3027F
Service Manual

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Preface

This Service Manual explains basic procedures of maintenance, troubleshooting, and disassembly for the 3027F 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 6, *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.

Table of Contents

3 Connector Input/Output Definition

4 Troubleshooting

5 Maintenance Diagrams

6 Peripheral Devices

MITAC Global Support Problem Worksheet

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 80386™SL CPU and is easily upgradable via the expansion connectors.

Your computer comes with the following basic features:

- 25MHz 80386™SL microprocessor
- Socket for 80387™SL-25MHz numeric coprocessor
- 3.5-inch, 1.44MB floppy disk drive
- Hard disk drive
- NiCad rechargeable battery pack
- Flat-panel, backlit LCD screen with a resolution of 640 x 480 dots in 16 shades of gray
- 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, parallel device, fax/modem card, and expansion box)
- 2MB of DRAM standard, expandable up to 4MB or 10MB with SIMMs
- AC adapter
- Power Management feature that automatically conserves power
- Suspend/resume feature
- VGA (Video Graphic Array) controller
- Multi-layer security
- 16KB cache memory

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 and 1-4 shows the layout of the system board, followed with key components descriptions.

Figure 1-3. Major Components of System Board (top view)

Figure 1-4. Major Component of System Board (bottom view)

Mark	Reference	Description	Name
A	U1	Input/Output processor	82360SL
B	U2	Single power, single chip RS-232C driver	MAX241
C	U3	Battery charge controller	SANYO SCU-A2
D	U4	Numeric coprocessor socket	Intel 80387™SX
E	U6	System clock generator	AV9127-08
F	U10	Flash EPROM	28F010
G	U11	Floppy disk controller	82077SL
H	U13	Keyboard encoder	NT114LP
I	U14-U17	SIMM DRAM	HB56G1813-8AL
J	U504	CPU	80386™SL-25MHz
K	Y1	32KHz crystal for RTC	
L	Y2	14.318MHz crystal for AV9127-08	
M	Y3	4MHz crystal for NT114LP	

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 1-5 and 1-6 shows the layout of the VGA board, followed with key components descriptions.

Figure 1-5. Major Components of VGA Board (top view)

Figure 1-6. Major Components of VGA Board (bottom view)

Mark	Reference	Description	Name
Q	U1	Audio amplifier for speaker	LM386
R	U4	Keyboard controller; implements all standard PC/AT compatible keyboard and PS/2 mouse controller functions	Intel®8742
S	U8	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

Mark	Reference	Description	Name
T	U9	Battery low warning controller; blinks power LED after sensing the voltage of battery pack low	TL 555
U	U10	Frame buffer accelerator for LCD display only; 64KB x 4 bit memory provides 4-bit data to low panel of LCD display	TMS 4464-10
V	U15	VGA sequencer and CRT controller for video output sequencing and flat-panel/CRT control	CL-GD620C
W	U16	VGA graphics and attribute control	CL-GD610C
X	U21, U22	256KB video memory implemented by two 64KB x 16 bit DRAM chips	TC 511664-10
Y	U509	VGA clock generator	ICS 1394
A1	Y1	10MHz for keyboard controller	
B1	Y501	14.31818MHz for video clock generator	

VGA Modes

The following display modes are supported by the VGA controller:

For a flat panel display

				Compatible Mode		Compression/Expansion	
Mode (hex)	**Type**	**Shades of Gray**	**Col. x Rows**	**Character Size**	**Resolution**	**Character Size**	**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	graphic	4	40 x 25	16 x 16	640 x 400	16 x 19	640 x 475
5	graphic	4	40 x 25	16 x 16	640 x 400	16 x 19	640 x 475
6	graphic	2	80 x 25	8 x 16	640 x 400	8 x 19	640 x 475
D	graphic	16	40 x 25	16 x 16	640 x 400	16 x 19	640 x 475
E	graphic	16	80 x 25	8 x 16	640 x 400	8 x 19	640 x 475
F*	graphic	4	80 x 25	8 x 14	640 x 350	8 x 19	640 x 475
10*	graphic	16	80 x 25	8 x 14	640 x 350	8 x 19	640 x 475
11	graphic	2	80 x 30	8 x 16	640 x 480	8 x 19	640 x 480
12	graphic	16	80 x 30	8 x 16	640 x 480	8 x 19	640 x 480
13	graphic	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	graphic	16	80 x 25	8 x 16	640 x 400	8 x 19	640 x 475
70	graphic	32	45 x 30	8 x 16	360 x 480**	8 x 16	640 x 480
74	graphic	32	40 x 30	16 x 16	640 x 480	16 x 16	640 x 480
75	graphic	32	80 x 25	8 x 16	640 x 400	8 x 19	640 x 475
HGC	graphic	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 x25	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	graphic	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	graphic	16/256K	80 x 25	A0000	8 x 16	640 x 400
62	graphic	16/256K	80 x 28	A0000	8 x 16	640 x 450
63	graphic	16/256K	90 x 33	A0000	8 x 16	720 x 540
64	graphic	16/256K	100 x 37	A0000	8 x 16	800 x 600
70	graphic	256/256K	45 x 30	A0000	8 x 16	360 x 480
71	graphic	256/256K	66 x 25	A0000	8 x 16	528 x 400
72	graphic	16/256K	90 x 33	A0000	8 x 16	720 x 540
73	graphic	16/256K	100 x 37	A0000	8 x 16	800 x 600
74	graphic	16/256K	100 x 37	A0000	8 x 16	800 x 600
75	graphic	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 only.
3. Modes greater than 13 are extended text or graphics modes.

1.2.3 DC/DC Board

Figure 1-7. Major Component of DC/DC Board

Mark	Reference	Description	Name
A	U501	Switching power regulator	LT1172

1.2.4 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

1.2.5 Power Supply System

AC Adapter

- Portable, brick-shaped power supply with a separate AC power cord
- Full-range operating between 100V and 240V
- Frequency 50—60Hz
- Output voltage below 11V, with overcurrent and overcharging protection
- AC input current:
  0.7A (RMS) Max. for 100V
  0.4A (RMS) Max. for 240V
- 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 36.8Ah/Rg).

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 84 mm x 54 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. **Cover Latch**
3. **Floppy Disk Drive In-use Indicator**
4. **3.5-inch Floppy Disk Drive**
5. **Eject Button**

2.1.2 Rear and Left View

Figure 2-2. Computer Rear and Side View

1. **Battery Pack Cover**
   The battery pack is installed here.
2. **Fax/Modem Module**
3. **Power Connector**
   Connects the AC adapter.
4. **Serial Port (SIO#1)**
5. **Parallel Port (PIO)**
6. **Expansion Connector**
7. **Auxiliary Device Port (Mini DIN-6)**
8. **Analog Video Port**
9. **Brightness Dial**
   For the LCD screen.
10. **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:

- Philips screwdriver (small)
- Philips screwdriver (medium-sized)
- Hexnut driver (5mm)
- 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/reassembly and show corresponding illustrations.

2.2.2 Battery Pack

Disassembly (See 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 (See 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 (See Figure 2-4.)

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 unplug the two keyboard cables (2) from 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. Carefully pull the keyboard cable out of the connector.

Reassembly (See Figure 2-4.)

1. To connect the two keyboard cables (2) 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.
2. Align and fix the keyboard back onto the chassis.
3. Place the computer upside down.
4. Replace the three screws (1) attaching the keyboard to the chassis.

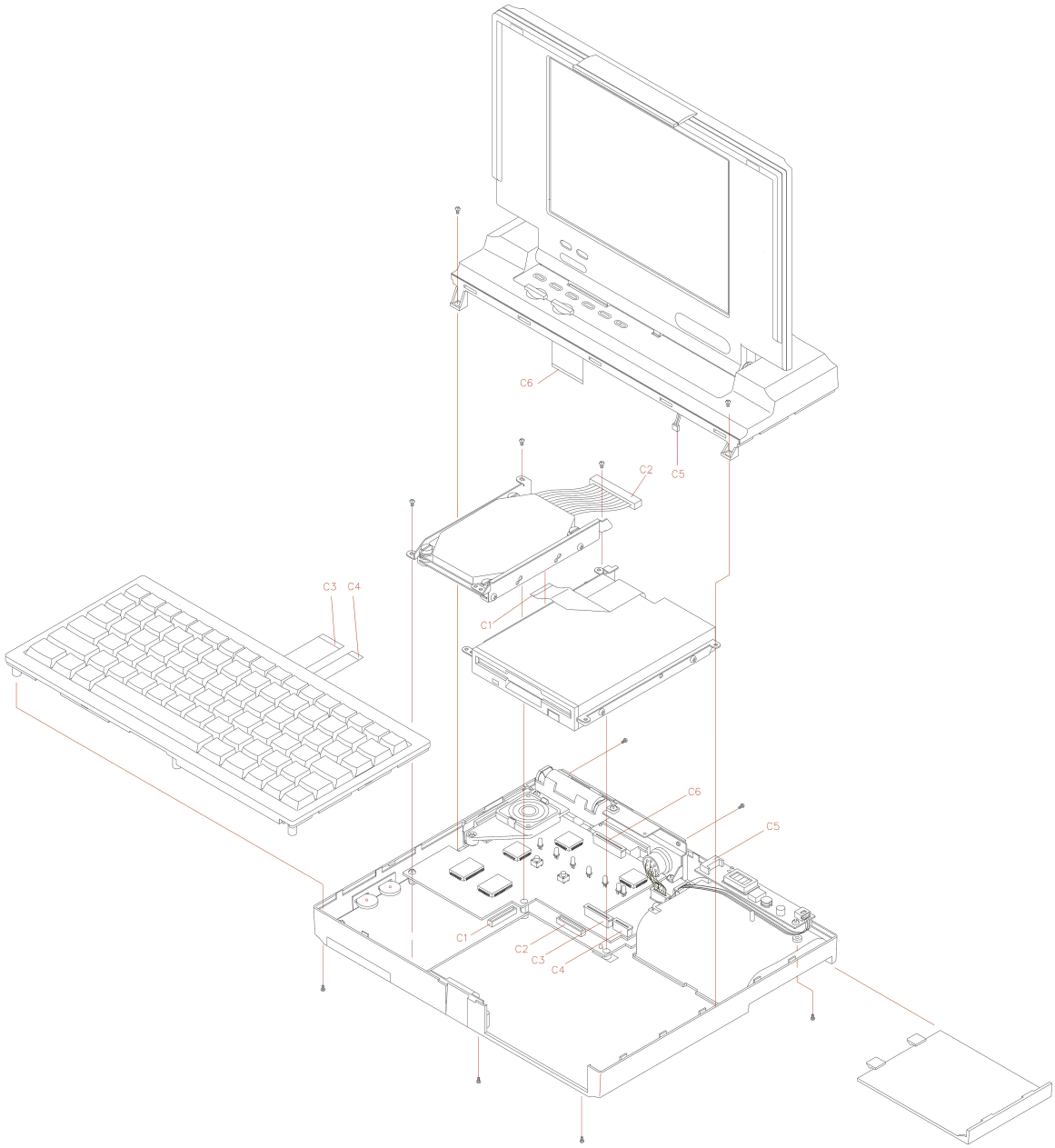


Figure 2-4. Keyboard Disassembly/Reassembly

2.2.4 Hard Disk

The hard disk is located under the keyboard.

Disassembly (See Figure 2-5.)

