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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.

1 General System Description

Figure 1-1. The Notebook Computer

1.1 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.

1-2 General System Description

Your computer comes with the following basic features:

- 20MHz 80386SX microprocessor
- 80387SX numeric coprocessor (factory-installed option)
- 3¹/₂-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

1.2 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

1.2.1 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 CMOS RAM	C&T 82C206
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

1.2.2 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

Mode (hex)	Type	Shades of Gray	Col. x Rows	Compatible Mode		Compression/Expansion	
				Character Size	Resolution Size	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	graph32	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.

For an external CRT monitor

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:

- * = EGA state. + = VGA state.
- Modes 43, 50, 51, 52, 53, 64, and 73, 74, and 75 are for multi-frequency monitors only.

1.2.3 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

1.2.4 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 (10/3 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. **3 $\frac{1}{2}$ 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 other side. The connector lock should come loose.
 - 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 other side. The connector lock should come loose.
 - 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.

2-6 System View and Disassembly

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.)

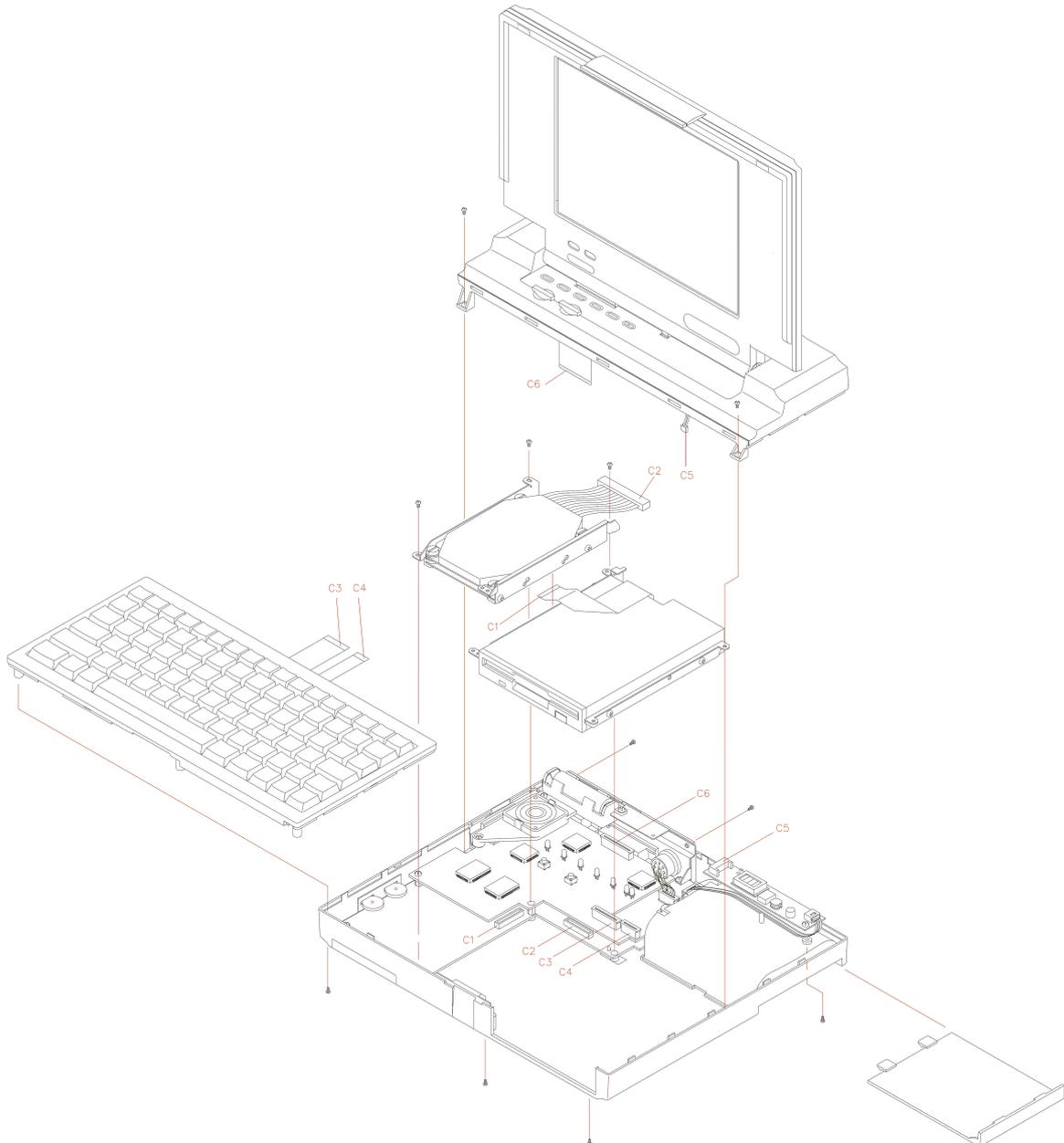


Figure 2-4. Keyboard Disassembly/Reassembly

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 f), 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 side. The connector lock should come loose.
 - b. Carefully pull the cable out of the connector.
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. The connector lock should come 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.

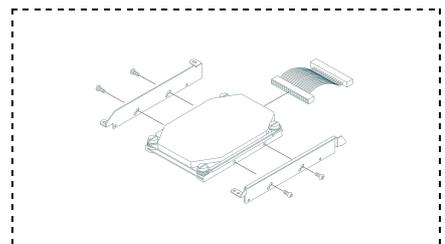
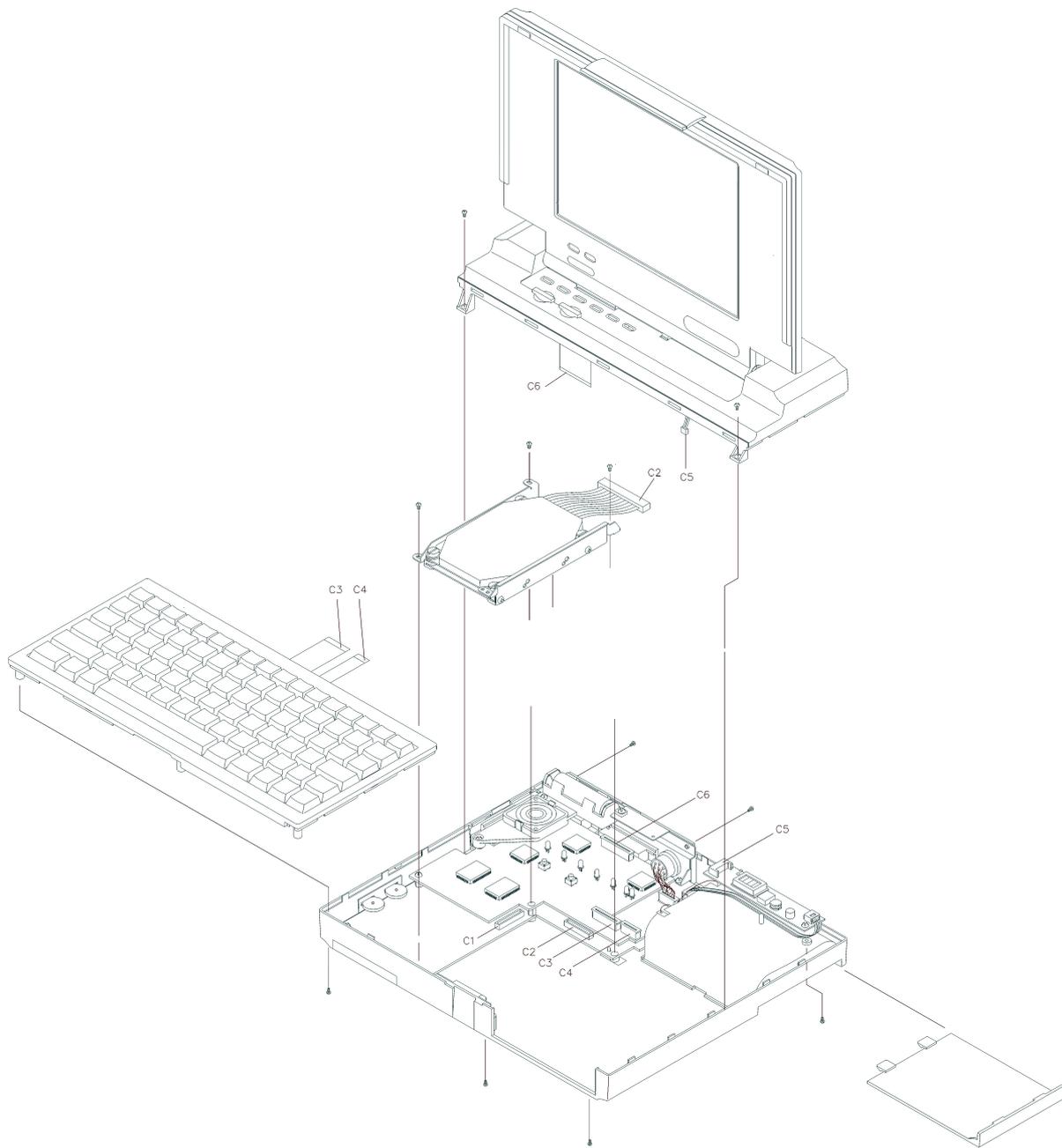


Figure 2-5. Hard Disk Disassembly/Reassembly

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 side. The connector lock should come loose.
 - b. Carefully pull the cable out of the connector.
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 side. The connector lock should come loose.
 - b. Firmly insert the cable end into the connector.
 - 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.)

