

1.1 Features

The Toshiba T2400CS/T2400CT is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the T2400CS/T2400CT offers excellent display legibility, battery operation, and IBM PC/AT compatibility. The T2400CS/T2400CT system unit consists of the following features:

- ❑ Microprocessor

The T2400CS/T2400CT uses an SL Enhanced Intel 486DX2-50 microprocessor that operates at 50 MHz, 3.3 Volts.

- ❑ Math co-processor

The T2400CS/T2400CT has a math co-processor which is stored in the i486DX2 microprocessor.

- ❑ Cache memory

The T2400CS/T2400CT has an 8 KB cache memory which is stored in the i486DX2 microprocessor.

- ❑ Disk storage

T2400CS/T2400CT has an internal 250 or 320 Megabyte (MB) Hard Disk Drive (HDD) with an average access time of 13 milliseconds for the 250 MB HDD and 12 milliseconds for the 320 MB HDD. A 3.5-inch Floppy Disk Drive (FDD) supports 2HD floppy disks (1.44 Mbytes) and 2DD floppy disks (720 Kbytes).

- ❑ Memory

The T2400CS comes standard with 4 MB of CMOS Random Access Memory (RAM), and the T2400CT comes with 8 MB 3.3 Volts. This includes 640 KB of conventional memory with 3,456 KB of extended memory for the T2400CS and 7,552 MB for the T2400CT, which can be utilized as expanded memory compatible with the Lotus/Intel/Microsoft Expanded Memory Specifications (LIM-EMS).

- ❑ STN color LCD (T2400CS)

A high-resolution, Supertwist Nematic (STN) color Liquid Crystal Display (LCD) displays 640x480 pixels with 4,096 colors for both graphics and characters. The T2400CS internal display controller supports Video Graphics Array (VGA) functions for internal display and Super VGA (SVGA) for external display.

- ❑ TFT color LCD (T2400CT)

A high-resolution, Thin Film Transistor (TFT) color LCD displays 640x480 pixels. The T2400CT internal display controller supports VGA functions for internal display and Super SVGA for external display.

Keyboard

An easy-to-use 82/84-key enhanced keyboard with full-size keys and standard spacing is compatible with IBM standard software. The computer's keyboard supports software that uses a 101- or 102-key enhanced keyboard.

Batteries

The T2400CS/T2400CT has three different batteries: a main battery, a backup battery, and a Real Time Clock (RTC) battery.

Personal Computer Memory Card International Association (PCMCIA) card slot

The T2400CS/T2400CT has two PCMCIA slots, which enable you to install a MiNC Toshiba card modem or other industry standard PCMCIA release 2.0 card. The right side slot is 14.5 mm (Type III). The left side slot is 5.0 mm (Type II).

Parallel port

T2400CS/T2400CT's Centronics compatible parallel interface port serves two purposes. The port can be used to connect a Centronics compatible printer or an external 5 1/4" floppy disk drive.

RS-232C port

The T2400CS/T2400CT has one 9-pin serial interface port.

Mouse port

The T2400CS/T2400CT has one 6-pin mouse port on the back that can be connected to an IBM PS/2 mouse.

Keyboard port

The T2400CS/T2400CT has one 6-pin keyboard port on the back that can be connected to an IBM PS/2 keyboard.

Port replicator port

The T2400CS/T2400CT has a port replicator port which enables connection of port replicator. The port replicator allows connection of PS/2 mouse, parallel port, serial port, DC IN socket, SCSI port, Joystick, line in, line out, PS/2 keyboard, and external monitor.

RGB port

The T2400CS/T2400CT has one 15-pin RGB port on the back that can be connected to an external video display.

SCSI port

The T2400CS/T2400CT has one Small Computer System Interface (SCSI2) port.

Memory card slot

The T2400CS/T2400CT has one Toshiba optional memory card slot, which enables you to install a Toshiba optional memory card.

Accupoint

The T2400CS/T2400CT pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse.

Microphone

The T2400CS/T2400CT has an internal microphone for an optional sound card.

The T2400CS/T2400CT Personal Computer is shown in figure 1-1. T2400CS/T2400CT system configuration is shown in figure 1-2.

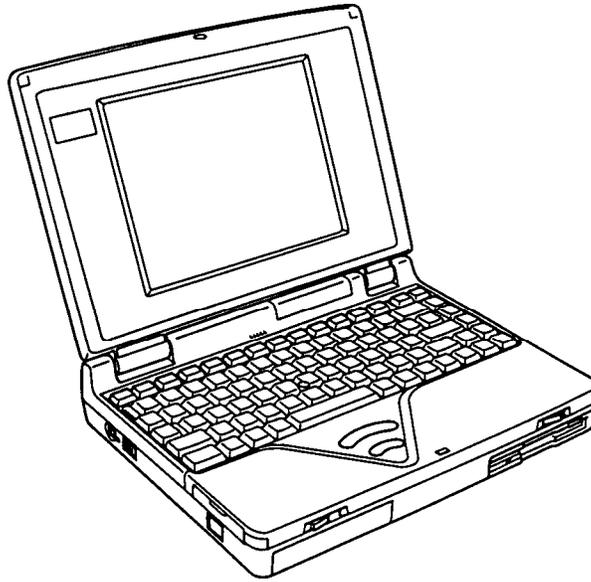


Figure 1-1 T2400CS/T2400CT personal computer

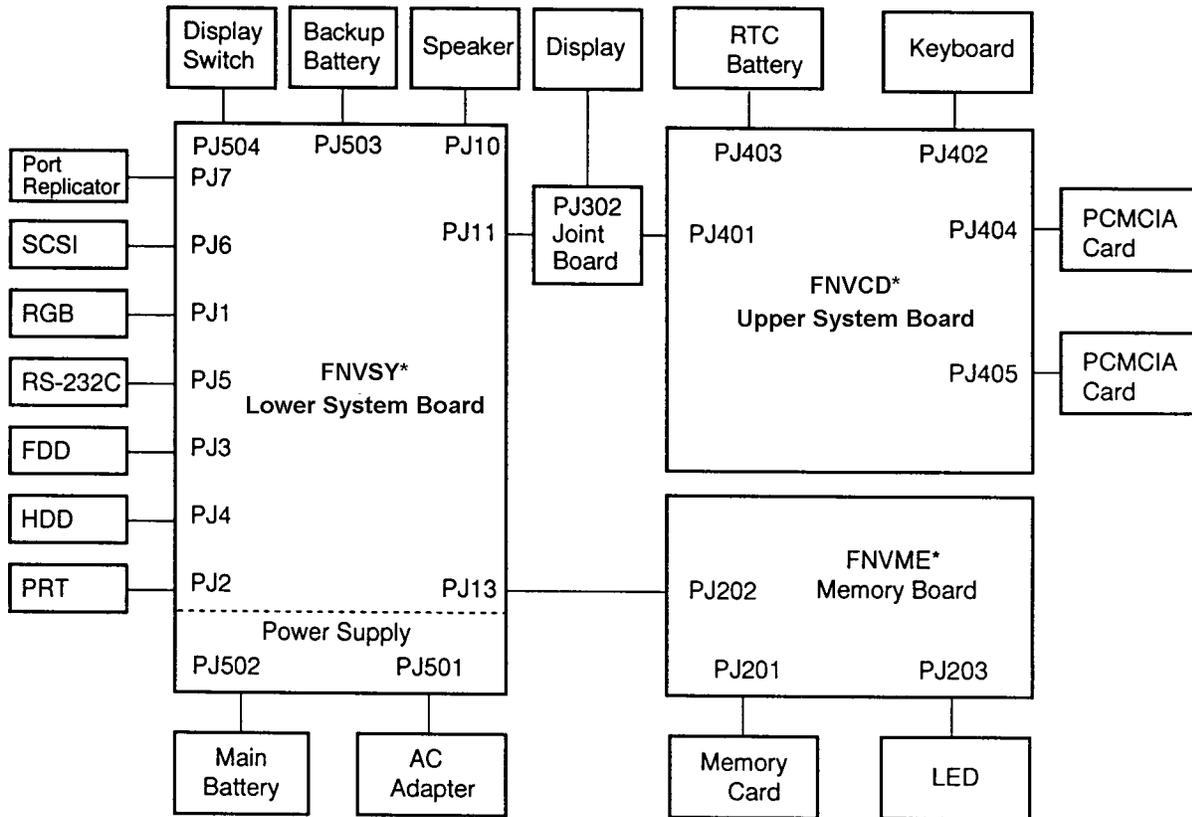


Figure 1-2 T2400CS/T2400CT system unit configuration

1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the T2400CS/T2400CT system unit.

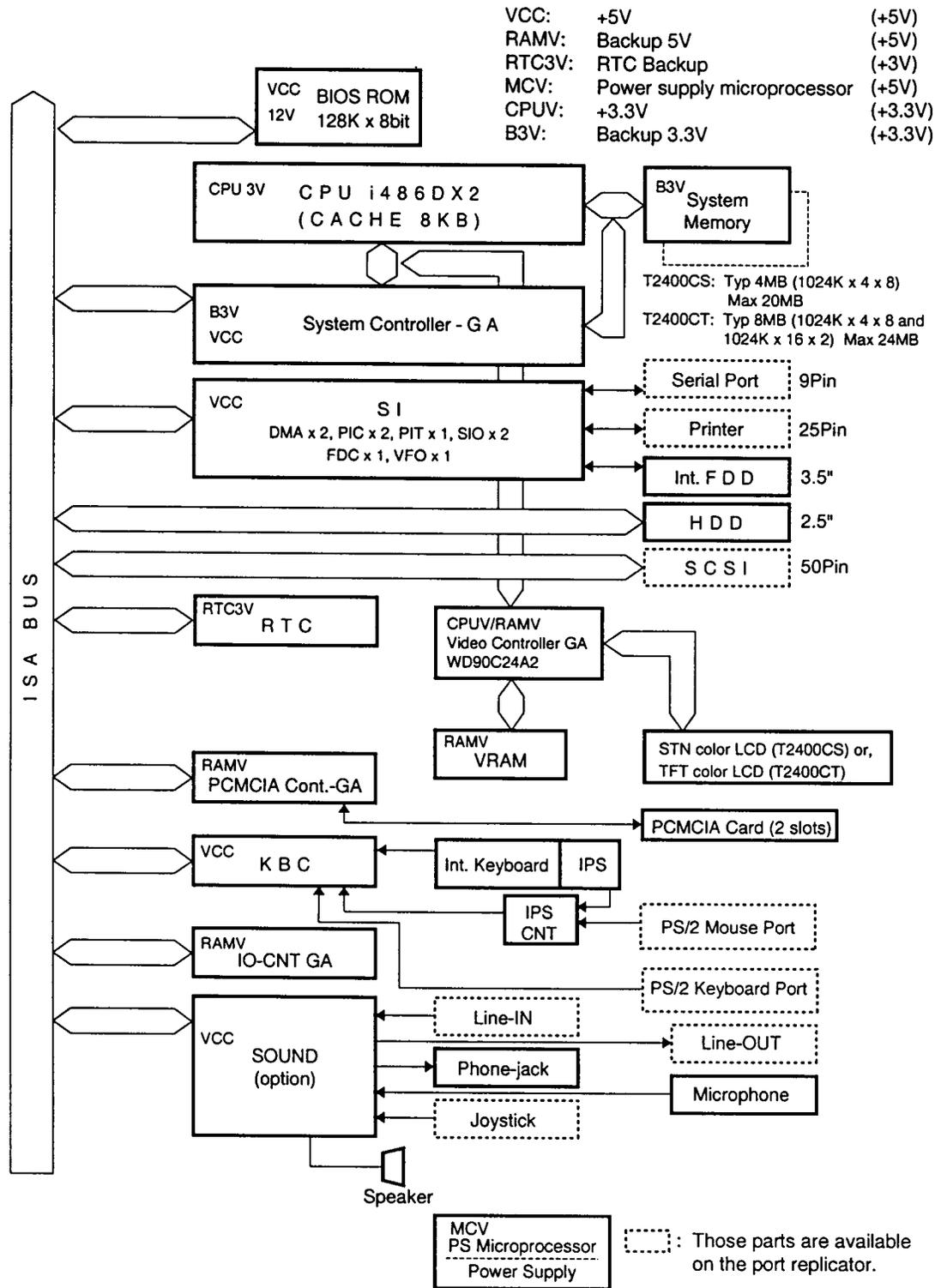


Figure 1-3 T2400CS/T2400CT system board block diagram

The T2400CS/T2400CT system board contains the following functional components:

- One SL Enhanced Intel 486DX2-50 32-bit microprocessor.

i486DX2 operates at 50 MHz and 3.3 volts.

- Standard RAM

4 Mbytes, eight 1024x4-bit chips (T2400CS)

8 Mbytes, eight 1024x4-bit chips and two 1024x16-bit chips (T2400CT)

3.3 volt operation

No parity bit

Access time 80 ns

Data transfer is 32-bit width.

- Cache memory

The 8 Kbytes of cache memory is stored inside the i486DX2.

Four-way set-associative method.

- BIOS ROM (Flash EEPROM)

128 Kbytes (one 128Kx8-bit chip) memory.

64 Kbytes in the ROM are used for system BIOS.

32 Kbytes in the ROM are used for VGA BIOS.

32 Kbytes in the ROM are reserved.

Access time 150 ns.

Data transfer is 8-bit width.

- Video RAM

1 Mbytes (two 256Kx16-bit chips).

5 volt operation.

Access time 70 ns.

- Optional memory

One expansion memory slot is available for 4, 8, and 16 Mbyte memory modules.

Total maximum memory size is 20 Mbytes for the T2400CS and 24 Mbytes for the T2400CT (if a 16 Mbyte module card is installed.)

3.3 volt operation

No parity bit

Access time 70 ns

- One super integration (SI)

The following components:

- Two DMACs 8237 equivalent

- Two PICs 8259 equivalent
- Two SIOs 16450 equivalent (One SIO is not used.)
- One PIT 8254 equivalent
- One FDC TC8565 equivalent
- One VFO TC8568 equivalent
- One I/O port decode
- One SIO port control
- One printer port control
- One FDD control
- One speaker control
- One power communication control

System Controller Gate Array (SYSCNT-GA)

This gate array has the following functions:

- Memory control
 - DRAM control
 - CPU control
- Bus control
 - Compatible bus interface control
 - Compatible bus access control
 - DMAC control
 - I/O control
- Address latch control
 - Address transfer
 - Address latch
 - DMA address generation
 - Refresh address generation
- I/O register control
 - Compatible I/O port
 - Register storing at resume mode power off
 - Special register
- Processing speed control
- Data bus transfer (32-bit to 16-bit) control
- Data latch

PCMCIA Controller Gate Array

PCMCIA (ToPIC) control

SCSI Controller

One AIC6360 chip is used. It controls the external SCSI ports.

Video Controller Gate Array

The T2400CS/T2400CT internal display controller (WD90C24A2) (3.3/5 volts operation) controls the internal VGA display and external SVGA compatible display.

Keyboard Controller (KBC)

One M38802 chip is used.

This KBC includes the keyboard scan controller and keyboard interface controller. The KBC controls the internal keyboard, external keyboard port, PS/2 mouse port.

Real Time Clock (RTC)

One T9934 chip is used. The T9934 has 128 of bytes memory. Fourteen bytes memory are used for the calender and clock. The remaining 114 bytes are used for the system configuration data.

IO-CNT GA

This gate array has the following functions:

- System interface
- SCSI controller control
- Sound function control
- Hot key control (KBC interface)
- PS interface
- BIOS ROM interface
- NEXUS GA function

AccuPoint Controller (U43SC11X)

This controller emulates the AccuPoint signals to PS/2 mouse signal and sends them to KBC.

1.3 3.5-inch Floppy Disk Drive

The T2400CS/T2400CT 3.5-inch Floppy Disk Drive (FDD) is a thin, high-performance reliable drive that supports 720-KB (formatted) 2DD and 1.44-MB (formatted) 2HD 3.5-inch floppy disks.

The T2400CS/T2400CT FDD is shown in figure 1-4. The specifications for the FDD are described in table 1-1.

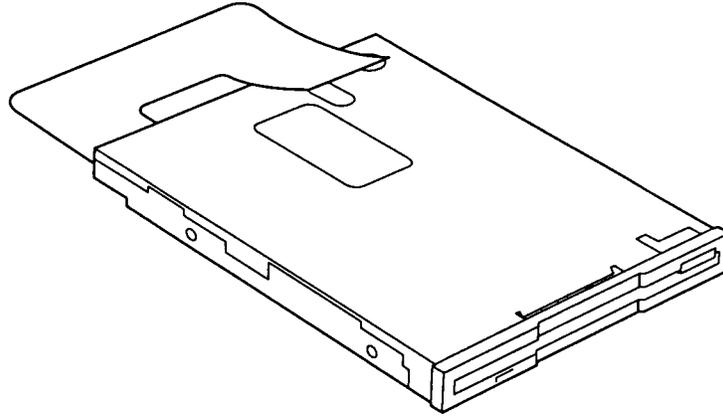


Figure 1-4 3.5-inch FDD

Table 1-1 3.5-inch FDD specifications

Item	2-MB mode	1-MB mode
Storage capacity (KB) Unformatted	2,000	1,000
Formatted	1,311	737
Number of heads	2	2
Number of cylinders	80	80
Access time (ms) Track to track	3	3
Average	181	181
Head settling time	15	15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

1.4 2.5-inch Hard Disk Drive

The Hard Disk Drive (HDD) is a random access nonvolatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-winchester type magnetic heads.

T2400CS/T2400CT supports the 250 MB, and 320 MB.

The T2400CS/T2400CT HDD is shown in figure 1-5. Specifications for the HDD are described in table 1-2.

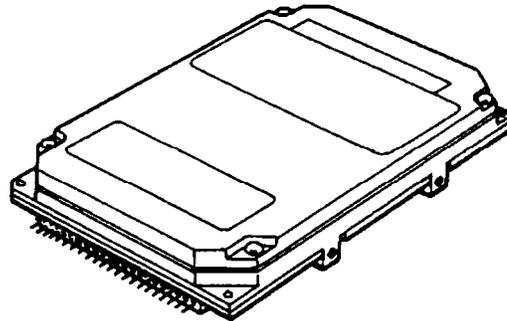


Figure 1-5 2.5-Inch HDD

Table 1-2 2.5-inch HDD specifications

	250 MB	320 MB	
	(MK1724FCV)	(MK2326FC)	(IBM-M2344-A4)
Storage capacity (MB) Formatted	262.0	340	344
Number of disks	2	3	2
Data heads	4	6	4
Data surfaces	4	6	4
Track per surface	1,920	1,830	2,264
Sectors per track	–	–	–
Bytes per sector	512	512	512
Access time (ms) Track to track	3	3	4/4(Typ.) 5.5/6.5(Max.)
Average	13	12	14/15 (R/W)
Maximum	25	25	23/24(Typ.) 30/31 (Max.)
Rotation speed (rpm)	4,000	4,200	3,800
Data transfer rate (bps) To/from media	8.9 to 31.6 M	18.7 to 29.6 M	20 to 32M
Interleave	1:1	1:1	1:1
Recording method	1-7 RLL	1-7 RLL	1-7 RLL

1.5 Keyboard

The 82-(USA) or 84-(European) keyboard is mounted on the T2400CS/T2400CT's system unit. The keyboard is connected to the keyboard controller on the system board through a 25-pin flat cable. The T2400CS/T2400CT pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse. The keyboard is shown in figure 1-6.

See Appendix F for optional keyboard configurations.

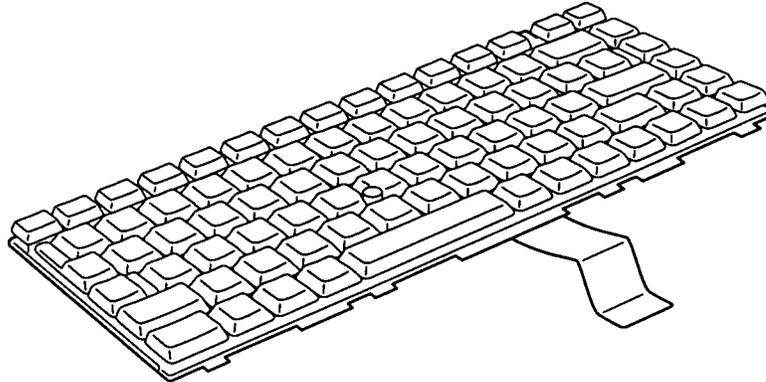


Figure 1-6 Keyboard

1.6 STN Color LCD

The STN Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

1.6.1 STN Color LCD Module

The T2400CS STN color LCD is backlit and supports 640x480 pixels with a Video controller. This video controller includes the functions of Video Graphics Array (VGA).

The T2400CS's LCD receives vertical and horizontal synchronizing signals, 16-bit data signal, 8-bit upper block data signal, 8-bit lower block data signal, and shift clock for data transmission. All signals are CMOS-level compatible.

The STN LCD is shown in figure 1-7. The specifications for the LCD are described in table 1-3.

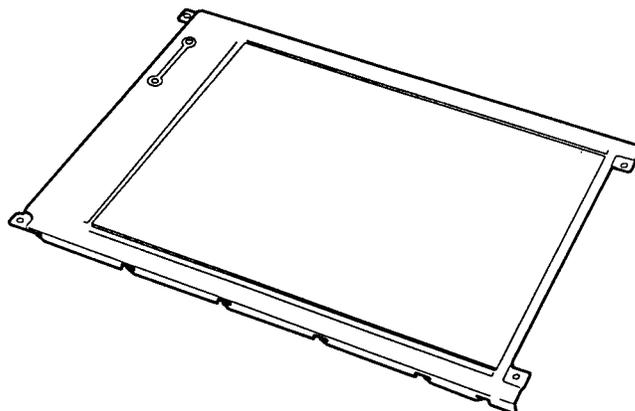


Figure 1-7 STN color LCD

Table 1-3 STN color LCD specifications

Item	Specifications
Number of Dots (dots)	640x480
Dot pitch (mm)	0.07xRGBx0.275
Display area (mm)	192 (W)x144 (H)
Contrast (Typically)	18:1
FL current (mA)	6.0
FL frequency (KHz)	42

1.6.2 STN Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the FL inverter are described in table 1-4.

Table 1-4 STN color FL inverter board specifications

Item		Specifications
Input	Voltage (VDC)	5
	Power (W)	6
Output	Voltage (VAC)	1,000
	Current (mA)	5.0
	Frequency (KHz)	42

1.7 TFT Color LCD

The TFT Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

1.7.1 TFT Color LCD Module

The T2400CT TFT color LCD supports 640x480 pixels with an internal display controller and 512 colors for graphics and characters. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The T2400CT's LCD receives 9-bit data signals, data enable signals, and shift clock for data transmission. All signals are CMOS-level compatible.

The TFT LCD is shown in figure 1-8. The specifications for the LCD are described in table 1-5.

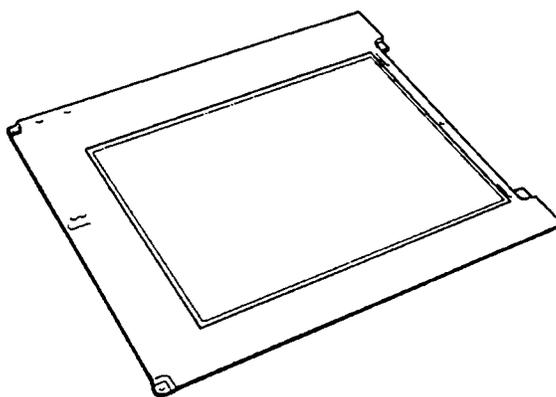


Figure 1-8 TFT color LCD

Table 1-5 TFT color LCD specifications

Item		Specifications
Number of dots	(dots)	640x480
Dot pitch	(mm)	0.27 (W)x0.27 (H)
Display area	(mm)	171 (W)x130 (H)
Contrast		60:1 (minimum)
FL current	(mA)	5.0
FL frequency	(KHz)	47

1.7.2 TFT Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the FL inverter are described in table 1-6.

Table 1-6 TFT color FL inverter board specifications

Item			Specifications
Input	Voltage	(VDC)	5
	Power	(W)	3
Output	Voltage	(VAC)	1,100
	Current	(mA)	5.0
	Frequency	(KHz)	47

1.8 Power Supply

The power supply supplies five kinds of voltages to the T2400CS/T2400CT system board. The T2400CS/T2400CT power supply has one microprocessor and it operates at 500 KHz. It contains the following functions:

1. Determines if the AC adapter or battery is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the LED indicator and speaker.
4. Turns the battery charging system on and off and detects a fully charged battery.
5. Determines if the power can be turned on and off.
6. Provides more accurate detection of a low battery.
7. Calculates the remaining battery capacity.

The power supply output rating is specified in table 1-7.

Table 1-7 Power supply output rating

Use for	Name	DC voltage (V)	Regulation tolerance (%)	Maximum current (mA)	Ripple (mV)
System logic, FDD, HDD, Display	VCC	+5	±5	2,500	100
RS-232C, Flash ROM	P12V	+12	±5	100	240
RAM	B3V	+3.3	±5	300	66
VRAM	RAMV	+4.7	±5	300	100
CPU	CPUV	+3.3	±5	1,200	66

1.9 Batteries

The T2400CS/T2400CT has three types of batteries:

- Main battery pack
- Backup battery
- Real Time Clock (RTC) battery

These battery specifications are described in table 1-8.

Table 1-8 Battery specifications

Battery name	Material	Output voltage	Capacity
Main battery	Nickel Metal Hydride	12 V	2,600 mAH
Backup battery	Nickel Metal Hydride	1.2 V	1,100 mAH
RTC battery	Lithium-Vanadium	3.0 V	50 mAH

1.9.1 Main Battery

The removable main battery pack is the computer's main power source when the AC adapter is not attached. The main battery recharges the backup battery when the system's power is on. The backup and main battery maintain the state of the computer when you enable AutoResume.

- Battery Indicator

The Battery indicator is located on the top cover of the T2400CS/T2400CT. The indicator shows the status of the removable battery pack, power supply and AC adapter.

The status of each can be determined by color:

- Orange The battery is being charged. (AC adapter is attached.)
- Green The battery is fully charged. (AC adapter is attached.)
- Blink orange The battery is low when the power is on.
- No light The AC adapter is disconnected from the computer. The AC adapter is connected, but it cannot charge the battery for one of the following reasons:
 - The battery is extremely hot. Allow the computer and the battery to reach room temperature before attempting to charge the battery.

- The battery is almost fully discharged. The battery will not begin charging immediately in this state, it will begin charging a few minutes after the AC adapter is connected.
- AC adapter is not receiving power.

1.9.2 Battery Charging Control

Battery charging is controlled by a power supply microprocessor that is mounted on the power supply. The microprocessor controls whether the charge is on or off and detects a full charge when the AC adapter and battery are attached to the computer. The system charges the battery using quick charge or trickle charge.

Quick Battery Charge

When the AC adapter is attached, there are two types of charge: quick charge when the system is powered off and trickle charge when the system is powered on.

Table 1-9 Time required for quick charges

	Charging time
Quick charge (power off)	About 1.4 hours (T2400CS/T2400CT)
Trickle charge (power on)	About 48 hours

If the one of the following occurs, the battery quick-charge process stops.

1. The battery becomes fully charged
2. The AC adapter or battery is removed.
3. The battery or AC adapter output voltage is abnormal.
4. The charge current is abnormal.

Trickle Battery Charge

When the main battery is fully charged and the AC adapter is attached, the power supply microprocessor automatically changes quick charge to trickle charge.

1.9.3 Backup Battery

The backup battery maintains data for AutoResume. The power source used to back-up the AutoResume data is determined according to the following priority:

AC adapter > Main battery > Backup battery

The backup battery is charged by the main battery or AC adapter when the system is powered on. Table 1-10 shows the charging time and data preservation period of the backup battery.

Table 1-10 Backup battery charging/data preservation time

		Time
Charging Time	Power On	16 H
	Power Off (with AC Adapter)	60 H
	Power Off (Without AC Adapter)	Doesn't charge
Data preservation period (full charge)		8 H

1.9.4 RTC Battery

The RTC battery provides power to keep the current date, time and other setup information in memory while the computer is turned off. Table 1-11 shows the charging time and data preservation period of the RTC battery.

Table 1-11 RTC battery charging/data preservation time

		Time
Charging Time	With AC adapter or main battery	48 H
Data preservation period (full charge)		1 month

2.1 Troubleshooting

Chapter 2 describes how to determine if a Field Replaceable Unit (FRU) in the T2400CS/T2400CT is causing the computer to malfunction. The FRUs covered are:

1. System Board(s)
2. Floppy Disk Drive
3. Hard Disk Drive
4. Keyboard
5. Display

The Diagnostics Disk operations are described in Chapter 3 and detailed replacement procedures are given in Chapter 4.

The following tools are necessary for implementing the troubleshooting procedures:

1. A T2400CS/T2400CT Diagnostics Disk
2. A Phillips head screwdriver (2 mm)
3. A Toshiba MS-DOS system disk(s)
4. A 2DD or 2HD formatted work disk for floppy disk drive testing
5. A cleaning kit for floppy disk drive troubleshooting
6. A printer port LED
7. An RS-232C wraparound connector
8. A printer wraparound connector
9. A multimeter
10. An external CRT

2.2 Troubleshooting Flowchart

Use the flowchart in figure 2-1 as a guide for determining which troubleshooting procedures to execute. Before going through the flowchart steps, verify the following:

- Ask the user if a password is registered, and if it is, ask him or her to enter the password. If the user has forgotten the password, connect the printer port wraparound board (F31PRT), then turn the POWER switch on. The computer will override the password function by erasing the current password.
- Verify with the customer that Toshiba MS-DOS is installed on the hard disk. Non-Toshiba operating systems can cause the computer to malfunction.
- Make sure all optional equipment is disconnected from the computer.
- Make sure the floppy disk drive is empty.

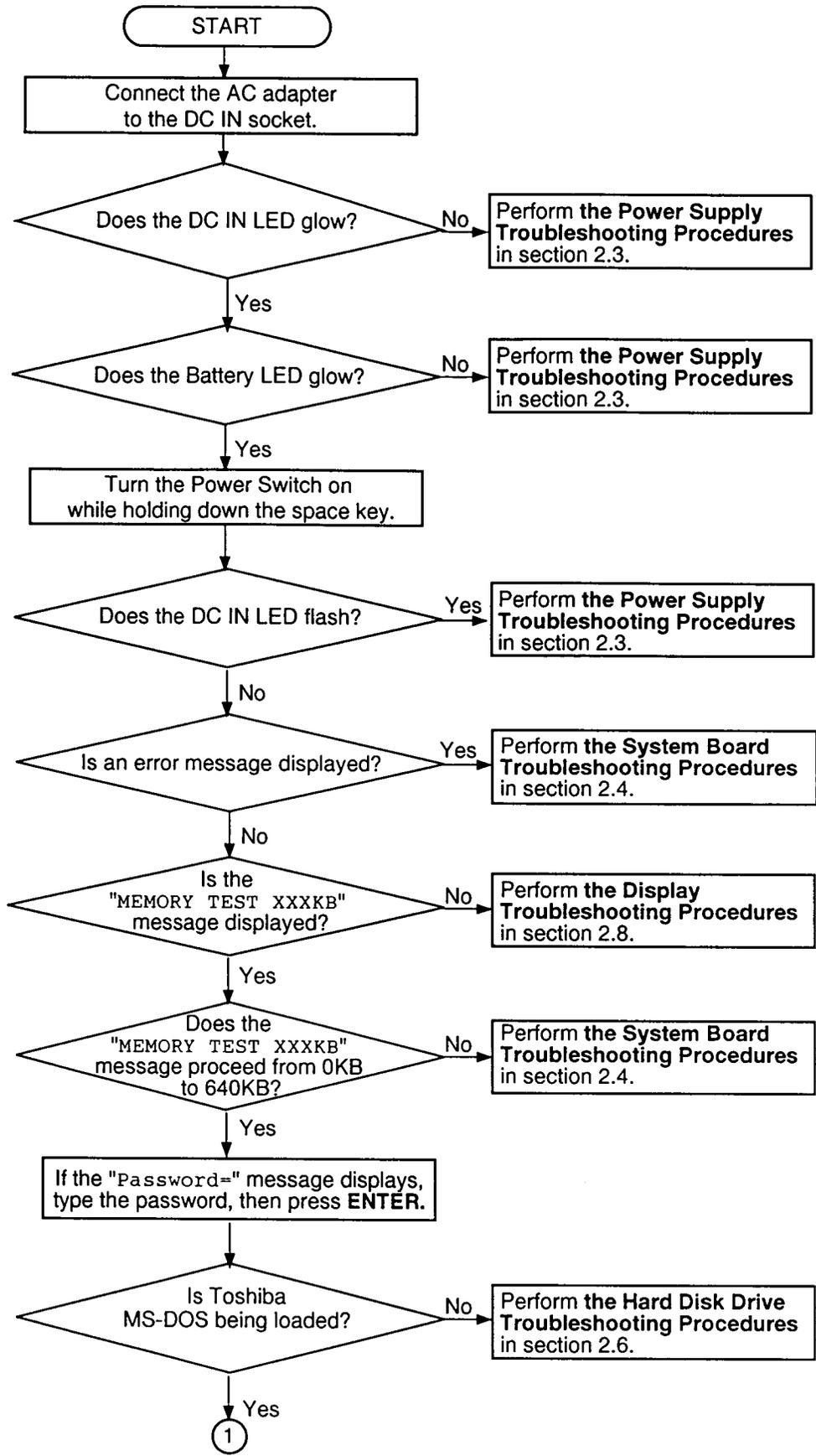


Figure 2-1 Troubleshooting flowchart (1/2)

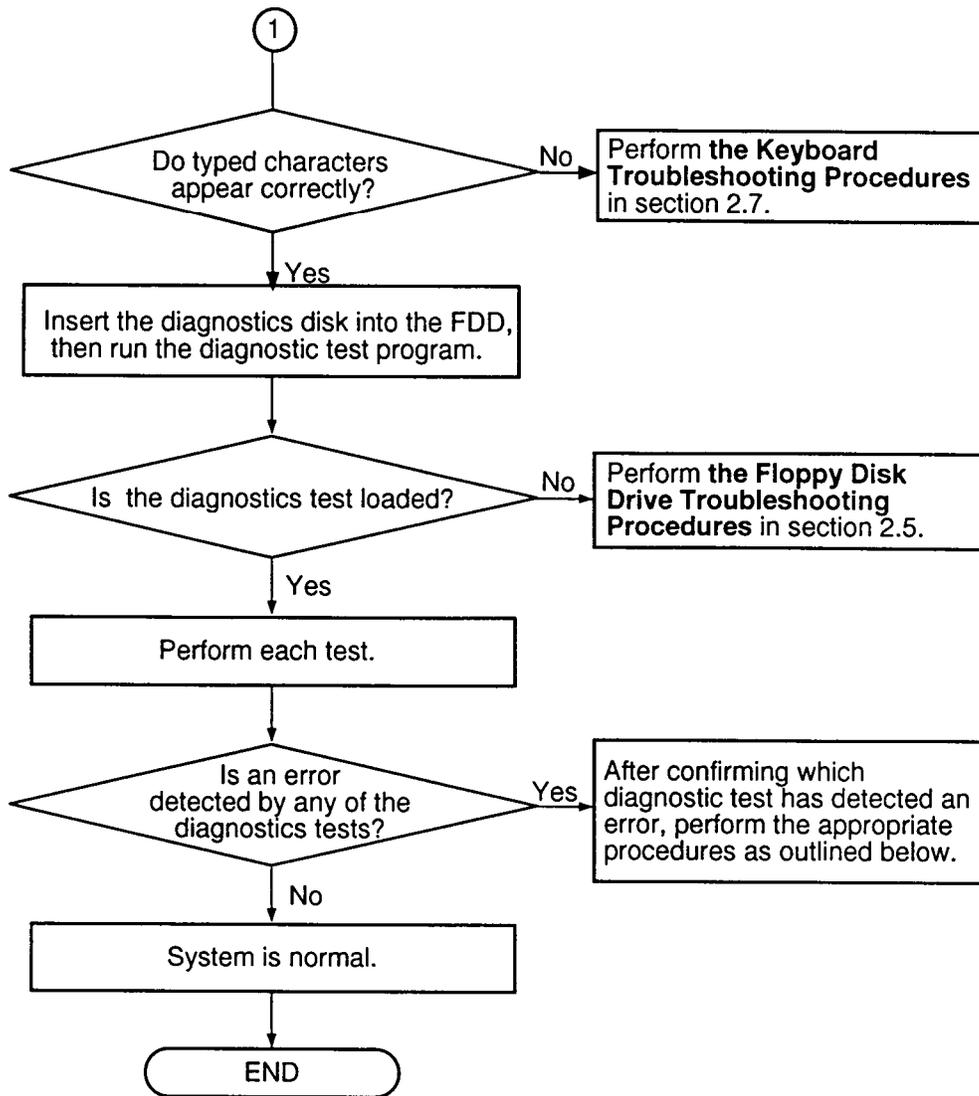


Figure 2-1 Troubleshooting flowchart (2/2)

If the diagnostics program cannot detect an error, the problem may be intermittent. The Running Test program should be executed several times to isolate the problem. Check the Log Utilities function to confirm which diagnostic test detected an error(s), then perform the appropriate troubleshooting procedures as follows:

1. If an error is detected on the system test, memory test, display test, ASYNC test, printer test, or real timer test, perform the system board troubleshooting procedures in section 2.4.
2. If an error is detected on the keyboard test, perform the keyboard troubleshooting procedures in section 2.7.
3. If an error is detected on the floppy disk test, perform the floppy disk drive troubleshooting procedures in section 2.5.
4. If an error is detected on the hard disk test, perform the hard disk drive troubleshooting procedures in section 2.6.

2.3 Power Supply Troubleshooting

The T2400CS/T2400CT's power supply controls many functions and components in the T2400CS/T2400CT. To determine if the power supply is functioning properly, start with Procedure 1 and continue with the other Procedures as instructed. The procedures described in this section are:

Procedure 1: DC IN LED Indicator Check

Procedure 2: Battery LED Indicator Check

Procedure 3: PCB Replacement Check

Procedure 1 DC IN LED Indicator Check

The T2400CS/T2400CT's AC adapter converts AC power to DC power and contains a charging circuit which charges the T2400CS/T2400CT's batteries. The adapter connects to the DC IN socket connector on the left side of the computer. When the AC adapter is connected to the T2400CS/T2400CT and the power is turned off, the AC adapter charges the batteries.

The DC IN indicator displays whether or not the AC adapter is connected and supplying power.

When the DC IN indicator is green, the AC adapter is connected and supplying power to the T2400CS/T2400CT.

If the DC IN indicator does not light, the AC adapter is not supplying power to the T2400CS/T2400CT or the AC adapter is not attached to the T2400CS/T2400CT, go to Check 1.

