

## 1.1 Features

The Toshiba T4700CS/T4700CT/T4800CT is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the T4700CS/T4700CT/T4800CT offers excellent color display legibility, battery operation and IBM PC/AT compatibility. The T4700CS/T4700CT/T4800CT system unit consists of the following features:

### Microprocessor

The T4700CS/T4700CT uses an SL Enhanced Intel 486™DX2 Microprocessor (referred to as 486DX2 in this manual) that operates at 50 MHz, 3.3 Volts.

The T4800CT uses an SL Enhanced Intel 486™DX4 Microprocessor (referred to as 486DX4 in this manual) that operates at 75 MHz, 3.3 Volts.

### Math co-processor

The T4700CS/T4700CT has a math co-processor which is stored in the 486DX2. The T4800CT has a math co-processor which is stored in the 486DX4.

### Cache memory

The T4700CS/T4700CT has an 8 KB cache memory which is stored in the 486DX2. The T4800CT has an 16-KB cache memory which is stored in the 486DX4.

### Disk storage

The T4700CS/T4700CT has an internal 200- or 320-Megabyte (MB) Hard Disk Drive (HDD) with an average access time of 12 milliseconds. A 3.5-inch Floppy Disk Drive (FDD) supports 2HD floppy disks (1.44 Mbytes) and 2DD floppy disks (720 Kbytes).

The T4800CT has an internal 320 or 500 MB HDD with an average access time of 12 milliseconds. A 3.5-inch FDD supports 2HD floppy disks (1.44 Mbytes) and 2DD floppy disks (720 Kbytes).

### Memory

The T4700CS/T4700CT/T4800CT comes standard with 8 MB of CMOS Random Access Memory (RAM) 3.3 Volts. This includes 640 KB of conventional memory and 7,424 KB of extended memory which can be utilized as expanded memory compatible with the Lotus/Intel/Microsoft Expanded Memory Specifications (LIM-EMS).

STN color LCD (T4700CS)

A high-resolution 9.5-inch full-color, Supertwist Nematic (STN) color Liquid Crystal Display (LCD) displays 640x480 pixels with 226,981 colors for both graphics and characters. The T4700CS internal display controller supports Video Graphics Array (VGA) functions on the internal display devices.

The T4700CS internal display controller supports Video Graphics Adapter (VGA) functions on the internal display and Super VGA (SVGA) functions on the external display.

TFT color LCD (T4700CT/T4800CT)

A high-resolution 9.5-inch full-color, Thin Film Transistor (TFT) color LCD displays 640x480 pixels.

The T4700CT/T4800CT internal display controller supports VGA functions on the internal display and SVGA functions on the 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.

Batteries

The T4700CS/T4700CT/T4800CT has three different batteries: a main battery, a backup battery, and a Real Time Clock (RTC) battery.

Status indicator panel

The T4700CS/T4700CT/T4800CT has a status indicator panel. It is a liquid crystal display (LCD) panel which displays battery charge indicator and 11 icons indicating the system status.

Memory card slot

The T4700CS/T4700CT/T4800CT has one Toshiba optional memory card slot, which enables you to install a Toshiba optional memory card.

Personal Computer Memory Card International Association (PCMCIA) card slot

The T4700CS/T4700CT/T4800CT has two PCMCIA slots, which enable you to install a MiNC Toshiba card modem or other industry standard PCMCIA release 2.0 card.

Expansion port

The T4700CS/T4700CT/T4800CT has one unique 150-pin expansion port, which attaches to a Desk Station IV.

PRT/FDD port

T4700CS/T4700CT/T4800CT's Centronics compatible parallel interface port serves two purposes. The port can be used to connect a Centronics compatible printer or an external 5.25-inch floppy disk drive.

RS-232C port

The T4700CS/T4700CT/T4800CT has one 9-pin serial interface port.

Mouse port

The T4700CS/T4700CT/T4800CT has one 6-pin mouse port on the back that can be connected to an IBM PS/2 mouse.

Keyboard port

The T4700CS/T4700CT/T4800CT has one 6-pin keyboard port on the back that can be connected to an IBM PS/2 keyboard.

Microsoft BallPoint mouse V2.0 with QuickPort connection (BPQP2)

The T4700CS/T4700CT/T4800CT has one BPQP2 port on the right.

RGB port

The T4700CS/T4700CT/T4800CT has one 15-pin RGB port on the back that can be connected to an external video display.

Audio ports

- Headphone, standard 3.5 mm diameter miniature stereo jack with speaker shutoff switch.

Use a headphone with an impedance of 16W.

- Microphone, standard 3.5 mm diameter miniature monaural jack.

The T4700CS/T4700CT/T4800CT Personal Computer is shown in figure 1-1. The system configuration is shown in figure 1-2.

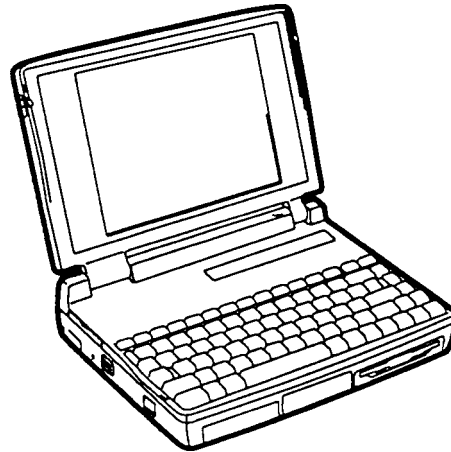


Figure 1-1 T4700CS/T4700CT/T4800CT personal computer

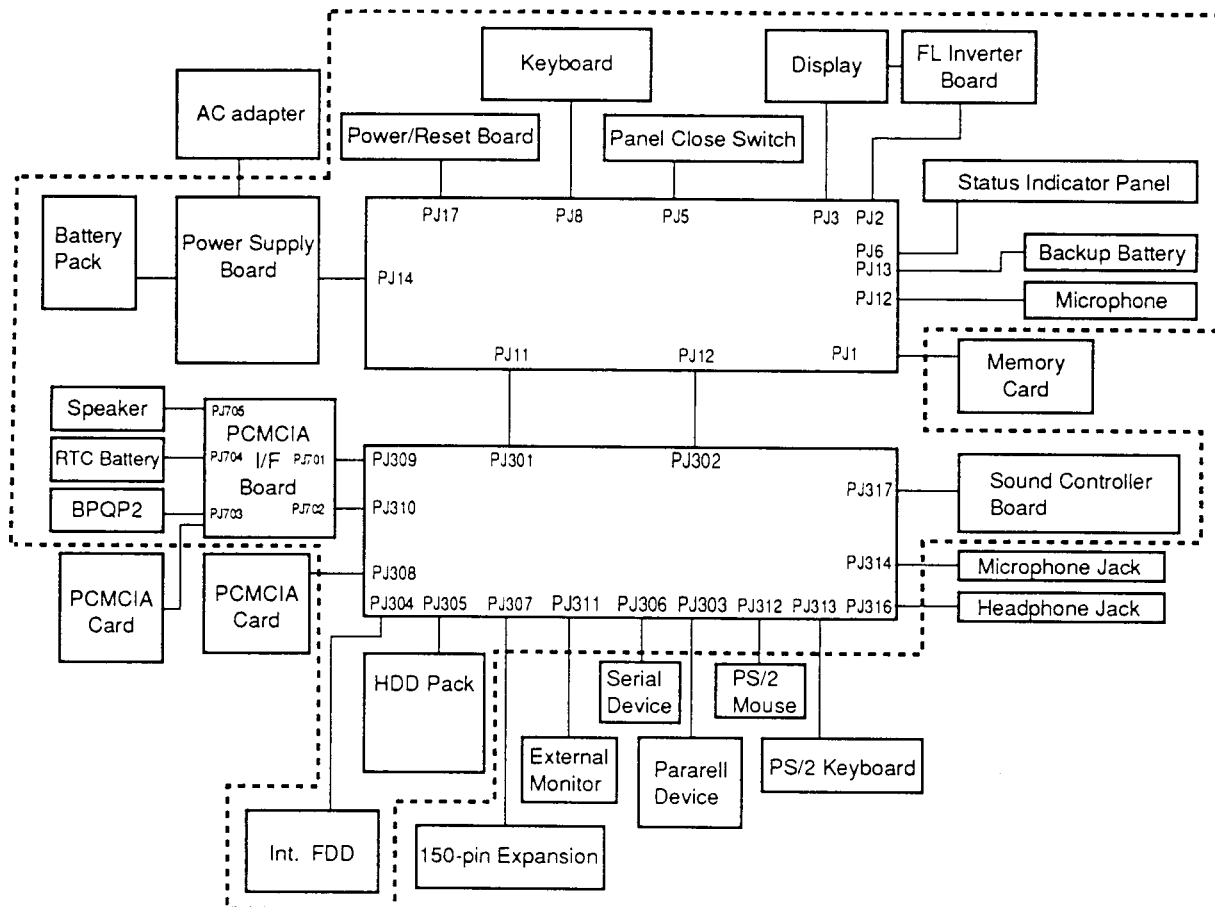


Figure 1-2 T4700CS/T4700CT/T4800CT system unit configuration

## 1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the T4700CS/T4700CT/T4800CT system unit.

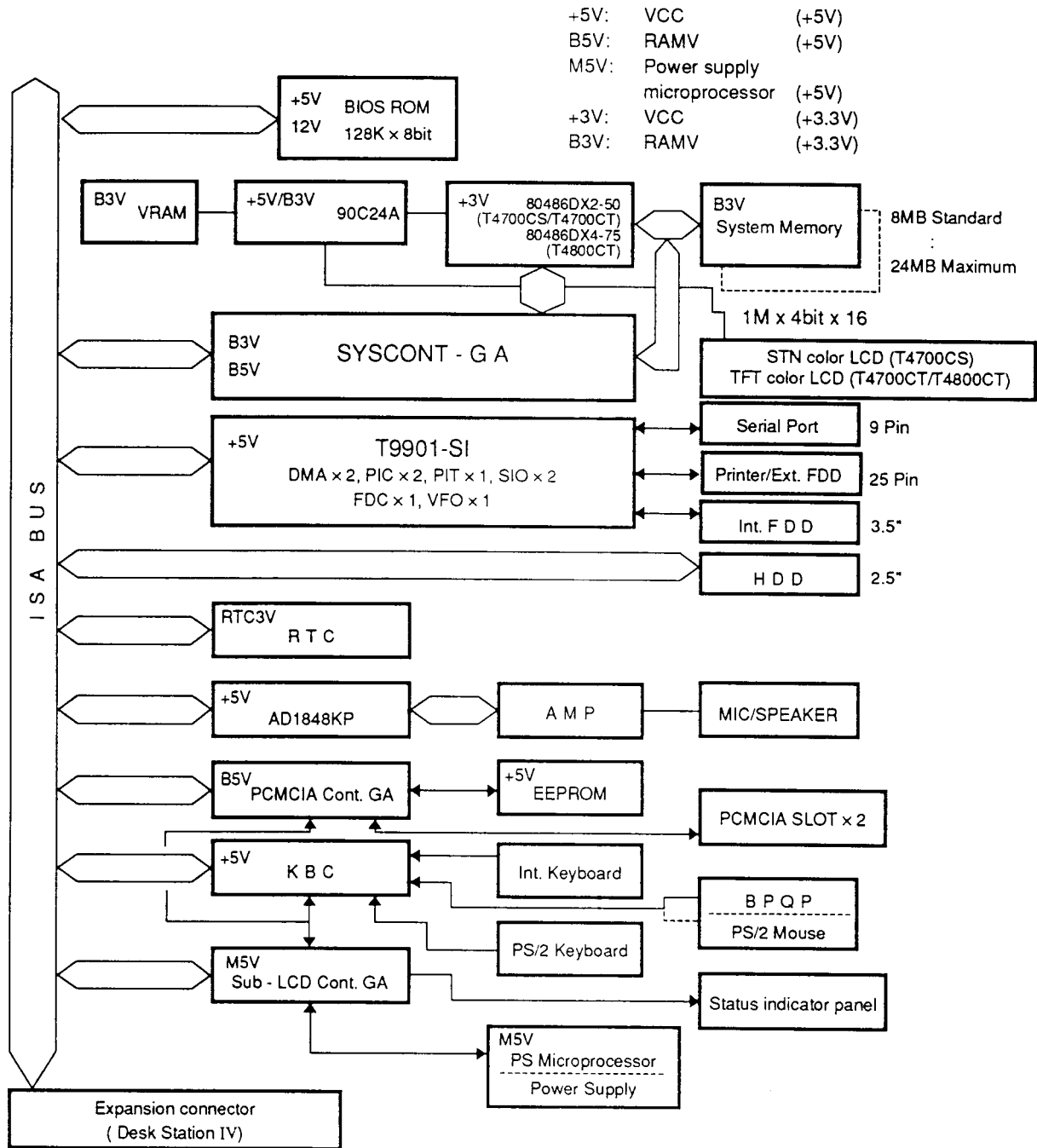


Figure 1-3 T4700CS/T4700CT/T4800CT system board block diagram

The T4700CS/T4700CT/T4800CT system board shown in figure 1-3 is composed of the following major components:

- ❑ A 486DX2-50 (T4700CS/T4700CT) CPU, which incorporates a math co-processor and 8 KB cache memory.  
A 486DX4-75 (T4800CT) CPU, which incorporates a math co-processor and 16 KB cache memory.
- ❑ The following memory components:
  - Standard RAM: 8 MB, 32-bit data width (70 ns)
  - Cache memory: 8 KB (inside a 486DX2-50 CPU)  
16 KB (inside a 486DX4-75 CPU)
  - System, Video, BIOS: 128 KB (96 KB are used), 8-bit data width  
A 1-Mbit flash ROM is used (150 ns).  
This ROM contains Initial Reliability Test (IRT), Basic Input/Output System (BIOS), and video BIOS.
  - Video RAM: 1 MB, 16-bit data width.  
Two 256Kx16 bit chips are used.
  - Memory card: 4, 8, or 16 MB memory card can be installed.  
32-bit data width.

- ❑ Super Integration (SI) T9901, which stores the following components:

- Two Direct Memory Access Controllers (DMAC): 82C37
- Two Programmable Interrupt Controllers (PIC): 82C59
- One Programmable Interval Timer (PIT): 82C54
- One Floppy Disk Controller (FDC): TC8565
- One Serial Input/Output Controller (SIO): TC8570
- One Variable Frequency Oscillator (VFO): TC8568
- One I/O Controller
- One Printer Port Controller
- One Speaker Controller

- ❑ A Real Time Clock (RTC)

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

- ❑ A Keyboard Controller (KBC)

One M37452M4 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, and BPQP2 port.

- ❑ VGA display controller: WD90C24A (208-pin)

This controller controls internal and external VGA compatible display and external SVGA compatible display with Analog Digital Converter (DAC). It can display data on the internal and external display at the same time and operates at 3.3 volts.

- ❑ Sound Controller

One AD1848 chip is used. The AD1848 controls the internal sound system.

- ❑ Clock Generator receives 14.31818 MHz (X1) and generates the following frequencies:

- 25 MHz for the CPU (CPU operates 50MHz[T4700CS/T4700CT] or 75MHz [T4800CT])
- 14.7456 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for GA
- 14.31818 MHz for WD90C24A (for VGA)

OSC (X3) generates 32.768 KHz for RTC.

- ❑ Gate Array

System Controller Gate Array

This gate array has following functions:

- CPU Controller
  - SMI Controller
  - CPU Clock Controller
- Memory Controller
  - DRAM Controller
  - Compatible Bus Interface Controller
- Bus Controller
  - Compatible Bus Interface Controller
  - Compatible Access Controller
  - DMAC Controller
  - I/O Controller
- Address Latch Controller
  - 32-Bit to 16-Bit Controller
  - Address Latch
  - DMA Address Generator
  - Refresh Address Generator
- I/O Register
  - Compatible I/O Port Register
  - Saving the data of the Register (in resume) Controller
  - Toshiba Special Register

- Processing Speed Controller
- Data Latch
- Suspend/Resume Controller

#### Sub LCD Controller Gate Array

This gate array has following functions:

- Status Indicator Panel Controller
  - LCD Segment Flashing Controller
- Internal Communication Controller
  - KBC/Power Supply Micro Processor/Main CPU Communication Controller
  - KBC/Power Supply Micro Processor Interrupt Controller

#### IC Card Controller Gate Array

This gate array has following functions:

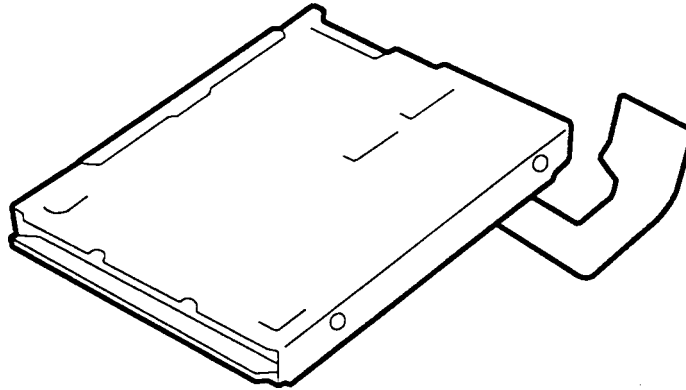
- IC Card Controller
  - PCMCIA IC Card Controller
  - Toshiba Modem Card Controller
- EEPROM (for security) Controller
  - KBC-Security-EEPROM Communication Controller
- Others
  - KBC Communication Controller
  - Disable the PRT/FDD Port, HDD Access Controller
  - EEPROM (for BIOS) Access Mode Controller
  - Sound System Access Controller



### 1.3 3.5-inch Floppy Disk Drive

The T4700CS/T4700CT/T4800CT 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 T4700CS/T4700CT/T4800CT 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*

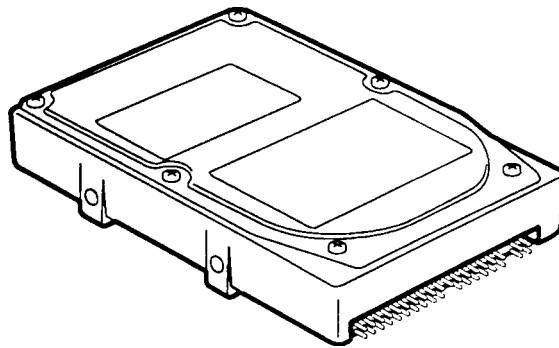
Item	2-MB mode	1-MB mode
Storage capacity (KB)		
Unformatted	2,000	1,000
Formatted	1,311	737
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
Track to track	3	3
Average	181	181
Head settling time	15	15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (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 non-volatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-winchester type magnetic heads.

T4700CS/T4700CT supports the 200 MB and 320 MB. T4800CT supports the 320 MB and 500 MB.

The T4700CS/T4700CT/T4800CT HDD is shown in figure 1-5. Specifications for the HDD are described in table 1-2.



*Figure 1-5 2.5-Inch HDD*

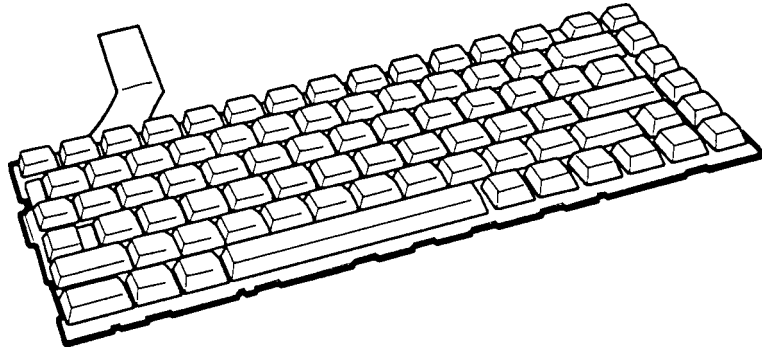
*Table 1-2 2.5-inch HDD specifications*

	200 MB	320 MB	500 MB
	(MK2224FC)	(MK2326FC)	(MK2428FC)
Storage capacity (MB) Formatted	213.0	320.0	524.0
Number of disks	2	3	4
Data heads	4	6	8
Data surfaces	4	6	8
Track per surface	1,560	1,830	1,920
Bytes per sector	512	512	512
Access time (ms)			
Track to track	3	3	3
Average	12	12	12
Maximum	25	25	25
Rotation speed (rpm)	4,000	4,200	4,000
Data transfer rate (bps) To/from media	18.9 to 31.6 M	18.7 to 29.6 M	18.9 to 31.6 M
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 T4700CS/T4700CT/T4800CT's system unit. The keyboard is connected to the keyboard controller on the system board through a 19-pin flat cable. 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 T4700CS 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 T4700CS's LCD receives vertical and horizontal synchronizing signals, 16-bit data signal (8-bit upper block data signal, 8-bit lower block data signal), display enable 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.

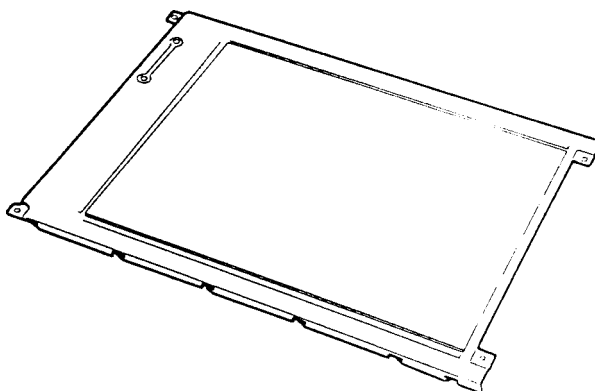


Figure 1-7 STN color LCD

Table 1-3 STN color LCD specifications

Item	Specifications
Number of Dots (dots)	640x480
Dot pitch (mm)	0.3(W)x0.3(H)
Display area (mm)	195 (W)x147 (H)
Contrast	18:1 (Typically)
FL current (mA)	6.0
FL frequency (KHz)	47

**NOTE:** If ghost images remain on the screen after power is turned off, leave the power off for a day and let the computer sit at room temperature. If the problem is still not corrected, leave the computer at room temperature for two days or longer.

## 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*

	<b>Item</b>		<b>Specifications</b>
Input	Voltage	(VDC)	18
	Power	(W)	4.17
Output	Voltage	(VAC)	1,100
	Current	(mA)	6.0
	Frequency	(KHz)	47

## 1.7 TFT Color LCD

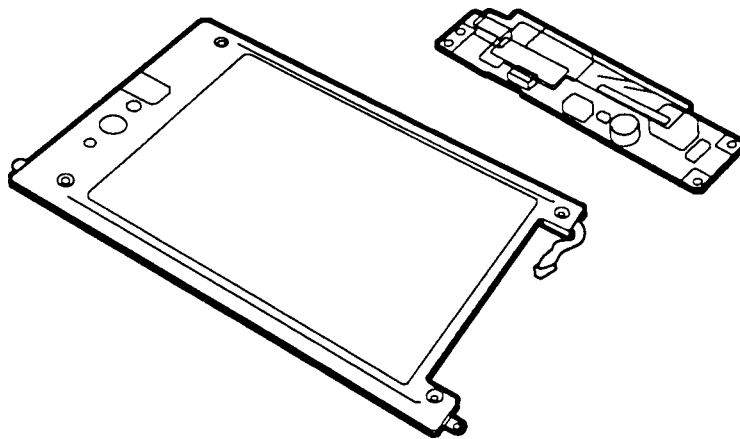
The TFT Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.7.1 TFT Color LCD Module

The T4700CT/T4800CT 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 T4700CT/T4800CT'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 and FL inverter board are 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)	0.3 (W)x0.3 (H)
Display area	(mm)	192 (W)x144 (H)
Contrast		60:1 (minimum)
FL current	(mA)	6.0
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 FL inverter board specifications*

	<b>Item</b>		<b>Specifications</b>
Input	Voltage	(VDC)	18
	Power	(W)	3
Output	Voltage	(VAC)	1,100
	Current	(mA)	6.0
	Frequency	(KHz)	47
	Current limits	(mA)	3.0 to 6.0

## 1.8 Power Supply

The power supply supplies five kinds of voltages to the T4700CS/T4700CT/T4800CT system board. The T4700CS/T4700CT/T4800CT power supply has one microprocessor and it operates at 500 KHz (power off) or 20 MHz (power on). 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 speaker and the brightness.
4. Controls the Battery capacity icon, Power on icon and AC adapter icon on the status indicator panel.
5. Turns the battery charging system on and off and detects a fully charged battery.
6. Determines if the power can be turned on and off.
7. Provides more accurate detection of a low battery.
8. Calculates the remaining battery capacity.

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

*Table 1-7 Power supply board output rating*

Use for	Name	DC voltage (V)	Regulation tolerance (%)	Maximum current (mA)	Ripple (mV)
System logic, FDD, HDD	VCC	+5	±5	2,700	100
RS-232C, Flash ROM	12V	+12	±5	120	240
Display	DSPV	+9.5 to +23	—	4.02 W	—
RAM, CPU	B3V	+3.3	±5	930 (T4700CS/T4700CT) 1,200 (T4800CT)	60
RS-232C	M12V	-7 to -12.6	—	10	—



## 1.9 Batteries

The T4700CS/T4700CT/T4800CT has three types of batteries:

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

These batteries' specifications are described in table 1-8.

*Table 1-8 Batteries' specifications*

<b>Battery name</b>	<b>Material</b>	<b>Output voltage</b>	<b>Capacity</b>
Main battery	Nickel Metal Hydride	12 V	2,400 mAh (T4700CS/T4700CT) 2,600 mAh (T4800CT)
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 backup and main battery maintain the state of the computer when you enable AutoResume.

## 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.

*NOTE: When the temperature difference between the computer and the battery pack is more than 10°C, a full charge may be detected even if the battery is not full charged. Remove the battery pack for about five minutes to let the computer and battery reach the same temperature. Then, reinstall the battery pack.*

### Quick Battery Charge

When the AC adapter is attached, there are two types of quick charge: quick charge 1 when the system is powered off and quick charge 2 when the system is powered on.

*Table 1-9 Time required for quick charges*

	<b>Kind of battery</b>	<b>Charging time</b>
Quick charge 1 (power off)	Nickel Metal Hydride	About 1 hour, 30 minutes
Quick charge 2 (power on)	Nickel Metal Hydride	2 to 4 hours (typical: 3 hours)

**NOTES** 1: *The time required for quick charge 2 is affected by the amount of power the system is consuming. Use of the fluorescent lamp and frequent disk access diverts power and lengthens charge time.*

2: *Using quick charge 1, the system CPU automatically stops the charge after two hours and twenty minutes regardless of the battery condition.*

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 output voltage is abnormal.

### Trickle Battery Charge

When the main battery is fully charged and the AC adapter is attached, the microprocessor automatically changes quick charge 1 or 2 to trickle charge.

## ❑ Detection of full charge

A full charge is detected only when the battery is charging at quick charge. A full charge is detected under any of the following conditions:

1. A battery voltage fall is detected.
2. The charging time exceeds the fixed limit.
3. The thermal rise (+DT) exceeds the fixed limit.
4. The battery's temperature is over 60°C.

### 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*

		<b>Time</b>
Charging Time	Power On	20 H
	Power Off	75 H
Data preservation period (full charge)		8.0 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*

		<b>Time</b>
Charging Time	Power On	24 H
	Power Off	24 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 T4700CS/T4700CT/T4800CT is causing the computer to malfunction. The FRUs covered are:

1. Power Supply Board
2. System Board(s)
3. Floppy Disk Drive
4. Hard Disk Drive
5. Keyboard
6. Display
7. Status Indicator Panel

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 T4700CS/T4700CT/T4800CT Diagnostics Disk
2. A Phillips head screwdriver (2 mm)
3. A Toshiba MS-DOS system disk
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-232-C wraparound connector
8. A printer wraparound connector
9. A multimeter
10. An external 5.25-inch floppy disk drive
11. An external CRT
12. A Password Deletion Program floppy disk

## 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, refer to Appendix H for procedures on how to delete it.
- 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.

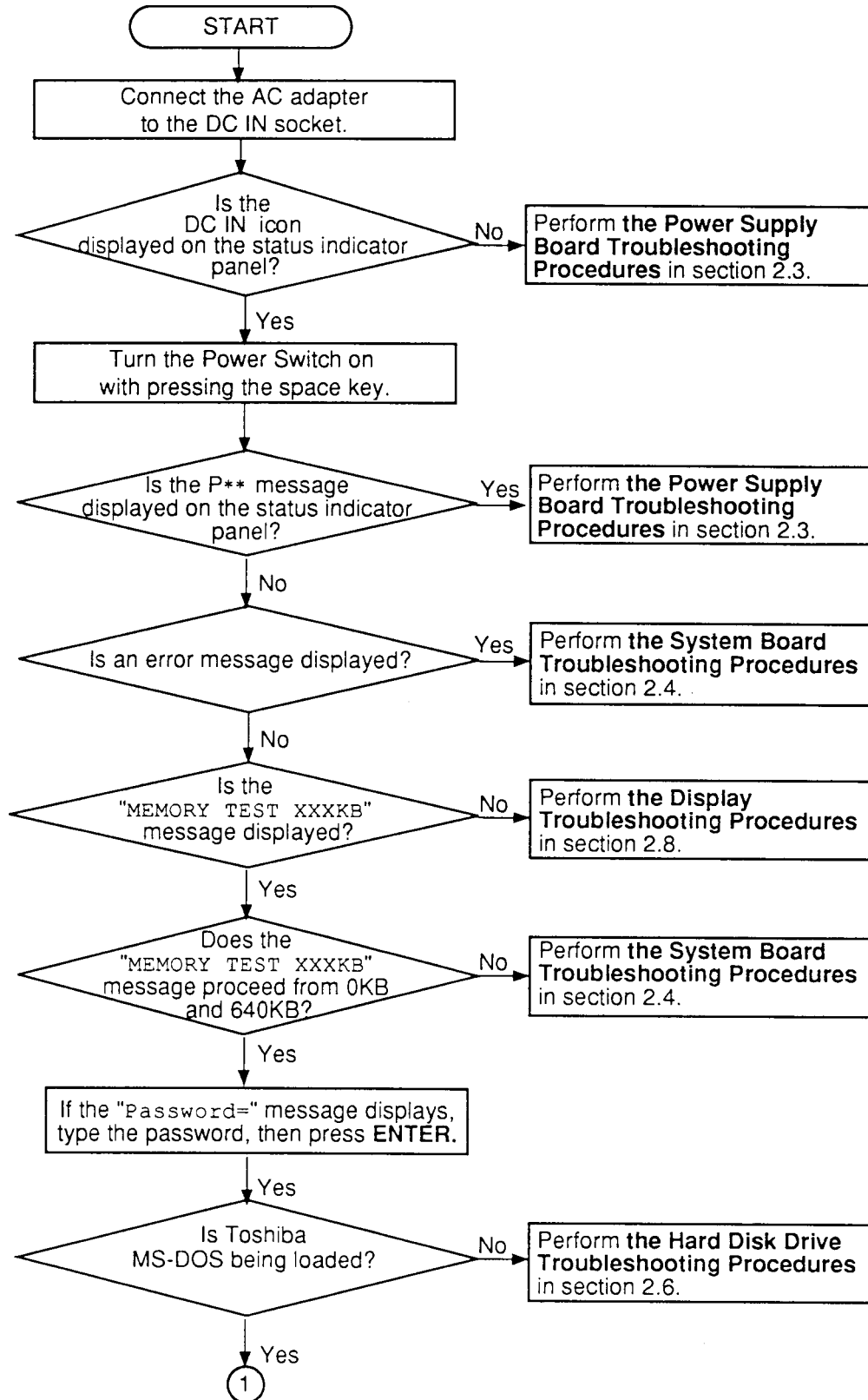


Figure 2-1 Troubleshooting flowchart (1/2)

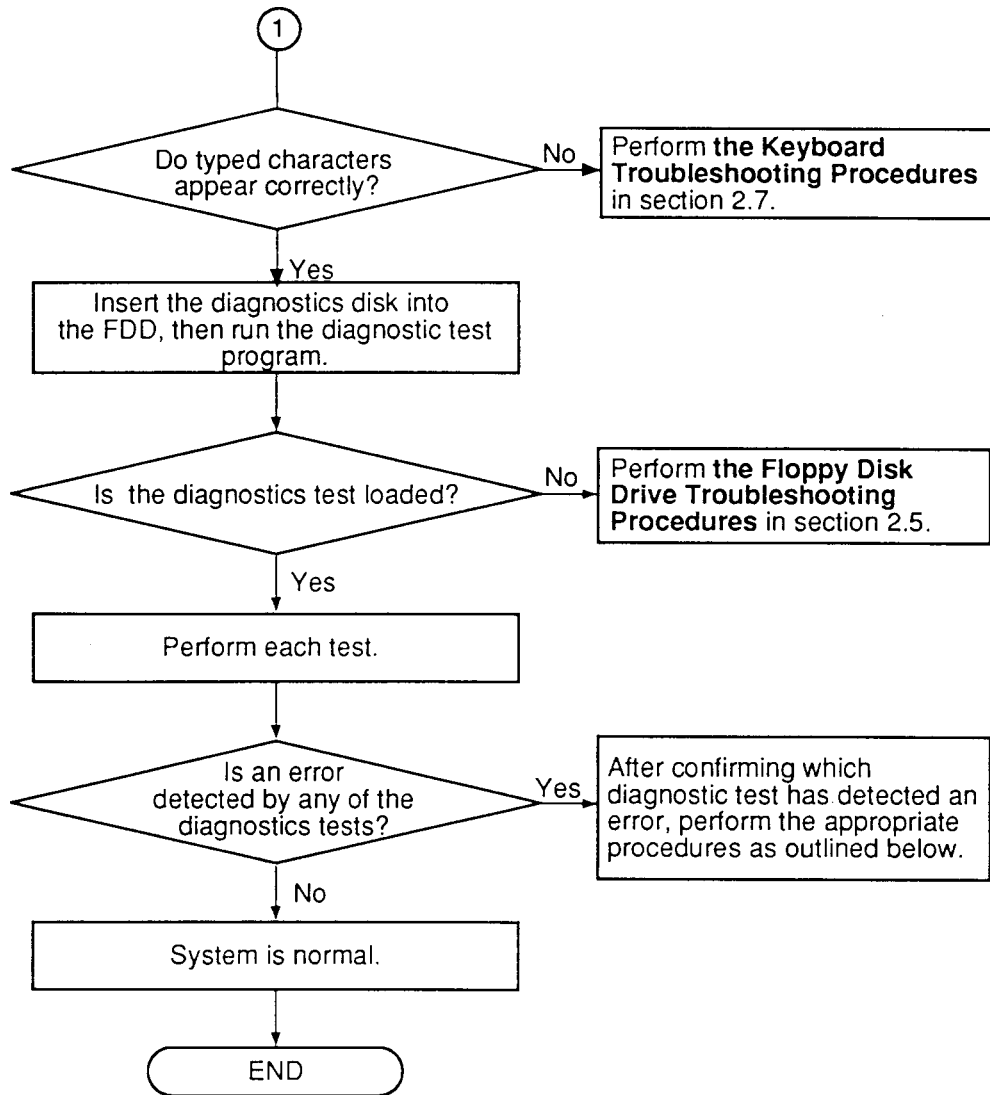


Figure 2-1 Troubleshooting flowchart (2/2)

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 T4700CS/T4700CT/T4800CT's power supply controls many functions and components in the T4700CS/T4700CT/T4800CT. 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: Power Status Check on Status Indicator Panel

Procedure 2: Connection Check

Procedure 3: Quick Charge Check

Procedure 4: Replacement Check

## Procedure 1 Power Status Check on Status Indicator Panel

The Status Indicator Panel displays the status of the following power related items:

- AC adapter or Desk Station IV connection status
- System power on status
- Remaining battery power

The Status Indicator Panel displays the remaining battery power as shown in table 2-1.

*Table 2-1 Battery power*

Battery	AC adapter	Battery Power (Status Indicator Panel)
Not installed	–	Doesn't display
Installed	Not connected	Time or percent (selected in Setup program)
	Connected	Only percent

**NOTE:** *The power supply microprocessor monitors the status of the power supply. When it detects an error, the error is displayed on the Status Indicator Panel.*

The status indicator panel will display the error status or other message. Perform the following procedures.

1. Install the battery pack.
2. Attach the AC adapter to DC IN 18 V.

Check the following items:

If DC IN icon does not light, go to Procedure 2.

If the battery capacity status does not appear, or battery capacity percent does not change, go to Procedure 3.

If the “P\*\*” message appears on the battery capacity status area, perform Check 1.

Check 1 Read the error status in the battery power indicator on the status indicator panel.

*Table 2-2 Outline of power supply error*

Status	Source of Error
P0*	AC Adapter or Desk Station IV error
P1*	Battery error
P2*	VCC Output error
P3*	B3V Output error
P4*	12V Output or M12V Output error
P5*	Power Supply Microcomputer error
P6*	Power On error
P8*	Environment

Adapter (AC Adapter or DeskStation)

Status	Meaning
P01	AC Adapter Voltage is over the maximum allowed limit.
P02	Desk Station Voltage is over the maximum allowed limit.

Battery

Status	Meaning
P10	Charge current is over the maximum allowed limit.

VCC Output

Status	Meaning
P20	VCC Voltage is over the maximum allowed limit.
P21	VCC Voltage is below the minimum allowed limit.
P22	VCC Voltage is out put at a low level (does not fall to zero) while the power is off.

B3V Output

Status	Meaning
P30	B3V Voltage is over the maximum allowed limit.
P31	B3V Voltage is below the minimum allowed limit.
P32	B3V Voltage is not within the normal range while the system is on.
P33	B3V Voltage is not within the normal range while the system is in the resume mode.

Output Voltage (12V or M12V)

Status	Meaning
P40	12V Voltage is over the maximum allowed limit.
P41	12V Voltage is below the minimum allowed limit.
P42	M12V Voltage is not within the normal range.

Power Supply Microprocessor

Status	Meaning
P50	Firmware error.
P52	Program error.

- Power Supply On/Off Sequence

Status	Meaning
P60	VCC and B3V error.

- Environment

Status	Meaning
P80	Temperature is over 70°C or under –20°C

Check 2 When **P02** is displayed, perform the following steps:

- Make sure the Desk Station IV is firmly connected to the computer's expansion bus port. If this port is connected correctly, go to following step:
- Replace the Desk Station IV with a new one.  
If the status still exists, go to Check 4.

Check 3 When **P01** is displayed, perform the following steps:

- Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN 18 V socket and wall outlet. If these cables are connected correctly, go to the following step:
- Connect a new AC adapter.  
If the status still exists, go to Check 4.