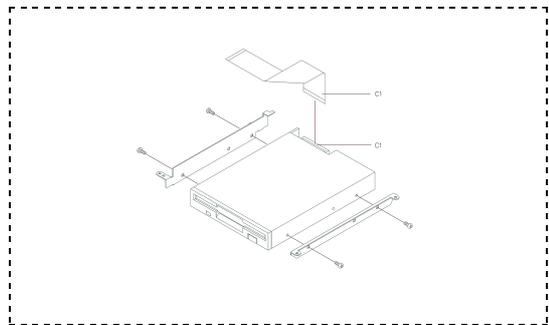
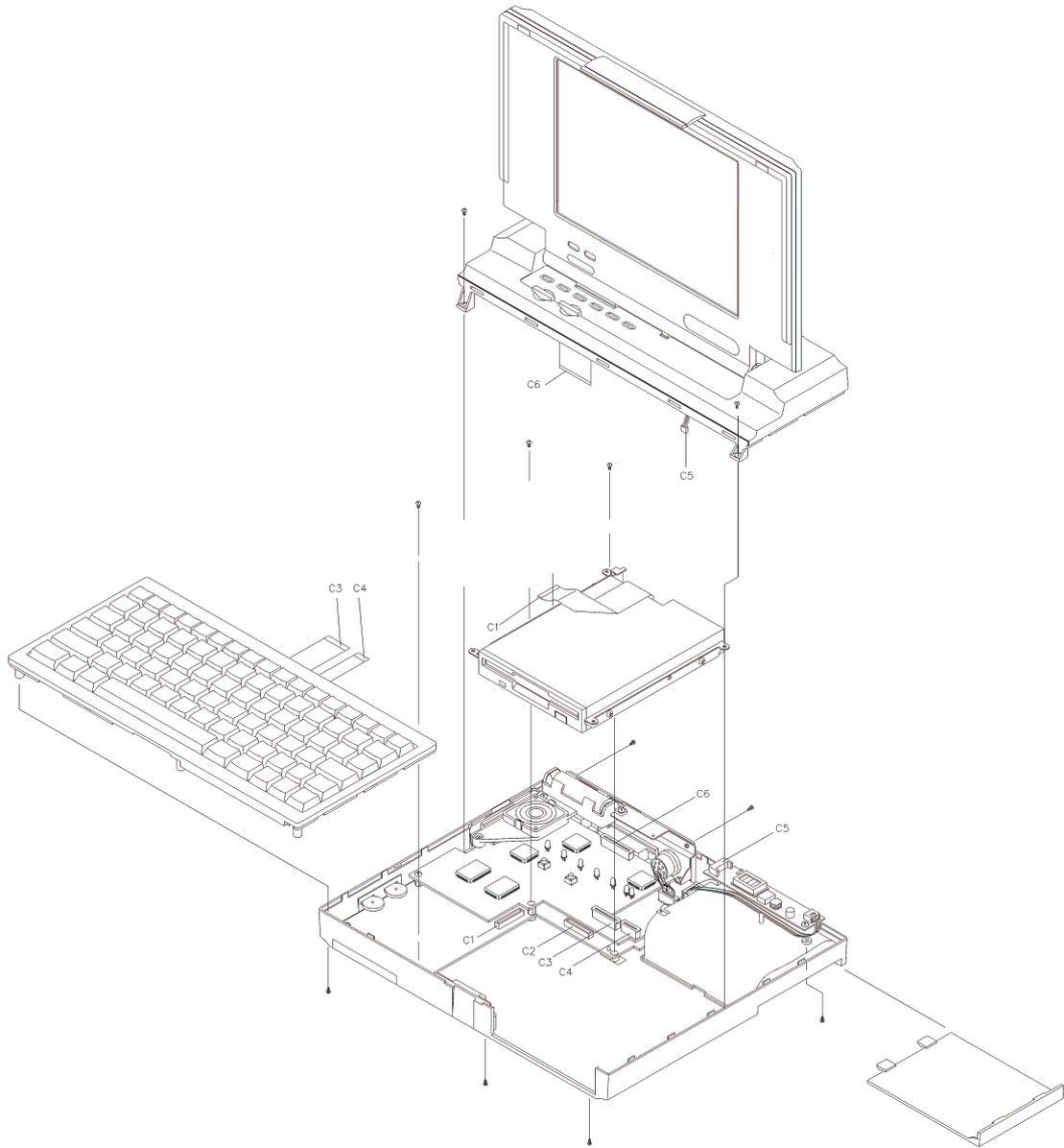


Figure 2-6. Floppy Disk Drive Disassembly/Reassembly

2.2.6 Li-Battery

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

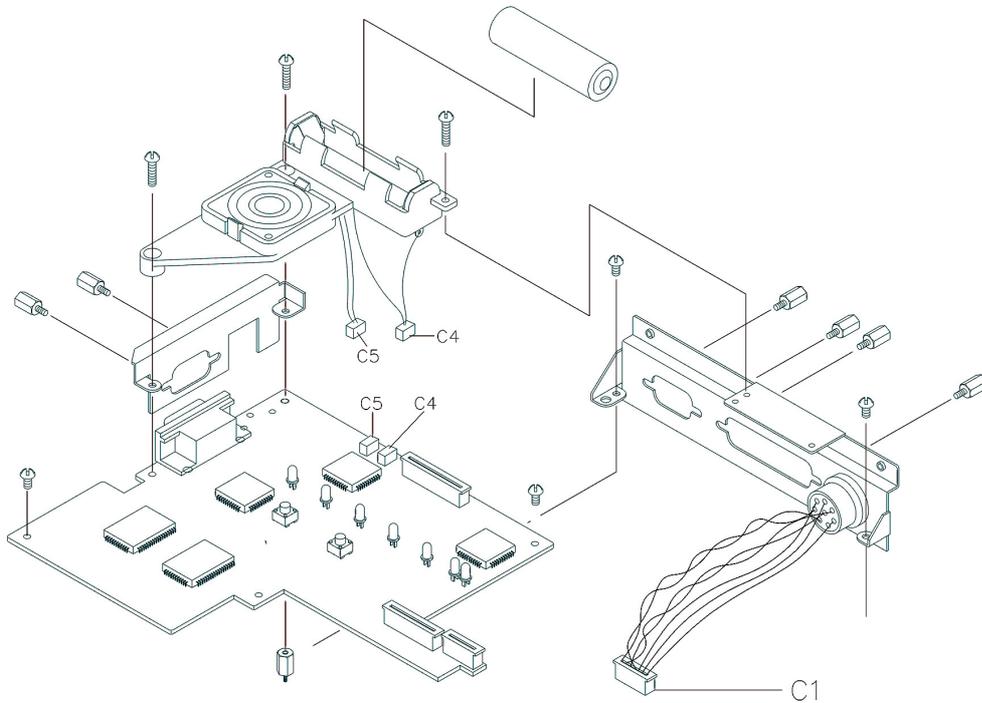
Disassembly (Figure 2-7)

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.