If the DC IN indicator is flashing green, the AC adapter's voltage supply is abnormal or the power supply is not functioning properly, go to Check 1.

If any of the above indicator conditions are abnormal, make sure the LED indicator lights are not burned out before performing the following Check:

Check 1 Make sure the correct AC adapter's cable is firmly plugged into the DC IN socket on the back of the computer.

T2400CS/T2400CT: PA2430U
DC 18 V, 1.1 A

Check 2 If the DC IN indicator flashes green when the AC adapter is connected, its voltage output is abnormal. Connect a new AC adapter and turn the T2400CS/T2400CT on again to verify the indicator condition.

- Check 3 The battery pack may be malfunctioning. Replace the battery pack with a new one and turn the computer on again. If the problem still exists, perform Check 4.
- Check 4 Place the T2400CS/T2400CT in an environment between -20°C and 70°C until the T2400CS/T2400CT is at the ambient temperature. Repeat the steps which caused the T2400CS/T2400CT to operate abnormally. If the same problem still appears, perform Procedure 3.

Procedure 2 Battery LED Indicator Check

The Battery LED indicator shows the battery charging status. The Battery LED, identified by a battery icon on the front of the computer, glows orange when the AC adapter is charging the T2400CS/T2400CT's battery pack.

If the Battery LED indicator glows green, the AC adapter is connected and the battery is fully charged.

If the Battery LED indicator glows orange, the AC adapter is connected and the battery is being charged.

If the Battery LED indicator does not glow, go to Check 1.

Check 1 Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN socket and wall outlet. If these cables are connected correctly, go to Check 2.

Check 2 Make sure the battery pack is installed in the computer correctly. If the battery pack is installed correctly, go to Check 3.

Check 3 Remove the battery pack and check that the battery and lower system board terminals are clean and not bent.

- If the battery and/or system board terminal appears dirty, clean it/them gently with a cotton swab dipped in alcohol.
- If either terminal looks bent or damaged, replace the battery or the lower system board.
- If the terminals are clean and not bent, go to Check 4.

Check 4 Connect a new AC adapter. If the Battery LED indicator still does not glow, go to Check 5.

Check 5 Install a new battery pack. If the Battery LED indicator still does not glow, go to Procedure 3.

Procedure 3 PCB Replacement Check

The PCB unit incorporates the system board and the power supply board. Power is supplied to the power supply board through the DC IN 18 V plug located on the power supply board. If either the power supply board or the system board is damaged, replace the PCB unit.

Refer to chapter 4 for instructions on how to disassemble the T2400CS/T2400CT, and then perform the following check:

Check 1 Replace the PCB unit with a new one and restart the system. If the problem still exists, other FRUs may be damaged.

2.4 System Board Troubleshooting

This section describes how to determine if the system board is defective or not functioning properly. Start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

- Procedure 1: Message Check
- Procedure 2: Printer Port LED Check on Boot Mode
- Procedure 3: Printer Port LED Check on Resume Mode
- Procedure 4: Diagnostic Test Program Execution Check
- Procedure 5: Replacement Check

Procedure 1 Message Check

When the power is turned on, the system performs the Initial Reliability Test (IRT) installed in the BIOS ROM. The IRT tests each IC on the system board and initializes it.

- ❑ If an error message is shown on the display, perform Check 1.
- ❑ If there is no error message, go to Procedure 2.
- ❑ If the Toshiba MS-DOS is properly loaded, go to Procedure 3.

Check 1 If one of the following error messages is displayed on the screen, press the **F1** key as the message instructs. These errors occur when the system configuration preserved in the RTC memory (CMOS type memory) is not the same as the actual configuration or when the data is lost.

If you press the **F1** key as the message instructs, the system configuration in the RTC memory configuration is set to the default setting. If error message (b) appears often when the power is turned on, replace the RTC battery. If any other error message is displayed, perform Check 2.

- (a) *** Error in CMOS. Bad HDD type ***
Check system. Then press [F1] key
- (b) *** Error in CMOS. Bad battery ***
Check system. Then press [F1] key
- (c) *** Error in CMOS. Bad check sum ***
Check system. Then press [F1] key
- (d) *** Error in CMOS. Bad memory size ***
Check system. Then press [F1] key
- (e) *** Error in CMOS. Bad time function ***
Check system. Then press [F1] key

Check 2 If the following error message is displayed on the screen, press any key as the message instructs.

The following error message appears when data stored in RAM under the resume function is lost because the battery has become discharged or the system board is damaged. Go to Procedure 3.

If any other message appears, perform Check 3.

```
WARNING: RESUME FAILURE.  
PRESS ANY KEY TO CONTINUE.
```

Check 3 The IRT checks the system board. When the IRT detects an error, the system stops or an error message appears.

If one of the following error messages (1) through (17), (19), (25) or (26) is displayed, replace the system board.

If error message (18) is displayed, go to the Keyboard Troubleshooting Procedures in section 2.7.

If error message (21) or (22) is displayed, go to the HDD Troubleshooting Procedures in section 2.6.

If error message (23) or (24) is displayed, go to the FDD Troubleshooting Procedures in section 2.5.

- (1) TIMER CH.2 OUT ERROR
- (2) PIT ERROR
- (3) MEMORY REFRESH ERROR
- (4) FIRST 64KB MEMORY ERROR
- (5) RTC ERROR
- (6) CRTIC ERROR
- (7) VRAM ERROR
- (8) KBC ERROR
- (9) SYSTEM MEMORY ERROR
- (10) SYSTEM MEMORY PARITY ERROR
- (11) EXTENDED MEMORY ERROR
- (12) EXTENDED MEMORY PARITY ERROR
- (13) DMA PAGE REGISTER ERROR
- (14) DMAC #1 ERROR
- (15) DMAC #2 ERROR
- (16) PIC #1 ERROR
- (17) PIC #2 ERROR
- (18) KEYBOARD ERROR
- (19) KBC ERROR
- (20) HDC ERROR
- (21) HDD #0 ERROR
- (22) HDD #1 ERROR
- (23) NO FDD ERROR
- (24) FDD ERROR
- (25) TIMER INTERRUPT ERROR
- (26) RTC UPDATE ERROR

Procedure 2 Printer Port LED Check on Boot Mode

The printer port LED displays the IRT status and test status by turning lights on and off as an eight-digit binary value for boot mode. Figure 2-2 shows the printer port LED.

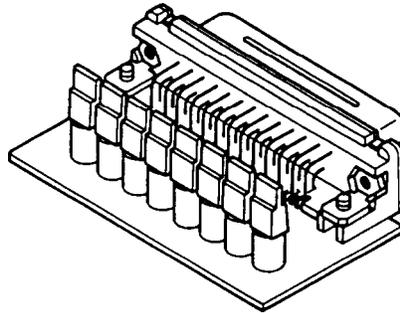


Figure 2-2 Printer port LED

To use the printer port LED follow these steps:

1. Turn on the T2400CS/T2400CT's power, then set to boot mode.
2. Turn off the T2400CS/T2400CT's power.
3. Plug the printer port LED into the T2400CS/T2400CT's PRTconnector.
4. Hold down the space bar and turn on the T2400CS/T2400CT's power.
5. Read the LED status from left to right as you are facing the back of the computer.
6. Convert the status from binary to hexadecimal notation.
7. If the final LED status is FFh (normal status), go to Procedure 3.
8. If the final LED status matches any of the test status values in table 2-1, perform Check 1.

NOTE: *If an error condition is detected by the IRT test, the printer port LED displays an error code after the IRT test ends. For example, when the printer port LED displays 22 and halts, the IRT test has already completed the KBC test. In this instance, the IRT indicates an error has been detected during the system memory test.*

Table 2-1 Printer port LED boot mode status (1/2)

LED status	Test item	Message
01H	KBC initialization	
	ROM checksum test	BIOS is damaged!
02H	Special register initialization	
	PIT test	PIT ERROR
	PIT initialization	—
03H	PIT function check	MEMORY REFRESH ERROR TIMER CH.2 OUT ERROR
	CMOS check	CMOS CHECKSUM ERROR CMOS BAD BATTERY ERROR
	KB initialization	KBC ERROR
04H	Initialization of memory configuration	—
05H	SM-RAM check	—
06H	Self test check	—
	Read of Power Supply information	—
07H	ROM/RAM copy	—
08H	Initialization of internal VGA	—
0AH	First 64 KB memory test	FIRST 64KB MEMORY ERROR FIRST 64KB MEMORY PARITY ERROR
0BH	System memory initialization	—
0CH	System initialization	—
0DH	Interrupt vector initialization	—
18H	PIC initialization	—
1FH	Display initialization	VRAM ERROR
25H	System memory test	SYSTEM MEMORY ERROR SYSTEM MEMORY PARITY ERROR
30H	Extended memory test	EXTENDED MEMORY ERROR EXTENDED MEMORY PARITY ERROR
40H	DMA page register test	DMA PAGE REGISTER ERROR
41H	DMAC test	DMAC #X ERROR
42H	DMAC initialization	—
4AH	PIC test	PIC #X ERROR
50H	Mouse initialization	—
55H	KBC initialization	KBC ERROR
60H	HDD initialization	HDC ERROR/HDD #0 ERROR
65H	FDD initialization	FDC ERROR/NO FDD ERROR
70H	Printer initialization	—
80H	SIO initialization	—
90H	Timer initialization	RTC UPDATE ERROR TIMER INTERRUPT ERROR
A0H	NDP initialization	—
A6H	Initialization of expansion ROM	—
C0H	Password check	—

Table 2-1 Printer port LED boot mode status (2/2)

LED status	Test item	Message
FFh	Setup boot check	*** Error is CMOS. xxxxxx *** Check system. Then press [F1] key.
FFh	Boot load	—

Check 1 If any of the following error codes are displayed, go to Procedure 5.

00h, 01h, 02h, 03h, 04h, 05h, 06h, 07h, 0Ah, 0Bh, 0Ch, 0Dh, 18h, 1Fh, 25h, 30h, 40h, 41h, 42h, 4Ah, 65h, 70h, 80h, 90h, A0h, C0h, FFh

Check 2 If error code **50h** is displayed, go to the Keyboard Troubleshooting procedures in Section 2.7.

Check 3 If error code **55h** is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.

Check 4 If error code **60h** is displayed, go to the FDD Troubleshooting Procedures in Section 2.5.

Procedure 3 Printer Port LED Check on Resume Mode

The printer port LED displays the IRT status and test status by turning lights on and off as an eight-digit binary value for resume mode.

To use the printer port LED follow these steps:

1. Turn on the T2400CS/T2400CT's power, then set to resume mode.
2. Turn off the T2400CS/T2400CT's power
3. Plug the printer port LED into the T2400CS/T2400CT's PRT connector.
4. Turn on the T2400CS/T2400CT's power.
5. Read the LED status from left to right as you face the back of the computer.
6. Convert the status from binary to hexadecimal notation.
7. If the final LED status is FFh (normal status), go to Procedure 4.
8. If the final LED status matches any of the test status values in table 2-2, go to Procedure 5.

Table 2-2 Printer port LED resume mode error status

Error status	Meaning of status
F1H	RAM BIOS error
F2H	The system has option ROM, or optional card (CGA, MDA).
F5H	Main memory checksum error
F6H	Video RAM checksum error
F7H	Extended memory checksum error

Procedure 4 Diagnostic Test Program Execution Check

Execute the following tests from the *Diagnostic Test* Menu. Refer to chapter 3, “*Tests and Diagnostics*,” for more information on how to perform these tests.

1. System test
2. Memory test
3. Printer test
4. ASYNC test
5. Real Timer test
6. PCMCIA test

If an error is detected during any of these tests, go to Procedure 5.

Procedure 5 Replacement Check

The system board(s) may be damaged. Disassemble the T2400CS/T2400CT following the steps described in chapter 4, *Replacement Procedures*, and perform the following checks:

If the IRT test detects the following code, go to check 1.

06H, 07H, 0AH, 0BH, 0DH, 15H, 18H, 1FH, 22H, 25H, 54H, 55H, 90H

If the IRT test detects the following code, go to check 2.

01H, 05H, 16H, 30H, 40H, 41H, 42H, 65H, 70H, 80H, A0H, A6H

If any of the following diagnostic tests detect an error, go to check 1.

System test
Memory test
Real Timer test

If any of the following diagnostic tests detect an error, go to check 2.

Printer test
ASYNC test
PCMCIA test

Check 1 Replace the upper system board with a new one. If the problem still exists, replace the lower system board. Refer to chapter 4, *Replacement Procedures*, for instructions on how to remove and replace the upper and lower system boards.

Check 2 Replace the lower system board with a new one. If the problem still exist, replace the upper system board. Refer to chapter 4, *Replacement Procedures*, for instructions on how to remove and replace the upper and lower system boards.

2.5 Floppy Disk Drive Troubleshooting

This section describes how to determine if the T2400CS/T2400CT's internal 3.5-inch floppy disk drive is functioning properly. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

- Procedure 1: FDD Head Cleaning Check
- Procedure 2: Diagnostic Test Program Check
- Procedure 3: Connector Check and Replacement Check

Procedure 1 FDD Head Cleaning Check

FDD head cleaning is one option available in the *Diagnostic Program*. Detailed operation is given in chapter 3, *Tests and Diagnostics*.

After loading Toshiba MS-DOS, run the Diagnostic Program and then clean the FDD heads using the cleaning kit. If the FDD still does not function properly after cleaning, go to Procedure 3.

If the test program cannot be executed on the T2400CS/T2400CT, go to Procedure 2.

Procedure 2 Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T2400CS/T2400CT Diagnostics Disk. After loading Toshiba MS-DOS, run the diagnostic program. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostics test procedures.

Floppy disk drive test error codes and their status names are described in table 2-3. Make sure the floppy disk in the FDD is formatted correctly and that the write protect tab is disabled. If any other errors occur while executing the FDD diagnostics test, go to Check 1.

Table 2-3 Floppy disk drive error code and status

Code	Status
01h	Bad command
02h	Address mark not found
03h	Write protected
04h	Record not found
06h	Media removed on dual attach card
08h	DMA overrun error
09h	DMA boundary error
10h	CRC error
20h	FDC error
40h	Seek error
60h	FDD not drive
80h	Time out error (Not ready)
EEh	Write buffer error
FFh	Data compare error

Check 1 If the following message is displayed, disable the write protect tab on the floppy disk. If any other message appears, perform Check 2.

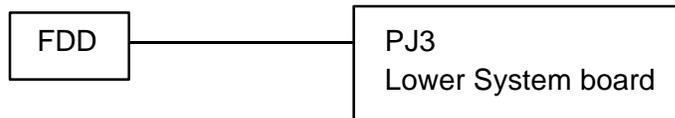
Write protected

Check 2 Make sure the floppy disk is formatted correctly. If it is, go to Procedure 3.

Procedure 3 Connector Check and Replacement Check

The 3.5-inch Floppy Disk Drive is connected to the lower system board by the FDD cable. This cable may be disconnected from the system board or damaged. Disassemble the T2400CS/T2400CT following the steps described in chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1 Make sure the FDD cable is firmly connected to the lower system board.



If this cable is disconnected, connect it to the system unit and repeat Procedure 3. If the FDD is still not functioning properly, perform Check 2.

Check 2 The FDD or its cable may be defective or damaged. Replace the FDD with a new one following the steps in chapter 4, *Replacement Procedures*. If the FDD is still not functioning properly, perform Check 3.

Check 3 Replace the upper system board with a new one following the steps in chapter 4. If the FDD is still not functioning properly, replace the lower system board.

2.6 Hard Disk Drive Troubleshooting

To determine if the hard disk drive is functioning properly, perform the procedures below starting with Procedure 1. Continue with the other procedures as instructed.

- Procedure 1: Partition Check
- Procedure 2: Message Check
- Procedure 3: Format Check
- Procedure 4: Diagnostic Test Program Execution Check

CAUTION: *The contents of the hard disk will be erased when the HDD troubleshooting procedures are executed. Transfer the contents of the hard disk to a floppy disk(s) using the Toshiba MS-DOS BACKUP command. Refer to the Toshiba MS-DOS Manual for more information about how to perform the BACKUP command.*

Procedure 1 Partition Check

Insert the Toshiba MS-DOS system disk and turn on the computer. Then perform the following checks:

- Check 1 Type **C:** and press **Enter**. If you cannot change to drive C, go to Check 2. If you can change to drive C, go to Procedure 2.
- Check 2 Type **FDISK** and press **Enter**. Choose Display Partition Information from the FDISK menu. If drive C is listed, go to Check 3. If drive C is not listed, return to the FDISK menu and choose the option to create a DOS partition on drive C. Then recheck the system. If the problem still exists, go to Procedure 2.
- Check 3 If drive C is listed as active in the FDISK menu, go to Check 4. If drive C is not listed as active, return to the FDISK menu and choose the option to set the active partition for drive C. Then recheck the system. If the problem still exists, go to Procedure 2.
- Check 4 Remove the system disk from the FDD and cold boot the computer. If the problem still exists, go to Procedure 2. Otherwise, the HDD is operating normally.

Procedure 2 Message Check

When the T2400CS/T2400CT's HDD does not function properly, some of the following error messages may appear on the display. Start with Check 1 below and perform the other checks as instructed.

Check 1 If any of the following messages appear, perform Check 2. If the following messages do not appear, perform Check 4:

```
HDC ERROR
  (After 5 seconds this message will disappear.)
      or
HDD #0 ERROR
  (After 5 seconds this message will disappear.)
      or
HDD #1 ERROR
  (After 5 seconds this message will disappear.)
```

Check 2 If either of the following messages appears, perform Procedure 3. If the following messages do not appear, perform Check 3.

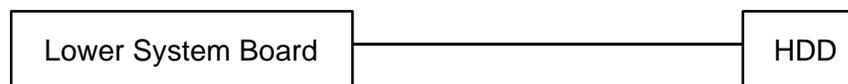
```
Insert system disk in drive
  Press any key when ready .....
      or
Non-System disk or disk error
  Replace and press any key
```

Check 3 Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

If the following message appears on the display, the system program has been transferred to the HDD. Restart the T2400CS/T2400CT. If the error message still appears, perform Check 4.

```
System transferred
```

Check 4 The HDD is connected to the lower system board directly. This connection can become disconnected or damaged. Disassemble the T2400CS/T2400CT as described in chapter 4. If the HDD is not connected, connect it to the system board and return to Procedure 1. If the HDD is firmly connected to the system board, perform Procedure 3.



Procedure 3 Format Check

The T2400CS/T2400CT's HDD is formatted using the low level format program and the MS-DOS FORMAT program. To format the HDD, start with Check 1 below and perform the other steps as required.

- Check 1 Using the Toshiba MS-DOS system disk, partition the hard disk using the FDISK command. Format the hard disk using **FORMAT C:/S/U** to transfer the system program to the HDD. If the following message appears on the display, the HDD is formatted.

```
Format complete
```

If any other error message appears on the display, refer to the *Toshiba MS-DOS Manual* for more information and perform Check 2.

- Check 2 Using the T2400CS/T2400CT Diagnostic Disk, format the HDD with a low level format option. Refer to Chapter 3, *Tests and Diagnostics* for more information about the diagnostic program.

If the following message appears on the display, the HDD low level format is complete. Partition and format the HDD using the MS-DOS FORMAT command.

```
Format complete
```

If you cannot format the HDD using the Test and Diagnostic program, go to Procedure 4.

Procedure 4 Diagnostic Test Program Execution Check

The HDD test program is stored in the T2400CS/T2400CT Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to chapter 3, *Tests and Diagnostics*, for more information about the HDD test program.

If an error is detected during the HDD test, an error code and status will be displayed; perform Check 1. The error codes and statuses are listed in table 2-4. If an error code is not generated, the HDD is operating properly.

Table 2-4 Hard disk drive error code and status

Code	Status
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialize
08	HDC overrun (DRQ)
09h	DMA boundary error
0Ah	Bad sector error
0Bh	Bad track error
10h	ECC error
11h	ECC recover enable
20h	HDC error
40h	Seek error
80h	Time out error
AAh	Drive not ready
BBh	Undefined error
CCh	Write fault
E0h	Status error
EEh	Access time out error
FFh	Data compare error

Check 1 Replace the HDD unit with a new one following the instructions in chapter 4, *Replacement Procedures*. If the HDD is still not functioning properly, perform Check 2.

Check 2 Replace the lower system board with a new one following the instructions in chapter 4. If the HDD is still not functioning properly, replace the upper system board.

2.7 Keyboard Troubleshooting

To determine if the T2400CS/T2400CT's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

Execute the Keyboard Test in the Diagnostic Program. Refer to chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

If an error occurs, go to Procedure 2. If an error does not occur, the keyboard is functioning properly.

Procedure 2 Connector and Replacement Check

The keyboard is connected to the upper system board by a 25-pin flat cable. This cable may be disconnected or damaged. Disassemble the T2400CS/T2400CT as described in chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1 Make sure the keyboard cable is not damaged and is connected to the upper system board.



If this cable is damaged, replace the cable with a new one. If the cable is disconnected, firmly connect it. Perform Procedure 1 again. If the keyboard is still not functioning properly, perform Check 2.

Check 2 The keyboard controller on the upper system board may be damaged. Replace the upper system board with a new one. Refer to chapter 4, *Replacement Procedures* for more information. If the keyboard is still not functioning properly, replace the lower system board.

2.8 Display Troubleshooting

This section describes how to determine if the T2400CS/T2400CT's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

- Procedure 1: Contrast Control Check (T2400CS only)
- Procedure 2: External CRT Check
- Procedure 3: Diagnostic Test Program Execution Check
- Procedure 4: Connector Check
- Procedure 5: Replacement Check

Procedure 1 Contrast Control Check (T2400CS only)

Contrast is changed by the contrast dial. If the contrast does not change when you turn the contrast dial, perform Procedure 2.

Procedure 2 External CRT Check

Connect the external CRT to the T2400CS/T2400CT's external monitor port, then boot the computer. The computer automatically detects the external CRT even if Resume mode is enabled.

If the external CRT works correctly, the internal LCD display may be damaged. Go to Procedure 4.

If the external CRT appears to have the same problem as the internal LCD, the display controller may be damaged. Go to Procedure 3.

Procedure 3 Diagnostic Test Program Execution Check

The Display Test program is stored on the T2400CS/T2400CT Diagnostic Disk. This program checks the display controller on the system board. After loading Toshiba MS-DOS, run the Diagnostic Program. Refer to chapter 3, *Tests and Diagnostics*, for details.

If an error is detected, go to Procedure 4. If an error is not detected, the display is functioning properly.

Procedure 4 Connector Check

The Display unit has an LCD module, FL, Display switch, and FL inverter board. The FL and FL inverter board are connected by two cables. The LCD module and system board are connected by two signal cables as shown below. Any of these cables may be disconnected.

Disassemble the display unit and check the following cable connections. Refer to chapter 4, *Replacement Procedures*, for more information about how to disassemble the computer.

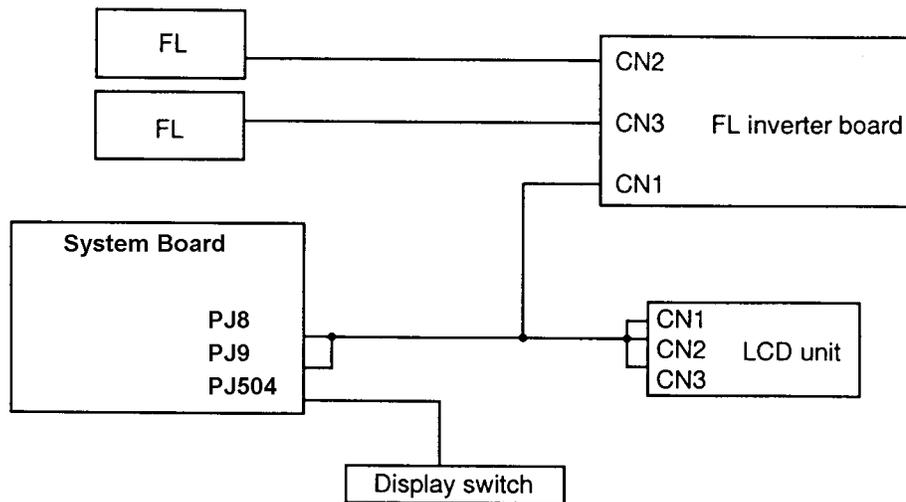


Figure 2-3 T2400CS display connection

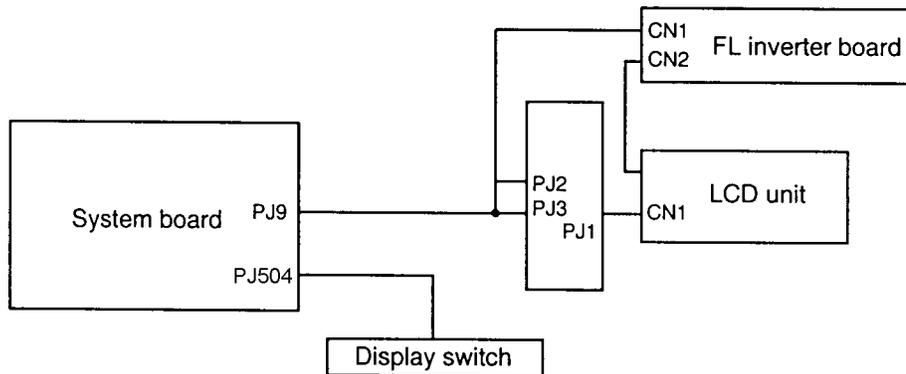


Figure 2-4 T2400CT display connection

If any of these cables is not connected, firmly reconnect it and repeat Procedures 1 and 2. If the problem still exists, perform Procedure 5.

Procedure 5 Replacement Check

The FL, FL inverter board, LCD module, and system boards are connected to the display circuits. Any of these components may be damaged. Refer to chapter 4, *Replacement Procedures*, for instructions on how to disassemble the computer and then perform the following checks:

If the FL does not light, perform Check 1.

If characters are not displayed clearly, perform Check 3.

If some screen functions do not operate properly, perform Check 3.

If the FL remains lit when the display is closed, perform Check 4.

- Check 1 Replace the FL with a new one and test the display again. If the problem still exists, perform Check 2.
- Check 2 Replace the FL inverter board with a new one and test the display again. If the problem still exists, perform Check 3.
- Check 3 Replace the LCD module with a new one and test the display again. If the problem still exists, perform Check 4.
- Check 4 Replace the display switch with a new one and test the display again. If the problem still exists, perform Check 5.
- Check 5 Replace the display cable with a new one and test the display again. If the problem still exists, perform Check 6.
- Check 6 The upper system board may be damaged. Replace the upper system board with a new one and test the display again. If the problem still exists, perform Check 7.
- Check 7 The lower system board may be damaged. Replace the lower system board with a new one.

3.1 The Diagnostic Test

This chapter explains how to use the T2400CS/T2400CT's Diagnostic Test program (TEST2400) to test the functions of the T2400CS/T2400CT's hardware modules. The Diagnostics Program is stored on the T2400CS/T2400CT Diagnostic Disk. The Diagnostic Test consists of 20 programs that are grouped into the Service Program Module (DIAGNOSTIC TEST MENU) and the Test Program Module (DIAGNOSTIC TEST).

The DIAGNOSTIC TEST MENU consists of the following eight functions. These are all located within the Diagnostic test function of the DIAGNOSTIC TEST MENU.

- DIAGNOSTIC TEST
- HARD DISK FORMAT
- HEAD CLEANING
- LOG UTILITIES
- RUNNING TEST
- FDD UTILITIES
- SYSTEM CONFIGURATION
- SETUP

The DIAGNOSTIC TEST MENU contains the following twelve functional tests:

- SYSTEM TEST
- MEMORY TEST
- KEYBOARD TEST
- DISPLAY TEST
- FLOPPY DISK TEST
- PRINTER TEST
- ASYNC TEST
- HARD DISK TEST
- REAL TIMER TEST
- NDP TEST
- EXPANSION TEST
- SOUND TEST

You will need the following equipment to perform some of the T2400CS/T2400CT Diagnostic test programs.

- The T2400CS/T2400CT Diagnostics Disk (all tests)
- A formatted working disk for the floppy disk drive test (all tests)
- 3.5-inch 2HD/2DD disk for internal 3.5-inch FDD
- A cleaning kit to clean the floppy disk drive heads (Head Cleaning)
- A PCMCIA wraparound connector for the I/O card test (PCMCIA test)
- A printer wraparound connector for the printer wraparound test (Printer test)
- An RS-232C wraparound connector for the RS-232C port wraparound test (ASYNC test)
- JOYSTICK wraparound

The following sections detail the tests within the Diagnostic Test function of the DIAGNOSTIC TEST MENU. Refer to Sections 3.17 through 3.23 for detailed information on the remaining seven Service Program Module functions.

3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the T2400CS/T2400CT DIAGNOSTICS PROGRAM. To start the DIAGNOSTIC PROGRAM follow these steps:

1. Turn on the computer, and allow the computer to boot. Insert the T2400CS/T2400CT Diagnostics disk in the computer's internal floppy disk drive.
2. At the system prompt, change to drive A and type **TEST2400**, and press **Enter**.

The following menu will appear:

```
TOSHIBA personal computer T2400 DIAGNOSTICS
version X.XX (c) copyright TOSHIBA Corp. 19XX
```

```
DIAGNOSTICS MENU :
```

```
1 - DIAGNOSTIC TEST
2 - HARD DISK FORMAT
3 -
4 - HEAD CLEANING
5 - LOG UTILITIES
6 - RUNNING TEST
7 - FDD UTILITIES
8 - SYSTEM CONFIGURATION
9 - EXIT TO MS-DOS
0 - SETUP
```

```
↑↓→←      :      Select items
Enter      :      Specify
Esc        :      Exit
```

NOTE: To exit the T2400CS/T2400CT DIAGNOSTIC TEST MENU, press the **Esc** key. If a test program is in progress, press **Ctrl + Break** to exit the test program. If a test program is in progress, press **Ctrl + C** to stop the test program.

- To execute the DIAGNOSTIC TEST MENU from the DIAGNOSTICS MENU, set the highlight bar to **1**, and press **Enter**. The following DIAGNOSTIC TEST MENU will appear:

```

TOSHIBA personal computer T2400 DIAGNOSTICS
version X.XX (c) copyright TOSHIBA Corp. 19XX
DIAGNOSTIC TEST MENU :
1 - SYSTEM TEST
2 - MEMORY TEST
3 - KEYBOARD TEST
4 - DISPLAY TEST
5 - FLOPPY DISK TEST
6 - PRINTER TEST
7 - ASYNC TEST
8 - HARD DISK TEST
9 - REAL TIMER TEST
10 - NDP TEST
11 - EXPANSION TEST
12 - SOUND TEST

88 - ERROR RETRY COUNT SET [HDD & FDD]
99 - EXIT TO DIAGNOSTICS MENU
      ↑↓→←      :      Select items
      Enter      :      Specify
      Esc        :      Exit

```

Refer to sections 3.4 through 3.15 for detailed descriptions of each Diagnostic Test 1 through 12. Function 88 sets the floppy disk drive and hard disk drive error retry count. Function 99 exits the submenus of the Diagnostic Test and returns to the Diagnostic Menu.

- Select the option you want to execute and press **Enter**. The following message will appear:

```

SYSTEM TEST      XXXXXXXX

```

```

T2400 DIAGNOSTIC TEST VX.XX
[Ctrl]+[Break] ; test end
[Ctrl]+[C]      ; key stop

```

```

SUB-TEST : XX
PASS COUNT: XXXXX ERROR COUNT: XXXXX
WRITE DATA: XX READ DATA : XX
ADDRESS : XXXXXX STATUS : XXX

SUB-TEST MENU :

01 - ROM checksum
02 - HW status
03 - Version check
99 - Exit to DIAGNOSTIC TEST MENU
      ↑↓→←      :      Select items
      Enter      :      Specify
      Esc        :      Exit

```

NOTE: The menu displayed by your T2400CS/T2400CT may be slightly different from the one shown above.

5. Select the desired subtest number from the subtest menu and press **Enter**.
The following message will appear:

```
TEST LOOP : YES
```

Selecting **YES** increases the pass counter by one, each time the test cycle ends and restarts the test cycle.

Selecting **NO** returns the subtest menu to the main menu after the test is complete.

6. The following message will appear:

```
ERROR STOP : YES
```

Then, use the left or right arrow keys to move the cursor to the desired option and press **Enter**.

Selecting **YES** stops the test program when an error is found and displays the operation guide on the right side of the display screen as shown below:

```
ERROR STATUS NAME  [[ HALT OPERATION  ]]  
  
1: Test end  
2: Continue  
3: Retry
```

These three selections have the following functions:

- 1: Terminates the test program and exits to the subtest menu.
- 2: Continues the test.
- 3: Restarts the test from the error.

Selecting **NO** keeps the test running even if an error is found.

7. Use the arrow keys to move the cursor to the desired option and press **Enter**.

Table 3-1 in section 3.3 describes the function of each test on the subtest menu.
Table 3-3 in section 3.16 describes the error codes and error status for each error.

3.3 Subtest Names

Table 3-1 lists the subtest names for each test program in the DIAGNOSTIC TEST MENU.

Table 3-1 Subtest names (1/2)

No.	Test name	Subtest No.	Subtest item
1	SYSTEM	01	ROM checksum
		02	H/W status
		03	Version check
2	MEMORY	01	RAM constant data
		02	RAM address pattern data
		03	RAM refresh
		04	Protected mode
		05	Memory module
		06	Cache memory
3	KEYBOARD	01	Pressed key display (82/84)
		02	Pressed key code display
		03	PS/2 Mouse connect check
		04	Pointing stick check
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80*25/30 Character display
		05	320*200 Graphics display
		06	640*200 Graphics display
		07	640*350/400/480 Graphics display
		08	Display page
		09	"H" pattern display/Border color
		10	LED/DAC pallet
		11	TFT color display
		12	SVGA color graphics display
5	FDD	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address
6	PRINTER	01	Ripple pattern
		02	Function
		03	Wraparound

Table 3-1 Subtest names (2/2)

No.	Test name	Subtest No.	Subtest item
7	ASYNC	01	Wraparound (board)
		02	Board (#1) <=> board (#2)
		03	Point to point (send)
		04	Point to point (receive)
		05	Interrupt test
8	HDD	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		05	Write/read/compare (CE)
		06	Write specified address
		07	Read specified address
		08	ECC circuit
		09	Sequential write
		10	W-R-C specified address
9	REAL TIMER	01	Real time
		02	Backup memory
		03	Real time carry
10	NDP	01	NDP test
11	EXPANSION	01	PCMCIA wraparound
		02	SCSI wraparound
12	SOUND	01	CODEC (REC/PLAY)
		02	FM synthesizer
		03	SINE wave play back

3.4 System Test

To execute the System Test select **1** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 ROM checksum

The ROM checksum tests the system board from address F0000h to FFFFFh (64KB).

Subtest 02 H/W status

This test reads and displays the hardware status as shown below:

```

                                76543210
H/W status =                   10001000

Bit7 -                          =
Bit6 - CPU clock                 =    25MHz
Bit5 - Notch signal=            2HD
Bit4 - FDD type                 =    2MB
Bit3 -                          =
Bit2 - Drive A/B                =    Ext. = B
Bit1 - External FDD=           OFF
Bit0 - Internal FDD=           2HD

```

Table 3-2 describes the hardware bit status for each bit tested. Pressing **Enter** returns you to the Sub-Test Menu.

Table 3-2 Hardware bit status

Bit	H/W status	1	0
7	Reserved	—	—
6	CPU clock speed	25 MHz	25 MHz
5	Media type	2DD	2HD
4	FDD type	1.6 MB	2 MB
3	Reserved	—	—
2	Drive A/B	Ext. = A	Ext. = B
1	External FDD	ON	OFF
0	Internal FDD	2DD	2HD

3.5 Memory Test

To execute the Memory Test, select **2** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 RAM constant data (real mode)

This subtest writes a 256-byte unit of constant data to conventional memory (0 to 640 KB). Then reads the new data and compares the result with the original data. The constant data is FFFFh, AAAAh, 5555h, and 0000h.

Subtest 02 RAM address pattern data (real mode)

This subtest writes address pattern data created by the exclusive-ORing ((XORing), to the address segment and address offset in conventional memory program end to 640 KB), then reads the new data and compares the result with the original data.

Subtest 03 RAM refresh (real mode)

This subtest writes a 256-byte unit of constant data to conventional memory (0 to 640 KB) then reads the new data and compares the result with the original data.

The constant data is AAAAh and 5555h.

NOTE: *There is a short delay between write and read operations, depending on the size of the data.*

Subtest 04 Protected mode

NOTE: *The CONFIG.SYS file must be configured without expanded memory manager programs such as EMM386.EXE, EMM386.SYS or QEMM386.SYS. Also, the HIMEM.SYS must be deleted from the CONFIG.SYS file.*

This subtest writes constant data and address data to extended memory (maximum address 100000h) then reads new data and compares the result with the original data.

The constant data is FFh, AAh, 55h, and 00h.

Subtest 05 Memory module

NOTE: *To execute this subtest, an optional memory card must be installed in the computer.*

This subtest functions the same as subtest 04, except it is used for testing an optional memory card. Memory module capacity is 4 MB, 8 MB, and 16 MB.

After selecting subtest 05, the following message will appear:

Extended memory size (1:4 MB, 2:8 MB, 3:16 MB) ?

Select the number that corresponds to the memory card installed in the T2400CS/T2400CT.

Subtest 06 Cache memory

To test the cache memory, a pass-through write-read comparison of '5A' data is run repeatedly to test area ('7000':'Program' size to '7000':=7FFF' (32 KB)) to check the hit-miss ratio (on/off status). One test takes 3 seconds.

Number of miss hit < Number of hit → OK
Number of miss hit ≥ Number of hit → Fail

3.6 Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Keyboard test contains two subtests that test the T2400CS/T2400CT's keyboard actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Pressed key display (82/84)

***NOTE:** The Num Lock and the Overlay mode must be off to execute this subtest.*

When you execute this subtest, the keyboard layout is drawn on the display as shown below. When any key is pressed, the corresponding key on the screen changes to an "*" character. Holding a key down enables the auto-repeat function which causes the key's display character to blink.

KEYBOARD TEST IN PROGRESS 301000

```

■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
  ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ ■           ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
```

```
PrtSc      :      [Alt] + [SysReq]
Pause      :      [Ctrl]+[Break] to test end
```

If test OK, Press [Del] then [Enter] Key

Subtest 02 Pressed key code display

When a key is pressed, the scan code, character code, and key top name are displayed on the screen in the format shown below. The **Ins**, **Caps Lock**, **Num Lock**, **Scroll Lock**, **Alt**, **Ctrl**, **Left Shift**, and **Right Shift** keys are displayed in reverse screen mode when pressed. The scan codes, character codes, and key top names are shown in Appendix D.

```
KEYBOARD TEST  IN PROGRESS  302000

          Scan code          =
          Character code     =
          Keytop             =

Ins Lock Caps Lock Num Lock  Scroll Lock
Alt  Ctrl  Left Shift Right Shift

PRESS [Enter] KEY
```

Subtest 03 PS/2 mouse connect check

***NOTE:** To execute the PS/2 mouse connect check, a PS/2 mouse must be connected to the computer.*

This subtest checks whether a PS/2 mouse is connected or not.