1. Separate the keyboard from the chassis. (See Section 2.2.3 Disassembly.)
2. Temporarily unplug the floppy disk drive cable (1) out of the connector on the System Board.
3. Remove the three screws (2) attaching the hard disk to the chassis.
4. Unplug the hard disk cable (3).
5. Lift the hard disk free.
6. To detach the hard disk brackets, remove the mounting screws (4) 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 (See Figure 2-5.)

1. Secure the brackets to the hard disk with four screws (4) at the first set or second set of holes.
2. Reconnect the hard disk cable (3).
3. Align and fix the hard disk back onto the chassis and secure with three screws (2).
4. Reconnect the floppy disk drive cable (1) to the System Board by firmly inserting the cable end into the connector.
5. Replace the keyboard. (See Section 2.2.3 Reassembly.)

2-8 System View and Disassembly

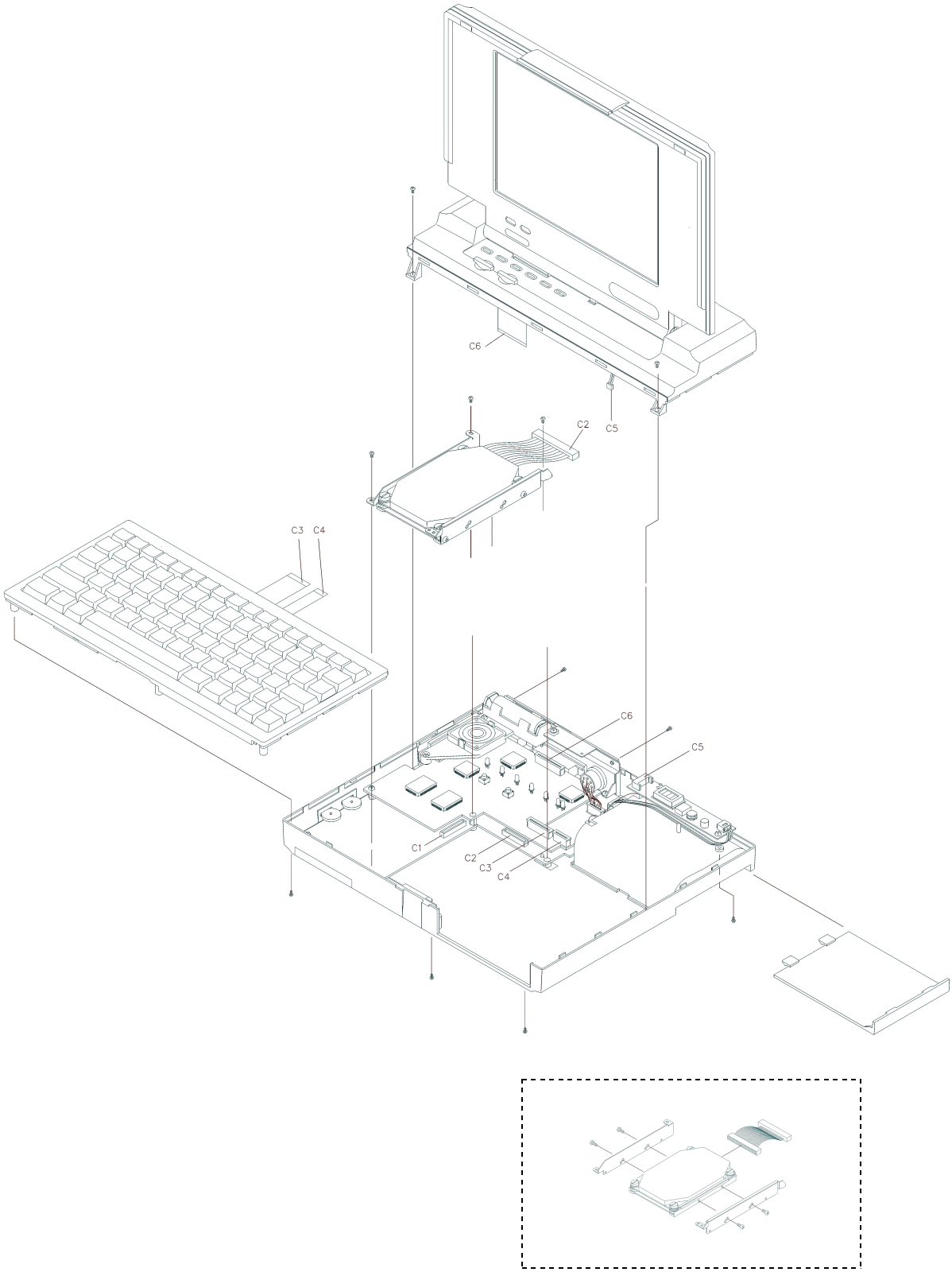


Figure 2-5. Hard Disk Disassembly/Reassembly

2.2.5 Floppy Disk Drive

The floppy disk drive is located under the keyboard.

Disassembly (See Figure 2-6.)

1. Separate the keyboard from the chassis. (See Section 2.2.3 Disassembly.)
2. Unplug the floppy disk drive cable (1) by carefully pulling 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 20mm (without disconnecting the hard disk cable).
4. Remove the screw (3) attaching the hard disk to the chassis.
5. Lift the floppy disk drive free.
6. To detach the floppy disk drive brackets, remove the mounting screws (4) from both sides.

Reassembly (See Figure 2-6.)

1. Secure the brackets to the floppy disk drive with four screws (4).
2. Align and fix the floppy disk drive back onto the chassis.
3. Secure the screw (3) attaching the floppy disk drive to the chassis.
4. Replace the hard disk and secure with the three screws (2).
5. Reconnect the floppy disk drive cable (1) by firmly inserting the cable end into the connector.
6. Replace the keyboard. (See Section 2.2.3 Reassembly.)

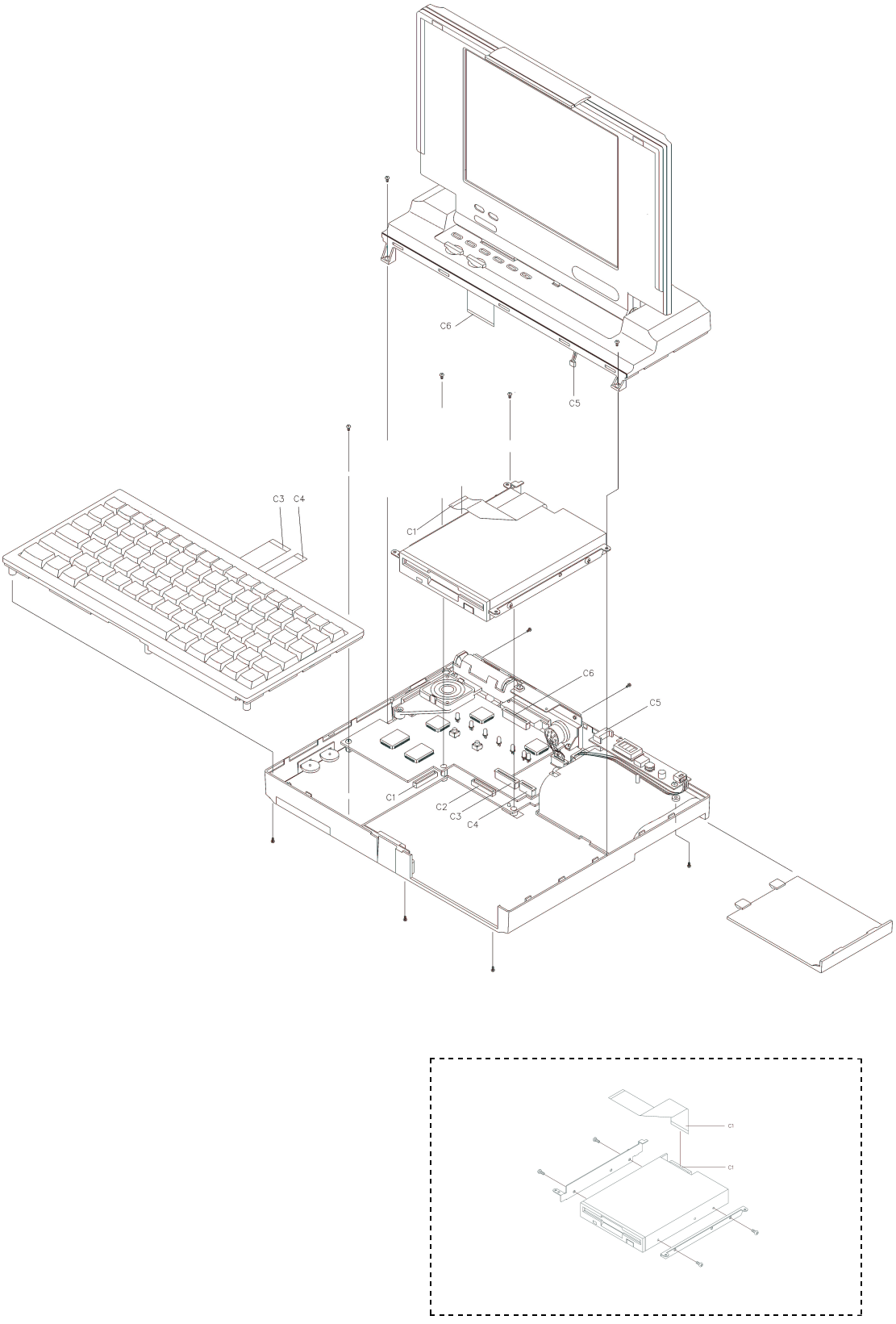


Figure 2-6. Floppy Disk Drive Disassembly/Reassembly

2.2.6 LCD/Cover Section

Disassembly (See Figure 2-7.)

1. Remove the battery pack. (See Section 2.2.2 Disassembly.)
2. Remove the three screws (1) inside the battery compartment.
3. Remove the keyboard from the chassis. (See Section 2.2.3 Disassembly.)
4. Remove the screws attaching the LCD/cover to the chassis: two screws (2) from the rear panel and two screws (3) from the LCD/cover feet.
5. Carefully separate the LCD/cover from the chassis pulling the LCD data cables (4) off.

Reassembly (See Figure 2-7.)

1. Attach the LCD/cover to the chassis by connecting the LCD data cables (4).
2. Secure the LCD/cover to the chassis with two screws (2) from the rear panel and two screws (3) on the LCD/cover feet.
3. Replace the keyboard. (See Section 2.2.3 Reassembly.)
4. Replace the three screws (1) inside the battery compartment.
5. Replace the battery pack. (See Section 2.2.2 Reassembly.)