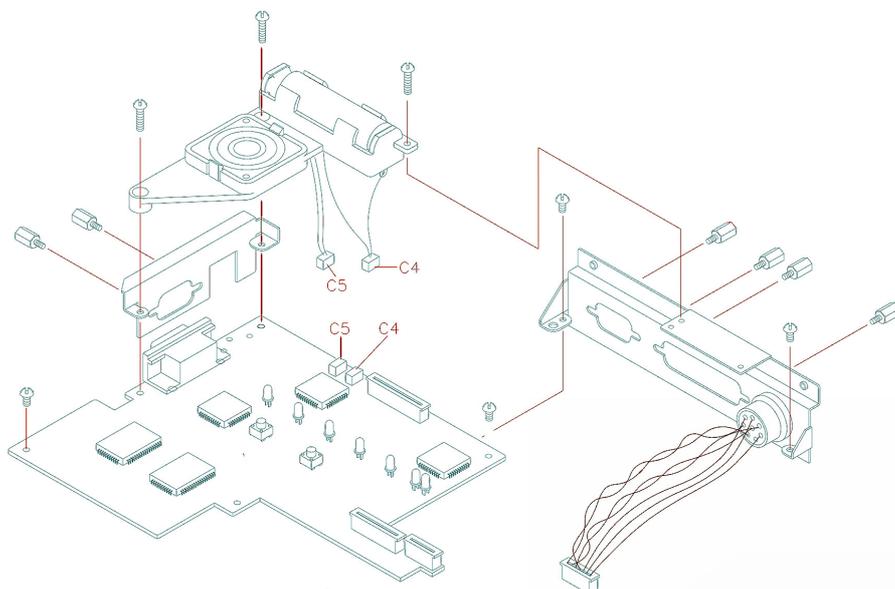
Disassembly (Figure 2-8)

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. 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.)

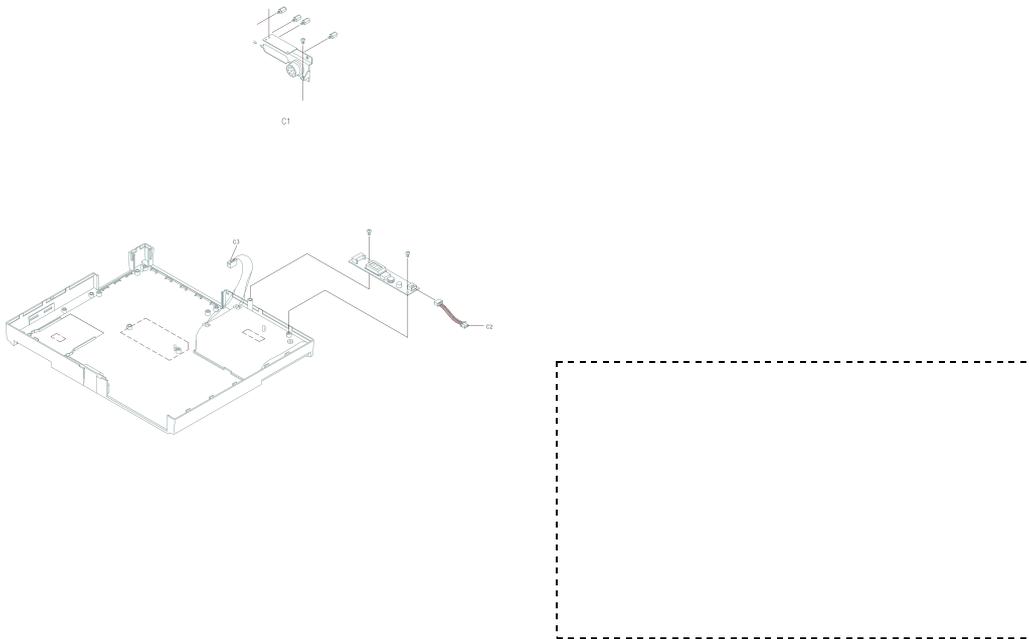


Figure 2-9. DC/AC Board Disassembly/Reassembly

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.)

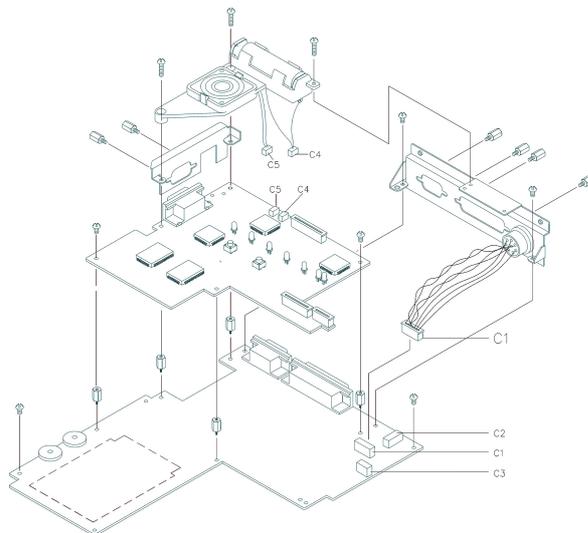


Figure 2-10. VGA Board Disassembly/Reassembly

2.2.10 System Board

Disassembly (Figure 2-11)

1. Remove the VGA board. (See Section 2.2.9 Disassembly.)
2. 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.)

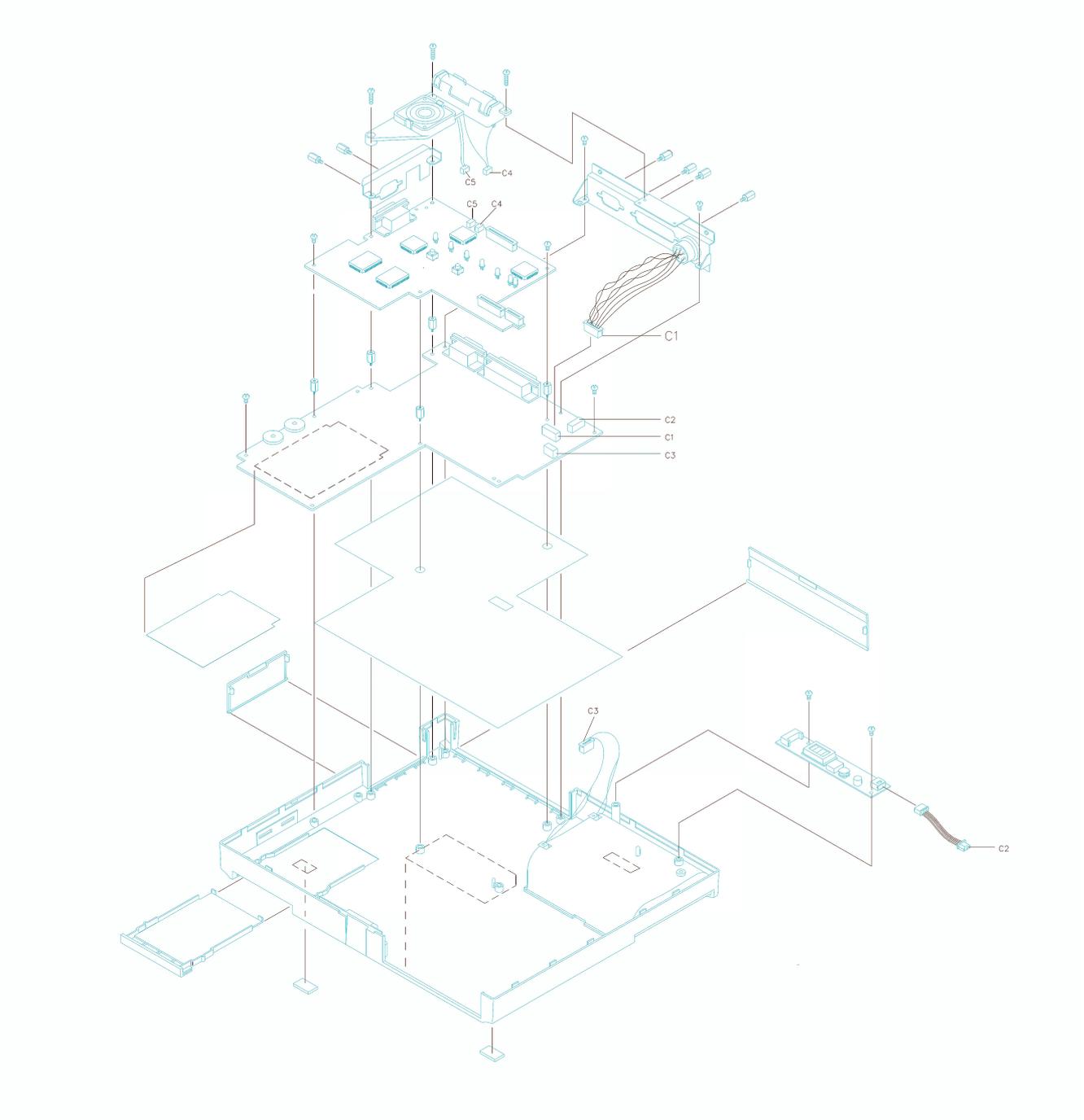


Figure 2-11. System Board Disassembly/Reassembly

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.)

