and from AUX device |
| 6 | NC | |

3.2.5 Analog Video Port (J5)

| Pin | Signal | Pin | Signal | Description |
|-----|--------|-----|--------|-------------------------|
| 1 | Red | 9 | NC | |
| 2 | Green | 10 | GND | |
| 3 | Blue | 11 | MS(0) | |
| 4 | MS(2) | 12 | MS(1) | |
| 5 | GND | 13 | BHSYNC | Horizontal Sync. output |
| 6 | GND | 14 | BVSYNC | Vertical Sync. output |
| 7 | GND | 15 | NC | |
| 8 | GND | | | |

3.2.6 Internal Keyboard Matrix 1 (J6)

| Pin | Signal | Description | Pin | Signal |
|-----|--------|------------------------------|-----|--------|
| 1 | SCAN0 | Scan line of keyboard matrix | 9 | SCAN8 |
| 2 | SCAN1 | | 10 | SCAN9 |
| 3 | SCAN2 | | 11 | SCAN10 |
| 4 | SCAN3 | | 12 | SCAN11 |
| 5 | SCAN4 | | 13 | SCAN12 |
| 6 | SCAN5 | | 14 | SCAN13 |
| 7 | SCAN6 | | 15 | SCAN14 |
| 8 | SCAN7 | | 16 | SCAN15 |

3.2.7 Internal Keyboard Matrix 2 (J7)

| Pin | Signal | Description | Pin | Signal |
|-----|--------|----------------------------------|-----|--------|
| 1 | KBMT0 | Output line of keyboard matrix 5 | | KBMT4 |
| 2 | KBMT1 | | 6 | KBMT5 |
| 3 | KBMT2 | | 7 | KBMT6 |
| 4 | KBMT3 | | 8 | KBMT7 |

3.2.8 Board-to-board Connector (J501)

See Section 3.1.6.

3.3 DC-AC Inverter Connector Definitions

3.3.1 Input Connector (CN1)

| Pin | Signal | Description |
|-----|-----------|--|
| 1 | Backlight | Square wave input control the brightness by adjusting the duty cycle |
| 2 | GND | |
| 3 | +5V | Power supply from system |

3.3.2 Output Connector (CN2)

| Pin | Signal | Description |
|-----|-----------|------------------------|
| 1 | OUT1 (HV) | High AC voltage output |
| 2 | NC | |
| 3 | NC | |
| 4 | NC | |
| 5 | OUT2 (HV) | Ground |

4 Troubleshooting

4.1 Introduction

When computer power is first turned on, the system BIOS runs a series of internal checks on the hardware. This Power-On Self Test (POST) allows the computer to detect problems as early as the power-on stage. Error messages and system beeps of POST can alert you to the problems of your computer.

If an error is detected during these tests, you will either hear system beep(s) or see an error message displayed on the screen. If the error occurs before the display is initialized, the system beeps to report error.

If error is fatal (non-correctable), the system halts after reporting the fatal error. If error is non-fatal (correctable), the process continues after reporting the non-fatal error.

4.2 Error Messages

Within POST, there are two kinds of messages:

Error messages—failure in hardware, software, or firmware

Informational messages—require no action

4-2 Troubleshooting

| Message | Possible Cause | Solution |
|--|--|--|
| Memory failed at physical address: <code>xxmemory</code> persists, replace | Circuitry associated with the <code>xxmemory</code> chips has failed. | Turn the power off, then back on again. If the problem persists, replace |
| | with a new system board. | |
| Configuration error due to coprocessor | Incorrect configuration of coprocessor | Run SETUP. |
| Bad diskette boot record—press any key | Both drive A and drive C are not formatted as bootable. | Replace the diskette with a bootable diskette or format drive C as bootable. |
| | If the problem persists, replace the | |
| | diskette or the hard disk. | |
| Fixed disk 0 failure | Incorrect configuration of hard disk information. | Run SETUP to enter the correct |
| Bad hard disk | Reboot. If this doesn't work, replace | |
| | the hard disk. | |
| Hard disk cable is not tightly connected. | Check the hard disk cable for proper connection. If this doesn't work, | |
| | replace the hard disk. | |
| Fixed disk controller failure | The NS87310 controller has failed. | Replace the system board. |
| xxxK system RAM failed at offset: <code>xx</code> | Circuitry associated with the <code>xxmemory</code> chip has failed. | Turn the power off, then back on again. If the problem persists, |
| | replace with a new system board. | |
| xxxK shadow RAM failed at offset: <code>xx</code> | | |
| xxxK extended RAM failed at offset: <code>xx</code> | | |
| System CMOS checksum bad—Run SETUP | Checksum byte in CMOS RAM has failed. | Run SETUP and reboot. |
| The ROM BIOS contains an invalid value. | Turn the power off, then back on again. If the problem persists, | |
| | replace with a new ROM. | |
| System battery is dead | Lithium battery failed. | Replace with a new battery. |
| System timer error failed. | The timer (in C&T 82C206) | Replace with a new system board. |
| Real time clock error failed. | The RTC (in C&T 82C206) | Replace with a new system board. |
| Keyboard controller error controller. | Keyboard controller failed. | Replace with a new keyboard controller. |
| Keyboard error floating. | Keyboard controller socket | Resolder the socket. |
| Keyboard encoder failed. | Replace with a new keyboard encoder. | |