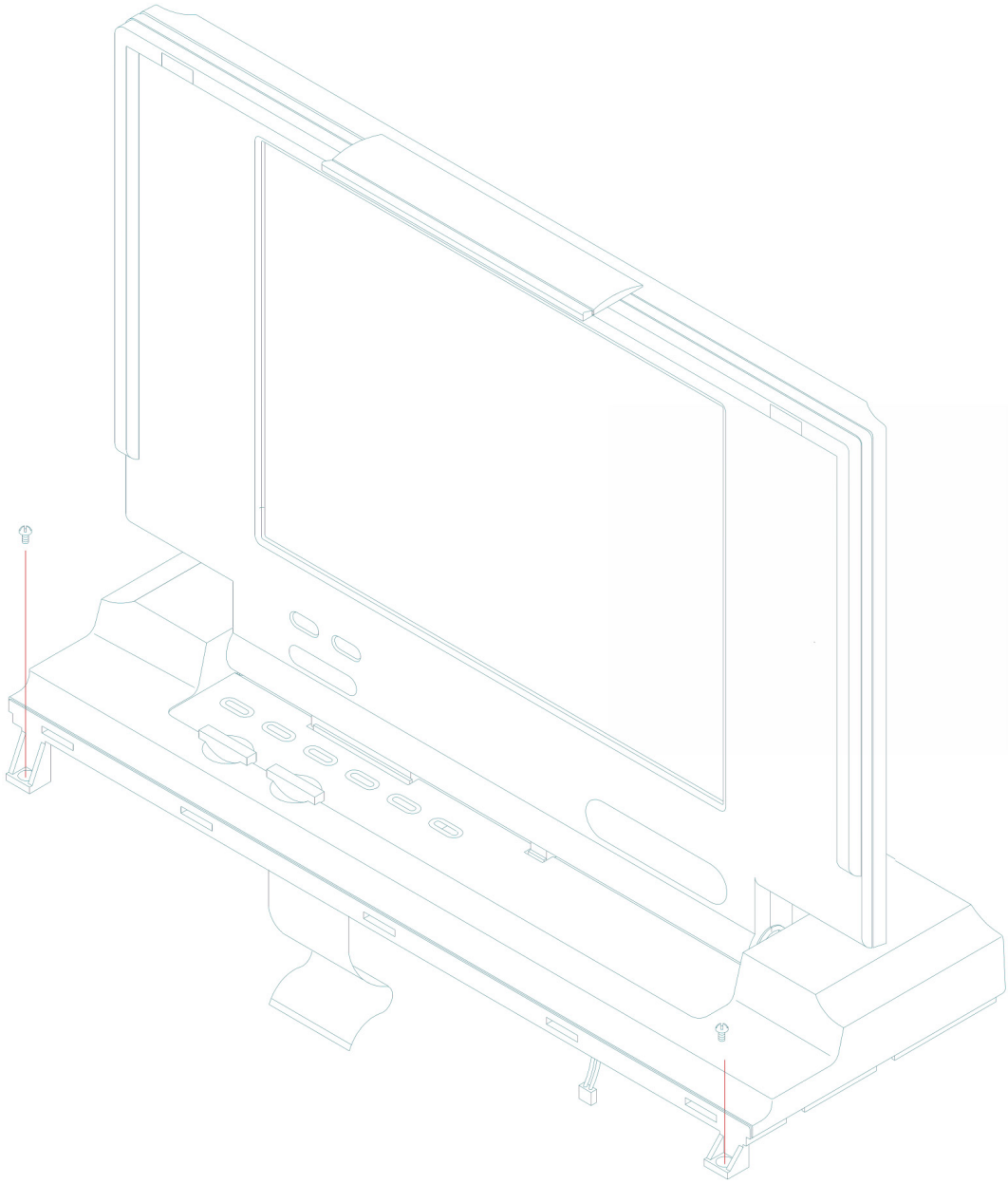


Figure 2-7. LCD/Cover Disassembly/Reassembly

2.2.7 Speaker

The speaker is mounted on the speaker assembly at the upper left corner of the chassis.

Disassembly (See Figure 2-8.)

1. Separate the LCD/cover from the chassis. (See Section 2.2.6 Disassembly.)
2. Remove the two screws (1) attaching the speaker assembly to the VGA board.
3. Unplug the cable (2) connecting the speaker assembly to the VGA board.
4. Lift the speaker assembly free.
5. Remove the speaker.

Reassembly (See Figure 2-8.)

1. Place the speaker into its compartment.
2. Reconnect the cable (2) to the VGA board.
3. Secure the speaker assembly to the VGA board with two screws (1).
4. Replace the LCD/cover. (See Section 2.2.6 Reassembly.)

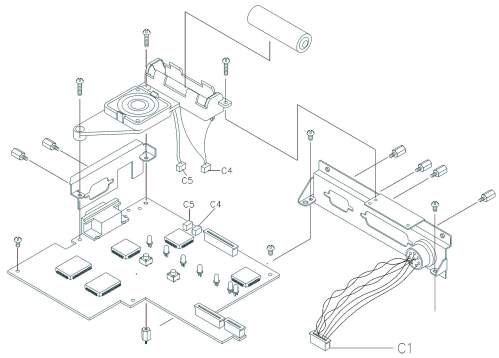


Figure 2-8. Speaker Disassembly/Reassembly

2.2.8 DC/DC Board

Disassembly (See Figure 2-9.)

1. Separate the LCD/cover from the chassis. (See Section 2.2.6 Disassembly.)
2. Remove the two screws (1) attaching the DC/DC board to the chassis.
3. Unplug the two cables (2) from the DC/DC board.
4. Lift the DC/DC board free.

Reassembly (See Figure 2-9.)

1. Reconnect the two cables (2). Note the cables should go alongside or under the DC/DC board. Do not allow the cables to scatter on the chassis surface.
2. Secure the DC/DC board to the chassis with two screws (1).
3. Replace the LCD/cover. (See Section 2.2.6 Reassembly.)

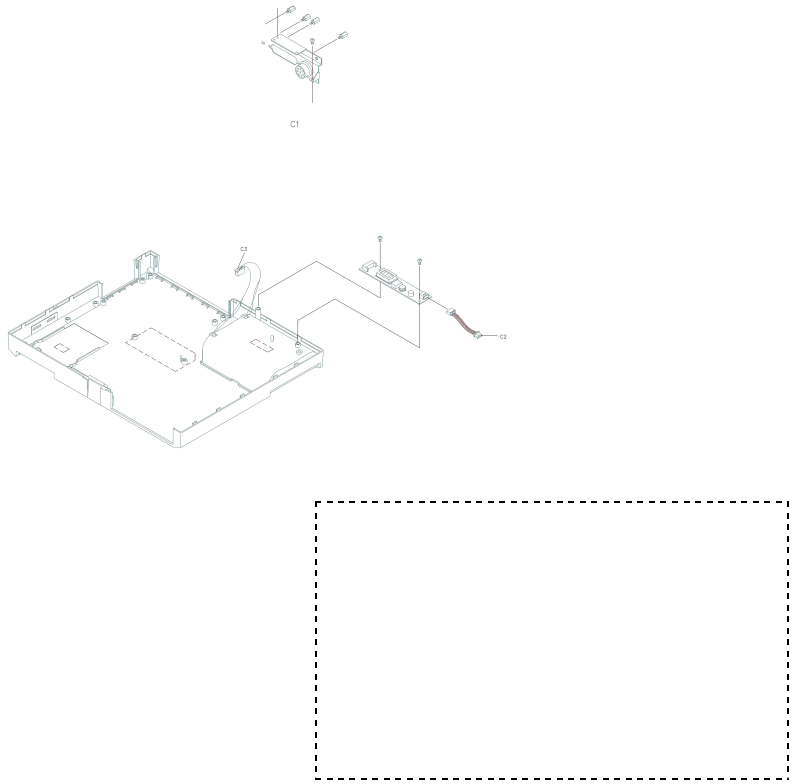


Figure 2-9. DC/DC Board Disassembly/Reassembly

2.2.9 VGA Board

Disassembly (See Figure 2-10.)

1. Remove the LCD/cover from the chassis. (See Section 2.2.6 Disassembly.)
2. Remove the hard disk from the chassis. (See Section 2.2.4 Disassembly.)
3. Remove the floppy disk drive from the chassis. (See Section 2.2.5 Disassembly.)
4. Remove the speaker assembly. (See Section 2.2.7 Disassembly.)
5. Remove the remaining one screw (1) attaching the VGA board to the System Board.
6. Lift the VGA board free.
7. To detach the side panel, remove the two hexnut screws (2).

Reassembly (See 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 screw (1).
3. Replace the speaker assembly. (See Section 2.2.7 Reassembly.)
4. Replace the floppy disk drive. (See Section 2.2.5 Reassembly.)
5. Replace the hard disk. (See Section 2.2.4 Reassembly.)
6. Replace the LCD/cover. (See Section 2.2.6 Reassembly.)

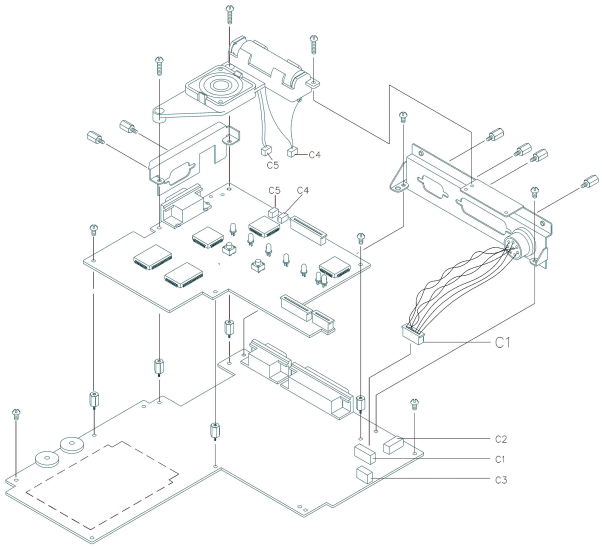


Figure 2-10. VGA Board Disassembly/Reassembly

2.2.10 System Board

Disassembly (See Figure 2-11.)

1. Remove the VGA board. (See Section 2.2.9 Disassembly.)
2. Remove the three 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 six hexnut screws (3).

Reassembly (See Figure 2-11.)

1. Secure the rear panel to the System Board with six 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 three screws (1) and five hexnut screws (2).
3. Reconnect all the connectors.
4. Replace the VGA board. (See Section 2.2.9 Reassembly.)