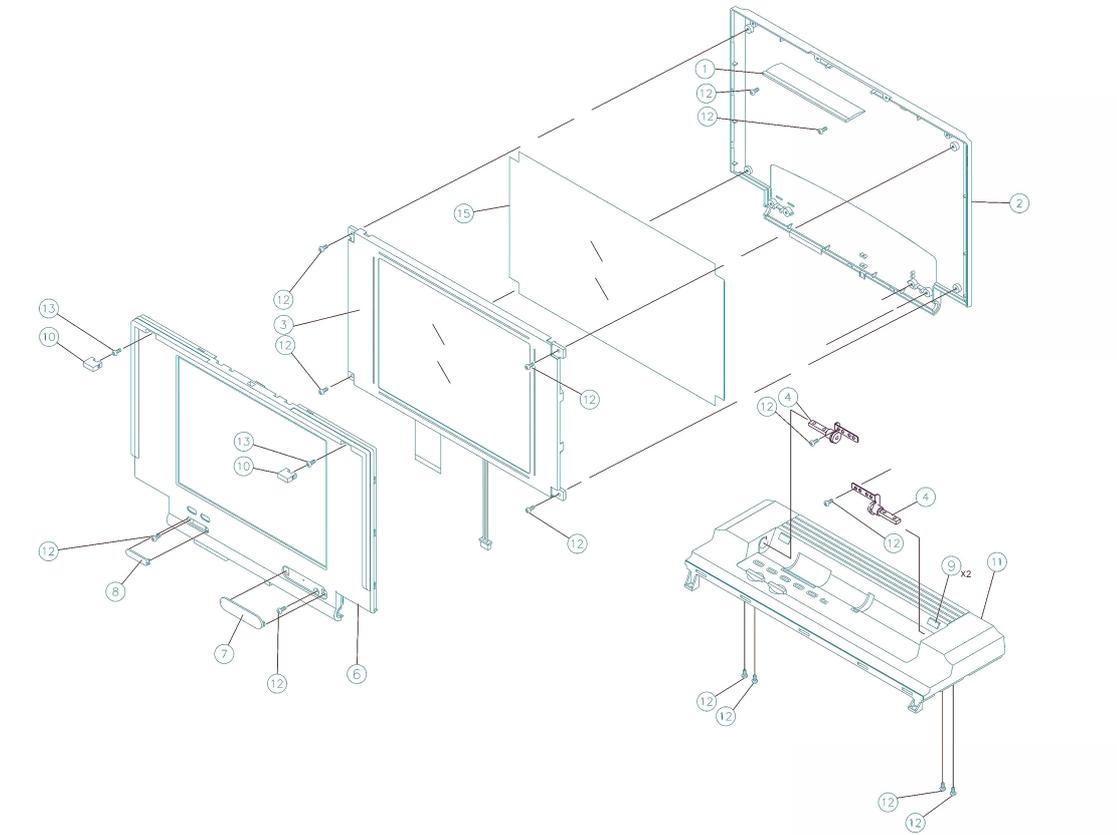
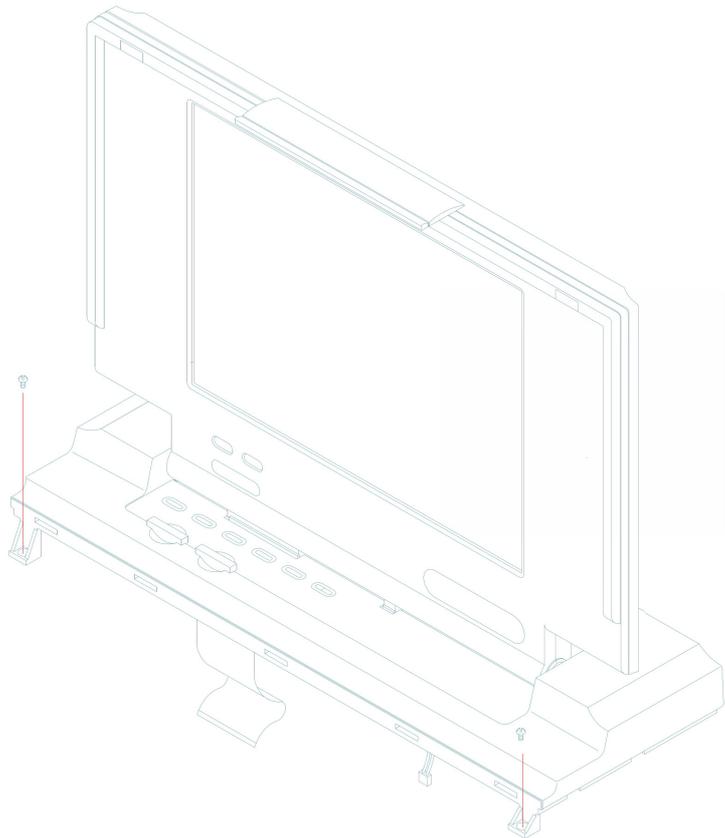
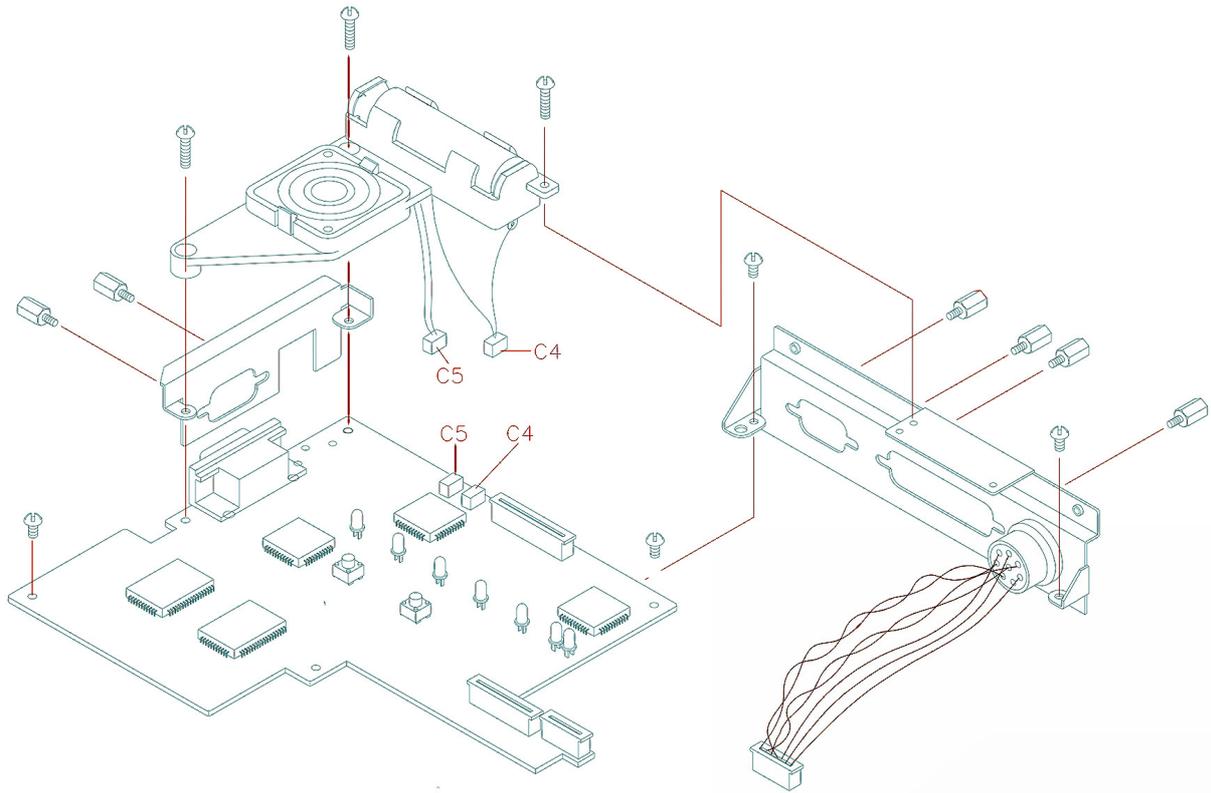
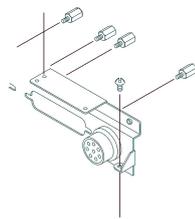
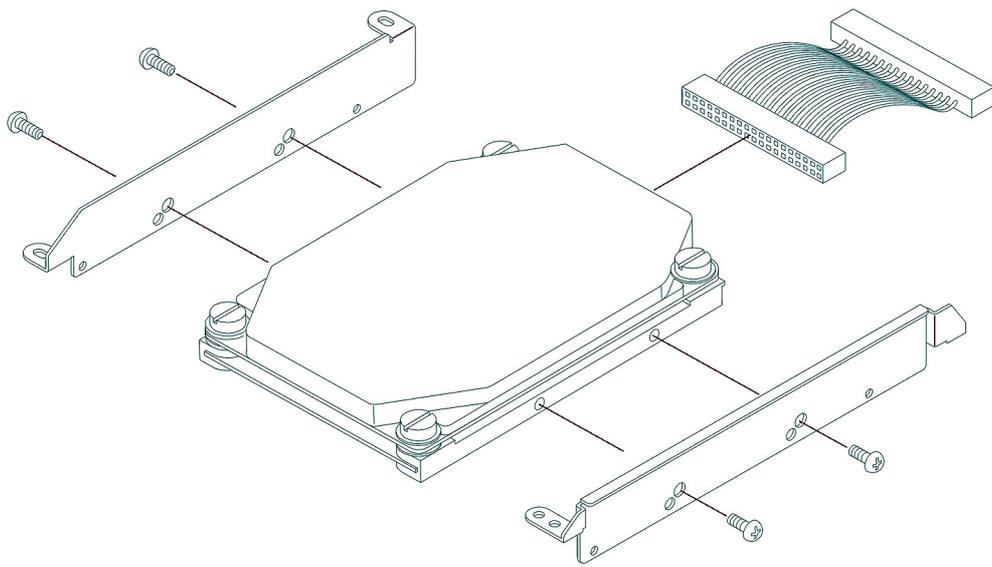
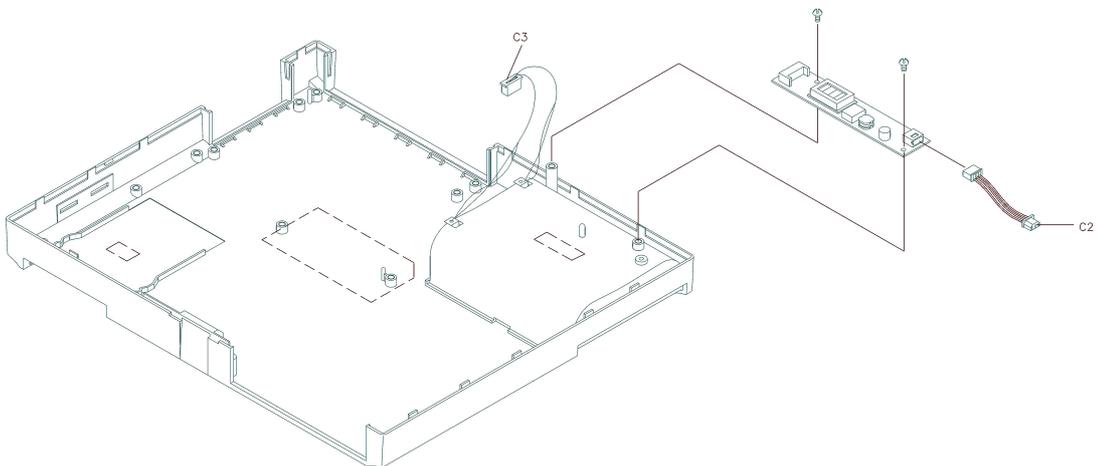