Check 4 When **P10** is displayed, perform the following steps:

- Make sure the battery pack is correctly installed in the computer.  
If the battery pack is correctly installed, go to the following step:
- Replace the battery pack with a new one.  
If the status still exists, go to Procedure 4.

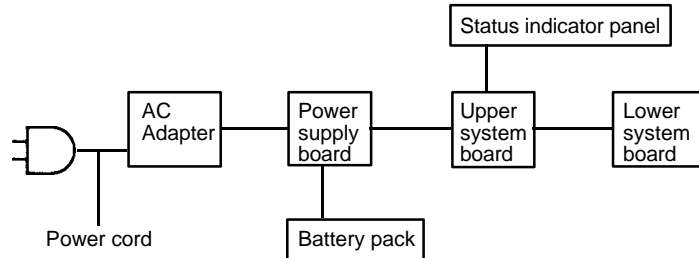
Check 5 When **P80** is displayed, it indicates that the computer's internal temperature is less than –20°C or more than 70°C. Perform the following steps:

- Move the computer to an area where the temperature is between 70°C and 20°C degrees until its internal temperature is within that range.
- If the status still exists, go to Procedure 4.

Check 6 When **P20, P21, P22, P30, P31, P32, P33, P40, P41, P42, P50** or **P60** is displayed, go to Procedure 4.

## Procedure 2 Connection Check

The power supply related wiring diagrams are shown below:



Any of the connectors may be disconnected. Perform Check 1.

If the battery power is not displayed, go to Check 1.

- Check 1 Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN 18 V socket and wall outlet. If these cables are connected correctly, go to Check 2.
- Check 2 Connect a new AC adapter. If the battery capacity does not change on status indicator panel, go to Check 3.
- Check 3 Make sure the battery pack is installed in the computer correctly. If the battery pack is installed correctly, go to Procedure 3.

### Procedure 3 Quick Charge Check

The power supply may not charge the battery pack. Perform the following procedures:

1. Install the battery pack to the T4700CS/T4700CT/T4800CT.
2. Attach the AC adapter to T4700CS/T4700CT/T4800CT, then turn on the power. (If you cannot turn on the power, go to Procedure 4.)
3. Run the Diagnostic test, following the steps described in chapter 3, and select the system configurations.
4. Read the character on battery capacity display area of the status indicator panel.

If the character matches any of the code of the following tables, go to each check item. If any of the character does not display, go to Procedure 4.

Code	Contents	Check items
	The AC adapter is quick charging.	Normal
1	The AC adapter is not attached, or AC adapter's output voltage is abnormal.	Check 1
2	The battery pack is not installed, or battery's output voltage is abnormal.	Check 2
3	The battery pack is not installed, or the battery's temperature is abnormal.	Check 3
4	The battery pack is fully charged.	Normal
5	Other reason	Check 4

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, replace the AC cord and AC adapter.

Check 2 The battery pack will completely discharged. Wait a few minutes to charge the battery pack. If still the battery pack isn't charged, replace the battery pack with a new one.

Check 3 The battery's temperature will be hot or cold. Return the temperature to normal operation condition.

If still the battery pack isn't charged, replace the battery pack with a new one.

Check 4 Go to Procedure 4.

## **Procedure 4    Replacement Check**

The power supply board or system board(s) may be disconnected or damaged. Disassemble the T4700CS/T4700CT/T4800CT following the steps described in chapter 4, Replacement Procedures, and check the connection between power supply board and system board(s) and status indicator panel. After checking the connection, perform the following checks:

- Check 1    Replace the power supply board with a new one. If the power supply is still not functioning properly, perform Check 2.
  
- Check 2    Replace the upper system board with a new one. If the power supply is still not functioning properly, perform Check 3.
  
- Check 3    Replace the lower system board with a new one. If the power supply is still not functioning properly, perform Check 4.
  
- Check 4    The status indicator panel will be damaged, go to status indicator panel troubleshooting.

## 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: Connection and 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 configuration ***`  
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. Error message appears when data stored in RAM under the resume function is lost because the battery has become discharged.

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), (20), (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. Figure 2-2 shows the printer port LED.

**NOTE:** When you perform this check, the external FDD/PRT option in the SETUP program must be set to PRT.

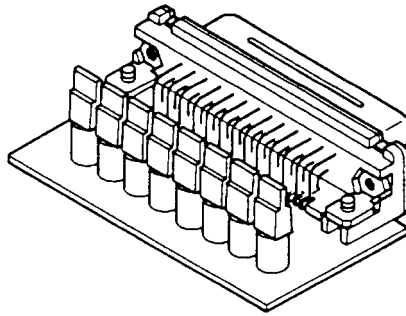


Figure 2-2 Printer port LED

To use the printer port LED follow these steps:

1. Turn off the T4700CS/T4700CT/T4800CT's power.
2. Plug the printer port LED into the T4700CS/T4700CT/T4800CT's PRT/FDD connector.
3. Hold down the space bar and turn on the T4700CS/T4700CT/T4800CT's power.
4. Read the LED status from left to right as you are facing the back of the computer.
5. Convert the status from binary to hexadecimal notation.
6. If the final LED status is FFh (normal status), go to Procedure 3.
7. If the final LED status matches any of the test status values in table 2-2, 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 with the system memory test.

Table 2-3 Printer port LED error status (1/2)

Error status	Test item	Message
01H	Pre-init for warm start test	—
05H	PIT test	TIMER CH.2 OUT ERROR
		PIT ERROR READ DATA = XXH WRITE DATA = XXH
06H	PIT initialization	—
07H	PIT function test	MEMORY REFRESH ERROR
0AH	First 64KB memory test	FIRST 64KB MEMORY ERROR
0BH	System memory initialization	—
0DH	Interrupt vector initialization	—
15H	RTC test	RTC ERROR READ DATA = XXH WRITE DATA = XXH
16H	CMOS RAM test	****Error in CMOS. Bad battery**** ****Error in CMOS. Bad check sum**** ****Error in CMOS. Bad configuration**** ****Error in CMOS. Bad memory size**** ****Error in CMOS. Bad HDD type**** ****Error in CMOS. Bad time function**** Check system. Then press [F1] key
18H	PIC initialization	—
1FH	Display initialization	CRTC ERROR
		VRAM ERROR READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
22H	KBC test	KBC ERROR
25H	System memory test	SYSTEM MEMORY ERROR
		ADDRESS = XXXXXXXXXH READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
		SYSTEM MEMORY PARITY ERROR ADDRESS = XXXX0000H - XXXXFFFFH
30H	Extended memory test	EXTENDED MEMORY ERROR
		ADDRESS = XXXXXXXXXH READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
		EXTENDED MEMORY PARITY ERROR ADDRESS = XXXX0000H - XXXXFFFFH
40H	DMA page register test	DMA PAGE REGISTER ERROR READ DATA = XXH WRITE DATA = XXH

Table 2-3 Printer port LED error status (2/2)

Error status	Test item	Message
41H	DMAC test	DMAC #1 ERROR READ DATA = XXXXH WRITE DA = XXXXH
		DMAC #2 ERROR READ DATA = XXXXH WRITE DATA = XXXXH
42H	DMAC initialization	-
4AH	PIC test	PIC #1 ERROR READ DATA = XXH WRITE DATA = XXH
		PIC #2 ERROR READ DATA = XXH WRITE DATA = XXH
54H	Keyboard test	KEYBOARD ERROR
55H	KBC initialization	KBC ERROR
5AH	Mouse initialization	-
60H	HDD initialization	HDC ERROR HDC #0 ERROR HDC #1 ERROR
65H	FDD initialization	NO FDD ERROR FDD ERROR
70H	Printer test	-
80H	RS-232-C test	-
90H	Timer initialization	TIMER INTERRUPT ERROR RTC UPDATE ERROR
A0H	NDP initialization	-
A6H	Expansion I/O ROM	-
FFH	Expansion system ROM	-

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

01h, 05h, 06h, 07h, 0Ah, 0Bh, 0Dh, 15h, 16h, 18h, 1Fh, 22h, 25h, 30h, 40h,  
41h, 42h, 54h, 55h, 65h, 70h, 80h, 90h, A0h, A6h

Check 2 If error code **4Ah** is displayed, go to the Keyboard Troubleshooting procedures in section 2.7.

Check 3 If error code **5Ah** 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.

**NOTE:** When you perform this check, the external FDD/PRT option in the SETUP program must be set to PRT and set to resume mode.

To use the printer port LED follow these steps:

1. Turn on the T4700CS/T4700CT/T4800CT's power, then set to resume mode.
2. Turn off the T4700CS/T4700CT/T4800CT's power
3. Plug the printer port LED into the T4700CS/T4700CT/T4800CT's PRT/FDD connector.
4. Turn on the T4700CS/T4700CT/T4800CT'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 2-4, go to Procedure 5.

Table 2-4 Printer port LED resume mode error status

Error status	Meaning of status
00H	RAM BIOS error
F0H	Press the reset switch.
F1H	Suspend process error (The system will suspend while FDD is accessed, etc.)
F2H	The system has option ROM, or optional card (CGA, MDA).
F4H	Backup RAM checksum error
F5H	Main memory checksum error
F6H	Video RAM checksum error
F7H	Extended memory checksum error
F8H	Backup RAM checksum error
F9H	Main memory checksum error
FAH	Video RAM checksum error
FBH	Extended memory checksum error
FDH	Card modem error (The card modem will be removed while the system is resume, etc.)
FEH	Password error (The password will be erased before it is suspended.)

## Procedure 4 Diagnostic Test Program Execution Check

Execute the following tests from the *Diagnostic Test* Menu. Refer to Chapter 3, “Test and Diagnostic,” 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. NDP test
7. Expansion test

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

## Procedure 5 Connection and Replacement Check

The system board(s) may be disconnected or damaged. Disassemble the T4700CS/T4700CT/T4800CT following the steps described in chapter 4, Replacement Procedures, and check the connection between upper system board and lower system board, and other components. After checking the connection, perform the following checks.

If the IRT test (Boot mode) detects the following codes, go to Check 1.

FFH (first), 07H, 0AH, 0BH, 0DH, 15H, 18H, 1FH, 22H, 25H, 30H, 4AH, 54H, 55H, 90H, A0H, A6H

If the IRT test (Boot mode) detects the following codes, go to Check 2.

01H, 05H, 06H, 16H, 40H, 41H, 42H, 5AH, 60H, 65H, 70H, 80H

If the IRT test (Resume mode) detects the following codes, go to Check 1.

00H, F0H, F1H, F4H, F5H, F6H, F7H, F8H, F9H, FAH, FBH, FEH

If the IRT test (Resume mode) detects the following codes, go to Check 2.

F2H, FDH

If the following diagnostic test detects the error, go to Check 1.

System test  
Memory test  
Real Timer test  
NDP test

If the following diagnostic test detects the error, go to Check 2.

Printer test  
ASYNC test  
Expansion test

**Check 1** Replace the upper system board with a new one. If the problem still exists, replace the lower system board with a new one. Refer to chapter 4 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 exists, replace the upper system board with a new one. Refer to chapter 4 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 T4700CS/T4700CT/T4800CT'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: External 5.25-inch FDD Check
- Procedure 3: Diagnostic Test Program Check
- Procedure 4: 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, *Test 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 T4700CS/T4700CT/T4800CT, go to Procedure 2.

## Procedure 2 External 5.25-inch FDD Check

The floppy disk controller on the computer's system board controls the internal and external FDD. To determine if either the system board or the internal FDD is defective, check the following items:

Check 1 Connect the external 5.25-inch FDD to the PRT/FDD port and make sure it functions properly. If it does, perform Procedure 4. If it doesn't, perform Check 1 and Check 3, Procedure 4.

**NOTE:** To use the external 5.25-inch FDD, set the external FDD/PRT option in the *SETUP* program to FDD A or FDD B.

### Procedure 3 Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T4700CS/T4700CT/T4800CT Diagnostics Disk. After loading Toshiba MS-DOS, run the diagnostic program. Refer to Chapter 3, *Test and Diagnostics*, for more information about the diagnostics test procedures.

Floppy disk drive test error codes and their status names are described in table 2-5. 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 2-5 Floppy disk drive error code and status*

<b>Code</b>	<b>Status</b>
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

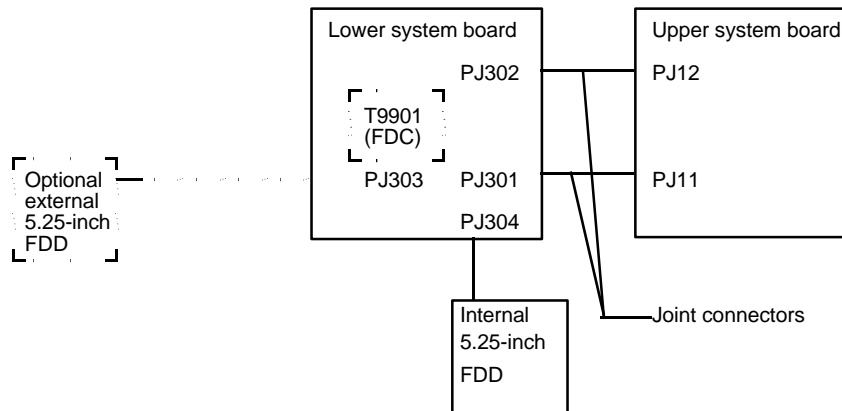
Check 1 If the following message is displayed, disable the write protect tab on the floppy disk. If any other message appears, perform Check 2.

Write protected

Check 2 Make sure the floppy disk is formatted correctly. If it is, go to Procedure 4.

## Procedure 4 Connector Check and Replacement Check

The 3.5-inch FDD related wiring diagrams are shown below.



The 3.5-inch Floppy Disk Drive is connected to the system unit by the FDD cable. This cable may be disconnected from the system board or damaged. Disassemble the T4700CS/T4700CT/T4800CT 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 system board.

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

**Check 2** Make sure the two joint connectors (PJ301 and PJ302) are firmly connected to the upper system board.

If these joint connectors are disconnected, connect them to the upper system board and repeat Procedure 3. If the FDD is still not functioning properly, perform Check 3.

**Check 3** 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 4.

**Check 4** The Floppy Disk Controller (FDC) may be defective or damaged. Replace the lower system board with a new one following the steps in chapter 4, *Replacement Procedures*. If the FDD is still not functioning properly, perform Check 5.

**Check 5** Replace the upper system board with a new one following the steps in Chapter 4, *Replacement Procedures*.

## 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: Connector Check

Procedure 4: Format Check

Procedure 5: Diagnostic Test Program Execution Check

Procedure 6: Replacement 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 T4700CS/T4700CT/T4800CT'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

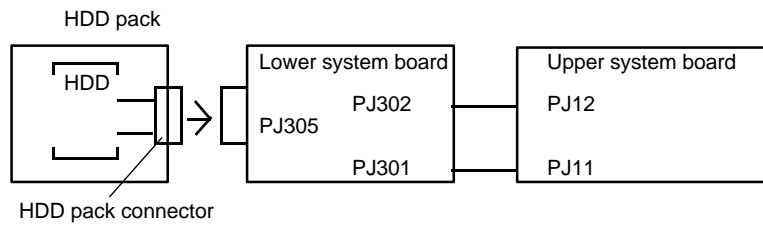
Check 3 Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

If the following message appears on the display, the system program has been transferred to the HDD. Restart the T4700CS/T4700CT/T4800CT. If the error message still appears, perform Procedure 3.

System transferred

### Procedure 3 Connector Check

The HDD related wiring diagrams are shown below.



The HDD is stored inside the HDD pack. The HDD pack connector is connected between HDD and the lower system board. This connector may be disconnected from the lower system board or HDD. Disassemble the T4700CS/T4700CT/T4800CT following the steps described in chapter 4, Replacement Procedures, and perform the following checks:

- Check 1    Make sure the HDD pack connector is firmly connected to the lower system board. Remove the HDD pack, and reinstall it. If the HDD is still not functioning properly, perform Check 2.
  
- Check 2    Disassemble the HDD pack. Make sure the HDD pack connector is firmly connected to the HDD. If it is disconnected, connect it to the HDD. If the HDD is still not functioning properly, perform Check 3.
  
- Check 3    Make sure the two joint connectors (PJ301 and PJ302) are firmly connected to the upper system board. If these joint connectors are disconnected, connect them to the upper system board. If the HDD is still not functioning properly, perform Procedure 4.



## Procedure 4    Format Check

The T4700CS/T4700CT/T4800CT'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 T4700CS/T4700CT/T4800CT Diagnostic Disk, format the HDD with a low level format option. Refer to Chapter 3, *Test 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 5.

## Procedure 5 Diagnostic Test Program Execution Check

The HDD test program is stored in the T4700CS/T4700CT/T4800CT Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to Chapter 3, *Test 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 Procedure 6. The error codes and statuses are described in table 2-6. If an error code is not generated, the HDD is operating properly.

*Table 2-6 Hard disk drive error code and status*

<b>Code</b>	<b>Status</b>
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialized
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
DDh	Total time out error
E0h	Status error
FFh	Data compare error

## Procedure 6 Replacement Check

The HDD peripheral component is composed of HDD, HDD pack connector, lower system board, and upper system board. If one of the components may be damaged, disassemble the T4700CS/T4700CT/T4800CT following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks:

- Check 1    Replace the HDD with a new one. If the HDD is still not functioning properly, perform Check 2.
  
- Check 2    Replace the HDD pack connector with a new one. If HDD is still not functioning properly, perform Check 3.
  
- Check 3    Replace the lower system board with a new one. If HDD is still not functioning properly, perform Check 4.
  
- Check 4    Replace the upper system board with a new one.

## 2.7 Keyboard Troubleshooting

To determine if the T4700CS/T4700CT/T4800CT's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedures as instructed.

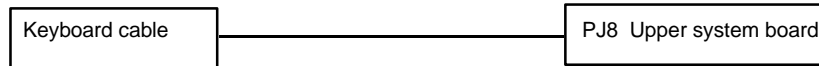
Procedure 1: Diagnostic Test Program Execution Check

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, *Test 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 system board by a 19-pin flat cable. This cable may be disconnected or damaged. Disassemble the T4700CS/T4700CT/T4800CT 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.

Keyboard cable

PJ8 Upper system board

If this cable is damaged, replace the keyboard 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 system board may be damaged. Replace the upper system board, with a new one. If the keyboard is still not functioning properly, perform Check 3.

Check 3 Replace the lower system board with a new one.

## 2.8 Display Troubleshooting

This section describes how to determine if the T4700CS/T4700CT/T4800CT's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1: Brightness and Contrast Control Check

Procedure 2: External CRT Check

Procedure 3: Diagnostic Test Program Execution Check

Procedure 4: Connector Check

Procedure 5: Replacement Check

## Procedure 1 Brightness and Contrast Control Check

Brightness is changed by the following Hot keys. If the display is blank, go to Check 1. If you cannot change the brightness, go to Check 3. If you cannot change the contrast, go to Check 4.

**NOTE:** *the contrast control is effective only on the T4700CS color LCD. You cannot change the contrast of the T4700CT/T4800CT color LCD.*

Check 1 Pressing **Fn+F5** selects the active display device. Each time you press **Fn+F5**, the active display device changes in the following order: LCD; Dual Display, which activates both LCD and CRT; and CRT.



If the display is still blank, go to Check 2.

**Note:** *Use of the Fn+F5 hotkey for display selection has different effects on the T4700CS and T4700CT/T4800CT.*

*For the T4700CS, the effect of the Fn+F5 hotkey depends on the Power on display setting, as follows:*

- (a) Simultaneous: Toggles between Internal and Simultaneous (SVGA is not supported).*
- (b) Internal/External (No external monitor connected): Toggles between Internal and Simultaneous (SVGA is not supported).*
- (c) Internal/External (External monitor connected): This hotkey does not work.*

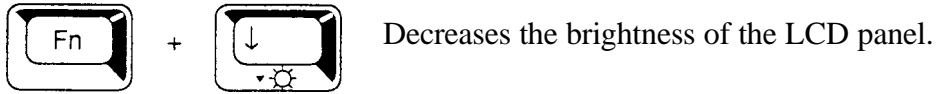
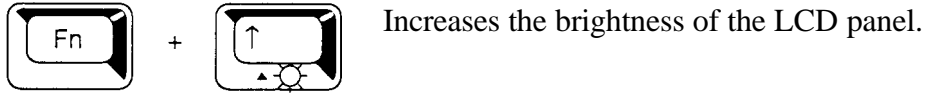
*For the T4700CT/T4800CT, Fn+F5 hotkey changes the display in the following order, regardless of the Power on display setting:*

*→Internal→Simultaneous→External→*

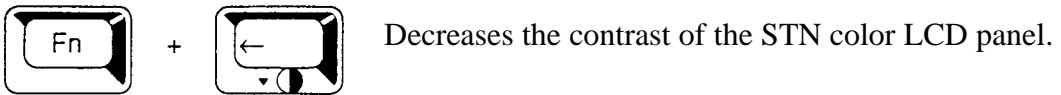
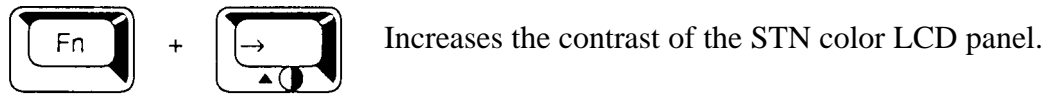
Check 2 Pressing **Fn+F1** to sets the computer in the instant security mode. Once set in this mode, the display becomes blank and the keyboard is locked to prevent others from gaining access to your computer. To restore the computer from the instant security mode, enter the instant password or turn the power off and back on.



Check 3 Pressing the **Fn+arrow** key increases or decreases the brightness of color LCD panels.



Check 4 Pressing the **Fn+arrow** key increases or decreases the contrast of STN color LCD.





## **Procedure 2 External CRT Check**

Connect the external CRT to the T4500/T4500C's external monitor port, then press **Fn+F5**

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.

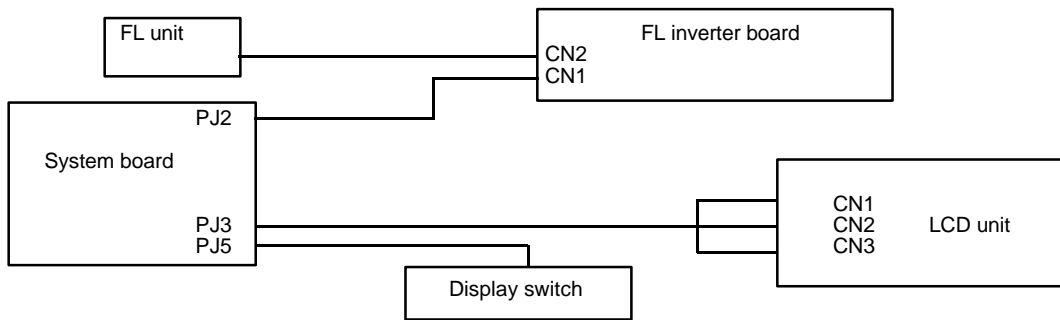
## **Procedure 3 Diagnostic Test Program Execution Check**

The Display Test program is stored on the T4700CS/T4700CT/T4800CT 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, Test and Diagnostics, for details.

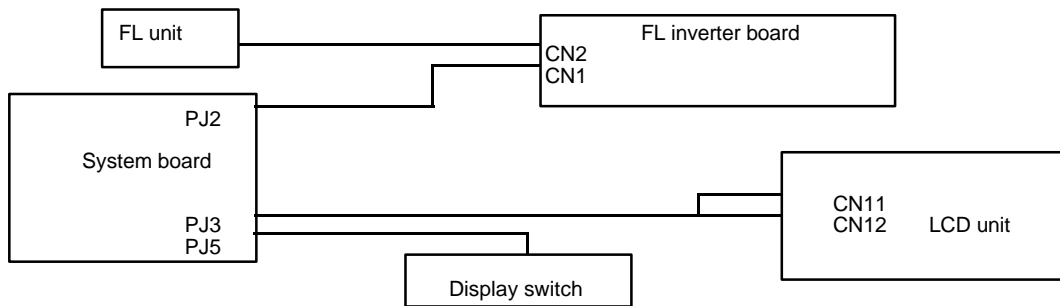
## Procedure 4 Connector Check

The Display unit has an LCD module, FL unit, Display switch, and FL inverter board. The FL unit and FL inverter board are connected by one cable. The FL inverter board and upper system board are connected by one cable. The LCD module and system board are connected by one signal cable 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 T4700CS display connection*



*Figure 2-4 T4700CT/T4800CT 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 unit, FL inverter board, LCD module, and system board 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 unit 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 unit remains lit when the display is closed, perform Check 4.

- Check 1 Replace the FL unit 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 5.
- 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 Replace the lower system board with a new one.

## **2.9 Status Indicator Panel Troubleshooting**

To determine if the T4700CS/T4700CT/T4800CT's Status Indicator Panel 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

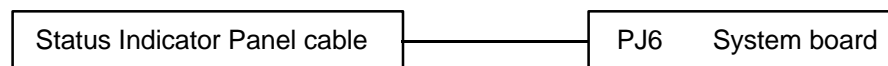
Execute the Status Indicator Panel Test in the Diagnostic Program. Refer to Chapter 3, *Test and Diagnostics*, for more information on how to perform the test program.

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

## Procedure 2 Connector and Replacement Check

The status indicator panel is connected to the system board. This cable may be disconnected or damaged. Disassemble the T4700CS/T4700CT/T4800CT as described in Chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1 Make sure the status indicator panel cable is not damaged and is connected to the system board.



If this cable is damaged, replace the status indicator panel with a new one. If the cable is disconnected, firmly connect it. Repeat Procedure 1. If the status indicator panel is still not functioning properly, perform Check 2.

Check 2 The status indicator panel controller on the system board may be damaged. Replace the upper system board with a new one. If the status indicator panel still not functioning properly, perform Check 3.

Check 3 Replace the lower system board with a new one.



### 3.1 The Diagnostic Test

This chapter explains how to use the Diagnostic Test programs (TESTCE47/48) to test hardware module functions. The Diagnostics Program is stored on the Diagnostic Disk. The Diagnostic Test consists of 19 programs grouped into the Service Program Module (DIAGNOSTICS MENU) and Test Program Module (DIAGNOSTIC TESTS).

The DIAGNOSTICS MENU consists of the following eight functions.

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

The DIAGNOSTIC TESTS menu contains the following eleven 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

The following equipment is needed to perform some test programs.

- T4700CS/T4700CT/T4800CT Diagnostics Disk (all tests)
- Formatted working disk for the floppy disk drive test (all tests)
- 3.5-inch 2HD/2DD disk for internal 3.5-inch FDD
- 5.25-inch 2D disk for external 5.25-inch FDD
- Cleaning kit to clean floppy disk drive heads (Head Cleaning)
- PCMCIA wraparound card for the I/O card (PCMCIA) test
- Printer wraparound connector for the printer wraparound (Printer) test
- RS-232C wraparound connector for the RS-232C port wraparound (ASYNC) test

The following sections detail function tests of the DIAGNOSTIC TESTS menu. Refer to sections 3.17 through 3.23 for detailed information on the other Service Program Module functions.

## 3.2 Executing the DiagnosticTest

Toshiba MS-DOS is required to run the T4700CS/T4700CT/T4800CT DIAGNOSTICS PROGRAM.

***NOTE:** Diagnostics cannot be run with expanded memory managers such as EMM386 or Quarterdeck QEMM in memory. Attempting to run diagnostics with either program loaded will cause the following message to display:*

Cannot execute in a virtual 8086 mode.

There are two ways to run diagnostics: 1) Booting from Drive A or 2) modifying the CONFIG.SYS file.

### Boot from Drive A

1. Insert a Toshiba operating system diskette into the FDD.
2. Turn on the computer, then proceed to the “Running the Diagnostics Program” section.

### Modify the CONFIG.SYS File

1. Turn on the computer and allow it to boot.
2. Deactivate the CONFIG.SYS file line that loads the device driver for the expanded memory manager by using DOS batch command “REM.” The CONFIG.SYS file may also be re-named to keep it from executing upon bootup.
3. Re-boot the computer, then proceed to the “Running the Diagnostics Program” section.

### Running the Diagnostics Program

1. Insert the Diagnostics disk in the internal FDD.
2. At the system prompt, change to Drive A (if necessary), type **TESTCE47** or **TESTCE48**, and press **Enter**.



The following menu appears:

TOSHIBA personal computer TXXXX 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 *DIAGNOSTIC TEST MENU*, press the **Esc** key. Press **Ctrl + Break** to exit a test in progress, or **Ctrl + C** to stop a test.

3. To select the **DIAGNOSTIC TEST** option from the **DIAGNOSTICS MENU**, set the highlight bar to **1**, and press **Enter**. The following screen appears:

```
TOSHIBA personal computer TXXXX 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
88 - ERROR RETRY COUNT [FDD & HDD]
99 - EXIT TO DIAGNOSTICS MENU
```

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

Refer to Sections 3.4 through 3.14 for detailed descriptions of each Diagnostic Test (1 through 10). Function 88 sets FDD and HDD error retry count. Function 99 exits to the Diagnostic Menu.

4. Select an option to execute and press **Enter**. The following message appears:

```
SYSTEM TEST          XXXXXXXX
```

```
TXXXX 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       : XXXXXXX STATUS       : XXX
```

```
SUB-TEST MENU :
```

```
01 - ROM checksum
02 - HW status
03 - ROM Version check
04 - EEPROM ID check
99 - Exit to DIAGNOSTIC TEST MENU
```

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

5. Select a subtest from the menu and press **Enter**. The following messages appear:

```
TEST LOOP      : YES
ERROR STOP     : YES
```

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

Selecting **YES** for *TEST LOOP* sets the test to run until halted by the user. Selecting **NO** exits to the main menu after the test is complete.

Selecting **YES** for *ERROR STOP* stops the test 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 test and exits to subtest menu.
- 2: Continues test.
- 3: Restarts test from the beginning.

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

Selecting **NO** for *ERROR STOP* keeps a test running even if an error is found.

Table 3-1 in section 3.3 describes each subtest menu test function; Table 3-3 in section 3.14 lists codes and status for each error.

### 3.3 Subtest Names

Table 3-1 lists subtest names for each test program in the DIAGNOSTIC TESTS 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
		03	Main battery charge
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	DCBP connect 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	Status indicator panel
		13	WD90C24A Bitblt (T4700CS only)
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	Point to point (send)
		03	Point to point (receive)
		04	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
11	EXPANSION	01	PCMCIA Wraparound

### 3.4 System Test

To execute the System Test, select **1** from the DIAGNOSTIC TESTS menu, press **Enter** and follow the directions displayed on the screen. Move the highlight bar to a subtest and press **Enter**.

Subtest 01 ROM checksum

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

Subtest 02 H/W status

This test reads and displays hardware status as shown below:

```

              76543210
H/W status = 10001000

Bit7 -           =
Bit6 - CPU clock   = 50MHz
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 lists hardware bit status for each bit tested. Press **Enter** to return to the Subtest Menu.

*Table 3-2 Hardware Bit Status*

Bit	H/W status	1	0
7	Reserved	—	—
6	CPU clock speed	50 MHz (T4700CS/CT) 75 MHz (T4800CT)	50 MHz (T4700CS/CT) 75 MHz (T4800CT)
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

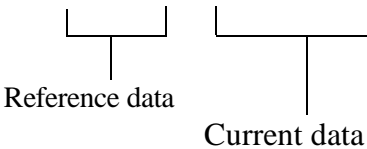
Subtest 03 Version check

This subtest checks versions for the following items:

- BIOS ROM
- BOOT ROM
- KBC version
- PS microprocessor

The subtest compares the items to test program reference data. When a read version is lower than a reference version, the speaker sounds, and the following screen image is displayed. Press the **S** key to exit. The display is unchanged if a read version is higher.

```
ROM-BIOS           = V1.00 : OK V1.10
ROM(BOOT)          = V1.00 : OK V1.00
KBC Version        = V1.00 : NG V0.90
PS Micom Version  = V1.40 : OK V1.40
```



The diagram shows two boxes representing data. The left box is labeled 'Reference data' and contains the values 'V1.00' and 'V1.40'. The right box is labeled 'Current data' and contains the values 'V1.10', 'V1.00', 'V0.90', and 'V1.40'. Lines connect the boxes to their respective labels.

Subtest 04 Main battery check

This subtest executes the quick charge to main battery, and the following message is displayed.

```
[Main battery charge]
```

## 3.5 Memory Test

To execute the Memory Test, select **2** from the DIAGNOSTIC TESTS menu, press **Enter** and follow the directions displayed on the screen. Move the highlight bar to a subtest 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 original data.

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 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 original data.

Constant data is AAAAh and 5555h.

<p><i><b>NOTE:</b> There is a short delay between write and read operations, depending on data size.</i></p>
--

### Subtest 04 Protected mode

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

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 but is used for testing an optional memory card. Memory module capacity is 4, 8, 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 corresponding to the installed memory card.

Subtest 06 Cache memory

To test cache memory, a pass-through write-read comparison of '5A' data is run repeatedly to a test area ('7000':'Program' size to '7000'::=7FFF' (32 KB)) to check 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

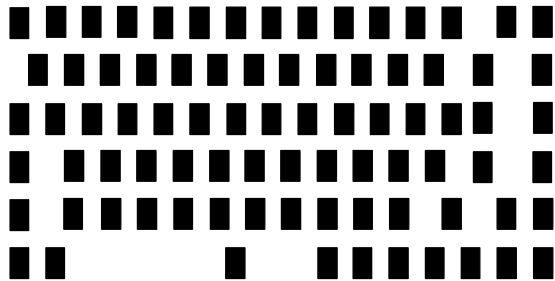
To execute the Keyboard Test, select **3** from the DIAGNOSTIC TESTS menu, press **Enter**, and follow the directions displayed on the screen. Two subtests test keyboard actions. Move the highlight bar to a subtest and press **Enter**.

Subtest 01    Pressed key display (82/84)

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

When this subtest is executed, the keyboard layout is drawn on the display as shown below. When a 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 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. Scan codes, character codes, and key top names are shown in Appendix E.

```
KEYBOARD TEST    IN PROGRESS    302000
```

```
Scan code    =  
Character code =  
Keytop       =
```

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

```
PRESS [Enter] KEY
```

Subtest 03    PS/2 mouse connect check

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

This subtest determines if a PS/2 mouse is connected or not.  
If no error is detected, it returns to the subtest menu.  
If an error is detected, the following message appears:

```
KBC - MOUSE INTERFACE ERROR
```

```
[[ HALT OPERATION ]]
```

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

Subtest 04    DCBP Check

**NOTE:** To execute the DCBP mouse connect check, a ball-point mouse must be connected to the computer. Be sure to disconnect the PS/2 mouse.

This subtest determines if a PS/2 mouse is connected or not.  
If no error is detected, it returns to the subtest menu.  
If an error is detected, the following message appears:

```
KBC - MOUSE INTERFACE ERROR
```

```
[[ HALT OPERATION ]]
```

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

### 3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TESTS menu, press **Enter**, and follow the directions displayed on the screen. Thirteen subtests test the display in various modes. Move the highlight bar to a subtest and press **Enter**.

#### Subtest 01 VRAM Read/Write

This subtest writes constant data FFFFh, AAAAh, 5555h, 0000h and address data to video RAM (1MB). This data is then read from the video RAM and compared to original data.

#### Subtest 02 Character Attributes (mode 1, 13h)

This subtest displays four character attribute modes; normal, intensified, reverse, and blinking. The character attribute modes display foreground and intensified color (16 colors or 16-level gray scale) using black, blue, red, magenta, green, cyan, yellow, and white from the color display. The following display appears when the subtest is executed.

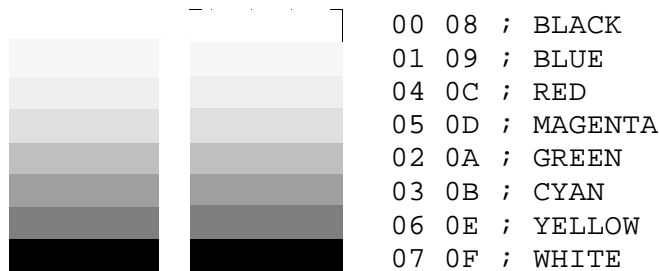
##### CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.  
NN

NEXT LINE SHOWS INTENSIFIED DISPLAY.  
II

NEXT LINE SHOWS REVERSE DISPLAY.  
RR

NEXT LINE SHOWS BLINKING DISPLAY  
BB



PRESS [Enter] KEY

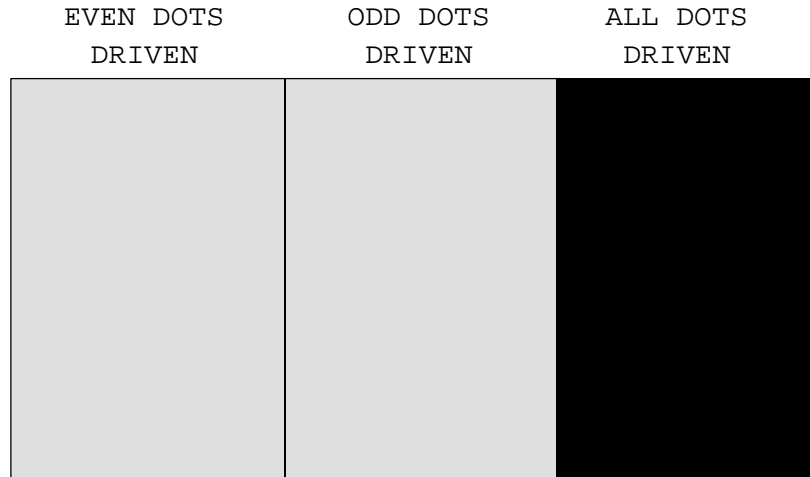




Subtest 06 640x200 Character Display (mode 6, E)

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

640\*200 GRAPHICS DISPLAY : [X]



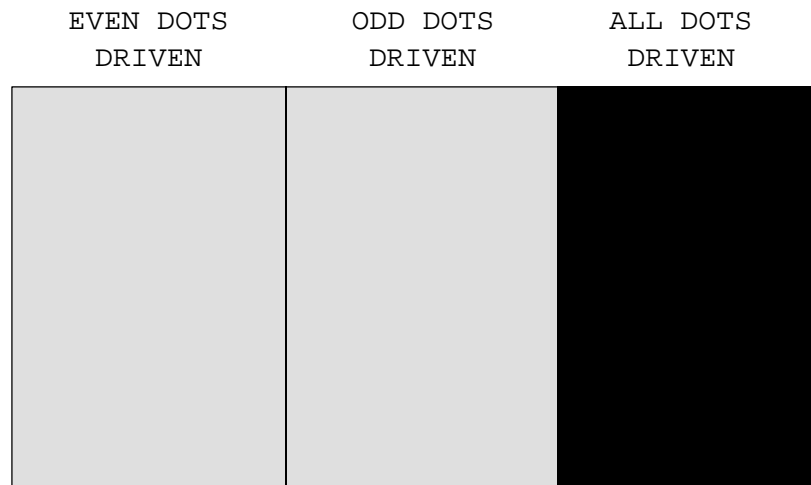
PRESS [Enter] KEY

To exit to the DISPLAY TEST menu, press **Ctrl + Break**.

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

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

640\*XXX GRAPHICS DISPLAY



PRESS [Enter] KEY

Press **Enter** to change displayed image size. To exit to the DISPLAY TEST menu, press **Ctrl + Break**.





## Subtest 10 LED/DAC Pallet

This subtest checks the icon of dub LCD (Caps Lock, Arrow, Num Lock, and Scroll Lock) by key operation.

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

- (1) Press [ Caps Lock ] key !...Cap (on/off)
- (2) Press [ Fn + F10 ] key !...Arrow (on/off)
- (3) Press [ Fn + F11 ] key !...Num (on/off)
- (4) Press [ Fn + F12 ] key !...Scroll (on/off)

```
PRESS [Enter] KEY
```

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

```
[ DAC pallet W-R-CMP test ] = (about 5 seconds)
```

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

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

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

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

## Subtest 11 TFT color display

This subtest displays eight screens. The first shows many colors (mode 13) at once. The next three display 64 shades (mode 13) of red, green, and blue successively. Next, a single screen displays many colors (mode 5F). The last three display 64 shades of red, green and blue.

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

## Subtest 12 Status Indicator Panel

This subtest turns the status indicator panel icon on and off. After this subtest is selected, all icons will be on and the following message will appear.