If this test does not detect an error, it returns to the subtest menu.

If this test detects an error, the following message appears:

```
KBD - MOUSE INTERFACE ERROR

[[ HALT OPERATION ]]

1: Test end
2: Continue
3: Retry
```

Subtest 04 Pointing Stick Check

***NOTE:** To execute the pointing stick check, a mouse driver software must be installed to the system.*

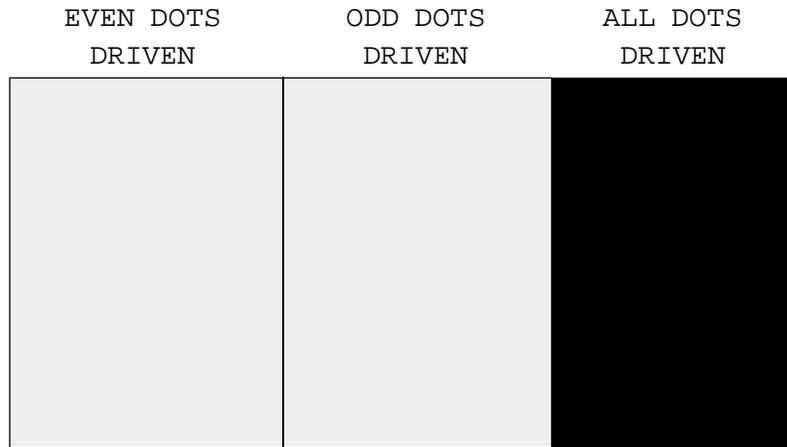
This subtest checks function of the pointing stick.

If this test does not detect an error, it returns to the subtest menu.

Subtest 06 640x200 Graphics Display (mode 6, E)

This subtest displays even dots, odd dots, and all dots in the 640x200 dot graphics mode 6 and E as shown below:

640*200 GRAPHICS DISPLAY : [X]



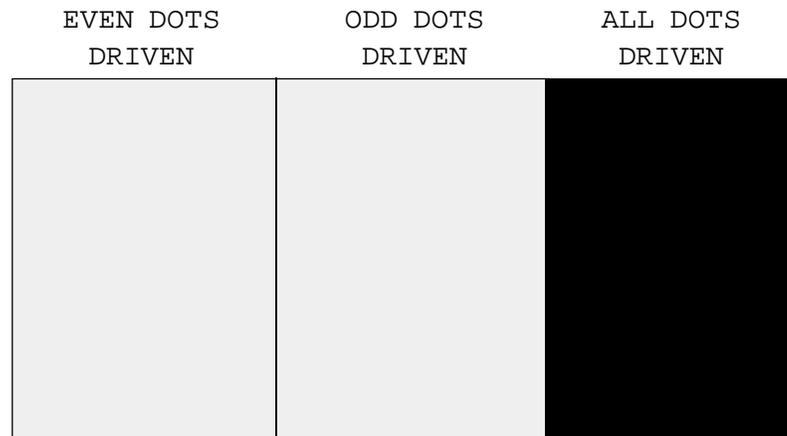
PRESS [Enter] KEY

To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

Subtest 07 640x350/400/480 Graphics Display (mode 10, 74, 12)

This subtest displays even dots, odd dots, and all dots in the 640x350, 640x400 and 640x480 dot graphics mode 10, 74, 12 as shown below:

640*XXX GRAPHICS DISPLAY



PRESS [Enter] KEY

Pressing **Enter** changes the size of the displayed image. To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

Subtest 10 LED/DAC Pallet

This subtest checks the LED indicator (Caps Lock, Overlay and Num Lock) by key operation.

```
[ Caps/Num/Overlay LED test ]
```

- (1) Press [Caps Lock] key !...Caps (on/off)
- (2) Press [Fn + Num Lock] key !...Num (on/off)
- (3) Press [Fn] key !...Overlay(on/off)

```
PRESS [Enter] KEY
```

Press **Enter** to display the following two messages:

After pressing **Enter**, it writes the '2A' and '15' data to 6 bit of 256x3 (RGB), then reads new data and compares the result with original data.

```
[ DAC pallet W-R-CMP test ] = (about 1 seconds)
```

```
[ Processor latch test ] =
```

```
Processor latch test (1:256 times, 2:endless) ?
```

To exit, press **Ctrl + Break**. Then press **Enter**.

Subtest 11 TFT color display (T2400CT only)

This subtest sets the video mode to '13,' and displays color code (0 to 63) at the same time, then displays seven screens. The first shows many colors at once, the next three display 64 shades of red, green, and blue successively and the last three display 64 shades of red, green and blue. Also, it sets the video mode to '5F,' and displays 256 colors.

Press **Enter** to change the display. Press **Ctrl + Break** to exit.

Subtest 12 SVGA color graphics display (T2400CS/T2400CT)

***NOTE:** To execute this subtest, the external SVGA display must be connected and the power on display option in SETUP must be set to Internal/External.*

This subtest displays seven screens.

Press **Enter** to change the display. Press **Ctrl + Break** to exit.

3.8 Floppy Disk Test

CAUTION: Before running the floppy disk test, prepare a formatted work disk. Remove the Diagnostics Disk and insert a work disk into the FDD. The contents of the floppy disk will be erased.

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Floppy Disk test contains five subtests that test the T2400CS/T2400CT's internal floppy disk drive. The following messages will appear after selecting the Floppy Disk Test from the DIAGNOSTIC TEST MENU. Answer each question with an appropriate response to execute the test.

1. Select the test drive number of the floppy disk drive to be tested and press **Enter**.

```
Test drive number select (1:FDD#1,2:FDD#2,0:FDD1&2)?
```

2. Select the media type of the floppy disk in the test drive to be tested, and press **Enter**.

```
Media in drive #X mode (0:2DD,1:2D,2:2D-2HD/2DD,3:2HD)?
```

3. Select the track you want the test to start on and press **Enter**. Simply pressing **Enter** sets the start track to zero.

```
Test start track (Enter:0/dd:00-79)?
```

4. The floppy disk test menu will appear after you select the start track number. Select the number of the subtest you want to execute and press **Enter**. The following message will appear during the floppy disk test.

```
FLOPPY DISK          XXXXXXXX
```

```
T2400 DIAGNOSTIC TEST VX.XX
[Ctrl]+[Break] ; test end
[Ctrl]+[C]      ; key stop
```

```
SUB-TEST : XX
PASS COUNT: XXXXX  ERROR COUNT: XXXXX
WRITE DATA: XX  READ DATA : XX
ADDRESS : XXXXXX STATUS : XXX
```

The first three digits in the ADDRESS number indicate which cylinder is being tested. The fourth digit indicates the head, and the last two digits indicate the sector being tested.

The first digit in the STATUS number indicates the drive being tested and the last two digits indicate the error status code as explained in table 3-3.

Subtest 01 Sequential Read

This subtest performs a Cyclic Redundancy Check (CRC), that continuously reads all the tracks on a floppy disk. The following tracks are read according to the media type in the floppy disk drive:

Double-sided, double-density (2D): Tracks 0 to 39.

Double-sided, double-density, double-track (2DD) and double-sided, high-density, double-track (2HD): Tracks 0 to 79.

The start track is specified when the FDD test is started from the Diagnostic Test Menu. Refer to step 3 at the beginning of this section to set the start track.

Subtest 02 Sequential Read/Write

This subtest continuously writes data pattern B5ADADh to all the specified tracks selected in subtest 01. The data is then read and compared to the original data.

Subtest 03 Random Address/Data

This subtest writes random data to random addresses on all tracks defined in subtest 01. The data is then read and compared to the original data.

Subtest 04 Write Specified Address

This subtest writes specified data to a specified track, head, and address.

Subtest 05 Read Specified Address

This subtest reads data from a specified track, head, and address.

3.9 Printer Test

To execute the Printer Test, select **6** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Printer Test contains three subtests that test the output of the printer connected to the T2400CS/T2400CT. The following messages will appear after selecting the Printer Test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test.

***NOTE:** An IBM compatible printer must be connected to the system to execute this test.*

The following message will appear when the printer test is selected:

```
channel#1 = XXXXh
channel#2 = XXXXh
channel#3 = XXXXh
Select the channel number (1-3) ?
```

The printer I/O port address is specified by the XXXXh number. The T2400CS/T2400CT supports three printer channels. Select the printer channel number, and press **Enter** to execute the selected subtest.

Subtest 01 Ripple Pattern

This subtest prints characters for codes 20h through 7Eh line-by-line while shifting one character to the left at the beginning of each new line.

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
```

Subtest 02 Function

This subtest is for IBM compatible printers, and tests the following functions:

- Normal print
- Double width print
- Compressed print
- Emphasized print
- Double strike print
- All characters print

This subtests prints the various print types shown below:

```
PRINTER TEST
1.      THIS LINE SHOWS NORMAL PRINT.
2.      THIS LINE SHOWS DOUBLE-WIDTH PRINT.
3.      THIS LINE SHOWS COMPRESSED PRINT.
4.      THIS LINE SHOWS EMPHASIZED PRINT.
5.      THIS LINE SHOWS DOUBLE-STRIKE PRINT.
6.      ALL CHARACTERS PRINT
! "# $ % & ' ( ) * + , . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n
o p q r s t u v w x y z { | } ~
```

Subtest 03 Wraparound

NOTE: To execute this subtest, a printer wraparound connector must be connected to the computer's printer port. The printer wraparound connector (34M741986G01) wiring diagram is described in Appendix G.

This subtest checks the output and bidirectional modes of the data control and status lines through the printer wraparound connector.

3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The async test contains six subtests that test the T2400CS/T2400CT's asynchronous communication functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtests 01 through 04 require the following data format:

Method:	Asynchronous
Speed:	9600BPS
Data:	8 bits and one parity bit (EVEN)
Data pattern:	20h to 7Eh

The following message will appear at the bottom of the screen when subtests 01, 03, 04, and 05 are selected:

```
Channel#1 = XXXXh
Channel#2 = XXXXh
Channel#3 = XXXXh
Select the Channel number (1/2/3)
```

The serial I/O port address is specified by the XXXXh number. Select the serial port channel number, and press **Enter** to start the subtest.

Subtest 01 Wraparound (board)

NOTE: To execute this subtest an RS-232C wraparound connector (34M741621G01) must be connected to the RS-232C port. The RS-232C wraparound connector wiring diagram is described in Appendix G.

This subtest checks the data send/receive function through the wraparound connector.

Subtest 02 Board (#1) <=> board (#2)

NOTE: To execute this subtest, an RS-232C cable (9-pin to 9-pin) must be connected to boards 1 and 2. The RS-232C direct cable wiring diagram is described in Appendix G.

This subtest checks the data send/receive function through the RS-232C direct cable.

Subtest 03 Point to point (Send)

***NOTE:** To execute this subtest, two machines must be connected with an RS-232C direct cable. One machine should be set as “send”(subtest 03) and the other set as ‘receive’ (subtest 04). The wiring diagram for the RS-232C direct cable is described in Appendix G.*

This subtest sends 20h through 7Eh data to the receive side, then receives the sent data and compares it to the original data.

Subtest 04 Point to point (Receive)

This subtest is used with subtest 03 described above. This subtest receives the data from the send side, then sends the received data.

Subtest 05 Interrupt Test

This subtest checks the Interrupt Request Level of IRQ 4, 3 and 5 from the send side.

3.11 Hard Disk Test

To execute the Hard Disk Test, select **8** from the DIAGNOSTIC TEST MENU. Press **Enter**, and follow the directions displayed on the screen. The hard disk test contains 10 subtests that test the T2400CS/T2400CT hard disk drive functions. The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test:

CAUTION: *The contents of the hard disk will be erased when subtest 02, 03, 04, 05, 06, 08, 09, or 10 is executed. Before running the test, transfer the contents of the hard disk to a floppy disk(s). This can be done with the Toshiba MS-DOS BACKUP command.*

After the hard disk test is completed, execute the Toshiba MS-DOS FDISK command, which will set the partition. Then execute the Toshiba MS-DOS FORMAT command. Refer to the Toshiba MS-DOS manual for details.

1. When you select the hard disk test from the DIAGNOSTIC TEST MENU, the following message will appear:

Test drive number select (1:HDD#1,2:HDD#2,0:HDD1&2)?

2. Select the hard disk drive number to be tested and press **Enter**. The following message will appear:

HDC F/W error retry (1:yes,2:no)?

3. This message is used to select the retry operation when the hard disk controller detects an error. Select **1** or **2** and press **Enter**. The following message will appear:

Data compare error dump (1:no,2:yes)?

4. This message is used to select the error dump operation when a data compare error is detected. Select **1** or **2** and press **Enter**. The following message will appear:

Detail status display (1:no,2:yes)?

5. This message is used to select whether or not the HDD status is displayed on the screen. The HDD status is described in section 3.16. Select **1** or **2** and press **Enter**.

6. The Hard Disk Test message will appear after you respond to the Detail Status prompt. Select the number of the subtest you want to execute and press **Enter**. The following message will appear during each subtest.

```
HARD DISK TEST      XXXXXXXX

SUB-TEST : XX
PASS COUNT: XXXXX  ERROR COUNT: XXXXX
WRITE DATA: XX  READ DATA : XX
ADDRESS : XXXXXXX STATUS : XXX
```

The first three digits of the ADDRESS indicate which cylinder is being tested, the fourth digit indicates the head and the last two digits indicate the sector.

The first digit of the STATUS number indicates the drive being tested and the last two digits indicate the error status code as explained in table 3-3.

Subtest 01 Sequential Read

This subtest is a sequential reading of all the tracks on the HDD starting at track 0. When all the tracks on the HDD have been read, the test starts at the maximum track and reads the tracks on the HDD sequentially back to track 0.

Subtest 02 Address Uniqueness

This subtest writes unique address data to each sector of the HDD track-by-track. The data written to each sector is then read and compared with the original data. There are three ways the HDD can be read:

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address/Data

This subtest writes random data to random addresses on the HDD cylinder, head and sector. This data is then read and compared to the original data.

Subtest 04 Cross Talk & Peak Shift

This subtest writes eight types of worst pattern data (shown below) to a cylinder, then reads the data while moving from cylinder to cylinder.

Worst pattern data	Cylinder
'B5ADAD'	0 cylinder
'4A5252'	1 cylinder
'EB6DB6'	2 cylinder
'149249'	3 cylinder
'63B63B'	4 cylinder
'9C49C4'	5 cylinder
'2DB6DB'	6 cylinder
'D24924'	7 cylinder

Subtest 05 Write /read/compare (CE)

This subtest writes B5ADADh worst pattern data to the CE cylinder on the HDD, then reads the data from the CE cylinder and compares it with the original data.

Subtest 06 Write specified address

This subtest writes specified data to a specified cylinder and head on the HDD.

Subtest 07 Read specified address

This subtest reads data which has been written to a specified cylinder and head on the HDD.

Subtest 08 ECC circuit

This subtest checks the Error Check and Correction (ECC) circuit functions of the specified cylinder and head on the HDD.

Subtest 09 Sequential write

This subtest writes specified 2-byte data to all of the cylinders on the HDD.

Subtest 10 W-R-C specified address

This subtest writes data to a specified cylinder and head on the HDD, then reads the data and compares it to the original data.

3.12 Real Timer Test

To execute the Real Timer Test, select **9** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. The real timer test contains three subtests that test the T2400CS/T2400CT's real timer functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Real Time

A new date and time can be input during this subtest. To execute the real time subtest follow these steps:

1. Select subtest 01 and the following message will appear:

```
Current date : XX-XX-XXXX
Current time : XX:XX:XX
```

Enter new date:

```
PRESS [ENTER] KEY TO EXIT TEST
```

2. If the current date is not correct, input the correct date at the "Enter new date" prompt and press **Enter**. The following prompt will appear:

```
Enter new time :
```

3. If the current time is not correct, input the correct time in 24-hour format.

Pressing **Enter** toggles between the time and the date. To exit, press **Ctrl + Break**.

Subtest 02 Backup Memory

This subtest performs the following backup memory check:

```
Writes 1-bit of "on" data to address 01h through 80h
Writes 1-bit of "off" data to address 0Eh through 80h
Writes the data pattern AAh through 55h to the RTC 114-byte memory
(address 0Eh to 7Fh)
```

Then the subtest reads and compares this data with the original data.

To exit, press **Ctrl + Break**.

CAUTION: *When this subtest is executed, the current date and time are erased.*

This subtest checks the real time clock increments, making sure the date and time are displayed in the following format:

```
Current date :    12-31-1992
Current time  :    23:59:58
```

Pressing **Enter** displays the following

```
Current date :    01-01-1993
Current time  :    00:00:00
```

```
PRESS [Enter] KEY TO EXIT TEST
```

Press **Ctrl + Break** to exit.

3.13 NDP Test

To execute the NDP test, select **10** from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen. The NDP test contains one subtest that tests the T2400CS/T2400CT's NDP functions.

Subtest 01 NDP

This test checks the following function of NDP:

- Control word
- Status word
- Bus
- Addition
- Multiplication

Press **Ctrl + Break** to exit.

3.14 Expansion Test

NOTE: To execute this subtest, the PCMCIA wraparound card is required.

Subtest 01 PCMCIA wraparound

This test checks the following signal line of the PCMCIA slot:

- Address line
- REG#, CE#1, CE#2 line
- Data line
- Speaker line
- Wait line
- BSY#, BVD1 line

This subtest is executed in the following order:

Sub#	Address	Good	Bad	Contents
01	00001 00001	nn nn	xx xx	Address line REG#, CE#1, CE#2 nn=A0, 90, 80, 00
02	00002	ww	rr	Data line ww=write data, rr=read data
03	00003	—	—	Speaker line
04	00004	40, 80	xx	Wait line (40<xx<80)
05	00005	nn	xx	Other lines (BSY#, BVD1) nn=21, 00

Subtest 02 SCSI wraparound

This test reads the 0 cylinder of HDD.

3.15 Sound Test

To execute the sound test, select **12** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions on the screen. The sound test contains five subtests that test the T2400CS/T2400CT's sound functions.

Subtest 01 CODEC (REC/PLAY)

NOTE: To execute this subtest, the internal microphone and internal headphone (or internal speaker) are required.

Test the functions of the Codec (ES688) A/D, D/A converter. At the same time, test the microphone terminals and Headphone terminals. When you execute this subtest the following message is displayed.

```
[Quick REC & PLAY for ES488/688]
Press any key to *** REC ***
```

After pressing any key, start the recording and immediately play the sound. (It takes three seconds.)

Subtest 02 FM Synthesizer

Test the OPL# (YMF262) functions. Connect the headphone, and check the scale of right and left side. Also check the sound adjustment volume.

Subtest 03 SINE wave playback

This subtest expands the sine wave data table to 64KB and creates sine wave data. The play data is transferred between DMA and CODEC, and plays the sound. (It is a long beep.) Also, using the oscilloscope, observe the sine wave form.

3.16 Error Code and Error Status Names

Table 3-3 lists the error codes and error status names for the Diagnostic Test.

Table 3-3 Error codes and error status names (1/2)

Device name	Error code	Error status name
(COMMON)	FF	Data Compare Error
SYSTEM	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	14	Memory Read/Write Error
	DD	Cache Memory Error
Keyboard	01	Mouse Interface Error
	02	IPS Interface Error
	03	Interface Error
	04	Retransmit Error
	05	Mouse Handler Not Supported
	06	PS/2 Mouse & IPS Not
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive Error
	80	Time Out Error
EE	Write Buffer Error	
Printer	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line
ASYNC	01	DSR On Time Out
	02	CTS On Time Out
	04	RX-READY Time Out
	08	TX-BUFFER Full Time Out
	10	Parity Error

Table 3-3 Error codes and error status names (2/2)

Device name	Error code	Error status name
ASYNC (cont.)	20	Framing Error
	40	Overflow Error
	80	Line Status Error
	88	Modem Status Error
	33	No Carrier (Card Modem)
	34	Error (Card Modem)
	36	No Dial Tone (Card Modem)
HDD	01	Bad Command Error
	02	Bad Address Mark Error
	04	Record Not Found
	05	HDC Not Reset Error
	07	Drive Not Initialized
	08	HDC Overflow (DRQ)
	09	DMA Boundary Error
	0A	Bad Sector
	0B	Bad Track Error
	10	ECC Error
	11	ECC Recover Enable
	20	HDC Error
	40	Seek Error
	80	Time Out Error
	AA	Drive Not Ready
	BB	Undefined Error
	CC	Write Fault
E0	Status Error	
EE	Access Time Out Error	
NDP	01	No Co-Processor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiply Error
PCMCIA	C1	Address Line Error
	C2	REG# Line Error
	C3	CE#1 Line Error
	C4	CE#2 Line Error
	C5	DATA Line Error
	C6	WAIT Line Error
	C7	BSY# Line Error
	C8	BVD1 Line Error
	CD	No PCMCIA

3.17 Hard Disk Test Detail Status

When an error occurs in the hard disk test, the following message is displayed:

```
HDC status = XXXXXXXX
```

Detailed information about the hard disk test error is displayed on the screen by an eight-digit number. The first four digits represent the hard disk controller (HDC) error status number and the last four digits are not used.

The hard disk controller error status is composed of 2 bytes; the first byte displays the contents of the HDC status register in hexadecimal form and the second byte displays the HDC error register.

The contents of the HDC status register and error register are described in tables 3-4 and 3-5.

Table 3-4 Hard disk controller status register contents

Bit	Name	Description
7	BSY (Busy)	"0" --- HDC is busy. "1" --- HDC is ready.
6	DRDY (Drive ready)	"0" --- Hard disk drive is not ready to accept any command. "1" --- Hard disk drive is ready.
5	DWF (Drive write fault)	"0" --- DWF error is not detected. "1" --- Write fault condition occurred.
4	DSC (Drive seek complete)	"0" --- The hard disk drive heads are not settled over a track. "1" --- The hard disk drive heads are settled over a track.
3	DRQ (Data request)	"0" --- Drive is not ready for data transfer. "1" --- Drive is ready for data transfer.
2	CORR (Corrected data)	"0" --- Other "1" --- Correctable data error is corrected.
1	IDX (Index)	"0" --- Other "1" --- Index is sensed.
0	ERR (Error)	"0" --- Other "1" --- The previous command was terminated with some error.

Table 3-5 Error register contents

Bit	Name	Description
7	BBK1 (Bad block mark)	"0" Other "1" A bad block mark is detected.
6	UNC (Uncorrectable)	"0" There is no uncorrectable data error. "1" Uncorrectable data error has been detected.
5	—	Not used
4	IDNF (Identification)	"0" Other "1" There was no ID field in the requested sector.
3	—	Not used
2	ABRT (Abort)	"0" Other "1" Illegal command error or a drive status error occurred.
1	TK00 (Track 0)	"0" The hard disk has found track 0 during a recalibrate command. "1" The hard disk could not find track 0 during a recalibrate command.
0	—	Not used.

3.18 Hard Disk Format

This command executes hard disk formatting. There are two types of hard-disk formatting:

- Low-level (physical) formatting
- MS-DOS (logical) formatting

This hard disk format function performs a low-level format of the hard disk and executes the following hard disk formats and check:

1. All track FORMAT
2. Good track FORMAT
3. Bad track FORMAT
4. Bad track CHECK

CAUTION: *The contents of the hard disk will be erased when this program is executed. Before executing the function, transfer the contents of the hard disk onto a floppy disk(s). This can be done with the Toshiba MS-DOS BACKUP command. See the Toshiba MS-DOS manual for details.*

3.18.1 Function Description

1. All track FORMAT

This option performs a low-level format of all the tracks on the hard disk as shown in Table 3-6 below:

NOTE: *Before executing the all track format option, check for bad tracks using the Bad Track CHECK option or display a list of bad tracks on the HDD.*

Table 3-6 Hard disk formatting sequence

	250 MB	320 MB	
	(MK2224FC)	(MK2326FC)	(IBM-H2344-A4)
Sector sequences	1	1	1
Cylinders	0 to 683	0 to 968	0 to 914
Heads	0 to 15	0 to 13	0 to 15
Sectors	1 to 38	1 to 49	1 to 49
Sector length (bps)	512	512	512

2. Good track FORMAT

This option formats a specified cylinder and track as a good track. If a good track is formatted as a bad track, use this option to change the track to a good track.

3. Bad track FORMAT

This option formats a specified cylinder and track as a bad track. If a bad track is detected, use this option to label it as a bad track.

4. Bad track CHECK

This option searches the hard disk for bad tracks by reading data to all the tracks on the hard disk. A list of bad tracks is displayed when the program is complete. If an error other than a bad track is detected, the program is automatically terminated.

3.18.2 Operations

***CAUTION:** After the HDD has been formatted, execute the Toshiba MS-DOS FDISK command, to partition the HDD. Next, execute the Toshiba MS-DOS FORMAT command. Refer to the Toshiba MS-DOS manual for more information about using these commands.*

Selecting TEST 2 and pressing **Enter** in the DIAGNOSTIC MENU, displays the following messages:

```
DIAGNOSTICS - HARD DISK FORMAT : VX.XX
```

```
1 - All track FORMAT
2 - Good track FORMAT
3 - Bad track FORMAT
4 - Bad track CHECK
9 - Go to TEST MENU
```

```
↑↓→←: Select items, Enter: Finish, Esc: Exit
```

1. All track FORMAT

Pressing 1 selects All track FORMAT, which lets you format the entire disk.

```
[All track FORMAT]

Drive      :      #1 = HDD   #2 = Non
Cylinder   :      XXXX
Head       :      XX
Sector     :      XX

<<< Model name = >>>
```

The following selections also appear at the bottom of the screen in succession:

```
Drive number select (1:#1,2:#2) ?
```

- (a) Select a drive number and press **Enter**. The following message will appear:

```
Interleave number (1/1 ~ 8) ?
```

- (b) Select an interleave number, 1 ~ 8 and press **Enter**. Pressing only **Enter** selects 1.

```
Unlock format select (1:no/2:yes)
```

- (c) Select whether the disk has an unlock format.

NOTE: This option appears only when an HDD manufactured by JVC is installed. For JVC HDDs, which are the only disks with unlock formats, you must select 2 (yes). If 1 is selected with a JVC disk, an error will be generated. The system defaults to 1 and this message does not appear when other disks are installed.

- (d) Bad track register

Next, the Bad Track register prompt will appear as shown below. Enter the cylinder and head numbers of bad tracks and press **Enter**. Note that if there are no bad tracks, pressing **Enter** alone is the same as executing All Track Format described in item (e) below.

```
[ WARNING : Current DISK data will be
           completely destroyed ]

Press Bad cylinder number (dddd)] key ?
Press Bad head number (dd)] key ?
```

Enter the cylinder and head number in the format above in decimal notation. Repeat for each bad track you want to format.

After entering the bad tracks, press **Enter** to execute the format.

(e) All track format

All tracks are formatted as good tracks except those registered as bad tracks in item (d) above or those identified as bad tracks in item (f) below.

(f) Track verification

A check is made of all tracks and if an ECC error, ECC-correctable-data error or record-not-found error is detected at a track, that track is automatically formatted as a bad track.

2. Good track FORMAT

If a good track has been erroneously formatted as a bad track, you can use this sub test to reformat the track as a good track. To format a track as a good track, enter the number for drive, interleave, cylinder, and head as indicated in the screen prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
Interleave number (1 / 1 - 8) ?
Press [Cylinder number (dddd)] ?
Press [Head number (dd)] ?
```

Press **Enter** to return to the Hard Disk Format menu.

3. Bad track FORMAT

To format a track as a bad track, enter the number for drive, interleave, cylinder, and head as indicated in the screen prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
Interleave number (1 / 1 - 8) ?
Press [Cylinder number (dddd)] ?
Press [Head number (dd)] ?
```

Press **Enter** to return to the Hard Disk Format menu.

4. Bad track CHECK

This subtest reads the entire disk and displays a list of bad tracks. The test is terminated in case of a bad track check error. To initiate the sub test enter the drive number at the prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
```

Bad tracks will be displayed in the format shown below.

```
[[cylinder, head = 0123 03]]
```

Press **Enter** to return to the Hard Disk Format menu.

3.19 Head Cleaning

3.19.1 Function Description

This function cleans the heads in the FDD by executing a series of head load/seek and read operations. A cleaning kit is necessary to perform this program.

3.19.2 Operations

1. Selecting test **4** from the DIAGNOSTIC MENU and pressing **Enter** displays the following messages:

```
DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : VX.XX
```

```
Mount cleaning disk(s) on drive(s).
```

```
Press any key when ready.
```

2. Remove the Diagnostics Disk from the FDD. Then insert the cleaning disk and press **Enter**.
3. When the cleaning start message appears, the FDD head cleaning has begun.
4. The display automatically returns to the DIAGNOSTIC MENU when the program is completed.

2. The error information displayed on the screen can be manipulated by the following number keys:

The **1** key scrolls the display to the next page.

The **2** key scrolls the display to the previous page.

The **3** key returns to the Diagnostic Menu.

The **4** key erases all error log information in RAM.

The **5** key outputs the error log information to a printer.

The **6** key reads the log information from a floppy disk.

The **7** key writes the log information to a floppy disk.

3. In the case of “error retry OK,” a capital “R” will be placed at the beginning of the error status. However, it is not added to the error count.

3.21 Running Test

3.21.1 Function Description

This function automatically executes the following tests in sequence:

1. System test (subtest number 01)
2. Memory test (subtest number 01, 02, 04, 06)
3. Display test (subtest number 01 to 08)
4. FDD test (subtest number 02)
5. HDD test (subtest number 01, 05)
6. Real timer test (subtest number 02)
7. Printer test (subtest number 03)
8. Async test (subtest number 01)

The system automatically detects the number of floppy disk drives connected to the T2400CS/T2400CT for the FDD test.

3.21.2 Operations

CAUTION: Do not forget to load a work disk in the FDD. If a work disk is not loaded, an error will be generated during the FDD testing.

1. Remove the diagnostics disk from the floppy disk drive and insert the work disk.
2. Select **6** from the Diagnostic Menu and press **Enter**, the following message will be displayed:

```
Printer wrap around test (Y/N) ?
```

Selecting **Y (yes)** executes the printer wraparound test. A printer wraparound connector must be connected to the **PRT** port on the back of the T2400CS/T2400CT to properly execute this test.

3. Select **Y** or **N** and press **Enter**. The following message will appear:

```
Serial #A wrap around test (Y/N) ?
```

Selecting **Y (yes)** executes the ASYNC wraparound test. An RS-232C wrap-around connector must be connected to the **serial port** on the back of the T2400CS/T2400CT to properly execute this test.

4. Select **Yes** or **No** and press **Enter**. The following message will be appear :

```
Mount the work disk(s) on the drive(s),  
then press [Enter] key.  
[Warning : The contents of the disk(s),  
will be destroyed.]
```

5. This program is executed continuously. To terminate the program, press **Ctrl + Break**.

3.22 Floppy Disk Drive Utilities

3.22.1 Function Description

This function formats the FDD, copies the floppy disk and displays the dump list for both the FDD and HDD.

1. FORMAT

NOTE: This program is only for testing a floppy disk drive. The option is different from the Toshiba MS-DOS FORMAT command.

This program can format a 5.25-inch or 3.5-inch floppy disk in the following formats:

- (a) 2D: Double-sided, double-density, 48/67.5 TPI, MFM mode, 512 bytes, 9 sectors/track.
- (b) 2DD: Double-sided, double-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 9 sectors/track.
- (c) 2HD: Double-sided, high-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 18 sectors/track.

2. COPY

This program copies data from a source floppy disk to a target floppy disk.

3. DUMP

This program displays the contents of the floppy disk (both 3.5-inch and 5.25-inch) and the designated sectors of the hard disk on the display.

3.22.2 Operations

1. Selecting **7** from the DIAGNOSTIC MENU and pressing **Enter**, displays the following message:

```
[ FDD UTILITIES ]  
  
1 - FORMAT  
2 - COPY  
3 - DUMP  
9 - EXIT TO DIAGNOSTICS MENU
```

2. FORMAT program

- (a) Selecting **FORMAT** displays the following message:

```
DIAGNOSTICS - FLOPPY DISK FORMAT : VX.XX
```

```
Drive number select (1:A, 2:B) ?
```

- (b) Select a drive number to display the following message:

```
Type select (0:2DD-2DD,1:2D-2D,2:2D-2HD,3:2HD-2HD) ?
```

- (c) Select a media/drive type number and press **Enter**. A message similar to the one below will be displayed:

```
Warning : Disk data will be destroyed.
```

```
Insert work disk into drive A:
```

```
Press any key when ready.
```

- (d) Remove the Diagnostics Disk from the FDD, insert the work disk and press any key.

The following message will be displayed when the FDD format is executed:

```
[ FDD TYPE ] : TRACK = XXX
```

```
[ FDD TYPE ] : HEAD = X
```

```
[ FDD TYPE ] : SECTOR = XX
```

```
Format start
```

```
[[track, head = XXX X]]
```

After the floppy disk is formatted, the following message will appear:

```
Format complete
```

```
Another format (1:Yes/2:No) ?
```

- (e) Typing **1**, displays the message from step (c) above. Typing **2** returns the test to the **DIAGNOSTIC MENU**.

3. COPY program

- (a) When **COPY** is selected, the following message appears:

```
FLOPPY DISK FORMAT & COPY : VX.XX
```

```
Type select (0:2DD-2DD,1:2D-2D,2:2D-2HD,3:2HD-2HD) ?
```

- (b) Selecting a media/drive type number will display a message similar to the one below:

```
Insert source disk into drive A:
Press any key when ready.
```

- (c) Remove the Diagnostics Disk from the FDD, insert the source disk and press any key. The following message will appear, indicating the program has started.

```
[ FDD TYPE ] : TRACK = XXX
[ FDD TYPE ] : HEAD = X
[ FDD TYPE ] : SECTOR = XX
```

```
Copy start
```

```
[[ track,head = XXX X ]]
```

- (d) Remove the source disk from the FDD, insert a formatted work disk and press any key. The [[track, head = XXX X]] message will appear and start copying to the target disk. When the amount of data is too large to be copied in one operation, the message from step (b) is displayed again. After the floppy disk has been copied, the following message will appear:

```
Copy complete
Another copy (1:Yes/2:No) ?
```

- (e) To copy another disk, type **1** and the message from step (a) will be displayed again. Entering **2** returns the test program to the DIAGNOSTIC MENU.

4. DUMP program

- (a) When dump is selected, the following message appears:

```
DIAGNOSTICS-HARD DISK & FLOPPY DISK DUMP : VX.XX
Drive type select (1:FDD, 2:HDD) ?
```

- (b) Select a format type number. If **C** or **D** is selected, the display will go to step (e).

```
Select drive number (1:A, 2:B) ?
(1:C, 2:D) ?
```

- (c) Select a drive number and the following message will be displayed:

```
Format type select (1:2DD, 2:2D, 3:2HD) ?
```

- (d) Select a media type number and the following message will appear:

```
Insert source disk into drive A:  
Press any key when ready.
```

- (e) Insert a source disk and press any key and the following message will appear:

```
— Max. address —  
  [Track ] = 0079  
  [ Head ] = 01  
  [Sector] = 09  
  
Track number ??
```

- (f) Set the track number you want to dump. Then, the system will access the disk and dump a list.

3.23 System Configuration

3.23.1 Function Description

The System Configuration program contains the following configuration information for the T2400CS/T2400CT:

1. BIOS ROM version
2. Boot ROM version
3. The number of math co-processor
4. Base memory size
5. The number of floppy disk drives
6. The number of ASYNC ports
7. The number of hard disk drives
8. The number of printer ports
9. Extended Memory Size
10. KBC version
11. PS Micom Version

3.23.2 Operations

Selecting **8** from the DIAGNOSTIC MENU and pressing **Enter** displays the following system configuration:

SYSTEM CONFIGURATION :

```
* - BIOS ROM VERSION = VX.XX
* - BOOT ROM VERSION = VX.XX
* - KBC VERSION      = VX.XX
* - PS MICOM VERSION = VX.XX
* - 639KB MEMORY
* - 1 FLOPPY DISK DRIVE(S)
* - 1 ASYNC ADAPTER
* - 1 HARD DISK DRIVE(S)
* - 1 PRINTER ADAPTER
* - XXXXXKB EXTENDED MEMORY
* - 1 MATH CO-PROCESSOR
* - CPU CLOCK        = 50MHz
```

Press [Enter] Key

Press **Enter** to return to the DIAGNOSTIC MENU.

3.24 SETUP

3.24.1 Function Description

This program displays the current system setup information as listed below:

1. Memory
 - (a) Total
 - (b) Base
 - (c) Extended Memory
 - (d) Shadow BIOS ROM

2. Display
 - (a) Display Adapter
 - (b) LCD Display Mode
 - (c) Scan Mode
 - (d) LCD Display Colors (T2400CT only)
 - (e) Power on display (T2400CT only)

3. Battery
 - (a) Battery Save Modes
 - (b) Manual set of battery level

4. Hard disk

5. COM/PRT/SCSI/SOUND
 - (a) Serial port
 - (b) Printer port type
 - (c) SCSI
 - (d) Sound system

6. Power on Password

7. Others
 - (a) Power-up Modes
 - (b) CPU Cache
 - (c) Processing Speed
 - (d) Speaker Volume
 - (e) Panel Power On/Off
 - (f) Alarm Power On
 - (g) Keyboard
 - (h) Pointing Devices
 - (i) Boot Priority

3.24.2 Accessing the SETUP Program

Selecting **0** from the DIAGNOSTICS MENU and pressing **Enter** displays the following:

```
----- MEMORY -----
Total           = 8192 KB
Base           = 640 KB
Extended       = 7360 KB
Shadow BIOS ROM = 192 KB
```

```
----- DISPLAY -----
Display Adapter = VGA compatible
LCD Display Mode = Color
Ext.Scan Mode   = Interlace
LCD Display Colors = 180K colors
Power On Display = Internal/External
```

```
----- BATTERY -----
Battery Save Mode = Full Power
Manual Set of Battery Level
                  = E ??? F
```

```
----- HARD DISK -----
Capacity        = *** MB
```

```
----- COM/PRT/SCSI/SOUND -----
Serial Port      = COM1 (IRQ4/3F8H)
Printer Port Type = Output
SCSI             = Enabled
Sound System     = Address/IRQ/DMA
```

```
----- PASSWORD -----
Not Registered
```

```
----- OTHERS -----
Power-up Mode    = Resume
CPU Cache        = Enabled
Processing Speed  = High
Speaker Volume   = High
Panel Power On/Off = Disabled
Alarm Power On   = Disabled
Keyboard         = Layout/Fn
Pointing Devices = Auto-selected
Boot Priority     = FDD→HDD
```

↑↓→←: Select items, Space, BkSp : Change values

Esc: Exit without saving, Home: Set default values, End: Save changes and Exit

- NOTES:**
1. The Panel Power On/Off item appears only when the T2400 series computer is in Resume mode.
 2. The LCD Display Colors item appears only on the T2400CT.
 3. The Manual Set of Battery Level option appears only when the system cannot detect the Battery charge. For example, when the battery is replaced.
 4. The Sound System item appears only when an optional sound card is installed.