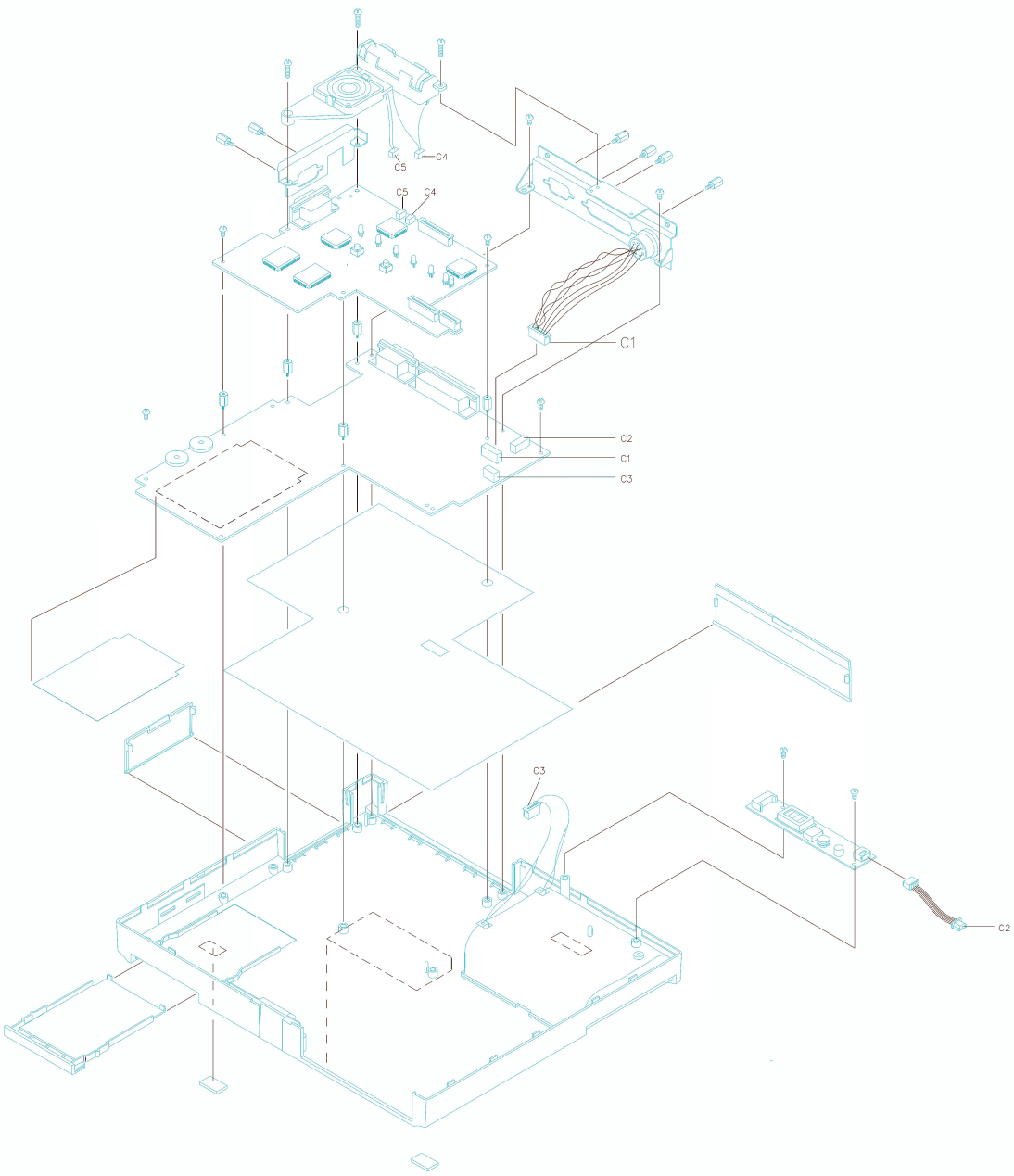


Figure 2-11. System Board Disassembly/Reassembly

2.2.11 LCD Section

Disassembly (See Figure 2-12.)

1. Separate the LCD/cover from the chassis. (See Section 2.2.6 Disassembly.)
2. Unplug the power cable (1) from the DC/DC board.
3. Remove the two nameplates at the lower corners of the LCD/cover and the screws underneath (2).
4. Remove the two cushion pads at the upper corners of the LCD/cover and the screws underneath (3).
5. Separate the LCD frame.
6. Remove the four screws (4) to separate the LCD from the back cover.
7. Unplug the LCD cable (5) from the VGA board.

Reassembly (See Figure 2-12.)

1. Reconnect the LCD cable (5) to the connector on the VGA board.
2. Secure the LCD to the back cover with four screws (4). Insert the power cable (1) into the opening.
3. Attach the LCD frame.
4. Replace the two screws and cushion pads (3) at the upper corners of the LCD/cover.
5. Replace the two screws and nameplates (2) at the lower corners of the LCD/cover.
6. Reconnect the power cable (1) to the DC/DC board.
7. Replace the LCD/cover. (See Section 2.2.6 Reassembly.)

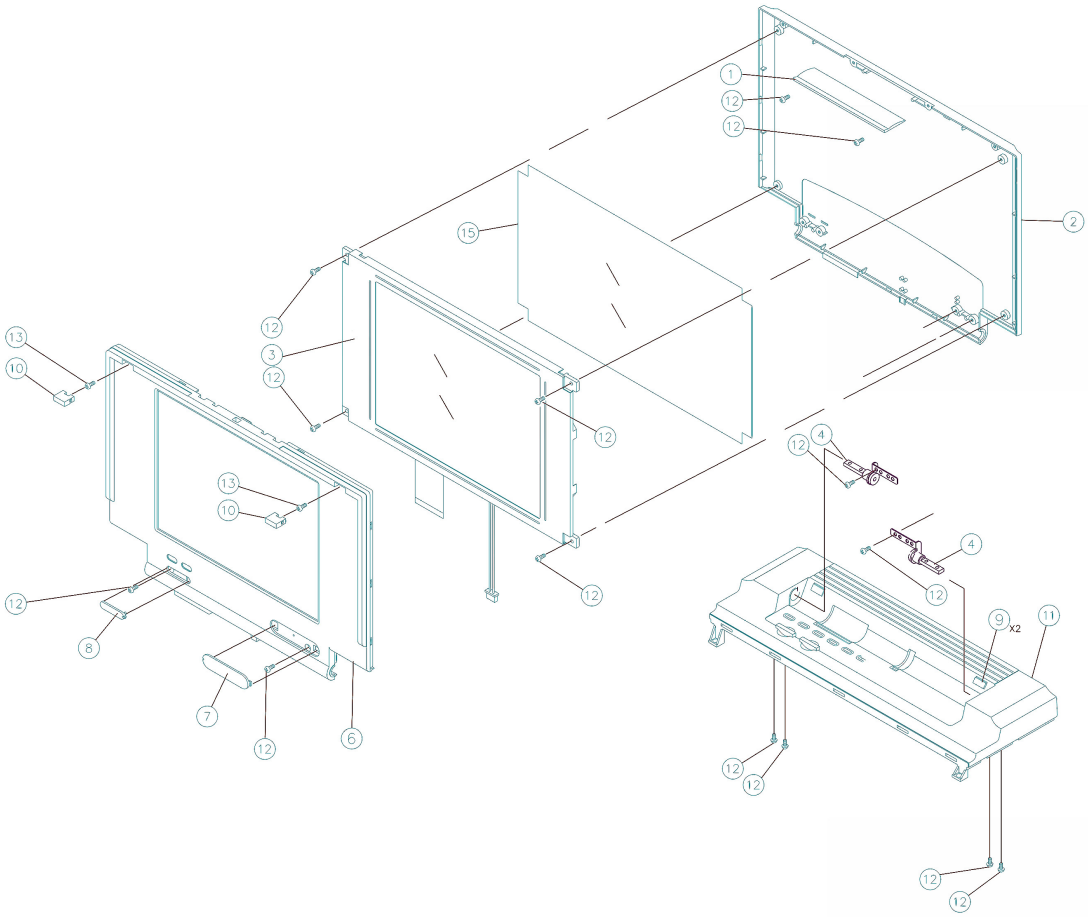


Figure 2-12. LCD Disassembly/Reassembly

2.2.12 DC/AC Board

Disassembly (See Figure 2-13.)

1. Separate the LCD/cover from the chassis. (See Section 2.2.6 Disassembly.)
2. Separate the LCD screen from the LCD/cover. (See Section 2.2.11 Disassembly steps 1 to 5.)
3. Unplug the cable (1) from the connector on the DC/AC board.
4. Remove the two screws (2) to separate the DC/AC board from the back cover.

Reassembly (See Figure 2-13.)

1. Replace the two screws (2) connecting the DC/AC board to the back cover.
2. Reconnect the cable (1) to the connector on the DC/AC board.
3. Replace the LCD screen. (See Section 2.2.11 Reassembly steps 3 to 7.)
4. Replace the LCD/cover. (See Section 2.2.6 Reassembly.)

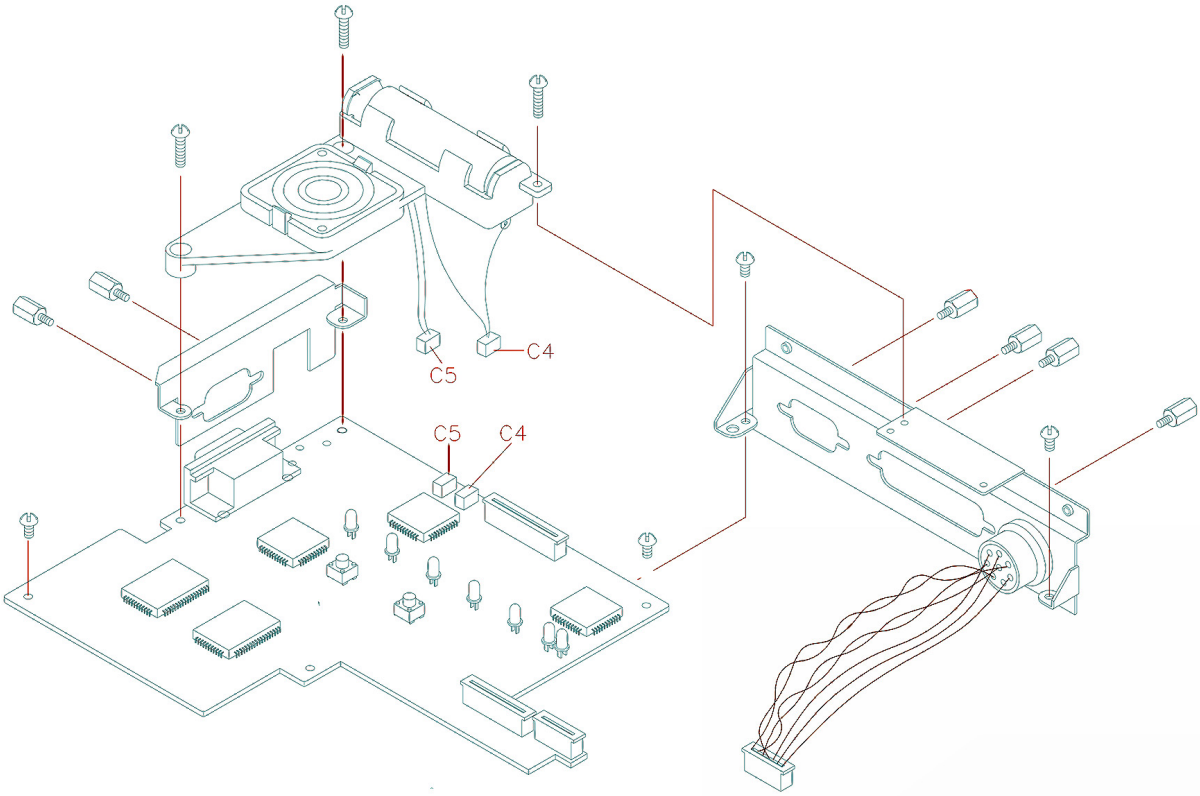


Figure 2-13. DC/AC Board Disassembly/Reassembly

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	Expansion connector	100
J2	Serial port (SIO 1) / Parallel port (PIO) connector	30
J3	Power connector to AC adapter connector	8
J4	System board to DC/DC board connector	22
J5	Board-to-board connector to VGA board	100
J6	Hard disk connector	44
J7	Floppy disk drive connector	26
J9	Scan lines from keyboard encoder to keyboard connector	16
J10	Keyboard matrix to keyboard encoder connector	8