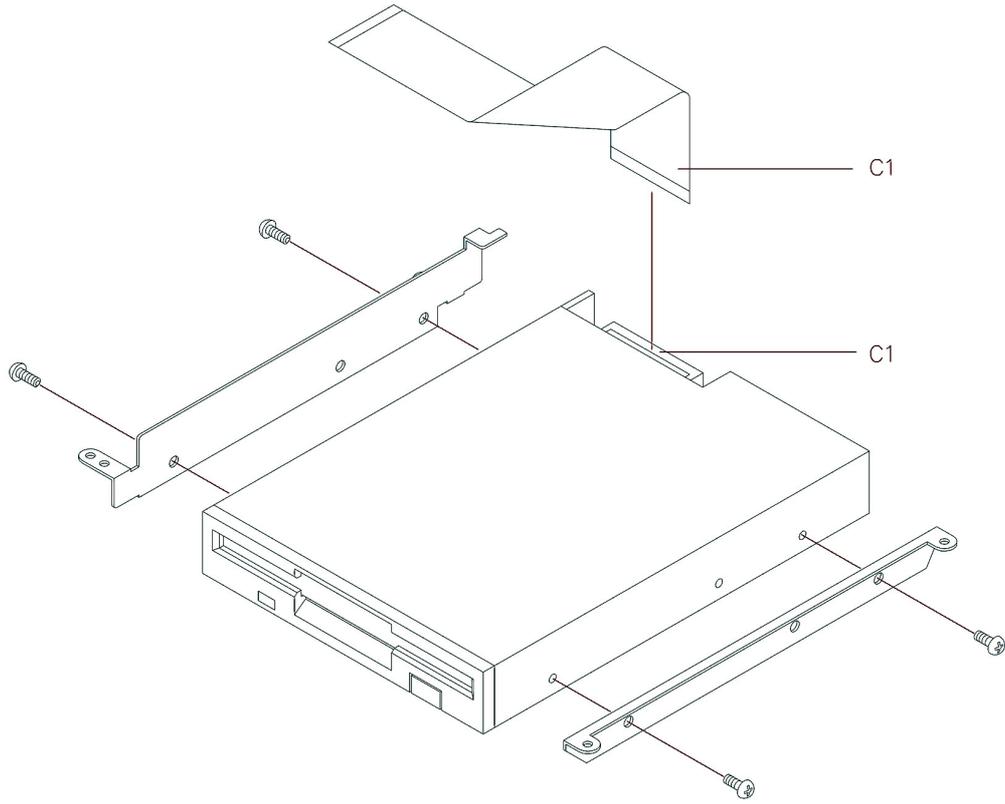
Figure 2-12. LCD Disassembly/Reassembly





C1





3 Connector Input/Output Definition

3.1 System Board Connector Definitions

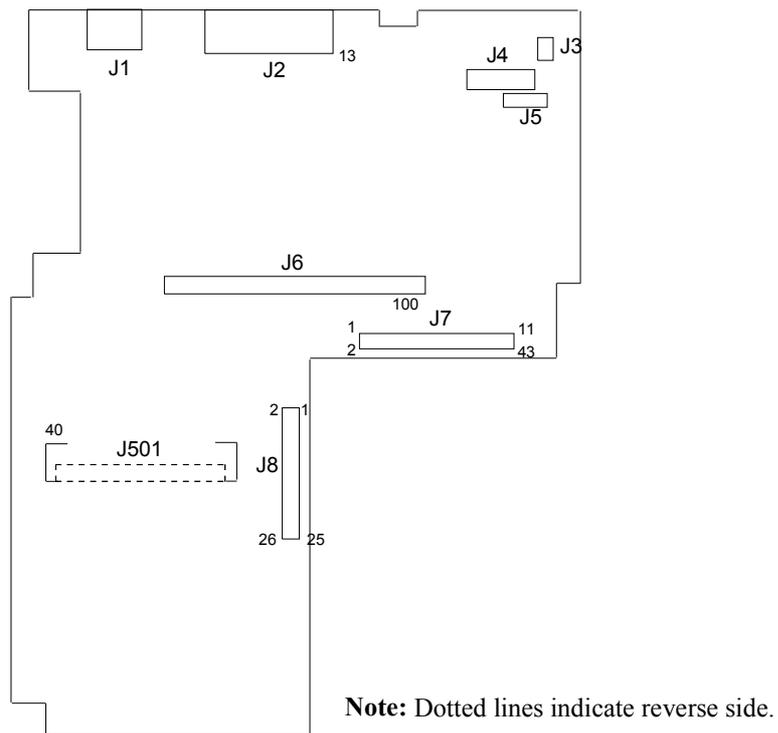


Figure 3-1. System Board Connector Positions

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

3-2 Connector Input/Output Definition

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	STDBYBTM	Signal to toggle Suspend/Resume system
13	REF/	System in DRAM refresh cycle	43	LCDVR1	Pin of variable resistor to control voltage of LCD (-)
14	GND		44	+BATTERY	Voltage supply from Li-battery
15	SD2	Data bus from system bus	45	LCD5V	Voltage supply to LCD (+)
16	SD4	Data bus from system bus	46	+5V	Voltage supply to VGA board
17	SD6	Data bus from system bus	47	+5V	
18	SD8	Data bus from system bus	48	VCC1	Voltage supply to VGA board in Suspend mode
19	SD10	Data bus from system bus	49	VCC1	
20	SD12	Data bus from system bus	50	GND	
21	SD14	Data bus from system bus	51	XA1	Address line from system
22	GND		52	XA3	Address line from system
23	XD0	Data bus from X-bus	53	XA5	Address line from system
24	XD2	Data bus from X-bus	54	XA7	Address line from system
25	XD4	Data bus from X-bus	55	XA9	Address line from system
26	XD6	Data bus from X-bus	56	XA11	Address line from system
27	IRQ1	IRQ from keyboard	57	XA13	Address line from system
28	IRQ12	IRQ from PS/2 mouse	58	XA15	Address line from system
29	RESET4	Reset drive from system	59	A17	Address line from system
30	ALE	Address latch enable	60	A19	Address line from system

(To be continued)

3-6 Connector Input/Output Definition

Pin	Signal	Description	Pin	Signal	Description
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	84	MEMCS16/	Signal 16-bit memory access
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	90	GATEA20	Signal to gate CPU address line 20
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		93	POWERSW/	Signal to toggle system power
74	XD1	Data bus from X-bus	94	LCDBIASPWR/	Signal to gate the voltage of LCD (-)
75	XD3	Data bus from X-bus	95	LCDVR2	Pin of variable resistor
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	99	VCC1	Power supply for VGA board in Suspend
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.

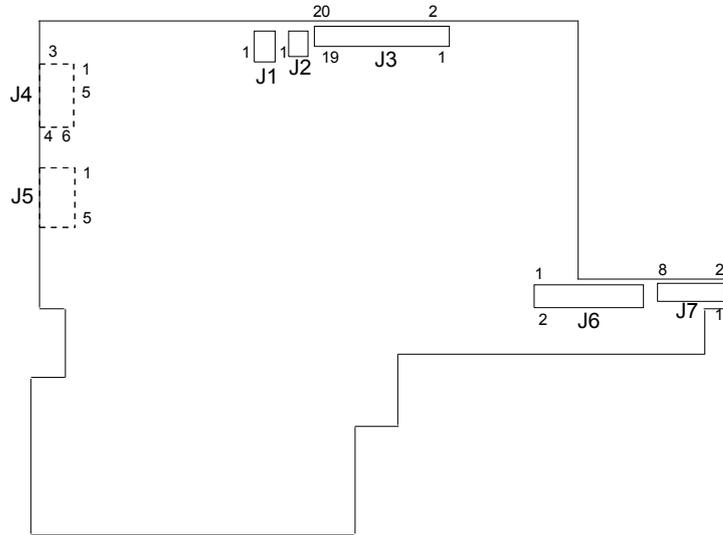
3.1.9 IC Memory Card Connector (J501)

Pin	Signal	Description	Pin	Signal	Description
1	GND		11	GND	
2	MD3	Data for memory bus	12	CAS01/	CAS control signal for high byte of bank 0 in IC card
3	MD4	Data for memory bus	13	NC	
4	MD5	Data for memory bus	14	RAS1/	RAS control signal for bank 1 in IC card
5	MD6	Data for memory bus	15	WE/	Write enable
6	MD7	Data for memory bus	16	CAS00/	CAS control signal for low byte of bank 0 in IC card
7	MD8	Data for memory bus	17	NC	
8	MD9	Data for memory bus	18	RAS0/	RAS control signal for bank 0 in IC card
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/	CAS control signal for high 39 byte of bank 1 in IC card	MD15		Data for memory bus
30	CAS10/	CAS control signal for low byte of bank 1 in IC card	40	GND	

3.2 VGA Board Connector Definitions



Note: Dotted lines indicate reverse side.

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.

3.2.4 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 are not bootable.	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