4.3 Run-Time Message

Run time messages are displayed if an error occurs after the boot procedure is complete. The table below lists these errors with corresponding solutions.

| Message | Cause | Solution |
|--|--|--|
| Unexpected hardware interrupt at <i>xxxx:xxxx</i> address. Press the R key to reboot or any other key to continue | Hardware problem. Not displayed if the extended interrupt handler is not enabled. | Check the hardware. |
| Unexpected software interrupt <i>interrupt</i> at <i>xxxx:xxxx</i> address. Press the R key to reboot or any other key to continue | Error(s) in the software program. Not displayed if the extended interrupt handler check the program. | Turn the power off, then back on again. If this doesn't work, check the program. |

4-4 Troubleshooting

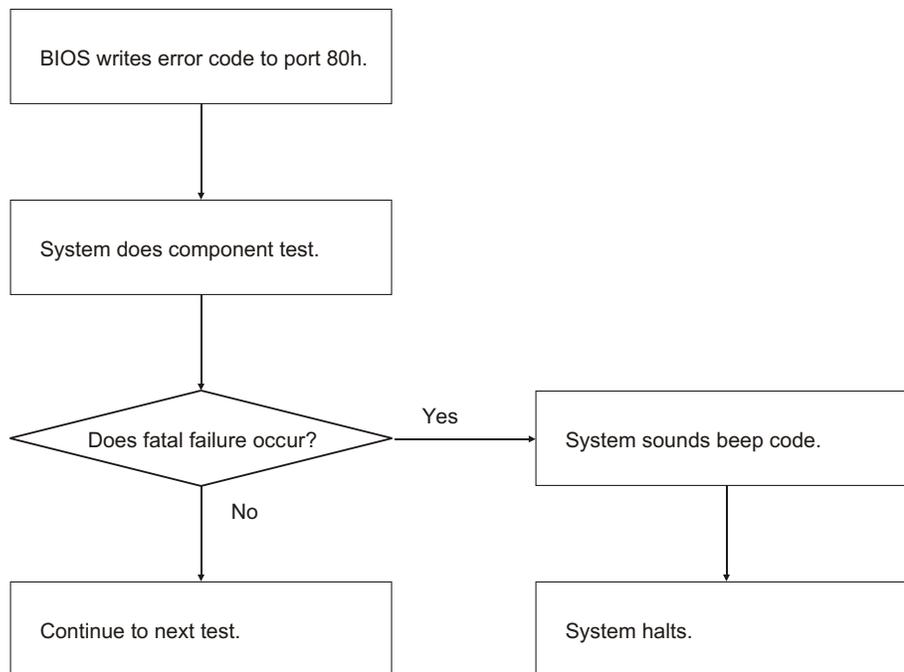
4.4 Beep Codes

In some cases, POST errors cannot be reported on the screen. When an error occurs before the screen is initialized or when the system is set to loop on the system board tests, then the screen cannot display the error message. Beep codes are used to identify a POST error that occurs when the screen is not available.

For example, a beep code of 1-3 (a single beep and a burst of 3 beeps) indicates failure of video memory testing. The value for the diagnostic port (port 80h) is written at the beginning of the test. Therefore, if the test failed, the user can determine where the problem occurred by reading the last value written to port 80h.

The diagram below shows the process performed by the system if an error occurs and the screen is unavailable.

The following table lists the system board and VGA board errors. Note that no beep code is sounded if a test is aborted while in progress. The contents of port 80h can be read to identify the area of failure.



| Beep Code | Contents of Port 80h | Description |
|-----------|----------------------|---------------------------------|
| 3 | 01h | CPU flag register failed. |
| 3 | 02h | CPU register failed. |
| 3 | 03h | ROM did not checksum. |
| 3 | 04h | 8255 DMA controller failed. |
| 3 | 05h | 8253 timer failed. |
| 3 | 06h | Base 64K failed address test. |
| 3 | 07h | Base 64K failed RAM test |
| 3 | 08h | 8259 int controller failed. |
| 3 | 09h | Hot interrupt occurred. |
| 3 | 0Ah | System timer doesn't interrupt. |
| 3 | 0Bh | CPU is still in protected mode. |
| 3 | 0Ch | DMA page registers failed. |
| 3 | 0Dh | Refresh does not occur. |
| 3 | 0Eh | 8742 is not responding. |
| 3 | 0Fh | Cannot enter protected mode. |
| 3 | 10h | GDT or IDT failed. |
| 3 | 11h | LDT register failed. |
| 3 | 12h | Task register failed. |
| 3 | 13h | LSL instruction failed. |
| 3 | 14h | LAR instruction failed. |
| 3 | 15h | VERR/VERW failed. |
| 3 | 16h | 8742 A20 failed. |
| 3 | 17h | Exception failed/unexpected. |

(To be continued.)