```
[Status Indicator Panel Display]
```

```
Status Indicator Panel ALL ON
```

```
PRESS [ENTER] KEY
```

## Subtest 13 WD90C24A Bitblt (4700CS only)

This subtest checks the V-RAM transfer command function. It reads and writes a partition of V-RAM data and compares written data to original data.

### 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 TESTS menu, press **Enter**, and follow the directions displayed on the screen. Five subtests test the internal floppy disk drive. The following messages will appear after the Floppy Disk Test is selected. Answer each question with an appropriate response.

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 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 to start the test on and press **Enter**. Pressing **Enter** alone sets the start track to zero.

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

4. The floppy disk test menu will appear after the start track number is selected. Select a subtest number and press **Enter**. The following message will appear during the test.

FLOPPY DISK            XXXXXXXX

```
TXXXX 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 the cylinder being tested. The fourth indicates the head, and the last two indicate the sector being tested.

The first digit in the STATUS number indicates the drive being tested and the last two 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 tracks on a floppy disk. The following tracks are read according to the media type in the FDD:

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.

A 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. 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. 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 TESTS menu, press **Enter**, and follow the directions displayed on the screen. Three subtests test printer output. The following messages will appear after selecting Printer Test. Answer each question with an appropriate response.

***NOTE:** An IBM-compatible printer must be connected to the system to execute this test. Make sure the setup option External FDD/PRT is set to Printer.*

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 T4700CS/T4700CT/T4800CT supports three printer channels. Select the appropriate printer channel number, and press **Enter** to execute a 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:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopq
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrs
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrst
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuv
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuvw
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuvwx
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuvwxy
```

## 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 subtest 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 printer port. The printer wraparound connector (34M741986G01) wiring diagram is shown in Appendix G.*

This subtest checks 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 TESTS menu, press **Enter**, and follow the directions displayed on the screen. Four subtests test asynchronous communication functions. Move the highlight bar to a subtest 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, 02, 03, and 04 are selected:

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

The serial I/O port address is specified by the XXXXh number. Select the appropriate 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 wrap-around connector wiring diagram is shown 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 shown 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 as 'receive' (subtest 04). The wiring diagram for the RS-232C direct cable is shown 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. This subtest receives data from the send side, then sends the received data.

Subtest 05 Card Modem Loopback (2400BPS)

**NOTES:**

- (1) *To execute this subtest, a 2400 bps type card modem must be installed.*
- (2) *It is not necessary to turn on the modem at the Setup option. When this subtest is selected, the modem is powered on automatically.*
- (3) *Set the PCMCIA Slot to Others in the Setup program to execute.*

This subtest sends data from the RS-232C port to the built-in modem. The same data is then sent back to the RS-232C port and compared to original data.

When the serial port channel number is selected and **Enter** is pressed, the following message appears:

```
Baud rate select (2: 300BPS, 4: 1200BPS, 5: 2400BPS) ?  
Mode select (1: BELL, 2: CCITT) ?
```

Select the baud rate and mode for the card modem and press **Enter** to execute the subtest.

Subtest 06 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 TESTS menu, press **Enter**, and follow the directions displayed on the screen. Ten subtests test the HDD functions. The following messages will appear after the hard disk test is selected. Answer each question with an appropriate response.

**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 the hard disk test is selected, the following message will appear:  
Test drive number select (1:HDD#1,2:HDD#2,0:HDD1&2) ?
2. Select the HDD 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 HDD status for display or non-display. HDD status is described in section 3.16. Select **1** or **2** and press **Enter**.



6. The Hard Disk Test message will appear after a response to the Detail Status prompt. Select a subtest 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 : XXXXXX STATUS : XXX
```

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

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

Subtest 01 Sequential Read

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

Subtest 02 Address Uniqueness

This subtest writes unique address data to each sector 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 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 and compares it with the original data.

Subtest 06 Write specified address

This subtest writes specified data to a specified cylinder and head.

Subtest 07 Read specified address

This subtest reads data written to a specified cylinder and head.

Subtest 08 ECC circuit

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

Subtest 09 Sequential write

This subtest writes specified 2-byte data to all cylinders.

Subtest 10 W-R-C specified address

This subtest writes data to a specified cylinder and head, 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 TESTS menu, press **Enter**, and follow the directions on the screen. Three subtests test the real timer functions. Move the highlight bar to a subtest and press **Enter**.

### Subtest 01 Real Time

A new date and time can be input during this subtest. To execute this 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 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 FEh through 7Fh
Writes the data pattern AAh through 55h to the RTC 50-byte memory
(address 0Eh to 3Fh)
```

The subtest then reads and compares this data with original data.

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

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

This subtest checks real time clock increments, verifying 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 DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. The NDP test contains one subtest that tests the 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

To execute the Expansion Test, Select **11** from the Diagnostic Tests Menu, press **Enter**, and follow the directions on the screen. One subtest tests the expansion port functions. The following message will appear after the Expansion Test is selected.

```
Test slot number select (1:slot1,2:slot2,0:slot1&2)?
```

Select a PCMCIA test slot number and press **Enter**.

Subtest 01 I/O Card Test (PCMCIA)

**NOTE:** A PCMCIA wraparound card is required to execute this subtest.

This test checks the following signal lines 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

### 3.15 Error Code and Error Status Names

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

*Table 3-3 Error Codes and Error Status Names (1/2)*

<b>Device name</b>	<b>Error code</b>	<b>Error status name</b>
(COMMON)	FF	Data Compare Error
SYSTEM	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	DD	Cache Memory Error
Keyboard	03	Mouse Interface Error
	04	DCBP Interface Error
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

Table 3-3 Error Codes and Error Status Names (2/2)

Device name	Error code	Error status name
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
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
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 Overrun (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	
NDP	01	No Co-processor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiplication 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



## 3.16 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, the last four are not used.

HDC error status is composed of 2 bytes; the first byte displays the contents of the HDC status register in hexadecimal form, the second displays the HDC error register.

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

*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 was 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*

<b>Bit</b>	<b>Name</b>	<b>Description</b>
7	BBK1 (Bad block mark)	“0” Other “1” A bad block mark was 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 found track 0 during a recalibrate command. “1” The hard disk could not find track 0 during a recalibrate command.
0	—	Not used.

## 3.17 Hard Disk Format

This function performs a low-level (physical) hard disk format and also executes the following:

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

**CAUTION:** *The hard disk will be erased when this program is executed. Before executing, transfer hard disk contents onto a backup system. This can be done with the Toshiba MS-DOS BACKUP command. See the Toshiba MS-DOS manual for details on using the BACKUP command.*

### 3.17.1 Function Description

1. All track FORMAT

This option performs a low-level format of all hard disk tracks as listed 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

	200 MB	320 MB	500 MB
Model Name	(MK2224FC)	(MK2326FC)	(MK2428FC)
Sector sequences	1	1	1
Cylinders	0 to 683	0 to 968	0 to 1,015
Heads	0 to 15	0 to 13	0 to 15
Sectors	1 to 38	1 to 49	63
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 for bad tracks by reading data to all tracks. 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 terminated.

## 3.17.2 Operations

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

Select **2** from the DIAGNOSTIC MENU and press **ENTER** to display the following menu:

```
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

Press **1** to select “All track FORMAT,” and format the entire disk.

```
[All track FORMAT]
```

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

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

The following prompts display 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 appears:

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

- (b) Select an interleave number (1 ~ 8) and press **Enter**. Press **Enter** only to select **1**.

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

- (c) Select an unlock format.

***NOTE:** This option appears only when a JVC HDD is installed. Select **2** (yes) for JVC HDDs, the only disks with unlock formats. If **1** is selected for 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 appears. Enter the bad track cylinder and head numbers and press **Enter**. If there are no bad tracks, press **Enter** only to execute All Track Format as 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 cylinder and head number in the format above in decimal notation. Repeat for each bad track to format.

After entering 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 identified as bad tracks in the Track Verification function described in Item (f) below.

- (f) Track Verification

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

## 2. Good track FORMAT

If a good track has been erroneously formatted as a bad track, use this subtest to reformat it as a good track. Enter the drive, interleave, cylinder, and head numbers 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 drive, interleave, cylinder, and head numbers 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 bad track list. The test is terminated in case of a bad track check error. To initiate the subtest, enter the drive number at the prompt shown below.

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

Bad tracks are displayed in the format shown below.

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

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

**NOTE:** 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.

## 3.18 Head Cleaning

### 3.18.1 Function Description

This function cleans FDD heads by executing a series of head load/seek and read operations. A cleaning kit is required.

### 3.18.2 Operations

1. Select **4** from the DIAGNOSTIC MENU and press **Enter** to display 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, insert the cleaning disk, and press **Enter**.
3. When the cleaning start message appears, FDD head cleaning has begun.
4. The display returns to the DIAGNOSTIC MENU when the program is completed.





2. Error information on the screen can be manipulated by the following number keys:
  - 1 scrolls the display to the next page.
  - 2 scrolls the display to the previous page.
  - 3 returns to the Diagnostic Menu.
  - 4 erases all error log information in RAM.
  - 5 outputs the error log information to a printer.
  - 6 reads log information from a floppy disk.
  - 7 writes 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, but not added to the error count.

## 3.20 Running Test

### 3.20.1 Function Description

This function executes the following tests in sequence:

1. System test (subtest number 01)
2. Memory test (subtest numbers 01, 02, 04, 06, 07)
3. Display test (subtest numbers 01 to 08)
4. FDD test (subtest number 02)
5. HDD test (subtest numbers 01, 05)
6. Real timer test (subtest number 02)
7. Printer test (subtest number 03)
8. Async test (subtest number 01)

The system detects the number of floppy disk drives connected to the T4700CS/T4700CT/T4800CT for the FDD test.

### 3.20.2 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 FDD testing.

1. Remove the diagnostics disk from the FDD and insert the work disk.
2. Select **6** from the Diagnostic Menu and press **Enter** to display the following message:

Printer wrap around test (Y/N) ?

Select **Y (yes)** to execute the printer wraparound test. A printer wraparound connector must be connected to the **PRT/FDD** port on the back of the T4700CS/T4700CT/T4800CT to execute this test.

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

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

Select **Y (yes)** to execute the ASYNC wraparound test. An RS-232C wraparound connector must be connected to the **serial port** on the back of the T4700CS/T4700CT/T4800CT to execute this test.

4. Select **Yes** or **No** and press **Enter** to display the following message:

```
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**.

## 3.21 Floppy Disk Drive Utilities

### 3.21.1 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 floppy disk (both 3.5-inch and 5.25-inch) contents and designated hard disk sectors.

### 3.21.2 Operations

1. Select **7** from the DIAGNOSTIC MENU and press **Enter** to display the following message:

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

## 2. FORMAT program

- (a) Select **FORMAT** to display 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** to display a message similar to the one below:

```
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) Type **1** to display the message from step (c) above. Type **2** to return to the **DIAGNOSTIC MENU**.

## 3. COPY program

- (a) Select **COPY** to display the following message:

```
FLOPPY DISK FORMAT & COPY : VX.XX  
Type select (0:2DD-2DD,1:2D-2D,2:2D-2HD,3:2HD-2HD) ?
```

- (b) Select a media/drive type number to 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 indicates 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 data cannot all 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. Enter **2** to return to the DIAGNOSTIC MENU.

#### 4. DUMP program

- (a) Select dump to display the following message:

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

- (b) Select a format type number. If **2** is selected, the display will go to step (e).

```
Select FDD number (1:A, 2:B) ?
```

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

```
Format type select (0:2DD, 1:2D, 2:2HD) ?
```

- (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 a track number to dump. The system will access the disk and dump a list.

## 3.22 System Configuration

### 3.22.1 Function Description

The System Configuration program contains the following information:

1. BIOS ROM version
2. Boot ROM version
3. Number of math co-processors
4. KBC version
5. Base memory size
6. Number of floppy disk drives
7. Number of ASYNC ports
8. Number of hard disk drives
9. Number of printer ports
11. PS Micom Version
12. Battery Type

### 3.22.2 Operations

Select **8** from the DIAGNOSTIC MENU and press **Enter** to display the system configuration menu:

```
SYSTEM CONFIGURATION :  
  
* - BIOS (BOOT) ROM VERSION = VX.XX  
                                (VX.XX)  
* - 1 MATH CO-PROCESSOR  
* - KBC VERSION = VX.XX  
* - 639KB MEMORY  
* - 1 FLOPPY DISK DRIVE(S)  
* - 1 ASYNC ADAPTER  
* - 1 HARD DISK DRIVE(S)  
* - 1 PRINTER ADAPTER  
* - XXXXXXKB EXTENDED MEMORY  
* - PS MICOM VERSION = VX.XX  
* - XXXXXX BATTERY
```

Press [Enter] Key

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

## 3.23 Setup

### 3.23.1 Function Description

This program displays 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) LCD Display Colors
  - (d) Power On Display
3. COM/PCMCIA/FDD/PRT
  - (a) PC Card Slot 1
  - (b) PC Card Slot 2
  - (c) Serial Port
  - (d) Ext. FDD/PRT
  - (e) Printer Port Type
4. Hard Disk
  - (a) Capacity
5. Battery
  - (a) Battery Save Mode
  - (b) Battery Display
  - (c) Manual Set of Battery Level
6. Power on Password
7. Others
  - (a) Power-up Mode
  - (b) CPU Cache
  - (c) Speaker Volume
  - (d) Panel Power On/Off
  - (e) Alarm Power On
  - (f) Hotkey
  - (g) Boot Priority
  - (h) Sound I/O Address
  - (i) Ext. Keyboard "Fn" key equivalent



### 3.23.2 Accessing the SETUP Program

Select **0** from the DIAGNOSTICS MENU and press **Enter** to display the following:

T4700CT SETUP		BIOS version = *.*.*	
<b>MEMORY</b>		<b>BATTERY</b>	
Total	= 8192 KB	Battery Save Mode	= Economy Power
Base	= 640 KB	Battery Display	= Time
Extended	= 7424 KB		
Shadow BIOS ROM	= 128 KB		
<b>DISPLAY</b>		<b>POWER ON PASSWORD</b>	
Display Adapter	= VGA Compatible	Not Registered	
LCD Display Mode	= Color		
LCD Display Colors	= 180K Colors		
Power On Display	= Internal/External		
<b>COM/PCMCIA/FDD/PRT</b>		<b>OTHERS</b>	
PC Card Slot 1	= PCMCIA	Power-up Mode	= Boot
PC Card Slot 2	= PCMCIA	CPU Cache	= Enabled
Serial Port	= COM1 (IRQ4/3F8H)	Speaker Volume	= High
External FDD/PRT	= Printer		
Printer Port Type	= Output	Alarm Power On	= Disabled
		Hotkey	= Enabled
		Boot Priority	= FDD→HDD
		Sound I/O Address	= 0530H
		Ext. Keyboard "Fn" Key Equivalent	= Disabled
<b>HARD DISK</b>			
Capacity	= 320MB		

↑ ↓ → ←: Select items, Space, BkSp : Change values  
Esc: Exit without saving, Home: Set default values, End: Save changes and Exit

**NOTE:** LCD display colors do not appear on the T4700CS screen.

### Moving Within the SETUP Menu and Changing Values

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

### Accepting Changes and Exiting the SETUP Window

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

If the changed item does not require a system re-boot, the following message is displayed:

Are you sure? (Y/N)

If the changed item requires a system re-boot, the following message is displayed:

Are you sure? (Y/N)

Changes made will cause the system to re-boot.

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

3. To accept changes, press **Y**.

**NOTE:** Press *Esc* to quit at any time without saving changes. *SETUP* asks confirmation for not saving changes.

## The Factory Preset Configuration

When *SETUP* is accessed, the current configuration is displayed.

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

## SETUP Options

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

1. Memory

This group lists values for computer memory.

- (a) Total

This field displays the total amount of memory installed and is calculated by the computer. These values may not be changed by the user.

- (b) Base

This field displays the amount of base (conventional) memory, 640 KB and is calculated by the computer. These values may not be changed by the user.

- (c) Extended Memory

This field displays the amount of extended memory available. These values may not be changed by the user.

- (d) Shadow BIOS ROM

The *SETUP* program displays 128 KB of RAM reserved for Shadow BIOS ROM. These values may not be changed by the user.

## 2. Display

This group of options allows configuration of the computer display.

### (a) Display Adapter

This field displays the internal adapter for the VGA internal display. Only VGA-compatible is displayed. This field cannot be changed.

### (b) LCD Display Mode

Use this option to set the display mode.

<i>Color</i>	Displays in color mode in a maximum of 512, 24K, 180K or 256K colors. (This is the default.)
<i>Monochrome</i>	Displays in the monochrome mode. The intensity levels of gray are converted to the appropriate levels of gray for the TFT color LCD.

### (c) LCD Display Colors (T4700CT/T4800CT only)

Use this option to set the number of colors to be supported by the color LCD display. Choose another setting if the 180K default setting does not provide an adequate display.

<i>256K colors</i>	Supports 256K (262,144) colors.
<i>180K colors</i>	Supports 180K ( 185,193) colors.
<i>24K colors</i>	Supports 24K (24,389) colors.
<i>512 colors</i>	Supports 512 colors.

**NOTE:** *If the screen flickers at a setting, select another setting with fewer colors.*

### (d) Power On Display

This option selects the display on which the system starts up when the computer is turned on. Once the system starts up, you can switch the active display by using the hotkey, **Fn+F5**

<i>Internal/External</i>	The system starts up by using the internal display if no external display is attached, or by using the external display if an external display is attached.
<i>Simultaneous</i>	The system starts up by using both the internal and external displays.

**Note:** Use of the **Fn+F5** hotkey for display selection has different effects on the T4700CS and T4700CT/T4800CT.

For the T4700CS, the effect of the **Fn+F5** hotkey depends on the Power on display setting, as follows:

- (a) *Simultaneous:* Toggles between Internal and Simultaneous (SVGA is not supported).
- (b) *Internal/External (No external monitor connected):* Toggles between Internal and Simultaneous (SVGA is not supported).
- (c) *Internal/External (External monitor connected):* This hotkey does not work.

For the T4700CT/T4800CT, **Fn+F5** hotkey changes the display in the following order, regardless of the Power on display setting:

→Internal→Simultaneous→External→

### 3. COM/PCMCIA/FDD/PRT

This option controls settings for PC card slots 1 and 2, and serial and parallel ports.

#### (a) PC Card Slot 1 or 2

These options allow you to use the PCMCIA or other optional card on slot 1 or 2. If you set Other, you can set the next window, COM Port and Power.

<i>PCMCIA</i>	You can use the PCMCIA card.
<i>Others</i>	This option allows you to set the COM port of the card modem and power on/off in the following options.
<i>COM Port</i>	Two COM levels for the card modem can be selected: COM1 (IRQ4/3F8H) or COM2 (IRQ3/2F8H). If you set this level to the same as that of the serial port, the serial port setting automatically changes to Not Used.
<i>Power</i>	This option allows you to turn the card modem on or off.

#### (b) Serial Port

Use this option to set the COM level, COM1 or COM2, for the serial and

parallel ports. The serial port interrupt level (IRQ) and I/O port base address for each COM level is shown in the following table:

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

**NOTE:** The card modem COM level is not displayed but is automatically set to the remaining COM level when the serial port is set.

(c) Ext. FDD/PRT

Use this option to assign the function of the **External PRT/FDD** port.

- Printer* Configures the port for output to a printer or other parallel device. (This is the default.)
- FDD A* Configures the port for output and input to and from an external 5.25-inch FDD, assigns the letter A to the external drive. The internal drive becomes drive B by default.
- FDD B* Configures the port for output and input to and from an external 5.25-inch FDD and assigns the letter B to the external drive. By default the internal drive remains drive A.

(d) Printer Port Type

This option sets the communication mode for the PRT/FDD port to either output-only or bi-directional. It is effective only when the External **PRT/FDD** option is set to printer. If FDD is selected, this setting is ignored and the mode is automatically set to bi-directional. For most printers, the port should be set to Output. With some other parallel devices, the setting should be Bi-directional.

- Output* Activates uni-directional operation.  
(This is the default)
- Bi-directional* Activates bi-directional operation.

4. Hard Disk

This option enables or disables the HDD.

- XX MB* The 200-MB (T4700CS/T4700CT), 320-MB or 500-MB (T4800 CT) type HDD can be used. Disk capacity is displayed automatically and cannot be changed.
- No Drive* The hard disk cannot be accessed.

## 5. Battery

### (a) Battery Save Mode

This option is used to select Full Power, Economy Power, Low Power, or User Setting of the BATTERY SAVE OPTIONS. You can also set this option using the **Hotkey**.

*Full Power/* Selects a preset set of battery save parameters suitable for either Full Power, Economy Power, or Low Power operation. Selecting this option displays a sub-window of BATTERY SAVE OPTIONS, like the one shown here. The options in the sub-window cannot be changed and are for informational purposes only.

*Economy Power/*

*Low Power/*

*User Setting*

FULL POWER	ECONOMY POWER
<b>BATTERY SAVE OPTIONS</b>	<b>BATTERY SAVE OPTIONS</b>
Processing Speed = High	Processing Speed = High
CPU Sleep Mode = Disabled	CPU Sleep Mode = Disabled
Display Auto Off = 30 Min.	Display Auto Off = 30 Min.
HDD Auto Off = Printer	HDD Auto Off = Printer
System Auto Off = Disabled	System Auto Off = Disabled
(only Resume mode)	(only Resume mode)
Max. LCD Brightness = High	Max. LCD Brightness = High

LOW POWER
<b>BATTERY SAVE OPTIONS</b>
Processing Speed = High
CPU Sleep Mode = Disabled
Display Auto Off = 30 Min.
HDD Auto Off = Printer
System Auto Off = Disabled
(only Resume mode)
Max. LCD Brightness = High

#### *User Settings*

Use this option to set battery save parameters on the sub-window, BATTERY SAVE OPTIONS. When selected, the automatic setting feature (Full Power, Economy 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: Full Power, Economy Power, or Low Power. User settings let you select the following options:

(1) Processing Speed

This option is used to set the CPU operating speed to high or low.

<b>Processing Speed</b>	<b>CPU Speed</b>
<i>High</i>	50 MHz [T4700CS/T4700CT] 75 MHz [T4800CT]
<i>Low</i>	25 MHz (Equivalent) [T4700CS/T4700CT] 37.5 MHz (Equivalent) [T4800CT]

(2) CPU Sleep Mode

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

<i>Enabled</i>	Enables sleep mode.
<i>Disabled</i>	Disables sleep mode.

(3) Display Auto Off

This option is used to disable or set the duration of the display automatic power-off function. This function turns the display illumination off if you make no entry for the set period of time.

<i>Disabled</i>	Disables display automatic power-off.
<i>xx Min.</i>	Automatically turns off power to the display illumination LCD panel if it is not used for the duration set. The duration xx can be set to 1, 3, 5, 10, 15, 20 or 30 minutes.

(4) HDD Auto Off

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

<i>Disabled</i>	Disables HDD automatic power-off.
<i>xx Min.</i>	Automatically turns off power to the HDD if it is not used for the duration set. Duration xx can be set to 3, 5, 10, 15, 20 or 30 minutes.

(5) System Auto Off

This option enables or disables the system automatic power-off and is selectable only if the Power-up Mode is set to Resume. When automatic power is enabled, the duration can be programmed to any of the intervals listed below.

<i>Disabled</i>	System automatic power-off is disabled.
<i>xx Min.</i>	System automatic power-off is enabled. The system is

automatically powered off if you do not use it for the duration set. You can set the duration to 10, 20, 30, 40, 50 or 60 minutes.

(6) Max. LCD Brightness

This option selects the maximum LCD brightness level, a high level or a low level.

<i>High</i>	Maximum brightness level is set to high
<i>Low</i>	Minimum brightness level is set to low

(b) Battery display





This option selects the way the status indicator panel indicates remaining battery capacity when the T4700CS/T4700CT/T4800CT is not connected to the AC adapter. The options are Time and % Remaining.

The status indicator panel indicates how much battery power is left. If you select Time the status indicator panel indicates an estimated time for which the T4700CS/T4700CT/T4800CT can operate with the remaining battery power. If you select the % Remaining, the status indicator panel displays a remaining battery capacity in percent.

The status indicator panel displays a remaining battery capacity in percent whenever the T4700CS/T4700CT/T4800CT is connected to the AC adapter.

**Manual set of battery level**

This option is displayed only if the status indicator panel cannot indicate the charge level because the T4700CS/T4700CT/T4800CT cannot estimate the remaining battery capacity. This option allows you to set the charge level of the battery. A horizontal bar graph between the values E (Empty) and F (Full) represents the amount of charge. You can manually set the charge level by using the **Space** and **Backspace** keys. The options are:

E		F	The charge level is 100%.
E		F	The charge level is 75%.
E		F	The charge level is 50%.
E		F	The charge level is 25%.
E	??	F	The charge level is unknown.

The charge level you set here will be displayed on the status indicator panel after quitting the system configuration program.



## 6. Power On Password

Use this option to set or reset the power-on password.

*Registered*      The password has been registered.  
*Not registered*      The password has not been registered.

For details on setting the power-on password refer to the *User's Reference Manual*.

## 7. Others

Whether it is necessary to configure the computer with these options depends primarily on the kind of software or peripherals used.

### (a) Power-up Mode

This option enables and disables the AutoResume feature. You can also set this option using the Hotkey. Disabling AutoResume enables boot mode.

*Boot*      Turns off boot mode. (This is the default.)  
*Resume*      Turns on the AutoResume feature.

### (b) CPU Cache

Use this option to enable or disable the CPU cache.

*Enabled*      Enables the CPU cache. (This is the default.)  
*Disabled*      Disables CPU cache.

### (c) Speaker Volume

This option sets software use of the system speaker. Setting this option to off disables the self-test alarm. All other system alarms are unaffected. This option also appears in the Hotkey. The default is high.

*Off*      Disables the speaker.  
*Low*      Selects the minimum speaker volume.  
*Medium*      Selects the medium speaker volume.  
*High*      Sets the maximum speaker volume.

If you select this option, a sub-window, **SPEAKER VOLUME OPTIONS**, appears and you can set additional options for the speaker volume .

(d) System Speaker

This option enables or disables the system speaker.

*Enabled* Enables the system speaker. (This is the default).

*Disabled* Disables the system speaker.

(e) Low Battery Alarm

This option enables or disables the alarm when the capacity of the battery is low.

*Enabled* Enables the battery alarm when the capacity of the battery is low. (This is the default.)

*Disabled* Disables the battery alarm when the capacity of the battery is low.

(f) Panel Close Alarm

This option enables or disables the alarm when you close the panel.

*Enabled* Enables the panel close alarm when you close the panel. (This is the default.)

*Disabled* Disables the alarm when you close the panel.

(g) Panel Power On/Off

This option enables and disables automatic panel close suspend. This option automatically turns off the computer when the display panel is closed and turns on the computer when the display panel is opened. When the system is set to boot mode, this option is automatically disabled.

*Enabled* Enables the system automatic power off when the display panel is closed.

*Disabled* Disables the system automatic power off when the display panel is closed. (This is the default.)

(h) Alarm Power On

This option enables and disables the alarm power on feature.

*Disabled* Alarm power on feature is disabled.

*hh:mm:ss* Alarm power on feature is enabled .

If you enable this option, the T4700CS/T4700CT/T4800CT will be powered on and boot up, or resume automatically at the time you set here.

(i) Hotkey

This option enables or disables the hotkeys.

*Enabled* Enables hotkeys. (This is the default.)

*Disabled* Disables hotkeys.

**NOTES:**

**1.** *The following hot keys do not work in an operating system environment other than MS-DOS or Windows 3.0/3.1 Enhanced mode. If the T4700CS/T4700CT/T4800CT is running in such environment, you must set this option to Disable. The other hotkeys, however, work in any operating system environment.*

**Fn + F1** Instant password  
**Fn + F2** Power save mode  
**Fn + F3** Resume mode  
**Fn + F5** Display device

**2.** If you use the hot keys in Windows 3.0/3.1 enhanced mode environment, you need to install the WRESUME drivers. For more information, see the User's T4700CS/T4700CT/T4800CT Reference Manual.

(j) Boot Priority

This option specifies the priority of the disk drive from which the computer attempts to load the operating system when you turn it on .

*FDD → HDD*                      *FDD A → FDD B → HDD*

*HDD → FDD*                      *HDD → FDD A → FDD B*

**NOTE:** *If you turn the T4700CS/T4700CT/T4800CT on while pressing the **F10** key, it attempts to load the operating system in the reverse order that you set by using this option. The option setting is not affected by pressing the **F10** key.*

(k) Sound I/O address

This option enables or disables the sound system. When the sound system is enabled, you can select the sound I/O base address.

0530H

0604H

0E80H

Disabled

If you enable this option, the OPTION sub-window appears.

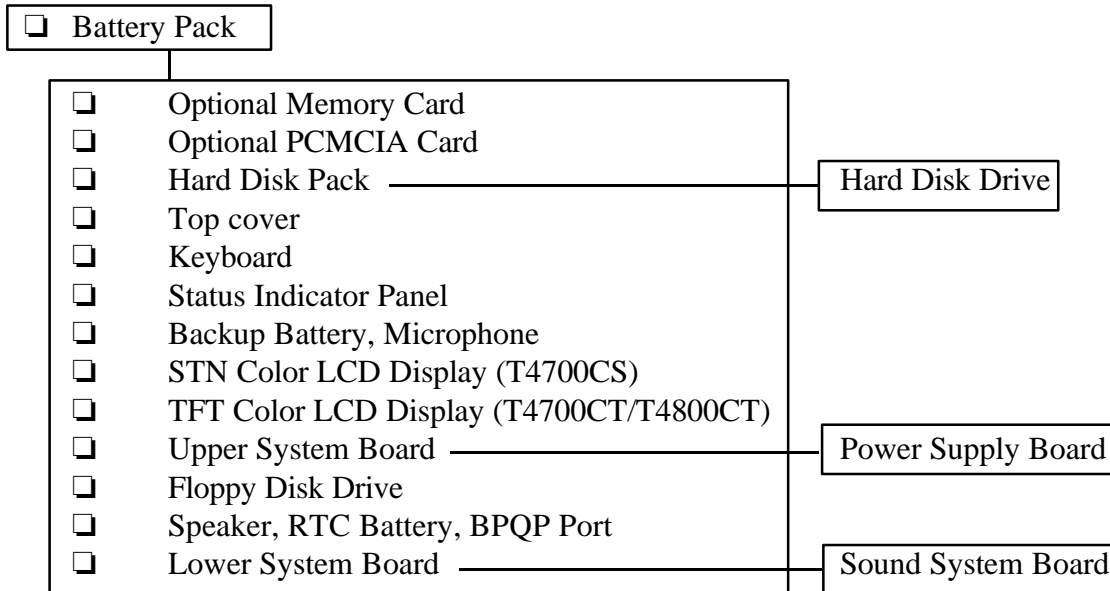
(1) External keyboard “Fn” key equivalent

This option is used to let substitute keys function as the **Fn** key.

Disable	Disables any key serve for Fn key. (This is the default.)
Left Ctrl + Left Alt	<b>Left Ctrl + Left Alt</b> functions as <b>Fn</b> key.
Right Ctrl + Right Alt	<b>Right Ctrl + Right Alt</b> functions as <b>Fn</b> key.
Left Alt + Left Shift	<b>Left Alt + Left Shift</b> functions as <b>Fn</b> key.
Right Alt + Right Shift	<b>Right Alt + Right Shift</b> functions as <b>Fn</b> key.
Left Alt + Caps Lock	<b>Left Alt + Caps Lock</b> functions as <b>Fn</b> key.

## 4.1 General

This section explains how to disassemble the T4700CS/T4700CT/T4800CT 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 lines on the chart to determine which FRU you must remove next in order to repair the one you think is causing the T4700CS/T4700CT/T4800CT to operate improperly.



### Before You Begin

Look over the procedures in this section before disassembling the T4700CS/T4700CT/T4800CT. Familiarize yourself with disassembly and reassembly steps. Begin each procedure by removing the AC adapter and battery pack as instructed in section 4.2.

1. Do not disassemble the T4700CS/T4700CT/T4800CT 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 T4700CS/T4700CT/T4800CT:
  - 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 unnecessary operations and use only the described procedures for disassembling and installing T4700CS/T4700CT/T4800CT FRUs.

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 T4700CS/T4700CT/T4800CT. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.
8. When assembling the T4700CS/T4700CT/T4800CT make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.
9. The T4700CS/T4700CT/T4800CT contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU make sure the T4700CS/T4700CT/T4800CT is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

## Disassembly Procedures

The T4700CS/T4700CT/T4800CT 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 connectors' 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 T4700CS/T4700CT/T4800CT and fixed or repaired the problem that was causing the T4700CS/T4700CT/T4800CT to operate abnormally, you will need to reassemble the T4700CS/T4700CT/T4800CT.

While assembling the T4700CS/T4700CT/T4800CT, 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 T4700CS/T4700CT/T4800CT.
- 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 closed securely 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 T4700CS/T4700CT/T4800CT confirm that the FRU and the T4700CS/T4700CT/T4800CT 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 T4700CS/T4700CT/T4800CT:

- One M2 Phillips screwdriver to remove and replace screws.
- Tweezers, to lift out screws that you cannot grasp with your fingers.
- 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 T4700CS/T4700CT/T4800CT battery pack, follow the steps below and refer to figure 4-1.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Close the display if it is open.
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).

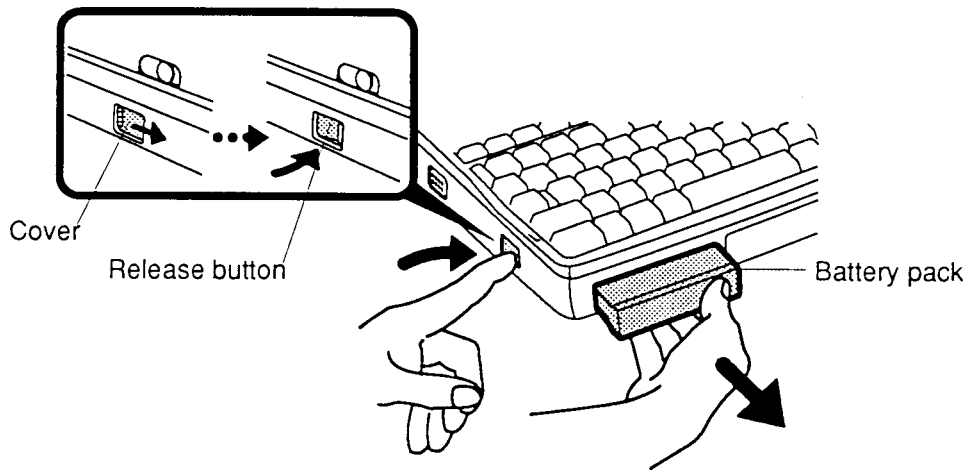


Figure 4-1 Removing the battery pack

### Installing the Battery Pack

**NOTE:** The battery pack is designed to fit into the T4700CS/T4700CT/T4800CT in only one way. Notice that the battery packs for the T4700CS/T4700CT and T4800CT are different.

To install the T4700CS/T4700CT/T4800CT battery pack, follow the steps below and refer to figure 4-1:

1. Gently slide the **battery pack** into the battery slot making sure the **tongue** 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 Memory Card

### Removing an Optional Memory Card

To remove an optional memory card from the T4700CS/T4700CT/T4800CT, follow the steps below and refer to figures 4-2 and 4-3.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack as described in section 4.2.
3. Open the **cover** to the expansion memory slot located on the left side of the computer (figure 4-2).

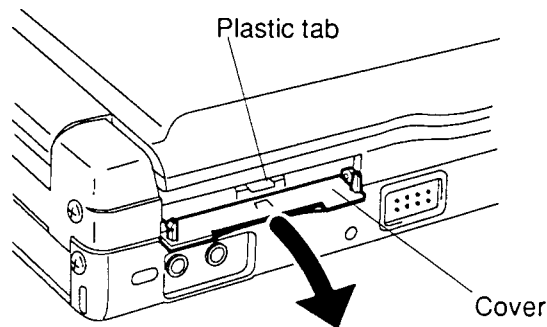


Figure 4-2 Opening the cover

4. Grasp the **plastic tab** and pull it so that the card comes partially out of the computer (figure 4-2).
5. Grasp the **optional memory card** and pull it completely out (figure 4-3).