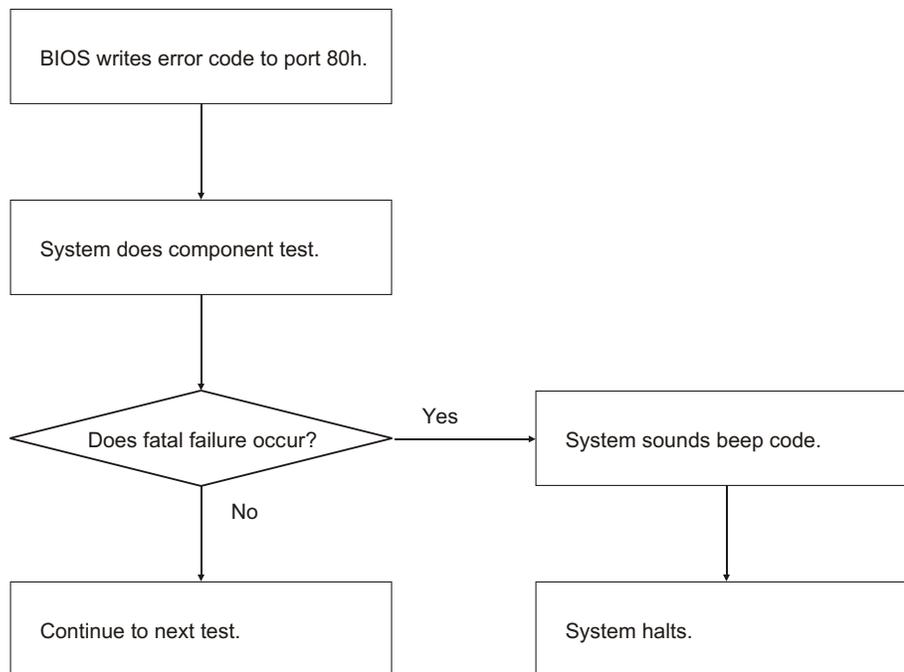
4.4 Beep Codes

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

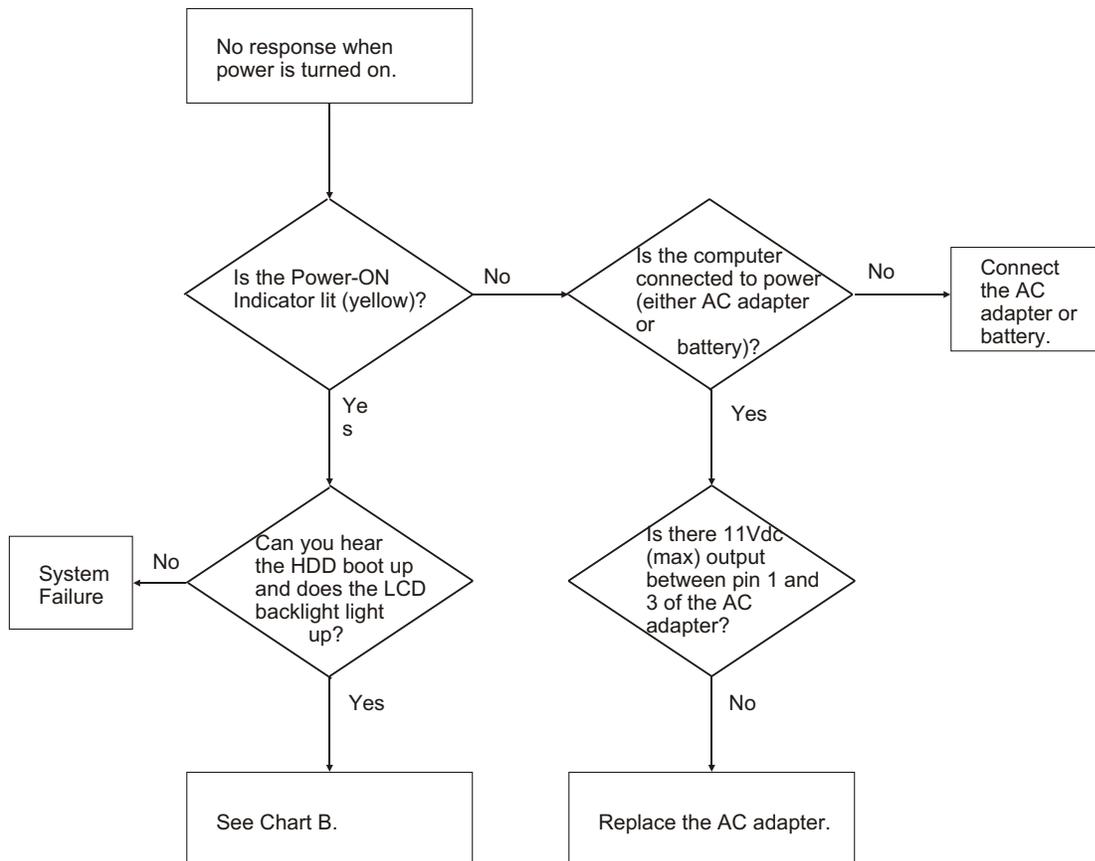


Chart B

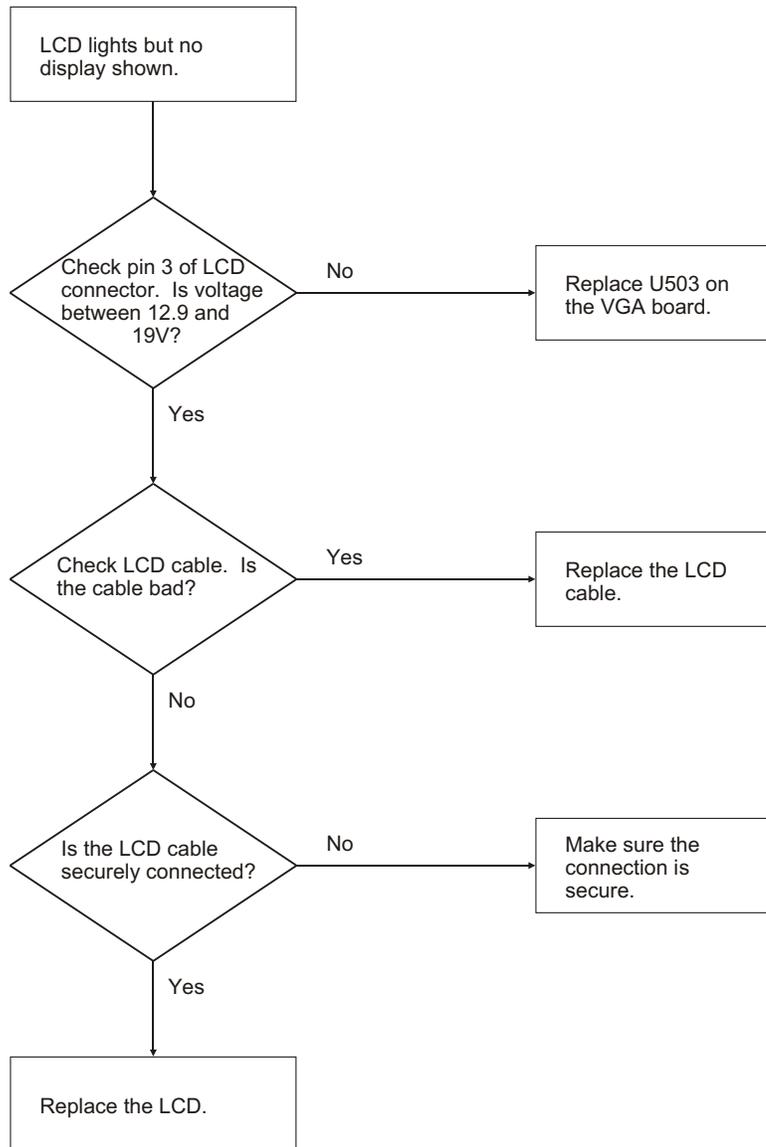


Chart C

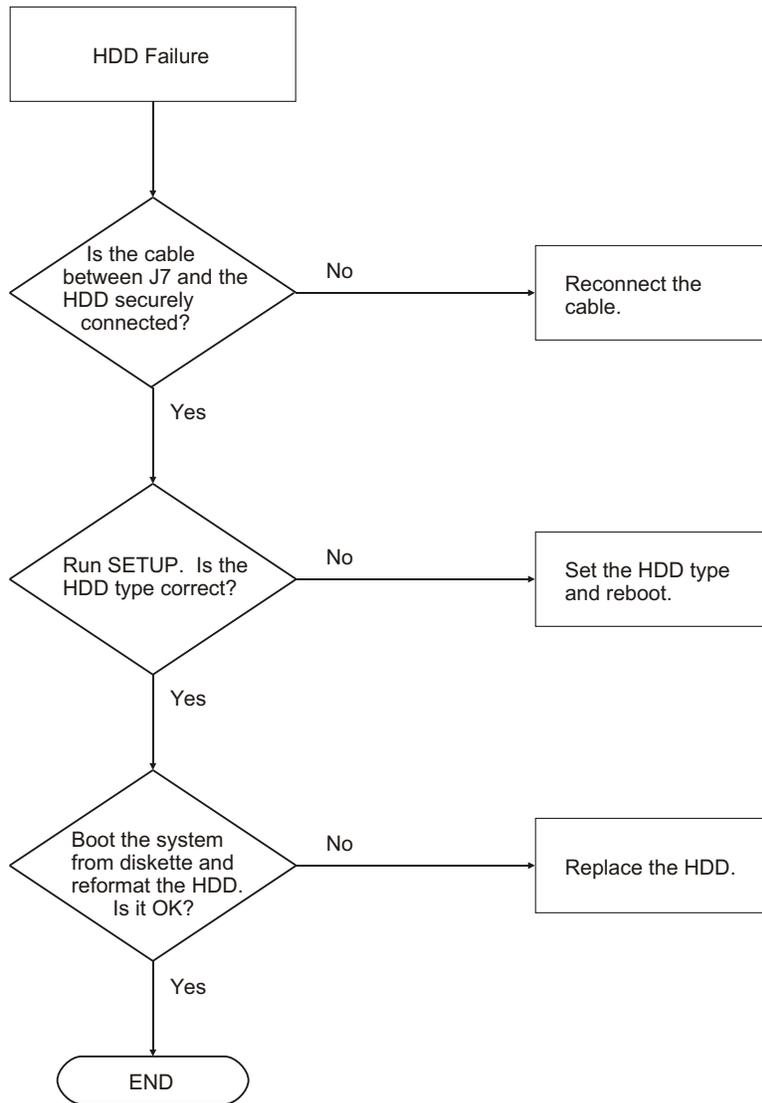


Chart D

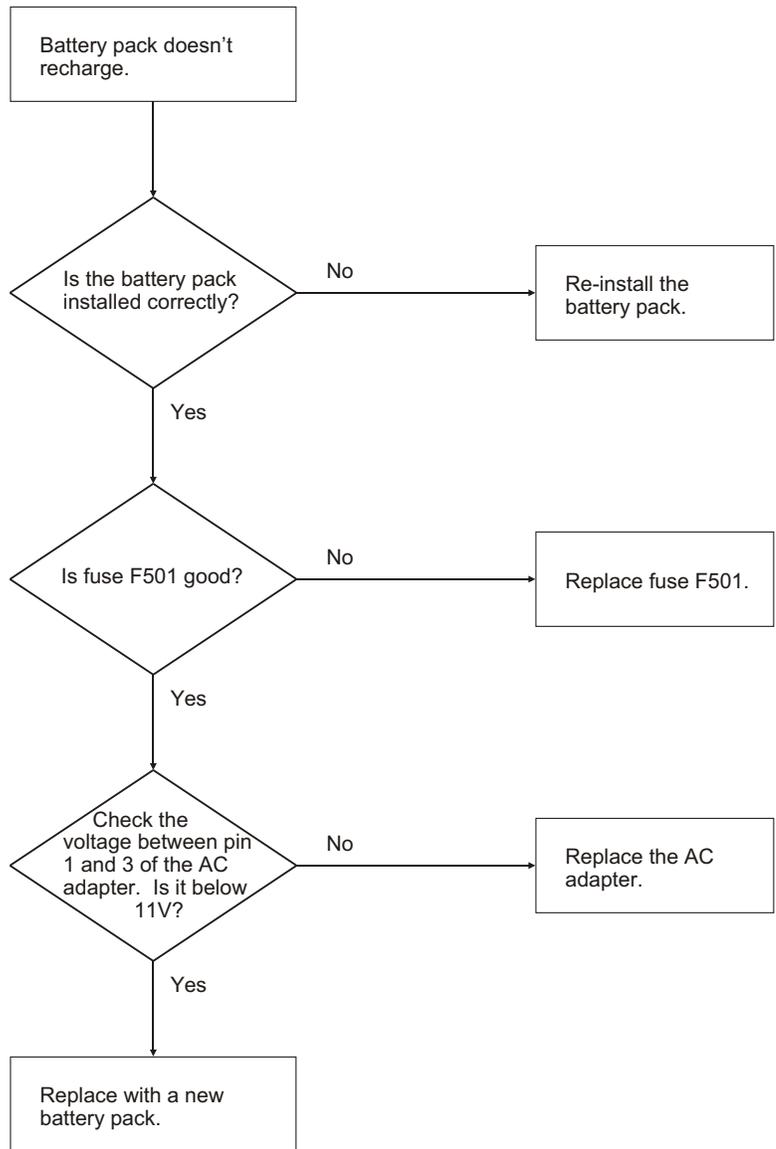


Chart E

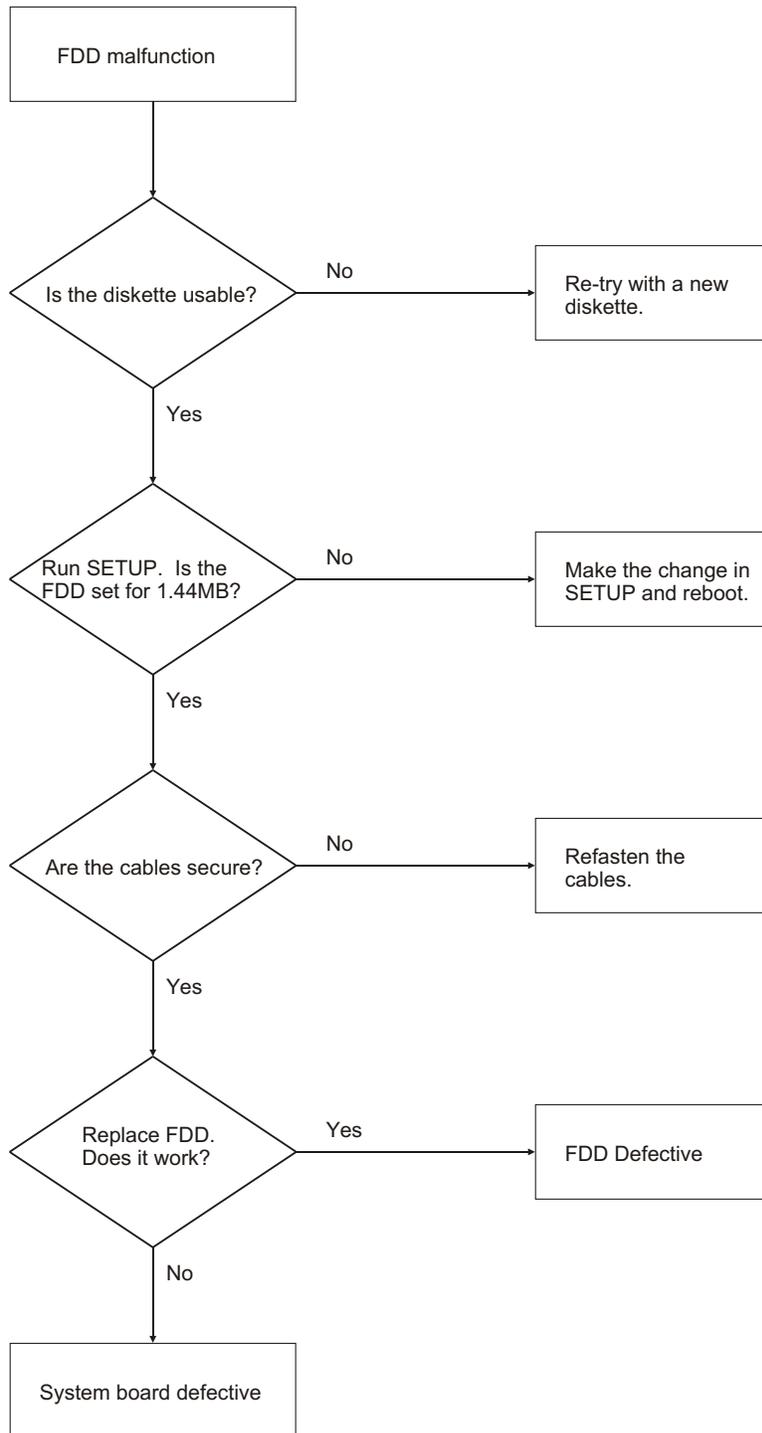
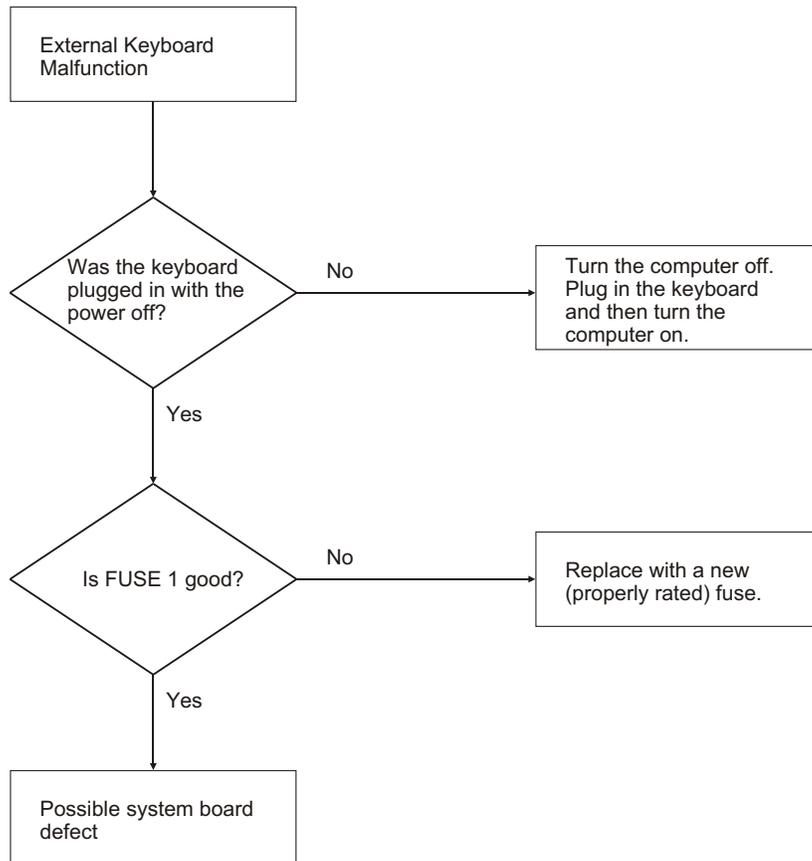


Chart F



5 Maintenance Diagrams

5.1 System Board and VGA Board Layout

5-2 Maintenance Diagrams

5.2 System Board Schematic Diagrams

5-4 Maintenance Diagrams

5.3 VGA Board Schematic Diagrams

5-6 Maintenance 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

6.1.2 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)

6.2 Hard Disk

6.2.1 Specifications

	Conner CP2044	Conner CP2064	Seagate ST9051A	Western Digital AH620
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)
21	Reserved	43	GND
22	GND	44	XT/AT

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)

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 (5% to drive circuitry
+5V (Motor)	O	42	5 volt (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

6.3.2 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)