3.1.1 Expansion (J1)

Pin	Signal	Description	Pin	Signal	Description
1	SA0	Address line from system	31	IOW/	I/O write
2	SA1	Address line from system	32	GND	GND
3	SA2	Address line from system	33	SMEMR/	Memory read under 1MB address
4	GND	Ground	34	SMEMW/	Memory write under 1MB address
5	SA7	Address line from system	35	IOCHCK/	I/O channel parity error
6	SA8	Address line from system	36	IOCS16/	16-bit I/O chip select
7	SA9	Address line from system	37	IRQ16	Interrupt request signal
8	GND	Ground	38	RESET	Reset signal
9	SA13	Address line from system	39	AEN	Address enable
10	SA14	Address line from system	40	IOCHRDY	I/O channel ready signal
11	SA15	Address line from system	41	MASTER/	External bus master cycle
12	IRQ6	Interrupt request signal	42	IRQ12	Interrupt request signal
13	LA17	Latch address from AT bus	43	SD12	Data line from system
14	LA18	Latch address from AT bus	44	SD11	Data line from system
15	LA19	Latch address from AT bus	45	SD10	Data line from system
16	LA20	Latch address from AT bus	46	GND	Ground
17	DRQ3	DMA request signal	47	SD5	Data line from system
18	DRQ0	DMA request signal	48	SD4	Data line from system
19	DRQ1	DMA request signal	49	SD3	Data line from system
20	DRQ5	DMA request signal	50	SD2	Data line from system
21	DRQ6	DMA request signal	51	SA3	Address line from system
22	DRQ7	DMA request signal	52	DRQ2	DMA request signal
23	GND	Ground	53	SA4	Address line from system
24	SYCLK	AT bus system clock	54	SA5	Address line from system
25	GND	Ground	55	SA6	Address line from system
26	IRQ10	Interrupt request signal	56	IRQ3	Interrupt request signal
27	IRQ11	Interrupt request signal	57	SA10	Address line from system
28	IRQ15	Interrupt request signal	58	SA11	Address line from system
29	IRQ9	Interrupt request signal	59	SA12	Address line from system
30	IOR/	I/O read	60	GND	Ground

(Continued on following page)

Pin	Signal	Description	Pin	Signal	Description
61	SA16	Address line from system	81	MEMR/	Memory read
62	SA17	Address line from system	82	MEMW/	Memory write
63	SA18	Address line from system	83	MEMCS/	16-bit memory cycle
64	SA19	Address line from system	84	GND	Ground
65	IRQ5	Interrupt request signal	85	ALE	Address latch enable
66	LA21	Latch address from AT bus	86	TC	Terminal count for DMA
67	LA22	Latch address from AT bus	87	REF/	AT bus refresh cycle
68	LA23	Latch address from AT bus	88	0WS/	Zero wait state signal
69	GND	Ground	89	+5V DC	Power
70	OSC	AT bus 14.318MHz	90	SD15	Data line from system
71	GND	Ground	91	SD14	Data line from system
72	DACK0	DMA acknowledge signal	92	SD13	Data line from system
73	DACK1	DMA acknowledge signal	93	GND	Ground
74	DACK5	DMA acknowledge signal	94	SD9	Data line from system
75	DACK6	DMA acknowledge signal	95	SD8	Data line from system
76	DACK7	DMA acknowledge signal	96	SD7	Data line from system
77	DACK3	DMA acknowledge signal	97	SD6	Data line from system
78	IRQ4	Interrupt request signal	98	DACK2	DMA acknowledge signal
79	IRQ7	Interrupt request signal	99	SD1	Data line from system
80	BHE/	High byte enable signal	100	SD0	Data line from system

3.1.2 Serial / Parallel Port (J2)

Pin	Signal	Description
1	Strobe	Indicates data at the parallel port is valid
2	Auto feed XT	Signals the printer to automatically feed line after printing a line
3	Data bit 0	Parallel port data
4	Error	Indicates when printer has detected an error
5	Data bit 1	Parallel port data
6	INIT	Initializes the printer
7	Data bit 2	Parallel port data
8	SLCT In	Selects the printer
9, 15, 20, 25, 30	GND	Signal Ground
10	Data bit 3	Parallel port data
11	Data bit 4	Parallel port data
12	Data bit 5	Parallel port data
13	Data bit 6	Parallel port data
14	Data bit 7	Parallel port data
16	ACK	Indicates printer has received data
17	Busy	Indicates printer cannot accept another character
18	PE	Indicates when printer is out of paper
19	SLCT	Indicates when printer is selected
21	RI	Ring indicator
22	DTR	Data terminal ready
23	CTS	Clear to send
24	TXD	Transmit data
26	RTS	Request to send
27	RXD	Receive data
28	DSR	Data set ready
29	DCD	Carrier detect

3.1.3 Power (J3)

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	Reserved

3.1.4 System Board to DC/DC Board (J4)

Pin	Signal	Description
1	VR1	Backlit variable resistor signal
2	VDD	Power supply for RTC
3	+ISENSE	Battery current sense signal for charging
4	VDD1	Power supply for power ON/OFF sequence
5	PWRGOOD	Power good signal
6	-30V DC	Power supply for LCD panel
7, 8	GND	Ground
9-12	+5V DC	System power supply
13, 14	GND	Ground
15	POSW/	Power ON/OFF signal
16	BACKEN	Enable LCD backlit
17-19	VINP1	Power supply from AC adaptor
20-22	VINPGND	Ground from AC adaptor

3.1.5 Board-to-board Connector (J5)

Pin	Signal	Description	Pin	Signal	Description
1	SA0	Address line from system	31	COMBCTS/	COM2 clear to send
2	SA1	Address line from system	32	NUM LED	Signal to active NUM LED
3	SA2	Address line from system	33	COMBRI/	COM2 ring indicator
4	GND	Ground	34	GND	Ground
5	SA3	Address line from system	35	COMBRXD	COM2 receive data
6	SA4	Address line from system	36	RST	Reset
7	SA5	Address line from system	37	COMBRTS/	COM2 request to send
8	GND	Ground	38	QEN	Power on signal
9	SA6	Address line from system	39	GND	Ground
10	SA7	Address line from system	40	SD8	Data bus from system bus
11	SA8	Address line from system	41	SD7	Data bus from system bus
12	GND	Ground	42	SD6	Data bus from system bus
13	SA9	Address line from system	43	GND	Ground
14	SA10	Address line from system	44	SD5	Data bus from system bus
15	SA11	Address line from system	45	SD4	Data bus from system bus
16	GND	Ground	46	SD3	Data bus from system bus
17	IRQ1	IRQ from keyboard	47	GND	Ground
18	IRQ9	IRQ from VGA	48	SD2	Data bus from system bus
19	IRQ12	IRQ from PS/2 mouse	49	SD1	Data bus from system bus
20	IRQ5	IRQ from fax/modem	50	SD0	Data bus from system bus
21	GND	Ground	51	SA12	Address line from system
22	HDDLED	Signal to active HDD LED	52	SA13	Address line from system
23	8042CS/	Select 8042	53	SA14	Address line from system
24	RC/	Reset signal from 8042	54	SA15	Address line from system
25	SMEMW/	Memory write	55	SA16	Address line from system
26	SMEMR/	Memory read	56	+5V DC	Voltage supply
27	SCL LED	Signal to active SCL LED	57	SA17	Address line from system
28	NC	Reserved	58	SA18	Address line from system
29	COMBDCD/	COM2 data carrier detect	59	SA19	Address line from system
30	COMBDSR/	COM2 data set ready	60	+5V DC	Voltage supply

(Continued on following page)

Pin	Signal	Description	Pin	Signal	Description
61	BATTWARN/	Battery used up warning signal	81	KBDCLK	8042 clock
62	STDBYBTN	Signal to suspend system	82	XD7	Data bus from system bus
63	LCDVR1	Pin of variable resistor to control voltage of LCD(-)	83	+5V DC	Voltage supply
64	+5V DC	Voltage supply	84	KBDATA	Keyboard data line
65	CRT/LCD/	Select CRT or LCD output	85	+5V DC	Voltage supply
66	QLOCK	Signal to LOCK peripheral	86	KBCLK	Keyboard clock line
67	SPKR	Speaker data	87	+5V DC	Voltage supply
68	HWRESET	Hardware reset signal	88	COMBDTR/	COM2 data terminal ready
69	IOR/	I/O read	89	COMBTXD	COM2 transmit data
70	IOW/	I/O write	90	LCD BIAS PWR/	Signal to active LCD(-)
71	AEN	DMA access enable	91	POWERSW/	Signal to toggle
72	SUS/STAT/	Signal to active suspend	92	LCD5V DC	Voltage supply to LCD(+)
73	-30V DC	Power supply for LCD(-)	93	SD15	Data bus from system bus
74	MEMCS16/	Signal 16-bit memory access	94	SD14	Data bus from system bus
75	IOCHRDY	Signal I/O access ready	95	SD13	Data bus from system bus
76	REF/	System in DRAM refresh cycle	96	CAPLED	Signal to active PAD LED
77	GATE20	Signal to GATE CPU address line 20	97	SD12	Data bus from system bus
78	SBHE/	Data bus high byte enable	98	SD11	Data bus from system bus
79	PAD LED	Signal to active PAD LED	99	SD10	Data bus from system bus
80	50WR/	50 port write	100	SD9	Data bus from system bus

3.1.6 Hard Disk Connector (J6)

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

Note: See Section 6.2.2 for descriptions.

3.1.7 Floppy Disk Drive Connector (J7)

Pin	I/O	Signal	Description	Pin	I/O	Signal	Description
1	N/A	DRV+5V DC		14	O	STEP/	
2	I	INDEX/		15	N/A	GND	Ground
3	N/A	DRV+5V DC		16	O	WRDATA/	
4	O	DS0/		17	N/A	GND	Ground
5	N/A	DRV+5V DC		18	O	WE/	
6	O	DS1/		19	N/A	GND	Ground
7	N/A	NC	Reserved	20	I	TRK0/	
8	I	DSKCHG		21	N/A	GND	Ground
9	N/A	NC	Reserved	22	I	WRTPRT	
10	O	ME0/		23	N/A	GND	Ground
11	N/A	NC	Reserved	24	I	RDATA/	
12	O	DIR		25	N/A	GND	Ground
13	N/A	NC	Reserved	26	O	HDSEL	

Note: See Section 6.1.2 for descriptions.

3.1.8 Internal Keyboard Matrix 1 (J9)

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

3.1.9 Internal Keyboard Matrix 2 (J10)

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

3.1.10 SIMM Socket (U14-U17) Bank 0 low (high) byte

Pin	Signal	Description	Pin	Signal	Description
4	EA0	Address for memory bus	3	MD0 (MD8)	Data for memory bus
5	EA1	Address for memory bus	6	MD1 (MD9)	Data for memory bus
7	EA2	Address for memory bus	10	MD2 (MD10)	Data for memory bus
8	EA3	Address for memory bus	13	MD3 (MD11)	Data for memory bus
11	EA4	Address for memory bus	16	MD4 (MD12)	Data for memory bus
12	EA5	Address for memory bus	20	MD5 (MD15)	Data for memory bus
14	EA6	Address for memory bus	23	MD6 (MD14)	Data for memory bus
15	EA7	Address for memory bus	25	MD7 (MD15)	Data for memory bus
18	EA9	Address for memory bus	28, 24	NC	Reserved
19	EA10	Address for memory bus	26, 29	NC	Reserved
2	CAS/	CAS control signal	1, 30	VCC1	Power supply to IC card
27	RAS/	RAS control signal	9, 22	GND	Ground
21	WE/	Write enable			

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	LCD connector	20
J501	Auxiliary device port (Mini DIN-6)	6
J502	Analog video port (DB-15)	15
J503	Fax/modem connector	40
J504	Board-to-board connector	100

3.2.1 Speaker Connector (J1)

Pin	Signal	Description
1	SPK1	Speaker signal
2	SPK2	Speaker signal

3.2.2 LCD Connector (J2)

Pin	Signal	Description	Pin	Signal	Description
1	LCD+5V DC		11	UD0	Display data DU0
2	V_{SS}		12	UD1	Display data DU1
3	V_{EE}		13	UD2	Display data DU2
4	BCLK	Input data latch	14	UD3	Display data DU3
5	NC	Reserved	15	LD0	Display data DL0
6	NC	Reserved	16	LD1	Display data DL1
7	BCLK	Row scan shift clock	17	LD2	Display data DL2
8	BLFS	Scan start-up signal	18	LD3	Display data DL3
9	VDCLK	Data input clock	19	ENI	Enable input
10	NC	Reserved	20	ENO	Enable output

Note: See Section 6.3.2 for descriptions.