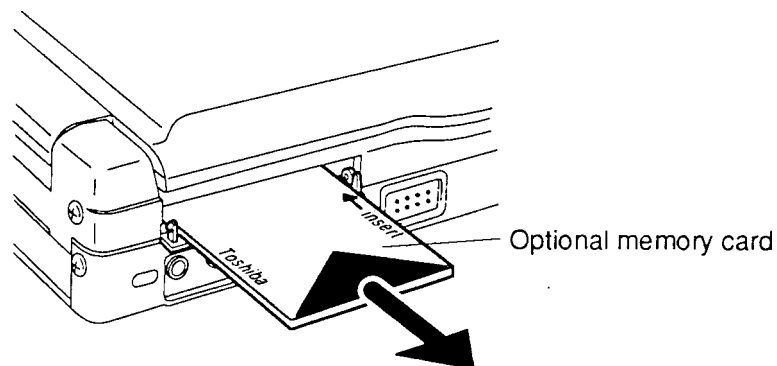


Figure 4-3 Removing the optional memory card

**CAUTION:** DO NOT touch the connecting edge of the memory card. Debris or oil in or on the connector may cause memory access problems.

## Installing an Optional Memory Card

To install an optional memory card in the T4700CS/T4700CT/T4800CT, follow the steps below and refer to figures 4-2 and 4-3.

1. The top of the **optional memory card** is marked with the word “insert” and an arrow pointing toward the connecting edge. Turn the memory card so that it is facing up and carefully insert the connecting edge (arrow first) into the slot. Push gently to ensure a firm connection (figure 4-3).
2. Close the **expansion memory cover** (figure 4-2).
3. Install the battery pack as described in section 4.2.
4. The T4700CS/T4700CT/T4800CT automatically configures all additional memory as extended memory.

## 4.4 Optional PCMCIA Card

### Removing an Optional PCMCIA Card

The T4700CS/T4700CT/T4800CT has two PCMCIA slots: one for a card up to 5.0 mm (slot 2) and one for a card up to 16 mm (slot 1). To remove optional PCMCIA cards, follow the steps below and refer to figures 4-4 through 4-6:

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack as described in section 4.2.
3. To remove a card from the PCMCIA card slot 2 (center), pull up the **cover** to the slot to expose the card.
4. Push the **eject button** to pop the card slightly out, then grasp the card and pull it completely out (figure 4-4).

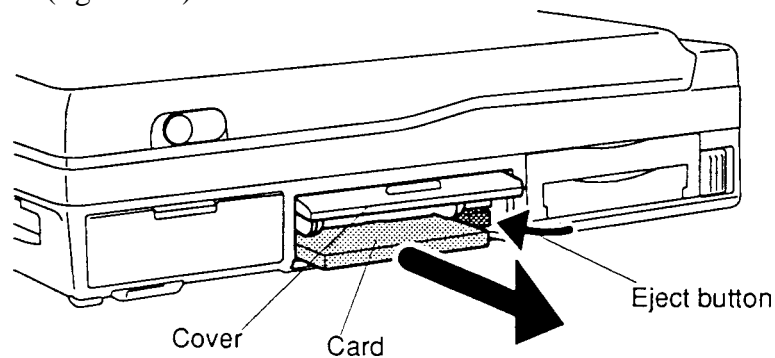


Figure 4-4 Removing the card from the PCMCIA card slot 2

5. To remove a card from the PCMCIA card slot 1, slip your fingernail or a thin object under the **notch** at the top of the cover and snap off the cover (figure 4-5).

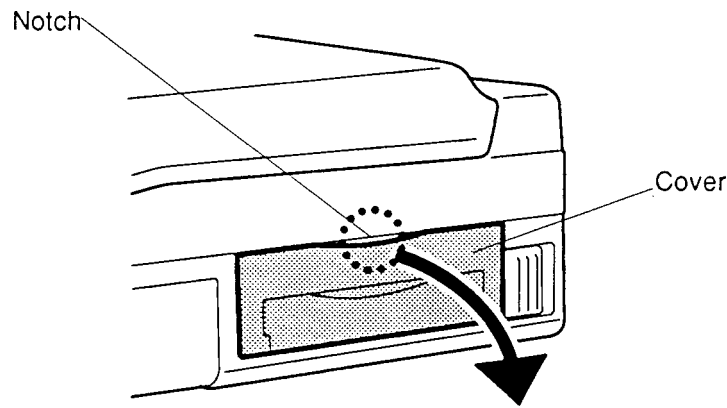
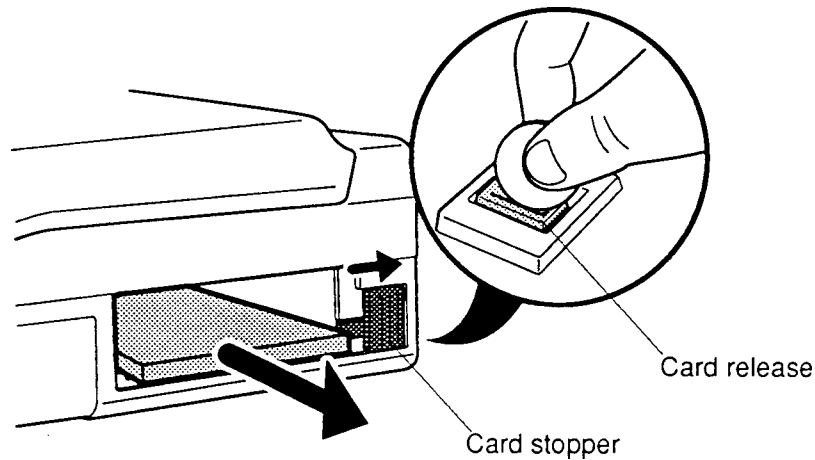


Figure 4-5 Removing the PCMCIA card slot 1 cover

6. Push the PCMCIA **card stopper** to the right to release the card, then use coin to slide the **card release button** on the bottom of the computer to pop the card slightly out (figure 4-6).
7. Grasp the card and pull it out.



*Figure 4-6 Removing the card from the PCMCIA card slot 1*

### **Installing an Optional PCMCIA Card**

To install the optional PCMCIA cards in the T4700CS/T4700CT/T4800CT, follow the steps below and refer to figures 4-4 through 4-6:

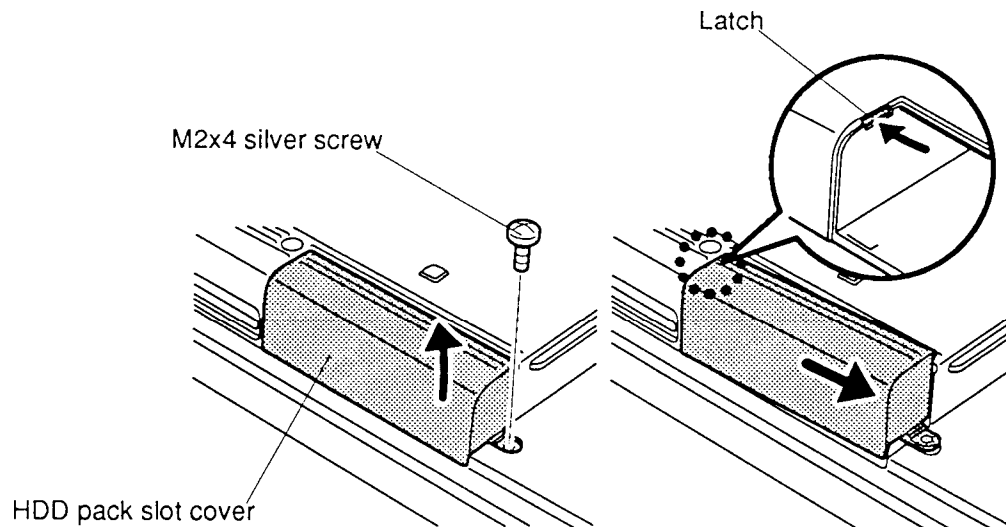
1. To install a PCMCIA card into PCMCIA card slot 2, carefully insert the card, making sure the card is right side up and the contact surface is inserted first (figure 4-4).
2. When the card is almost fully seated, you will feel some resistance. Press gently until the **eject button** pops out. Do not force the card into position.
3. Close the slot cover.
4. To install a PCMCIA card into PCMCIA card slot 1, carefully insert the card, making sure the card is right side up and the contact surface is inserted first (figure 4-6).
5. When the card is almost fully seated, you will feel some resistance. Press gently until the PCMCIA card lock clicks into place to secure the card.
6. Place the **cover** over the slot and press to snap it into place (figure 4-5).
7. Install the battery pack as described in section 4.2.

## 4.5 Hard Disk Drive

### Removing the Hard Disk Drive

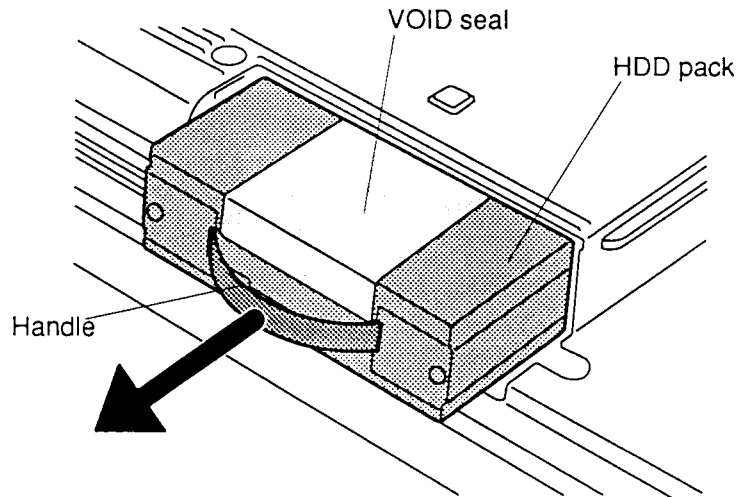
To remove the T4700CS/T4700CT/T4800CT's hard disk drive, follow the steps below and refer to figures 4-7 through 4-10.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack as described in section 4.2.
3. Turn the computer upside down.
4. Remove the **M2.5x4 silver screw**, securing the **HDD pack slot cover**, at the bottom of the computer (figure 4-7).
5. Slightly lift up the side of the **HDD pack slot cover** that was secured by the screw. A **latch** holds the other side to the computer (figure 4-7).
6. Slide the **cover** to disengage the latch and lift off the cover. You will see the HDD pack (figure 4-7).



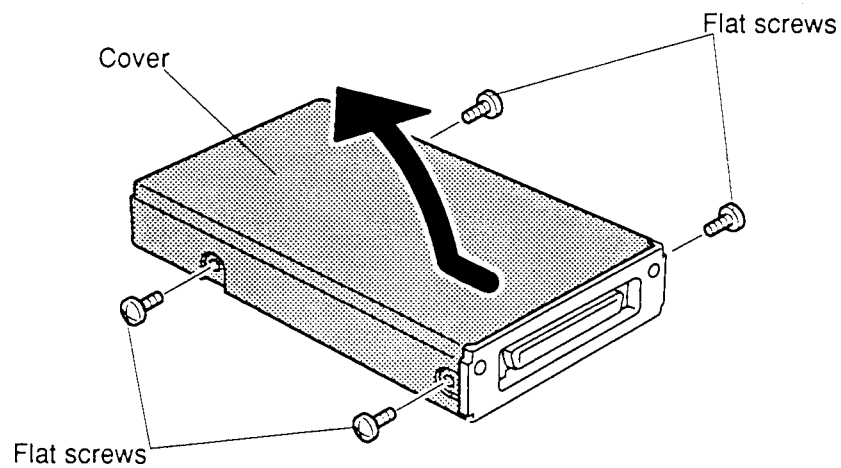
*Figure 4-7 Removing the HDD pack cover*

7. Grasp the **handle** on the **HDD pack** and pull out the pack (figure 4-8).



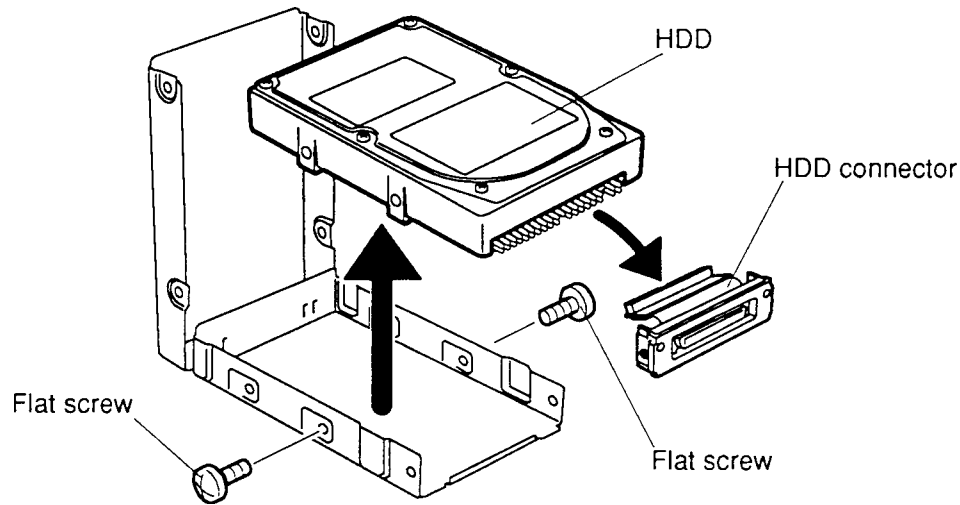
*Figure 4-8 Removing the HDD pack*

8. Remove the **VOID seal**, and remove the **four flat screws** securing the cover to the pack, slide the **cover** forward slightly (about 2 cm) and lift off the cover (figure 4-9).



*Figure 4-9 Removing the cover*

9. Remove the **two flat screws**, securing the **HDD** to the case and lift out the HDD (figure 4-10).
10. Carefully pull off the **HDD connector** (figure 4-10).



*Figure 4-10 Removing the HDD*

## Installing the HDD

To install the T4700CS/T4700CT/T4800CT's HDD follow the steps below and refer to figures 4-7 through 4-10.

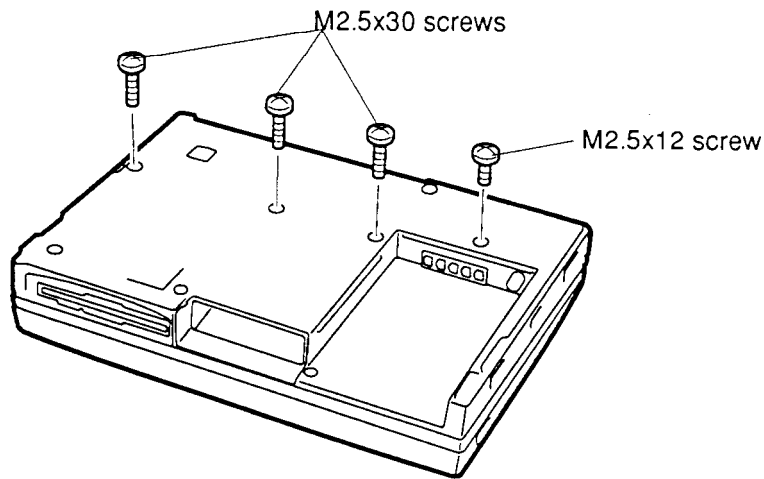
1. Connect the HDD connector to the HDD. Fit a slot on the bottom of the connector onto a tongue on the case and seat the HDD into the case (figure 4-10).
2. Align the screw holes in the HDD and case, then secure the HDD with **two flat screws** (figure 4-10).
3. Place the **HDD pack cover** onto the case, align the screw holes and secure the cover with **four flat screws** (figure 4-9).
4. Apply the **new VOID seal** to the HDD pack.
5. Insert the **HDD pack** into the HDD slot until you hear it click into place. Press the HDD gently; do not force it. The HDD pack is designed so it will go into the slot only one way (figure 4-8).
6. Fit the **latch** on the HDD pack cover into the **notch** on the computer, rotate the cover into place and secure the **one M2.5x4 silver screw** (figure 4-7).
7. Install the battery pack as described in section 4.2.

## 4.6 Top Cover

### Removing the Top Cover

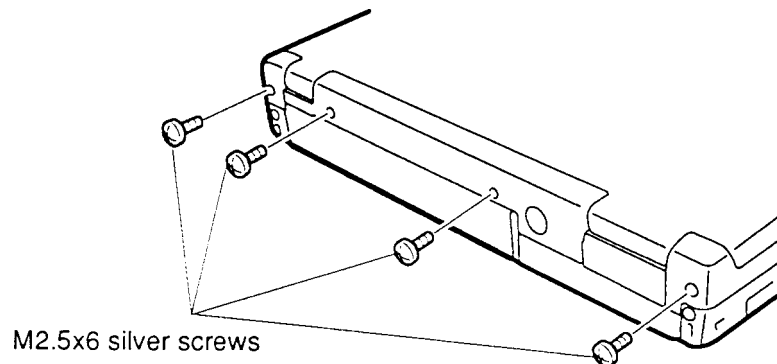
To remove the T4700CS/T4700CT/T4800CT's top cover, follow the steps below and refer to figures 4-11 to 4-13.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA cards and HDD pack as described in sections 4.2, 4.3, 4.4 and 4.5.
3. Turn the computer upside down and remove **three M2.5x30 screws** securing the top cover of the T4700CS/T4700CT/T4800CT and **one M2.5x12 screw** (figure 4-11).



*Figure 4-11 Removing screws (bottom of the computer) securing the top cover*

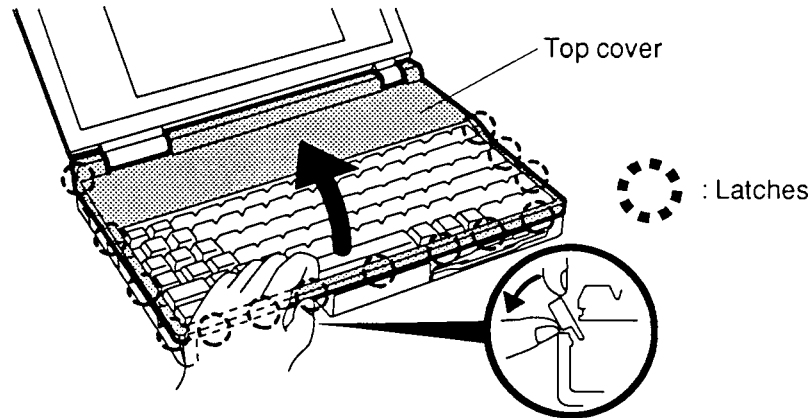
4. Turn the T4700CS/T4700CT/T4800CT right side up so that the back of the computer faces you. Remove **four M2.5x6 silver screws**, securing the top cover at the back of the T4700CS/T4700CT/T4800CT (figure 4-12).



*Figure 4-12 Removing screws (back of the computer) securing the top cover*



5. Turn the computer around 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.)
6. Unsnap the **14 latches** securing the **top cover** to the bottom cover. Start by pressing on the front of the **top cover** just in front of the space bar and rotate the keyboard's front edge toward you to release the **front latches** (figure 4-13).
7. Continue around the rim of the **top cover** until all latches are released, then carefully lift off the **top cover** (figure 4-13).



*Figure 4-13 Unlatching the top cover*

## Installing the Top Cover

To install the T4700CS/T4700CT/T4800CT's top cover, follow the steps below and refer to figures 4-11 through 4-13.

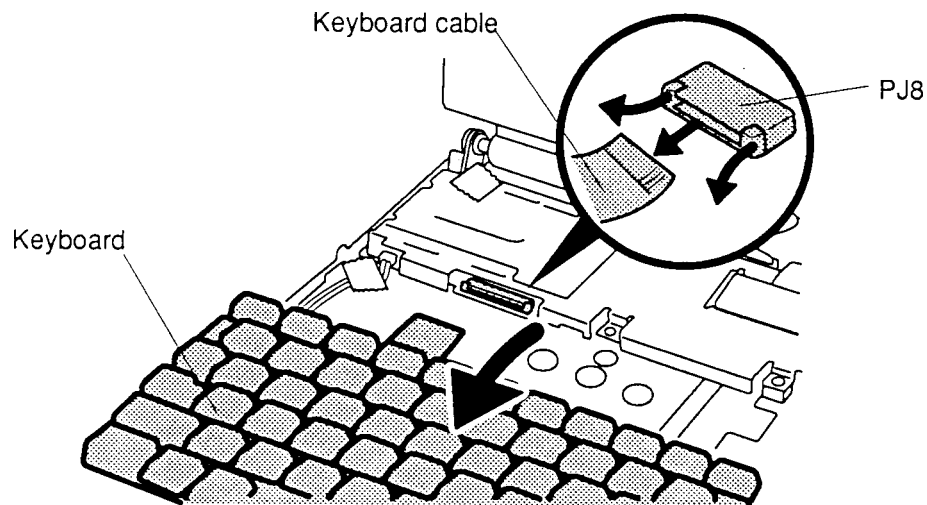
1. Place the **top cover** on the T4700CS/T4700CT/T4800CT.
2. Begin at the back and snap the top cover into place, continuing along the sides and finally the front until all **14 latches** are snapped (figure 4-13).
3. Close the display.
4. Secure the **four M2.5x6 silver screws** at the back of the T4700CS/T4700CT/T4800CT (figure 4-12).
5. Turn the computer over.
6. Secure the **three M2.5x30 screws** and **one M2.5x12 screw** on the bottom of the T4700CS/T4700CT/T4800CT (figure 4-11).
7. Install the HDD pack, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.5, 4.4, 4.3, and 4.2 .

## 4.7 Keyboard

### Removing the Keyboard

To remove the T4700CS/T4700CT/T4800CT's keyboard, follow the steps below and refer to figure 4-14.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack and top cover as described in sections 4.2, 4.3, 4.4, 4.5 and 4.6.
3. Carefully lift off the **keyboard** to expose the keyboard connector.
4. Disconnect the **keyboard cable** from **pressure plate connector (PJ8)** on the upper system board (figure 4-14).

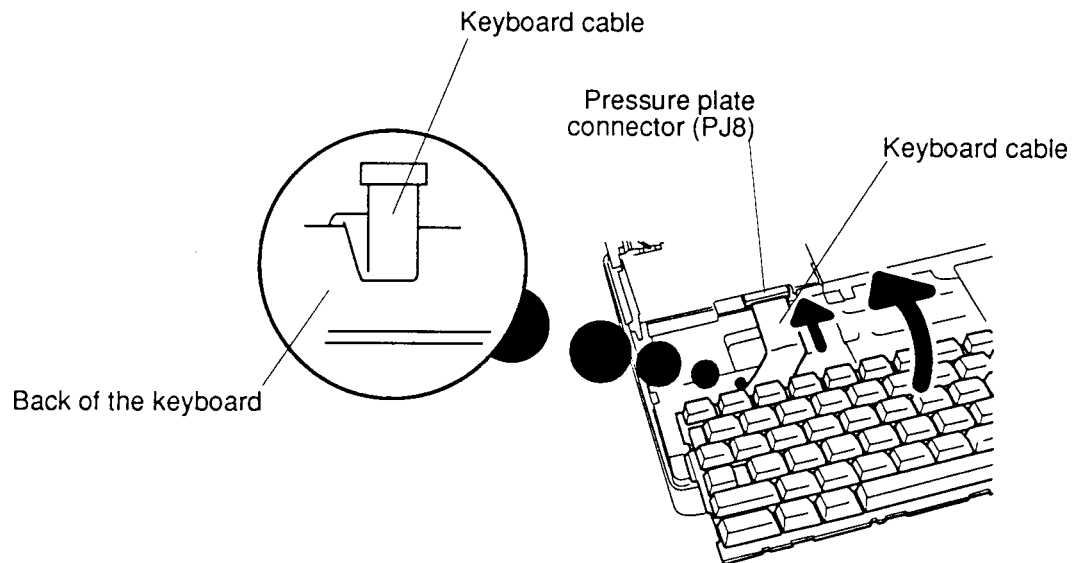


*Figure 4-14 Removing the keyboard*

## Installing the Keyboard

To install the T4700CS/T4700CT/T4800CT's keyboard, follow the steps below and refer to figures 4-14 and 4-15.

1. Connect the **keyboard cable** to **pressure plate connector (PJ8)** on the upper system board (figure 4-14).
2. Seat the **keyboard** in the T4700CS/T4700CT/T4800CT. Note that a fold is built into the **keyboard cable**. Do not try to bend the cable at any other point when you install the keyboard (figure 4-15).



*Figure 4-15 Seating the keyboard*

3. Install the top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in sections 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.8 Status Indicator Panel

### Removing the Status Indicator Panel

To remove the T4700CS/T4700CT/T4800CT's status indicator panel, follow the steps below and refer to figure 4-16.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack and top cover as described in sections 4.2, 4.3, 4.4, 4.5 and 4.6.
3. Remove the **tape** securing the **status indicator panel cable**.
4. Disconnect the **status indicator panel cable** from **PJ6** on the upper system board and lift the panel out of its brackets (figure 4-16).

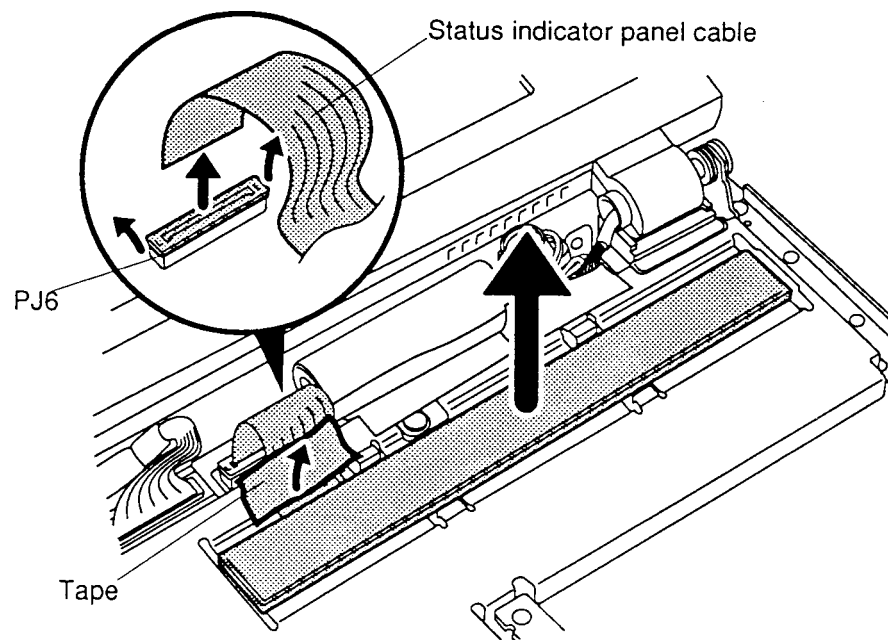


Figure 4-16 Removing the status indicator panel

## Installing the Status Indicator Panel

To install the T4700CS/T4700CT/T4800CT's status indicator panel, follow the steps below and refer to figures 4-16.

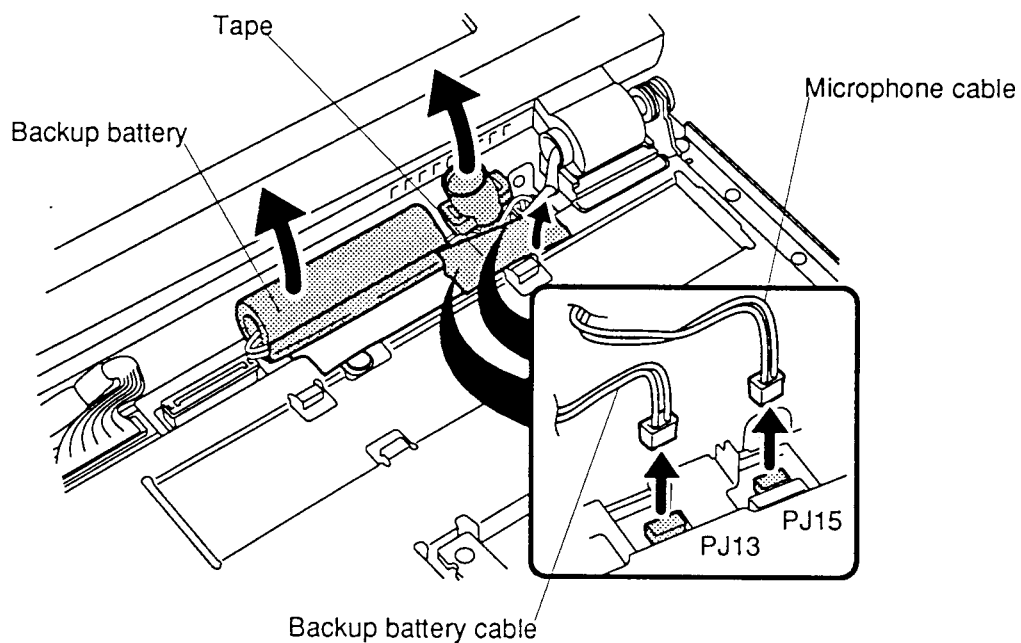
1. Connect the **status indicator panel cable** to **pressure plate connector (PJ6)** on the upper system board (figure 4-16).
2. Set the **status indicator panel** in the upper system board cover, making sure it is seated securely in its brackets. Note that a fold is not built into the **status indicator panel cable**. Let the cable bend naturally when you seat the panel; do not try to fold the cable (figure 4-16).
3. Secure the **status indicator panel cable** with **tape**.
4. Install the top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in sections 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.9 Backup Battery, Microphone

### Removing the Backup Battery, Microphone

To remove the T4700CS/T4700CT/T4800CT's backup battery and microphone, follow the steps below and refer to figures 4-9 through 4-12.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card,, HDD pack, and top cover as described in sections 4.2, 4.3, 4.4, 4.5, and 4.6.
3. Remove the **tape, securing the backup battery.**
4. Disconnect the backup battery cable from PJ\* of the upper system board.
5. Lift up the microphone little, then disconnect the microphone cable from PJ\* of the upper system board.

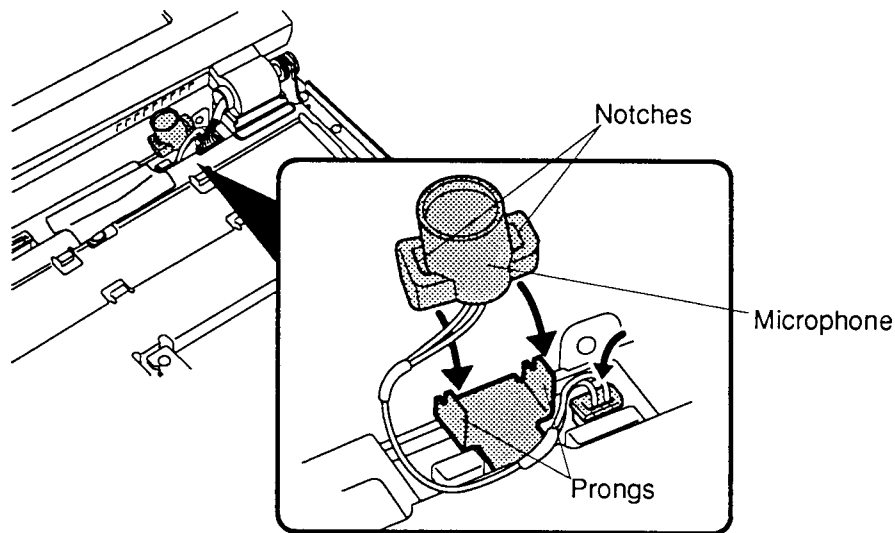


*Figure 4-17 Removing the backup battery and microphone*

## Installing the Backup Battery and Microphone

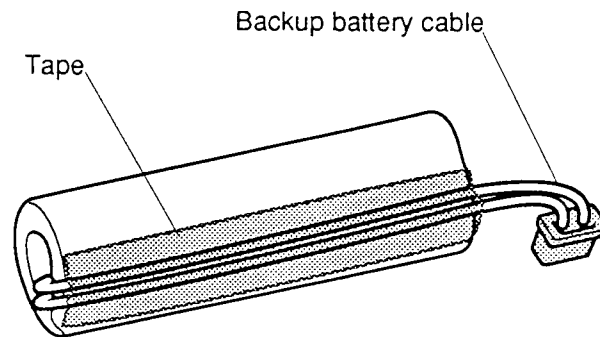
To install the T4700CS/T4700CT/T4800CT's backup battery and microphone, follow the steps below and refer to figures 4-18 and 4-20.

1. Fit the **two notches** on the microphone onto two prongs on the computer (figure 4-18).



*Figure 4-18 Installing the microphone*

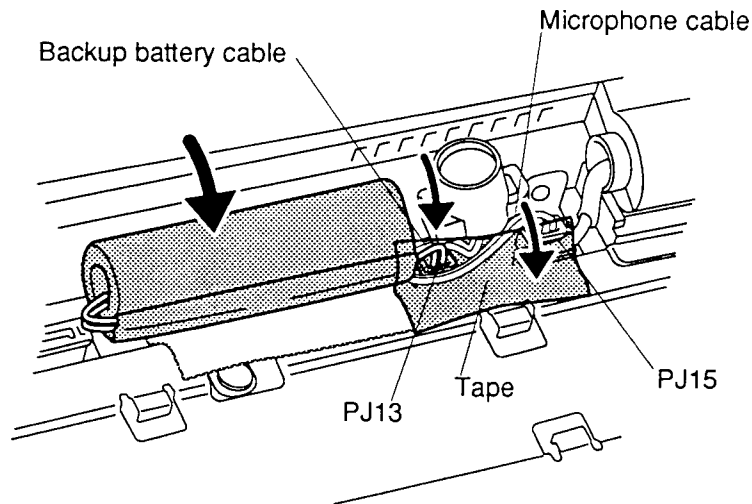
2. Secure the **backup battery cable** with **tape**. Part of the cable is wrapped under the battery's green plastic cover. When you tape the cable, be sure it is aligned with the part that is under the green cover (figure 4-19).



*Figure 4-19 Securing the backup battery cable*



3. Connect the **backup battery cable** to **PJ13** on the upper system board. Wrap the **microphone cable** under the backup battery connector and bring it back in front of the microphone to connect it to **PJ15** on the upper system board (figure 4-20).



*Figure 4-20 Installing the backup battery*

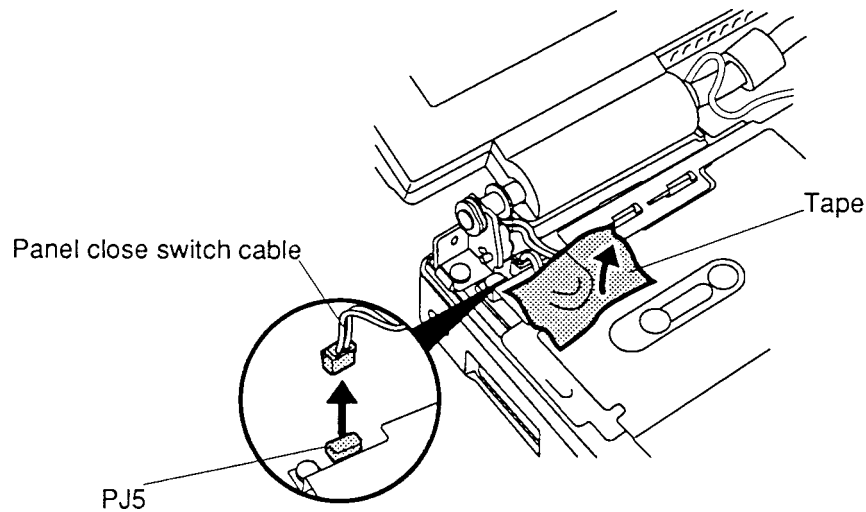
4. Lay the **backup battery** and cables in place on the computer and secure them with **tape** (figure 4-20).
5. Install the top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in sections 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.10 Display Assembly

### Removing the Display Assembly

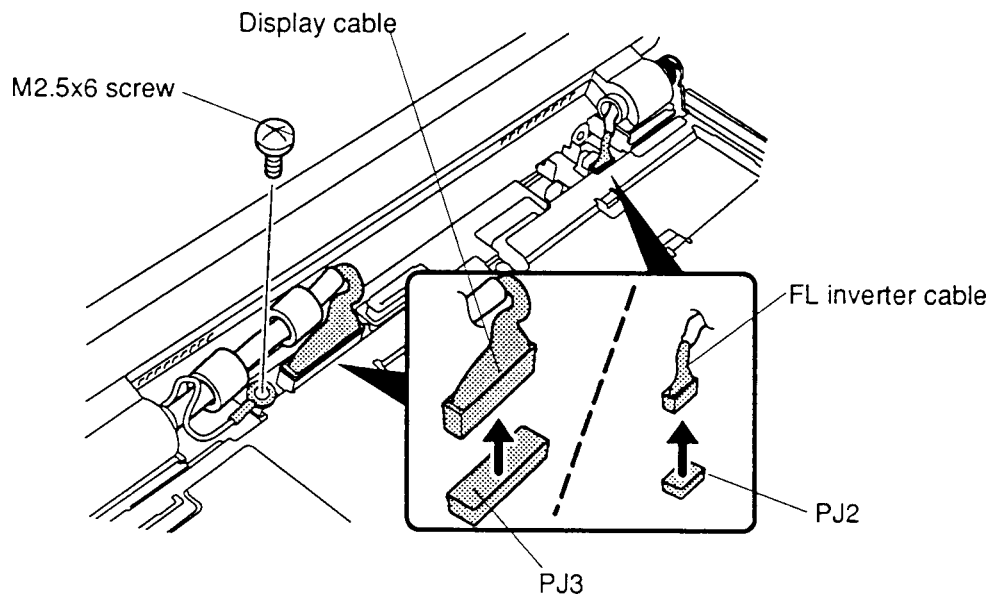
To remove the T4700CS/T4700CT/T4800CT's display assembly, follow the steps below and refer to figures 4-21 through 4-24.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, and top cover as described in sections 4.2, 4.3, 4.4, 4.5 and 4.6.
3. Remove the **tape**, securing the **panel close switch cable**, then disconnect it from **PJ5** on the upper system board (figure 4-21).



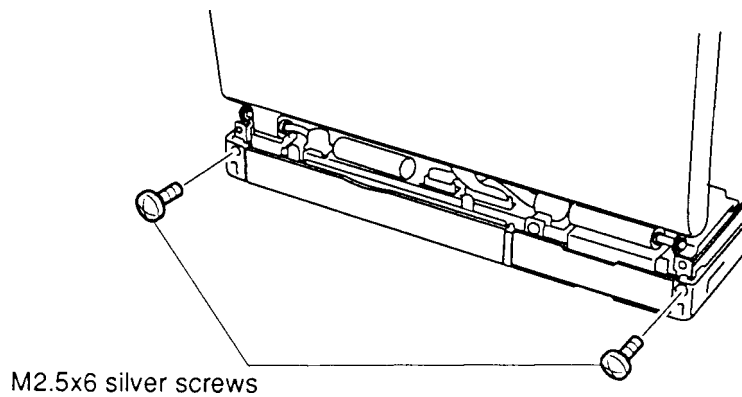
*Figure 4-21 Removing the panel close switch cable*

4. Disconnect the **display cable** from **PJ3** and **FL inverter cable** from **PJ2** on the upper system board (figure 4-22).
5. Remove the **M2.5x6 screw**, securing **display ground cable** (figure 4-22).