Moving Within the SETUP Menu and Changing Values

1. Press ← and → to move between the two columns. Press ↑ and ↓ to move between items in a column.
2. Press either the **spacebar** or **BkSp** to change the value.

Accepting Changes and Exiting the SETUP Window

1. Press **End** to accept the changes you made.

If the changed item does not require the system to reboot, the following message is displayed:

Are you sure? (Y/N)

If the changed item requires the system to reboot, the following message is displayed:

Are you sure? (Y/N)

The changes you made will cause the system to reboot.

2. To make other changes, press **N**. Repeat the steps above.
3. To accept the changes, press **Y**.

NOTE: You can press *Esc* to quit at any time without saving changes. *SETUP* asks you to confirm that you don't want to save your changes.

The Factory Preset Configuration

When you access *SETUP*, the current configuration is displayed.

1. To show the factory preset configuration, press **Home**.
2. To accept the default settings, press **End** and then press **Y**.

SETUP Options

The *SETUP* screen is divided into functionally related groups. This section describes each group and its options.

1. Memory

The fields in this group list the computer's memory allocations.

- (a) Total

This field displays the total amount of memory installed and is automatically calculated by the computer.

- (b) Base

This field displays the amount of base (conventional) memory, **640 KB** and is automatically calculated by the computer.

- (c) Extended Memory

This field displays the amount of extended memory the computer has available.

(d) Shadow BIOS ROM

The SETUP program displays 192 KB of RAM, which is reserved for the Shadow BIOS ROM.

2. Display

This group of options helps you configure the computer's display.

(a) Display Adapter

This field displays the internal adapter for the VGA internal display. Only **VGA compatible** is displayed. You cannot change it.

(b) LCD Display Mode

Use this option to set the computer's display mode.

Color Selects 80 x 25 text or 640 x 480 graphics modes. This option also affects a color monitor attached to the external display port. (Default)

Monochrome Selects monochrome mode. This is also used when you attach a VGA monochrome monitor to the external display port. Also some software is displayed better in monochrome mode.

NOTE: When you connect a CRT to the computer, you cannot change the display mode. The LCD Display Mode is automatically set to conform to the CRT being used.

(c) Ext. Scan Mode

This option selects interlace or non-interlace mode for the external CRT.

Interlace Selects the interlace mode. (Default)

Non-interlace Selects the non-interlace mode.

(d) LCD Display Colors (T2400CT only)

This option is used to select the color palette of the T2400CT's internal TFT display when the LCD mode is set to "Color."

<i>256K colors</i>	Displays 256 colors out of 262,144 colors.
<i>180K colors</i>	Displays 256 colors out of 185,193 colors.
<i>24K colors</i>	Displays 256 colors out of 24,576 colors.
<i>512 colors</i>	Displays 256 colors out of 512 colors.

NOTE: *If the screen flickers with a certain LCD Display Colors setting, select a setting that has a lower number of colors.*

(e) Power on display

This option is used to select the display when booting up.

<i>Internal/External</i>	Selects an external CRT if one is connected, otherwise it selects the internal LCD. (Default)
<i>Simultaneous</i>	Selects both the internal LCD and the external CRT for simultaneous display.

NOTE: *When starting the computer in Resume mode, the last configuration is remembered. If data does not appear on the display you are using after starting in Resume mode, press **Fn + F5**.*

3. Battery

These options let you set battery save functions for optimum performance or battery power conservation. You can also set the battery charge level when necessary.

(a) Battery Save Modes

This option is used to select **Full Power** or **Low Power** or **User Setting** of the **BATTERY SAVE OPTION**.

Full Power The following shows full power settings.

BATTERY SAVE OPTIONS		
CPU Sleep Mode	=	Disabled
Display Auto Off	=	Disabled (T2400CS) 30 Min. (T2400CT)
HDD Auto Off	=	Disabled
System Auto OFF	=	Disabled

Low Power The following shows low power settings.

BATTERY SAVE OPTIONS		
CPU Sleep Mode	=	Enabled
Display Auto Off	=	03 Min.
HDD Auto Off	=	03 Min
System Auto OFF	=	30 Min.

NOTE: *In boot mode, System Auto OFF is not displayed.*

User Setting

This option, allows you to set the battery save parameters on the sub-window, **BATTERY SAVE OPTIONS**. When you select this option, the automatic setting feature (**Full Power** or **Low Power**) is disabled and the user-preferred parameters become effective. The default setting in the sub-windows depends on the **Battery Save Mode: Low Power (Long Life) or Full Power (Normal Life)**. For details, see *Battery Save Options* below.

(b) User Setting Options

The following set of options can be selected in the sub menu of **User Setting**, which is one of the **Battery Save Mode** options.

CPU Sleep Mode

Use this option to enable or disable the CPU sleep function.

Enabled Enables sleep mode.

Disabled Disables sleep mode.

Display Auto Off

Use this option to disable or set the duration of the display automatic power off function. This function causes the computer to turn the LCD panel's illumination off if you make no entry for the set period of time.

Disabled Disables display automatic power off.

xx Min. Automatically turns off power to the LCD panel's illumination if the panel is not used for the duration set. The duration **xx** can be set to 1, 3, 5, 10, 15, 20, or 30 minutes.

HDD Auto Off

Use this option to disable or set the duration of the HDD automatic power off function.

Disabled Disables HDD automatic power off.

xx Min. Automatically turns off power to the hard disk drive if it is not used for the duration set. The duration **xx** can be set to 3, 5, 10, 15, 20, or 30 minutes.

System auto off

Use this option to enable or disable the system automatic off function when the power up mode is set to Resume. In Boot mode, this feature is always disabled and therefore not displayed.

Disabled Disables system automatic power off.

xx Min. Automatically turns off power to the system if it is not used for the duration set. The duration **xx** can be set to 10, 20, 30, 40, 50, or 60 minutes.

(c) Manual set of battery level

When you use the computer for the first time or when you install a new or recharged battery, the charge level is unknown to the system. In this case the Manual Set of Battery Level options will be displayed to enable you to set the charge level to 100%, 75%, 50% or 25% as indicated below.

E F 100% charge
E F 75% charge
E F 50% charge
E F 25% charge
E ??? F Charge is unknown (Displayed in TSETUP)

4. Hard Disk

This option enables or disables the hard disk drive and displays the capacity of the HDD. When TSETUP displays the disk capacity, it rounds the one's place down to zero. For the actual capacity, use the DOS CHKDSK command.

240MB or 320MB You can access the hard disk. The disk's capacity is automatically displayed and cannot be changed.

No Drive You cannot access the hard disk.

5. COM/PRT/SCSI/SOUND

This option controls settings for serial and printer ports and optional sound card and SCSI devices.

(a) Serial Port

This option allows you to set the COM level, **COM1** or **COM2**, for the serial port and PCMCIA slot.

The serial port interrupt request level (IRQ) and I/O port base address for each COM level is shown below.

COM level	Interrupt level	I/O address
COM1	4	3F8h (Serial Port default)
COM2	3	2F8h
Not Used	-	- (Disables Port)

NOTE: Do not assign the same interrupt request level and I/O address to the serial port and PCMCIA card.

(b) Printer Port Type

This option sets the communication mode for the printer port to either output-only or bi-directional. For most printers, the port should be set to **Output**. Some other parallel devices should be set to **Bi-directional**.

Output Activates uni-directional operation. (Default)

Bi-directional Activates bi-directional operation.

(c) SCSI

Use this option to enable or disable the SCSI port. If the port is enabled, you can also set the interrupt request level (IRQ) for a SCSI device. If the IRQ level selected is the same as that used by an optional sound card, the sound card IRQ level is automatically set to disabled when you quit this option. The options in the main menu are:

Enabled Enables the port. (Default)

Disabled Disables the port.

When **Enabled** is selected, a subwindow similar to the one below appears to let you set the interrupt level. The options for this setting are **IRQ9**, **IRQ10**, **IRQ11** (default) and **Disabled**.

```
----- SCSI -----  
SCSI interrupt level = IRQ11
```

(d) Sound System

This item appears only when an optional sound card is installed. It allows you to enable or disable the sound card ports.

Address/IRQ/DMA Enables the port. (Default)

Disabled Disables the port.

When **Enabled** is selected, a subwindow like the one below appears to let you set the **I/O address**, **Interrupt level** and **DMA channel** for the sound card.

```
      SOUND SYSTEM
I/O Address      = 0220H
Interrupt Level  = IRQ7
DMA              = Channel 1
```

The following explains each setting:

I/O address

Use this option to set the I/O address from among the following settings:

0220h (default), 0230h, 0240h, 0250h

Interrupt level

If the IRQ level selected is the same as that used by a SCSI device, the SCSI device IRQ level is automatically set to disabled when you quit this option.

The available settings are:

IRQ5, IRQ7 (Default), IRQ9, IRQ11

DMA (direct memory access) channel

Use this option to set the DMA channel from among the following settings:

Channel 0, Channel 1 (Default)

6. Power on Password

This option allows you to set or reset the password for power on and instant security.

Registered The password has been registered.

Not registered The password has not been registered.

For details on setting the password refer to the *Password security* section later in this chapter.

7. Others

Whether or not you need to configure the computer with these options depends primarily on the kind of software or peripherals you use.

(a) Power-up Modes

This option lets you choose between AutoResume and boot mode. You can also set this option using hotkeys. AutoResume is effective with either the internal LCD or with an external monitor.

Boot Turns on boot mode. (Default)

Resume Turns on the AutoResume feature.

(b) CPU Cache

Use this feature to enable or disable the CPU cache.

Enabled Enables the CPU cache. (Default)

Disabled Disables the CPU cache.

(c) Processing Speed

This feature changes the CPU processing speed.

High The CPU operates at 50 MHz. (Default)

Low The CPU operates at half speed.

(d) Speaker Volume

This option disables or sets the volume level of the speaker. Setting this option to off disables the computer's sound function for alarms as well as for application programs. This option can also be set with hotkeys.

Off Disables software use of the speaker.

Low Sets the volume of the speaker to low.

Medium Sets the volume of the speaker to medium.

High Sets the volume of the speaker to high. (Default)

When **Low**, **Medium** or **High** is selected for **Speaker volume**, the subwindow below is displayed to let you enable or disable certain speaker functions.

SPEAKER VOLUME OPTIONS		
System Speaker	=	Enabled
Low Battery Alarm	=	Enabled
Panel Close Alarm	=	Enabled

Enabled Enables the feature. (Default)

Disabled Disables the feature.

(e) Panel Power On/Off

This option allows you to automatically turn your T2400 series computer on or off by opening or closing the display panel. If this feature is enabled when the computer is in Resume mode, the system is automatically powered off when the display panel is closed and powered on when the panel is opened. This option is not displayed when the computer is in boot mode.

Enabled Enables the feature.

Disabled Disables the feature. (Default)

NOTE: Do not remove the AC adapter and battery pack at the same time when you use this feature. If you do so, data saved by AutoResume will be lost. You must also reset this option.

(f) Alarm Power On

This option lets you set the time for the system to turn on automatically. For example, if you are expecting to receive a modem transmission at a time you are away or asleep, you can set this option to the time of the transmission. This option does not automatically turn off the system. This feature is effective in either Resume and boot mode.

00:00:00 Sets the power on time (24-hour clock)
(hour:minute:seconds).

Disabled Disables the alarm. (Default)

NOTE: Do not remove the AC adapter and battery pack at the same time when you use this feature. If you do so, the time setting will be lost. You must reset this option when you restore power.

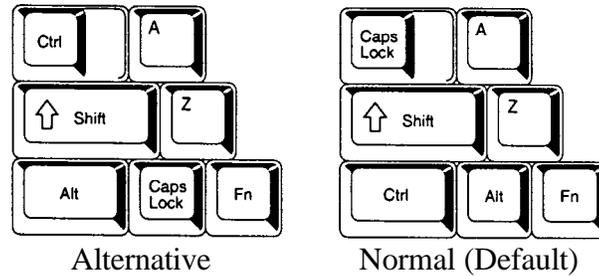
(g) Keyboard

This item lets you change the keyboard layout and set the **Fn** key equivalent when you are using an external keyboard. Selecting this option displays the following subwindow.

Keyboard		
Keyboard key layout	=	Normal
Ext.Keyboard "Fn" key equivalent	=	Disabled

Keyboard key layout

This option lets you select the arrangement of the **CapsLock**, **Shift**, **Ctrl** and **Alt** keys according to the following illustrations:



Ext.Keyboard “Fn” key equivalent

Use this option to set a key combination on an external keyboard to emulate the **Fn** key on the computer’s internal keyboard. Setting an **Fn** key equivalent lets you use “Hotkeys” by pressing the set combination in place of the **Fn** key.

<i>Disabled</i>	No Fn key equivalent. (Default)		
<i>Fn Equivalent</i>	Left Ctrl	+	Left Alt*
	Right Ctrl	+	Right Alt*
	Left Alt	+	Left Shift
	Right Alt	+	Right Shift
	Left Alt	+	Caps Lock

* If these selections are made, you cannot warm boot the system by pressing **Ctrl + Alt + Del**.

(h) Pointing Devices

Use this option to enable or disable the AccuPoint.

Simultaneous If a PS/2 mouse is connected to an optional port replicator, both the AccuPoint and the external mouse are enabled.

Auto-selected The AccuPoint is disabled when a PS/2 mouse is connected, otherwise the AccuPoint is enabled. (Default)

(i) Boot Priority

Use this option to select the disk drive priority for boot up.

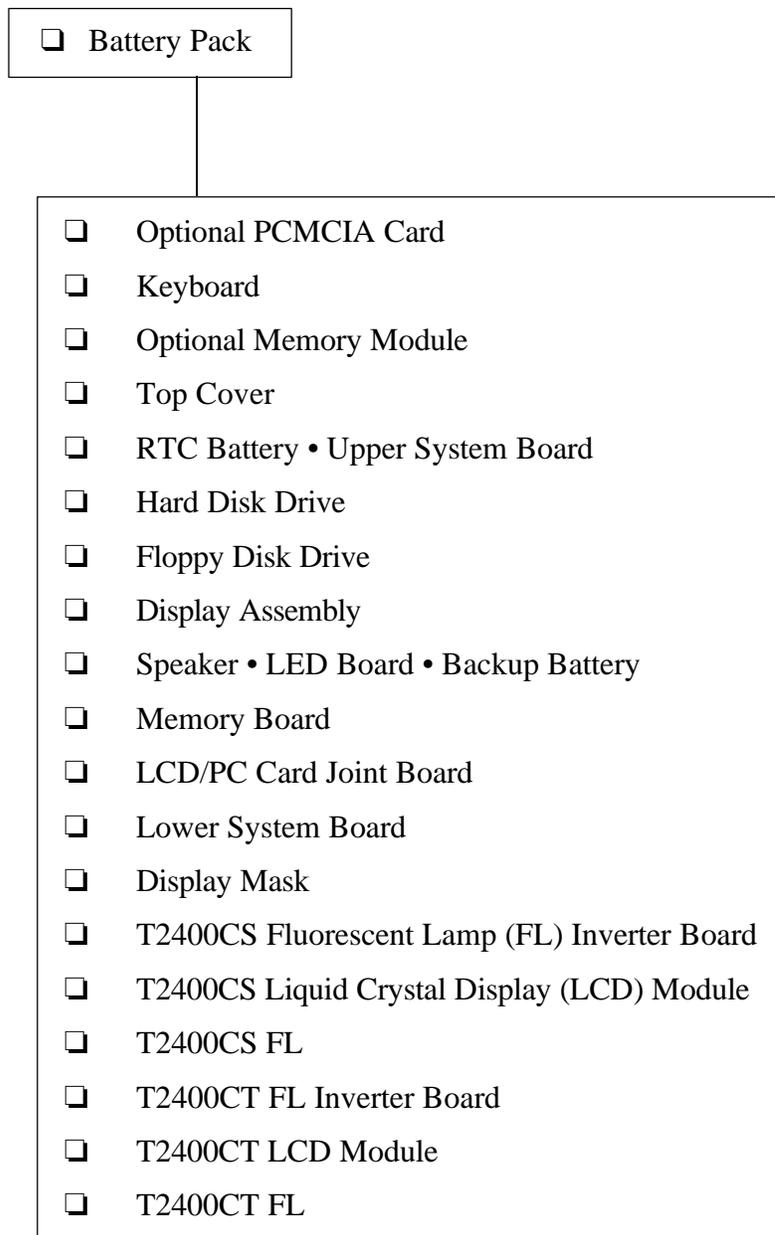
FDD→HDD The computer looks for bootable files first on the
diskette drive and next on the HDD. (Default)

HDD→FDD The computer looks for bootable files first on the HDD
and next on the diskette drive.

You can reverse the order by holding down the **F10** key while the computer is booting. This procedure does not affect the setting.

4.1 General

This section explains how to disassemble the T2400CS/T2400CT and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, then follow the chart to determine which FRU you must remove next in order to repair the one you think is causing the T2400CS/T2400CT to operate improperly.



Before You Begin

Look over the procedures in this section before you begin disassembling the T2400CS/T2400CT. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC adapter and the battery pack as instructed in section 4.2, *The Battery Pack*:

1. Do not disassemble the T2400CS/T2400CT unless it is operating abnormally.
2. Use only the correct and approved tools.
3. Make sure the working environment is free from the following elements whether you are using or storing the T2400CS/T2400CT:
 - Dust and contaminants
 - Static electricity
 - Extreme heat, cold, and humidity
4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.
5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the T2400CS/T2400CT.
6. After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and will not interfere with your work.
7. You will remove and replace many screws when you disassemble the T2400CS/T2400CT. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.
8. When assembling the T2400CS/T2400CT make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.
9. The T2400CS/T2400CT contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU make sure the T2400CS/T2400CT is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

NOTE: *The illustrations in chapter 4 are based on the appearance of the T2400CS, unless otherwise noted.*

Disassembly Procedures

The T2400CS/T2400CT has two basic types of cable connectors:

- Pressure Plate Connectors
- Normal Pin Connectors

To disconnect a Pressure Plate connector, lift up the tabs on either side of the connector's plastic pressure plate and slide the cable out of the connector. To connect the cable to a Pressure Plate connector, make sure the pressure plate is fully lifted and slide the cable into the connector. Secure the cable in place by pushing the sides of the pressure plate down so the plate is flush with the sides of the connector. Gently pull on the cable to make sure the cable is secure. If you pull out the connector, connect it again making sure the connector's pressure plate is fully lifted when you insert the cable.

Standard pin connectors are used with all other cables. These connectors can be connected and disconnected by simply pulling them apart or pushing them together.

Assembly Procedures

After you have disassembled the T2400CS/T2400CT and fixed or repaired the problem that was causing the T2400CS/T2400CT to operate abnormally, you will need to reassemble the T2400CS/T2400CT.

While assembling the T2400CS/T2400CT, remember the following general points:

- Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the T2400CS/T2400CT.
- Make sure all cables and connectors are securely fastened.
- Before securing the FRU or other parts, make sure that no cables will be pinched by screws or the FRU.
- Check that all latches are securely closed in place.
- Make sure all the correct screws are used to secure all FRUs. Using the wrong screw can either damage the threads on the screw or the head of the screw, and may prevent proper seating of an FRU.

After installing an FRU in the T2400CS/T2400CT confirm that the FRU and the T2400CS/T2400CT are functioning properly.

Tools and Equipment

The use of ElectroStatic Discharge (ESD) equipment is very important for your safety and the safety of those around you. Proper use of these devices will increase the success rate of your repairs and lower the cost for damaged or destroyed parts. The following equipment is necessary to disassemble and reassemble the T2400CS/T2400CT:

- One M2 Phillips screwdriver to remove and replace screws.
- A jeweler's screwdriver to remove screw covers.
- Tweezers, to lift out screws that you cannot grasp with your fingers.
- An LCD support block composed of antistatic foam.
- ESD mats for the floor and the table you are working on.
- An ESD wrist strap or heel grounder.
- Anti-static carpeting or flooring.
- Air ionizers in highly static sensitive areas.

4.2 The Battery Pack

Removing the Battery Pack

To remove the T2400CS/T2400CT battery pack, follow the steps below and refer to figure 4-1.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord and all external cables connected to the T2400CS/T2400CT.
2. Close the display if it is open and turn off the computer.
3. Slide open the **cover** to the battery latch and press the **release button** until it clicks. The battery will pop out slightly (figure 4-1).
4. Firmly grasp the **battery pack** and pull it out (figure 4-1).

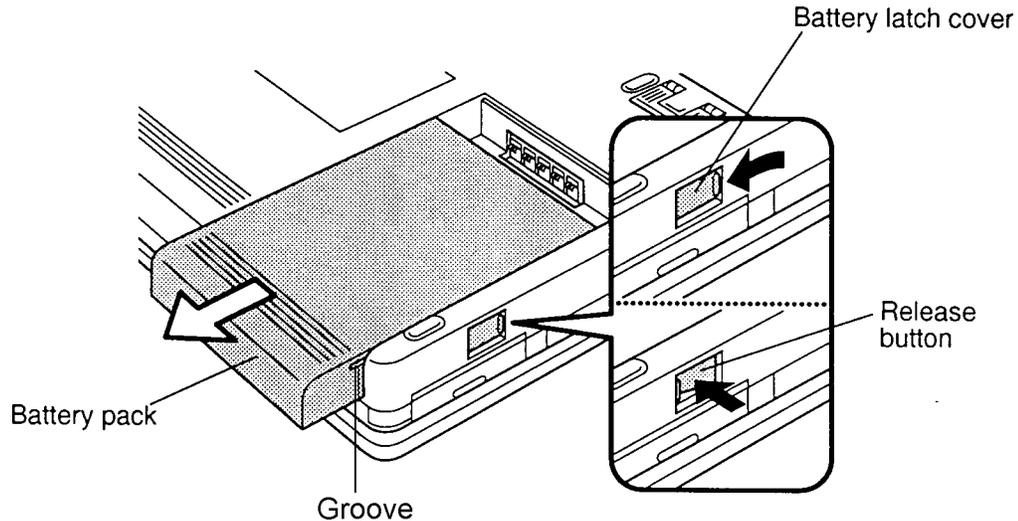


Figure 4-1 Removing the battery pack

Installing the Battery Pack

NOTE: The battery pack is designed to fit into the T2400CS/T2400CT in only one way.

To install the T2400CS/T2400CT battery pack, follow the steps below and refer to figure 4-1:

1. Turn the computer over and gently slide the **battery pack** into the battery slot making sure the **groove** on the side of the battery faces left and the smooth side faces right.
2. Push the **battery pack** in until it locks into place (figure 4-1).

4.3 Optional PCMCIA Card

Removing an Optional PCMCIA Card

The T2400CS/T2400CT has two PCMCIA slots: one for a card up to 5.0 mm (Type II), and one for a card up to 14.5 mm (Type III). Procedures for removing Type II and Type III cards are the same.

To remove optional PCMCIA cards, follow the steps below and refer to figure 4-2.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack as described in section 4.2.
3. Open the **PCMCIA card slot cover**, then slide open the **PCMCIA card sliding stopper** (figure 4-2).
4. Slide the release button to the left to release the card (figure 4-2).
5. Grasp the card and pull it out.

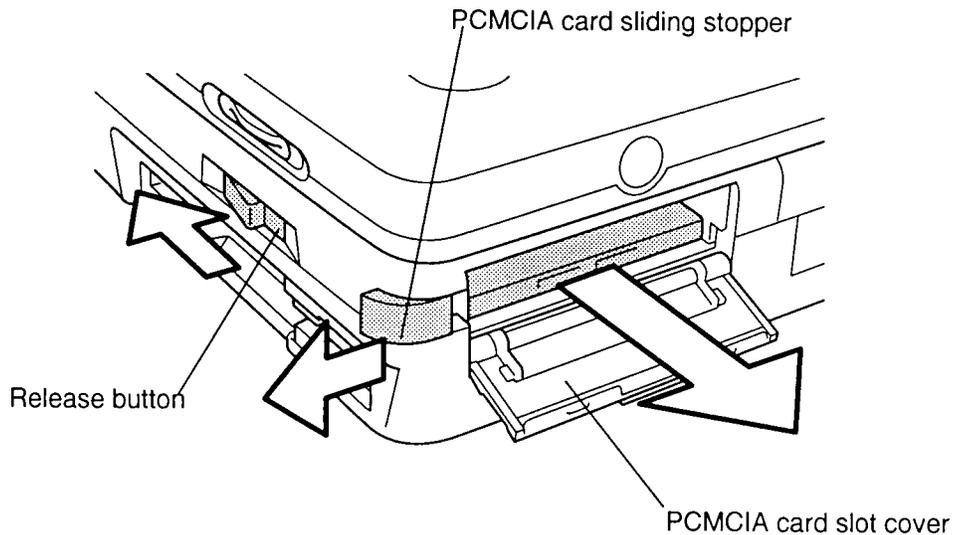


Figure 4-2 Removing the PCMCIA card

Installing an Optional PCMCIA Card

To install an optional PCMCIA card in the T2400CS/T2400CT, follow the steps below and refer to figure 4-3:

1. To install a **PCMCIA card**, carefully insert the card, making sure the card is right side up and the contact surface is inserted first.
2. When the card is almost fully seated, you will feel some resistance. Press gently to assure a firm connection, but do not force the card into position.
3. Push the **PCMCIA card sliding stopper** into place, then close the **PCMCIA slot cover** (figure 4-3).

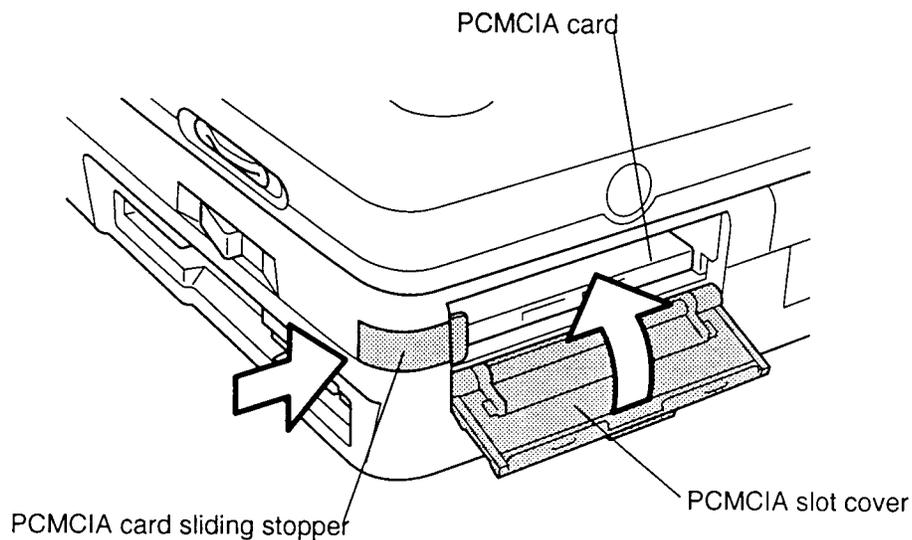


Figure 4-3 Installing the optional PCMCIA card

4. Install the battery pack as described in section 4.2.

4.4 Keyboard

Removing the Keyboard

To remove the T2400CS/T2400CT's keyboard, follow the steps below and refer to figures 4-4 to 4-6.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack and optional PCMCIA card as described in sections 4.2 and 4.3.
3. Turn the computer over and remove three **M2.5x8 silver screws** on the bottom.

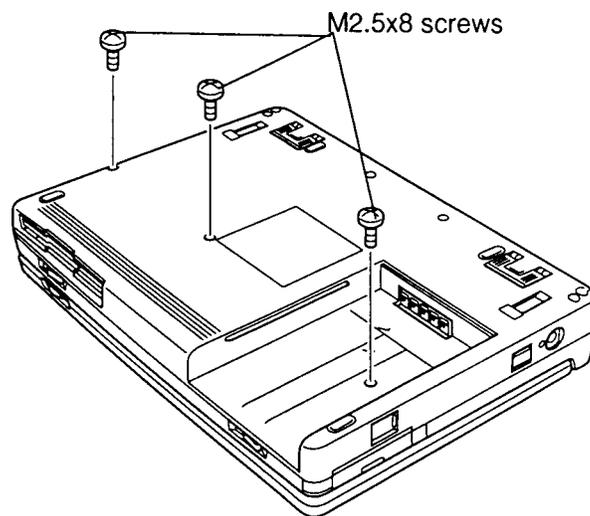


Figure 4-4 Removing three screws

4. Turn the computer back over and open the display panel and the PCMCIA card slot covers.
5. Open each side of the PCMCIA card sliding stopper and the PCMCIA slot cover.
6. Put your fingers just inside the PCMCIA slots and lift off the **cover** at the base of the keyboard (figure 4-5).

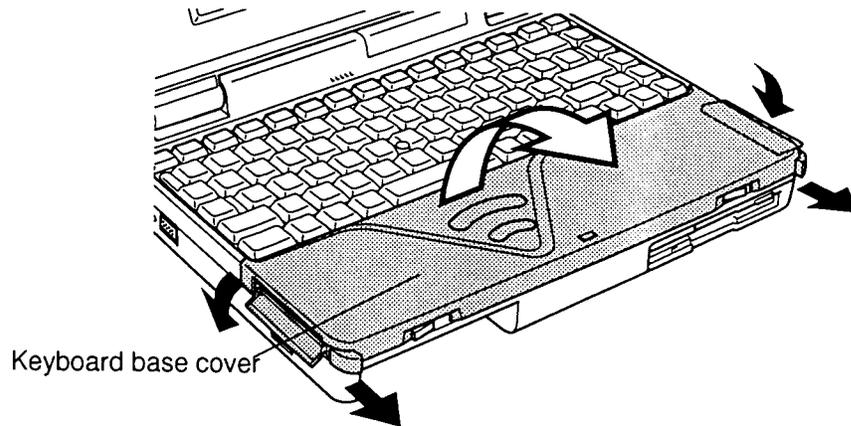


Figure 4-5 Removing the keyboard base cover

7. Carefully lift up the keyboard to expose the keyboard connector.
8. Disconnect the **keyboard cable** from the pressure-plate connector (**PJ402**) on the upper system board (figure 4-6).

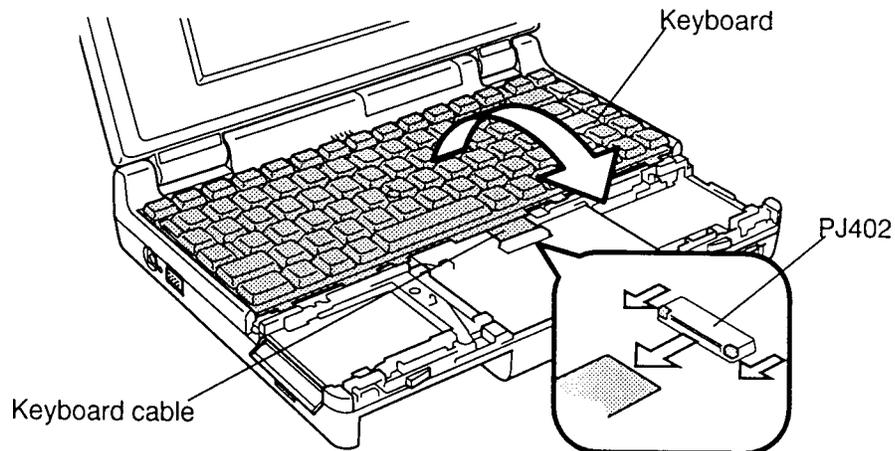


Figure 4-6 Removing the keyboard

Installing the Keyboard

To install the T2400CS/T2400CT's keyboard, follow the steps below and refer to figures 4-4 to 4-6.

1. Connect the **keyboard cable** to **pressure plate connector** (PJ402) on the upper system board (figure 4-6).
2. Replace the **keyboard**. Fit extensions on the back of the keyboard into corresponding holes on the computer and lay the keyboard in place.
3. Place the base of the keyboard on the T2400CS/T2400CT (figure 4-5).
4. Turn the computer over and secure three **M2.5x8 silver screws** on the bottom (figure 4-4).
5. Install the optional PCMCIA card and battery pack as described in sections 4.3 and 4.2.

CAUTION: *The PCMCIA card sliding stopper comes off easily, so be careful not to lose it.*

4.5 Optional Memory Module

Removing the Optional Memory Module

To remove an optional memory module from the T2400CS/T2400CT, follow the steps below and refer to figures 4-4, 4-5, 4-7, and 4-8.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack and optional PCMCIA card as described in sections 4.2 and 4.3.
3. Turn the computer over and remove three M2.5x8 silver screws on the bottom (figure 4-4).
4. Turn the computer back over and open the display panel and the PCMCIA card slot covers.
5. Put your fingers just inside the PCMCIA slots and lift off the cover at the base of the keyboard (figure 4-5).
6. Put your finger under the space bar on the keyboard, lift up slightly so the extensions at the back of the keyboard clear corresponding holes on the computer. Rotate the keyboard forward so that it lies face down over the AccuPoint buttons. Do not remove the keyboard cable (figure 4-7).

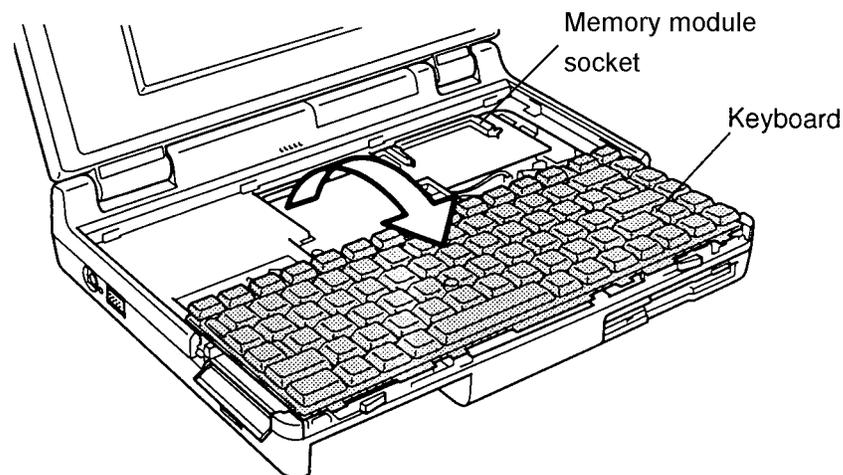


Figure 4-7 Exposing the Memory Module socket

7. The memory module socket is now exposed. Two latches on each side of the module hold it in place. Press these to the outside to release the module. The side of the module away from the connectors will spring up (figure 4-8).

CAUTION: Do not touch the connectors on the memory module or on the computer. Debris on the connectors may cause memory access problems.

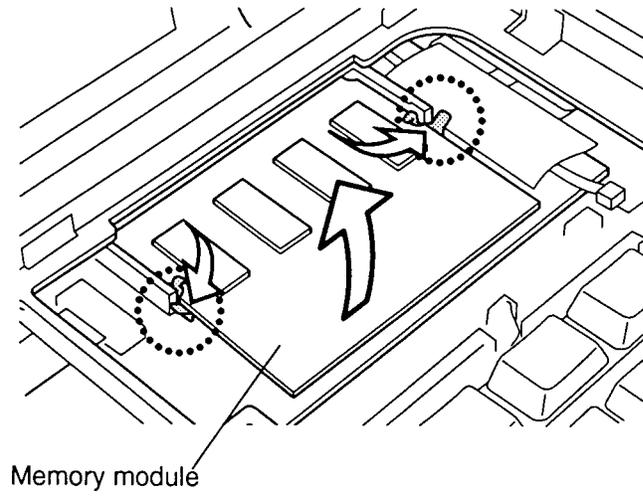


Figure 4-8 Removing the memory module

8. Grasp the module and pull it out.

Installing the Optional Memory Module

To install an optional memory module in the T2400CS/T2400CT, follow the steps below and refer to Figures 4-4, 4-5, and 4-9.

1. Insert the memory module at about a 45° angle, connectors first, into the computer's connectors. Note the notch at the corner of the module. This notch should be on the right as you insert the module (figure 4-9).

CAUTION: Do not touch the connectors on the memory module or on the computer. Debris on the connectors may cause memory access problems.

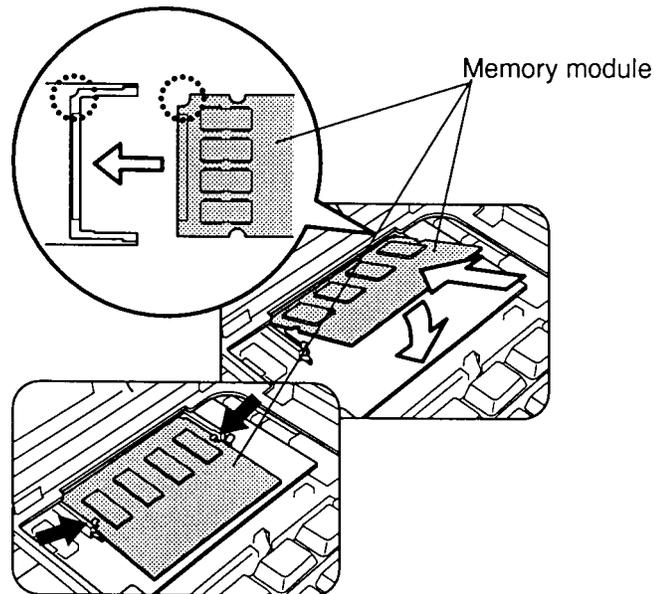


Figure 4-9 Inserting the memory module

2. The module is held up by springs in the computer's socket. Gently push the module into place until two latches close over each side.
3. Replace the keyboard. Fit the extensions on the back of the keyboard into corresponding holes on the computer and lay the keyboard in place.
4. Place the base of the keyboard on the T2400CS/T2400CT (figure 4-5).
5. Turn the computer over and secure three M2.5x6 silver screws on the bottom (figure 4-4).
6. Install the optional PCMCIA card and battery pack as described in sections 4.3 and 4.2.

4.6 Top Cover

Removing the Top Cover

To remove the T2400CS/T2400CT's top cover, follow the steps below and refer to figures 4-10 and 4-11.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard and optional memory module as described in sections 4.2, 4.3, 4.4 and 4.5.
3. Turn the computer over and remove four M2.5x8 silver screws on the bottom and two M2.5x8 silver screws, securing the top cover, at the back of the T2400CS/T2400CT (figure 4-10).