3.2.3 Auxiliary Device Port (J501)

Pin	Signal	Description
1	KBCLK	Clock to synchronous KBDATA or Mouse Data
2	NC	Reserved
3	GND	Ground
4	+5V DC	Power supply to AUX device
5	KBDATA	KBD clock or mouse clock
6	GND	Ground

3.2.4 Analog Video Port (J502)

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

3.2.5 Fax/modem Connector (J503)

Pin	Signal	Description	Pin	Signal	Description
1	NC	Reserved	11	NC	Reserved
2	NC	Reserved	12	+5V DC	
3	NC	Reserved	13	NC	Reserved
4	NC	Reserved	14	COMBRTS	Request to Send
5	NC	Reserved	15	NC	Reserved
6	NC	Reserved	16	COMBDCD	Carrier Detect
7	NC	Reserved	17	NC	Reserved
8	NC	Reserved	18	COMBCTS	Clear to Send
9	GND	Ground	19	NC	Reserved
10	NC	Reserved	20	COMBRXD	Receive Data

(Continued on following page)

Pin	Signal	Description	Pin	Signal	Description
21	NC	Reserved	31	NC	Reserved
22	COMBDTR	Data Terminal Ready	32	NC	Reserved
23	NC	Reserved	33	NC	Reserved
24	COMBRI	Ring Indicator	34	NC	Reserved
25	NC	Reserved	35	NC	Reserved
26	COMBTXD	Transmit Data	36	NC	Reserved
27	AMP	Modem Speaker Output	37	NC	Reserved
28	COMBDSR	Data Set Ready	38	CARDEN/	Card Enable Signal
29	NC	Reserved	39	NC	Reserved
30	RESET		40	NC	Reserved

3.2.6 Board-to-Board Connector (J504)

See Section 3.1.5.

3.3 DC/DC Board Connector Definitions

Figure 3-3. DC/DC Board Connector Positions

Connector	Definition	Number of Pins
J1	Input connector	3
J2	Battery connector	4
J3	System board to DC/DC board connector	22

3.3.1 Input Connector (J1)

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

3.3.2 Battery Connector (J2)

Pin	Signal	Description
1	+BAT	Output voltage of battery
2	+BAT	Output voltage of battery
3	BATGND	Battery ground
4	BATGND	Battery ground

3.3.3 System Board to DC/DC Board Connector (J3)

See Section 3.1.4

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

Message	Possible Cause	Solution
Memory failed at physical address: *xx*	Circuitry associated with the memory 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 fixed disk (hard disk).	Run SETUP to enter the correct hard disk information.
	Bad hard disk.	Reboot. If this does not work, replace the hard disk.
	Hard disk cable is not tightly connected.	Check the hard disk cable for proper connection. If this does not work, replace the hard disk.
Fixed disk controller failure	The NS87310 controller has failed.	Replace the system board.
	Hard disk type incorrect.	Run SETUP to configure correct hard disk type.
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	The timer (in C&T 82C206) failed.	Replace with a new system board.
Real time clock error (failure)	The RTC (in C&T 82C206) failed.	Replace with a new system board.
	RTC does not update the time.	Replace RTC.
Keyboard controller error	Keyboard controller failed.	Replace with a new keyboard controller.

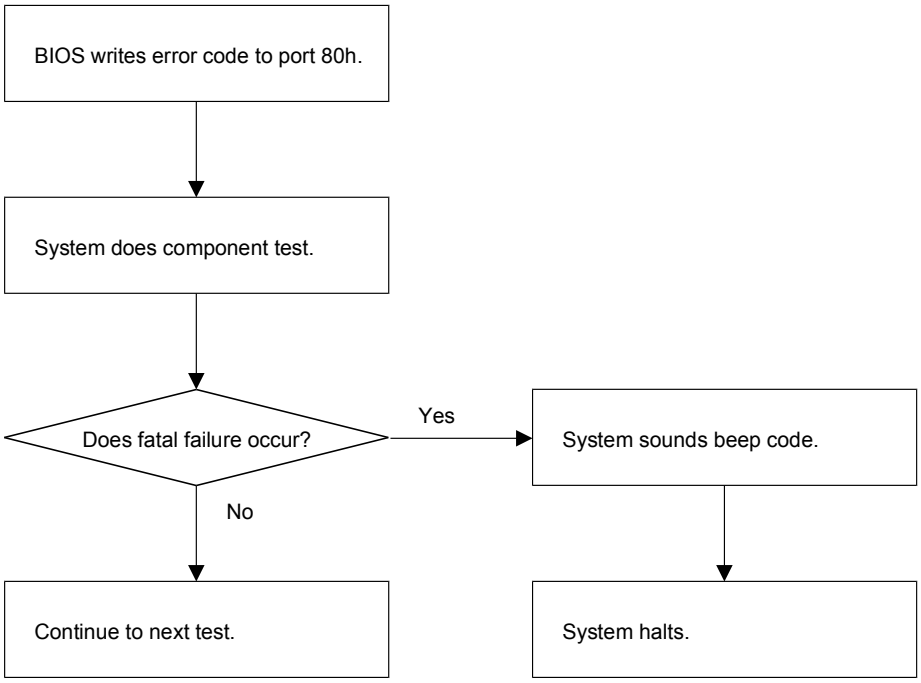
Message	Possible Cause	Solution
Keyboard error (failure)	Keyboard controller socket floating.	Resolder the socket.
	Keyboard encoder failed (bad).	Replace with a new keyboard encoder.
No timer tick interrupt	82360 failed.	
Shutdown failure	CPU reset failed.	
Timer counter 2 failure	82360 failed.	
Keyboard clockline failure (data)	Interface between KBDC and KBD encoder failed.	
Keyboard stuck key failure	Key pressed during power on.	Do not press any key during power-on.
Decreasing available memory	Memory failed.	Replace memory SIMM.
Invalid configuration information - run SETUP program	Current system configuration does not match with SETUP configured.	Run SETUP.
Diskette drive 0 failure	Cannot seek to track 0.	Run SETUP to configure correct diskette drive type.
80386SL default configuration	Last boot unsuccessful.	Reboot.
Pointer device failure is in use	PS/2 mouse failed or external keyboard key pressed during power-on.	Change PS/2 mouse or do not press external keyboard during power-on.

4.3 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 three 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 interrupt controller failed.
3	09h	Hot interrupt occurred.
3	0Ah	System timer does not 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.

(Continued on following page)

Beep Code	Contents of Port 80h	Description
3	17h	Exception failed/unexpected.
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.

(Continued on following page)

Beep Code	Contents of Port 80h	Description
3	66h	Memory test.
None	67h	Extended memory test.
None	68h	Timer interrupt test.
None	69h	RTC test.
None	6Ah	Keyboard test.
None	6Bh	80387™SX test.
None	6Ch	RS-232C 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.

(Continued on following page)