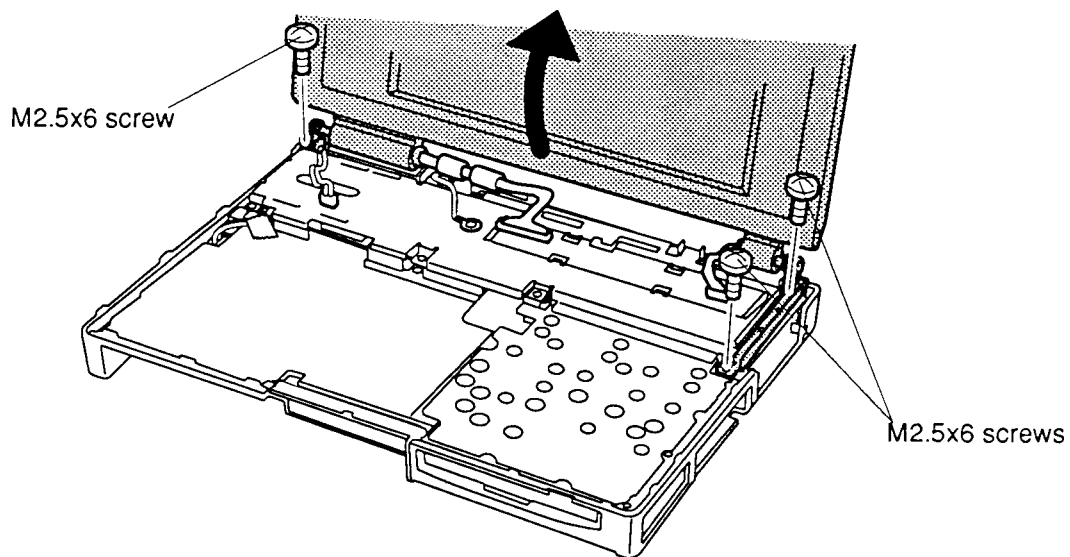
*Figure 4-22 Removing the display , FL and ground cable*

6. Turn the computer around and remove the **two M2.5x6 silver screws** on the back of the computer securing the display assembly (figure 4-23).



*Figure 4-23 Removing the screws (back of computer) securing the display assembly*

7. Turn the computer again so the front faces you. Hold the display assembly to keep it steady and remove the **three M2.5x6 screws**, securing the display hinges. Remove the screws at the corners first then remove the screw securing the hinge brace at the right side of the computer (figure 4-24).



*Figure 4-24 Removing the display assembly*

8. If you are going to disassemble the display assembly, go to section 4.16.

## Installing the Display Assembly

To install the T4700CS/T4700CT/T4800CT's display assembly, follow the steps below and refer to figures 4-21 through 4-24.

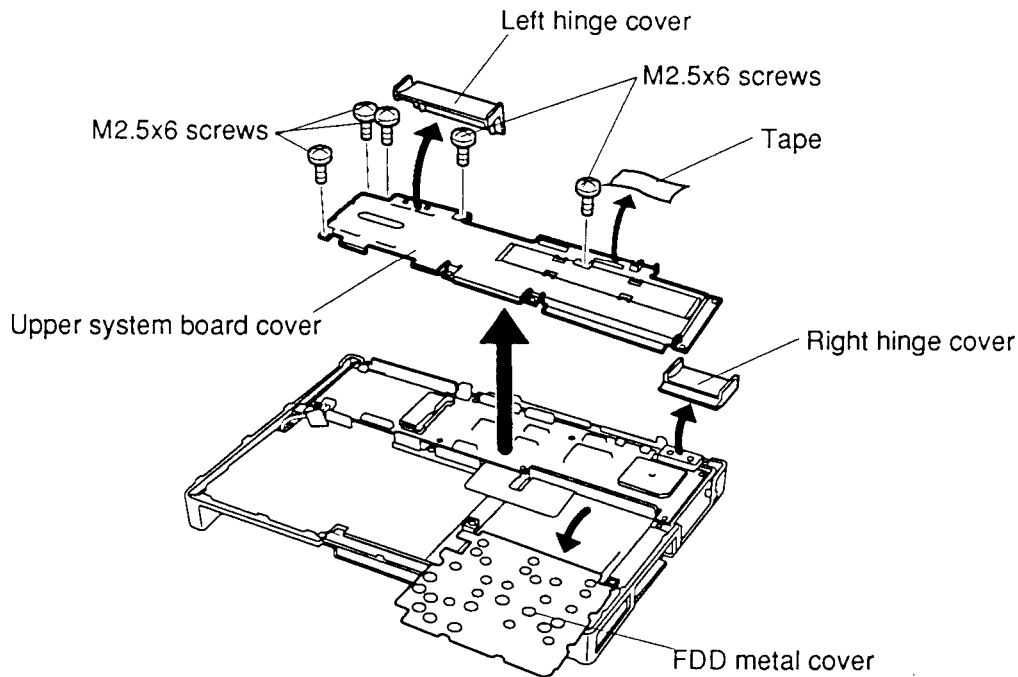
1. Place the **display assembly** on the computer making sure the brackets on the display fit in front of the corresponding brackets on the computer.
2. Hold the display to steady it and secure the **three M2.5x6 screws** for the **display hinges** to secure the display assembly (figure 4-24). Secure the screw for the display hinge brace at the right side of the computer first, then secure the screws at the corners.
3. Turn the computer around and secure the **two M2.5x6 silver screws** on the back (figure 4-23).
4. Turn the computer again so the front faces you and connect the **display sensor switch cable** to **PJ5** on the upper system board, then secure it with **tape** (figure 4-21).
5. Connect the **display cables** to **PJ3** and **FL cable** to **PJ2** on the upper system board (figure 4-22).
6. Secure the **ground cable** with one **M2.5x6 screw** to the upper system board (figure 4-22).
7. Install the top cover, HDD pack, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.11 Upper System Board, Power Supply Board

### Removing the Upper System Board and Power Supply Board

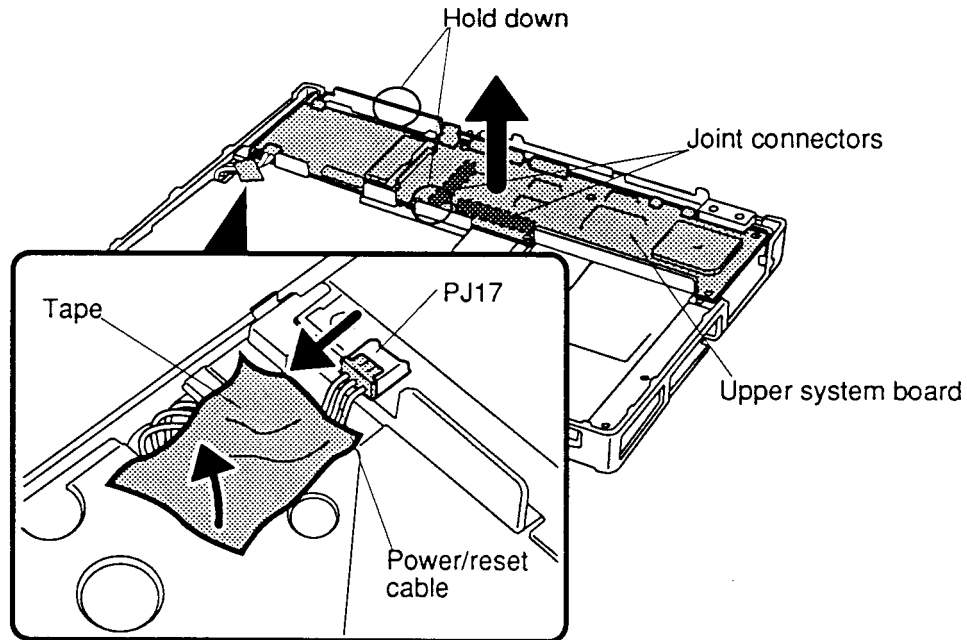
To remove the T4700CS/T4700CT/T4800CT's upper system board and power supply board, follow the steps below and refer to figures 4-25 through 4-27.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, top cover, keyboard, status indicator panel, backup battery/microphone and display assembly as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 and 4-10.
3. Remove the **left hinge cover** and **tape**, then remove the **five M2.5x6 screws**, securing the **upper system board cover**.
4. Lift off the **upper system board cover**, the **FDD metal cover** and the **right hinge cover** (figure 4-25).



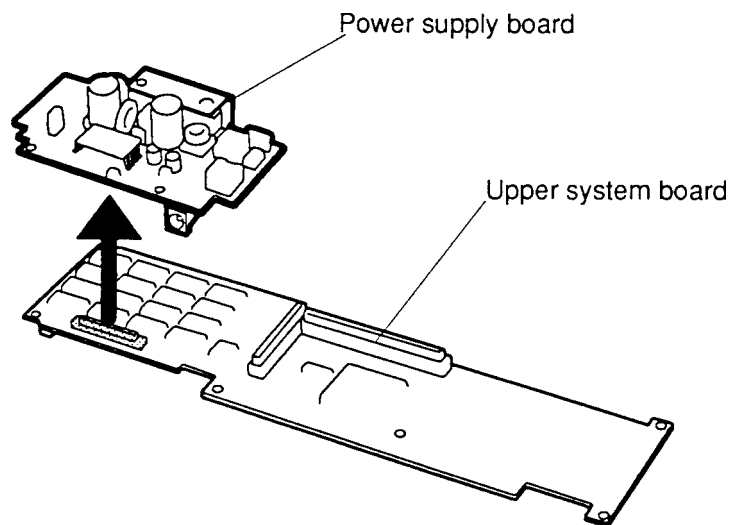
*Figure 4-25 Removing the upper system board cover*

5. Remove the **tape** securing the **power/reset cable** and disconnect the cable from **PJ17** on the **upper system board** (figure 4-26).
6. Hold down the system board's edges circled in figure 4-26 and carefully lift up the **upper system board** to disconnect **two joint connectors** with power supply board.



*Figure 4-26 Removing the upper system board*

7. Turn the **upper system board** upside down, and remove the **power supply board** (figure 4-27).



*Figure 4-27 Removing the power supply board*

## Installing the Upper System Board and Power Supply Board

To install the T4700CS/T4700CT/T4800CT's upper system board and power supply board, follow the steps below and refer to figures 4-25 through 4-27.

1. Connect the **power supply board** to the **upper system board** (figure 4-27).
2. Place the **upper system board** on the lower system board, (figure 4-26).
3. Align the **two joint connectors (PJ11 and PJ12)**, then gently press the upper system board to connect them (figure 4-26).
4. Connect the **power/reset cable** to **PJ17** on the upper system board and secure it with **tape** (figure 4-26).
5. Set in place the **FDD metal cover, right hinge cover** and **upper system board cover** (figure 4-25).
6. Secure the **upper system board cover** with **five M2.5x6 screws** and set the **left hinge cover**, then apply the **tape** (figure 4-25).
7. Install the display assembly, backup battery, microphone, status indicator panel, keyboard, top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in sections 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3 and 4.2.

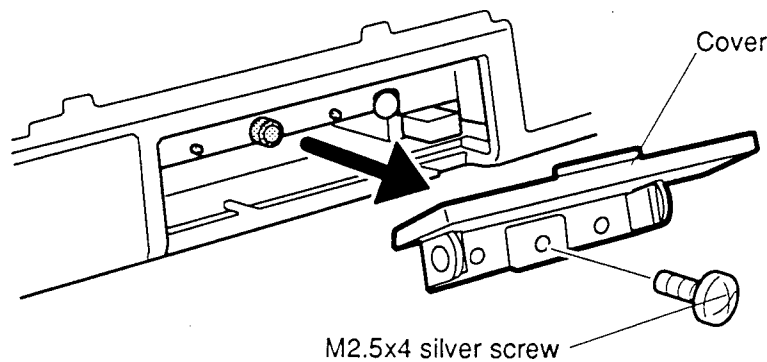


## 4.12 Base Assembly, Power/Reset Board

### Removing the Base Assembly

To remove the T4700CS/T4700CT/T4800CT's base assembly, follow the steps below and refer to figures 4-28 and 4-31.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, top cover, keyboard, backup battery, microphone, display assembly, upper system board, and power supply board as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, and 4.11.
3. Open the **cover** to PCMCIA slot 2 and remove the **M2.5x4 silver screw**, securing the cover (figure 4-28). Set the cover aside.



*Figure 4-28 Removing the PCMCIA slot cover*

- Stand the T4700CS/T4700CT/T4800CT on its back side and grasp the computer with your hand covering the base assembly. While holding the computer with one hand to steady it and to protect the base assembly, remove **two M2.5x6 silver screws** and **one M2.5x12 silver screw** on the bottom of the computer (figure 4-29).

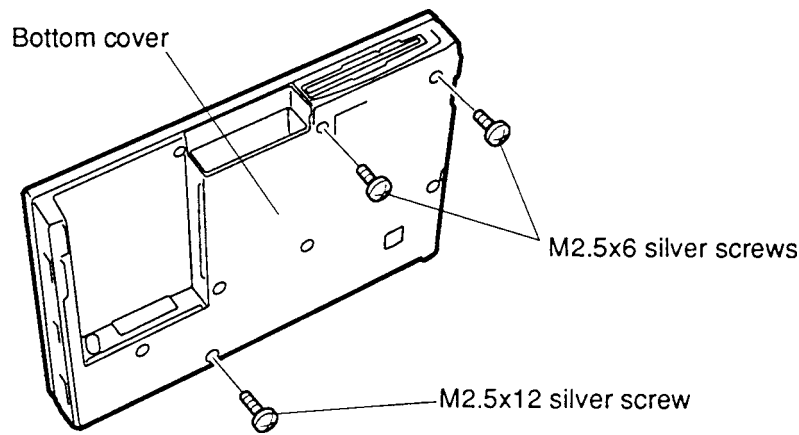


Figure 4-29 Removing the screw securing the base assembly

- Remove the **M2.5x6 screw**, at the left front corner, securing the base assembly to the **bottom cover** (figure 4-30).
- Press the **FDD eject button** so that it clears the bottom cover and lift up the front of base assembly (figure 4-30).
- After lifting up the front of the **base assembly**, open the **I/O port cover** on the bottom cover and pry the I/O port frame slightly away from the base assembly to separate the base assembly from the bottom cover and lift the **power/reset board** out of the bottom cover (figure 4-30).

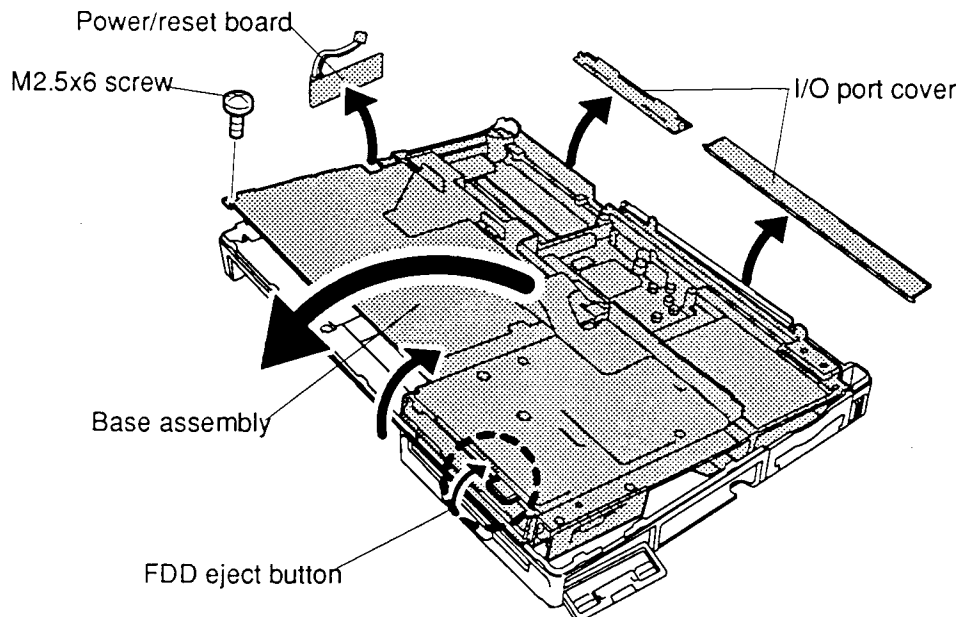
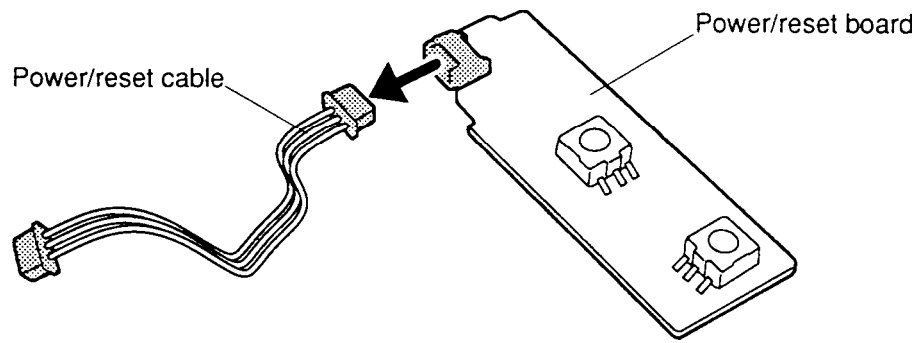


Figure 4-30 Removing the base assembly

8. Disconnect the **power/reset cable** from the **power/reset board** (figure 4-31).

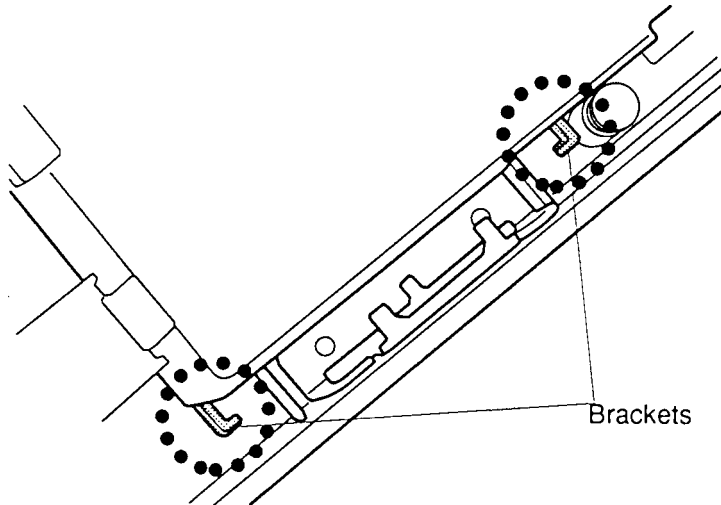


*Figure 4-31 Removing the power/reset cable*

## Installing the Base Assembly

To install the T4700CS/T4700CT/T4800CT's base assembly and power/reset board, follow the steps below and refer to figures 4-28 through 4-32.

1. Connect the **power/reset cable** to the **power/reset board** (figure 4-31).
2. Seat the **power/reset board** inside its **brackets** on the bottom cover, then fold the **power/reset cable** down into the slot in front of the system board. Leave about 2 cm extending out of the slot (figure 4-32).



*Figure 4-32 Power/reset cable setting*

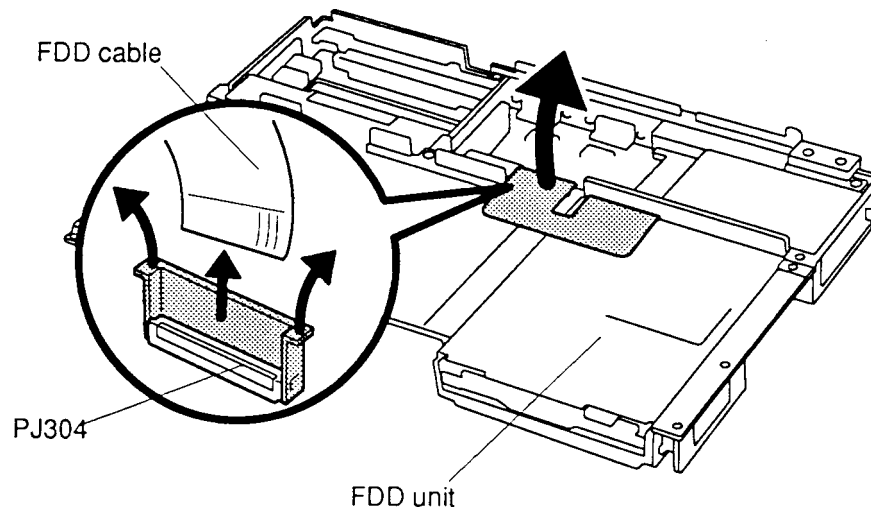
3. Fit the I/O port connector side of the **base assembly** into the bottom cover. Then, make sure the **power/reset cable** extends through the **notch** on the base assembly and lay the base assembly into the bottom cover. Press the **FDD eject button** so the base assembly can clear the bottom cover (figure 4-30).
4. Secure the base assembly's front-left corner with **one M2.5x6 screw** (figure 4-30).
5. Secure the **two M2.5x6 silver screws** and **one M2.5x12 silver screw** on the bottom cover (figure 4-29).
6. Secure the **PCMCIA slot 2 cover** with **one M2.5x4 silver screw** and close the slot cover (figure 4-28).
7. Install the power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA card, optional memory card and battery pack as described in sections 4.11, 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.13 Floppy Disk Drive

### Removing the Floppy Disk Drive

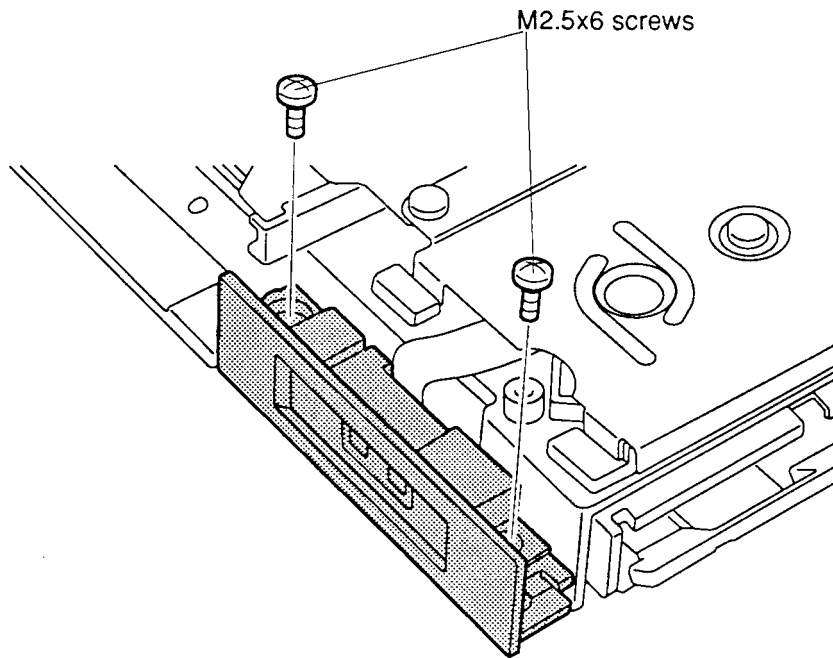
To remove the T4700CS/T4700CT/T4800CT's floppy disk drive, follow the steps below and refer to figures 4-33 through 4-35.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, top cover, keyboard, status indicator panel, backup battery and microphone, display assembly, upper system board, power supply board, and base assembly as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11 and 4.12.
3. Disconnect the **FDD cable** from **PJ304** of the lower system board (figure 4-33).



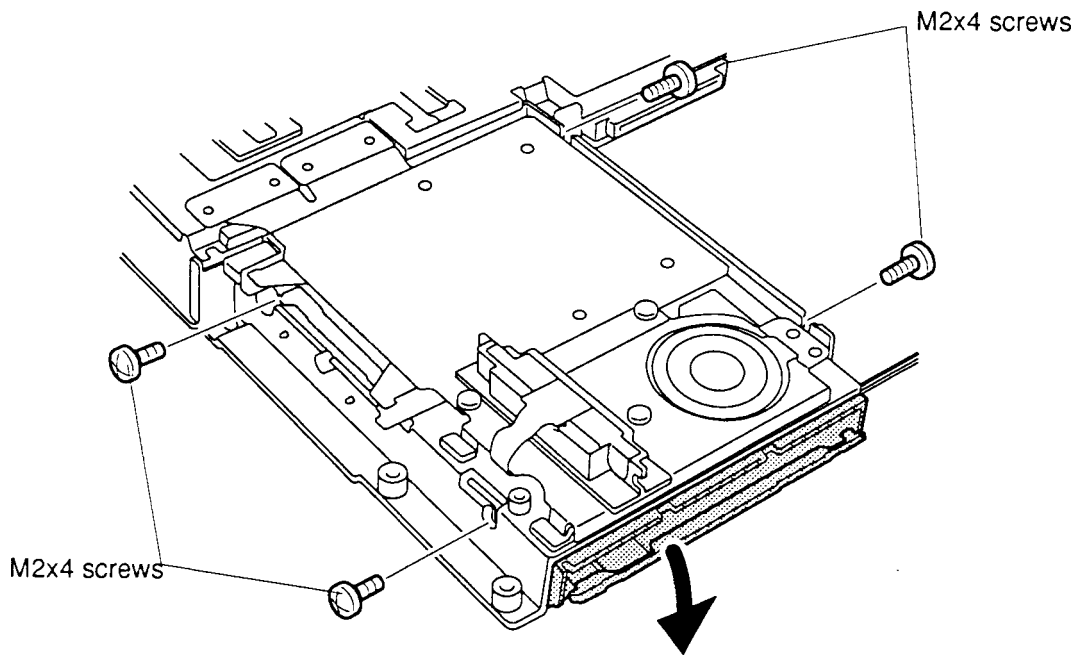
*Figure 4-33 Disconnecting the FDD cable*

4. Turn over the **base assembly** and remove the **two M2.5x6 screws**, securing the BPQP port (figure 4-34).



*Figure 4-34 Removing BPQP port screws*

5. Remove the **four M2x4 screws**, securing the **FDD** and lift the base assembly off the FDD (figure 4-35).



*Figure 4-35 Removing the FDD*

## Installing the Floppy Disk Drive

To install the T4700CS/T4700CT/T4800CT's floppy disk drive, follow the steps below and refer to figures 4-33 through 4-35.

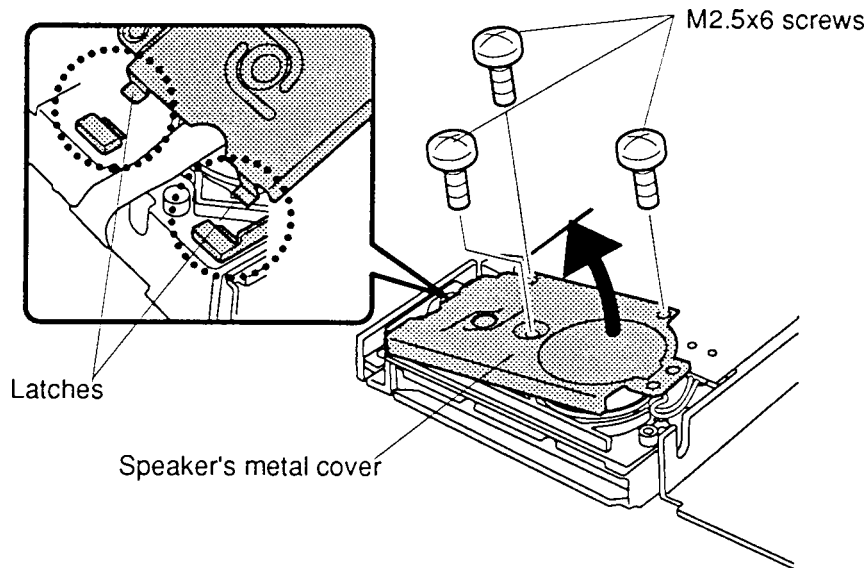
1. Place the **FDD** in the **base assembly** and, holding the FDD with your hand so it doesn't fall out, turn the base assembly over.
2. Secure the **FDD** with the **four M2x4 screws** (figure 4-35).
3. Secure the **BPQP port** with **two M2.5x6 screws** to the base assembly (figure 4-34).
4. Connect the **FDD cable** to **pressure plate connector PJ304** on the lower system board (figure 4-33).
5. Install the base assembly, power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA cards, optional memory card and battery pack as described in sections 4.12, 4.11, 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.14 Speaker, RTC Battery, BPQP Port

### Removing the Speaker, RTC Battery, BPQP Port

To remove the T4700CS/T4700CT/T4800CT's speaker, RTC battery and BPQP port, follow the steps below and refer to figures 4-36 through 4-38.

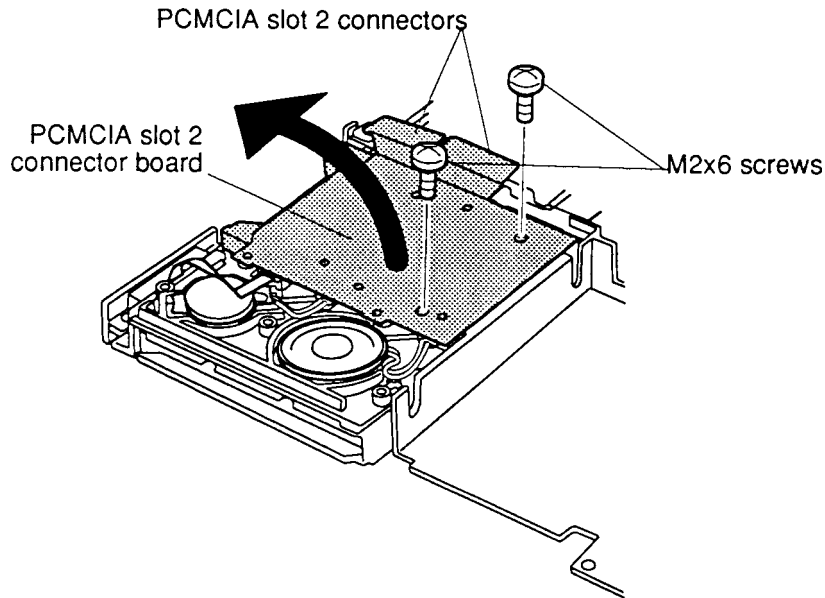
1. Turn off the power to the T4700CS/T4700CT/T4800CT and disconnect the AC adapter, power cord, and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, top cover, keyboard, status indicator panel, backup battery and microphone, display assembly, upper system board, power supply board, and base assembly as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11 and 4.12.
3. Turn the **base assembly** upside down.
4. Remove **two M2.5x6 screws** securing the **BPQP port**, if they were not removed earlier.
5. Remove **three M2.5x6 screws** securing the **speaker's metal cover**. Then, lift up the left side to disengage **two latches** on the right side and remove the cover (figure 4-36).



*Figure 4-36 Removing the speaker's metal cover*

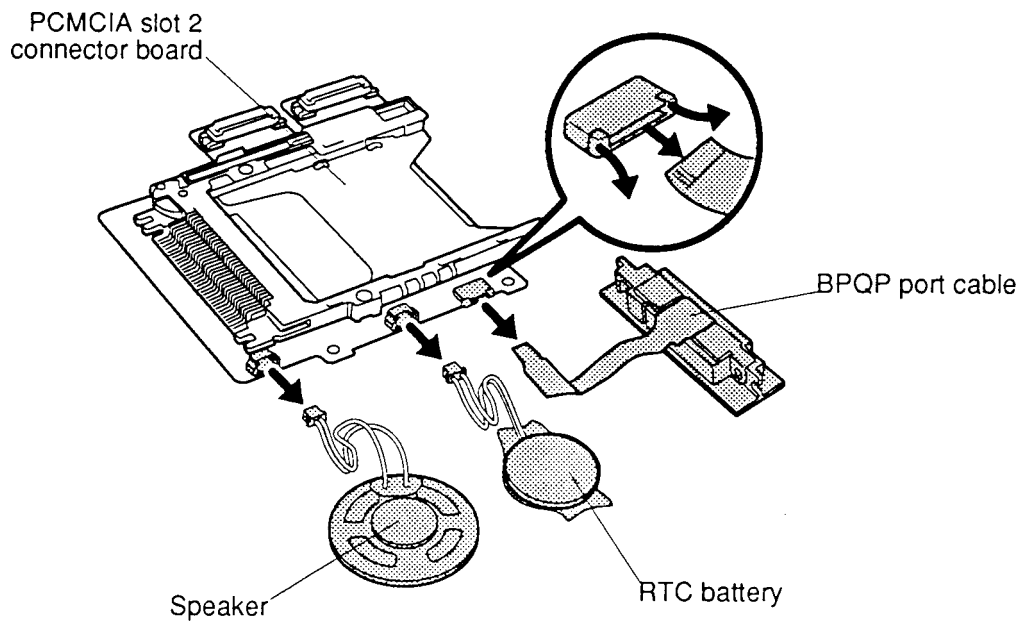


6. Remove **two M2x6 screws** securing the **PCMCIA slot 2 connector board** at the corners. Do not remove the two screws at the middle edges of the board (figure 4-37).
7. Disconnect the **two PCMCIA slot 2 connectors** from the **lower system board** and lift out the PCMCIA slot 2 connectors board (figure 4-37).



*Figure 4-37 Removing the PCMCIA slot 2 connector board*

8. Disconnect the **speaker, RTC battery, and BPQP port cable** from the each connector of the **PCMCIA slot 2 connector board** (figure 4-38).



*Figure 4-38 Disconnecting the speaker, RTC battery, and BPQP port cable*

## Installing the Speaker, RTC Battery, BPQP port

To install the T4700CS/T4700CT/T4800CT's speaker, RTC battery, and BPQP port, follow the steps below and refer to figures 4-36 through 4-38.

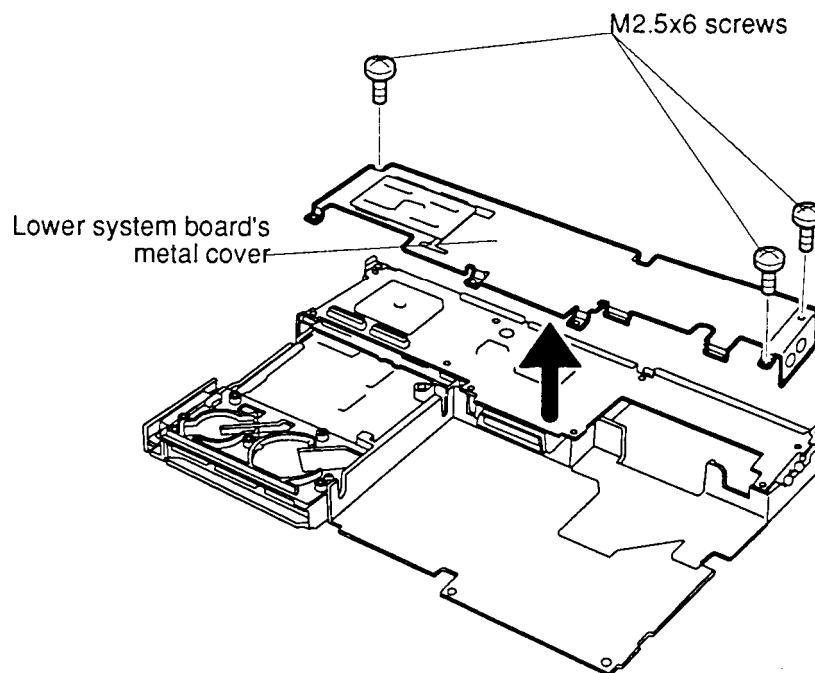
1. Connect the **speaker, RTC battery, and BPQP port** cable to **PCMCIA slot 1 board** (figure 4-38).
2. Seat the **PCMCIA slot 2 board** with speaker, RTC battery, and BPQP port attached, then connect the **two PCMCIA slot 2 connectors** to the **lower system board** (figure 4-37).
3. Secure the PCMCIA slot 2 board with **two M2x6 screws**, then set the speaker, RTC battery and BPQP port in place. Make sure insulation for the speaker cables goes on top of the cables (figure 4-37).
4. Fit the right side of the **speaker's metal cover** into the **latches** on the base assembly and secure the cover with **two M2.5x6 screws** (figure 4-36).
5. Secure the BPQP with **two M2.5x6 screws**.
6. Install the base assembly, power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA cards, optional memory card and battery pack as described in sections 4.12, 4.11, 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.15 Lower System Board

### Removing the Lower System Board

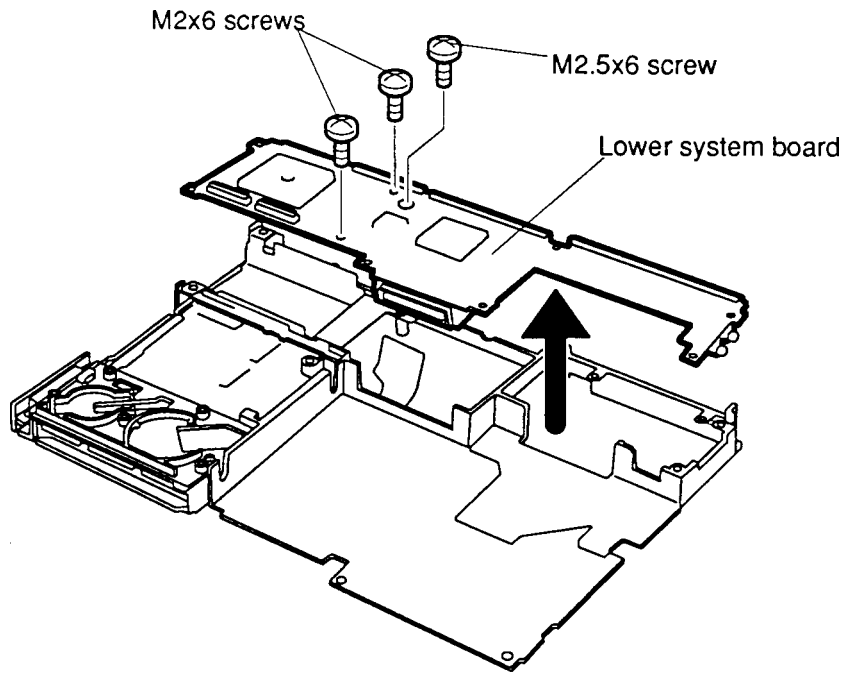
To remove the T4700CS/T4700CT/T4800CT's lower system board, follow the steps below and refer to figures 4-39 through 4-41.