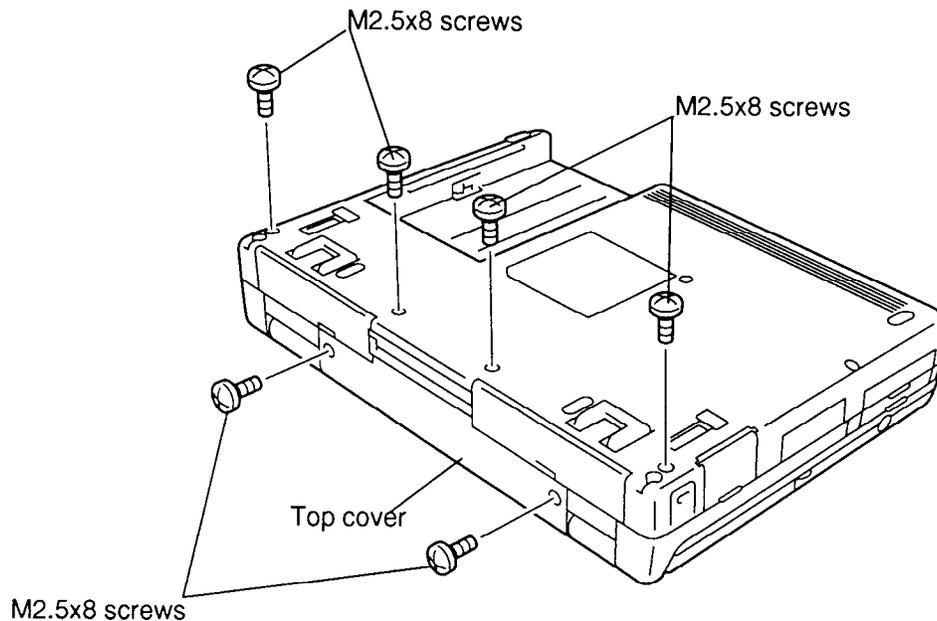


Figure 4-10 Removing top cover screws

4. Turn the computer so the front faces you and open the display. Lay the display back fully. (Put a book or small box behind the display to support it.)
5. Disconnect the RTC battery connector from PJ403 and the speaker cable from PJ10 and unthread their cables, (figure 4-11).
6. Unsnap the **latches** securing the **top cover** to the base assembly. Start by releasing the two front latches (figure 4-11). You may need a small jeweler's screwdriver to release the latches on a newer unit.
7. Continue around the rim of the **top cover** until all latches are released, then carefully lift up the **top cover** (figure 4-11).

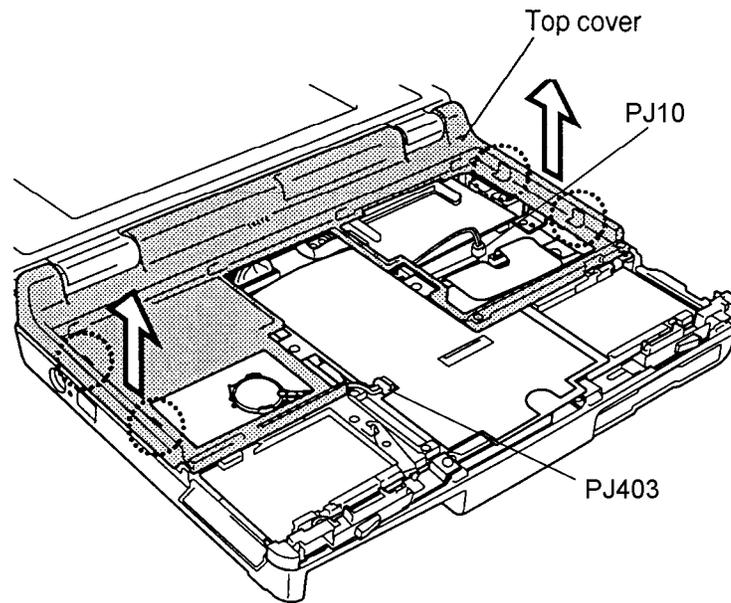


Figure 4-11 Unlatching the top cover

Installing the Top Cover

To install the T2400CS/T2400CT's top cover follow the steps below and refer to figures 4-10 and 4-11.

1. Place the **top cover** on the T2400CS/T2400CT.
2. Begin at the back and snap the **top cover** into place. Snap the side latches (figure 4-11). Be sure the RTC battery cable and speaker cable are not caught under the top cover.
3. Connect the RTC battery cable to PJ403 and the speaker cable to PJ10, then route the cables in the notches of the top cover.
4. Close the display so the back faces you and turn the computer over.

5. Secure the two M2.5x8 silver screws at the back of the computer and four M2.5x8 silver screws on the bottom at the computer (figure 4-10).
6. Install the optional memory module, keyboard, optional PCMCIA card and battery pack as described in sections 4.5, 4.4, 4.3, and 4.2.

4.7 RTC Battery•Upper System Board

Removing the RTC Battery•Upper System Board

To remove the T2400CS/T2400CT's RTC battery and upper system board, follow the steps below and refer to figures 4-12 and 4-13.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional memory card, keyboard, optional memory module and top cover as described in sections 4.2 through 4.6.
3. Remove the one M2.5x6 screw to remove the right side PCMCIA card ejector (figure 4-12). Note the peg on the card ejector which fits into a metal loop on the release device below the card ejector.

NOTE: Be careful to retain the PCMCIA card slider stopper on the right side of the PCMCIA card ejector.

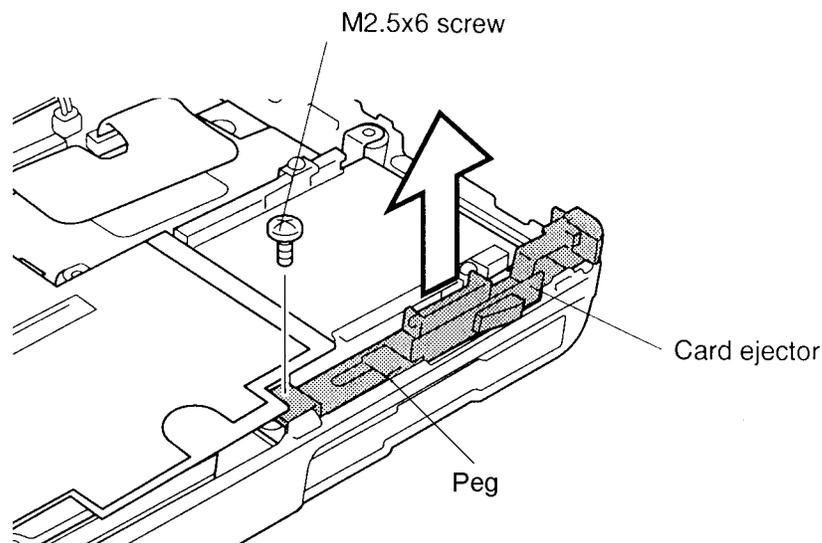


Figure 4-12 Removing the right side PCMCIA card ejector

4. Remove the two M2x6 screws, two M2x4 screws and one M2.5x6 screw securing the upper system board (figure 4-13).
5. Disconnect PJ401 on the upper system board from the connector on the LCD/PC card board and lift out the upper system board (figure 4-13). Note the metal loop on the left release device which fits over the peg on the left PCMCIA card ejector.
6. Lift out the RTC battery.

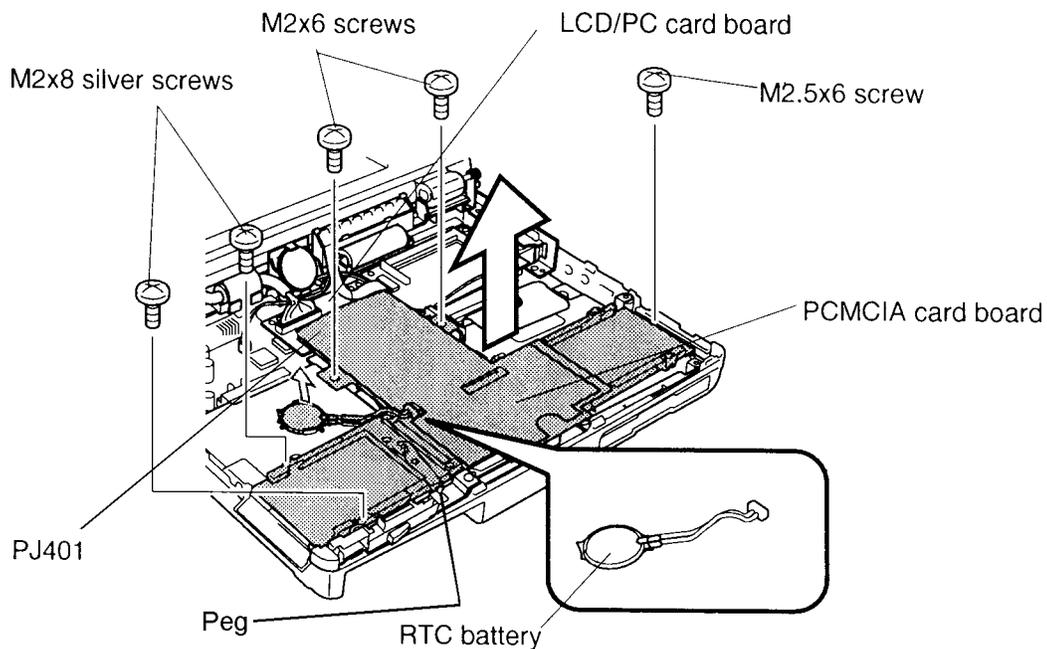


Figure 4-13 Removing the RTC battery and upper system board

Installing the RTC Battery•Upper System Board

To install the T2400CS/T2400CT's RTC battery•Upper System board, follow the steps below and refer to figures 4-12 and 4-13.

1. Set the RTC battery in place, but do not connect the RTC battery cable to PJ403 on the upper system board at this time (figure 4-13).
2. Connect PJ401 on the PCMCIA card board to the connector on the LCD/PC card board (figure 4-13). Be sure to fit the metal loop on the left release device over the peg on the upper part of the PCMCIA card ejector.
3. Secure the upper system board with the two M2x6 screws, two M2x4 screws and one M2.5x6 screw (figure 4-13). Be sure to fit the peg on the underneath part of the PCMCIA card ejector into the metal loop on the release device.
4. Secure the right side PCMCIA card ejector with the one M2.5x6 screw (figure 4-12).
5. Install the top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.6 back through 4.2.

4.8 Hard Disk Drive

Removing the Hard Disk Drive

To remove the T2400CS/T2400CT's hard disk drive, follow the steps below and refer to figures 4-14 and 4-15.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery back, optional PCMCIA card, keyboard, optional memory module, top cover, and upper system board as described in sections 4.2 through 4.7.
3. Remove two M2.5x4 screws from the middle of the HDD, and slide the HDD to the front to disconnect the HDD connector (figure 4-14).
4. Lift out the HDD from the system unit.

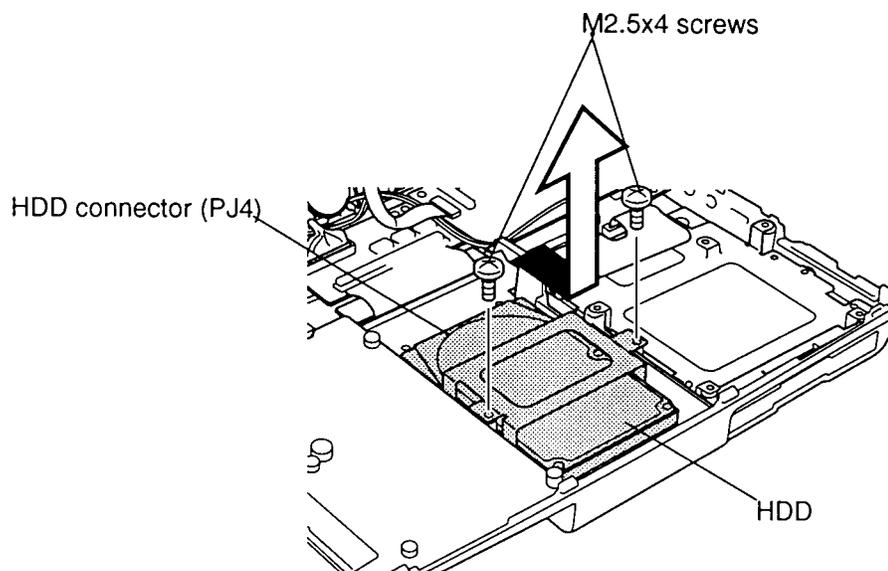


Figure 4-14 Removing the HDD with bracket

5. Remove four flat-head M3x4 screws securing the bracket to the HDD and slip off the bracket (figure 4-15).

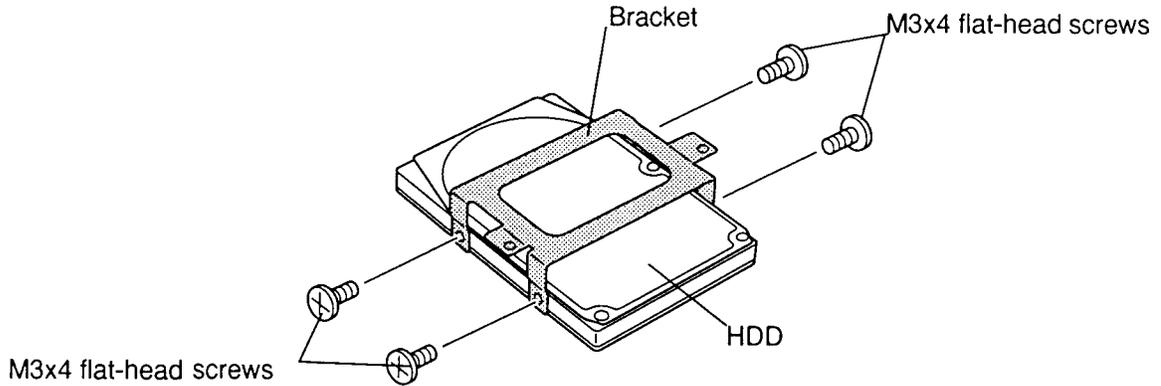


Figure 4-15 Removing the HDD

Installing the Hard Disk Drive

To install the T2400CS/T2400CT's hard disk drive, follow the steps below and refer to figures 4-14 and 4-15.

1. Secure the bracket with the four flat-head M3x4 screws (figure 4-15).
2. Place the HDD on the HDD slot, and slide the HDD to the back. Make sure the HDD connector connects to the system board (PJ4) (figure 4-14).
3. Secure two M2.5x4 screws at the middle of the HDD (figure 4-15).
4. Install the upper system board, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.7 back through 4.2.

4.9 Floppy Disk Drive

Removing the Floppy Disk Drive

To remove the T2400CS/T2400CT's floppy disk drive, follow the steps below and refer to figures 4-16 and 4-17.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, top cover, and upper system board as described in sections 4.2 through 4.7.
3. Disconnect the FDD cable from PJ3 on the lower system board and remove the sound port cover (figure 4-16).
4. Lift out the FDD from the system unit (figure 4-16).

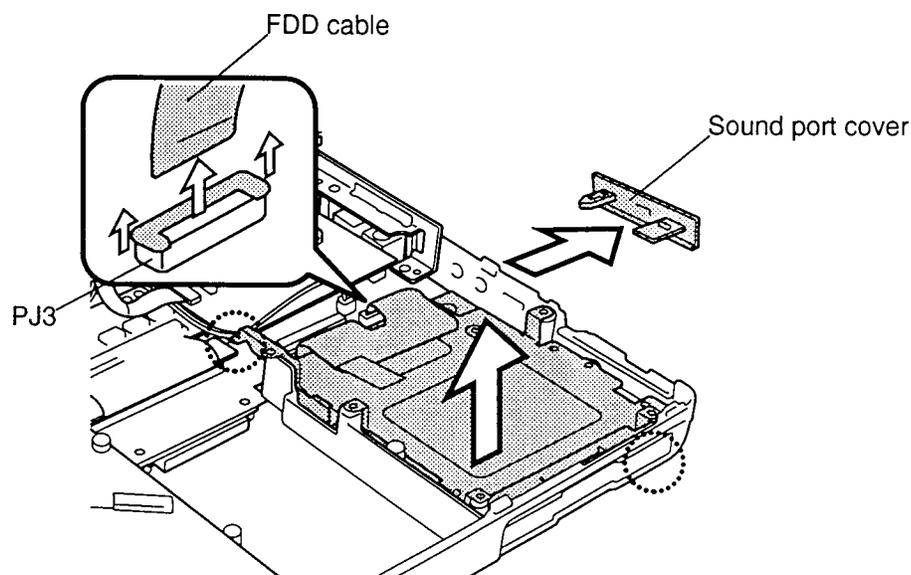


Figure 4-16 Removing the FDD with bracket

5. Remove four flat-head M2.5x2.8 screws securing the bracket to the FDD and slip off the bracket (figure 4-17).

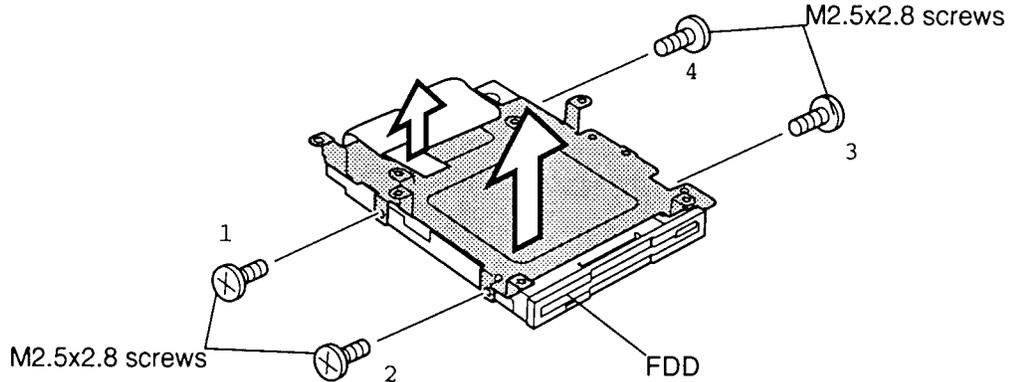


Figure 4-17 Removing the HDD

Installing the Floppy Disk Drive

To install the T2400CS/T2400CT's floppy disk drive, follow the steps below and refer to figures 4-16 and 4-17.

1. Secure the bracket with four flat-head M2.5x2.8 screws in the numbered order: 1 to 4 (figure 4-17). Tighten screws 1 to 4 to a torque of less than 2.2 kgfcm.
2. Place the FDD assembly in the computer, and connect the FDD cable to PJ3 on the lower system board (figure 4-16).
3. Install the upper system board, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.7 back through 4.2.

4.10 Microphone

Removing the Internal Microphone

To remove the internal microphone from the T2400CS/T2400CT, follow the steps below and refer to figures 4-18, 4-19, and 4-20.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, and top cover as described in sections 4.2 through 4.6.
3. Peel off the **tape** securing the internal microphone cable (figure 4-18).

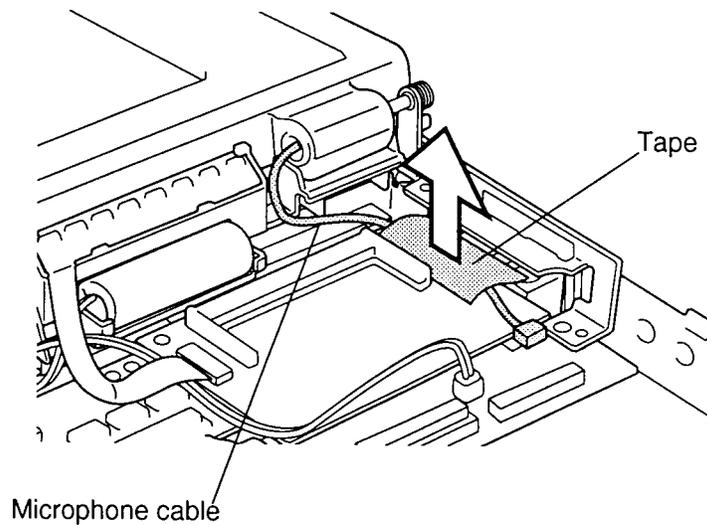


Figure 4-18 Peeling off the tape

4. Remove two LCD mask seals from the display hinges and two rubber pads from the top of corners of the display to expose screws securing the display mask (figure 4-19).
5. Remove two M2.5x6 screws at the bottom corners of the display mask, and two M2.5x6 screws at the top two corners (figure 4-19).
6. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the **four latches** across the top of the display mask (figure 4-19).
7. Continue unlatching the mask along the **sides (three latches on each side)**, at the bottom, four latches, and display supports (figure 4-19).

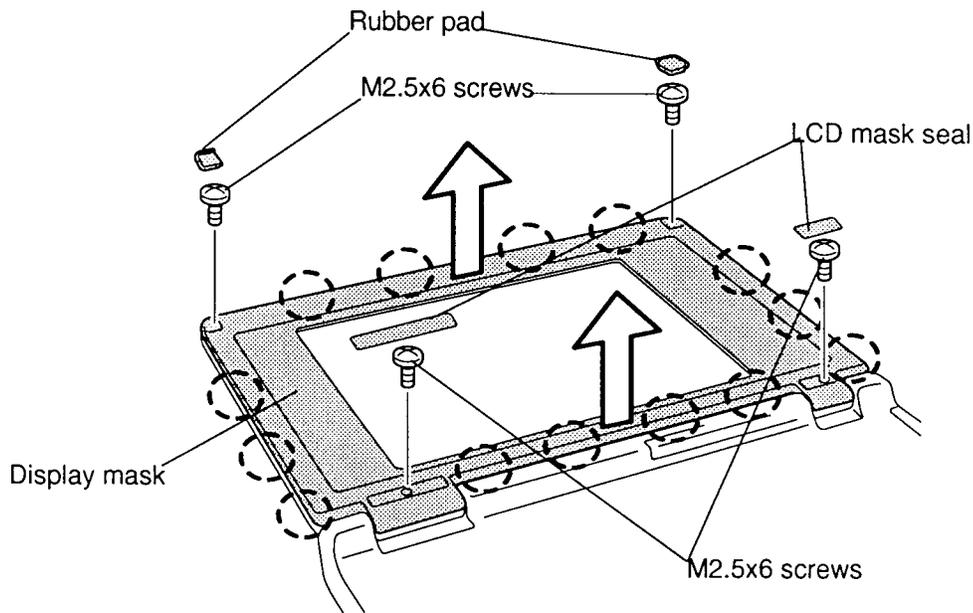


Figure 4-19 Removing the display mask

8. Lift out the internal microphone (figure 4-20).

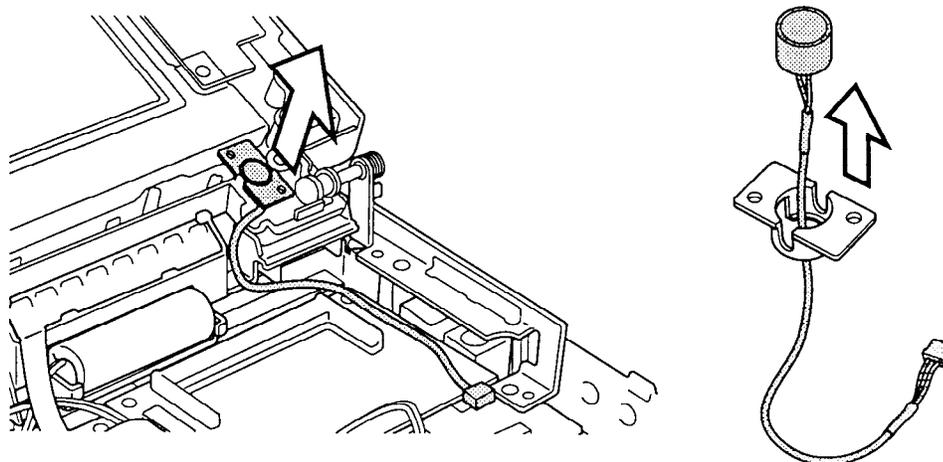


Figure 4-20 Lifting out the internal microphone base

Installing the Internal Microphone

To install the T2400CS/T2400CT's display mask, follow the steps below and refer to figures 4-18 through 4-20.

1. Set the internal microphone base on the cover (figure 4-20).
2. Set the display mask in place and press firmly to secure the latches. Start at the bottom four latches and work your way around the sides (three latches on each side) and, finally, secure the four latches at the top (figure 4-19).
3. Secure four brass M2.5x6 screws, one at each corner of the display cover (figure 4-19).
4. Replace the two rubber pads and two LCD mask seals covering screws at the top two corners and hinges (figure 4-19).
5. Replace the tape securing the internal microphone cable (figure 4-18).
6. Replace the top cover, optional memory module, keyboard, optional PCMCIA card and battery pack as described in sections 4.6 back through 4.2.

4.11 Display Assembly

Removing the Display Assembly

To remove the T2400CS/T2400CT's display assembly, follow the steps below and refer to figure 4-18 and figures 4-21 through 4-23.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, and top cover as described in sections 4.2 through 4.6.
3. Peel off the tape securing the internal **microphone cable** (figure 4-18).
4. Disconnect the **display sensor switch cable** from **PJ504** on the lower system board (figure 4-21).

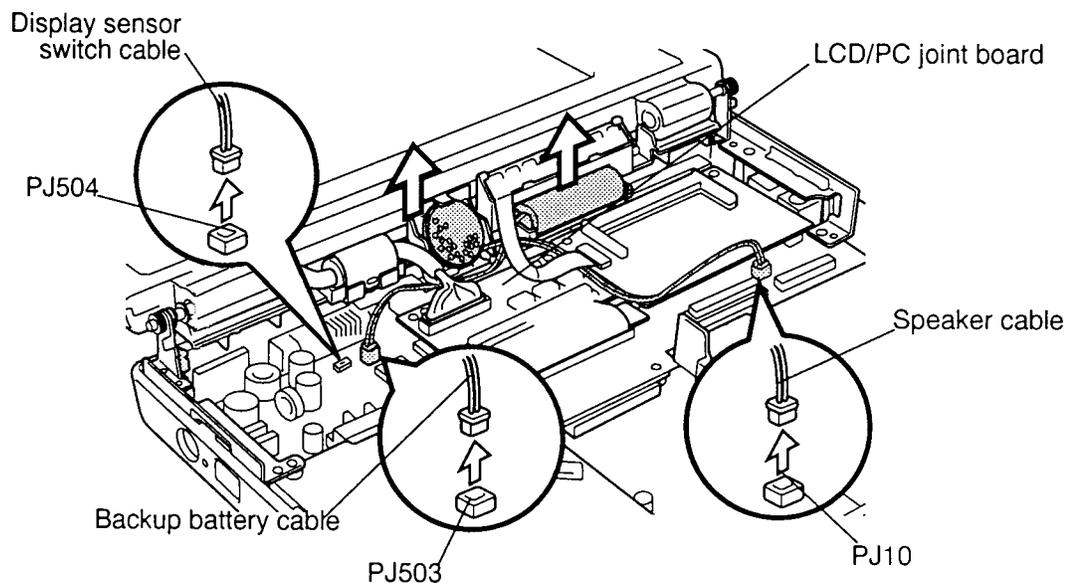


Figure 4-21 Removing the cable

5. Remove the left side M2.5x6 screw on the **LCD/PC card joint board** (figure 4-22).

Note the presence of the GND cable, it will need to be in place when you replace the screw.

6. Lift the **display cable cover** and disconnect the **display cable** from the connector on the LCD/PC card joint board (figure 4-22).

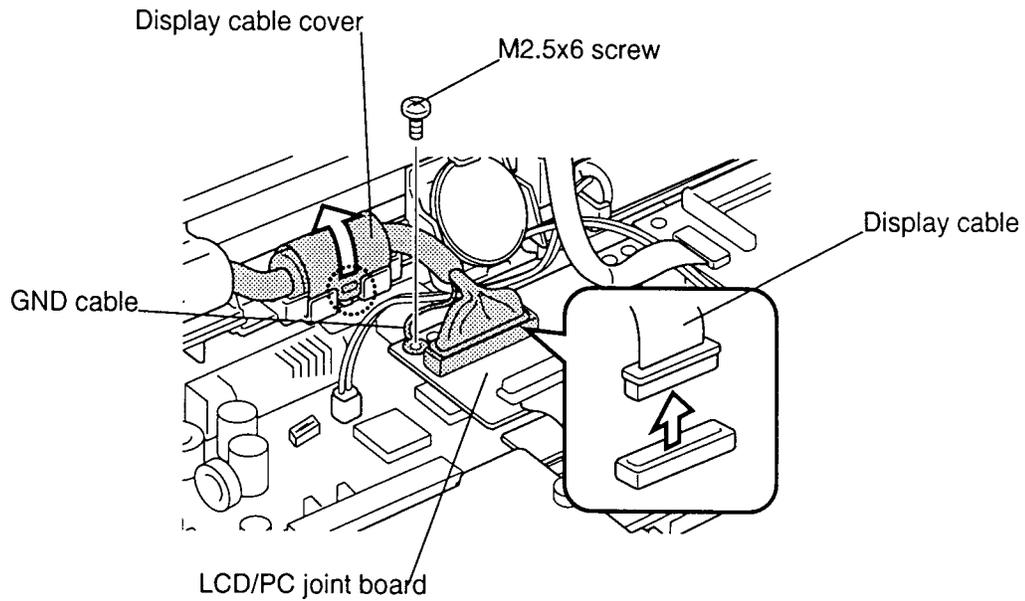


Figure 4-22 *Disconnecting the display cable*

7. Remove the **four M2.5x6 screws** on the system unit, then lift off the **display assembly** (figure 4-23).

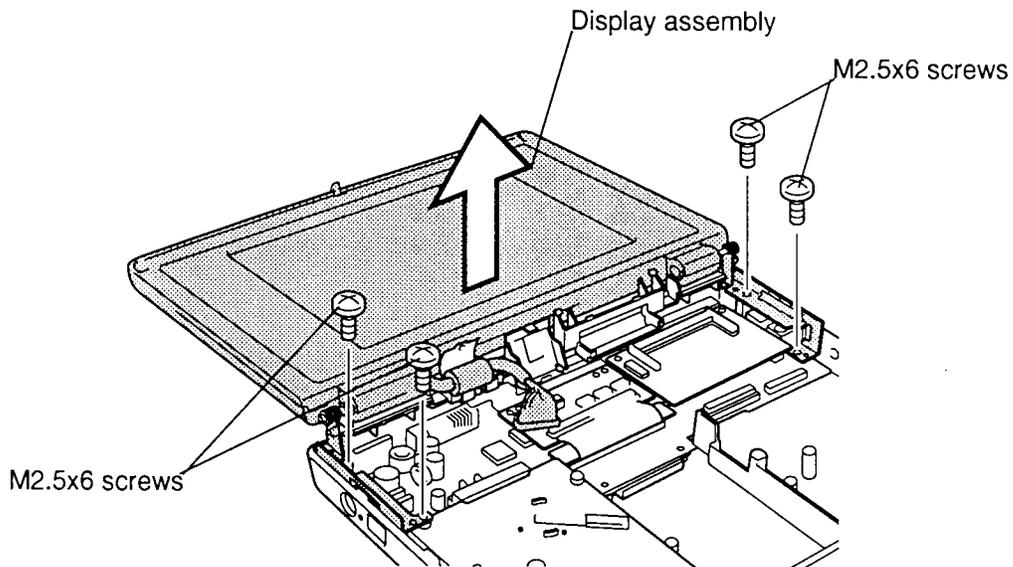


Figure 4-23 *Removing the display assembly*

Installing the Display Assembly

To install the T2400CS/T2400CT's display assembly, follow the steps below and refer to figure 4-18 and figures 4-21 through 4-23.

1. Secure the **four M2.5x6 screws** on the display hinges to secure the **display assembly** (figure 4-23).
2. Connect the **display cable** to the connector on the **LCD/PC board** and replace the **display cable cover** (figure 4-22).
3. Secure the **GND cable** from the LCD on the LCD/PC board with an **M2.5x6 screw** (figure 4-22).
4. Connect the **display sensor switch cable** to **PJ504** on the lower system board (figure 4-21).
5. Place the microphone cable beside the memory module socket on the memory board and secure it with tape (figure 4-18).
6. Install the top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.6 back through 4.2.

4.11 Display Assembly

Removing the Display Assembly

To remove the T2400CS/T2400CT's display assembly, follow the steps below and refer to figure 4-18 and figures 4-21 through 4-23.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, and top cover as described in sections 4.2 through 4.6.
3. Peel off the tape securing the internal **microphone cable** (figure 4-18).
4. Disconnect the **display sensor switch cable** from **PJ504** on the lower system board (figure 4-21).

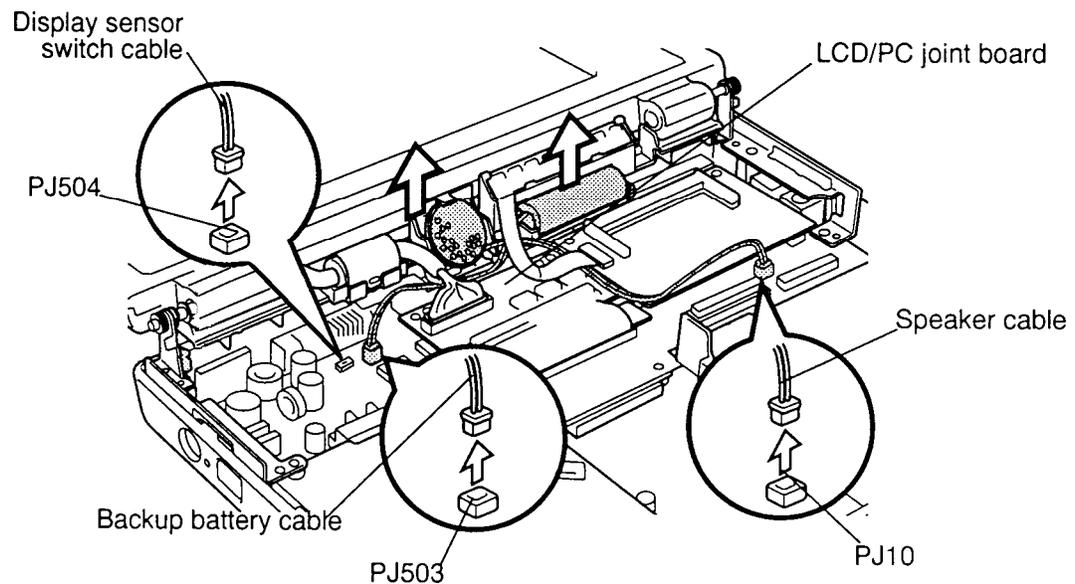


Figure 4-21 Removing the cable

5. Remove the left side M2.5x6 screw on the **LCD/PC card joint board** (figure 4-22).

Note the presence of the GND cable, it will need to be in place when you replace the screw.

6. Lift the **display cable cover** and disconnect the **display cable** from the connector on the LCD/PC card joint board (figure 4-22).

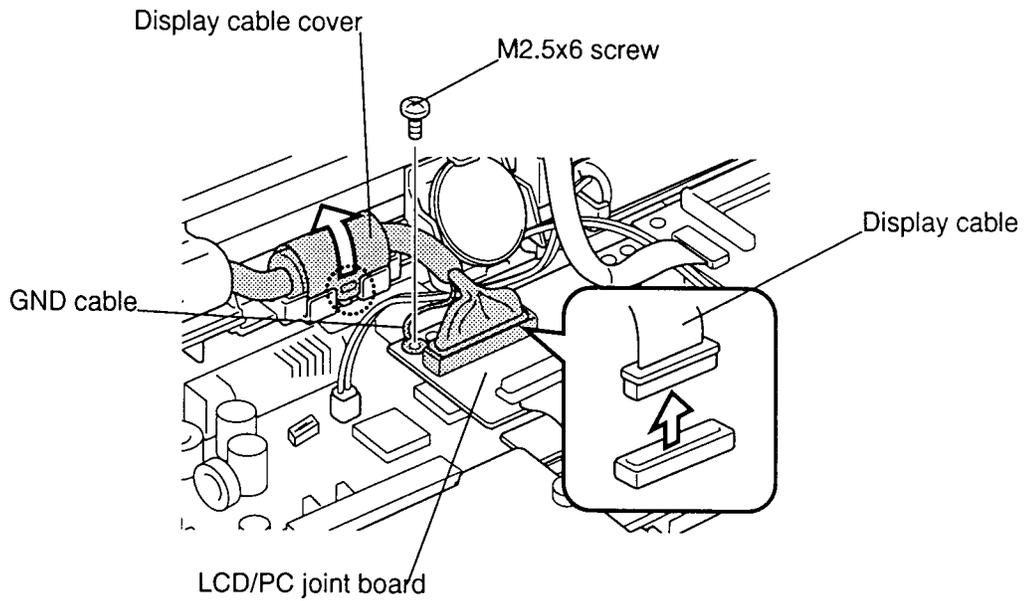


Figure 4-22 Disconnecting the display cable

7. Remove the **four M2.5x6 screws** on the system unit, then lift off the **display assembly** (figure 4-23).

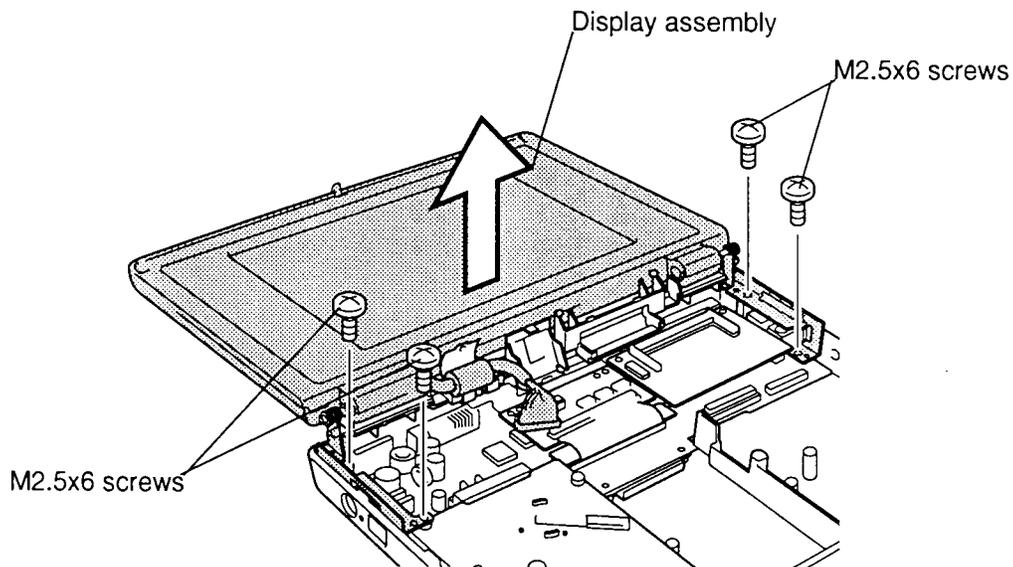


Figure 4-23 Removing the display assembly

Installing the Display Assembly

To install the T2400CS/T2400CT's display assembly, follow the steps below and refer to figure 4-18 and figures 4-21 through 4-23.