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

4.4 Fault Isolation Flowcharts

Chart A

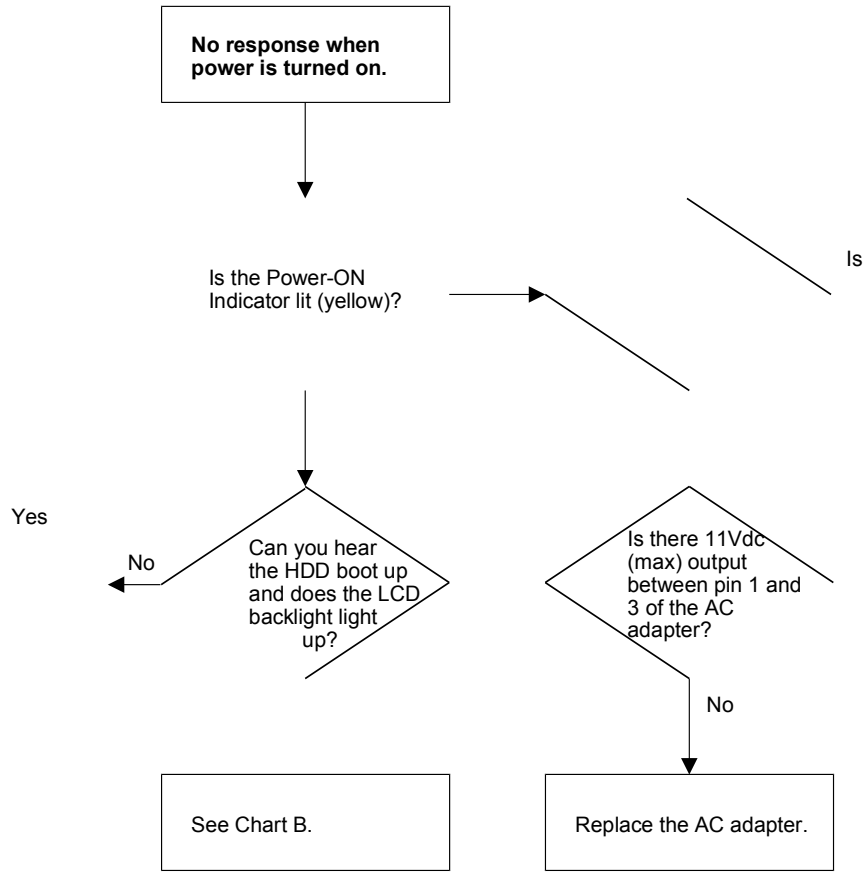


Chart B

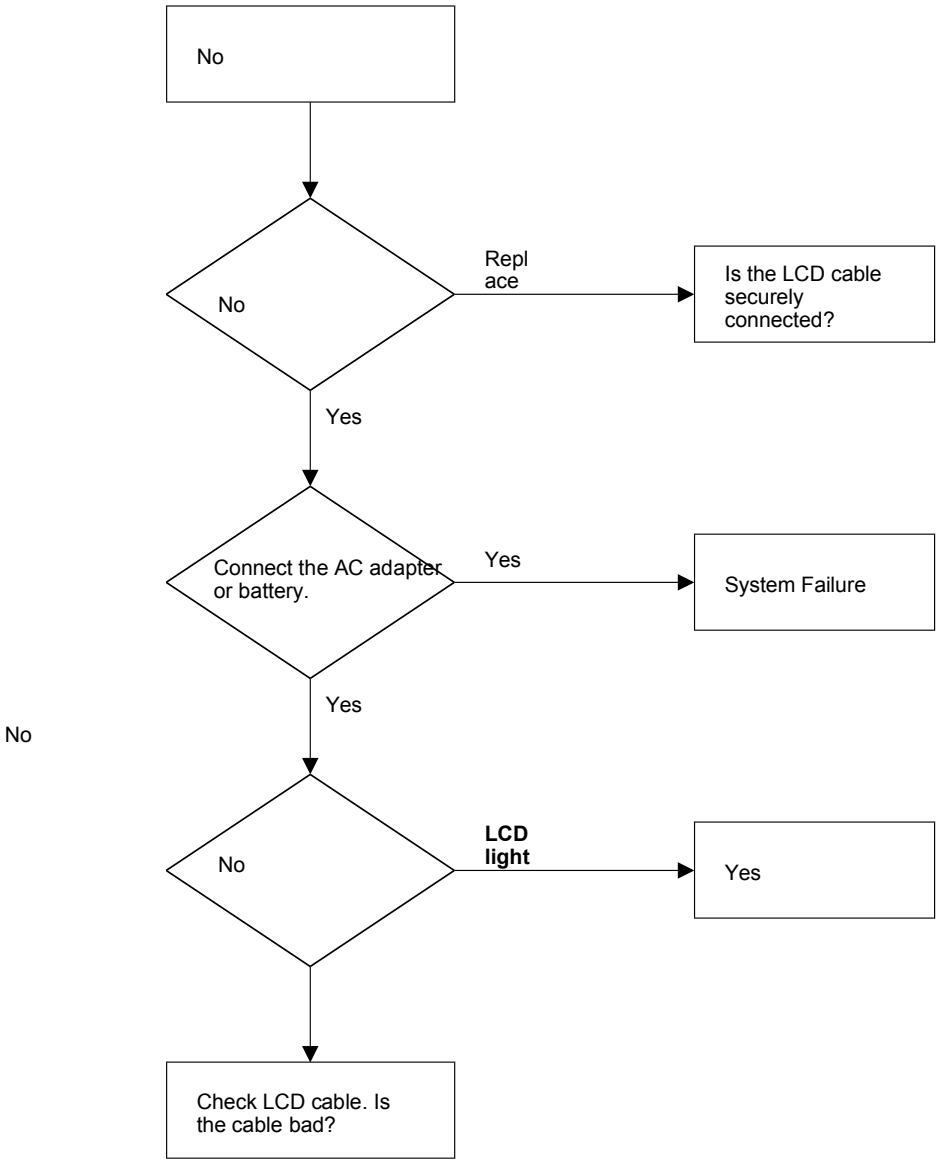

No
No
Repl
ace
Is the LCD cable
securely
connected?
Yes
Connect the AC adapter
or battery.
Yes
System Failure
Yes
No
No
LCD
light
Yes
Check LCD cable. Is
the cable bad?

Chart C

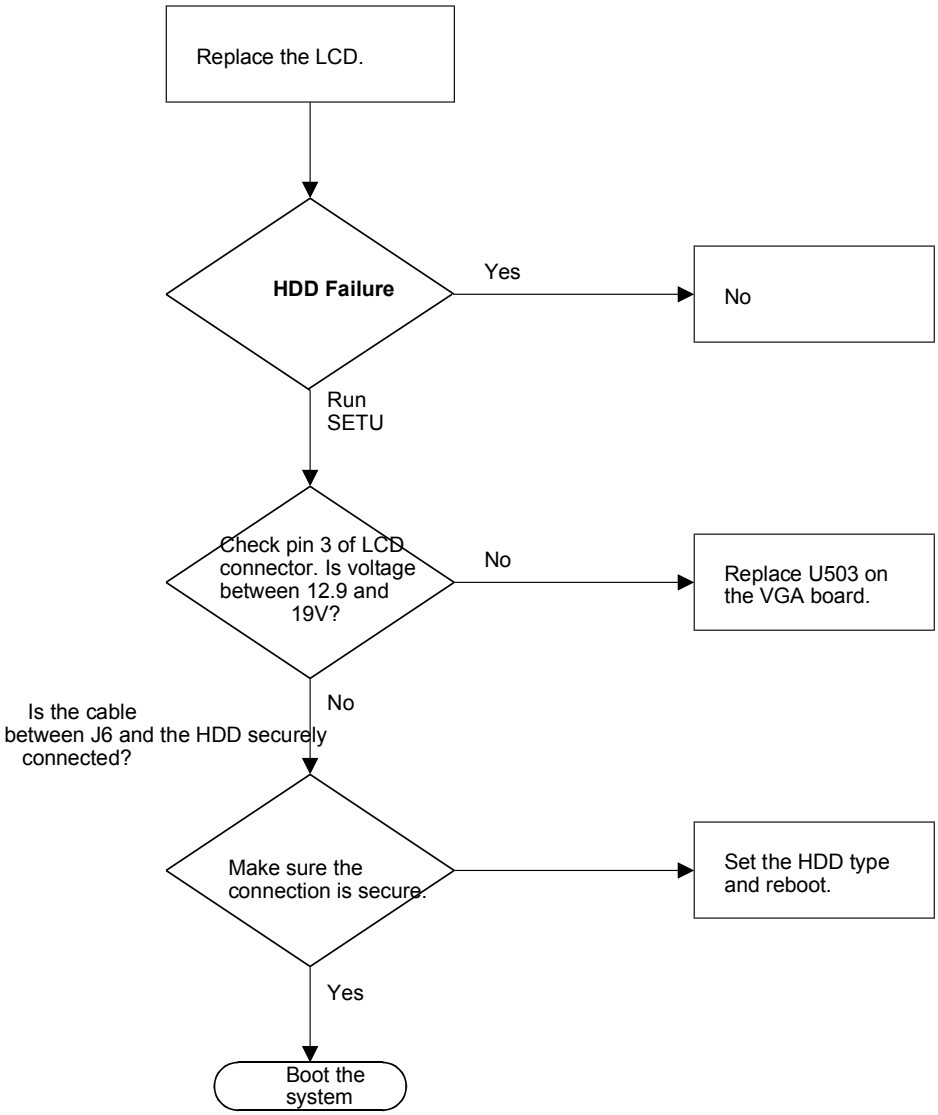

Replace the LCD.
HDD Failure
Yes
No
Run SETU
Check pin 3 of LCD connector. Is voltage between 12.9 and 19V?
No
Replace U503 on the VGA board.
No
Is the cable between J6 and the HDD securely connected?
Make sure the connection is secure.
Set the HDD type and reboot.
Yes
Boot the system

Chart D

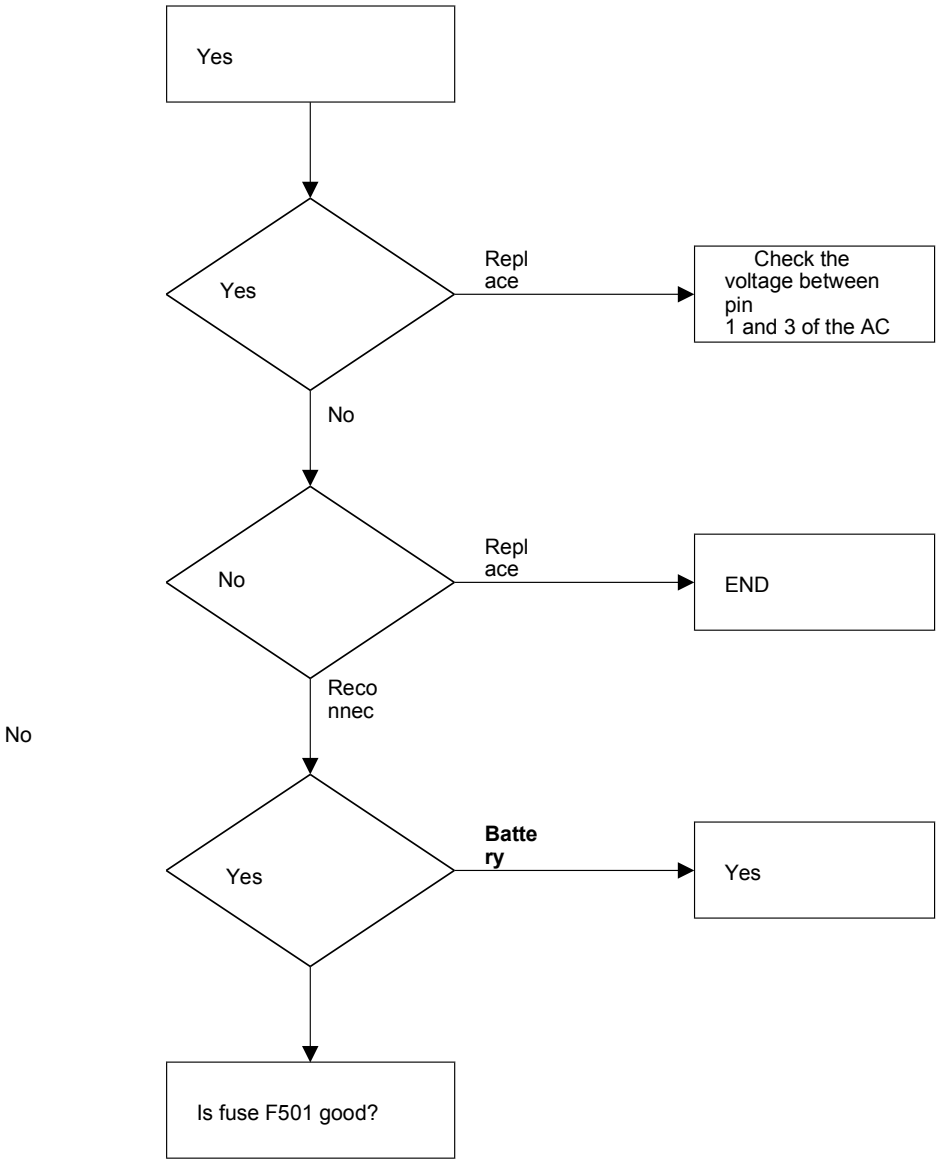

Yes
Yes
Repl
ace
Check the
voltage between
pin
1 and 3 of the AC
No
No
Repl
ace
END
Reco
nnec
No
Yes
Batte
ry
Yes
Is fuse F501 good?