1. Turn off the power to the T4700CS/T4700CT/T4800CT and disconnect the AC adapter, power cord, and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, top cover, keyboard, status indicator panel, backup battery and microphone, display assembly, upper system board, power supply board, base assembly, and PCMCIA slot 2 board as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11 4.12, and 4.14.
3. Disconnect the **FDD cable** from **PJ304** of the lower system board, if they were not disconnected earlier.
4. Remove **three M2.5x6 screws** securing the **lower system board's metal cover**, then lift it off the lower system board's metal cover (figure 4-39). Be careful to clear **two audio ports** projecting slightly through holes in the cover.



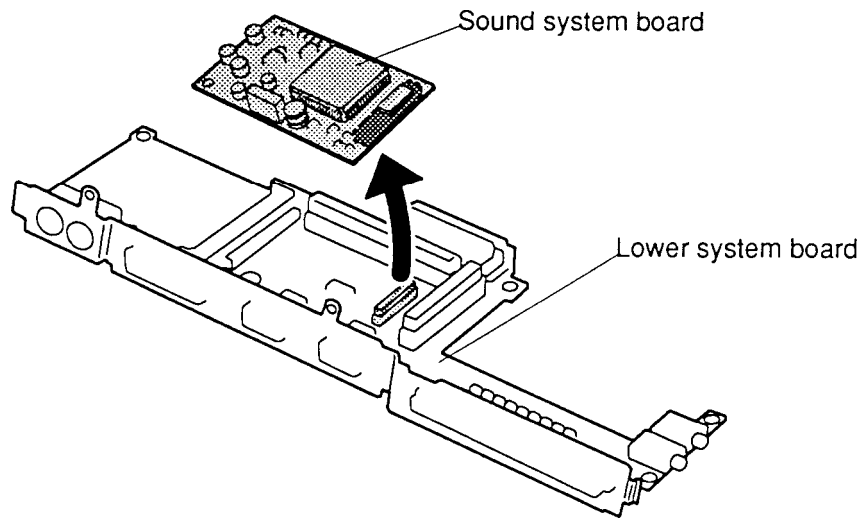
*Figure 4-39 Removing the lower system board's metal cover*

5. Remove one **M2.5x6 screw** and **two M2x6 screws**, securing the lower system board and lift it out of the base assembly frame (figure 4-40).



*Figure 4-40 Removing the lower system board*

6. Disconnect the **sound system board** from **lower system board** (figure 4-41).



*Figure 4-41 Removing the sound system board*

## Installing the Lower System Board

To install the T4700CS/T4700CT/T4800CT's lower system board, follow the steps below and refer to figure 4-39 through 4-41.

1. Connect the **sound system board** to **lower system board**, then place the lower system board on the base assembly frame (figure 4-41).
2. Secure the **lower system board** with **one M2.5x6 screw** and **two M2x6 screws** (figure 4-40).
3. Set the **lower system board's metal cover** in place. Be sure the **two audio ports** extend through holes in the cover (figure 4-39).
4. Install the PCMCIA slot 2 board, base assembly, power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA cards, optional memory card and battery pack as described in sections 4.14, 4.12, 4.11, 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3 and 4.2.

## 4.16 Display Mask

### Removing the Display Mask

To remove the T4700CS/T4700CT/T4800CT's display mask, follow the steps below and refer to figure 4-42.

1. Turn off the power to the T4700CS/T4700CT/T4800CT and disconnect the AC adapter, power cord, and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack and top cover as described in Sections 4.2 and 4.6.
3. Remove **two rubber cushions** from the top corners of the display to expose **two screws** securing the **display mask** (figure 4-42).
4. Remove the **two M2.5x6 screws** that were covered by the cushions (figure 4-42).
5. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the **six latches** across the top of the display mask (figure 4-42).
6. Continue unlatching the mask along the **sides (three latches on each side)**, at the **bottom (two latches)** and the **display supports, one latch** at the small support and **two latches** at the larger support (figure 4-42).

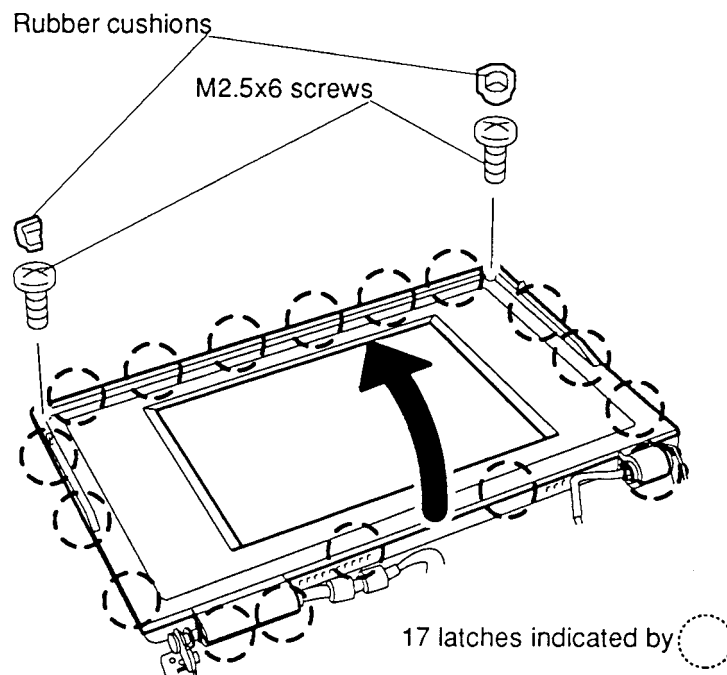


Figure 4-42 Removing the display mask

## Installing the Display Mask

1. Set the **display mask** in place and secure the snaps beginning with the three snaps in the display supports (two in the larger support and one in the small support (figure 4-42).
2. Continue along the bottom of the display (**two snaps**), along the sides (**three snaps**) and across the top (**six snaps**) (figure 4-42).
3. Secure the cover with **two M2.5x6 screws** at the top corners (figure 4-42).
4. Attach the **two rubber cushions** at each top corner to cover the screws (figure 4-42).
5. Install the top cover and battery pack as described in sections 4.6 and 4.2.

## 4.17 T4700CS FL Inverter Board

### Removing the T4700CS FL Inverter Board

To remove the T4700CS's FL inverter board, follow the steps below and refer to figure 4-43.

1. Turn off the power to the T4700CS. Disconnect the AC adapter, and all external cables connected to the T4700CS.
2. Remove the battery pack, top cover, and display mask as described in sections 4.2, 4.6, and 4.16.
3. Remove the **two M2.5x6 screws** securing the **FL inverter board** (figure 4-43).
4. Carefully rotate the **FL inverter board** out from right to left and disconnect the **FL inverter cable** from **CN1** and the **FL cables** from **CN2** (figure 4-43).

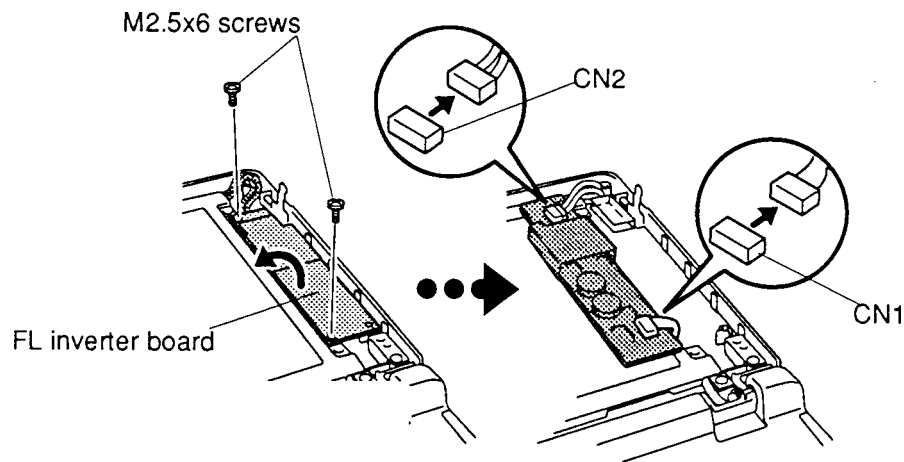


Figure 4-43 Removing the FL inverter board (T4700CS)



## Installing the T4700CS FL Inverter Board

To install the T4700CS's FL inverter board, follow the steps below and refer to figure 4-43.

1. Connect the **FL inverter cable** to **CN1** on the **inverter board** and the **FL cables** to **CN2** (figure 4-43).
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 **two M2.5x6 screws** (figure 4-43).
4. Install the display mask, top cover, and battery pack as described in sections 4.16, 4.6 and 4.2.

## 4.18 T4700CS LCD Module

### Removing the Color LCD Module

To remove the T4700CS's color LCD module, follow the steps below and refer to figure 4-44.

1. Turn off the power to the T4700CS. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS.
2. Remove the battery pack, top cover, display mask, and FL inverter board as described in sections 4.2, 4.6, 4.16 and 4.17.
3. Remove the **four M2.5x6 screws** securing the **LCD module** to the LCD cover (figure 4-44).
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 4-44).

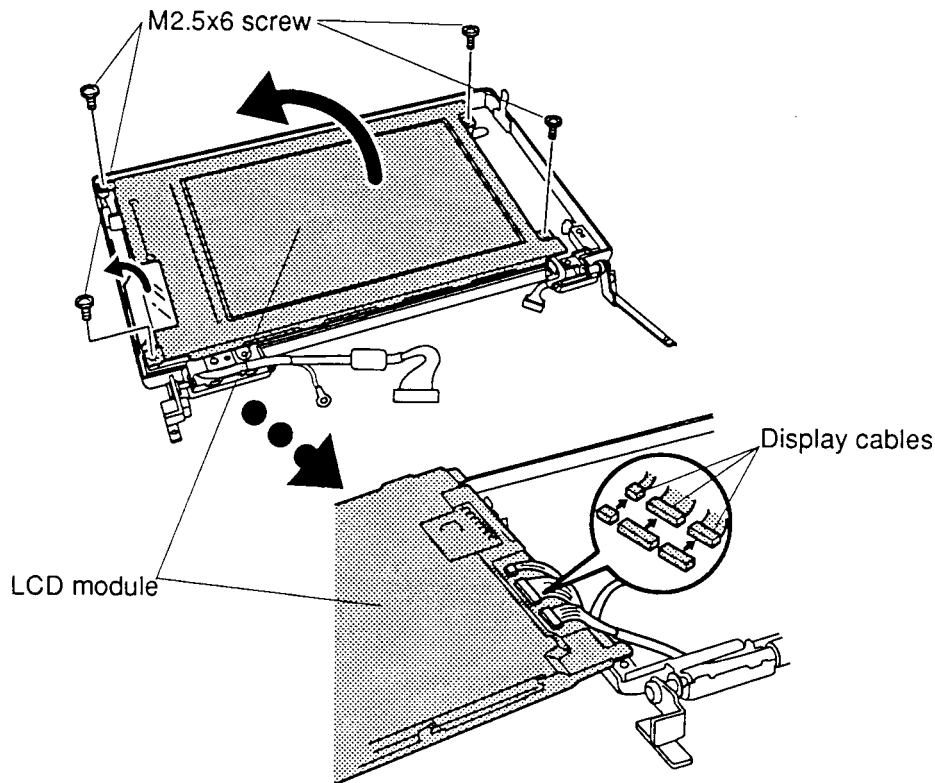


Figure 4-44 Removing the LCD module (T4700CS)

## Installing the T4700CS LCD Module

To install the T4700CS's LCD module, follow the steps below and refer to figure 4-44.

1. Connect the **three display cables** to the LCD module, and carefully rotate the LCD module to the LCD cover.
2. Secure the **four M2.5x6 screws** on the LCD module.
3. Install the FL inverter board, display mask, top cover and battery pack as described in sections 4.17, 4.16, 4.6 and 4.2.

## 4.19 T4700CS Fluorescent Lamp (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 T4700CS FL

To remove the T4700CS's FL, follow the steps below. Refer to figures 4-45 through 4-47.

1. Turn off the power to the T4700CS. Disconnect the AC adapter, and all external cables connected to the T4700CS.
2. Remove the battery pack, top cover, display mask, FL inverter board, and LCD module as described in sections 4.2, 4.6, 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 4-45).

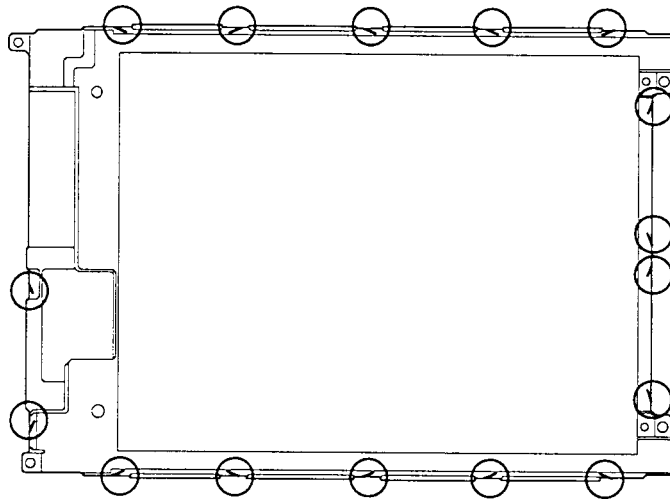


Figure 4-45 Unbending the color LCD module latches (T4700CS)

- Remove the **four M2x3 screws** securing the **FL unit** and **FL unit cover** to the back frame (figure 4-46).

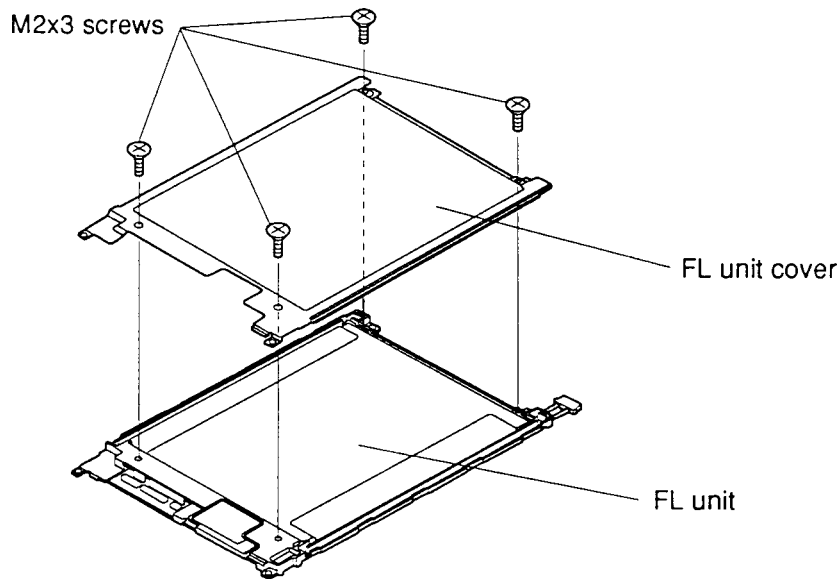


Figure 4-46 Removing the FL screws (T4700CS)

- Lift up the **reflective sheet** covering the LCD module.
- Lift out the **FL** (figure 4-47).

**CAUTION:** When you remove the FL, do not lift up the FL panel, which is attached to the reflective sheet covering the FL. The FL panel is highly sensitive to dust, so be very careful not to expose it.

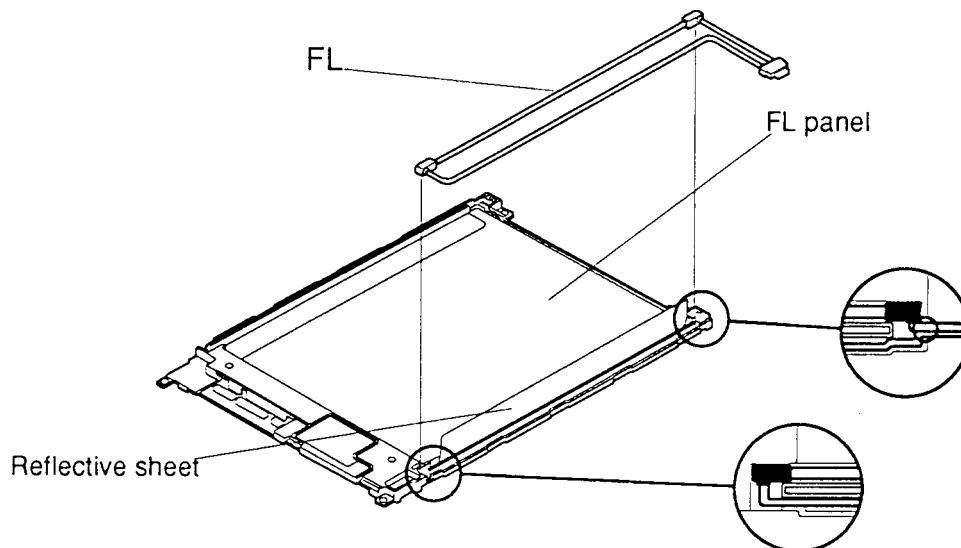


Figure 4-47 Removing the FL (T4700CS)

## Installing the T4700CS FL Unit

To install the T4700CS's FL unit, follow the steps below and refer to figures 4-45 through 4-47.

1. Place the **FL** on the **FL unit** and cover the FL using a reflective sheet (figure 4-47).
2. Secure the **FL unit cover** with **four M2x3 screws** (figure 4-46).
3. Carefully bend the **16 latches** back into place (figure 4-45).
4. Install the color LCD module, FL inverter board, display mask, top cover, and battery pack as described in sections 4.18, 4.17, 4.16, 4.6 and 4.2.

## 4.20 T4700CS FL Inverter Cable, Display Cable

### Removing the FL Inverter Cable, Display Cable

To remove the T4700CS's FL inverter cable, display cable, follow the steps below and refer to figures 4-48 and 4-49.

1. Turn off the power to the T4700CS. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS.
2. Remove the battery pack, top cover, display mask, FL inverter board, LCD module, and FL as described in sections 4.2, 4.6, 4.16, 4.17, 4.18 and 4.19.
3. Remove the **tape**, securing the **FL inverter cable** on display cover (figure 4-48).
4. Disconnect the **FL inverter cable** from **PJ2** from upper system board (figure 4-48).

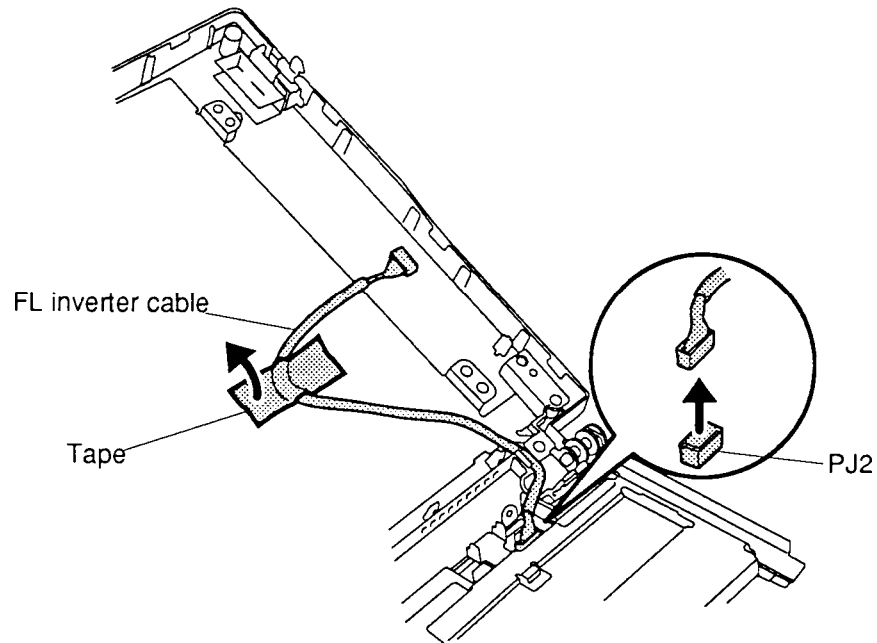
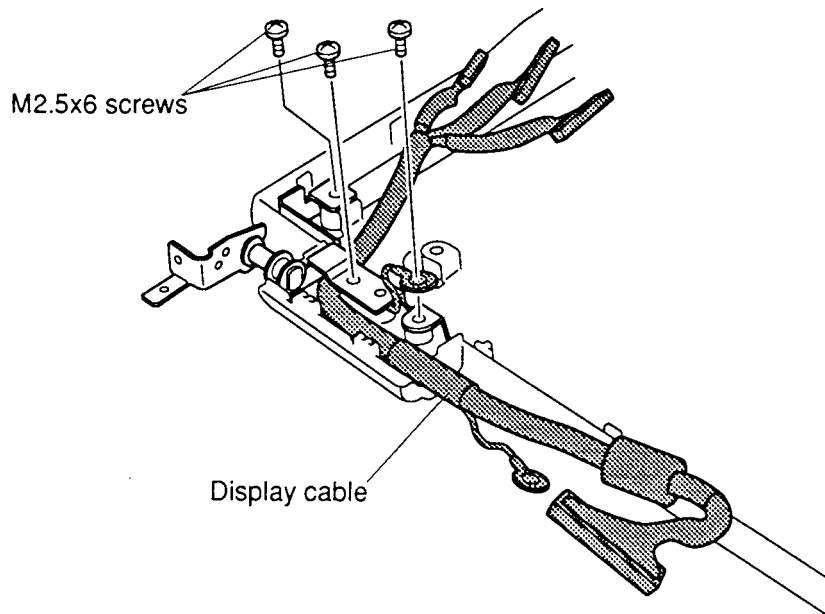


Figure 4-48 Removing the FL inverter signal cable (T4700CS)

5. Remove the **two M2.5x6 screws**, securing the display hinge and **one M2.5x6 screw** securing the **ground cable** (figure 4-49).
6. Remove the **display hinge** and lift off the **display cable** (figure 4-49).



*Figure 4-49 Removing the display cables (T4700CS)*

### **Installing the FL Inverter Cable, Display Cable**

To install the T4700CS's FL inverter cable, display cable, follow the steps below and refer to figures 4-48 and 4-49.

1. Fit the **display cable** to the display cover and secure the **display hinge** with **two M2.5x6 screws**. Secure the **ground cable** to the display cover with **one M2.5x6 screw** (figure 4-49).
2. Connect the **FL inverter cable** to **PJ2** of the **upper system board**, and secure it with **tape** to the display cover (figure 4-48).
3. Install the FL, LCD module, FL inverter board, display mask, top cover, and battery pack as described in sections 4.2, 4.6, 4.16, 4.17, 4.18 and 4.19.



## 4.21 T4700CT/T4800CT TFT Color LCD Module

### Removing the TFT Color LCD Module

To remove the T4700CT/T4800CT's LCD module, follow these steps and refer to figures 4-50 and 4-51.

1. Turn off the power to the T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CT/T4800CT.
2. Remove the battery pack, top cover and display mask as described in sections 4.2, 4.6 and 4.16.
3. Remove **four M2.5x10 screws** and **two M2.5x6 screws** securing the **LCD module** to the LCD cover (figure 4-50).
4. Remove the tape, securing the FL inverter cable, and disconnect the **FL cable** from **CN2** . Then turn over the **LCD module** (figure 4-50).

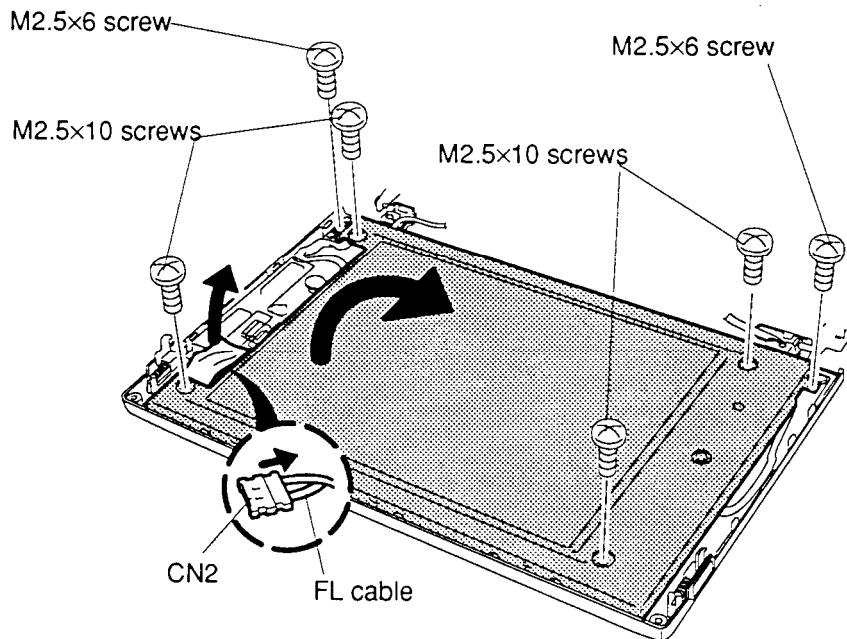
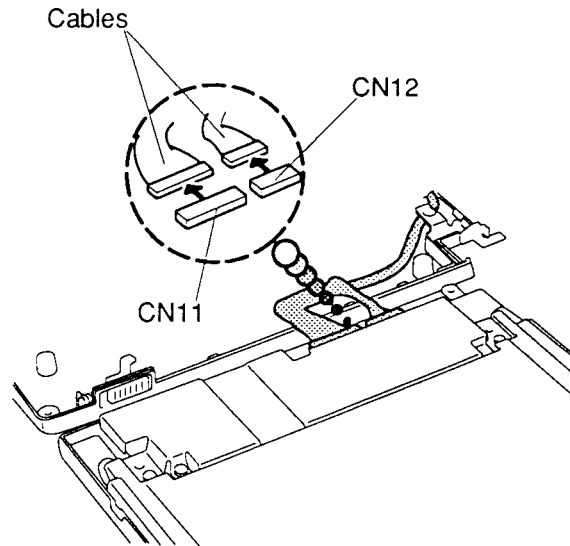


Figure 4-50 Removing the six screws and connectors (T4700CT/T4800CT)

5. Disconnect the **two cables** from **CN11** and **CN12** on the LCD module (figure 4-51).



*Figure 4-51 Disconnecting the two cables (T4700CT/T4800CT)*

### **Installing the TFT Color LCD Module**

To install the T4700CT/T4800CT's TFT color LCD module, follow the steps below and refer to figures 4-50 and 4-51:

1. Connect the **two display cables** to **CN11** and **CN12** on the **LCD module** (figure 4-51).
2. Connect the **FL cable** to **CN2** on the **FL inverter board** and secure the tape (figure 4-50).
3. Align the **LCD module** and then secure it with **two M2.5x6 screws**, and secure the **four M2.5x10 screws** (figure 4-50).
4. Install the battery pack, top cover and display mask as described in sections 4.2, 4.6 and 4.16.

## 4.22 T4700CT/T4800CT Fluorescent Lamp (FL) Unit

### Removing the FL Unit

**CAUTION:** When you remove the **FL unit**, be careful not to let any dust or other foreign matter from contaminating the **LCD panel**. Any contamination can affect the performance of the unit.

To remove the T4700CT/T4800CT's FL unit, follow the steps below and refer to figure 4-52:

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, top cover, display mask and TFT color LCD module as described in sections 4.2, 4.6, 4.16, and 4.21.
3. Place the **FL unit** face down and remove the **four M2x6 silver screws** (figure 4-52).
4. Lift the **FL unit** out of the frame (figure 4-52).

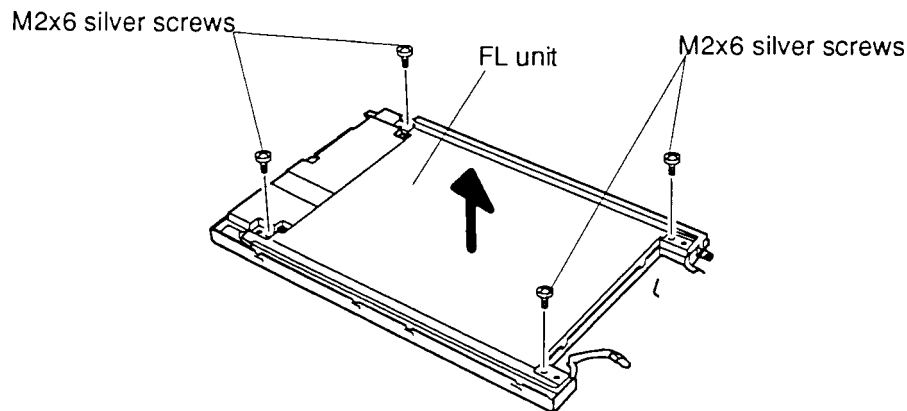


Figure 4-52 Removing the FL unit (T4700CT/T4800CT)

### Installing the FL Unit

To install the T4700CT/T4800CT's FL unit, follow the steps below.

1. Replace the **FL unit** in the frame and secure it with the **four M2x6 silver screws** (figure 4-52).
2. Install the TFT color LCD module, the display mask, top cover, and the battery pack as described in sections 4.2, 4.6, 4.16, and 4.21.

## 4.23 T4700CT/T4800CT FL Inverter Board

### Removing the FL Inverter Board

To remove the T4700CT/T4800CT's FL inverter board, follow the steps below and refer to figure 4-53.

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, top cover, display mask and the TFT color LCD module as described in 4.2, 4.6, 4.16, and 4.21.
3. Remove the **two M2x5 screws** securing the **FL inverter board** (figure 4-53).
4. Disconnect the **FL inverter cable** from the **CN1** and lift out the **FL inverter board** (figure 4-53).

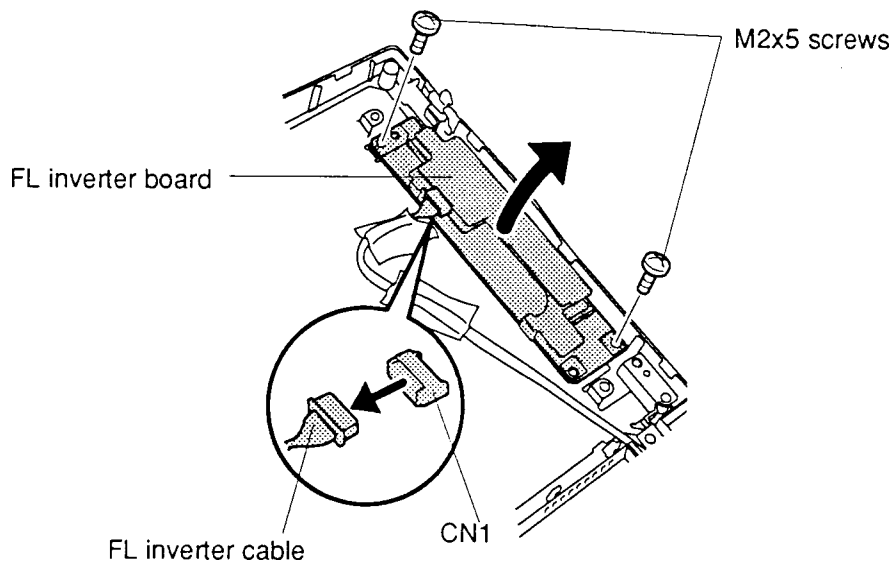


Figure 4-53 Removing the FL inverter board (T4700CT/T4800CT)

### Installing the FL Inverter Board

To install the T4700CT/T4800CT's FL inverter board, follow the steps below and refer to figure 4-53.

1. Connect the **FL inverter cable** to the **CN1** of the FL inverter board (figure 4-53).
2. Replace the **FL inverter board** and secure it with the **two M2x5 screws** (figure 4-53).
3. Install the TFT color LCD module, display mask, top cover and battery pack as described in sections 4.2, 4.6, 4.16, and 4.21.

## 4.24 T4700CT/T4800CT FL Inverter Cable, Display Cable

### Removing the FL Inverter Cable, Display Cable

To remove the T4700CT/T4800CT's FL inverter cable, display cable, follow the steps below and refer to figures 4-54 and 4-55.

1. Turn off the power to the T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CT/T4800CT.
2. Remove the battery pack, top cover, display assembly, display mask, and TFT color LCD module as described in sections 4.2, 4.6, 4.10, 4.16, and 4.21.
3. Remove the **tapes**, securing the **FL inverter cable** on display cover and disconnect the **FL inverter cable** from **CN1** of the FL inverter board (figure 4-54).
4. Disconnect the **FL inverter cable** from **PJ2** from upper system board (figure 4-54).

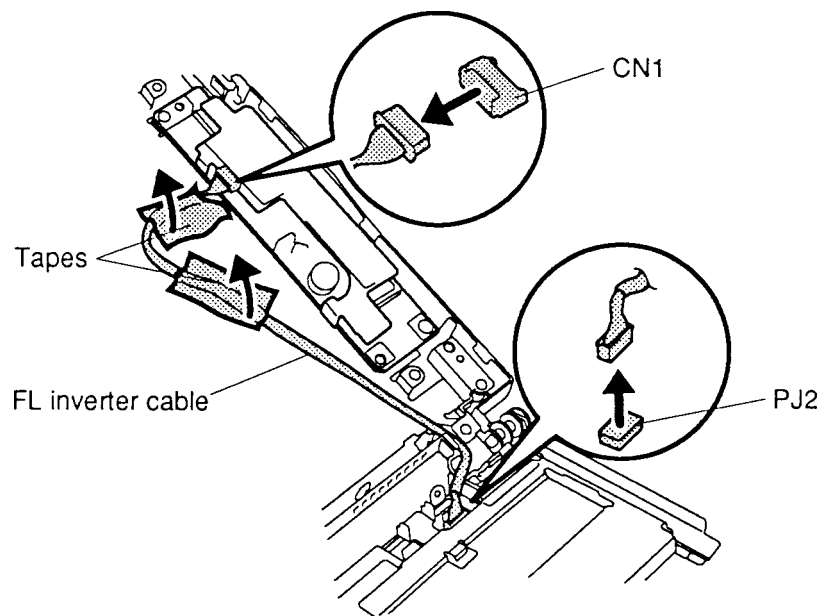
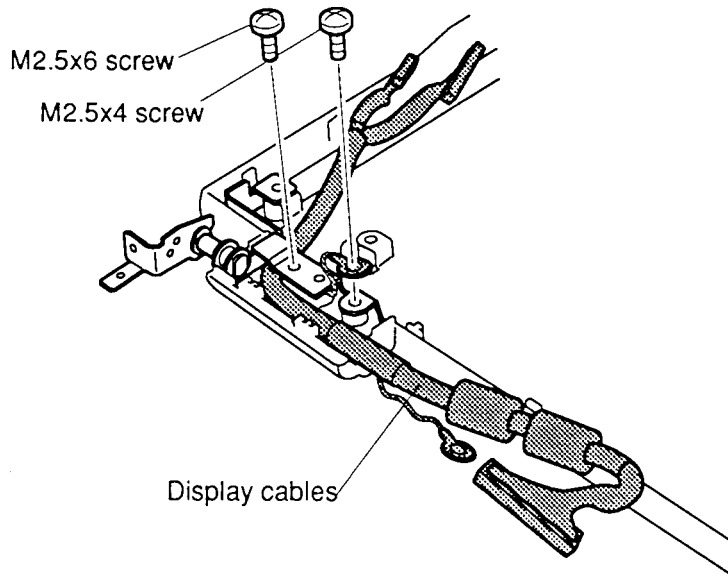


Figure 4-54 Removing the FL inverter signal cable (T4700CT/T4800CT)

5. Remove the **one M2.5x6 screw**, securing the display hinge and **one M2.5x4 screw** securing the **ground cable** (figure 4-55).
6. Remove the **display hinge** and lift off the **display cable** (figure 4-55).



*Figure 4-55 Removing the display cables (T4700CT/T4800CT)*

### **Installing the FL Inverter Cable, Display Cable**

To install the T4700CT/T4800CT's FL inverter cable, display cable, follow the steps below and refer to figures 4-54 and 4-55.

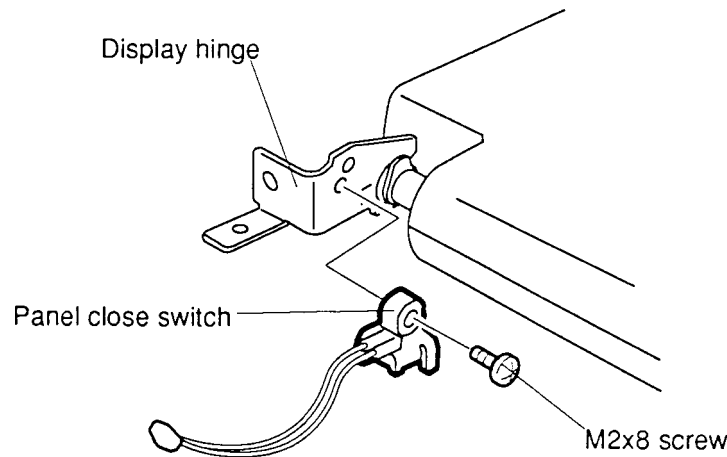
1. Fit the **display cable** to display cover and secure the **display hinge** with **one M2.5x6 screw**. Secure the **ground cable** to display cover with **one M2.5x4 screw** (figure 4-55).
2. Connect the **FL inverter cable** to **CN1** of the **FL inverter board** and **PJ2** of the **upper system board**, and secure it with **tape** to display cover (figure 4-54).
3. Install the TFT color LCD module, display mask, display assembly, top cover, and battery pack as described in sections 4.2, 4.6, 4.10, 4.16, and 4.21.

## 4.25 Panel Close Switch

### Removing the Panel Close Switch

To remove the T4700CS/T4700CT/T4800CT's panel close switch, follow the steps below and refer to figure 4-56.

1. Turn off the power to the T4700CS/T4700CT/T4800CT. Disconnect the AC adapter, power cord and all external cables connected to the T4700CS/T4700CT/T4800CT.
2. Remove the battery pack, top cover, display assembly, as described in sections 4.2, 4.6, and 4.10.
3. Remove the **M2x8 screw**, securing the **panel close switch** on **display hinge** (figure 4-56).



*Figure 4-56 Removing the panel close switch*

### Installing the Panel Close Switch

To install the T4700CS/T4700CT/T4800CT's panel close switch, follow the steps below and refer to figure 4-56.