4-6 Troubleshooting

| Beep Code | Contents of Port 80h | Description |
|-----------|----------------------|------------------------------------|
| 3 | 18h | Shutdown during memory test. |
| 3 | 19h | Copyright checksum error. |
| 3 | 1Ah | BMS did not checksum. |
| None | 50h | Initialize hardware. |
| None | 51h | Initialize timer. |
| None | 52h | DMA init. |
| None | 53h | 8259 init. |
| None | 54h | Initialize chip set. |
| None | 55h | Setup BMS configuration. |
| None | 56h | Start first protected mode. |
| None | 57h | Memory size test. |
| None | 58h | Configure chip interleave. |
| None | 59h | End of first protected mode. |
| None | 5Ah | Determine system board size. |
| None | 5Bh | Relocate shadow RAM. |
| None | 5Ch | Configure EMS system. |
| None | 5Dh | Setup wait state configuration. |
| None | 5Eh | Retest base 64K RAM. |
| None | 5Fh | Test shadow RAM. |
| None | 60h | CMOS test. |
| None | 61h | Video test. |
| None | 63h | Test interrupts in protected mode. |
| None | 64h | Test line A20. |
| 3 | 65h | Test address lines. |
| 3 | 66h | Memory test. |
| None | 67h | Extended memory test. |
| None | 68h | Timer interrupt test. |
| None | 69h | RTC test. |
| None | 6Ah | Keyboard test. |

(To be continued.)

| Beep Code | Contents of Port 80h | Description |
|-----------|----------------------|---|
| None | 6Bh | 80387SX test. |
| None | 6Ch | RS232 test. |
| None | 6Dh | Parallel port test. |
| None | 6Fh | Floppy disk drive test. |
| None | 70h | Hard disk test. |
| None | 71h | Keyboard test. |
| None | 72h | Auxiliary device test. |
| None | 90h | RAM setup. |
| None | 91h | Calculate CPU speed. |
| None | 92h | Check configuration. |
| None | 93h | BIOS initialization. |
| None | 94h | Bootstrap. |
| None | 95h | Reset ICs. |
| None | 30h | VGA initialize. |
| None | 31h | Disable display and program extended registers. |
| None | 32h | Get user video option from int 15h. |
| None | 33h | Check any co-resident video card. |
| None | 34h | Initialize video data area. |
| None | 35h | Write panel dependent parameters and set all options. |
| 1-3 | 36h | Check video memory. |
| None | 37h | Print error messages on co-resident video card. |
| None | 38h | Select LCD/CRT. |
| None | 39h | Display copyright message. |

Note: Beep code 3 indicates a burst of 3 beeps.

Beep code 1-3 indicates a single beep and a burst of 3 beeps.