1. Secure the **four M2.5x6 screws** on the display hinges to secure the **display assembly** (figure 4-23).
2. Connect the **display cable** to the connector on the **LCD/PC board** and replace the **display cable cover** (figure 4-22).
3. Secure the **GND cable** from the LCD on the LCD/PC board with an **M2.5x6 screw** (figure 4-22).
4. Connect the **display sensor switch cable** to **PJ504** on the lower system board (figure 4-21).
5. Place the microphone cable beside the memory module socket on the memory board and secure it with tape (figure 4-18).
6. Install the top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.6 back through 4.2.

4.12 Speaker/LED Board/Backup Battery

Removing the Speaker/LED Board/Backup Battery

To remove the T2400CS/T2400CT's speaker, LED board and backup battery, follow the steps below and refer to figures 4-21, 4-24, and 4-25.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, top cover, and display assembly as described in sections 4.2 through 4.6, and 4.11.
3. Disconnect the speaker cable from PJ10 on the lower system board (figure 4-21).
4. Gently pull up the speaker latch and lift out the speaker from the system unit.
5. Disconnect the LED board cable from PJ203 on the memory board (figure 4-24).
6. Press outward on either side latch and lift the LED board from the system unit.

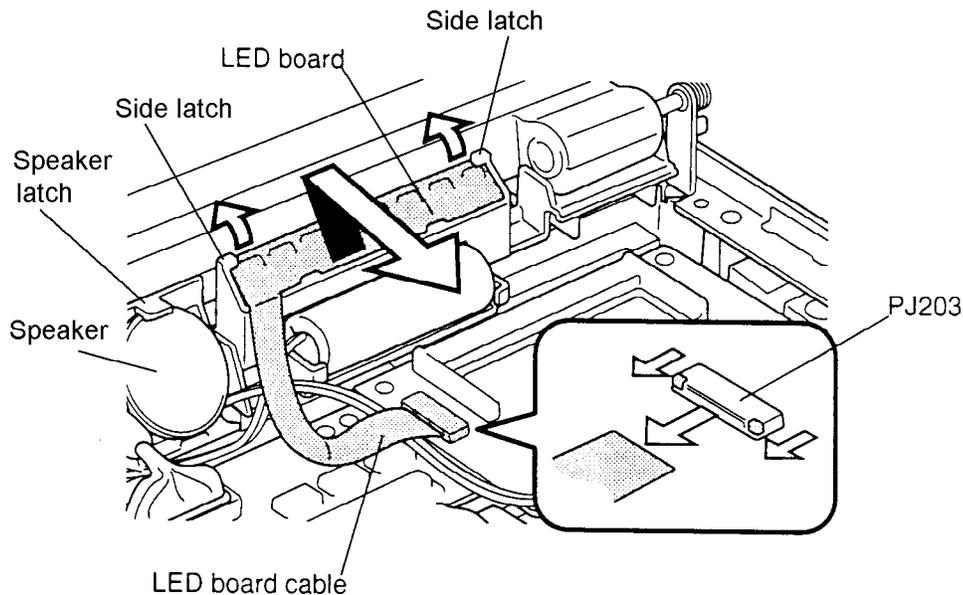


Figure 4-24 Removing the LED board

7. Disconnect the backup battery cable from PJ503 on the system board (figure 4-21).

- Lift out the speaker/LED board/backup battery table frame from the system unit (figure 4-25). Note the routing of the backup battery cables.
- Remove the backup battery from the frame.

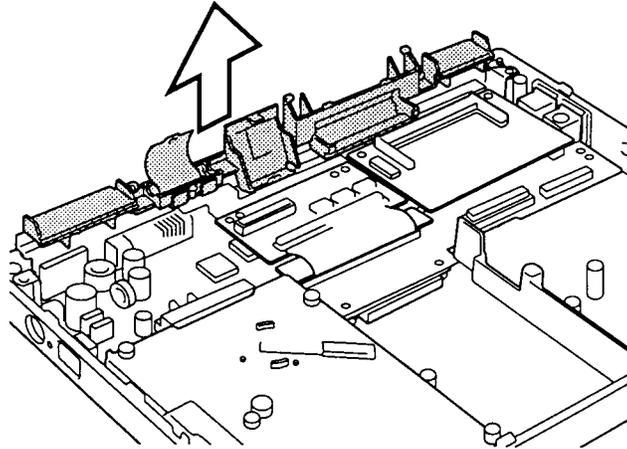


Figure 4-25 Removing the speaker/LED board/backup battery table frame

Installing the Speaker/LED Board/Backup Battery

To install the T2400CS/T2400CT's speaker, LED board and backup battery, follow the steps below and refer to figures 4-21, 4-24, and 4-25.

- Place the backup battery in the speaker/LED board/backup battery frame, then place the frame in the bottom unit. Be sure to route the backup battery cable correctly.
- Connect the backup battery cable to PJ503 on the lower system board (figure 4-21).
- Place the LED board into the system unit.
- Connect the LED board cable to PJ203 on the memory board (figure 4-24).
- Place the speaker in the backup battery table frame.
- Connect the speaker cable to PJ10 on the lower system board (figure 4-21).
- Install the display assembly, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.11 and 4.6 back through 4.2.

4.13 Memory Board

Removing the Memory Board

To remove the T2400CS/T2400CT's memory board, follow the steps below and refer to figure 4-26.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, top cover, display assembly, and speaker/LED board/backup battery as described in sections 4.2 through 4.6, 4.11, and 4.12.
3. Remove two M2.5x6 screws on the memory board (figure 4-26).
4. Disconnect the memory board connector (PJ202) from PJ13 on the lower system board and lift the memory board from the system unit (figure 4-26).

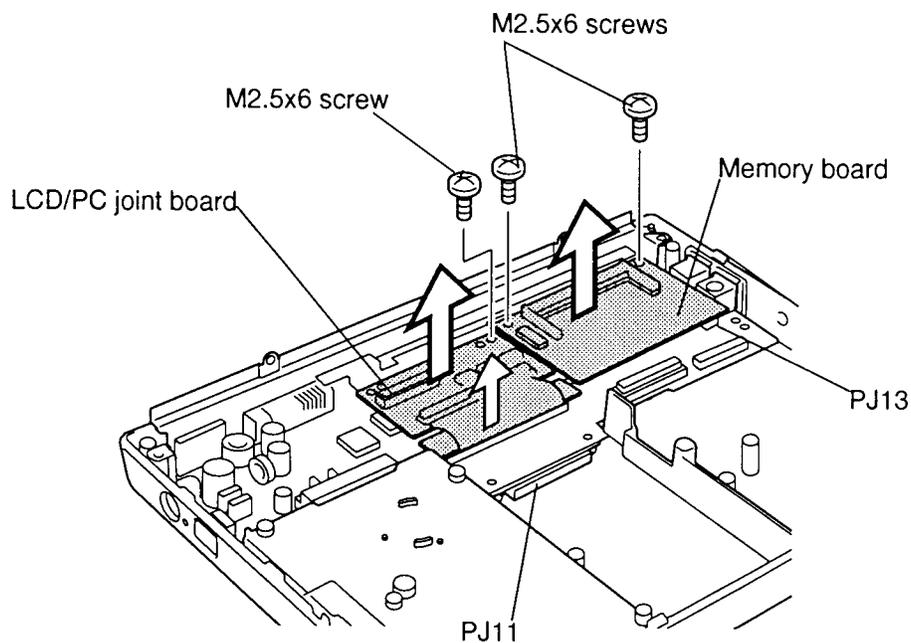


Figure 4-26 Removing the memory board and LCD/PC card joint board

Installing the Memory Board

To install the T2400CS/T2400CT's memory board, follow the steps below and refer to figure 4-26.

1. Place the memory board in the computer, and connect the memory board connector (PJ202) to PJ13 on the lower system board (figure 4-26).
2. Secure two M2.5x6 screws on the memory board (figure 4-26).
3. Install the speaker/LED board/backup battery, display assembly, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.12, 4.11, and 4.6 back through 4.2.

4.14 LCD/PC Card Joint Board

Removing the LCD/PC Card Joint Board

To remove the T2400CS/T2400CT's LCD/PC card joint board, follow the steps below and refer to figure 4-26.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, top cover, display assembly, and speaker/LED board/backup battery table frame as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.11, and 4.12.
3. Remove the right side M2.5x6 screw on the LCD/PC card joint board (figure 4-26).
4. Carefully disconnect the LCD/PC card joint board connector from PJ11 on the lower system board (figure 4-26) and lift out the LCD/PC card joint board from the system unit.

Installing the LCD/PC Card Joint Board

To install the T2400CS/T2400CT's LCD/PC card joint board, follow the steps below and refer to figure 4-26.

1. Place the LCD/PC card joint board in the computer and connect the LCD/PC card joint board connector to PJ11 on the lower system board (figure 4-26).
2. Align the holes on the LCD/PC card joint board with the notches in the back frame of the system board and press the board into place.
3. Secure the right side M2.5x6 screw on the LCD/PC card joint board (figure 4-26).
4. Install the speaker/LED Board/Backup Battery, display assembly, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.12, 4.11, 4.6, 4.5, 4.4, 4.3, and 4.2.

4.15 Lower System Board

Removing the Lower System Board

To remove the T2400CS/T2400CT's system board, follow the steps below and refer to figure 4-27.

1. Turn off the power to the T2400CS/T2400CT. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery pack, optional PCMCIA card, keyboard, optional memory module, top cover, RTC battery/Upper System board, HDD, FDD, display assembly, speaker/LED board/backup battery, memory board, and LCD/PC card joint board as described in sections 4.2 through 4.9 and 4.11 through 4.14.
3. Remove the five M2.5x6 screws on the system board (figure 4-27).
4. Lift the right side of the system board which will release the DC IN jack from the bottom cover, then lift up the system board (figure 4-27).

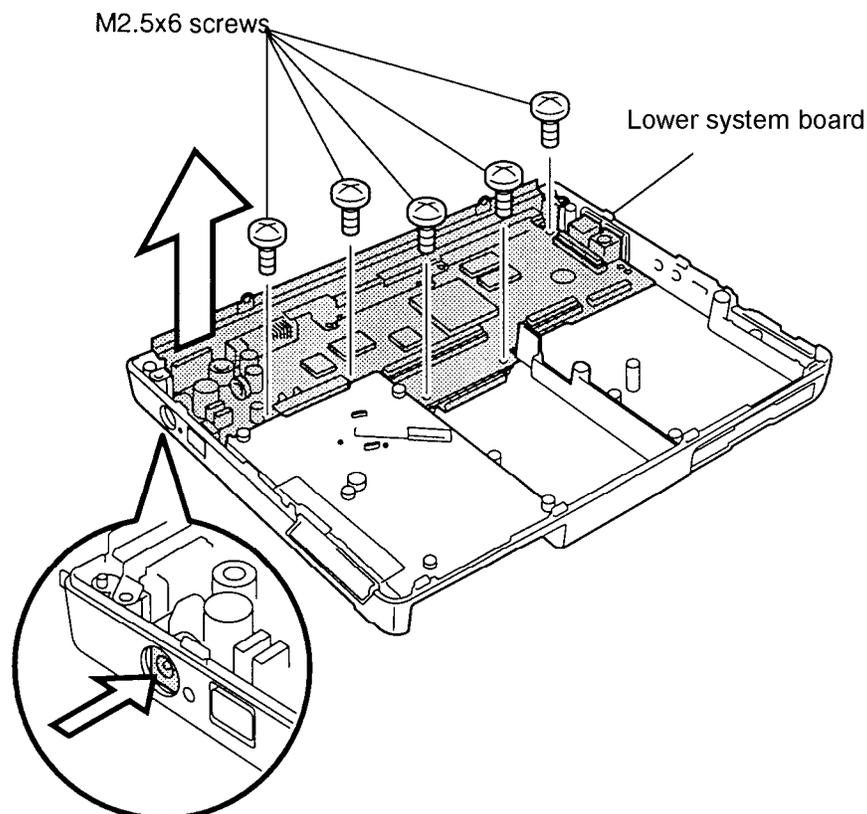


Figure 4-27 Removing the lower system board

Installing the Lower System Board

To install the T2400CS/T2400CT's lower system board, follow the steps below and refer to figure 4-27.

1. Place the system board on the bottom cover, and secure the five M2.5x6 screws on the system board (figure 4-27).

NOTE: Be careful not to bend the battery terminals when seating the system board.

2. Install the LCD/PC card joint card, memory board, speaker/LED board/backup battery, display assembly, FDD, HDD, RTC battery/Upper System board, top cover, optional memory module, keyboard, optional PCMCIA card, and battery pack as described in sections 4.14 back through 4.11 and 4.9 back through 4.2.

4.16 Display Mask

Removing the Display Mask

To remove the T2400CS/T2400CT's display mask, follow the steps below and refer to figure 4-19.

1. Turn off the power to the T2400CS/T2400CT and disconnect the AC adapter, power cord, and all external cables connected to the T2400CS/T2400CT.
2. Remove the battery as described in section 4.2.

NOTE: It is not necessary to remove the display assembly.

3. Remove two LCD mask seals from the display hinges and two rubber pads from the top corners of the display to expose screws securing the display mask (figure 4-19).
4. Remove two M2.5x6 screws at the bottom corners of the display mask, and two M2.5x6 screws at the top corners (figure 4-19).
5. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the four latches across the top of the display mask (figure 4-19).
6. Continue unlatching the mask along the sides (three latches on each side), at the bottom, four latches, and display supports (figure 4-19).

Installing the Display Mask

To install the T2400CS/T2400CT's display mask, follow the steps below and refer to figure 4-19.

1. Set the display mask in place and press firmly to secure the latches. Start at the bottom four latches and work your way around the sides (three latches on each side and the four latches at the top) (figure 4-19).
2. Secure four brass M2.5x6 screws, one at each corner of the display cover (figure 4-19).
3. Replace the two rubber pads and two LCD mask seals covering screws at the top corners and the hinges (figure 4-19).
4. Replace the battery pack as described in section 4.2.

4.17 T2400CS Fluorescent Lamp (FL) Inverter Board

Removing the T2400CS FL Inverter Board

To remove the T2400CS's FL inverter board, follow the steps below and refer to figures 4-28 and 4-29.

1. Turn off the power to the T2400CS. Disconnect the AC adapter and all external cables connected to the T2400CS.
2. Remove the battery pack and display mask as described in sections 4.2 and 4.16.
3. Remove the three M2.5x6 screws from the FL inverter board (figure 4-28).

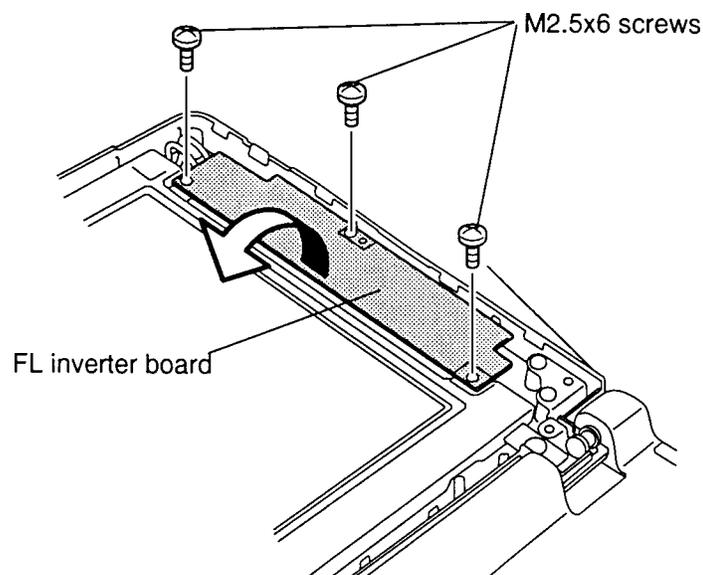


Figure 4-28 Removing the FL inverter board

4. Carefully rotate the FL inverter board out from right to left and disconnect the FL inverter cable from CN1 and the FL cable from CN2 (figure 4-29).

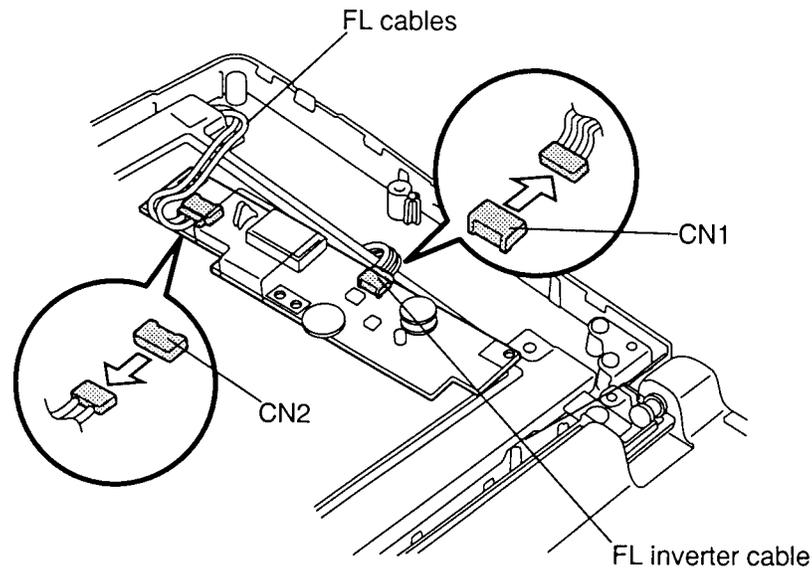


Figure 4-29 Disconnecting the FL inverter board

Installing the T2400CS FL Inverter Board

To install the T2400CS's FL inverter board, follow the steps below and refer to figures 4-28 and 4-29.

1. Connect the **FL inverter cable** to **CN1** on the **inverter board** and the **FL cable** to **CN2** (figure 4-29).
2. Route the **cables** so they are not pinched by the **FL inverter board**, **display hinge**, or other component.
3. Replace the **FL inverter board** and secure it with the **three M2.5x6 screws** (figure 4-28).
4. Install the display mask and battery pack as described in sections 4.16 and 4.2.

4.18 T2400CS Liquid Crystal Display (LCD) Module

Removing the T2400CS Color LCD Module

To remove the T2400CS's color LCD module, follow the steps below and refer to figure 4-30.

1. Turn off the power to the T2400CS. Disconnect the AC adapter, power cord, and all external cables connected to the T2400CS.
2. Remove the battery pack, display mask, and FL inverter board as described in sections 4.2, 4.16, and 4.17.
3. Remove the two **M2.5x6 screws** securing the **LCD module** to the LCD cover (figure 4-30).
4. Carefully rotate the **LCD module** from right to left out of the display cover and disconnect the **three display cables** from the LCD module (figure 4-30).

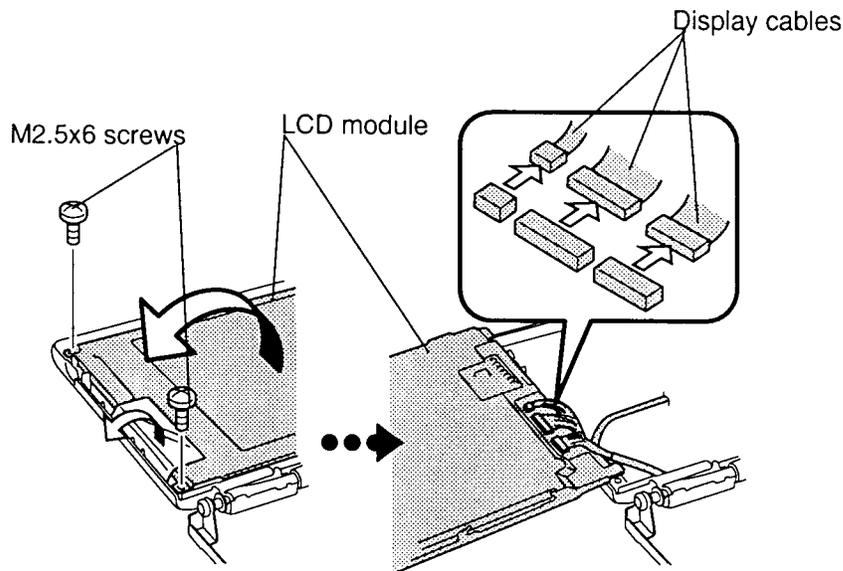


Figure 4-30 Removing the LCD module

Installing the T2400CS LCD Module

To install the T2400CS's LCD module, follow the steps below and refer to figure 4-30.

1. Connect the **three display cables** to the LCD module, and carefully rotate the LCD module to the LCD cover (figure 4-30).
2. Secure the two **M2.5x6 screws** on the LCD module (figure 4-30).
3. Install the FL inverter board, display mask, and battery pack as described in sections 4.17, 4.16, and 4.2.

4.19 T2400CS FL

CAUTION: When you remove the **FL**, be careful not to let any dust or other foreign matter enter the display panel components.

Removing the T2400CS FL

To remove the T2400CS's FL, follow the steps below. Refer to figures 4-31 through 4-33.

1. Turn off the power to the T2400CS. Disconnect the AC adapter, and all external cables connected to the T2400CS.
2. Remove the battery pack, display mask, FL inverter board and LCD module as described in sections 4.2, 4.16, 4.17, and 4.18.
3. Lay the **color LCD module** face down and use needle-nose pliers to unbend the **16 latches** holding the front and back frames together. Then, lift the unit out of the front frame (figure 4-31).

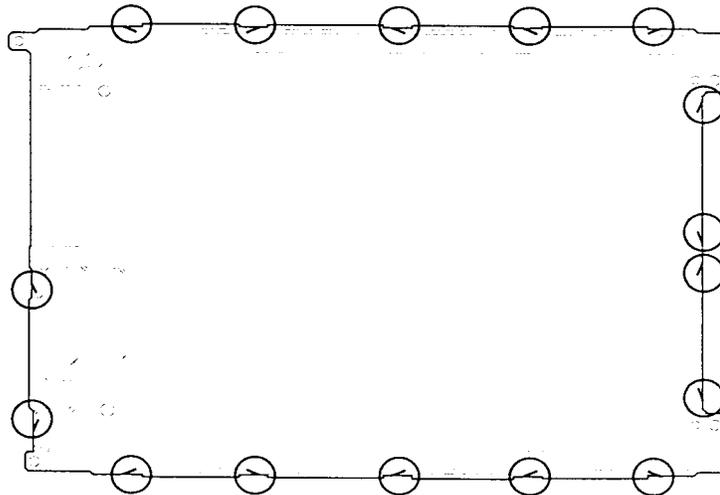


Figure 4-31 Unbending the color LCD module latches

4. Remove the **four M2x4 silver screws** securing the **FL unit** and **LCD panel** to the back frame (figure 4-32).

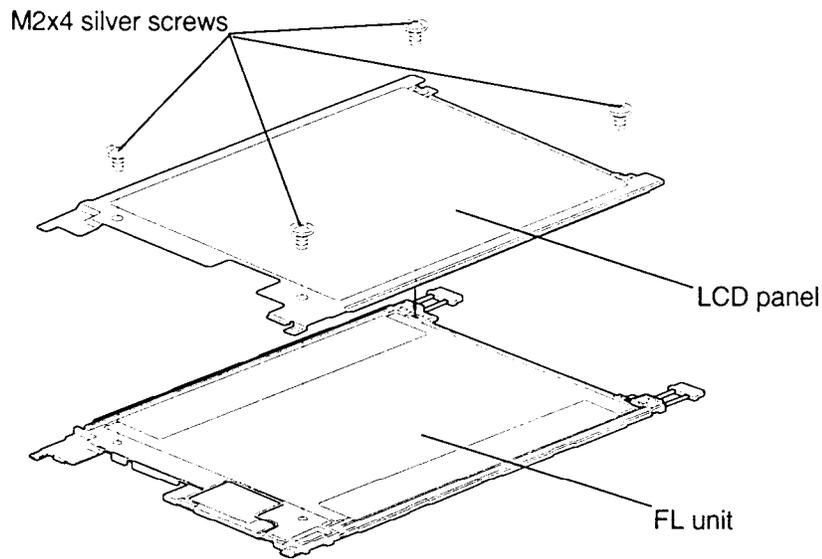


Figure 4-32 Removing the FL screws

5. Pull up the **reflective sheet** from the LCD module.
6. Lift out the **FL** (figure 4-33).

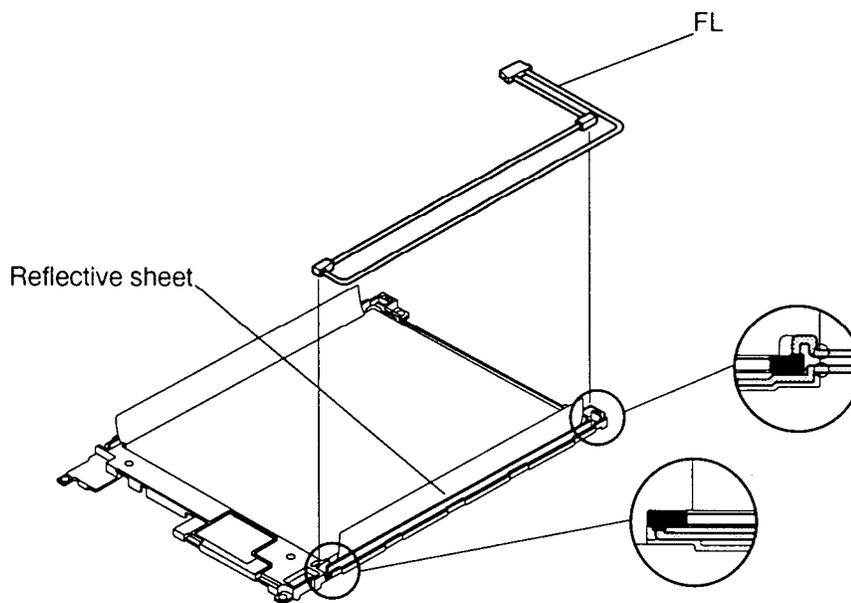


Figure 4-33 Removing the FL

Installing the T2400CS FL

To install the T2400CS's FL unit, follow the steps below and refer to figures 4-31 through 4-33.

1. Place the **FL** on the **FL unit** and cover the FL using the reflective sheet (figure 4-33).
2. Secure the **LCD panel** with **four M2x4 screws** (figure 4-32).
3. Carefully bend the **16 latches** back into place (figure 4-31).
4. Install the LCD module, FL inverter board, display mask, and battery pack as described in sections 4.18, 4.17, 4.16, and 4.2.

4.20 T2400CT FL Inverter Board

Removing the T2400CT FL Inverter Board

To remove the T2400CT's FL inverter board, follow the steps below and refer to figures 4-34 and 4-35.

1. Turn off power to the T2400CT. Disconnect the AC adapter and all external cables connected to the T2400CT.
2. Remove the battery pack and display mask as described in sections 4.2 and 4.16.
3. Remove the **three M2.5x6 screws** securing the **FL inverter board** (figure 4-34).

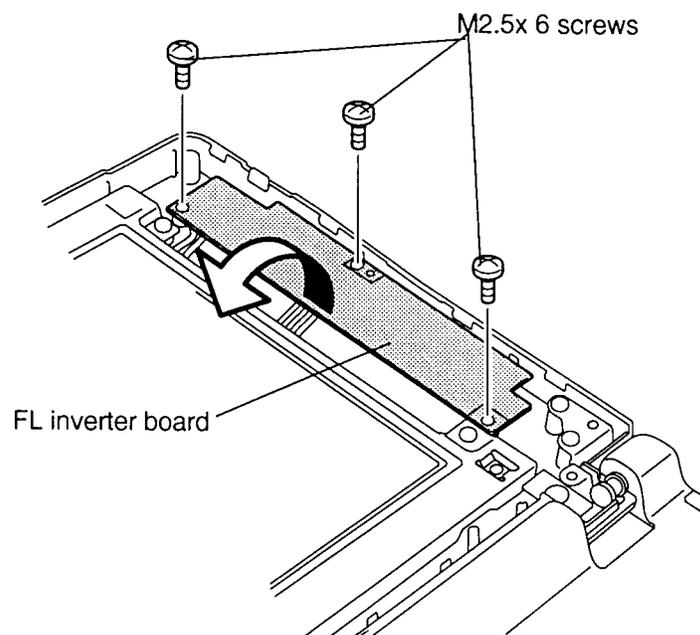


Figure 4-34 Removing the FL inverter board

4. Rotate the FL inverter board out of its seating and disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2** on the FL inverter board (figure 4-35).

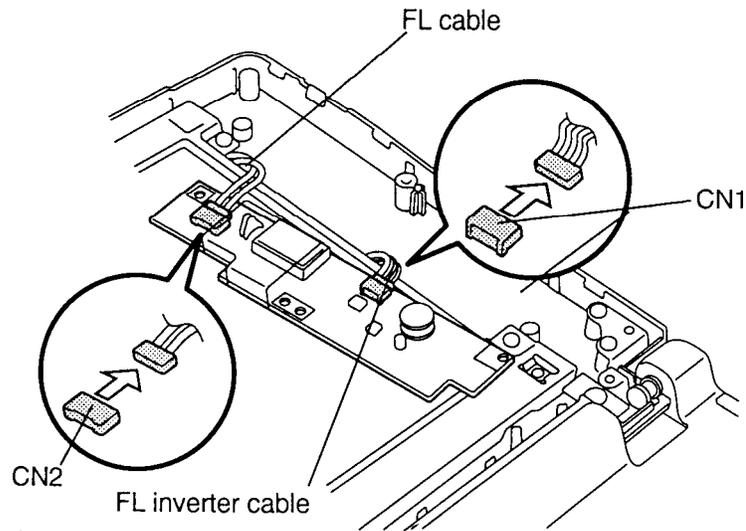


Figure 4-35 Disconnecting the FL inverter board

Installing the T2400CT FL Inverter Board

To install the T2400CT's FL inverter board, follow the steps below and refer to figures 4-34 and 4-35.

1. Connect the **FL inverter cable** to **CN1** and the **FL cable** to **CN2** on the FL inverter board (figure 4-35).
2. Seat the **FL inverter board** and route the **cables** so they will not be pinched by the display cover or other components.
3. Secure the **FL inverter board** with the **three M2.5x6 screws** (figure 4-34).
4. Install the display mask and battery pack as described in sections 4.16 and 4.2.

4.21 T2400CT LCD Module

Removing the T2400CT LCD Module

CAUTION: The T2400CT LCD module is easily damaged. Before removing the module, refer to Appendix A for precautions on handling.

To remove the T2400CT's LCD Module, follow the steps below and refer to figures 4-36 to 4-38.

1. Turn off the power to the T2400CT. Disconnect the AC adapter, and all external cables connected to the T2400CT.
2. Remove the battery pack, display mask, and FL inverter board as described in sections 4.2, 4.16, and 4.20.
3. Remove the **four M2.5x6 screws** securing the LCD module to the back frame of the computer (figure 4-36).

NOTE: Do not remove the screws circled in figure 4-36. These screws secure the metal cover to the LCD panel.

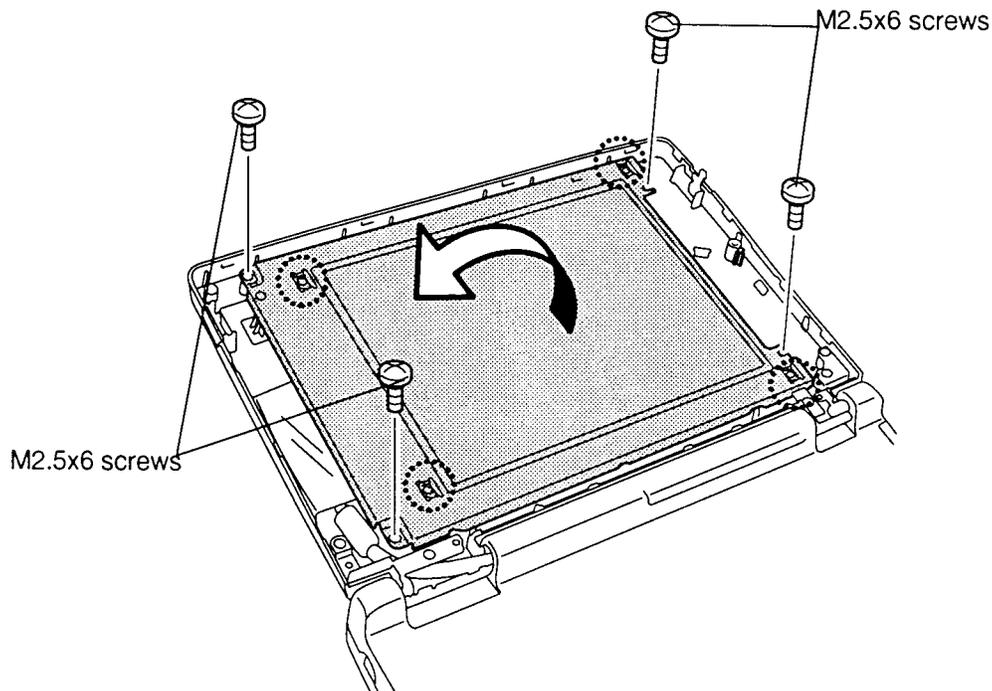


Figure 4-36 Removing the LCD screws

4. Rotate the **LCD module** out of the cover from right to left (figure 4-37).
5. Disconnect the **display cable board** from the **LCD module** (figure 4-37).

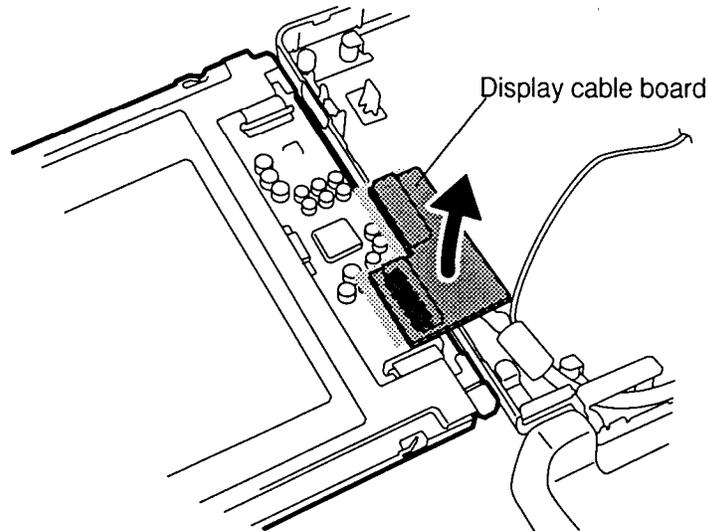


Figure 4-37 Removing the LCD module

6. Pull off the insulator attached by double-sided tape.
7. Disconnect the **display cables** from the **display cable board** to remove the board (figure 4-38).

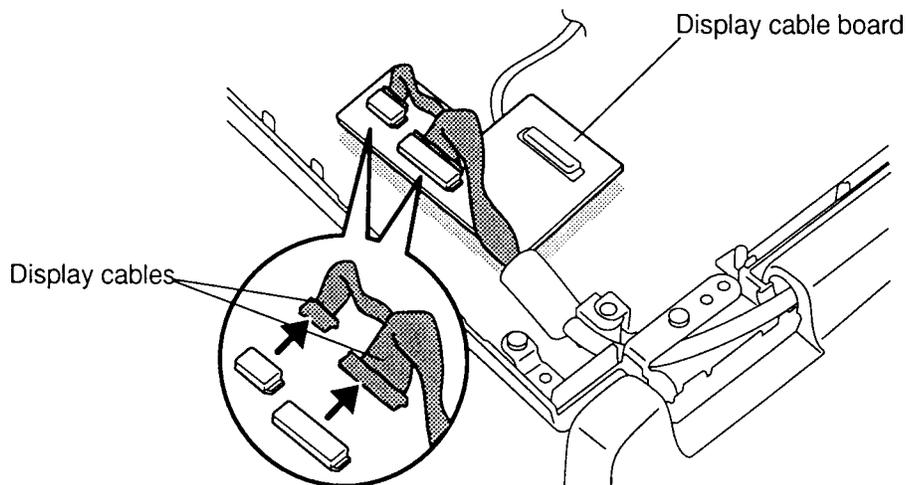


Figure 4-38 Removing the display cable board

Installing the T2400CT LCD Module

To install the T2400CT's liquid crystal display module, follow the steps below and refer to figures 4-36 to 4-38.

1. Connect the **display cables** to the display cable board (figure 4-38).
2. Connect the **display cable board** to the LCD module (figure 4-37).
3. Fix the insulator to the board pressing gently to secure the tape.
4. Place the **module** in the cover and route the **cables** so they will not be pinched by the display panel or other components.
5. Secure the panel with **four M2.5x6 screws** (figure 4-36).
6. Install the FL inverter board, display mask, and battery pack as described in sections 4.20, 4.16, and 4.2.

4.22 T2400CT FL

Removing the T2400CT FL

To remove the T2400CT's fluorescent lamp, follow the steps below and refer to figures 4-39 to 4-41.

1. Turn off the power to the T2400CT. Disconnect the AC adapter, and all external cables connected to the T2400CT.
2. Remove the battery pack, display mask, FL inverter board, and LCD module as described in sections 4.2, 4.16, 4.20, and 4.21.
3. Turn the LCD module upside down and remove the **six M2x4 screws** (figure 4-39).

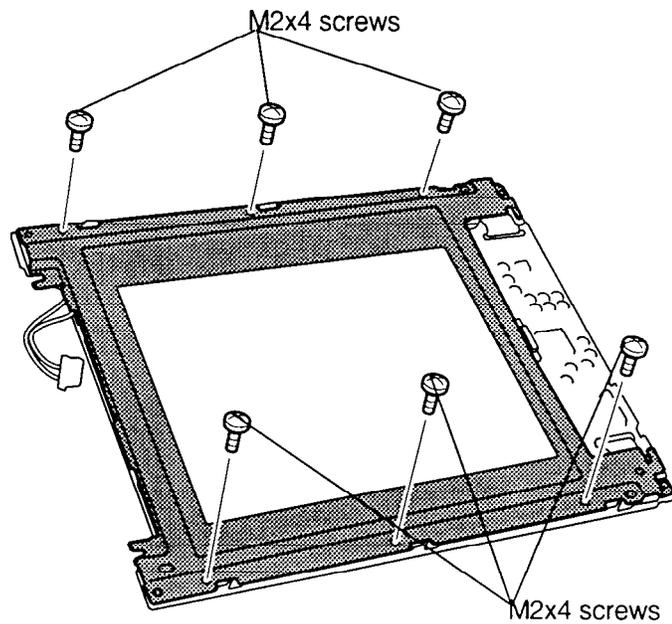


Figure 4-39 Removing the FL screws

4. Lift the left corners slightly, then slide the **metal cover** out gently to the left to free it of the **latches** marked by circles in figure 4-40. Lift off the cover.