1. Fit the **panel close switch** to display hinge and secure the **panel close switch** with **one M2x8 screw** (figure 4-56).
2. Install the display assembly, top cover, and battery pack as described in sections 4.2, 4.6, and 4.10.





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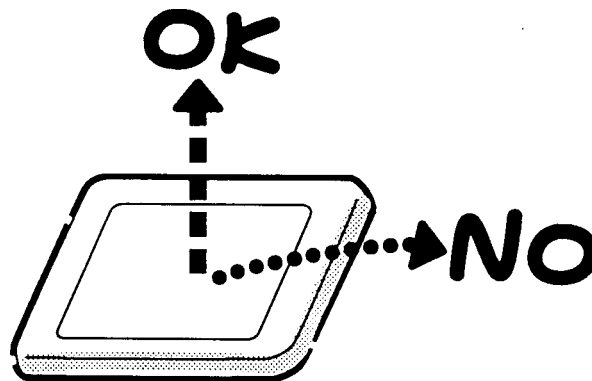
# Appendix A Handling the LCD Module

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Precautions for handling the T4700CS/T4700CT/T4800CT LCD module

The T4700CS/T4700CT/T4800CT's LCD module can be easily damaged during assembly or disassembly. 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.



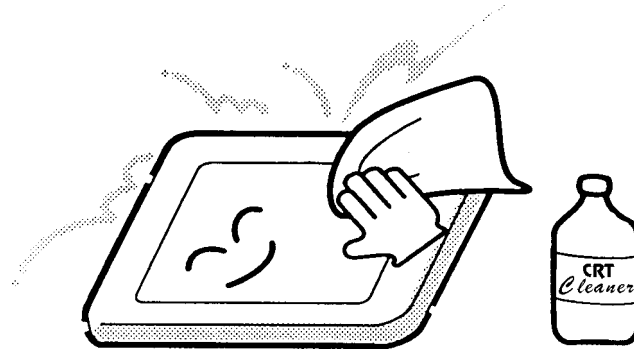
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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

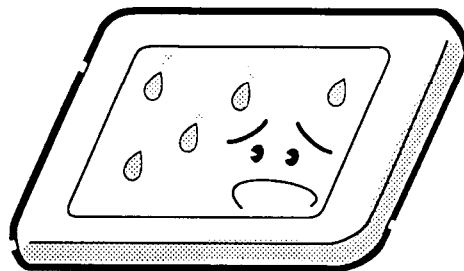


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

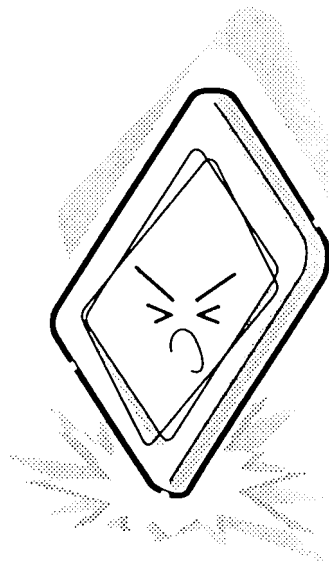
If the surface is very dirty, we recommend Ligroin as a cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



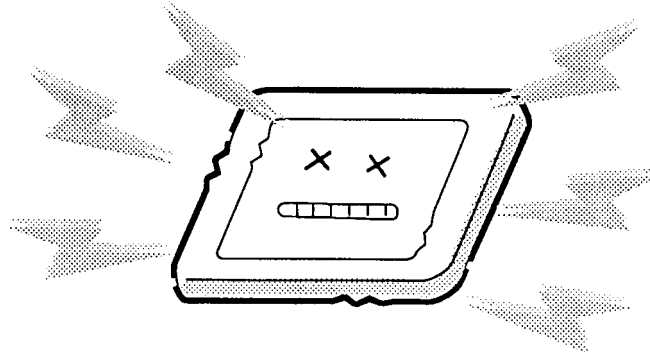
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



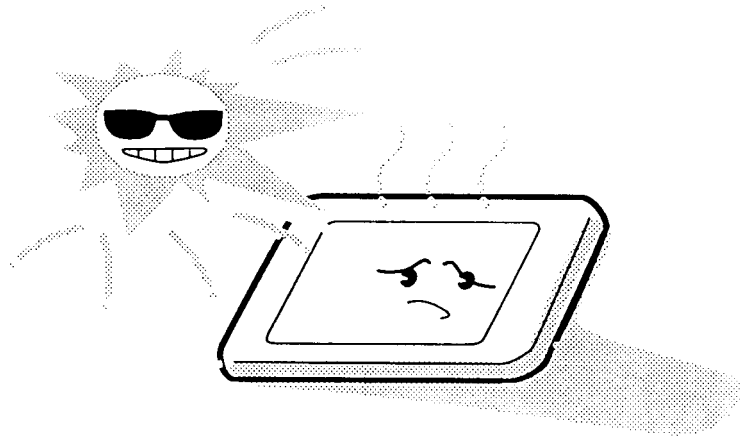
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



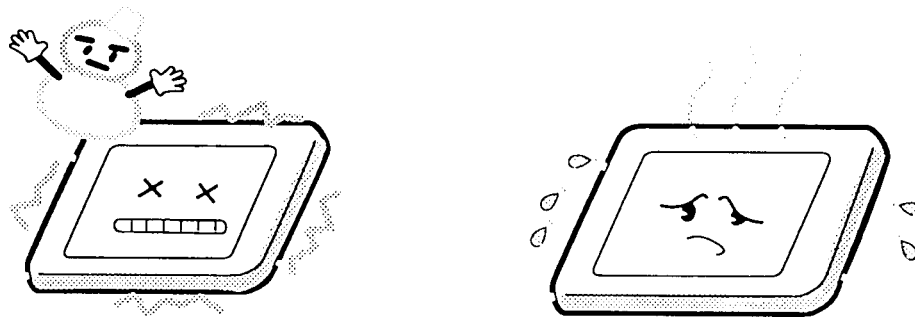
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



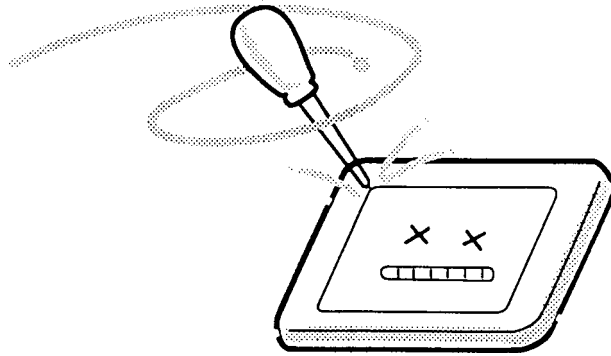
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



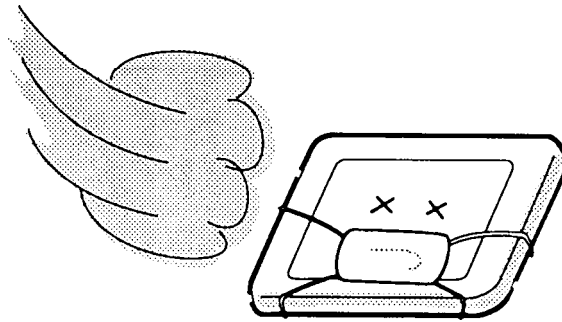
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



9. Do not disassemble the LCD module. Disassembly can cause malfunctions.



0. 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 panels' polarization.



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# Appendix B Board Layout

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## B.1 T4700CS/T4700CT Upper System Board (FSXSY4)

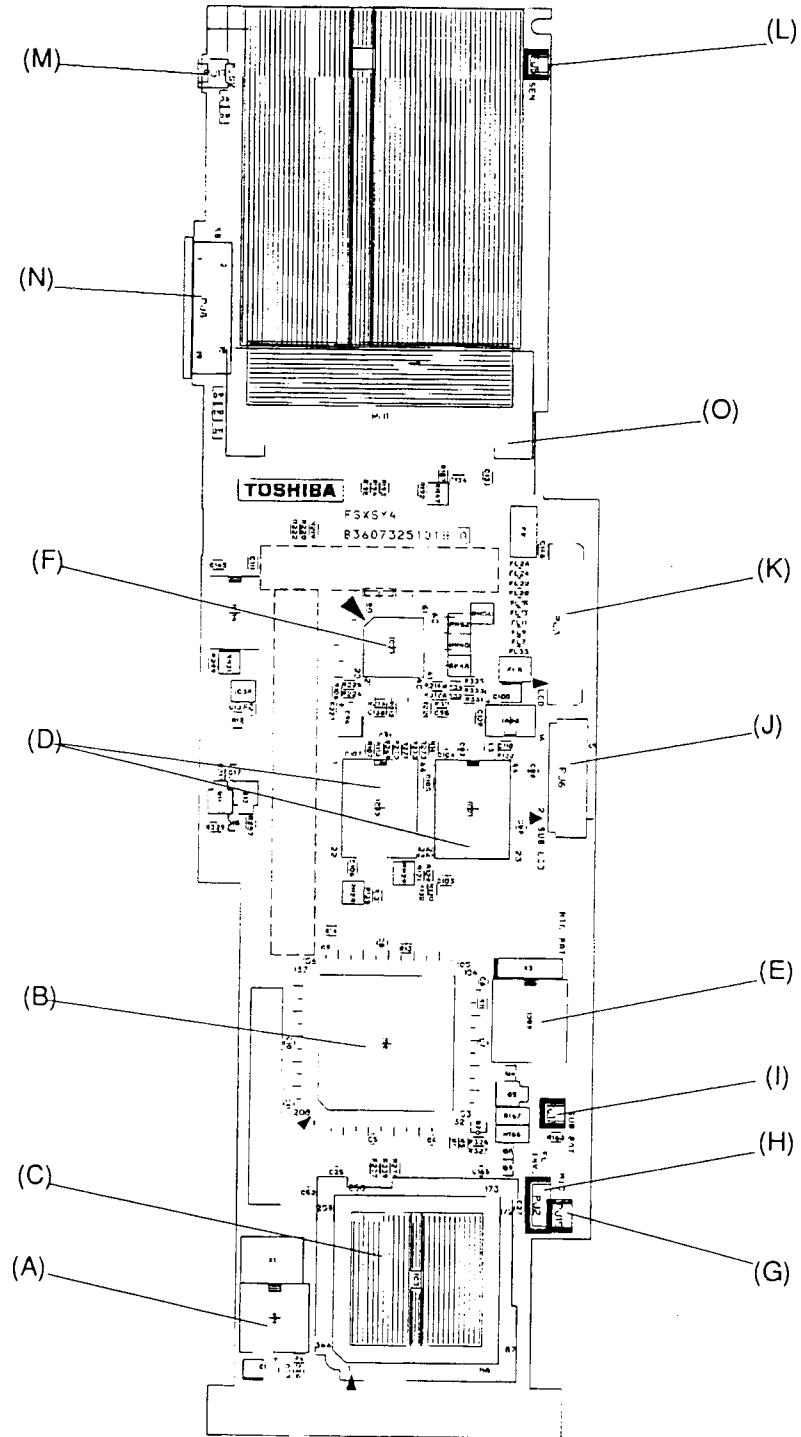


Figure B-1 Upper system board FSXSY4 (front)

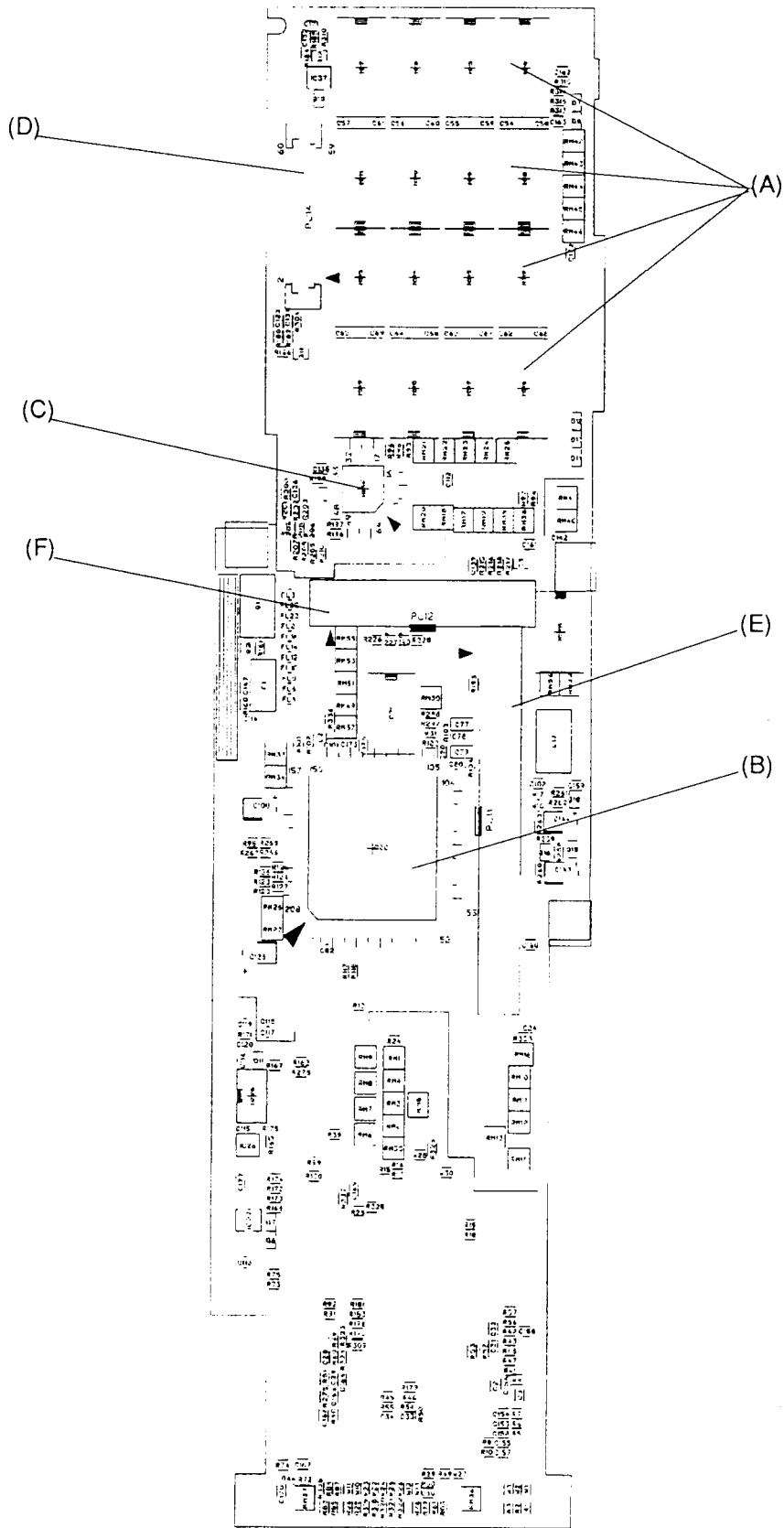


Figure B-2 Upper system board FSXSY4 (back)

## B.2 T4800CT Upper System Board (FX3SY1)

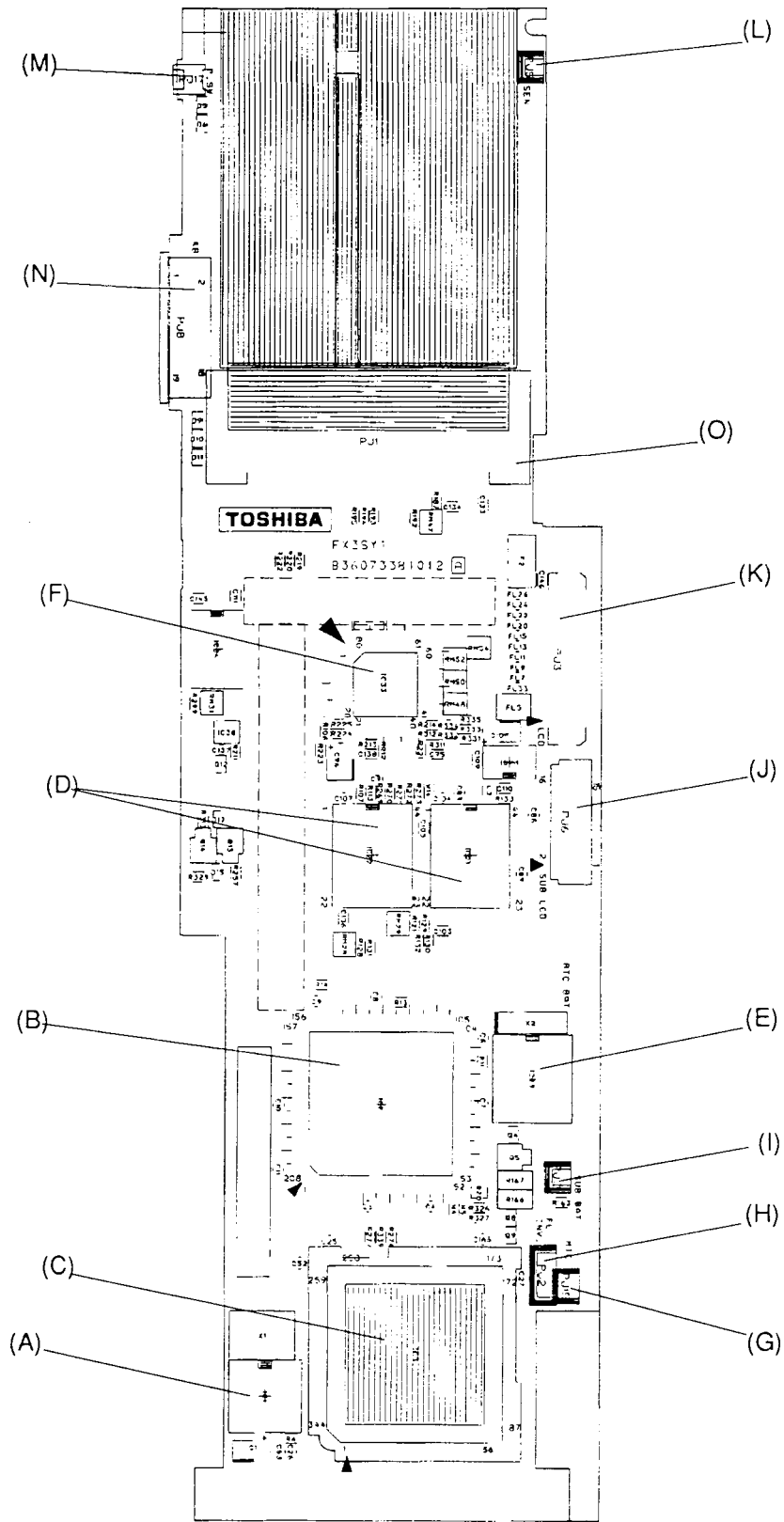


Figure B-3 Upper system board FX3SY1 (front)

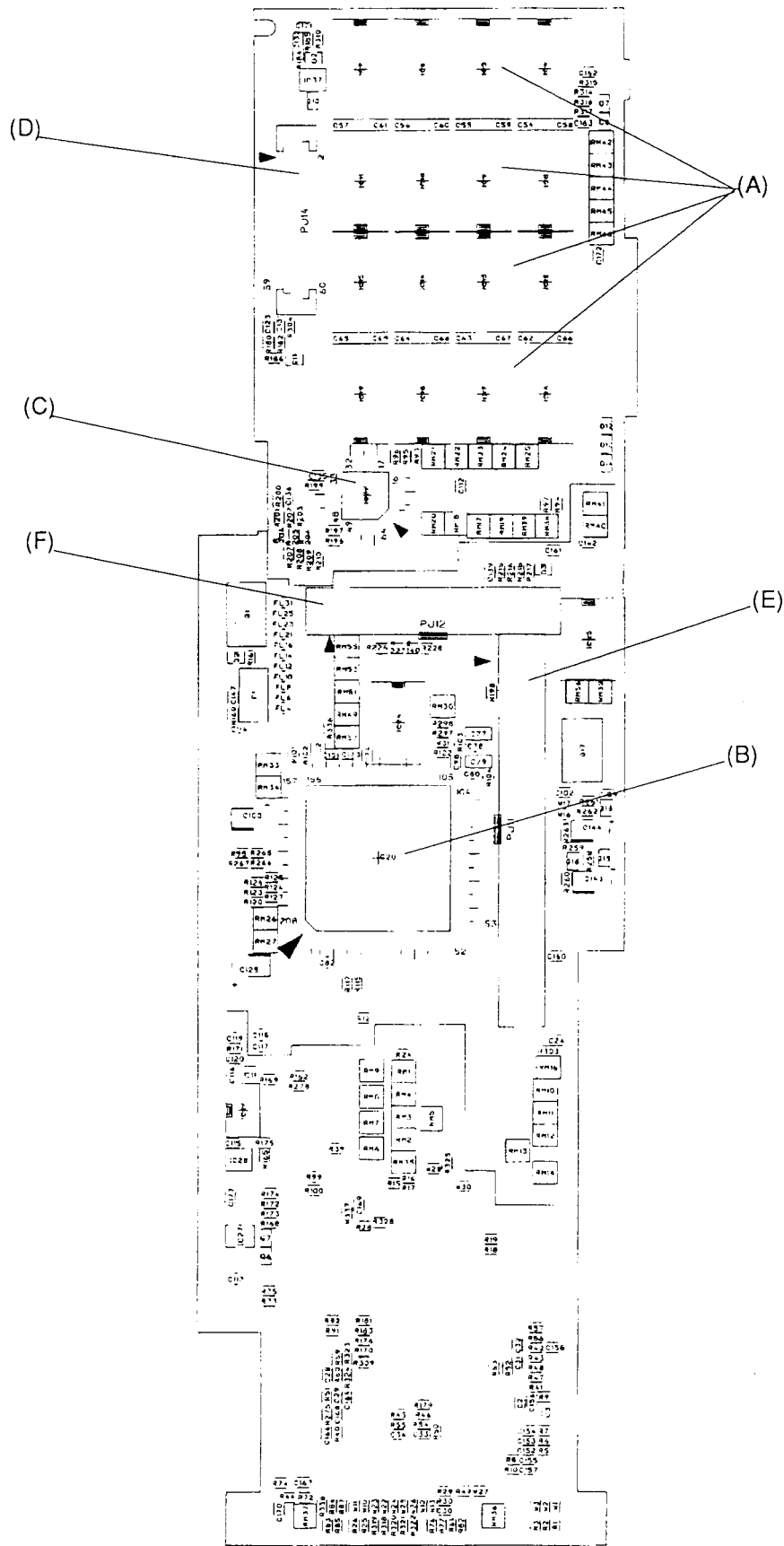


Figure B-4 Upper system board FX3SY1 (back)



*Table B-1 Upper ICs and connectors on the system board (front)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC1	Clock generator
(B)	IC2	CPU 486DX2 (FSXSY4) CPU 486DX4 (FX3SY1)
(C)	IC3	System controller gate array
(D)	IC21, 22	Video RAM
(E)	IC29	RTC
(F)	IC33	KBC
(G)	PJ15	Microphone connector
(H)	PJ2	FL inverter connector
(I)	PJ13	Backup battery connector
(J)	PJ6	Status indicator panel connector
(K)	PJ3	Display connector
(L)	PJ5	Panel close switch connector
(M)	PJ17	Power/reset switch connector
(N)	PJ8	Keyboard connector
(O)	PJ1	Memory card connector

*Table B-2 Upper ICs and connectors on the system board (back)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC4 to IC19	System memory
(B)	IC20	Video controller (WD90C24A)
(C)	IC32	Sub LCD controller gate array
(D)	PJ14	Power supply board connector
(E)	PJ11	Joint connector 1
(F)	PJ12	Joint connector 2

### B.3 Lower System Board (FSXIO2)

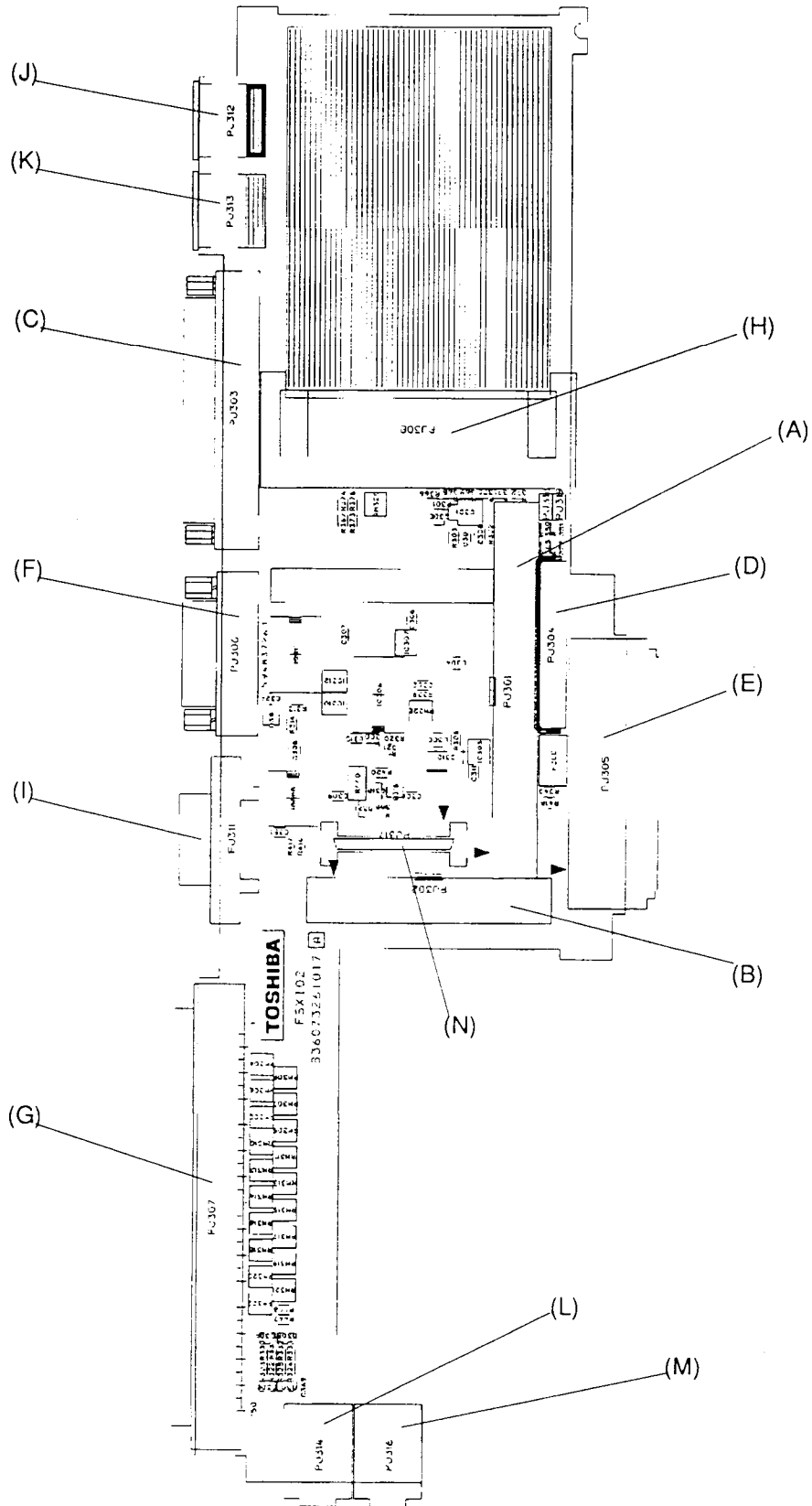


Figure B-5 Lower system board FSXIO2 (front)



*Table B-3 Lower ICs and connectors on the system board (front)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	PJ301	Joint connector 1
(B)	PJ302	Joint connector 2
(C)	PJ303	PRT/FDD connector
(D)	PJ304	Internal FDD connector
(E)	PJ305	HDD connector
(F)	PJ306	Serial connector
(G)	PJ307	150-pin expansion connector
(H)	PJ308	PCMCIA slot 1 connector
(I)	PJ311	External display connector
(J)	PJ312	PS/2 mouse connector
(K)	PJ313	PS/2 keyboard connector
(L)	PJ314	Microphone jack connector
(M)	PJ316	Headphone jack connector

*Table B-4 Lower ICs and connectors on the system board (back)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC300	BIOS ROM
(B)	IC303	Super integration (T9901)
(C)	IC314	PCMCIA controller gate array
(D)	PJ309, PJ310	PCMCIA slot 2 joint connector

# Appendix C Pin Assignment

## C.1 PJ1 Memory Slot Connector (88-Pin)

Table C-1 Memory slot connector pin assignment (88-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	45	GND	—
02	D00;100	I/O	46	D16;100	I/O
03	D01;100	I/O	47	D17;100	I/O
04	D02;100	I/O	48	D18;100	I/O
05	D03;100	I/O	49	D19;100	I/O
06	D04;100	I/O	50	D20;100	I/O
07	D05;100	I/O	51	D21;100	I/O
08	D06;100	I/O	52	D22;100	I/O
09	B3V	—	53	D23;100	I/O
10	D07;100	I/O	54	GND	—
11	VCC	—	55	RAS2;001	O
12	GND	—	56	GND	—
13	MA00;111	O	57	MA01;111	O
14	MA02;111	O	58	MA03;111	O
15	B3V	—	59	MA05;111	O
16	MA04;111	O	60	MA07;111	O
17	VCC	—	61	MA09;111	O
18	MA06;111	O	62	GND	—
19	MA08;111	O	63	GND	—
20	MA10;111	O	64	GND	—
21	GND	—	65	RAS1;001	O
22	RAS0;001	O	66	CAS2;011	O
23	CAS0;011	O	67	GND	—
24	CAS1;011	O	68	CAS3;011	O
25	VCC	—	69	RAS1;001	O
26	RAS0;001	O	70	MEMWE2;001	O
27	B3V	—	71	DRMST1;100	I/O
28	DRMST2;100	I/O	72	DRMST3;100	I/O
29	DRMST4;100	I/O	73	GND	—
30	DRMST6;100	I/O	74	DRMST5;100	I/O
31	CAS0;011	O	75	DRMST7;100	I/O
32	CAS1;011	O	76	DRMST8;100	I/O
33	GND	—	77	CAS2;011	O
34	D08;100	I/O	78	CAS3;011	O
35	VCC	—	79	GND	—
36	D09;100	I/O	80	D24;100	I/O
37	B3V	—	81	D25;100	I/O
38	D10;100	I/O	82	D26;100	I/O
39	D11;100	I/O	83	D27;100	I/O
40	D12;100	I/O	84	D28;100	I/O
41	D13;100	I/O	85	D29;100	I/O
42	D14;100	I/O	86	D30;100	I/O
43	D15;100	I/O	87	D31;100	I/O
44	GND	—	88	GND	—

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## C.2 PJ2 FL Inverter Connector (6-Pin)

Table C-2 FL inverter connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DSPV	O	04	GND	—
02	DSPV	O	05	BRTCNT;100	O
03	GND	—	06	GND	—

## C.3 PJ3 LCD Connector (40-Pin)

Table C-3 LCD connector pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	LCDVCC	—	21	STND3;103	O
02	LCDVCC	—	22	FR;103	O
03	PNEL1;100	I	23	STND0;103	O
04	GND	—	24	GND	—
05	PNEL0;100	I	25	BLUE2;103	O
06	GND	—	26	BLUE0;103	O
07	RESET;000	O	27	BLUE1;103	O
08	GND	—	28	GND	—
09	CNTRST;100	O	29	STND5;103	O
10	XSCLK;103	O	30	STND2;103	O
11	XCLK;103	O	31	LP;103	O
12	GND	—	32	GND	—
13	FP;103	O	33	STND6;103	O
14	LGREN0;103	O	34	LGREN1;103	O
15	LGREN2;103	O	35	RED2;103	O
16	GND	—	36	GND	—
17	RED0;103	O	37	STND1;103	O
18	RED1;103	O	38	GND	—
19	STND4;103	O	39	STNVCC	—
20	GND	—	40	STNVCC	—

#### C.4 PJ5 Panel Close Switch Connector (2-Pin)

*Table C-4 Panel close switch connector pin assignment (2-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	PNLOFF;000	I	02	GND	—

#### C.5 PJ6 Status Indicator Panel Connector (16-Pin)

*Table C-5 Status indicator panel I/F pin assignment (16-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	LCOM4;100	O	09	LSEG08;110	O
02	LCOM3;100	O	10	LSEG07;110	O
03	LCOM2;100	O	11	LSEG06;110	O
04	LCOM1;100	O	12	LSEG05;110	O
05	LSEG12;110	O	13	LSEG04;110	O
06	LSEG11;110	O	14	LSEG03;110	O
07	LSEG10;110	O	15	LSEG02;110	O
08	LSEG09;110	O	16	LSEG01;110	O

#### C.6 PJ8 KB I/F Connector (19-Pin)

*Table C-6 KB I/F connector pin assignment (19-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	KBOT00;010	O	11	KBOT03;010	O
02	KBRT6;110	I	12	KBOT04;010	O
03	KBRT0;110	I	13	KBOT05;010	O
04	KBRT2;110	I	14	KBOT06;010	O
05	KBRT3;110	I	15	KBOT08;010	O
06	KBRT1;110	I	16	KBOT02;010	O
07	KBRT7;110	I	17	KBOT07;010	O
08	KBRT5;110	I	18	KBOT09;010	O
09	KBRT4;110	I	19	KBOT10;010	O
10	KBOT01;010	O			



## C.7 PJ11 (PJ301) Joint Connector 1 (100-Pin)

Table C-7 Joint connector 1 pin assignment (100-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	SD07;100	I/O	51	TMOUT2;100	I
02	SD08;100	I/O	52	TIMGT2;100	O
03	SD06;100	I/O	53	TMOUT1;100	I
04	SD09;100	I/O	54	MEWR;000	I/O
05	SD05;100	I/O	55	KBCS;000	I
06	SD10;100	I/O	56	MERD;000	I/O
07	SD04;100	I/O	57	HREQ;100	I
08	SD11;100	I/O	58	RSTCPU;100	O
09	GND	—	59	DMEN16;100	O
10	GND	—	60	PCLR;001	O
11	SD03;100	I/O	61	HLDACK;100	O
12	SD12;100	I/O	62	ROMCS;000	O
13	SD02;100	I/O	63	DMACLK;100	O
14	SD13;100	I/O	64	BALE;100	O
15	SD01;100	I/O	65	DMARDY;100	I
16	SD14;100	I/O	66	ZEROWS;000	I
17	SD00;100	I/O	67	DMAWR;000	O
18	SD15;100	I/O	68	IMCS16;000	I
19	LGREN;100	O	69	GND	—
20	RED;100	O	70	GND	—
21	BLUE;100	O	71	DMARD;000	O
22	HSYNC;100	O	72	ESM1;000	I
23	OVSNC;100	O	73	DMAEN8;100	I
24	LA22;100	I/O	74	ESM2;000	I
25	CRTEN;000	O	75	SA00;100	I/O
26	LA23;100	I/O	76	BUFOFF;000	I
27	\$24MHZ;100	O	77	SA01;100	I/O
28	LA21;100	I/O	78	SA12;100	I/O
29	GND	—	79	SA02;100	I/O
30	GND	—	80	SA13;100	I/O
31	IIRDY;100	I	81	SA03;100	I/O
32	LA19;100	I/O	82	SA14;100	I/O
33	ALED;100	I	83	SA04;100	I/O
34	LA20;100	I/O	84	SA15;100	I/O
35	IIO16;000	I/O	85	SA05;100	I/O
36	SBHE;000	I/O	86	SA16;100	I/O
37	DRVSL;000	I	87	SA06;100	I/O
38	LA17;100	I/O	88	SA17;100	O
39	LA18;100	I/O	89	GND	-
40	IOCHCK;000	I	90	SA18;100	O
41	CPHLDA;100	O	91	SA07;100	I/O
42	EICS16;000	I	92	RTCBAT	I
43	IRQ8;100	O	93	SA08;100	I/O
44	EMCS16;000	I	94	SA19;100	O
45	INTA;000	O	95	SA09;100	I/O
46	IRQ13;100	O	96	B5V	-
47	INTR;100	O	97	SA10;100	I/O
48	IRQ0;100	O	98	12V	-
49	GND	-	99	SA11;100	I/O
50	GND	-	100	B5V	-

## C.8 PJ12 (PJ302) Joint Connector 2 (60-Pin)

<i>Table C-8 Joint connector 2 pin assignment (60-pin)</i>					
Pin	Signal	I/O	Pin	Signal	I/O
01	DCIN	I	31	GND	—
02	ADPCNT;100	I	32	IRQ12;100	O
03	DCIN	I	33	REFRSH;000	I/O
04	CPCNF;100	I	34	DACK6;000	I
05	DCIN	I	35	IHMED;000	I
06	SMEW;000	O	36	DACK7;000	I
07	DCIN	I	37	KBRW0;000	I
08	SMER;000	O	38	DACK4;000	I
09	AGNDIM	O	39	KBTMG;100	I
10	BEEP;000	I	40	MASTER;000	I
11	GND	-	41	KBOT00;000	I/O
12	M12V	-	42	KEYPRS;100	O
13	IMICIN;100	O	43	KBOT01;000	I/O
14	GND	—	44	KBOT02;000	I/O
15	IOWR;000	I/O	45	KBOT03;000	I/O
16	IORD;000	I/O	46	KBOT04;000	I/O
17	SPKVOL;100	O	47	GND	—
18	EPNLOF;000	O	48	KBOT05;000	I/O
19	SPKDRV;000	O	49	KBOT06;000	I/O
20	DACK2;000	I	50	GND	—
21	RESET;000	O	51	MOUSDT;100	O
22	DACK3;000	I	52	KBOT07;000	I/O
23	IOCLK;100	O	53	KBIRQ1;100	O
24	DACK0;000	I	54	MOUSCK;100	O
25	\$14R3M;110	O	55	EKBDAT;100	O
26	AEN;100	I	56	EKBCLK;100	O
27	CK32K;100	O	57	VCC	-
28	EIORDY;100	I	58	VCC	-
29	\$14R7M;100	O	59	VCC	-
30	GND	—	60	VCC	-

### C.9 PJ13 Backup Battery Connector (2-Pin)

*Table C-9 Backup battery connector pin assignment (2-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	SUBBAT	—	02	GND	—