4.5 Fault Isolation Flowcharts

Chart A

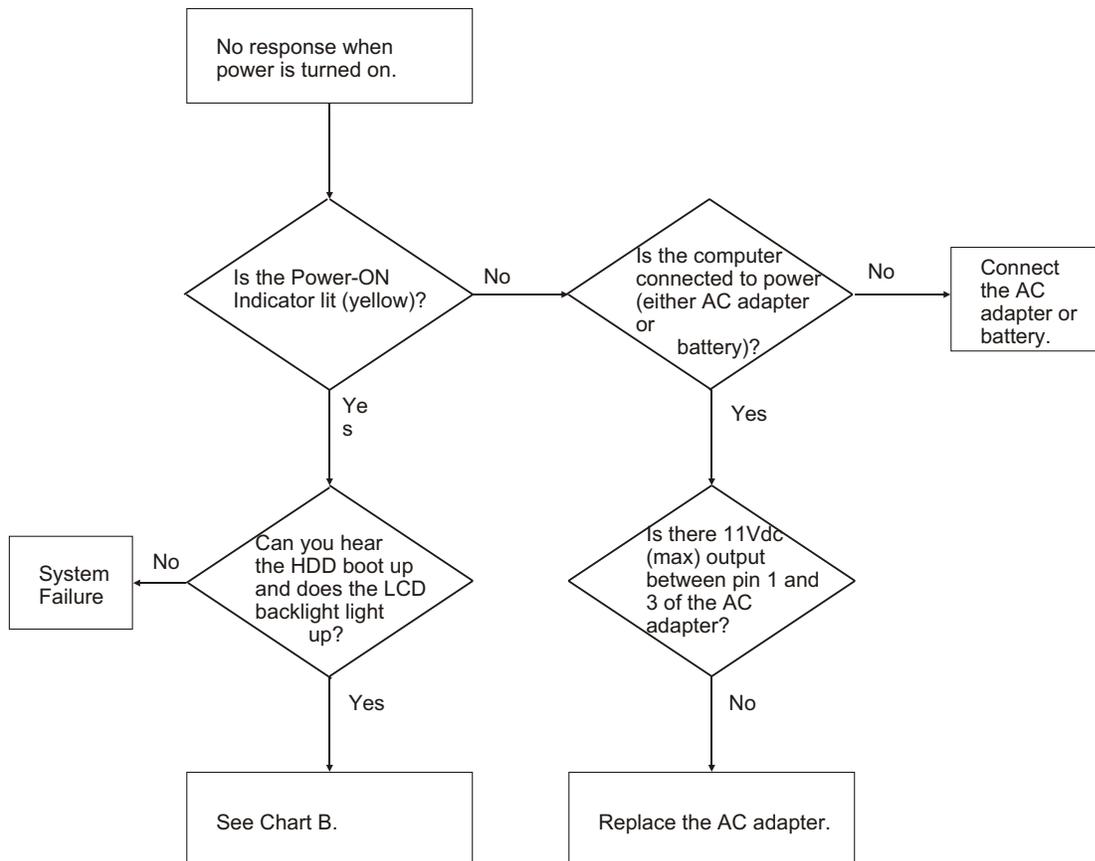


Chart B