Chart E

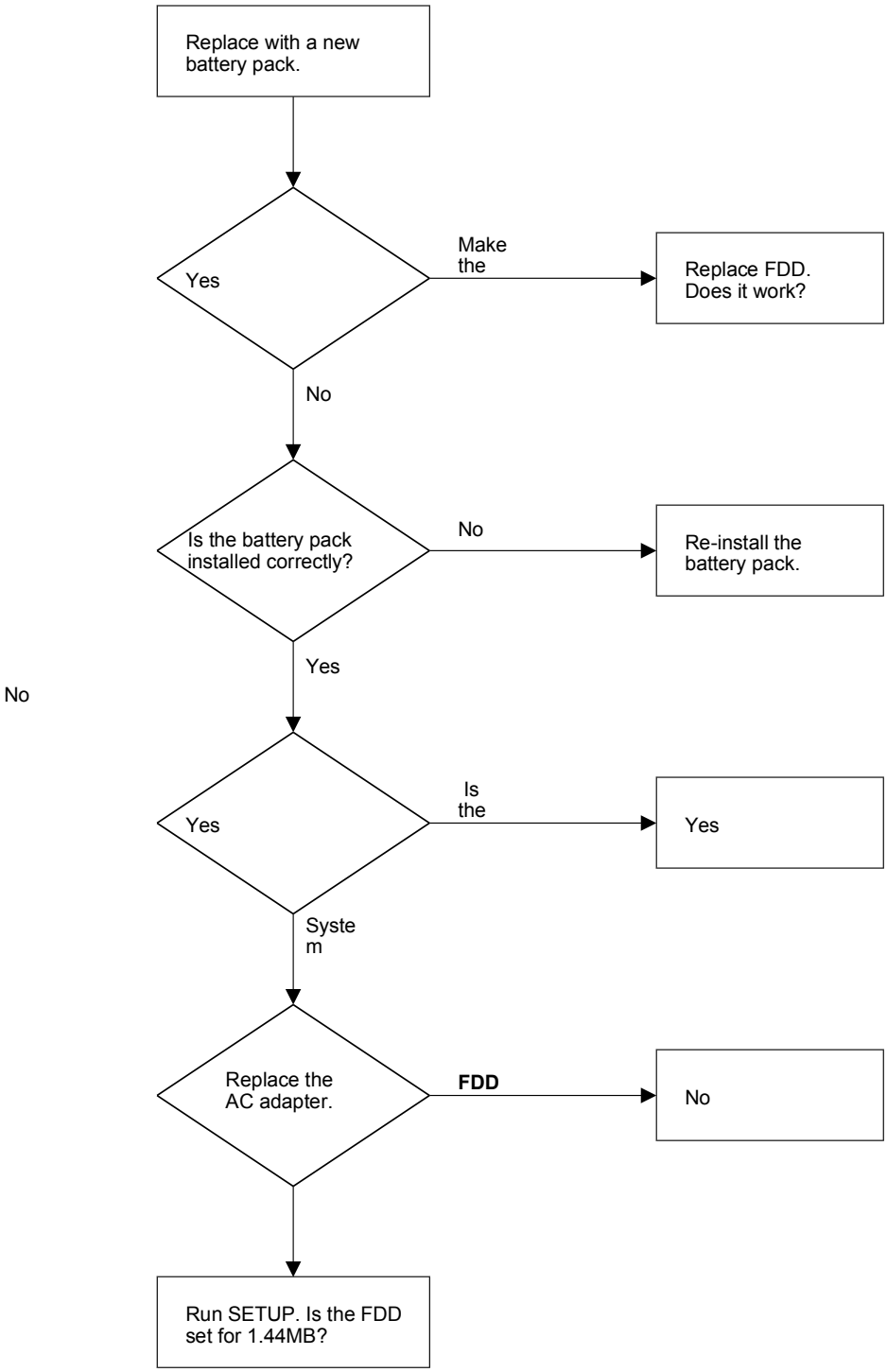
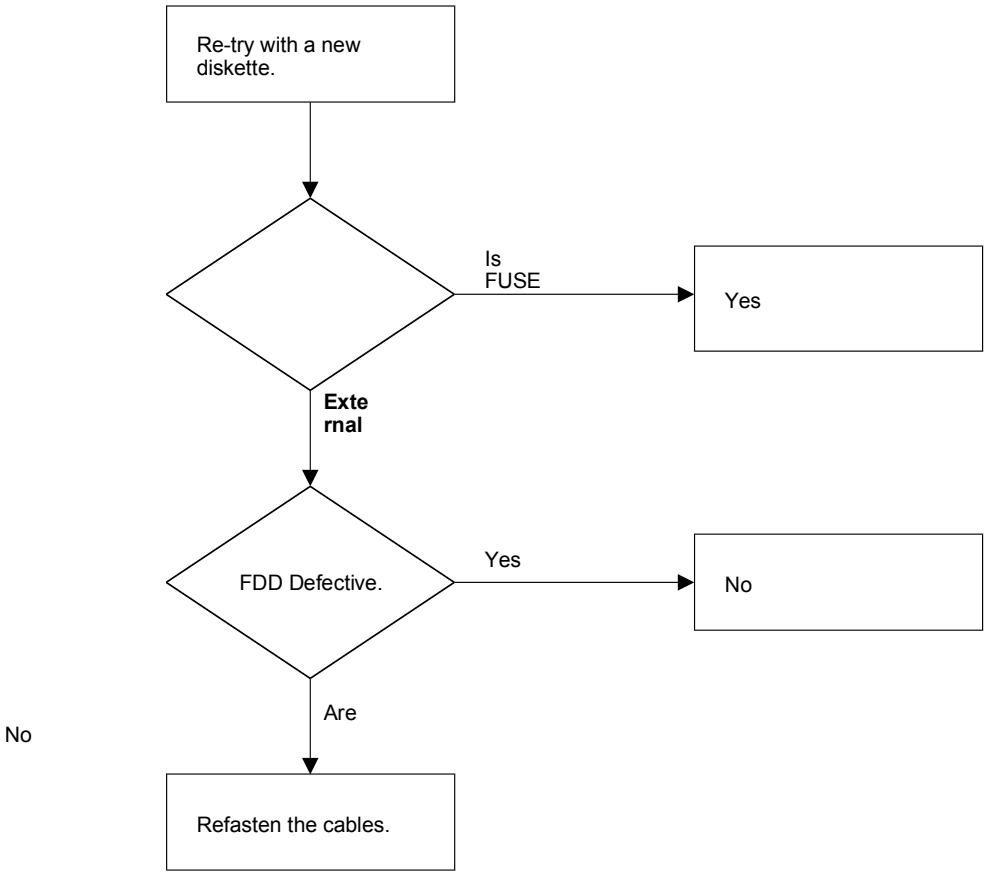

Replace with a new battery pack.
Yes
Make the
Replace FDD. Does it work?
No
Is the battery pack installed correctly?
No
Re-install the battery pack.
Yes
No
Yes
Is the
Yes
Syste m
Replace the AC adapter.
FDD
No
Run SETUP. Is the FDD set for 1.44MB?

Chart F


Re-try with a new diskette.
Is FUSE
Yes
External
FDD Defective.
Yes
No
Are
No
Refasten the cables.

5 Maintenance Diagrams

5.1 System Board, VGA Board, and DC/DC Board Layout

5.2 System Board Schematic Diagrams

5.3 VGA Board Schematic Diagrams

5.4 DC/DC Board Schematic Diagrams

5.5 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 (without 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	I/O	Signal	Description
1	N/A	+5V DC	
2	I	Index	
3	N/A	+5V DC	
4	O	Drive Select 0	Drive select decoded for drive 0.
5	N/A	+5V DC	
6	O	Drive Select 1	Drive select decoded for drive 1.
7	N/A	NC	Reserved
8	I	Disk Change	Indicates when the disk drive door has been opened.
9	N/A	NC	Reserved
10	O	Motor On	Enables motor for drive 0.
11	N/A	NC	Reserved
12	O	Direction	Determines the direction of the head movement. (low = step in; high = step out)
13	N/A	GND	Ground
14	O	Step	Produces a pulse at a software programmable rate to move the head during a seek operation.
15	N/A	GND	Ground
16	O	Write Data	Writes precompensated serial data to be written onto the selected disk drive.
17	N/A	GND	Ground
18	O	Write Gate	Enables the write circuitry of the selected drive to prevent glitches during power up and power down.
19	N/A	GND	Ground
20	I	Track 00	Tells the controller that the head is at track zero of the selected drive.
21	N/A	GND	Ground
22	I	Write Protect	Indicates the disk is write-protected.
23	N/A	GND	Ground
24	I	Read Data	Reads raw data from the drive.
25	N/A	GND	Ground
26	O	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	Description	Pin	Signal	Description
1	-RESET		23	-IOW	
2	GND	Ground	24	GND	Ground
3	+DATA 7		25	-IOR	
4	+DATA 8 (AT Only)		26	GND	Ground
5	+DATA 6		27	-DACK (XT Only)	
6	+DATA 9 (AT Only)		28	NC	Reserved
7	+DATA 5		29	+DRQ (XT Only)	
8	+DATA 10 (AT Only)		30	GND	Ground
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	-CSO	
16	+DATA 14 (AT Only)		38	-CS1 (AT Only)	
17	+DATA 0		39	-ACTIVE (LED)	
18	+DATA 15 (AT Only)		40	GND	Ground
19	GND	Ground	41	5 Volts (Logic)	
20	KEY		42	5 Volts (Motor)	
21	NC	Reserved	43	GND	Ground
22	GND	Ground	44	XT/AT	

6.2.3 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 bi-directional data between the host and the drive. In AT mode, the low eight bits, HD0 - HD7, are used for register and ECC access. The high bits are used for data transfers. In XT mode, only the lower eight 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.
NC	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).
+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.

(Continued on the following page)

+5V (Motor)	O	42	5 volt (10% supply to drive motors.

Signal Name	Dir	Pin	Description
-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.

6.2.4 Types

Vendor	Model	Type	Head	Cylinder	Sectors/track	Size
Toshiba	MK1122	24	5	988	17	40MB
Toshiba		17	10	988	17	80MB
Western Digital	AH260	19	7	1024	17	60MB
Western Digital	AH280	20	10	980	17	80MB
Seagate	ST9051A1	23	4	654	32	40MB
Seagate	ST9077A	25	4	802	39	60MB
Seagate	ST9096A	26	10	980	17	80MB
Seagate	ST9144A	27	15	980	17	120MB
Quantum	GODRIVE-40	30	6	821	17	40MB
Quantum	GODRIVE-80	31	10	991	17	80MB
Conner	CP2034	43	4	411	38	30MB
Conner	CP2044	44	5	980	17	40MB
Conner	CP2064	45	4	823	38	60MB

Conner	CP2084	46	8	548	38	80MB

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 DC)
2	VSS	Ground
3	VEE	Power supply for LCD (-)
4	CP1	Input data latch signal
5	NC	Reserved
6	NC	Reserved
7	YSCL	Row scan shift clock
8	S	Scan start-up signal
9	CP2	Data input clock signal
10	NC	Reserved
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	Reserved
3	NC	Reserved
4	NC	Reserved
5	GND	Ground line (from D/A inverter)

NORDIC CAUTION TEXTS CONCERNING LITHIUM BATTERIES

- **DANISH**

ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

- **NORWEGIAN**

ADVARSEL:
Lithiumbatteri - Eksplosjonsfare. Ved utskifting benzttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

- **SWEDISH**

VARNING:
Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

- **FINNISH**

VAROITUS:
Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suositteleman tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

- **ENGLISH**

CAUTION:
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer’s instructions.

MiTAC GLOBAL SUPPORT PROBLEM WORKSHEET

To : _____ / _____ Date: ___ / ___ / _____
(Engineer) (Department)
Priority : _____ (Urgent, Routine)

Customer Information

Customer : _____ Customer Ref. No: _____
Engineer : _____

System Configuration

Product Name	: _____	PCBA Rev.	: _____
Memory Installed	: _____		
System BIOS Rev.	: _____	Video BIOS Rev.	: _____
Video Adapter	: _____	Video Monitor	: _____
Controller / HD Installed	: _____		
Special Adapter(s) Installed	: _____		
Operating System	: _____	OS Rev.	: _____
Application	: _____	Rev.	: _____
System Rev.	: _____		
Others	: _____		

Problem Symptom

Problem Description

Remarks:

When filling up information in the “Problem Description” space, please note down the following:

1. Possibility of re-creating the problem for our study purposes
2. Frequency of problem occurence
3. Any results from trying the problem on other types of system (e.g., IBM products, other models of MiTAC machines, etc.)
4. Circumstances that may have led to this problem (e.g., making alterations in the system configuration such as installing a video adapter, etc.)

Any pertinent information you can furnish us to expedite our response will be greatly appreciated.