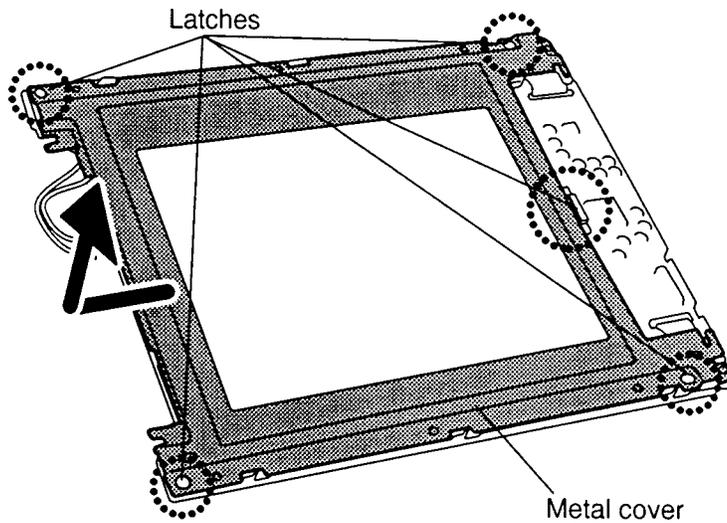


Figure 4-40 Removing the metal cover.

5. Hold up the **plastic cover** shielding the **fluorescent lamp** and lift the **FL cable** to remove the **lamp** (figure 4-41). The cable is held secure in its groove by small tongues, so pry it out gently.

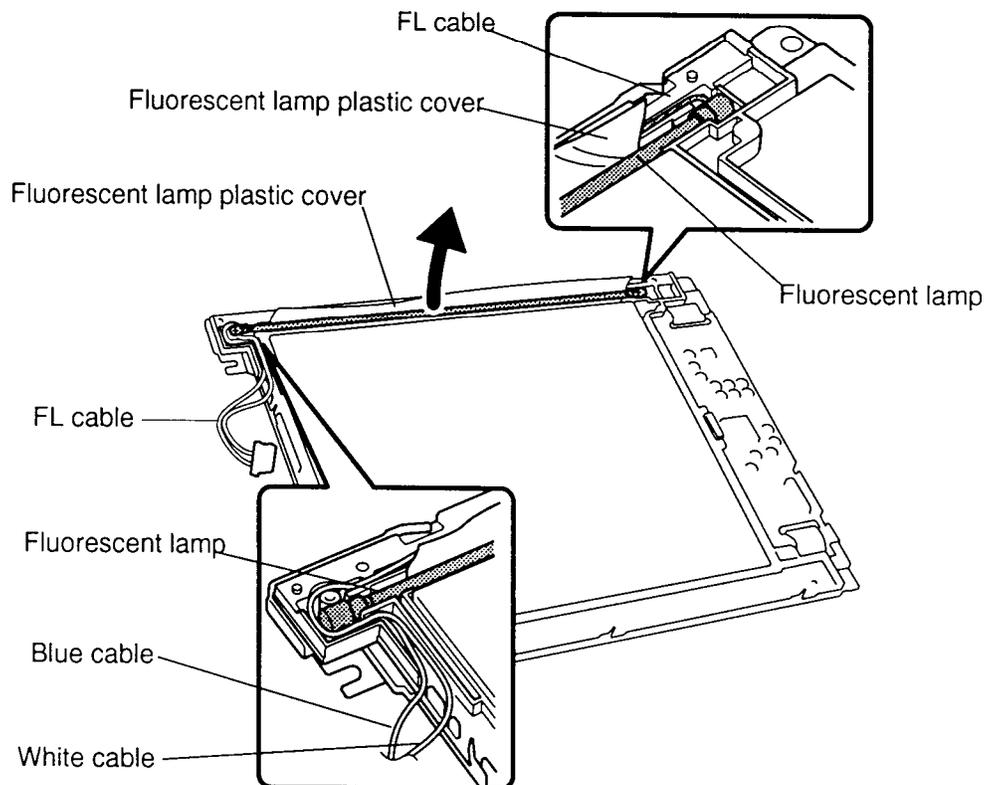


Figure 4-41 Removing the fluorescent lamp

Installing the T2400CT FL

To install the T2400CT's fluorescent lamp, follow the steps below and refer to figures 4-39 to 4-41. Note that there are separate grooves for the lamp and its white cable.

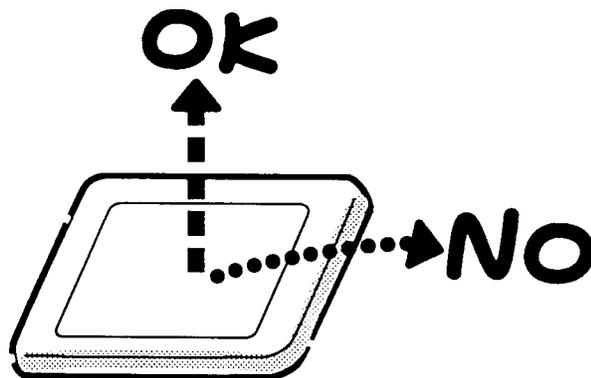
1. Slip the lamp's **plastic shield** between the lamp and its **white cable** and lay the lamp into its groove.
2. Lay the cable into its groove pressing down gently so that it is held in place by the small tongues in the groove.
3. Route the **white** and **blue cables** as shown in figure 4-41. Make sure the cables are pressed down snugly so they will not be pinched by other components.
4. Lay the **metal cover** on the LCD panel making sure the latches marked by circles in figure 4-40 fit into their corresponding **notches** on the LCD panel. First, fit the **larger latch** at the center of the edge facing the inverter board into its **notch**, which should guide the other fittings into position.
5. Slide the **metal cover** back into place to secure the latches.
6. Secure the metal cover with **six M2x4 screws** (figure 4-39).
7. Install the LCD module, FL inverter board, display mask, and battery pack as described in sections 4.21, 4.20, 4.16, and 4.2.

Appendix A Handling the LCD Module

Precautions for Handling the LCD Module

The computer's LCD module can be easily damaged during assembly or disassembly. Therefore, please observe the following precautions when handling the LCD module.

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.



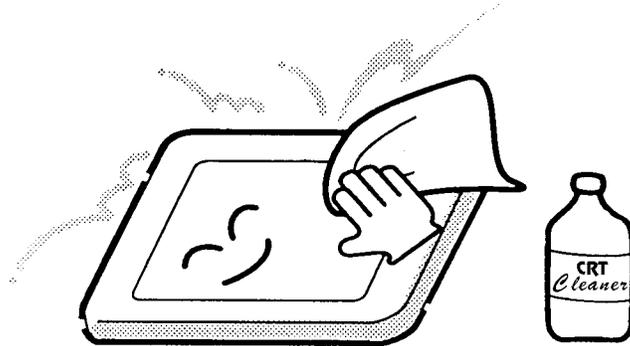
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

Also, the panel's polarized surface is easily scarred, so be careful when handling it.



3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

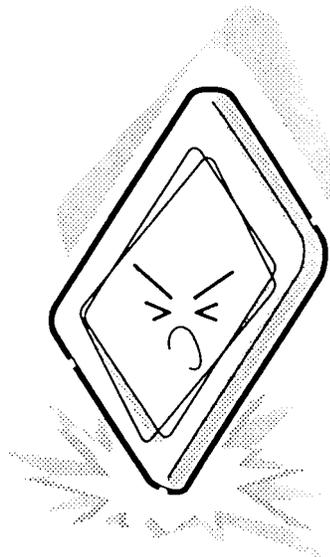
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



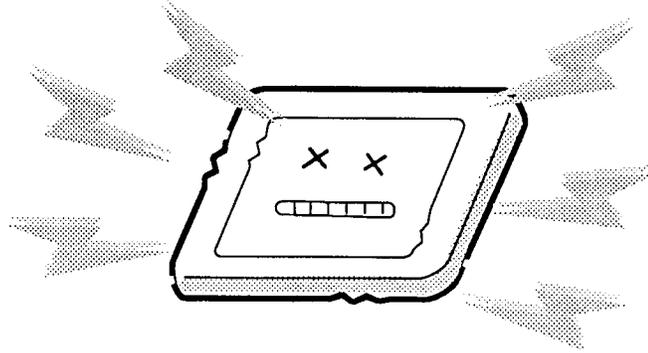
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



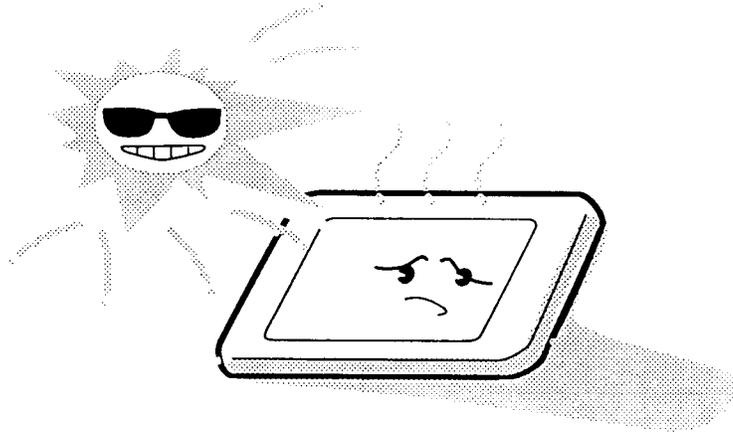
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



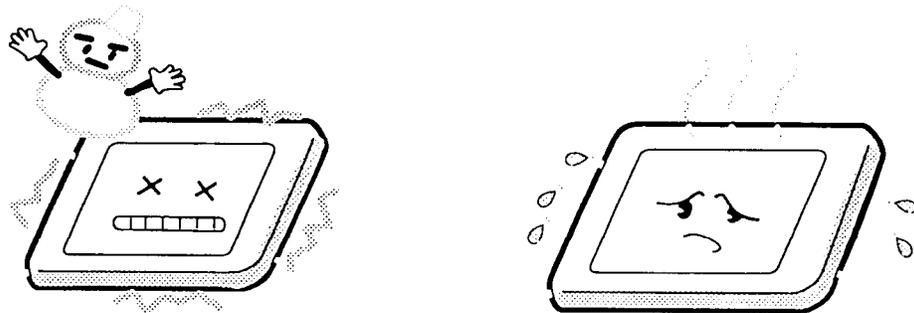
- CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



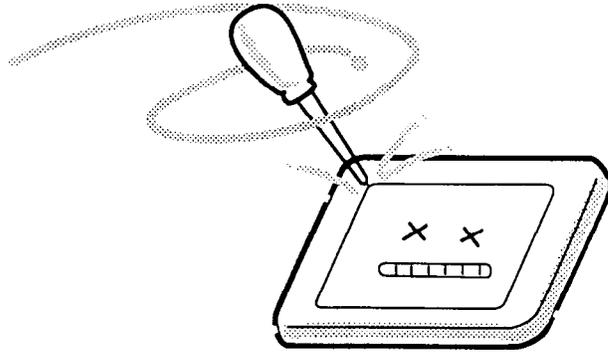
- Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



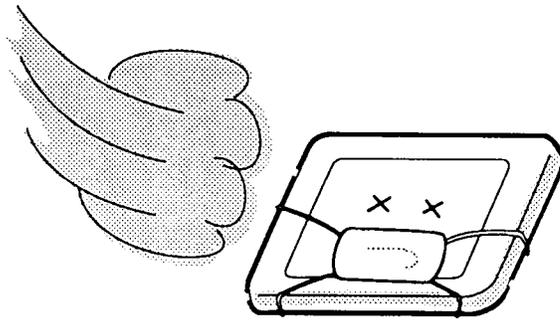
- Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



9. Do not disassemble the LCD module. Disassembly can cause malfunctions.



10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.



Appendix B Board Layout

B.1 FNVSY* Lower System Board

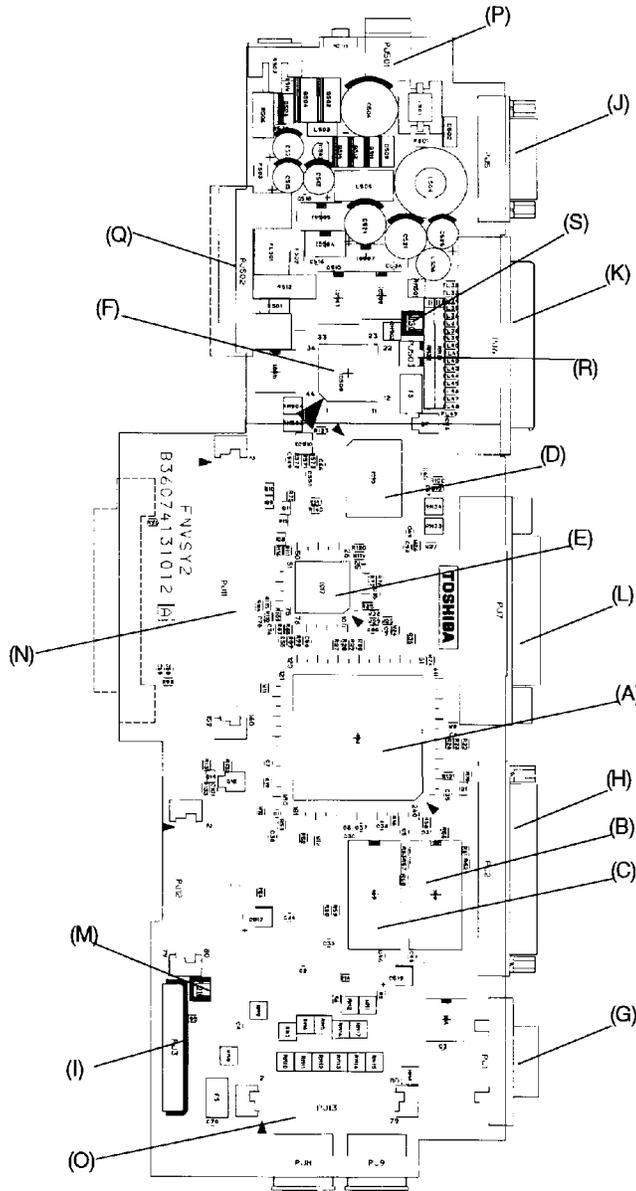


Figure B-1 FNVSY* lower system board (front)

Table B-1 FNVSY lower system board ICs and connectors (front)*

Mark	Number	Name
(A)	IC2	System Controller Gate Array
(B)	IC6	VRAM
(C)	IC7	VRAM
(D)	IC15	SCSI Controller
(E)	IC17	I/O Controller Gate Array
(F)	IC509	Power Supply Microprocessor
(G)	PJ1	CRT Connector
(H)	PJ2	PRT Connector
(I)	PJ3	Internal FDD Connector
(J)	PJ5	Serial Interface Connector
(K)	PJ6	SCSI Connector
(L)	PJ7	Port Replicator Connector
(M)	PJ10	Speaker Connector
(N)	PJ11	Joint Connector
(O)	PJ12	Memory Board Connector
(P)	PJ501	DC IN Connector
(Q)	PJ502	Main Battery Connector
(R)	PJ503	Backup Battery Connector
(S)	PJ504	Display Sensor Switch Connector

Table B-2 FNVSY lower system board ICs and connectors (back)*

Mark	Number	Name
(A)	IC1	CPU80486DX2
(B)	IC3	Clock Generator
(C)	IC4	Display Controller
(D)	IC9	Super Integration
(E)	PJ4	Internal HDD Connector

B.2 FNVCD* Upper System Board

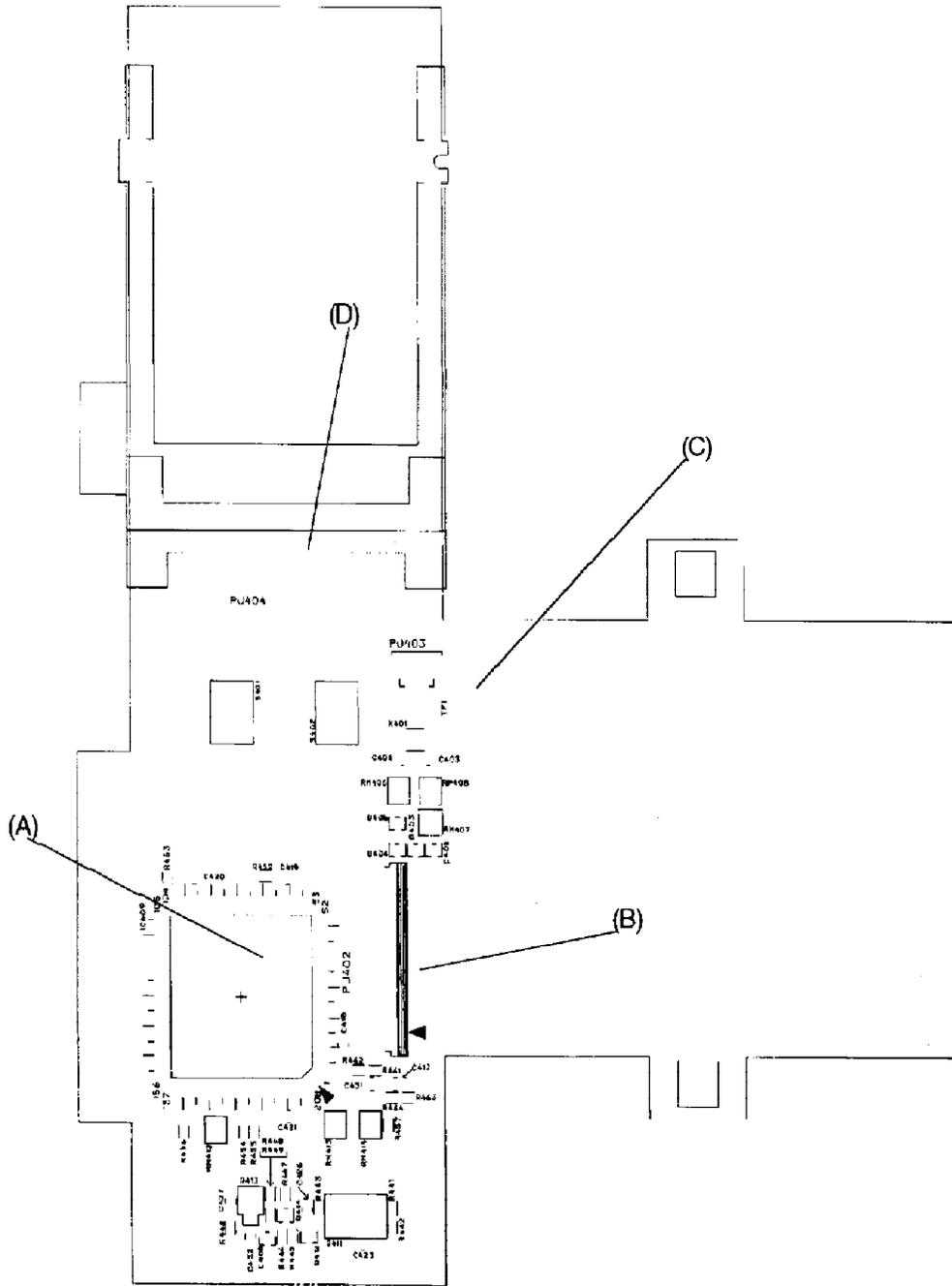


Figure B-3 FNVCD* upper system board (front)

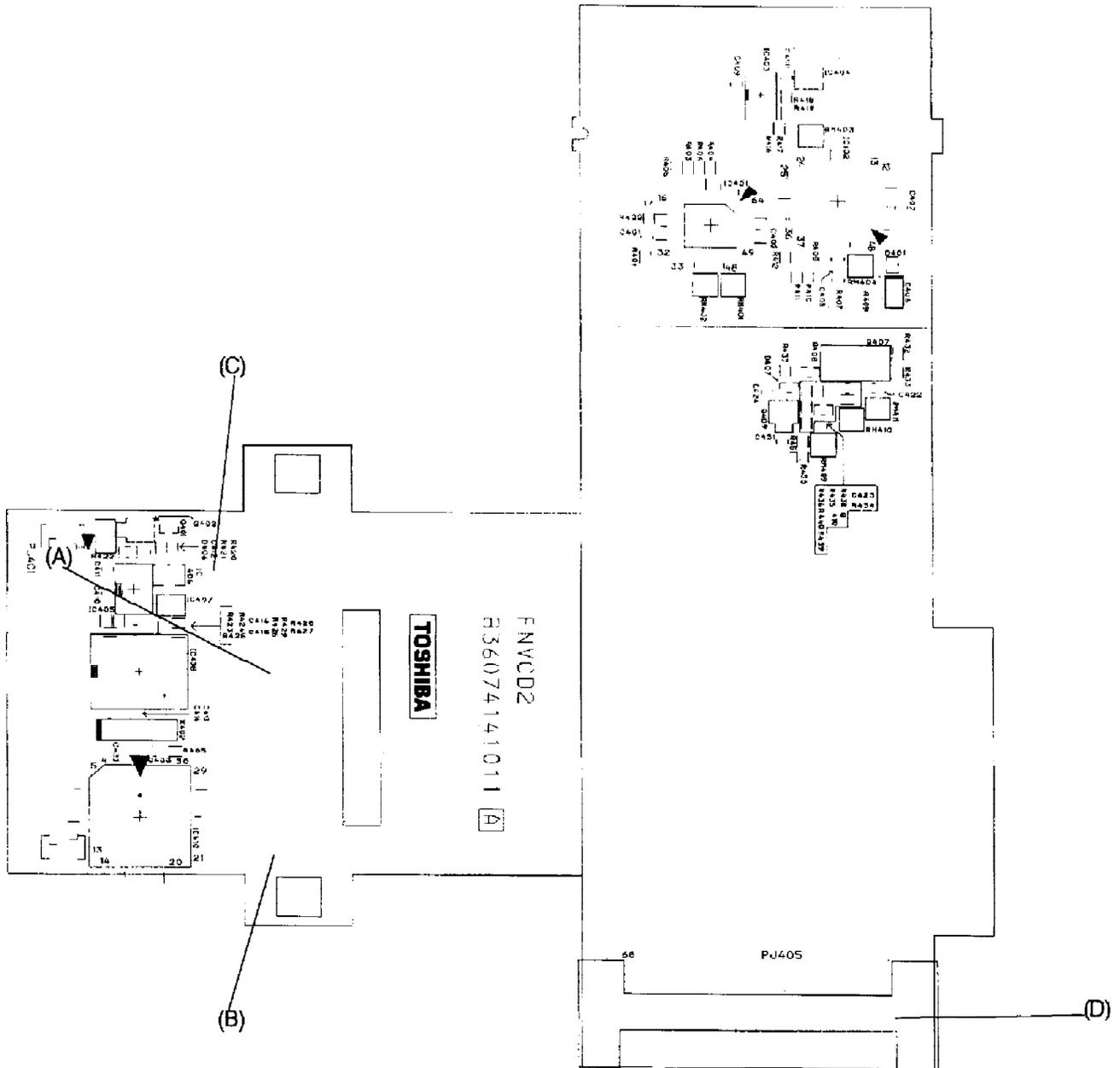


Figure B-4 FNVCD* upper system board (back)

Table B-3 FNVCD upper system board ICs and connectors (front)*

Mark	Number	Name
(A)	IC409	PCMCIA Controller Gate Array
(B)	PJ402	Keyboard Connector
(C)	PJ403	RTC Battery Connector
(D)	PJ404	PCMCIA Connector

Table B-4 FNVCD upper system board ICs and connectors (back)*

Mark	Number	Name
(A)	IC408	Real Time Clock
(B)	IC410	BIOS ROM
(C)	PJ401	Joint Connector
(D)	PJ405	PCMCIA Connector

Appendix C Pin Assignments

C.1 PJ1 RGB I/F Connectors (15-pin)

Table C-1 RGB I/F connector pin assignment (15-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RED;101	O	02	TGREN;101	O
03	BLUE;101	O	04	NC	–
05	GND	–	06	GND	–
07	GND	–	08	GND	–
09	NC	–	10	GND	–
11	NC	–	12	NC	–
13	HSYNC;100	O	14	TVSYNC;100	O
15	NC	–			

C.2 PJ2 PRT Connectors (25-pin)

Table C-2 PRT connector pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	STROB;000	I/O	02	PDB00;100	I/O
03	PDB01;100	I/O	04	PDB02;100	I/O
05	PDB03;100	I/O	06	PDB04;100	I/O
07	PDB05;100	I/O	08	PDB06;100	I/O
09	PDB07;100	I/O	10	ACK;000	I/O
11	BUSY;100	I/O	12	PE;100	I/O
13	SELCT;100	I/O	14	AUTFD;000	I/O
15	ERROR;000	I/O	16	PINT;000	I/O
17	SLIN;000	I/O	18	GND	–
19	GND	–	20	GND	–
21	GND	–	22	GND	–
23	GND	–	24	GND	–
25	GND	–			

C.3 PJ3 Internal FDD Connectors (26-pin)

Table C-3 Internal FDD connector pin assignment (26-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	ISSEL;000	O	02	GND	—
03	IRDAT;000	I	04	GND	—
05	IWPR;000	I	06	GND	—
07	ITR0;000	I	08	GND	—
09	IWEN;000	O	10	GND	—
11	IWDAT;000	O	12	GND	—
13	ISTEP;000	O	14	NC	—
15	IDIRC;000	O	16	ILOWD;000	O
17	IMON;000	O	18	IHMED;000	I
19	IRDY;000	I	20	VCC	—
21	DSKCHG;000	I	22	VCC	—
23	IDSL;000	O	24	VCC	—
25	IINDEX;000	I	26	VCC	—

C.4 PJ4 Internal HDD Connectors (44-pin)

Table C-4 Internal HDD connector pin assignment (44-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RESET;000	I	02	GND	–
03	SD07;100	I/O	04	SD08;100	I/O
05	SD06;100	I/O	06	SD09;100	I/O
07	SD05;100	I/O	08	SD10;100	I/O
09	SD04;100	I/O	10	SD11;100	I/O
11	SD03;100	I/O	12	SD12;100	I/O
13	SD02;100	I/O	14	SD13;100	I/O
15	SD01;100	I/O	16	SD14;100	I/O
17	SD00;100	I/O	18	SD15;100	I/O
19	GND	–	20	NC	–
21	NC	–	22	GND	–
23	IOWR;000	I/O	24	GND	–
25	IORD;000	I/O	26	GND	–
27	NC	–	28	NC	–
29	IIRDY;100	I	30	GND	–
31	IRQ14;100	I	32	IIO16;000	I
33	SA01;100	I/O	34	NC	–
35	SA00;100	I/O	36	SA02;100	I/O
37	HDC0CS;000	O	38	HDC1CS;000	O
39	DRVSL;000	I	40	GND	–
41	VCC	–	42	VCC	–
43	GND	–	44	RVCC	–

C.5 PJ5 Serial I/F Connectors (9-pin)

Table C-5 Serial I/F connector pin assignment (9-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCD1;110	I	02	RD1;010	I
03	SD1;010	O	04	DTR1;110	O
05	GND	–	06	DSR1;110	I
07	RTS1;110	O	08	CTS1;110	I
09	RI1;110	I			

C.6 PJ6 External SCSI Connectors (50-pin)

Table C-6 External SCSI connector pin assignment (50-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	SCSID0;000	I/O
03	GND	–	04	SCSID1;000	I/O
05	GND	–	06	SCSID2;000	I/O
07	GND	–	08	SCSID3;000	I/O
09	GND	–	10	SCSID4;000	I/O
11	GND	–	12	SCSID5;000	I/O
13	GND	–	14	SCSID6;000	I/O
15	GND	–	16	SCSID7;000	I/O
17	GND	–	18	SCSIDP;000	I/O
19	GND	–	20	GND	–
21	GND	–	22	GND	–
23	GND	–	24	GND	–
25	N/C	–	26	VCC	–
27	GND	–	28	GND	–
29	GND	–	30	GND	–
31	GND	–	32	SCATN;000	I/O
33	GND	–	34	GND	–
35	GND	–	36	SCBSY;000	I/O
37	GND	–	38	SCACK;000	I/O
39	GND	–	40	SCRST;000	O
41	GND	–	42	SCMSG;000	I/O
43	GND	–	44	SCSEL;000	I/O
45	GND	–	46	SCSICD;000	I/O
47	GND	–	48	SCREQ;000	I/O
49	GND	–	50	SCSIIO;000	I/O

C.7 PJ7 Port Replicator Connectors (120-pin)

Table C-7 Port replicator connector pin assignment (120-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	GND	–
03	SCSID0;100	I/O	04	SCSID2;100	I/O
05	SCSID4;100	I/O	06	SCSID6;100	I/O
07	SCSIDP;100	I/O	08	SCBSY;100	I/O
09	SCRST;100	I/O	10	SCSEL;100	I/O
11	SCREQ;100	I/O	12	GND	–
13	AUTFD;000	O	14	PINT;000	O
15	GND	–	16	MOUSDT;100	I/O
17	EXKBDT;100	I/O	18	GND	–
19	SD00;100	I/O	20	SD02;100	I/O
21	SD04;100	I/O	22	SD06;100	I/O
23	JOYR;000		24	GND	–
25	CVSYNC;110	O	26	GND	–
27	AGREEN;100	O	28	ABLUE;100	O
29	GND	–	30	GND	–
31	GND	–	32	GND	–
33	SCSID1;100	I/O	34	SCSID3;100	I/O
35	SCSID5;100	I/O	36	SCSID7;12200	I/O
37	SCATN;000	I/O	38	SCACK;000	I/O
39	SCMSG;000		40	SCSICD;000	
41	SCSIID;000		42	GND	–
43	ERROR;000		44	SLIN;000	
45	GND	–	46	MOUSCK;100	
47	EXKBCK;100		48	GND	–
49	SD01;100		50	SD03;100	
51	SD05;100		52	SD07;100	
53	JOYW;000		54	GND	–
55	CHSYNC;110		56	GND	–
57	ARED	O	58	GND	–
59	GND	–	60	GND	–
61	DCIN	–	62	DCIN	–
63	NC	–	64	SCVCC	–
65	NC	–	66	DSR1;110	I
67	DCD1;110	I	68	CTS1;110	I
69	RD1;010	I	70	GND	–
71	STROB;000	I/O	72	PDB00;100	I/O

Table C-7 Port replicator connector pin assignment (120-pin) (continued)

Pin	Signal	I/O	Pin	Signal	I/O
73	PDB02;100	I/O	74	PDB04;100	I/O
75	PDB06;100	I/O	76	ACK;000	I/O
77	PE;100	I/O	78	GND	–
79	NC	–	80	PRDT1;000	I/O
81	NC	–	82	PRVCC	–
83	NC	–	84	MSI;100	I
85	GND	–	86	GND	–
87	LOUTRP	O	88	LOUTRM	O
89	LINRM	I	90	LINRP	I
91	DCIN	–	92	DCIN	–
93	ADCIN	I	94	SCVCC	–
95	NC	–	96	DTR1;110	O
97	RI1;110	I	98	RTS1;110	O
99	SD1;010	O	100	GND	–
101	NC	–	102	PDB01;100	I/O
103	PDB03;100	I/O	104	PDB05;100	I/O
105	PDB07;100	I/O	106	BUSY;100	I/O
107	SELCT;100	I/O	108	GND	–
109	NC	–	110	PRDT2;000	I/O
111	NC	–	112	PRVCC	–
113	NC	–	114	MSO;100	O
115	GND	–	116	GND	–
117	LOUTLP	O	118	LOUTLM	O
119	LINLM	I	120	LINLP	I

C.8 PJ11 Joint Connectors (160-pin)

Table C-8 Joint connector pin assignment (160-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	GND	–
03	SD15;100	I/O	04	SD14;100	I/O
05	SD13;100	I/O	06	SD12;100	I/O
07	SD11;100	I/O	08	SD10;100	I/O
09	SD09;100	I/O	10	SD08;100	I/O
11	IRQ5;100	I	12	IRQ7;100	I
13	IRQ4;100	I	14	IRQ12;100	I
15	IRQ3;100	I	16	IRQ11;100	I
17	IRQ1;100	I	18	IRQ10;100	I
19	IRQ15;100	I	20	IRQ9;100	I
21	IRQ14;100	I	22	IRQ8;100	I
23	MCV	–	24	PCLR;000	O
25	SA00;100	I	26	SA01;100	I
27	SA02;100	I	28	SA03;100	I
29	SA04;100	I	30	SA05;100	I
31	SA06;100	I	32	SA07;100	I
33	SA08;100	I	34	SA09;100	I
35	SA10;100	I	36	SA11;100	I
37	SA12;100	I	38	SA13;100	I
39	SA14;100	I	40	SA15;100	I
41	SA16;100	I	42	SA17;100	I
43	SA18;100	I	44	SA19;100	I
45	GND	–	46	GND	–
47	CK32K;100	I	48	KBRW;000	I
49	PCSMI;000	I	50	KBTMG;100	I
51	STBY;000	I/O	52	KBUPDT;100	O
53	IPSSSEL;100	O	54	KBOT00;000	I
55	BUFOFF;000	I	56	KBOT01;000	I
57	GND	–	58	KBOT02;000	I
59	ROMSL;000	O	60	KBOT03;000	I
61	ROMA16;100	O	62	KBOT04;000	I
63	ROMWE;000	O	64	KBOT05;000	I
65	ROMPRG;110	O	66	KBOT06;000	I
67	PDNROM;000	O	68	KBOT07;000	I
69	RAMV	–	70	RAMV	–
71	SD07;100	I/O	72	SD03;100	I/O
73	SD06;100	I/O	74	SD02;100	I/O
75	GND	–	76	GND	–
77	SD05;100	I/O	78	SD01;100	I/O

Table C-8 Joint connector pin assignment (160-pin) (continued)

Pin	Signal	I/O	Pin	Signal	I/O
79	SD04;100	I/O	80	SD00;100	I/O
81	VCC	–	82	VCC	–
83	VCC	–	84	VCC	–
85	KEYPRS;100	I	86	RESET;000	O
87	IORD;000	O	88	KBCS;000	O
89	IOWR;000	O	90	REFRSH;000	I/O
91	AEN;100	O	92	NC	–
93	CSPTN;000	I	94	NC	–
95	NC	–	96	IOCLK;100	O
97	MERD;000	I/O	98	MEWR;000	I/O
99	P12V	–	100	P12V	–
101	LA21;100	O	102	LA20;100	O
103	LA23;100	O	104	LA22;100	O
105	GND	–	106	GND	–
107	RESET;100	O	108	A20LOW;000	I/O
109	IIRDY;100	I	110	RSTCP;000	I
111	IIO16;000	I	112	KBWR;000	O
113	VCC	–	114	VCC	–
115	IMCS16;000	O	116	KBCLK;110	O
117	ZROW;000	O	118	RTCWR;000	O
119	SBHE;000	O	120	RTCDS;000	O
121	BALE;100	O	122	RTCAS;100	O
123	PNLD07;100	O	124	PNLD06;100	O
125	PNLD08;100	O	126	PNLD05;100	O
127	PNLD09;100	O	128	PNLD04;100	O
129	GND	–	130	GND	–
131	PNLD10;100	O	132	PNLD03;100	O
133	PNLD11;100	O	134	PNLD02;100	O
135	PNLD12;100	O	136	PNLD01;100	O
137	PNLD13;100	O	138	PNLD00;100	O
139	DSPV	–	140	DSPV	–
141	PNLD14;100	O	142	FR;100	O
143	PNLD15;100	O	144	FP;100	O
145	DSPV	–	146	LP;100	O
147	FLTEN;000	O	148	SCLK;100	O
149	VCC	–	150	LCDEN;000	O
151	MOUSD;100	I/O	152	MOUSCK;100	I/O
153	EXKBCK;100	I/O	154	EXKBDT;100	I/O
155	ARWLED;100	I	156	NUMLED;100	I
157	CAPLED;100	I	158	IHMED;000	O
159	GND	–	160	GND	–

C.9 PJ201 Memory Slot Connectors (72-pin)

Table C-9 Memory slot connector pin assignment (72-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	MD00;101	I/O
03	MD01;101	I/O	04	MD02;101	I/O
05	MD03;101	I/O	16	MD04;101	I/O
07	MD05;101	I/O	08	MD06;101	I/O
09	MD07;101	I/O	10	B3V	–
11	NC	–	12	MA00;101	O
13	MA01;101	O	14	MA02;101	O
15	MA03;101	O	16	MA04;101	O
17	MA05;101	O	18	MA06;101	O
19	MA10;101	O	20	NC	–
21	MD08;101	O	22	MD09;101	O
23	MD10;101	O	24	MD11;101	O
25	MD12;101	O	26	MD13;101	O
27	MD14;101	O	28	MA07;101	O
29	MA11;101	O	30	B3V	–
31	MA08;101	O	32	MA09;101	O
33	RAS3;001	O	34	RAS1;001	O
35	MD15;101	O	36	NC	–
37	MD16;101	O	38	MD17;101	O
39	GND	–	40	CAS0;001	O
41	CAS2;001	O	42	CAS3;001	O
43	CAS1;001	O	44	RAS0;001	O
45	RAS2;001	O	46	GND	–
47	MWE2;001	O	48	GND	–
49	MD18;101	I/O	50	MD19;101	I/O
51	MD20;101	I/O	52	MD21;101	I/O
53	MD22;101	I/O	54	MD23;101	I/O
55	NC	–	56	MD24;101	I/O
57	MD25;101	I/O	58	MD26;101	I/O
59	MD28;101	I/O	60	MD27;101	I/O
61	B3V	–	62	MD29;101	I/O
63	MD30;101	I/O	64	MD31;101	I/O
65	NC	–	66	NC	–
67	NC	–	68	NC	–
69	NC	–	70	NC	–
71	NC	–	72	GND	–

C.10 PJ302 LCD Connectors (40-pin)

Table C-10 LCD connector pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	PSPV	–	02	DSPV	–
03	GND	–	04	GND	–
05	GND	–	06	RESET;000	O
07	LCDEN;000	O	08	LCDEN;000	O
09	PNLD15;110	O	10	PNLD02;110	O
11	FP;110	O	12	PNLD06;110	O
13	PNLD08;110	O	14	PNLD01;110	O
15	LP;110	O	16	GND	–
17	GND	–	18	GND	–
19	GND	–	20	GND	–
21	PNLD10;110	O	22	PNLD05;110	O
23	PNLD07;110	O	24	PNLD00;110	O
25	PNLD11;110	O	26	GND	–
27	PNLD09;110	O	28	GND	–
29	GND	–	30	GND	–
31	SCLK;110	O	32	PNLD04;110	O
33	PNLD12;110	O	34	FR;110	O
35	PNLD13;110	O	36	PNLD03;110	O
37	PNLD04;110	O	38	GND	–
39	GND	–	40	GND	–