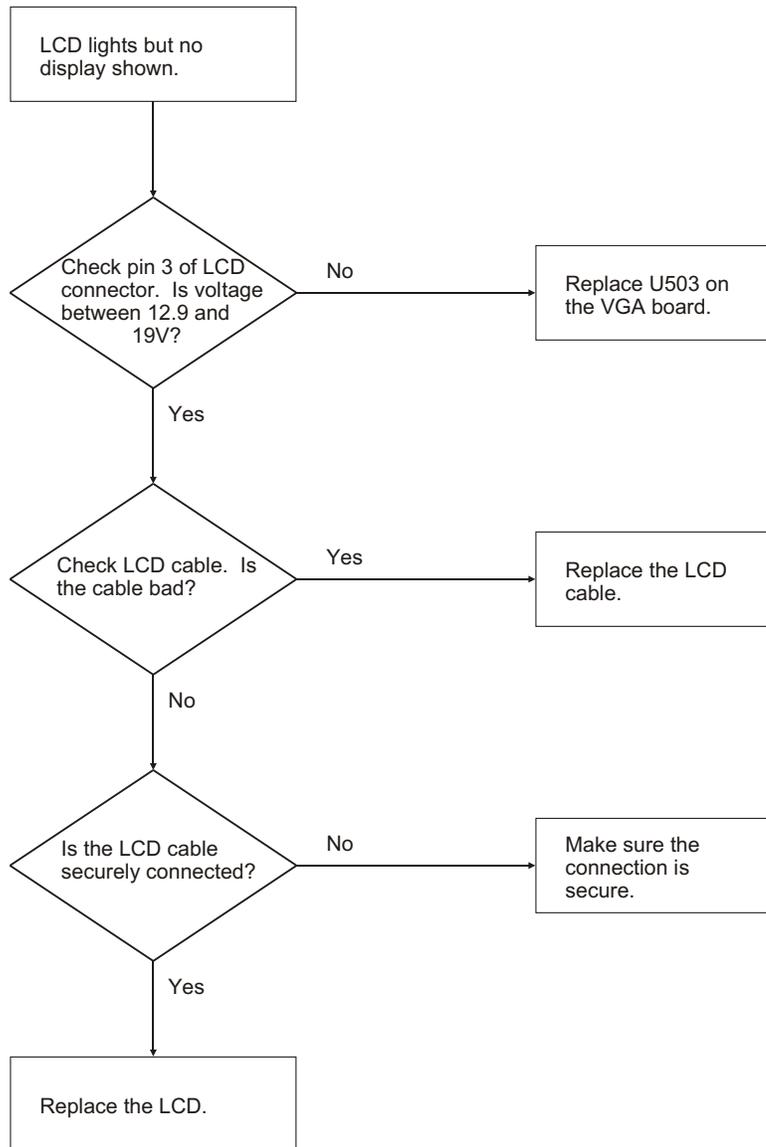


Chart C

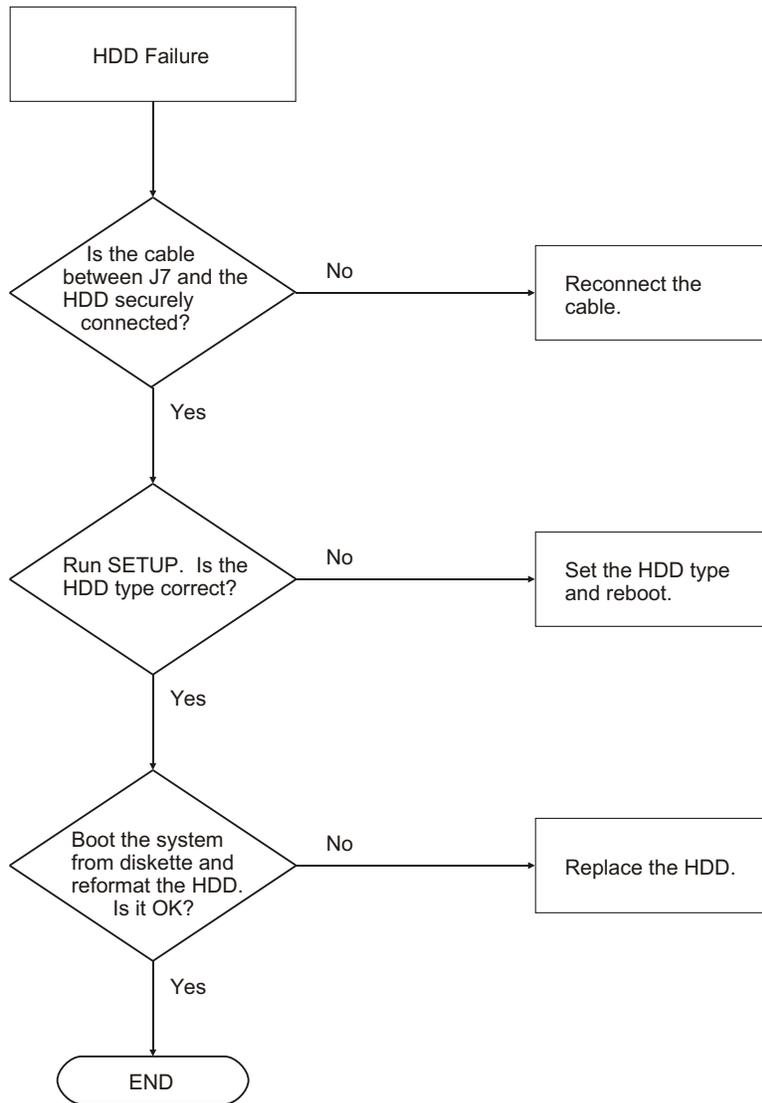


Chart D

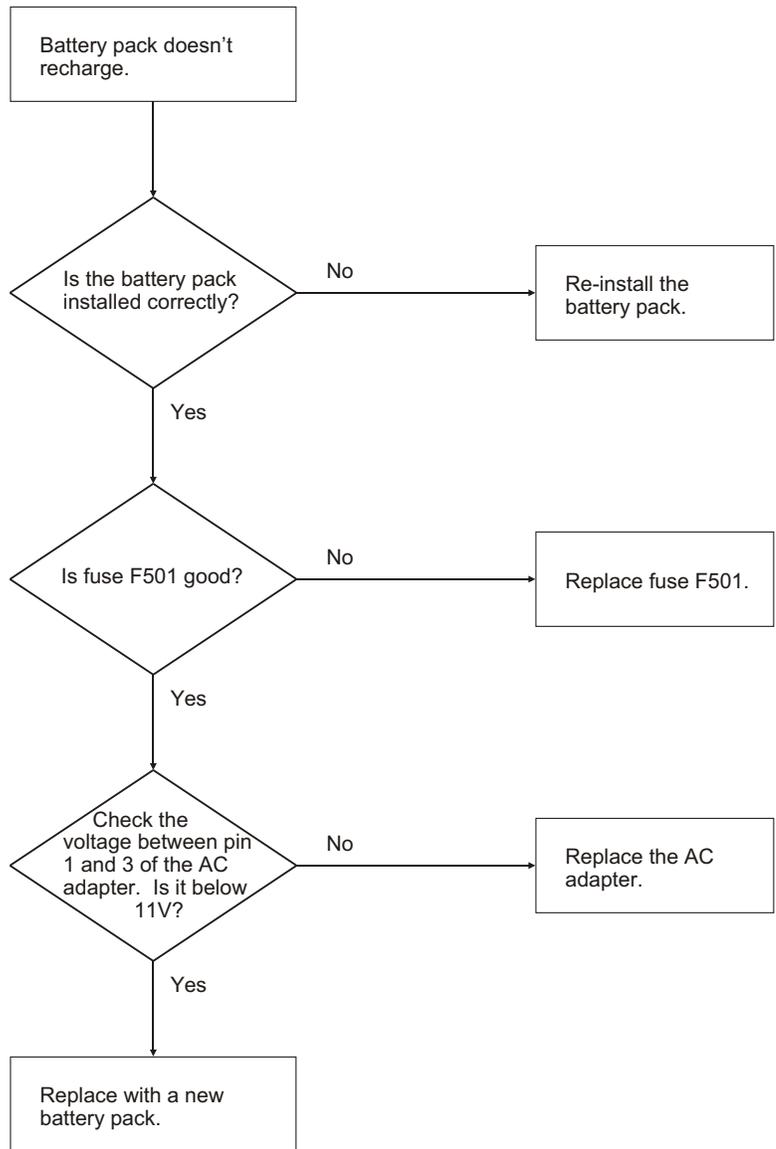