### C.10 PJ14 PS I/F Connector (60-Pin)

*Table C-10-1 PS IF connector pin assignment (60-pin) [T4700CS/T4700CT]*

Pin	Signal	I/O	Pin	Signal	I/O
01	M12V	-	31	VCC	-
02	SUBBAT	I	32	GND	—
03	12V	-	33	VCC	-
04	SPKVOL;100	I	34	PSTMG;000	O
05	DCIN	I	35	VCC	-
06	BRTCNT;100	O	36	PSRW0;000	O
07	DCIN	I	37	VCC	-
08	CNTRST;100	O	38	PSAD0;100	I/O
09	DCIN	I	39	VCC	-
10	ADPCNT;100	I	40	PSAD1;100	I/O
11	DCIN	I	41	GND	—
12	GND	—	42	PSAD2;100	I/O
13	GND	—	43	GND	—
14	MCV	-	44	PSAD3;100	I/O
15	GND	—	45	B3V	-
16	SRBTN;000	I	46	PSAD4;100	I/O
17	GND	—	47	B3V	-
18	LOBAT;100	I	48	PSAD5;100	I/O
19	DSPV	I	49	GND	—
20	PCLR;000	I	50	PSAD6;100	I/O
21	DSPV	I	51	GND	—
22	BEEP;000	I	52	GND	—
23	GND	—	53	PSREQ;000	I
24	CPCNF;100	I	54	PSAD7;100	I/O
25	GND	—	55	SUSSTA;001	I
26	ENVCC;000	I	56	PNLOF;000	O
27	GND	—	57	PSUPDT;100	I
28	EN3V;000	I	58	RSTSW;000	O
29	VCC	-	59	PSRST;000	O
30	ENB3V;000	I	60	PWRSW;000	O

Table C-10-2 PS IF connector pin assignment (60-pin) [T4800CT]

Pin	Signal	I/O	Pin	Signal	I/O
01	PWRSW;000	O	31	ENB3V;000	I
02	PSRST;000	O	32	VCC	-
03	RSTSW;000	O	33	EN3V;000	I
04	PSUPDT;100	I	34	GND	—
05	PNLOF;000	O	35	ENVCC;000	I
06	SUSSTA;001	I	36	GND	—
07	PSAD7;100	I/O	37	CPCNF;100	I
08	PSREQ;000	I	38	GND	—
09	GND	—	39	BEEP;000	I
10	GND	—	40	DSPV	I
11	PSAD6;100	I/O	41	PCLR;000	I
12	B3V	—	42	DSPV	I
13	PSAD5;100	I/O	43	LOBAT;100	I
14	B3V	-	44	GND	—
15	PSAD4;100	I/O	45	SRBTN;000	I
16	B3V	-	46	GND	—
17	PSAD3;100	I/O	47	MCV	-
18	GND	—	48	GND	—
19	PSAD2;100	I/O	49	GND	—
20	GND	—	50	DCIN	I
21	PSAD1;100	I/O	51	ADPCNT;100	I
22	VCC	-	52	DCIN	I
23	PSAD0;100	I/O	53	CNTRST;100	O
24	VCC	-	54	DCIN	I
25	PSRW0;000	O	55	BRTCNT;100	O
26	VCC	-	56	DCIN	I
27	PSTMG;000	O	57	SPKVOL;100	I
28	VCC	-	58	12V	-
29	GND	—	59	SUBBAT	I
30	VCC	-	60	M12V	-

### C.11 PJ15 Microphone Connector (3-Pin)

Table C-11 Microphone connector pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	IMICIN;100	I	03	N.C.	—
02	AGNDIM	I			

### C.12 PJ17 Power/Reset Switch Connector (3-Pin)

Table C-12 Power/Reset switch connector pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RSTSW;010	I	03	PWRSW;010	I
02	GND	—			

### C.13 PJ303 PRT/FDD Connector (for Printer) (25-Pin)

Table C-13 PRT/FDD connector (for printer) pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	STROB;001	O	14	AUTFD;001	O
02	PDB00;101	I/O	15	ERROR;001	I
03	PDB01;101	I/O	16	PINT;001	O
04	PDB02;101	I/O	17	SLIN;001	O
05	PDB03;101	I/O	18	GND	—
06	PDB04;101	I/O	19	GND	—
07	PDB05;101	I/O	20	GND	—
08	PDB06;101	I/O	21	GND	—
09	PDB07;101	I/O	22	GND	—
10	ACK;001	I	23	GND	—
11	BUSY;102	I	24	GND	—
12	PE;101	I	25	GND	—
13	SELCT;101	O			

### C.14 PJ303 PRT/FDD Connector (for FDD) (25-Pin)

Table C-14 PRT/FDD connector (for FDD) pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RDY	I	15	LOWD	O
02	INDX	I	15	SSEL	O
03	TRO	I	16	DIRC	O
04	WPR	I	17	STEP	O
05	RDAT	I	18	GND	—
06	DKCH	I	19	GND	—
07	N/C	—	20	GND	—
08	N/C	—	21	GND	—
09	N/C	—	22	GND	—
10	DSL	O	23	GND	—
11	MON	O	24	GND	—
12	WDAT	O	25	GND	—
13	WEN	O			

### C.15 PJ304 FDD (Int) Connector (26-Pin)

Table C-15 FDD (Int) connector pin assignment (26-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	ISSEL;000	I	14	GND	—
02	GND	—	15	IDIRC;000	O
03	IRDAT;000	I	16	ILOWD;000	O
04	GND	—	17	IMON;000	O
05	IWPR;000	I	18	IHMED;000	I
06	GND	—	19	IRDY;000	I
07	ITRO;000	I	20	VCC	—
08	GND	—	21	DSKCHG;000	I
09	IWEN;000	O	22	VCC	—
10	GND	—	23	IDSL;000	O
11	IWDAT;000	O	24	VCC	—
12	GND	—	25	IINDEX;000	I
13	ISTEP;000	O	26	VCC	—

## C.16 PJ305 HDD I/F Connector (60-Pin)

Table C-16 HDD I/F connector pin assignment (60-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	SD07;102	I/O	31	GND	—
02	RESET;000	O	32	GND	—
03	SD08;102	I/O	33	IORD;000	O
04	GND	—	34	IOWR;000	O
05	SD06;102	I/O	35	GND	—
06	SD09;102	I/O	36	GND	—
07	GND	—	37	IIO16	I
08	GND	—	38	IIRDY	I
09	SD05;102	I/O	39	GND	—
10	SD10;102	I/O	40	GND	—
11	GND	—	41	SA01;100	O
12	GND	—	42	IRQ14;100	I
13	SD04;102	I/O	43	GND	—
14	SD11;102	I/O	44	GND	—
15	GND	—	45	SA00;100	O
16	GND	—	46	SA02;100	O
17	SD03;102	I/O	47	GND	—
18	SD12;102	I/O	48	GND	—
19	GND	—	49	HDDCS2;010	O
20	GND	—	50	HDDCS1;010	O
21	SD02;102	I/O	51	GND	—
22	SD13;102	I/O	52	HDDVCC	—
23	GND	—	53	DRVSL;000	I
24	GND	—	54	HDDVCC	—
25	SD01;102	I/O	55	HDDVCC	—
26	SD14;102	I/O	56	HDDVCC	—
27	GND	—	57	HDDVCC	—
28	GND	—	58	HDDIN;000	I
29	SD00;102	I/O	59	ATSEL;100	I
30	SD15;102	I/O	60	GND	—

## C.17 PJ306 Serial I/F Connector (9-Pin)

*Table C-17 Serial I/F connector pin assignment (9-pin)*

<b>Pin</b>	<b>Signal</b>	<b>I/O</b>	<b>Pin</b>	<b>Signal</b>	<b>I/O</b>
01	DCD1;101	I	06	DSR1;101	I
02	RD1;001	I	07	RTS1;101	O
03	SD1;001	O	08	CTS1;101	I
04	DTR1;101	O	09	RI1;101	I
05	GND	—			



## C.18 PJ307 Expansion Connector (150-Pin)

*Table C-18 Expansion connector pin assignment (150-pin) (1/2)*

Pin	Signal	I/O	Pin	Signal	I/O
01	DCIN	I	31	SA11;101	I/O
02	DCIN	I	32	SA12;101	I/O
03	DCIN	I	33	SA13;101	I/O
04	DCIN	I	34	SA14;101	I/O
05	N/C (DSKCUR)	I	35	SA15;101	I/O
06	N/C (DSKCUR)	I	36	GND	—
07	N/C (DSKCUR)	I	37	SA16;101	I/O
08	N/C (DSKCUR)	I	38	SA17;101	I/O
09	ADPCNT;100	I	39	SA18;101	I/O
10	GND	—	40	SA19;101	I/O
11	RVCC	—	41	SD00;101	I/O
12	RGND	—	42	SD01;101	I/O
13	CPCNF;100	I	43	SD02;101	I/O
14	MDMSL;001	O	44	SD03;101	I/O
15	\$14R7M;100	O	45	GND	—
16	MIRQ;001	I	46	SD04;101	I/O
17	SPKTON;001	I	47	SD05;101	I/O
18	GND	—	48	SD06;101	I/O
19	SA00;101	I/O	49	SD07;101	I/O
20	SA01;101	I/O	50	SMEW;001	O
21	SA02;101	I/O	51	SMER;001	O
22	SA03;101	I/O	52	GND	—
23	SA04;101	I/O	53	IOWR;001	I/O
24	SA05;101	I/O	54	IORD;001	I/O
25	SA06;101	I/O	55	TC;101	O
26	SA07;101	I/O	56	BALE;101	O
27	GND	—	57	RESET;101	O
28	SA08;101	I/O	58	DACK1;001	O
29	SA09;101	I/O	59	IRQ9;101	I
30	SA10;101	I/O	60	GND	—

Table C-18 Expansion connector pin assignment (150-pin) (2/2)

Pin	Signal	I/O	Pin	Signal	I/O
61	VCC	—	106	IRQ4;101	I
62	IOCLK;110	O	107	MEWR;001	I/O
63	IRQ5;101	I	108	IRQ7;101	I
64	DRQ3;101	I	109	GND	—
65	DACK3;001	O	110	RED;101	O
66	AEN;101	O	111	LGREN;101	O
67	DRQ1;101	I	112	BLUE;101	O
68	EIORDY;101	I	113	GND	—
69	GND	—	114	PHSYNC;100	O
70	IRQ10;101	I	115	PVSYNC;100	O
71	IRQ14;101	I	116	GND	—
72	SD08;101	I/O	117	EKBDAT;100	I/O
73	SD09;101	I/O	118	EKBCLK;100	I/O
74	IRQ11;101	I	119	N/C	—
75	SD10;101	I/O	120	MOUSDAT;100	I/O
76	SD11;101	I/O	121	MOUSCK;100	I/O
77	SD12;101	I/O	122	GND	—
78	IRQ12;101	I	123	STROB;000	I/O
79	GND	—	124	PDB00;100	I/O
80	SD13;101	I/O	125	PDB01;100	I/O
81	SD14;101	I/O	126	PDB02;100	I/O
82	IRQ6;101	I	127	PDB03;100	I/O
83	SD15;101	I/O	128	PDB04;100	I/O
84	LA22;101	I/O	129	PDB05;100	I/O
85	LA23;101	I/O	130	PDB06;100	I/O
86	DRQ2;101	I	131	PDB07;100	I/O
87	LA21;101	I/O	132	ACK;000	I/O
88	LA19;101	I/O	133	BUSY;101	I/O
89	LA20;101	I/O	134	PE;100	I/O
90	DACK6;001	O	135	SELCT;100	I/O
91	GND	—	136	AUTFD;000	I/O
92	REFRSH;001	I/O	137	ERROR;000	I/O
93	LA18;101	I/O	138	PINT;000	I/O
94	MASTER;001	I	139	SLIN;000	I/O
95	LA17;101	I/O	140	GND	—
96	SBHE;001	I/O	141	SD1;000	I
97	IOCHCK;001	I	142	DTR1;100	I
98	EMCS16;001	I	143	RTS1;100	I
99	GND	—	144	DCD1;100	O
100	EICS16;001	I	145	RD1;000	O
101	DACK2;001	O	146	DSR1;100	O
102	DRQ6;101	I	147	CTS1;100	O
103	DRQ5;101	I	148	RI1;100	O
104	DACK5;001	O	149	GND	—
105	MERD;001	I/O	150	GND	—

## C.19 PJ308 PCMCIA Slot 1 Connector (68-Pin)

Table C-19 PCMCIA slot 1 connector pin assignment (68-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	35	GND	—
02	CDA03;100	I/O	36	CD1A;000	I
03	CDA04;100	I/O	37	CDA11;100	I/O
04	CDA05;100	I/O	38	CDA12;100	I/O
05	CDA06;100	I/O	39	CDA13;100	I/O
06	CDA07;100	I/O	40	CDA14;100	I/O
07	CE1A;000	O	41	CDA15;100	I/O
08	CADA10;100	O	42	CE2A;000	O
09	OEA;000	O	43	N/C	—
10	CADA11;100	O	44	IORA;000	O
11	CADA09;100	O	45	IOWA;000	O
12	CADA08;100	O	46	CADA17;100	O
13	CADA13;100	O	47	CADA18;100	O
14	CADA14;100	O	48	CADA19;100	O
15	WEA;000	O	49	CADA20;100	O
16	BSYA;000	I	50	CADA21;100	O
17	MCVCCA	—	51	MCVCCA	—
18	MCVP1A	—	52	MCVP2A	—
19	CADA16;100	O	53	CADA22;100	O
20	CADA15;100	O	54	CADA23;100	O
21	CADA12;100	O	55	CADA24;100	O
22	CADA07;100	O	56	CADA25;100	O
23	CADA06;100	O	57	N/C	—
24	CADA05;100	O	58	CRSTA;100	O
25	CADA04;100	O	59	WAITA;000	I
26	CADA03;100	O	60	INPAKA;000	I
27	CADA02;100	O	61	REGA;000	O
28	CADA01;100	O	62	BVDA2;100	I
29	CADA00;100	O	63	BVDA1;100	I
30	CDA00;100	I/O	64	CDA08;100	I/O
31	CDA01;100	I/O	65	CDA09;100	I/O
32	CDA02;100	I/O	66	CDA10;100	I/O
33	WPA;000	I	67	CD2A;000	I
34	GND	—	68	GND	—

## C.20 PJ309 PCMCIA Slot 2 Joint Connector 1 (40-Pin)

Table C-20 PCMCIA slot 2 joint connector 1 pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	CADB22;100	O	21	CADB03;100	O
02	MCVP2B	—	22	REGB;000	O
03	CADB16;100	O	23	CADB02;100	O
04	MCVP1B	—	24	BVDB2;100	I
05	CADB15;100	O	25	CADB01;100	O
06	CADB23;100	O	26	BVDB1;100	I
07	CADB12;100	O	27	CADB00;100	O
08	CADB24;100	O	28	CDB08;100	I/O
09	GND	—	29	GND	—
10	GND	—	30	GND	—
11	CADB25;100	O	31	CDB00;100	I/O
12	CADB07;100	O	32	CDB09;100	I/O
13	CADB06;100	O	33	CDB01;100	I/O
14	CRSTB;100	O	34	CDB10;100	I/O
15	CADB05;100	O	35	CDB2B;000	I
16	CADB04;100	O	36	CDB02;100	I/O
17	WAITB;000	I	37	WPB;000	I
18	INPAKB;000	I	38	SPKM;100	O
19	GND	—	39	SPKP;100	O
20	GND	—	40	RTCBAT	I

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## C.21 PJ310 PCMCIA Slot 2 Joint Connector 2 (40-Pin)

Table C-21 PCMCIA slot 2 joint connector 2 pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	VCC	—	21	GND	—
02	MOUSCK;100	O	22	GND	—
03	MOUSDT;100	O	23	OEB;000	O
04	CDB11;100	I/O	24	CADB11;100	O
05	CD1B;000	I	25	IOWB;000	O
06	CDB04;100	I/O	26	CADB09;100	O
07	CDB03;100	I/O	27	CADB17;100	O
08	CDB05;100	I/O	28	CADB08;100	O
09	CDB12;100	I/O	29	CADB18;100	O
10	CDB06;100	I/O	30	CADB13;100	O
11	GND	—	31	GND	—
12	GND	—	32	GND	—
13	CDB13;100	I/O	33	CADB19;100	O
14	CDB14;100	I/O	34	CADB14;100	O
15	CDB07;100	I/O	35	CADB20;100	O
16	CDB15;100	I/O	36	WEB;000	I
17	CE1B;100	O	37	CADB21;100	O
18	CADB10;100	O	38	MCVCCB	—
19	CE2B;000	O	39	BSYB;000	I
20	IORB;000	O	40	MCVCCB	—

## C.22 PJ311 CRT I/F Connector (15-Pin)

Table C-22 CRT I/F connector pin assignment (15-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RED;101	O	09	N/C	—
02	LGREN;101	O	10	GND	—
03	BLUE;101	O	11	N/C	—
04	N/C	—	12	N/C	—
05	GND	—	13	PHSYNC;100	O
06	GND	—	14	PVSYNC;100	O
07	GND	—	15	N/C	—
08	GND	—			

### C.23 PJ312 PS/2 Mouse Connector (6-Pin)

Table C-23 PS/2 mouse connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	MOUSDT;101	I/O	04	VCC	—
02	N/C	—	05	MOUSCK;101	I/O
03	GND	—	06	N/C	—

### C.24 PJ313 PS/2 Keyboard I/F Connector (6-Pin)

Table C-24 PS/2 keyboard I/F connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	EKBDAT;101	I/O	04	VCC	—
02	N/C	—	05	EKBCLK;101	I/O
03	GND	—	06	N/C	—

### C.25 PJ314 Microphone Jack Connector (6-Pin)

Table C-25 Microphone jack connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	AGNDEM	I	04	AGNDEM	I
02	EMICIN	I	05	IMICOF	I
03	EMICIN	I	06	N.C.	—

### C.26 PJ316 Headphone Jack Connector (6-Pin)

Table C-26 Headphone jack connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	AGNDHP	O	04	AGNDHP	O
02	LHPHON	O	05	SPKOFF	I
03	RHPHON	O	06	N.C.	—

# 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	ö	▹	►	▻	τ	≈
8	•	↑	(	8	H	X	h	x	ê	ÿ	ï	▻	▼	▽	δ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	Γ	▻	▾	▿	θ	•
A	●	→	*	:	J	Z	j	z	è	Ü	┘	▻	▹	▸	Ω	•
B	♂	←	+	;	K	[	k	{	ï	ç	½	▻	▹	▸	δ	√
C	♀	└	,	<	L	\	l	!	↑	£	¼	▻	▹	▸	∞	n
D	♪	↔	-	=	M	]	m	}	ì	¥	ì	▻	▹	▸	φ	2
E	♪	▲	.	>	N	^	n	~	Ä	¶	«	▻	▹	▸	€	■
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.	Keytop	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 <b>Shift</b>	With right <b>Shift</b>
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				
122	NUML	45	C5	77	F0 77				
123	SCRL	46	C6	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.

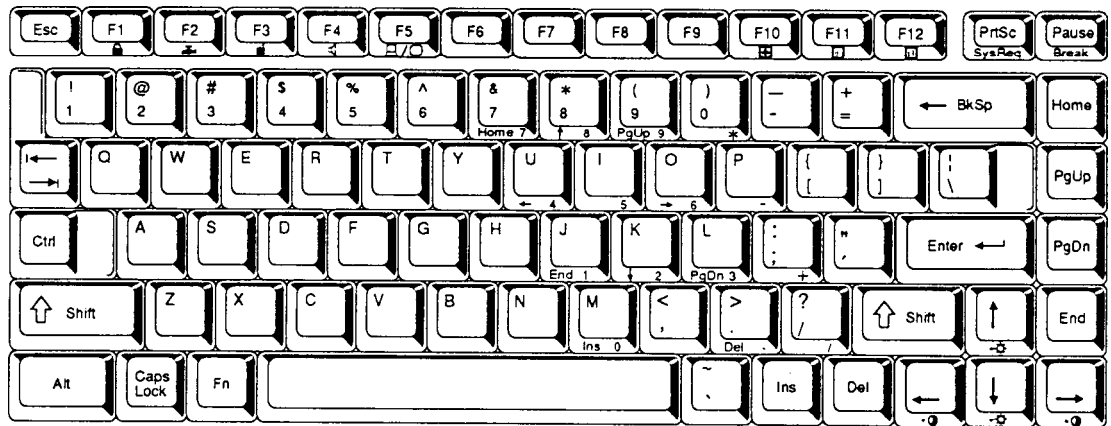
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# Appendix F Key Layout

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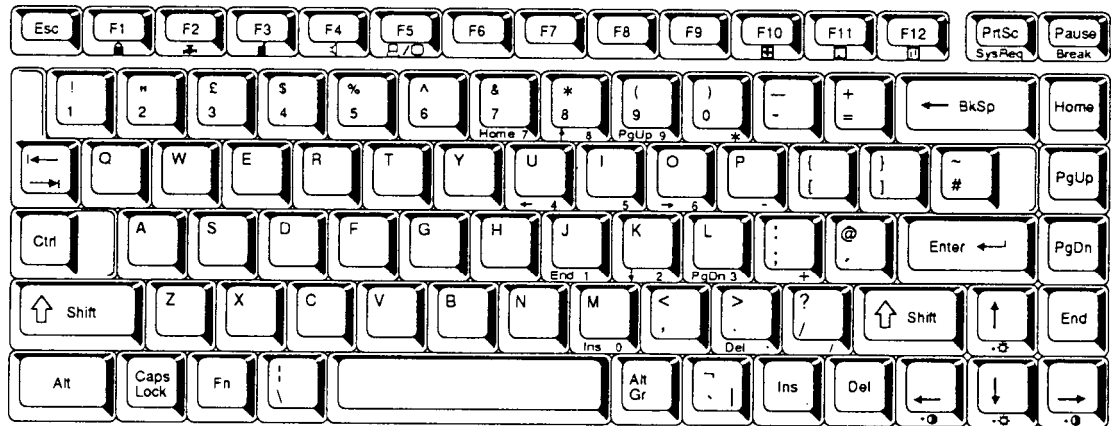
The arrow key markings for the T4700CS and T4700CT/T4800CT are different. The T4700CS keyboard has contrast icons on the left and right arrow keys. The T4700CT/T4800CT keyboard has no contrast control function.

## 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

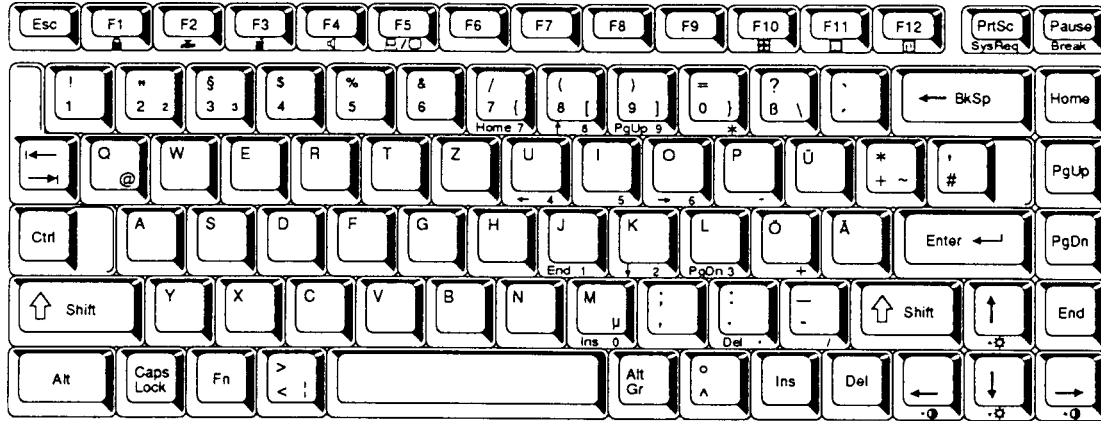


Figure F-3 GR Keyboard

### F.4 French (FR) Keyboard

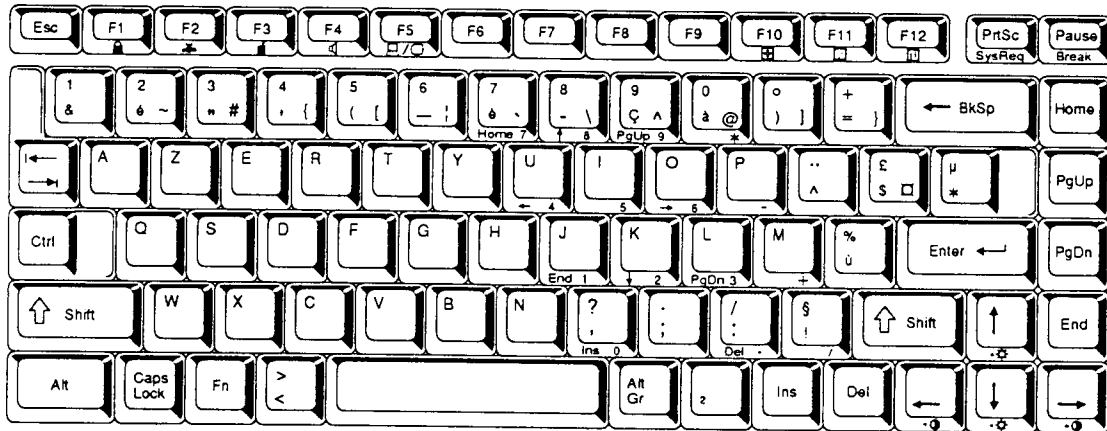


Figure F-4 FR Keyboard

## F.5 Spanish (SP) Keyboard



Figure F-5 SP Keyboard

## F.6 Italian (IT) Keyboard

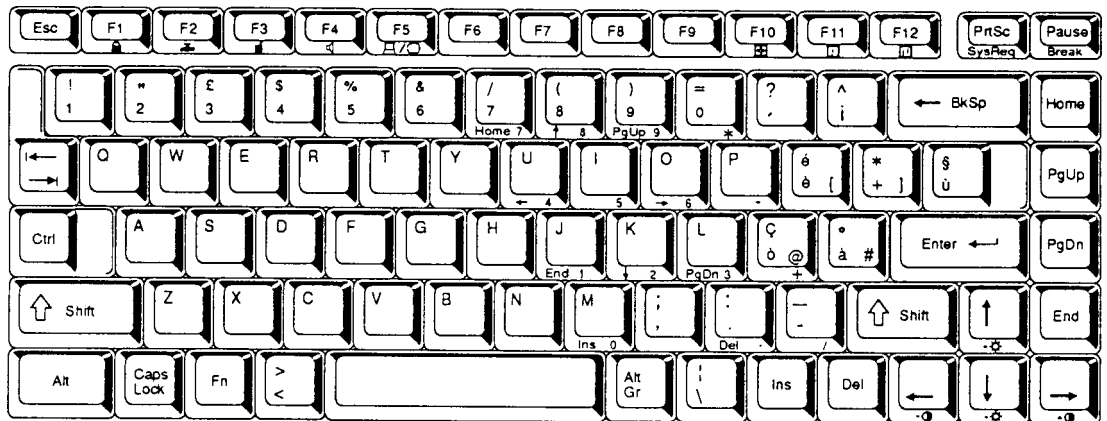


Figure F-6 IT Keyboard



## F.7 Scandinavian (SC) Keyboard

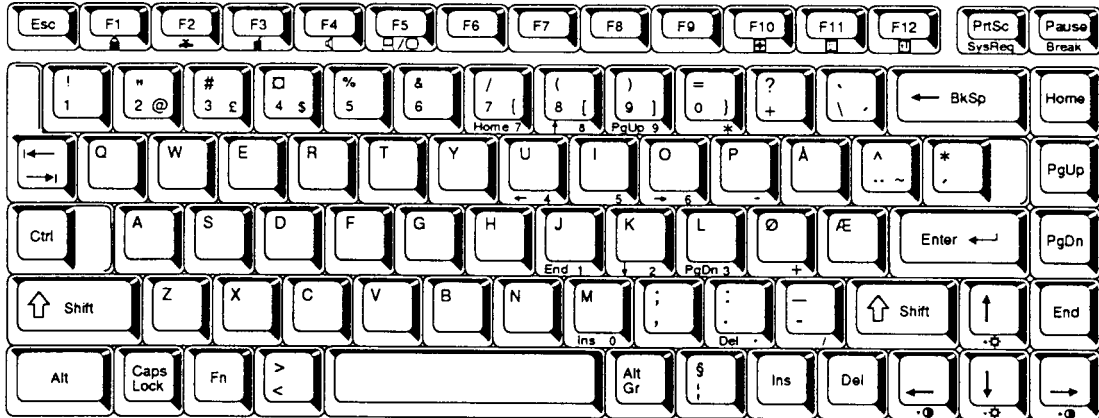


Figure F-7 SC Keyboard

## F.8 Swiss-German (SL) Keyboard

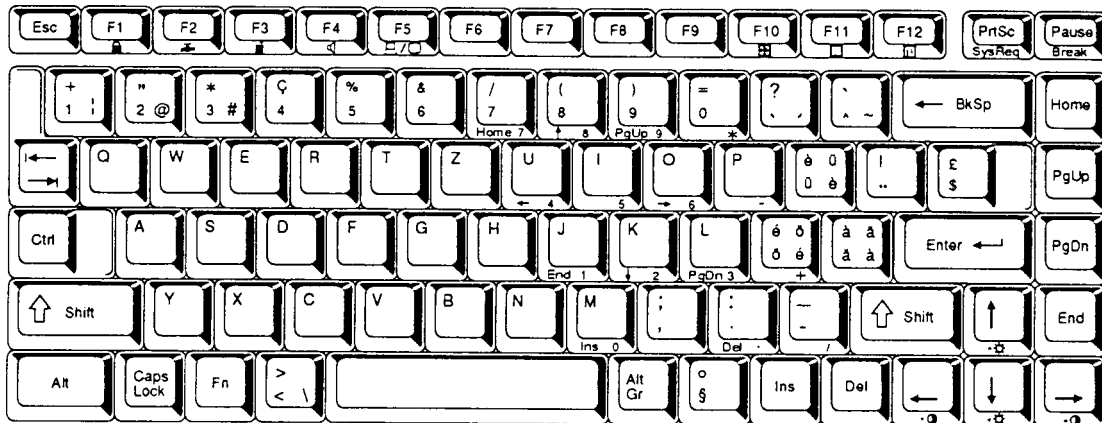


Figure F-8 SL Keyboard

## F.9 Canadian (Specialized) Keyboard

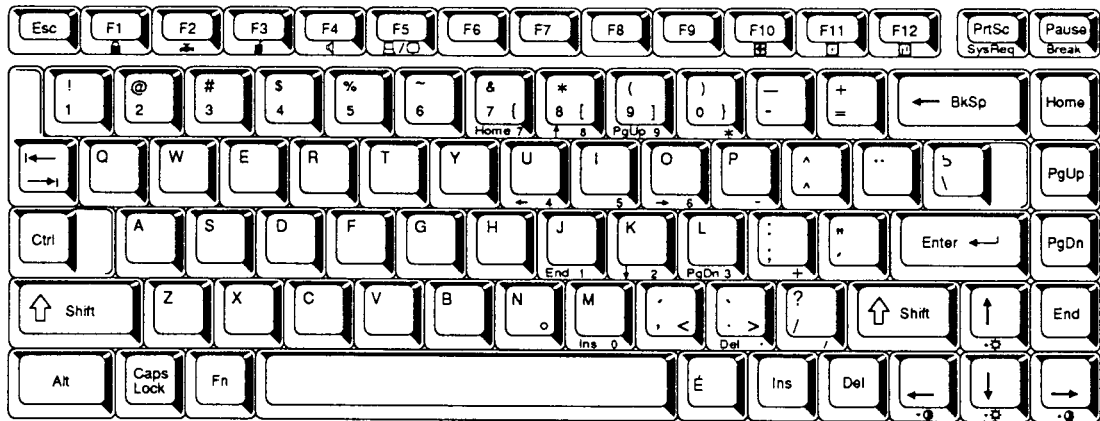


Figure F-9 Canadian Keyboard

## F.10 Keycap Number Keyboard

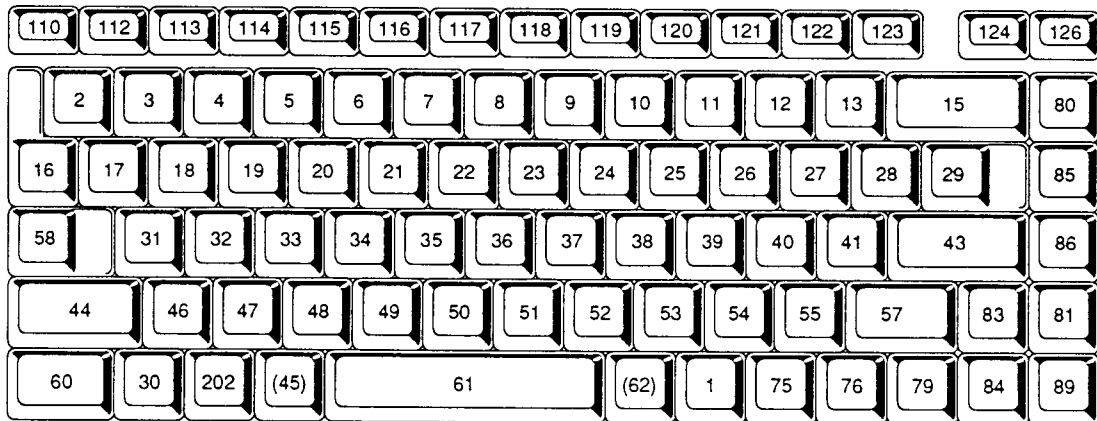


Figure F-10 Keycap Number Keyboard

# Appendix G Wiring Diagrams

## G.1 Printer Wraparound Connector

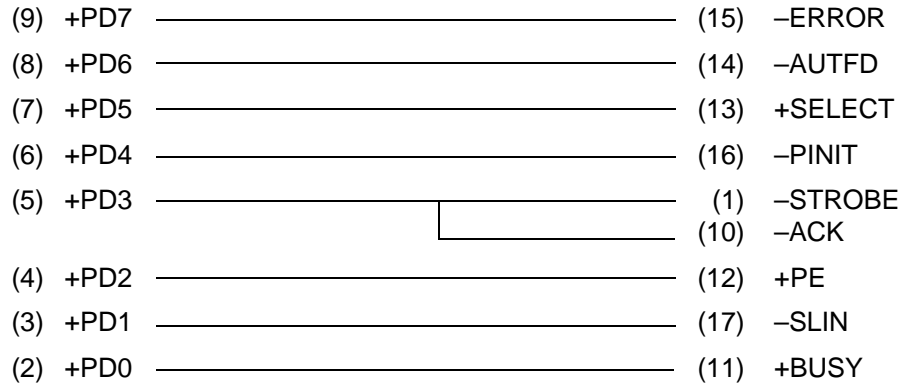


Figure G-1 Printer Wraparound Connector

## G.2 RS-232C Wraparound Connector

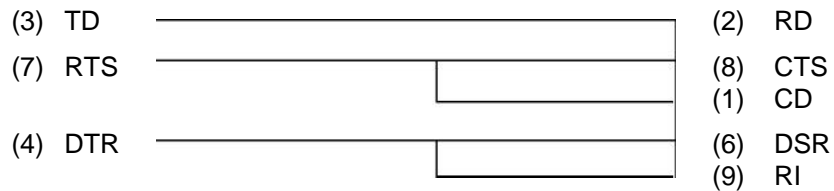


Figure G-2 RS-232C Wraparound Connector

## G.3 RS-232C Direct Cable (9-Pin to 9-Pin)

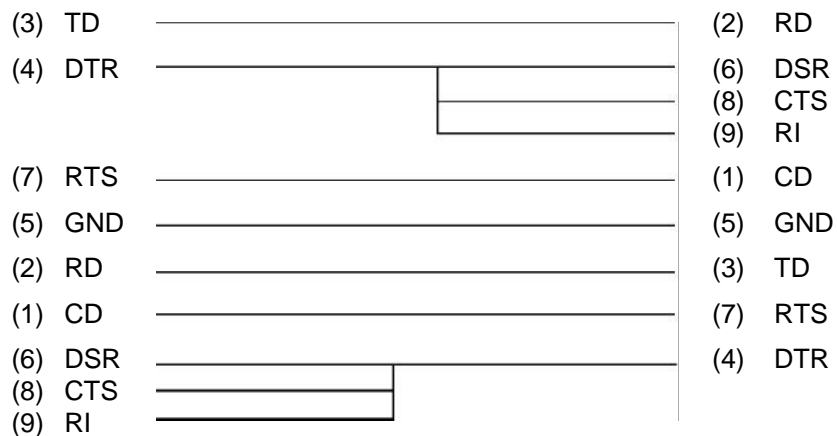
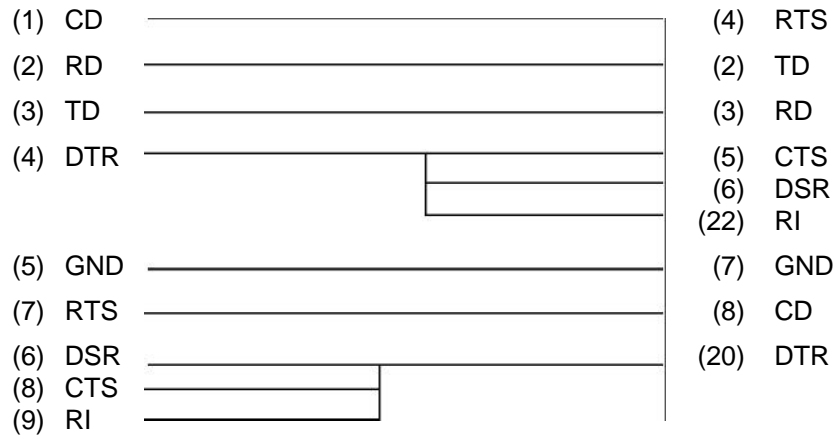


Figure G-3 RS-232C Direct Cable (9-pin to 9-pin)

#### G.4 RS-232C Direct Cable (9-Pin to 25-Pin)



*Figure G-4 RS-232C Direct Cable (9-pin to 25-pin)*

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## Appendix H Deleting the Password

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For security reasons, the Password Deletion Disk will not be distributed to Service Providers. You must obtain the current password from the computer's owner to service the machine.

If the owner forgets the password, contact your Toshiba representative for further action.

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# Appendix I BIOS Rewrite Procedures

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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 rewriting disk for T4700CS/T4700CT/T4800CT

## Rewriting the BIOS

1. Set the system to Boot Mode.
2. Turn off power to the T4700CS/T4700CT/T4800CT.
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 rewriting disk into the FDD. Press **Enter** key to start BIOS rewriting.
6. When the BIOS rewriting is completed, eject the BIOS rewriting disk and press the reset switch to restart the system.