C.11 PJ401 Joint Connectors (140-pin)

Table C-11 Joint connector pin assignment (140-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	GND	–
03	SD15;100	I/O	04	SD14;100	I/O
05	SD13;100	I/O	06	SD12;100	I/O
07	SD11;100	I/O	08	SD10;100	I/O
09	SD09;100	I/O	10	SD08;100	I/O
11	IRQ5;100	O	12	IRQ7;100	I
13	IRQ4;100	O	14	IRQ12;100	O
15	IRQ3;100	O	16	IRQ11;100	O
17	IRQ1;100	O	18	IRQ10;100	O
19	IRQ15;100	O	20	IRQ9;100	O
21	IRQ14;100	O	22	IRQ8;000	O
23	MCV	–	24	PCLR;000	I
25	SA00;100	O	26	SA01;100	O
27	SA02;100	O	28	SA03;100	O
29	SA04;100	O	30	SA05;100	O
31	SA06;100	O	32	SA07;100	O
33	SA08;100	O	34	SA09;100	O
35	SA10;100	O	36	SA11;100	O
37	SA12;100	O	38	SA13;100	O
39	SA14;100	O	40	SA15;100	O
41	SA16;100	O	42	SA17;100	O
43	SA18;100	O	44	SA19;100	O
45	GND	–	46	GND	–
47	CK32K;100	O	48	KBRW;000	O
49	PCSMI;000	O	50	KBTMG;100	O
51	STBY;000	I/O	52	KBUPDT;110	I
53	IPSEL;100	I	54	KBOT00;000	O
55	BUFOFF;000	O	56	KBOT01;000	O
57	GND	–	58	KBOT02;000	O
59	ROMCE;000	I	60	KBOT03;000	O
61	ROMA16;100	I	62	KBOT04;000	O
63	ROMWE;000	I	64	KBOT05;000	O
65	ROMPRG;110	I	66	KBOT06;000	O
67	PDNROM;100	I	68	KBOT07;000	O
69	RAMV	–	70	RAMV	–
71	SD07;100	I/O	72	SD03;100	I/O

Table C-11 Joint connector pin assignment (140-pin) (continued)

Pin	Signal	I/O	Pin	Signal	I/O
73	SD06;100	I/O	74	SD02;100	I/O
75	GND	–	76	GND	–
77	SD05;100	I/O	78	SD01;100	I/O
79	SD04;100	I/O	80	SD00;100	I/O
81	VCC	–	82	VCC	–
83	VCC	–	84	VCC	–
85	KEYPRS;100	O	86	RESET;000	I
87	IORD;000	I	88	KBCS;000	I
89	IOWR;000	I	90	REFRSH;000	I/O
91	AEN;100	I	92	BRIDGE3	–
93	CSPTN;000	O	94	BRIDGE4	–
95	BRIDGE1	–	96	IOCLK;100	I
97	MERD;000	I/O	98	MEWR;000	I/O
99	P12V	–	100	P12V	–
101	LA21;100	I	102	LA20;100	I
103	LA23;100	I	104	LA22;100	I
105	GND	–	106	GND	–
107	RESET;100	I	108	A20LOW;000	I/O
109	IIRDY;100	O	110	RSTCP;000	O
111	IIO16;000	O	112	KBWR;000	I
113	VCC	–	114	VCC	–
115	IMCS16;000	I	116	KBCLK;110	I
117	ZROW;000	I	118	RTCWR;000	I
119	SBHE;000	I	120	RTCDS;000	I
121	BALE;100	I	122	RTCAS;100	I
123	MOUSCK;100	I	124	GND	–
125	EXKBDT;100	I/O	126	GND	–
127	NUMLED;100	O	128	NC	–
129	IHMED;100	I	130	NC	–
131	VCC	–	132	VCC	–
133	MOUSDT;100	I/O	134	NC	–
135	EXKBCK;100	I/O	136	NC	–
137	ARWLED;100	O	138	GND	–
139	CAPLED;100	O	140	GND	–

C.12 PJ402 KB I/F Connectors (25-pin)

Table C-12 KB I/F connector pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	KBOT10;000	O	02	KBOT09;000	O
03	KBOT08;000	O	04	KBOT07;000	O
05	KBOT06;000	O	06	KBOT05;000	O
07	KBOT04;000	O	08	KBOT03;000	O
09	KBRT7;100	I	10	KBRT6;100	I
11	KBRT5;100	I	12	KBRT4;100	I
13	KBRT3;100	I	14	KBRT2;100	I
15	KBRT1;100	I	16	KBRT0;100	I
17	KBOT02;000	O	18	KBOT01;000	O
19	KBOT00;000	O	20	IPSTK5;000	I/O
21	NC	–	22	IPSTK4;000	I/O
23	IPSTK3;000	I/O	24	VCC	–
25	IPSTK1;000	I/O			

C.13 PJ403 RTC Connectors (3-pin)

Table C-13 RTC connector pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	S10.1	–	02	NC	–
03	GND	–			

C.14 PJ404 and PJ405 PC Card Slot Connectors (68-pin)

Table C-14 PC card slot connector pin assignment (68-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	02	CDx03;100	I/O
03	CDx04;100	I/O	04	CDx05;100	I/O
05	CDx06;100	I/O	06	CDx07;100	I/O
07	CE1x;000	O	08	CADx10;100	O
09	OEx;000	O	10	CADx11;100	O
11	CADx09;100	O	12	CADx08;100	O
13	CADx13;100	O	14	CADx14;100	O
15	WEx;000	O	16	CBSYx;000	I
17	MCVCCx	–	18	MCVPPx	–
19	CADx16;100	O	20	CADx15;100	O
21	CADx12;100	O	22	CADx07;100	O
23	CADx06;100	O	24	CADx05;100	O
25	CADx04;100	O	26	CADx03;100	O
27	CADx02;100	O	28	CADx01;100	O
29	CADx00;100	O	30	CDx00;100	I/O
31	CDx01;100	I/O	32	CDx02;100	I/O
33	WPx;000	I	34	GND	–
35	GND	–	36	CDx1;000	I
37	CDx11;100	I/O	38	CDx12;100	I/O
39	CDx13;100	I/O	40	CDx14;100	I/O
41	CDx15;100	I/O	42	CE2x;000	O
43	NC	–	44	IORx;000	O
45	IOWx;000	O	46	CADx17;100	O
47	CADx18;100	O	48	CADx19;100	O
49	CADx20;100	O	50	CADx21;100	O
51	MCVCCx	–	52	MCVPPx	–
53	CADx22;100	O	54	CADx23;100	O
55	CADx24;100	O	56	CADx25;100	O
57	NC	–	58	CRSTx;100	O
59	WAITx;000	I	60	NC	–
61	REGx;000	O	62	BVDx2;100	I
63	BVDx1;100	I	64	CDx08;100	I/O
65	CDx09;100	I/O	66	CDx10;100	I/O
67	CDx2;000	I	68	GND	–

NOTE: The T2400CS/T2400CT has two PCMCIA slots: A and B. Therefore, these are two identical sets of connectors, one for each card. For signals containing an “x” designation, for example CDx04;100, read the x as “A” or “B.”

C.15 PJ501 DC IN Connectors (3-pin)

Table C-15 DC IN connector pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCIN	–	02	GND	–
03	GND	–			

C.16 PJ502 Main Battery Connectors (5-pin)

Table C-16 Main battery connector pin assignment (5-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	BATT	–	02	ABTH	–
03	BATSL	–	04	GND	–
05	GND	–			

C.17 PJ503 Backup Battery Connectors (2-pin)

Table C-17 Backup battery connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	SUBBAT	–	02	GND	–

C.18 PJ504 Display Switch Connectors (2-pin)

Table C-18 Display switch connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	PNLOFF;000	I	02	GND	–

Appendix D USA Display Codes

Table D-1 USA display codes

HEXA DECIMAL VALUE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	BLANK NULL	▶	BLANK SPACE	0	@	P	'	p	Ç	É	á	⋮	⎓	⎓	α	≡
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⋮	⎓	⎓	β	±
2	☹	↑	"	2	B	R	b	r	é	Æ	ó	⋮	⎓	⎓	Γ	≥
3	♥	!!	#	3	C	S	c	s	â	ô	ú	⋮	⎓	⎓	π	≤
4	♠	¶	\$	4	D	T	d	t	ä	ö	ñ	⋮	⎓	⎓	Σ	∫
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⋮	⎓	⎓	σ	∫
6	♠	—	&	6	F	V	f	v	ð	û	ä	⋮	⎓	⎓	μ	÷
7	•	↓	'	7	G	W	g	w	ç	ù	o	⋮	⎓	⎓	τ	≈
8	•	↑	(	8	H	X	h	x	ê	ÿ	ï	⋮	⎓	⎓	ϕ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	Γ	⋮	⎓	⎓	θ	•
A	○	→	*	:	J	Z	j	z	è	Ü	Γ	⋮	⎓	⎓	Ω	•
B	♂	←	+	;	K	[	k	{	ï	ç	½	⋮	⎓	⎓	δ	√
C	♀	└	,	<	L	\	l	!	↑	£	¼	⋮	⎓	⎓	∞	∞
D	♪	↔	—	=	M	]	m	}	ì	¥	ì	⋮	⎓	⎓	φ	2
E	♪	▲	•	>	N	^	n	~	Ä	Pt	«	⋮	⎓	⎓	€	■
F	☼	▼	/	?	O	_	o	Δ	Å	f	»	⋮	⎓	⎓	∩	BLANK FF

Appendix E Keyboard Scan/Character Codes

Table E-1 Scan codes (set 1 and set 2) (1/3)

Cap No.	Keypop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
01	' ~	29	A9	0E	F0 0E	
02	1 !	02	82	16	F0 16	
03	2 @	03	83	1E	F0 1E	
04	3 #	04	84	26	F0 26	
05	4 \$	05	85	25	F0 25	
06	5 %	06	86	2E	F0 2E	
07	6 ^	07	87	36	F0 36	
08	7 &	08	88	3D	F0 3D	*2
09	8 *	09	89	3E	F0 3E	*2
10	9 (	0A	8A	46	F0 46	*2
11	0)	0B	8B	45	F0 45	
12	- _	0C	8C	4E	F0 4E	
13	= +	0D	8D	55	F0 55	
15	BkSp	0E	8E	66	F0 66	
16	Tab	0F	8F	0D	F0 0D	
17	Q	10	90	15	F0 15	
18	W	11	91	1D	F0 1D	
19	E	12	92	24	F0 24	
20	R	13	93	2D	F0 2D	
21	T	14	94	2C	F0 2C	
22	Y	15	95	35	F0 35	
23	U	16	96	3C	F0 3C	*2
24	I	17	97	43	F0 43	*2
25	O	13	98	44	F0 44	*2
26	P	19	99	4D	F0 4D	*2
27	[{	1A	9A	54	F0 54	
28	] }	1B	9B	5B	F0 5B	
29 (42)	\ |	2B	AB	5D	F0 5D	*5
30	Caps Lock	3A	BA	58	F0 58	
31	A	1E	9E	1C	F0 1C	
32	S	1F	9F	1B	F0 1B	
33	D	20	A0	23	F0 23	
34	F	21	A1	2B	F0 2B	
35	G	22	A2	34	F0 34	
36	H	23	A3	33	F0 33	
37	J	24	A4	3B	F0 3B	*2
38	K	25	A5	42	F0 42	*2
39	L	26	A6	4B	F0 4B	*2
40	; :	27	A7	4C	F0 4C	*2

Table E-1 Scan codes (set 1 and set 2) (2/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
41	' "	28	A8	52	F0 52	
43	Enter	1C	9C	5A	F0 5A	
44	Shift (L)	2A	AA	12	F0 12	
45	No.102 key	56	D6	61	F0 61	
46	Z	2C	AC	1A	F0 1A	
47	X	2D	AD	22	F0 22	
48	C	2E	AE	21	F0 21	
49	V	2F	AF	2A	F0 2A	
50	B	30	B0	32	F0 32	
51	N	31	B1	31	F0 31	
52	M	32	B2	3A	F0 3A	*2
53	, <	33	B3	41	F0 41	*2
54	. >	34	B4	49	F0 49	*2
55	/ ?	35	B5	4A	F0 4A	*2
57	Shift (R)	36	B6	59	F0 59	
58	Ctrl	1D	9D	14	F0 14	*3
60	Alt (L)	38	B8	11	F0 11	*3
61	Space	39	B9	29	F0 29	
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0 11	
75	Ins	E0 52	E0 D2	E0 70	E0 F0 70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0 71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0 6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0 6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0 69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0 75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0 72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0 7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0 7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0 74	*1
110	Esc	01	81	76	F0 76	

Table E-1 Scan codes (set 1 and set 2) (3/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
112	F1	3B	3B	05	F0 05	
113	F2	3C	BC	06	F0 06	
114	F3	3D	BD	04	F0 04	
115	F4	3E	BE	0C	F0 0C	
116	F5	3F	BF	03	F0 03	
117	F6	40	C0	0B	F0 0B	
118	F7	41	C1	83	F0 83	
119	F8	42	C2	0A	F0 0A	
120	F9	43	C3	01	F0 01	
121	F10	44	C4	09	F0 09	
122	F11	57	D7	78	F0 78	*3
123	F12	58	D8	07	F0 07	*3
124	PrintSc	*6	*6	*6	*6	*6
126	Pause	*7	*7	*7	*7	*7
202	Fn	—	—	—	—	*4

Notes:

- 1* Scan codes differ by mode.
- 2* Scan codes differ by overlay function.
- 3* Combination with **Fn** key makes different codes.
- 4* **Fn** key does not generate a code by itself.
- 5* This key corresponds to key No. 42 in 102-key model.
- 6* Refer to table E-6, scan codes with **Ctrl** key.
- 7* Refer to table E-7, scan codes with **Alt** key.

Table E-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1		Code set 2	
		Make	Break	Make	Break
75	INS	E0 AA E0 52	E0 D2 E0 2A	E0 F0 12 E0 70	E0 F0 70 E0 12
76	DEL	E0 AA E0 53	E0 D3 E0 2A	E0 F0 12 E0 71	E0 F0 71 E0 12
79	←	E0 AA E0 4B	E0 CB E0 2A	E0 F0 12 E0 6B	E0 F0 6B E0 12
80	Home	E0 A E0 47	E0 C7 E0 2A	E0 F0 12 E0 6C	E0 F0 6C E0 12
81	End	E0 AA E0 4F	E0 CF E0 2A	E0 F0 12 E0 69	E0 F0 69 E0 12
83	↑	E0 AA E0 48	E0 C8 E0 2A	E0 F0 12 E0 75	E0 F0 75 E0 12
84	↓	E0 AA E0 50	E0 D0 E0 2A	E0 F0 12 E0 72	E0 F0 72 E0 12
85	PgUp	E0 AA E0 49	E0 C9 E0 2A	E0 F0 12 E0 7D	E0 F0 7D E0 12
86	PgDn	E0 AA E0 51	E0 D1 E0 2A	E0 F0 12 E0 7A	E0 F0 7A E0 12
89	→	E0 AA E0 4D	E0 CD E0 2A	E0 F0 12 E0 74	E0 F0 74 E0 12

Note: The table above shows scan codes with the left **Shift** key. In combination with the right **Shift** key, scan codes are changed as below:

	With left Shift	With right Shift
Set 1	E0 AA _____	E0 B6
	E0 2A _____	E0 36
Set 2	E0 F0 12 _____	E0 F0 59
	E0 12 _____	E0 59

Table E-3 Scan codes in Numlock mode

Cap No.	Key top	Code set 1		Code set 2	
		Make	Break	Make	Break
75	INS	E0 2A E0 52	E0 02 E0 AA	E0 12 E0 70	E0 F0 70 E0 F0 12
76	DEL	E0 2A E0 53	E0 D3 E0 AA	E0 12 E0 71	E0 F0 71 E0 F0 12
79	←	E0 2A E0 4B	E0 CB E0 AA	E0 12 E0 6B	E0 F0 6B E0 F0 12
80	Home	E0 2A E0 47	E0 C7 E0 AA	E0 12 E0 6C	E0 F0 6C E0 F0 12
81	End	E0 2A E0 4F	E0 CF E0 AA	E0 12 E0 69	E0 F0 69 E0 F0 12
83	↑	E0 2A E0 48	E0 C8 E0 AA	E0 12 E0 75	E0 F0 75 E0 F0 12
84	↓	E0 2A E0 50	E0 D0 E0 AA	E0 12 E0 72	E0 F0 72 E0 F0 12
85	PgUp	E0 2A E0 49	E0 C9 E0 AA	E0 12 E0 7D	E0 F0 7D E0 F0 12
86	PgDn	E0 2A E0 51	E0 D1 E0 AA	E0 12 E0 7A	E0 F0 7A E0 F0 12
89	→	E0 2A E0 4D	E0 CD E0 AA	E0 12 E0 74	E0 F0 74 E0 F0 12

Table E-4 Scan codes with Fn key

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
43	ENT	E0 1C	E0 9C	E0 5A	E0 F0 5A
58	CTRL	E0 1D	E0 9D	E0 14	E0 F0 14
60	LALT	E0 38	E0 B8	E0 11	E0 F0 11
121	ARROW	05	C5	77	F0 77
122	NUMERIC	05	C5	7E	F0 7E

Table E-5 Scan codes in overlay mode

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
08	7 (7)	47	C7	6C	F0 6C
09	8 (8)	48	C8	75	F0 75
10	9 (9)	49	C9	7D	F0 7D
11	0 (÷)	37	B7	7C	F0 7C
23	U (4)	4B	CB	6B	F0 6B
24	I (5)	4C	CC	73	F0 73
25	O (6)	4D	CD	74	F0 74
26	P (–)	4A	CA	7B	F0 7B
37	J (1)	4F	CF	69	F0 69
38	K (2)	50	D0	72	F0 72
39	L (3)	51	D1	7A	F0 7A
40	; (+)	4E	CE	79	F0 79
52	M (0)	52	D2	70	F0 70
53	, (,)	33	B3	41	F0 41
54	(.)	53	D3	71	F0 71
55	/ (/)	E0 35	E0 B5	40 4A	E0 F0 4A

Table E-6 Scan codes with Ctrl key

Key top	Shift	Code set 1		Code set 2	
		Make	Break	Make	Break
Prt Sc	Common	E0 2A E0 37	E0 B7 E0 AA	E0 12 E0 7C	E0 F0 7C E0 F0 12
	Ctrl*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Shift*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Alt*	54	D4	84	F0 B4

Table E-7 Scan codes with Alt key

Key top	Shift	Code set 1						Code set 2							
		Make						Make							
Pause	Common	E1	ID	45	E1	SD	C5	E1	14	77	E1	F0	14	F0	77
	Ctrl*	E0	46	E0	C6			E0	7E	E0	F0	7E			

*: This key generates only make codes.

Appendix F Key Layout

F.1 United States (US) Keyboard

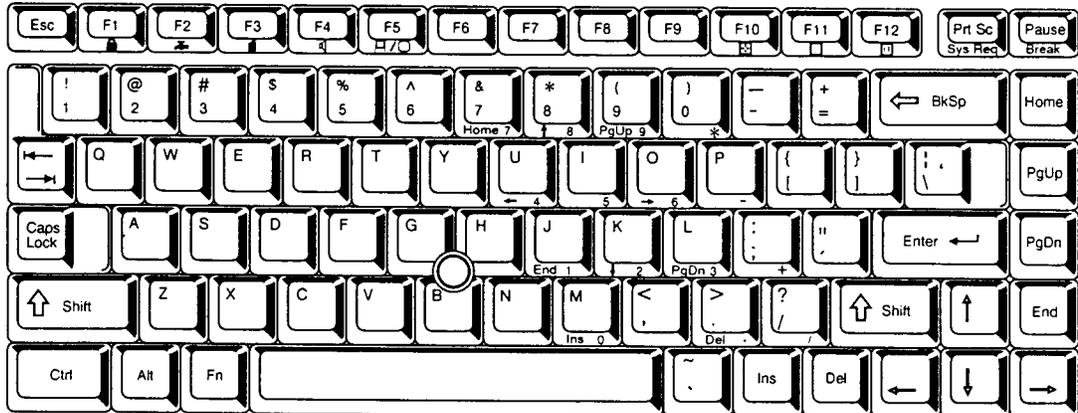


Figure F-1 US keyboard

F.2 United Kingdom (UK) Keyboard

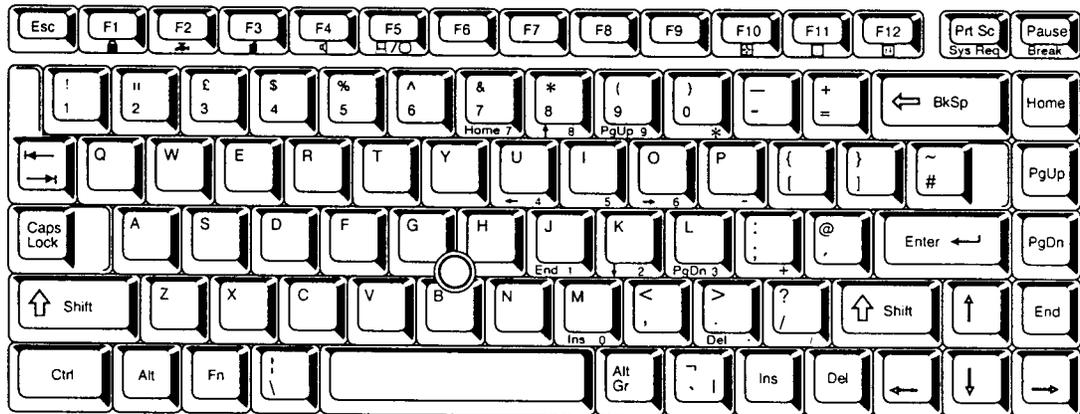


Figure F-2 UK keyboard

F.3 German (GR) Keyboard

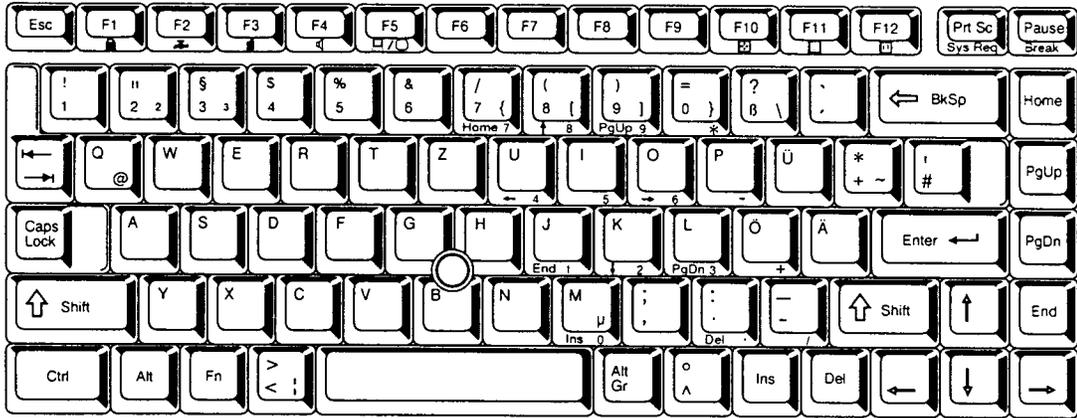


Figure F-3 GR keyboard

F.4 French (FR) Keyboard

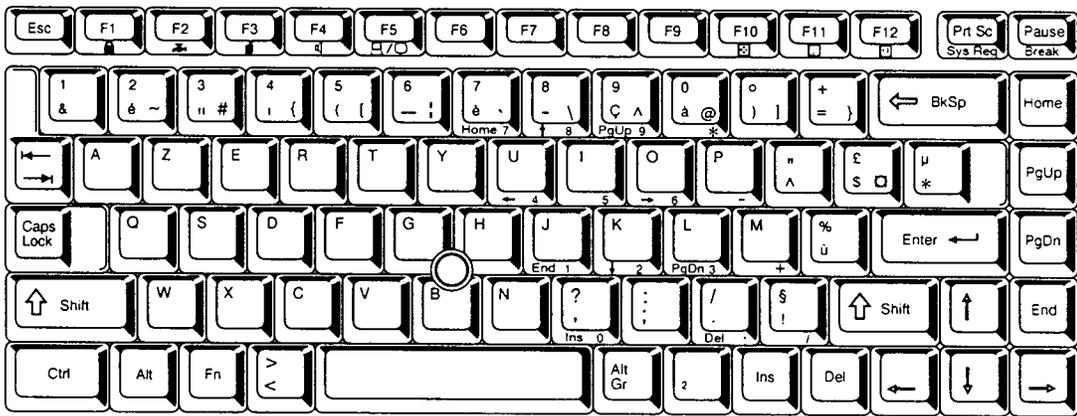


Figure F-4 FR keyboard

F.5 Spanish (SP) Keyboard

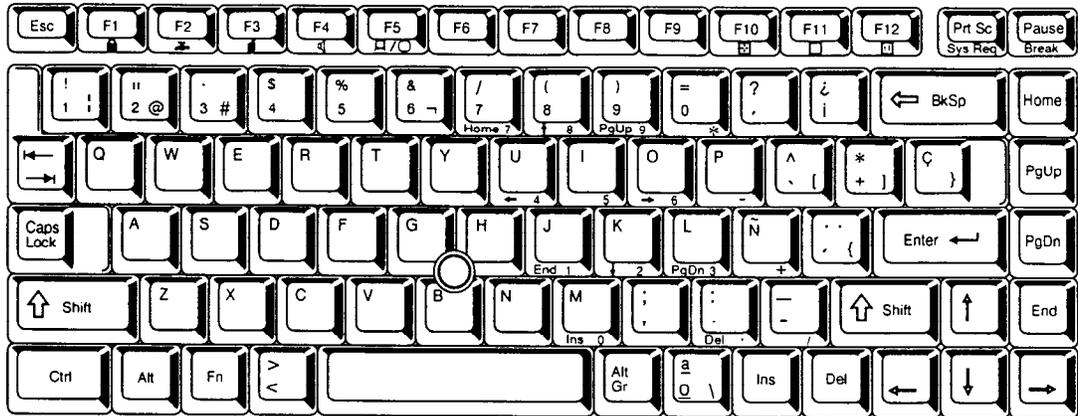


Figure F-5 SP keyboard

F.6 Italian (IT) Keyboard

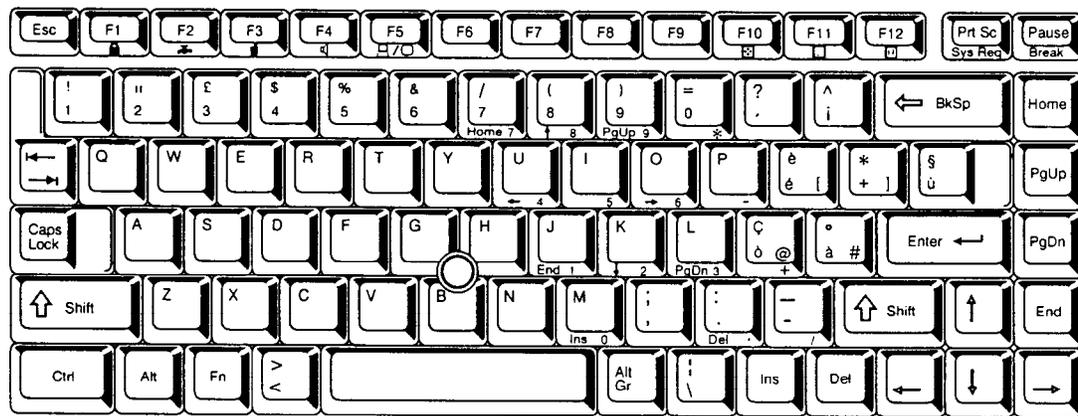


Figure F-6 IT keyboard

F.7 Scandinavian (SC) Keyboard

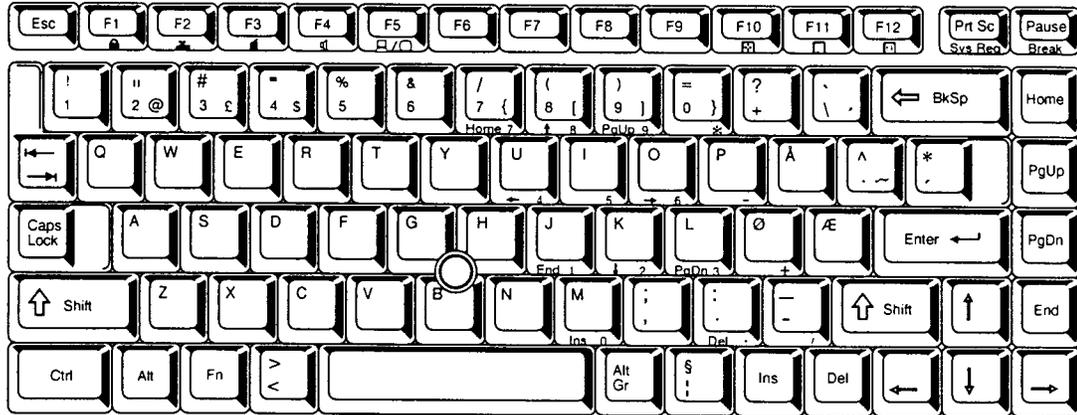


Figure F-7 SC keyboard

F.8 Swiss-German (SL) Keyboard

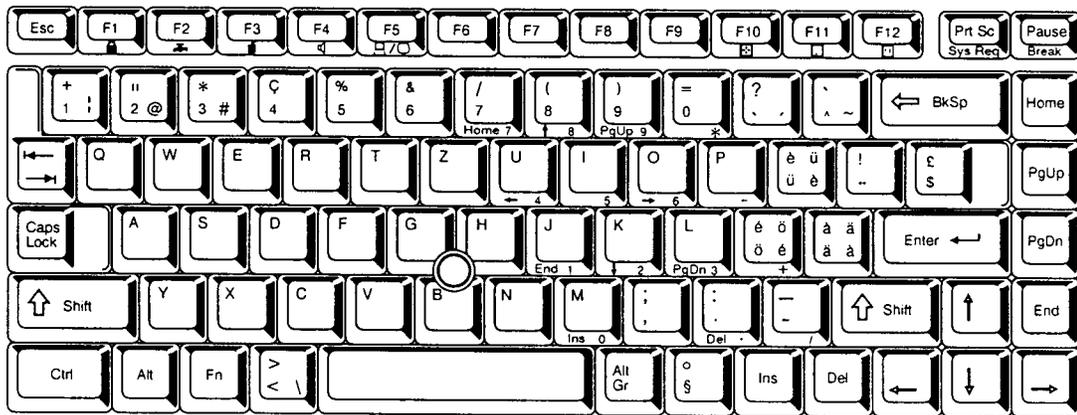


Figure F-8 SL keyboard

F.9 Canadian (Specialized) Keyboard

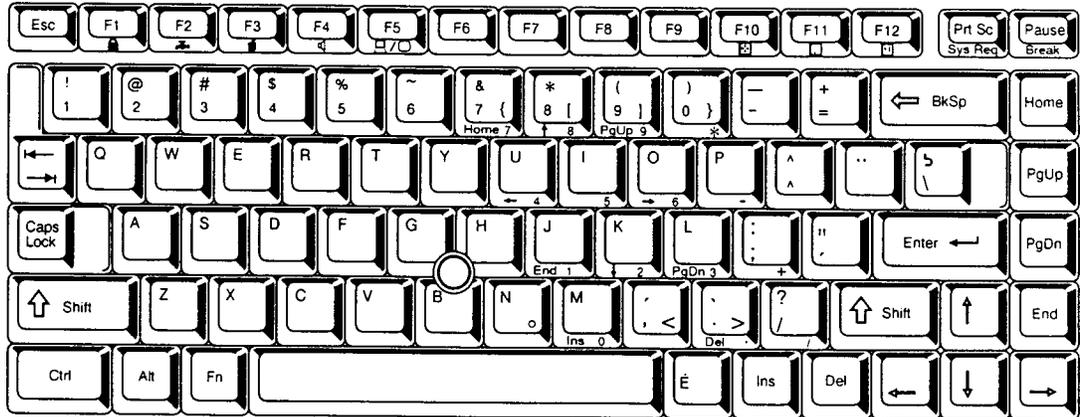


Figure F-9 Canadian keyboard

F.10 Keycap Number Keyboard

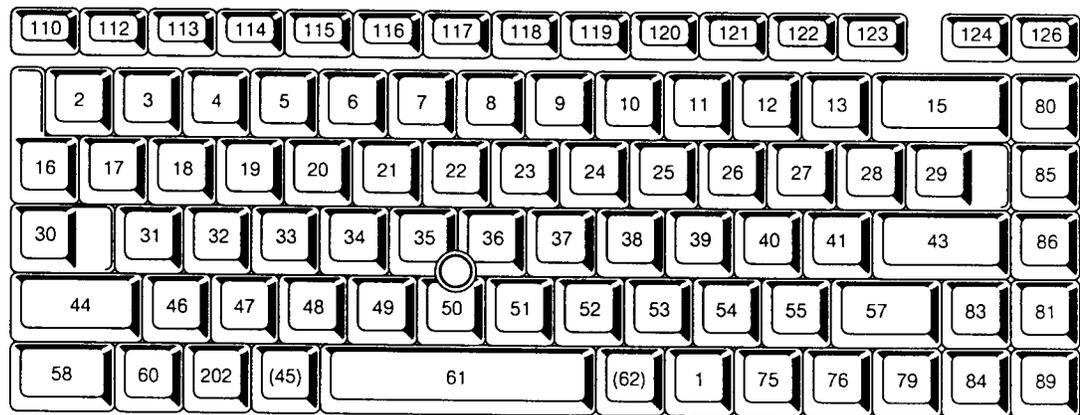


Figure F-10 Keycap number keyboard

Appendix G Wiring Diagrams

G.1 Printer Wraparound Connector

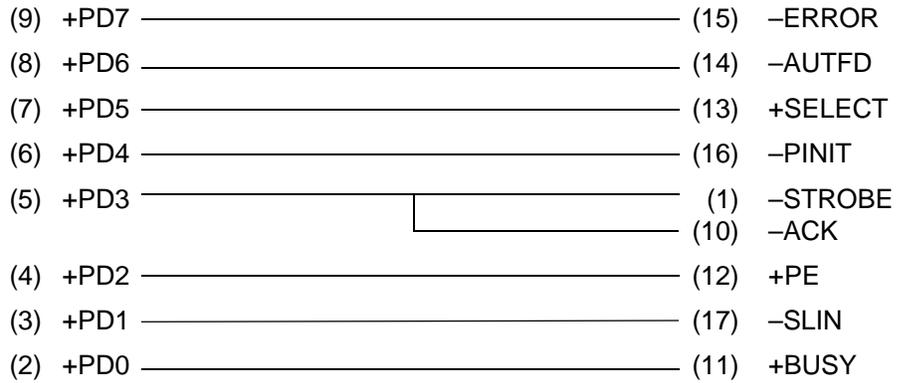


Figure G-1 Printer wraparound connector

G.2 RS-232C Wraparound Connector

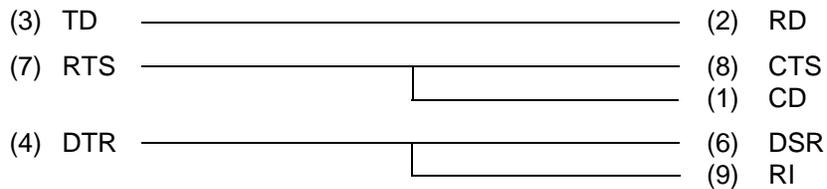


Figure G-2 RS-232C wraparound connector

G.3 RS-232C Direct Cable (9-Pin to 9-Pin)

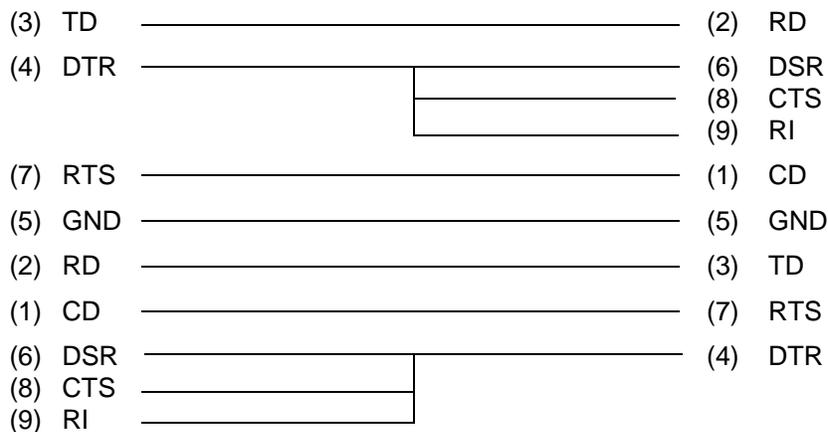


Figure G-3 RS-232C direct cable (9-pin to 9-pin)

G.4 RS-232C Direct Cable (9-Pin to 25-Pin)

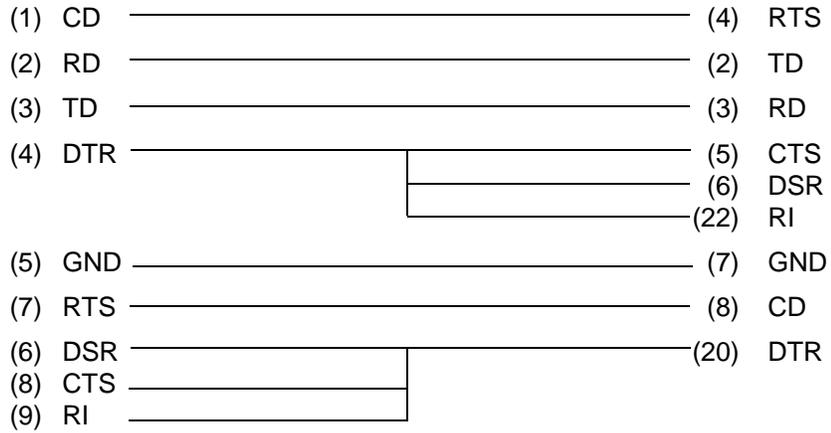


Figure G-4 RS-232C direct cable (9-pin to 25-pin)

Appendix H BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when you update the system BIOS.

Tools

To rewrite the BIOS, you need the following tool:

- ❑ BIOS rewrite disk for T2400CS/T2400CT

Rewriting the BIOS

1. Set the system to Boot Mode.
2. Turn off the power to the T2400CS/T2400CT.
3. Remove the external cable and PCMCIA card.
4. Turn on the power while holding down the **F12** key. (Keep holding down the key until the system speaker sounds a beep.)
5. When the message is displayed, insert the BIOS rewrite disk into the FDD. Press the **Enter** key to start the BIOS rewrite.
6. When the BIOS rewrite is finished, eject the BIOS rewrite disk and press the reset switch to restart the system.