Chart E

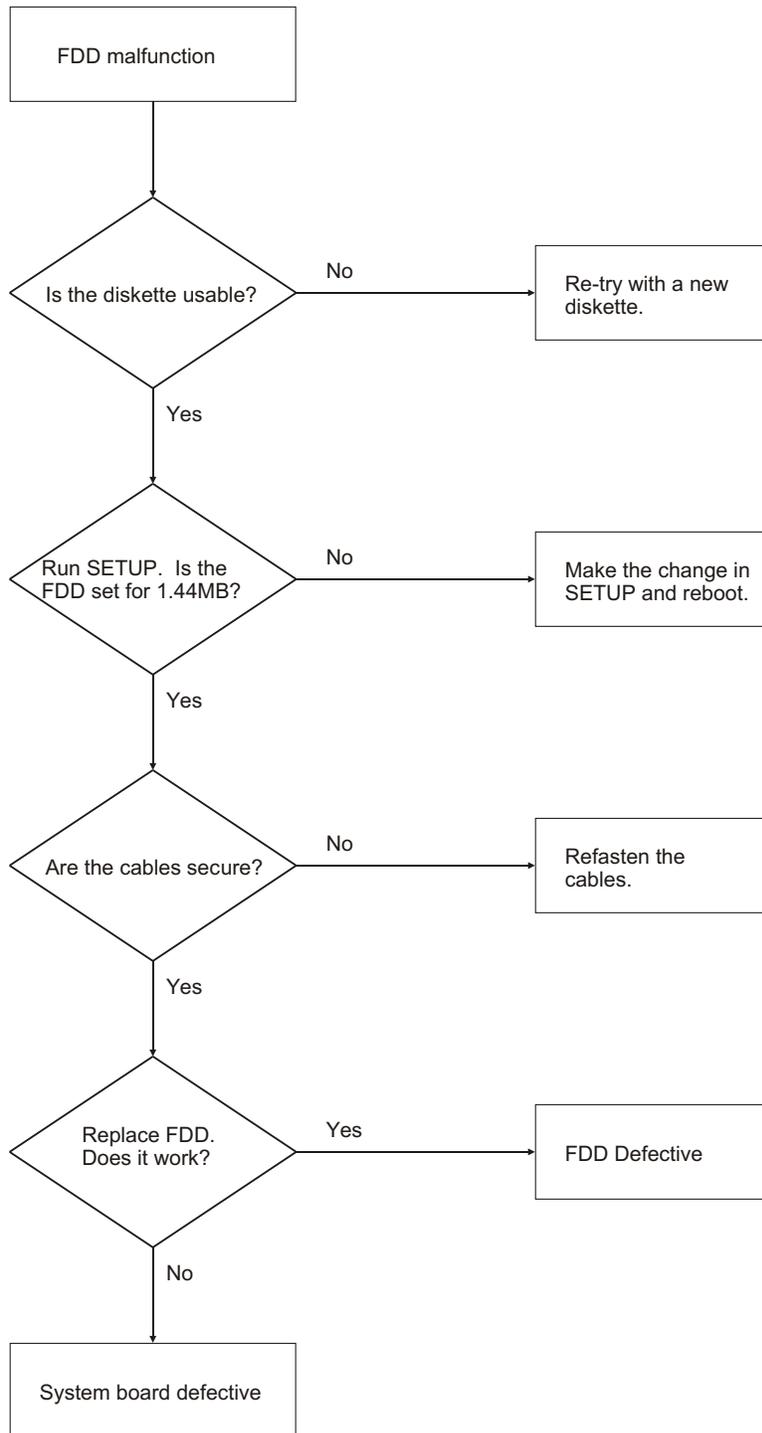
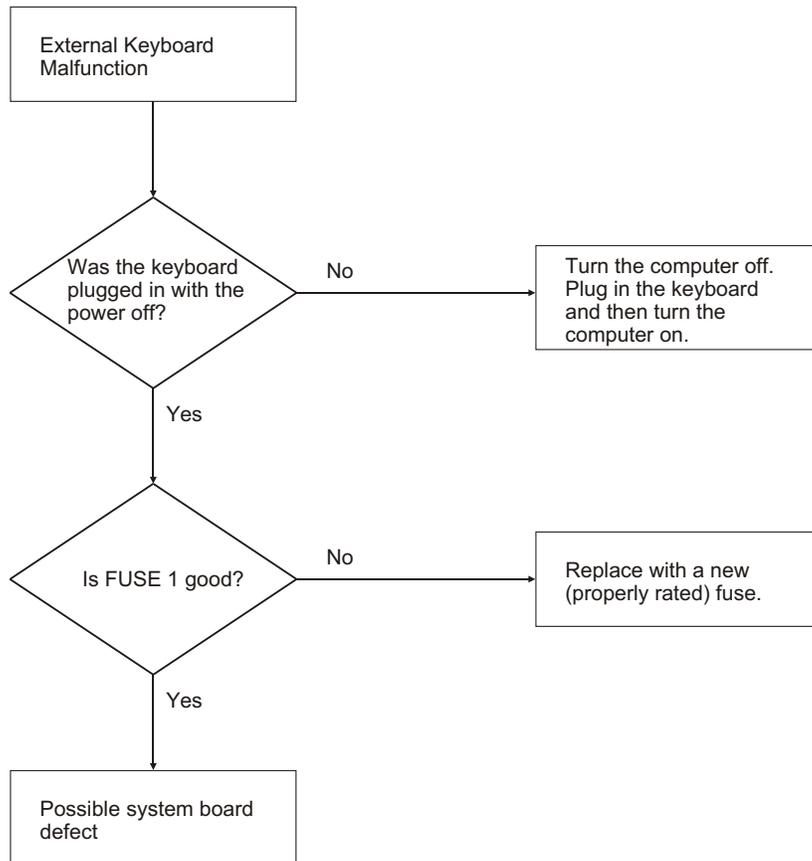


Chart F



5 Maintenance Diagrams

5.1 System Board and VGA Board Layout

5.2 System Board Schematic Diagrams

5.3 VGA Board Schematic Diagrams

5.4 Exploded Views

6 Peripheral Devices

6.1 Floppy Disk Drives

6.1.1 Specifications

Performance

| TEAC FD-335 | Normal Density (2D) | High Density (HD) |
|-------------------------------|---------------------|-------------------|
| Unformatted Capacity (KB) | | |
| per disk | 1000 | 2000 |
| per surface | 500 | 1000 |
| per track | 6.25 | 12.5 |
| Formatted Capacity (KB) | | |
| 256 bytes/sector | 655.36 (16) | 1310.72 (32) |
| 512 bytes/sector | 737.28 (9) | 1474.56 (18) |
| 1024 bytes/sector | 819.2 (5) | 1638.40 (10) |
| Transfer Rate (K-bits/second) | 250 | 500 |
| Average Latency (msec) | 100 | 100 |
| Access Time (msec) | | |
| track-to-track (w/o settling) | 3 | 3 |
| average (with settling) | 94 | 94 |
| Settling Time (msec) | 15 | 15 |
| Motor Start Time (sec) | 0.5 | 0.5 |

Functional

| TEAC FD-335 | Normal Density (2D) | High Density (HD) |
|-------------------------|---------------------|-------------------|
| Rotational Speed (rpm) | 300 | 300 |
| Recording Density (BPI) | 8717 | 17434 |
| Track Density (TPI) | 135 | 135 |
| Tracks | 160 | 160 |
| Encoding Method | MFM | MFM |

6-2 Peripheral Devices

6.1.2 Pin Descriptions

| Pin | Signal | Description |
|-----|----------------|---|
| 1 | +5V | |
| 2 | Index | |
| 3 | +5V | |
| 4 | Drive Select 0 | Drive select decoded for drive 0 |
| 5 | +5V | |
| 6 | Drive Select 1 | Drive select decoded for drive 1 |
| 7 | NC | |
| 8 | Disk Change | Indicates when the disk drive door has been opened. |
| 9 | NC | |
| 10 | Motor On | Enables motor for drive 0. |
| 11 | NC | |
| 12 | Direction | Determines the direction of the head movement. (low = step in; high = step out) |
| 13 | GND | |
| 14 | Step | Produces a pulse at a software programmable rate to move the head during a seek operation. |
| 15 | GND | |
| 16 | Write Data | Writes precompensated serial data to be written onto the selected disk drive. |
| 17 | GND | |
| 18 | Write Gate | Enables the write circuitry of the selected drive to prevent glitches during power up and power down. |
| 19 | GND | |
| 20 | Track 00 | Tells the controller that the head is at track zero of the selected drive. |
| 21 | GND | |
| 22 | Write Protect | Indicates the disk is write-protected. |
| 23 | GND | |
| 24 | Read Data | Reads raw data from the drive. |
| 25 | GND | |
| 26 | Side 1 Select | Determines which drive head is active. (low = head 1; open (high) = head 0) |
| 21 | Reserved | |
| 22 | GND | |
| 43 | GND | |
| 44 | XT/AT | |

6.2 Hard Disk

6.2.1 Specifications

| Conner CP2044 | Conner CP2064 | Seagate ST9051 | Western Digital AAH620 | | | |
|-------------------------|-------------------------|--------------------------|----------------------------------|-----|------|------|
| CMOS SETUP type | | | 44 | 45 | 23 | 19 |
| Formatted capacity (MB) | | | 40.6 | 61 | 40.8 | 59.5 |
| Number of heads | | | 5 | 4 | 4 | 7 |
| Cylinders | | | 980 | 823 | 654 | 1024 |
| Sectors/Track | | 17 | 38 | 32 | 17 | |
| Bytes/Sector | | | 512 | 512 | 512 | 512 |

6.2.2 Pin Descriptions

| Pin | Signal | Pin | Signal |
|-----|--------------------|-----|-------------------|
| 1 | -RESET | 23 | -IOW |
| 2 | GND | 24 | GND |
| 3 | +DATA 7 | 25 | -IOR |
| 4 | +DATA 8 (AT Only) | 26 | GND |
| 5 | +DATA 6 | 27 | -DACK (XT Only) |
| 6 | +DATA 9 (AT Only) | 28 | Reserved |
| 7 | +DATA 5 | 29 | +DRQ (XT Only) |
| 8 | +DATA 10 (AT Only) | 30 | GND |
| 9 | +DATA 4 | 31 | +IRQ |
| 10 | +DATA 11 (AT Only) | 32 | -IO16 (AT Only) |
| 11 | +DATA 3 | 33 | +ADDR 1 |
| 12 | +DATA 12 (AT Only) | 34 | -PDIAG (AT Only) |
| 13 | +DATA 2 | 35 | +ADDR 0 |
| 14 | +DATA 13 (AT Only) | 36 | +ADDR 2 (AT Only) |
| 15 | +DATA 1 | 37 | -CS0 |
| 16 | +DATA 14 (AT Only) | 38 | -CS1 (AT Only) |
| 17 | +DATA 0 | 39 | -ACTIVE (LED) |
| 18 | +DATA 15 (AT Only) | 40 | GND |
| 19 | GND | 41 | 5 Volts (Logic) |
| 20 | KEY | 42 | 5 Volts (Motor) |

Signal Descriptions

| Signal Name | Dir | Pin | Description |
|----------------|--------|-------------------------------|--|
| -RESET | O | 1 | Reset signal from the host system which is active low during power up and inactive thereafter in both XT and AT mode. |
| GND | O | 2, 19, 22, 24, 26, 30, 40, 43 | Ground between the drive and the host |
| +DATA 0-15 I/O | 3 - 18 | | 16-bit bidirectional data between the host and the drive. In AT mode, the low 8 bits, HD0 - HD7, are used for register and ECC access. The high bits are used for data transfers. In XT mode, only the lower 8 bits are used. These are tri-state lines with 10mA drive capability |
| KEY | N/C | 20 | An unused pin clipped on the drive and plugged on the cable. Used to guarantee correct orientation of the cable |
| Reserved | O | 21, 28 | Reserved |
| -IOW | O | 23 | Write strobe, the rising edge of which clocks data from the host data bus into a control register or the data register of the drive. |
| -IOR | O | 25 | Read strobe, which, when low enables data from a status register or the data register of the drive onto the host data bus. The rising edge of IOR latches data from the drive at the host. |
| -DACK | O | 27 | DMA handshake signal used to select a drive data register (XT-only) |
| +DRQ | I | 29 | DMA handshake signal used to select a drive data register (XT-only) |

(To be continued)

6-6 Peripheral Devices

| Signal Name | Dir | Pin | Description |
|-----------------|-----|------------|--|
| +IRQ | I | 31 | Interrupt to the host system. In AT mode, this signal is enabled only when the drive is selected, and the host activates the -IEN bit in the Digital Output Register. When the -IEN bit is inactive, or the drive is not selected, this output is in a high-impedance state regardless of the state of the +IRQ bit. The interrupt is set when the +IRQ bit is set by the drive CPU. +IRQ is reset to zero by a host read of the status register or a write to the command register. In XT mode, this signal is enabled when the +IRQ enable bit is set and the drive has completion status available for the host. This signal is a tri-state line with 12 mA drive capacity. |
| +5V (Logic) | O | 41 | 5 volt \pm 5% to drive circuitry |
| +5V (Motor) | O | 42 | 5 volt \pm 10% supply to drive motors |
| -XT/AT | O | 44 | Interface mode select. This signal is sampled on power up and will select XT or AT operating mode as requested by the host. |
| -IO16 | I | 32 | Indication to the host system that the 16-bit data register has been addressed and that the drive is prepared to send or receive a 16-bit data word. This line is tri-state line with 20 mA drive capacity |
| (AT mode only) | | | |
| -PDIAG | I | 34 | Passed diagnostic. This signal is ignored by the drive. |
| +A0, A1, A2 | O | 35, 33, 36 | But binary coded address used to select the individual registers in the drive. |
| -CS0 | O | 37 | Chip select decoded from the host address bus. Used to select some of the host-accessible registers. |
| NOTE: | | | This signal should be disabled by the host when DMA transfers are in progress. |
| -CS1 | O | 38 | Chip select decoded from the host address bus. Used to select three of the registers in the Task File |
| (AT mode only). | | | |
| -ACTIVE | I | 39 | Signal from the drive used to drive an active LED whenever the disk is being accessed. |

6.3 LCD Display Panel and CCFT

6.3.1 Specifications

SHARP LM64P701 LCD

| | |
|-----------------------------|-------------------|
| Effective viewing area (mm) | 180 (W) x 133 (H) |
| Display format | 640 (W) x 480 (H) |
| Dot size (mm) | 0.24 x 0.24 |
| Dot spacing (mm) | 0.03 |
| VDD-VSS (V) | 4.5 - 5.5 |
| VEE-VSS (V) | -12.9 - 21.0 |
| Response time (Rise) (ms) | 350 |
| Response Time (Decay) (ms) | 250 |

CCFT

| | |
|--------------------------|----------------|
| Circuit voltage | 1100 Vrms Min |
| Discharging tube current | 3.5 - 7 mA ac |
| Power consumption | 2W |
| Discharging tube voltage | 280 Vrms TYP |
| Brightness | 10,000 nit TYP |

6-8 Peripheral Devices

6.3.2 Pin Descriptions

LCD

| Pin | Signal | Description |
|-----|--------|----------------------------------|
| 1 | VCC | Power for logic and LCD (+5V) |
| 2 | VSS | Ground |
| 3 | VEE | Power supply for LCD (-) |
| 4 | CP1 | Input data latch signal |
| 5 | NC | |
| 6 | NC | |
| 7 | YSCL | Row scan shift clock |
| 8 | S | Scan start-up signal |
| 9 | CP2 | Data input clock signal |
| 10 | NC | |
| 11 | DU0 | Display data signal (upper half) |
| 12 | DU1 | Display data signal (upper half) |
| 13 | DU2 | Display data signal (upper half) |
| 14 | DU3 | Display data signal (upper half) |
| 15 | DL0 | Display data signal (lower half) |
| 16 | DL1 | Display data signal (lower half) |
| 17 | DL2 | Display data signal (lower half) |
| 18 | DL3 | Display data signal (lower half) |
| 19 | EI | Enable input |
| 20 | EO | Enable output |

CCFT

| Pin | Signal | Description |
|-----|--------|---------------------------------------|
| 1 | HV | High voltage line (from D/A inverter) |
| 2 | NC | |
| 3 | NC | |
| 4 | NC | |
| 5 | GND | Ground line (from D/A inverter) |